Cristian Markovich, Mayor
Christian Hernandez, Vice Mayor
Baru Sanchez, Council Member
Jack Guerrero, Council Member
Chris Garcia, Council Member

CUDAHY CITY
COUNCIL CHAMBERS
5240 Santa Ana Street
Cudahy, CA 90201
Phone: (323) 773-5143
Fax: (323) 771-2072

REMOTE TELECONFERENCE LOCATION:
Bedwell Hall
5240 Santa Ana Street
Cudahy, CA 90201

AGENDA

A REGULAR MEETING
OF THE CUDAHY CITY COUNCIL
And JOINT MEETING Of The
CITY OF CUDAHY AS SUCCESSOR AGENCY
TO THE CUDAHY DEVELOPMENT COMMISSION
Monday, October 12, 2015 – 6:30 P.M.

*"Members of the Public are Advised that all **PAGERS**, **CELLULAR TELEPHONES** and any **OTHER COMMUNICATION DEVICES** are to be **turned off** upon entering the City Council Chambers." If you need to have a discussion with someone in the audience, kindly step out into the lobby.*

Written materials distributed to the City Council within 72 hours of the City Council meeting are available for public inspection immediately upon distribution in the City Clerk's Office at City Hall located at 5220 Santa Ana Street, Cudahy, CA 90201.

In compliance with the Americans with Disabilities Act (ADA) if you need special assistance to participate in this meeting, you should contact the City Clerk's Office at (323) 773-5143 at least 72 hours in advance of the meeting.

1. **CALL TO ORDER**

2. **ROLL CALL**

   Council / Agency Member Garcia
   Council / Agency Member Guerrero
   Council / Agency Member Sanchez
   Vice Mayor / Vice Chair Hernandez
   Mayor / Chair Markovich

3. **PLEDGE OF ALLEGIANCE**

4. PRESENTATIONS

A. **Recognition of Ricardo Perez**

B. **Presentation by Woodcraft Rangers**

C. **Presentation by Aztlan Athletics**

D. **Presentation on Cyber Liability Insurance Coverage**

5. PUBLIC COMMENTS

(Mayor: This is the time set aside for citizens to address the City Council / Agency on matters relating **only to items on the agenda**. Anyone wishing to speak, please fill out the form located at the Council Chambers entrance and submit it to the City Clerk. Speakers that submitted comment cards within the first 20 minutes of the meeting will be permitted to speak. **Pursuant to Government Code section 54954.3(b), time limits are placed on the public comment period. The Mayor will announce when public comment cards may no longer be submitted to the City Clerk and no public comment cards will be accepted after the Mayor's announcement.** Each person who submits a public comment card will be allowed to speak only once and will be limited to three (3) minutes. When addressing the Council / Agency please speak into the microphone and voluntarily state your name and address.)

6. CITY COUNCIL COMMENTS / REQUESTS FOR AGENDA ITEMS

(This is the time for the City Council / Agency to comment on any topics related to "City Business," including announcements, reflections on city / regional events, response to public comments, suggested discussion topics for future council meetings, general concerns about particular city matters, questions to the staff, and directives to the staff (subject to approval / consent of the City Council majority members present, regarding staff directives). Each Council / Agency Member will be allowed to speak for a period not to exceed three (3) minutes. Notwithstanding the foregoing, the City Council Members shall not use this comment period for serial discussions or debate between members on City business matters not properly agendized. The City Attorney shall be responsible for regulating this aspect of the proceeding.)

7. CITY MANAGER REPORT (information only)

8. REPORTS REGARDING AD HOC, ADVISORY, STANDING, OR OTHER COMMITTEE MEETINGS

A. **Ad-Hoc Committee to Recommend Appointments to City Commissions**
(Vice Mayor Hernandez and Council Member Sanchez) – Formed August 24, 2015

B. **Finance Sub-Committee**
(Mayor Markovich and Council Member Sanchez) – Formed October 21, 2014

9. WAIVER OF FULL READING OF RESOLUTIONS AND ORDINANCES

(Consideration to waive full text reading of all Resolutions and Ordinances by single motion made at the start of each meeting, subject to the ability of the City Council / Agency to read the full text of selected resolutions and ordinances when the item is addressed by subsequent motion.) (COUNCIL / AGENCY)

Recommendation: Approve the Waiver of Full Reading of Resolutions and Ordinances.

10. CONSENT CALENDAR

(Items under the Consent Calendar are considered routine and will be enacted by one motion. There will be no separate discussion of these items unless a Council / Agency Member so requests, in which event the item will be removed from the Consent Calendar and considered separately.)
(COUNCIL / AGENCY)

A. Consideration to Approve the City Demands and Payroll including the Cash and Investment Report for the month of August 2015

Presented by Finance Director

Recommendation: The City Council is requested to approve the Demands and Payroll in the Amount of $973,057.65 including the Cash and Investment Report by Fund for the month of August 2015.

B. Consideration to Approve the Local Agency Investment Fund (LAIF) Report for the month of August 2015

Presented by Finance Director

Recommendation: The City Council is requested to approve the Local Agency Investment Fund (LAIF) Report for the month of August 2015 in the amount of $5,875,618.75.

C. Consideration to Review and Approve the Minutes of September 14, 2015 for the Regular Meeting of the City Council and the Joint Meeting of the City of Cudahy as Successor Agency to the Cudahy Development Commission (Agency)

Presented by Interim City Clerk

Recommendation: The City Council is requested to review and approve the City Council / Agency meeting minutes for September 14, 2015.

D. Consideration to Receive and File Aging and Senior Citizen Commission Minutes; Public Safety Commission Minutes; Planning Commission Minutes; and Parks and Recreation Commission Minutes

Presented by Acting Community Development Director

Recommendation: The City Council is requested to receive and file the minutes for the:

(1) Aging and Senior Citizen Commission – Meeting of August 10, 2015;
(2) Public Safety Commission – Meeting of August 11, 2015;
(3) Planning Commission – Meeting of August 17, 2015; and
(4) Parks and Recreation Commission – Meeting of August 28, 2015.

E. Consideration and Approval of a Resolution Adopting the Memorandum of Understanding (MOU) Between the City of Cudahy and the Cudahy Miscellaneous Employee's Association (CMEA) (July 1, 2015 – June 30, 2019)

Presented by Acting Human Resources Specialist

Recommendation: The City Council is requested to adopt a resolution approving the Memorandum of Understanding (MOU) between the City of Cudahy and the Cudahy Miscellaneous Employee's Association (July 1, 2015 - June 30, 2019).

11. PUBLIC HEARING

A. Consideration to Adopt a Resolution Approving the City of Cudahy's Natural Hazard Mitigation Plan (NHMP)

Presented by Acting Community Development Director

Recommendation: The City Council is requested to adopt a resolution approving the City of Cudahy's NHMP.

12. BUSINESS SESSION

A. Consideration to Approve the Ad-Hoc Committee's Recommendations to fill City Commission Vacancies

Presented by City Manager

Recommendation: The City Council is requested to approve the Ad-Hoc Committee's recommendations to fill City Commission vacancies for the Parks and Recreation Commission, Aging and Senior Citizens Commission, Public Safety Commission and Planning Commission.

B. Consideration to Introduce Ordinance No. 653 by First Reading, Amending Cudahy Municipal Code Chapter 20.28 Development Agreements of Title 20 Zoning

Presented by Acting Community Development Director

Recommendation: The City Council is requested to introduce Ordinance No. 653 by first reading, amending Cudahy Municipal Code (CMC) Chapter 20.28 Development Agreements of Title 20 Zoning

C. Discussion of the City Council Appointments to the General Plan Advisory Committee (GPAC)

Presented by Acting Community Development Director

Recommendation: The City Council is requested to consider the appointment of up to three candidates each to the General Plan Advisory Committee (GPAC) per Council Member

13. COUNCIL DISCUSSION

A. Vice Mayor Hernandez

i. Discussion of Young Mayor Program

ii. Discussion to bring forward a Resolution regarding Equal Wages for Gender Equality

14. ORAL COMMUNICATIONS (Closed Session)

(Each person will be allowed to speak only once on closed session items and will be limited to three (3) minutes. When addressing the Council please speak into the microphone and voluntarily state your name and address.)

RECESS TO CLOSED SESSION

This is the time at which the City Council will meet in closed session to go over items of business on the closed session agenda. It should be noted that because Councilman Guerrero will be participating from Bedwell Hall via teleconference, he will be patched into the closed session chambers from Bedwell Hall via telephone device. At this time, all persons other than Councilman Guerrero and City personnel authorized by either the City Manager or the City Attorney will not be allowed to remain in Bedwell Hall. Once closed session is completed and the City Council returns from closed session into open session, members of the public may then reenter the Council Chamber to rejoin the proceedings.

15. CLOSED SESSION

A. Closed Session Pursuant to Government Code Section 54956.9(d)(2) and 54956.9(e)(1) – Conference with Legal Counsel to Discuss a Matter Involving Potential Litigation and/or Significant Exposure to Litigation – [Two (2) Matters] - This Matter will be heard jointly by the Cudahy City Council and the Cudahy City Council in its capacity as Successor Agency to the Cudahy Redevelopment Agency.

B. Closed Session Pursuant to Government Code Section 54956.9(d)(4) – Conference with Legal Counsel to Discuss a Matter Involving Possible Initiation of Litigation – [One (1) Matter]

C. Closed Session Pursuant to Government Code Section 54956.9(d)(2) and 54956.9(e)(1) – Conference with Legal Counsel to Discuss Potential Litigation and/or Significant Exposure to Litigation [One (1) Matter]

D. Closed Session Pursuant to Government Code Section 54956.8 – Conference with Real Property Negotiator Location of Property: 4819 Patata, 8420 S. Atlantic Ave. (APN 622-034-014, 032, 040-41), Cudahy, CA 90201 City's Negotiator(s): City Manager Jose E. Pulido Party Negotiating With: Cudahy LF, LLC Under Discussion: Discussion of both price and terms of payment as related to purchase of subject property

E. Closed Session Pursuant to Government Code section 54957(b)(1) – Public Employee Performance Evaluation

Employee Title: City Manager

F. Closed Session Pursuant to Government Code Section 54957.6(a) – Conference with Labor Negotiator Regarding Represented Employees City's Designated Representative(s) for Negotiations: Jose Pulido, City Manager, Rhonda Strout-Garcia, Human Resources Consultant, Oliver Yee, Special Counsel Employee Organization: Cudahy Miscellaneous Employees Association (CMEA)

RECONVENE TO OPEN SESSION

16. CLOSED SESSION ANNOUNCEMENT

17. PUBLIC COMMENT

(Mayor: This is the time set aside for citizens to address the City Council / Agency **on matters under the City Council's jurisdiction**. Anyone wishing to speak, please fill out the form located at the Council Chambers entrance and submit it to the City Clerk. Speakers that submitted comment cards within the first 20 minutes of the meeting will be permitted to speak. **Pursuant to Government Code section 54954.3(b), time limits are placed on the public comment period. The Mayor will announce when public comment cards may no longer be submitted to the City Clerk and no public comment cards will be accepted after the Mayor's announcement.** Each person who submits a public comment card will be allowed to speak only once and will be limited to three (3) minutes. When addressing the Council / Agency please speak into the microphone and voluntarily state your name and address.)

18. ADJOURNMENT

Cudahy City Council / Agency will adjourn to a Regular and Joint Meeting as Successor Agency to the Cudahy Development Commission on Monday, October 26, 2015 at 6:30 p.m.

I Laura Valdivia, hereby certify under penalty of perjury under the laws of the State of California that the foregoing agenda was posted at Cudahy City Hall, Bedwell Hall, Clara Park, Lugo Park, and the City's Website not less than 72 hours prior to the meeting. A copy of said Agenda is on file in the City Clerk's Office.

Dated this 8th day of October 2015

Laura Valdivia
Interim City Clerk

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Item Number
10A

STAFF REPORT

Date: October 12, 2015

To: Honorable Mayor/Chair and City Council/Agency Members

From: Jose E. Pulido, City Manager/Executive Director
By: Steven Dobrenen, Finance Director

Subject: **Consideration to Approve the City Demands and Payroll Including Cash and Investment Report for the Month of August 2015**

RECOMMENDATION

The City Council is requested to approve the Demands and Payroll in the amount of $973,057.65 including Cash and Investment Report by Fund for the month of August 2015.

BACKGROUND

1. On August 13, 1993, Ordinance 476 was adopted and codified as Cudahy Municipal Code Section 3.04.080 indicating, "Except as otherwise provided, no warrant shall be drawn or evidence of indebtedness issued unless there shall be at the time sufficient money in the treasury legally applicable to the payment of the same."

2. On August 2015, the following demands and payroll have been audited by the Finance Department:

Demands	$ 788,472.84 (Attachment A)
Payroll Warrants	$ 107,212.93 (Attachment B)
	$ 73,693.65 (Attachment B)

ANALYSIS

The Check Register Report (Attachment A), Payroll Warrants including payroll taxes and insurance premiums (Attachment B), Cash and Investment Report by Fund August 2015 (Attachment C) indicate that the cash and investment balance was sufficient for disbursements for the month of August 2015, and (Attachment D) a summary of cash received and disbursed by month during Fiscal Year (FY) 2014-15.

Cudahy Municipal Code Section 3.04.070 indicates, "...Budgeted demands paid by warrant prior to audit by the council shall be presented to the council for ratification and approval..."

CONCULSION

The Finance Director certifies to the accuracy and availability of funds for payment. A Demand/Warrant Register has been submitted to the City Council for approval in accordance with Cudahy Municipal Code Section 3.04.070.

FINANCIAL IMPACT

The Cash and Investment Report by Fund (Attachment C) indicates how the total disbursements of $973,057.65 were distributed between the funds of the City.

ATTACHMENTS

A. Check Register Report
B. Payroll Warrants including payroll taxes and insurance premiums
C. Cash and Investment Report by Fund August 2015
D. Summary of Cash Receipt/Disbursement by Month – FY 2015

Attachment A

Check Number	Check Date / Void/Stop Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
38878	08/03/2015	8021	AT & T MOBILITY	571.72	571.72
		Printed	CELLULAR SERVICE JUN 7 - JUL6	0.00	

Ref#	GL Number	Gross	Discount	Amount
27326	001-4020-6390.000	499.64	0.00	499.64
27326	201-4425-6390.000	72.08	0.00	72.08

Check Amount 571.72

Check Number	Check Date / Void/Stop Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
38879	08/03/2015	6080	B & M LAWN & GARDEN INC.	3,499.47	3,499.47
		Printed	REPAIR RIDING MOWER	0.00	

Ref#	GL Number	Gross	Discount	Amount
27327	001-4410-6770.000	3,499.47	0.00	3,499.47

Check Amount 3,499.47

Check Number	Check Date / Void/Stop Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
38880	08/03/2015	10307	CHAIDEZ MARISSA	45.00	45.00
		Printed	REFUND - YOUTH SOCCER	0.00	

Ref#	GL Number	Gross	Discount	Amount
27339	001-0000-4990.000	45.00	0.00	45.00

Check Amount 45.00

Check Number	Check Date / Void/Stop Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
38881	08/03/2015	8076	DAVE BANG ASSOC., INC	1,383.74	1,383.74
		Printed	PLAYGROUND EQ TOT SWING SEATS	0.00	

Ref#	GL Number	Gross	Discount	Amount
27325	280-7093-6389.000	1,383.74	0.00	1,383.74

Check Amount 1,383.74

Check Number	Check Date / Void/Stop Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
38882	08/03/2015	10301	DE LA TORRE MARIA	135.00	135.00
		Printed	REFUND - SIGN PERMIT	0.00	

Ref#	GL Number	Gross	Discount	Amount
27338	001-0000-4815.000	135.00	0.00	135.00

Check Amount 135.00

Check Number	Check Date / Void/Stop Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
38883	08/03/2015	0569	FEDERAL EXPRESS SERVICES	30.50	30.50
		Printed	FEDEX EXPRESS SHIPMENT	0.00	

Ref#	GL Number	Gross	Discount	Amount
27329	001-4020-6385.000	30.50	0.00	30.50

Check Amount 30.50

Check Number	Check Date / Void/Stop Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
38884	08/03/2015	9983	FIESTA TAXI COOPERATIVE, INC.	3,413.33	3,413.33
		Printed	DIAL A RIDE SERVICE JUNE 2015	0.00	

Ref#	GL Number	Gross	Discount	Amount
27340	252-4750-6780.000	3,413.33	0.00	3,413.33

Check Amount 3,413.33

Check Number	Check Date / Void/Stop Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
38885	08/03/2015	8057	KONICA MINOLTA BUSINESS	176.57	176.57
		Printed	MONTHLY SERV DIGITAL	0.00	

Ref#	GL Number	Gross	Discount	Amount
27330	001-4020-6014.000	176.57	0.00	176.57

Check Amount 176.57

Check Number	Check Date / Void/Stop Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
38886	08/03/2015	5762	LANDSCAPE STRUCTURES, INC.	7,228.04	7,228.04
		Printed	CUDAHY PARK PLAYGROUND PARTS	0.00	

Check Number	Check Date Void/Stop Date	Vendor# Status	Vendor Name Check Description	Gross Discount	Amount

Ref#	GL Number	Gross	Discount	Amount
27324	280-7093-6389.000	7,228.04	0.00	7,228.04

Check Amount 7,228.04

Check Number	Check Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
38887	08/03/2015	1338-1	METROPOLITAN TRANSPORTATION	4,513.00	4,513.00
		Printed	TAP JUNE 2015	0.00	

Ref#	GL Number	Gross	Discount	Amount
27334	251-4760-6550.000	4,513.00	0.00	4,513.00

Check Amount 4,513.00

Check Number	Check Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
38888	08/03/2015	9717	PCAM, LLC	14,661.72	14,661.72
		Printed	SHUTTLE SERVICES JUNE 2015	0.00	

Ref#	GL Number	Gross	Discount	Amount
27337	251-4740-6780.000	14,661.72	0.00	14,661.72

Check Amount 14,661.72

Check Number	Check Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
38889	08/03/2015	10184	RED WING SHOES	156.95	156.95
		Printed	STEEL TOE BOOTS MAINT WORKER	0.00	

Ref#	GL Number	Gross	Discount	Amount
27333	001-4410-6250.000	156.95	0.00	156.95

Check Amount 156.95

Check Number	Check Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
38890	08/03/2015	9737	REGIONAL TAP SERVICE CENTER	40.00	40.00
		Printed	REGULAR BUS PASS JUNE 2015	0.00	

Ref#	GL Number	Gross	Discount	Amount
27335	251-4760-6550.000	40.00	0.00	40.00

Check Amount 40.00

Check Number	Check Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
38891	08/03/2015	9991	TRANSTECH	1,776.51	1,776.51
		Printed	PLAN CHECK SERVICE JUNE 2015	0.00	

Ref#	GL Number	Gross	Discount	Amount
27336	001-4212-6720.000	1,776.51	0.00	1,776.51

Check Amount 1,776.51

Check Number	Check Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
38892	08/03/2015	2859	UNDERGROUND SERVICE ALERT-SC	193.50	193.50
		Printed	DIG ALERT TICKETS	0.00	

Ref#	GL Number	Gross	Discount	Amount
27328	201-4425-6735.000	193.50	0.00	193.50

Check Amount 193.50

Check Number	Check Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
38893	08/03/2015	5631	WELLS LOCK & KEY	127.00	127.00
		Printed	KEY DUPLICATES	0.00	

Ref#	GL Number	Gross	Discount	Amount
27331	001-4020-6370.000	30.00	0.00	30.00
27332	001-4020-6370.000	97.00	0.00	97.00

Check Amount 127.00

Check Number	Check Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
38894	08/04/2015	4550	235- PRAXAIR DISTRIBUTION INC.	41.35	41.35
		Printed	CYLINDER RENTAL	0.00	

Ref#	GL Number	Gross	Discount	Amount
27354	201-4425-6150.000	41.35	0.00	41.35

Check Number	Check Date / Void/Stop Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
			Check Amount	41.35	
38895	08/04/2015	7995	AMERICAN CITY PEST CONTROL	484.00	484.00
		Printed	PEST CONTROL JULY 2015	0.00	

Ref#	GL Number	Gross	Discount	Amount
27362	001-4020-6720.000	101.00	0.00	101.00
27363	001-4020-6720.000	101.00	0.00	101.00
27364	001-4020-6720.000	117.00	0.00	117.00
27365	001-4020-6720.000	101.00	0.00	101.00
27366	001-4020-6720.000	64.00	0.00	64.00

Check Amount 484.00

Check Number	Check Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
38896	08/04/2015	10205	APPLE ONE EMPLOYMENT SERVICES	720.51	720.51
		Printed	EMPLOYMENT SERVICE JULY 18TH	0.00	

Ref#	GL Number	Gross	Discount	Amount
27341	001-4020-6720.000	720.51	0.00	720.51

Check Amount 720.51

Check Number	Check Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
38897	08/04/2015	10123	B & V GROUP CORPORATION	10.00	10.00
		Printed	REPAIR FLAT TIRE 2005 FORD VIC	0.00	

Ref#	GL Number	Gross	Discount	Amount
27345	001-4530-6394.000	10.00	0.00	10.00

Check Amount 10.00

Check Number	Check Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
38898	08/04/2015	0136	CITY OF SOUTH GATE	75.00	75.00
		Printed	SIGNAL MAINTENANCE JULY 2015	0.00	

Ref#	GL Number	Gross	Discount	Amount
27346	201-4420-6771.000	75.00	0.00	75.00

Check Amount 75.00

Check Number	Check Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
38899	08/04/2015	2167	DAILY BREEZE PRESS TELEGRAM	1,871.78	1,871.78
		Printed	CLASSIFIED ADVERTISING	0.00	

Ref#	GL Number	Gross	Discount	Amount
27357	001-4008-6310.000	1,379.05	0.00	1,379.05
27358	001-4008-6310.000	492.73	0.00	492.73

Check Amount 1,871.78

Check Number	Check Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
38900	08/04/2015	9998	DOWNEY SIGN & LIGHTING	401.26	401.26
		Printed	REPLACED LAMP @ CLARA PARK	0.00	

Ref#	GL Number	Gross	Discount	Amount
27353	001-4020-6720.000	401.26	0.00	401.26

Check Amount 401.26

Check Number	Check Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
38901	08/04/2015	6086	EWING	300.60	300.60
		Printed	REPAIRED WATER VALVES @ CLARA	0.00	

Ref#	GL Number	Gross	Discount	Amount
27342	001-4410-6389.000	300.60	0.00	300.60

Check Amount 300.60

Check Number	Check Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
38902	08/04/2015	0569	FEDERAL EXPRESS SERVICES	45.08	45.08
		Printed	FEDEX EXPRESS SHIPMENT	0.00	

Ref#	GL Number	Gross	Discount	Amount

Check Number	Check Date / Void/Stop Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount

Ref#	GL Number	Gross	Discount	Amount
27356	001-4020-6385.000	45.08	0.00	45.08

Check Amount 45.08

Check Number	Check Date	Vendor#	Vendor Name	Gross	Amount
38903	08/04/2015	9950	FLINT TRADING INC.	7,554.92	7,554.92
		Printed	THERMOPLASTIC PAVEMENT MARK'G7	0.00	

Ref#	GL Number	Gross	Discount	Amount
27350	201-4425-6150.000	7,554.92	0.00	7,554.92

Check Amount 7,554.92

Check Number	Check Date	Vendor#	Vendor Name	Gross	Amount
38904	08/04/2015	10053	HAULAWAY STORAGE CONTAINERS	153.70	153.70
		Printed	21FT STORAGE CONTAINER JULY	0.00	

Ref#	GL Number	Gross	Discount	Amount
27348	001-4020-6970.000	79.50	0.00	79.50
27349	001-4020-6970.000	74.20	0.00	74.20

Check Amount 153.70

Check Number	Check Date	Vendor#	Vendor Name	Gross	Amount
38905	08/04/2015	10106	HR DYNAMICS & PERFORMANCE MGNT	12,529.65	12,529.65
		Printed	H.R.CONSULTANT JUL 18 - AUG 1	0.00	

Ref#	GL Number	Gross	Discount	Amount
27360	001-4011-6720.000	4,675.00	0.00	4,675.00
27360	001-4930-6391.000	1,275.00	0.00	1,275.00
27361	001-4015-6720.000	6,579.65	0.00	6,579.65

Check Amount 12,529.65

Check Number	Check Date	Vendor#	Vendor Name	Gross	Amount
38906	08/04/2015	4553	J. V. PRINTING	208.19	208.19
		Printed	WINDOW ENVELOPES	0.00	

Ref#	GL Number	Gross	Discount	Amount
27344	001-4020-6970.000	31.61	0.00	31.61
27352	001-4020-6970.000	176.58	0.00	176.58

Check Amount 208.19

Check Number	Check Date	Vendor#	Vendor Name	Gross	Amount
38907	08/04/2015	8252	MYERS AND SONS HI WAY SAFETY	1,197.25	1,197.25
		Printed	BARRICADES, CONES, DELINEATORS	0.00	

Ref#	GL Number	Gross	Discount	Amount
27351	201-4425-6150.000	1,197.25	0.00	1,197.25

Check Amount 1,197.25

Check Number	Check Date	Vendor#	Vendor Name	Gross	Amount
38908	08/04/2015	7014	NATIONWIDE ENVIRONMENTAL	9,391.39	9,391.39
		Printed	STREET & PARK SWEEPING JULY	0.00	

Ref#	GL Number	Gross	Discount	Amount
27347	201-4425-6778.000	9,391.39	0.00	9,391.39

Check Amount 9,391.39

Check Number	Check Date	Vendor#	Vendor Name	Gross	Amount
38909	08/04/2015	4716	TAB PRODUCT COMPANY	46.12	46.12
		Printed	YEAR END LABELS 2015 & 2016	0.00	

Ref#	GL Number	Gross	Discount	Amount
27355	001-4020-6080.000	46.12	0.00	46.12

Check Amount 46.12

Check Number	Check Date	Vendor#	Vendor Name	Gross	Amount
38910	08/04/2015	10320	THE REGENTS OF THE UNIVERSITY	11,973.04	11,973.04
		Printed	STRATEGIC GROWTH COUNCIL	0.00	

Ref#	GL Number	Gross	Discount	Amount

Check Number	Check Date Void/Stop Date	Vendor# Status	Vendor Name Check Description	Gross Discount	Amount

Ref#	GL Number	Gross	Discount	Amount
27367	235-4215-6720.000	11,973.04	0.00	11,973.04

Check Amount 11,973.04

Check Number	Check Date	Vendor#	Vendor Name	Gross	Amount
38911	08/04/2015	10026	TRIMMING LAND COMPANY, INC.	250.00	250.00
		Printed	REMOVE BROKEN TREES @ CLARA	0.00	

Ref#	GL Number	Gross	Discount	Amount
27343	001-4410-6785.000	250.00	0.00	250.00

Check Amount 250.00

Check Number	Check Date	Vendor#	Vendor Name	Gross	Amount
38912	08/04/2015	0643	ZUMAR INDUSTRIES. INC.	136.25	136.25
		Printed	STREET SIGNS	0.00	

Ref#	GL Number	Gross	Discount	Amount
27359	201-4425-6387.000	136.25	0.00	136.25

Check Amount 136.25

Check Number	Check Date	Vendor#	Vendor Name	Gross	Amount
38913	08/12/2015	4546	CENTRAL BASIN MUNICIPAL WATER	465.74	465.74
		Printed	RECYCLE WATER SERVICE MAY 2015	0.00	

Ref#	GL Number	Gross	Discount	Amount
27368	001-4020-6395.000	465.74	0.00	465.74

Check Amount 465.74

Check Number	Check Date	Vendor#	Vendor Name	Gross	Amount
38914	08/12/2015	0097-3	EMPLOYMENT DEVELOPMENT DEPT.	4,168.00	4,168.00
		Printed	UNEMPLOYMENT INS. 2nd QTR 2015	0.00	

Ref#	GL Number	Gross	Discount	Amount
27370	001-4015-6480.000	4,168.00	0.00	4,168.00

Check Amount 4,168.00

Check Number	Check Date	Vendor#	Vendor Name	Gross	Amount
38915	08/12/2015	10201	OLIVAREZ MADRUGA, LLP	62,162.38	62,162.38
		Printed	LEGAL SERVICES MAY 2015	0.00	

Ref#	GL Number	Gross	Discount	Amount
27371	001-4005-6720.000	10,383.94	0.00	10,383.94
27371	610-4930-6755.000	18,688.08	0.00	18,688.08
27371	001-4930-6391.000	774.00	0.00	774.00
27371	001-4930-6755.000	12,007.31	0.00	12,007.31
27371	001-4005-6755.000	309.05	0.00	309.05
27371	001-4930-6391.000	897.00	0.00	897.00
27371	001-4005-6720.000	19,103.00	0.00	19,103.00

Check Amount 62,162.38

Check Number	Check Date	Vendor#	Vendor Name	Gross	Amount
38916	08/12/2015	10322	RODRIGUEZ VICTORIA	25.00	25.00
		Printed	REFUND -YOUTH RECREATION CLASS	0.00	

Ref#	GL Number	Gross	Discount	Amount
27369	001-0000-4995.000	25.00	0.00	25.00

Check Amount 25.00

Check Number	Check Date	Vendor#	Vendor Name	Gross	Amount
38917	08/12/2015	10205	APPLE ONE EMPLOYMENT SERVICES	1,416.35	1,416.35
		Printed	EMPLOYMENT SERVICE AUGUST 1	0.00	

Ref#	GL Number	Gross	Discount	Amount
27380	001-4020-6720.000	784.67	0.00	784.67
27397	001-4020-6720.000	631.68	0.00	631.68

Check Amount 1,416.35

Check Number	Check Date Void/Stop Date	Vendor# Status	Vendor Name Check Description	Gross Discount	Amount
38918	08/12/2015	9966 Printed	AT & T LONG DISTANCE SERVICE LONG DISTANCE PHONE	129.04 0.00	129.04

Ref#	GL Number	Gross	Discount	Amount
27376	001-4020-6390.000	129.04	0.00	129.04

Check Amount 129.04

Check Number	Check Date Void/Stop Date	Vendor# Status	Vendor Name Check Description	Gross Discount	Amount
38919	08/12/2015	0057-2 Printed	AT & T PHONE SERVICE PHONE LANDLINE JUN 8- JUL 24	601.27 0.00	601.27

Ref#	GL Number	Gross	Discount	Amount
27373	001-4020-6390.000	601.27	0.00	601.27

Check Amount 601.27

Check Number	Check Date Void/Stop Date	Vendor# Status	Vendor Name Check Description	Gross Discount	Amount
38920	08/12/2015	10133 Printed	AVANT-GARDE, INC. HSIP GRANT APPLICATION	9,000.00 0.00	9,000.00

Ref#	GL Number	Gross	Discount	Amount
27374	001-4020-6720.000	9,000.00	0.00	9,000.00

Check Amount 9,000.00

Check Number	Check Date Void/Stop Date	Vendor# Status	Vendor Name Check Description	Gross Discount	Amount
38921	08/12/2015	10013 Printed	CENTRAL FORD BROKEN INNER DOOR HANDLE	183.70 0.00	183.70

Ref#	GL Number	Gross	Discount	Amount
27396	001-4230-6394.000	183.70	0.00	183.70

Check Amount 183.70

Check Number	Check Date Void/Stop Date	Vendor# Status	Vendor Name Check Description	Gross Discount	Amount
38922	08/12/2015	2289 Printed	CONSOLIDATED DISPOSAL REFUSE ASSESSMENT JULY 2015	4,555.94 0.00	4,555.94

Ref#	GL Number	Gross	Discount	Amount
27381	730-0000-2007.000	4,555.94	0.00	4,555.94

Check Amount 4,555.94

Check Number	Check Date Void/Stop Date	Vendor# Status	Vendor Name Check Description	Gross Discount	Amount
38923	08/12/2015	5552 Printed	CUDAHY AUTO CENTER OIL CHANGE,HEAD LAMP,TIRE ROTA	97.47 0.00	97.47

Ref#	GL Number	Gross	Discount	Amount
27383	001-4410-6394.000	97.47	0.00	97.47

Check Amount 97.47

Check Number	Check Date Void/Stop Date	Vendor# Status	Vendor Name Check Description	Gross Discount	Amount
38924	08/12/2015	9998 Printed	DOWNEY SIGN & LIGHTING LIGHT POLE FIXTURE	190.00 0.00	190.00

Ref#	GL Number	Gross	Discount	Amount
27393	350-4430-6775.000	190.00	0.00	190.00

Check Amount 190.00

Check Number	Check Date Void/Stop Date	Vendor# Status	Vendor Name Check Description	Gross Discount	Amount
38925	08/12/2015	10018 Printed	ESTRADA HILDA INTERPRETER JULY 27, 2015	800.00 0.00	800.00

Ref#	GL Number	Gross	Discount	Amount
27392	001-4020-6720.000	800.00	0.00	800.00

Check Amount 800.00

Check Number	Check Date Void/Stop Date	Vendor# Status	Vendor Name Check Description	Gross Discount	Amount
38926	08/12/2015	6087 Printed	FIRST AMERICAN DATA TREE SERVICE RENDERED JULY 2015	99.00 0.00	99.00

Ref#	GL Number	Gross	Discount	Amount

Check Number	Check Date Void/Stop Date	Vendor# Status	Vendor Name Check Description	Gross Discount	Amount

Ref#	GL Number	Gross	Discount	Amount
27385	001-4215-6080.000	99.00	0.00	99.00

Check Amount 99.00

Check Number	Check Date	Vendor#	Vendor Name	Gross	Amount
38927	08/12/2015	0126-1	GOLDEN STATE WATER COMPANY	3,486.50	3,486.50
		Printed	WATER SERVICE JUN 22 - JUL 23	0.00	

Ref#	GL Number	Gross	Discount	Amount
27377	001-4020-6395.000	55.61	0.00	55.61
27378	001-4020-6395.000	3,430.89	0.00	3,430.89

Check Amount 3,486.50

Check Number	Check Date	Vendor#	Vendor Name	Gross	Amount
38928	08/12/2015	10053	HAULAWAY STORAGE CONTAINERS	74.20	74.20
		Printed	21FT STORAGE CONTAINER AUGUST	0.00	

Ref#	GL Number	Gross	Discount	Amount
27395	001-4020-6970.000	74.20	0.00	74.20

Check Amount 74.20

Check Number	Check Date	Vendor#	Vendor Name	Gross	Amount
38929	08/12/2015	9723	IT SYSTEMHOUSE, INC.	3,200.00	3,200.00
		Printed	IT OUTSOURCING SERV JULY 2015	0.00	

Ref#	GL Number	Gross	Discount	Amount
27394	001-4020-6720.000	3,200.00	0.00	3,200.00

Check Amount 3,200.00

Check Number	Check Date	Vendor#	Vendor Name	Gross	Amount
38930	08/12/2015	2378	ITL, INC.	2,703.95	2,703.95
		Printed	FUEL	0.00	

Ref#	GL Number	Gross	Discount	Amount
27386	001-4530-6040.000	163.77	0.00	163.77
27386	201-4425-6040.000	146.54	0.00	146.54
27386	001-4410-6040.000	302.36	0.00	302.36
27387	001-4530-6040.000	255.95	0.00	255.95
27387	001-4230-6040.000	47.17	0.00	47.17
27387	201-4425-6040.000	157.48	0.00	157.48
27387	001-4410-6040.000	259.63	0.00	259.63
27388	001-4530-6040.000	149.81	0.00	149.81
27388	201-4425-6040.000	167.61	0.00	167.61
27388	001-4410-6040.000	127.96	0.00	127.96
27389	001-4530-6040.000	227.10	0.00	227.10
27389	201-4425-6040.000	185.10	0.00	185.10
27389	001-4410-6040.000	513.47	0.00	513.47

Check Amount 2,703.95

Check Number	Check Date	Vendor#	Vendor Name	Gross	Amount
38931	08/12/2015	4553	J. V. PRINTING	961.38	961.38
		Printed	BUS CARDS, STATIONARY	0.00	

Ref#	GL Number	Gross	Discount	Amount
27391	001-4020-6970.000	961.38	0.00	961.38

Check Amount 961.38

Check Number	Check Date	Vendor#	Vendor Name	Gross	Amount
38932	08/12/2015	9668	KONICA MINOLTA BUSINESS	236.38	236.38
		Printed	KONICA MINOLTA COPIER LEASE	0.00	

Ref#	GL Number	Gross	Discount	Amount
27390	001-4020-6014.000	236.38	0.00	236.38

Check Amount 236.38

Check Number	Check Date Void/Stop Date	Vendor# Status	Vendor Name Check Description	Gross Discount	Amount
38933	08/12/2015	5411	LIEBERT CASSIDY WHITMORE	3,310.00	3,310.00
		Printed	PROFESSIONAL SERVICES	0.00	

Ref#	GL Number	Gross	Discount	Amount
27372	001-4015-6312.000	3,310.00	0.00	3,310.00

Check Amount 3,310.00

Check Number	Check Date Void/Stop Date	Vendor# Status	Vendor Name Check Description	Gross Discount	Amount
38934	08/12/2015	0070	SOUTHERN CALIFORNIA EDISON	11,910.43	11,910.43
		Printed	ELECTRICITY BILLS	0.00	

Ref#	GL Number	Gross	Discount	Amount
27379	350-4430-6318.000	70.25	0.00	70.25
27379	201-4420-6318.000	1,167.80	0.00	1,167.80
27379	001-4020-6318.000	10,672.38	0.00	10,672.38

Check Amount 11,910.43

Check Number	Check Date Void/Stop Date	Vendor# Status	Vendor Name Check Description	Gross Discount	Amount
38935	08/12/2015	9991	TRANSTECH	11,852.50	11,852.50
		Printed	LUGO PARK SOCCER & RESTROOM	0.00	

Ref#	GL Number	Gross	Discount	Amount
27375	510-7091-6725.000	2,170.00	0.00	2,170.00
27375	510-7092-6725.000	9,682.50	0.00	9,682.50

Check Amount 11,852.50

Check Number	Check Date Void/Stop Date	Vendor# Status	Vendor Name Check Description	Gross Discount	Amount
38936	08/12/2015	8217	UNIFORM & ACCESSORIES WAREHOUS	1,743.96	1,743.96
		Printed	LED LIGHT BAR MAINTENANCE VEH	0.00	

Ref#	GL Number	Gross	Discount	Amount
27382	201-4425-6394.000	1,743.96	0.00	1,743.96

Check Amount 1,743.96

Check Number	Check Date Void/Stop Date	Vendor# Status	Vendor Name Check Description	Gross Discount	Amount
38937	08/12/2015	2208	WEST COAST ARBORISTS, INC.	2,803.90	2,803.90
		Printed	TREE PRUNING & REMOVAL	0.00	

Ref#	GL Number	Gross	Discount	Amount
27384	201-4425-6785.000	2,803.90	0.00	2,803.90

Check Amount 2,803.90

Check Number	Check Date Void/Stop Date	Vendor# Status	Vendor Name Check Description	Gross Discount	Amount
38938	08/13/2015	10323	GLOBAL LEARNING PARTNERS, INC.	3,960.00	3,960.00
		Printed	CUSTOMER SERVICE TRAINING	0.00	

Ref#	GL Number	Gross	Discount	Amount
27398	001-4015-6392.000	3,960.00	0.00	3,960.00

Check Amount 3,960.00

Check Number	Check Date Void/Stop Date	Vendor# Status	Vendor Name Check Description	Gross Discount	Amount
38939	08/13/2015	5411	LIEBERT CASSIDY WHITMORE	17,554.80	17,554.80
		Printed	LABOR NEGOTIONS JULY 2015	0.00	

Ref#	GL Number	Gross	Discount	Amount
27399	001-4015-6720.000	2,646.00	0.00	2,646.00
27400	001-4015-6720.000	7,039.30	0.00	7,039.30
27401	001-4015-6720.000	5,860.50	0.00	5,860.50
27402	001-4015-6720.000	2,009.00	0.00	2,009.00

Check Amount 17,554.80

Check Number	Check Date Void/Stop Date	Vendor# Status	Vendor Name Check Description	Gross Discount	Amount
38940	08/18/2015	10106	HR DYNAMICS & PERFORMANCE MGNT	9,466.15	9,466.15
		Printed	HR CONSULTING 8/2/15-8/16/15	0.00	

Ref#	GL Number	Gross	Discount	Amount

Check Number	Check Date Void/Stop Date	Vendor# Status	Vendor Name Check Description	Gross Discount	Amount

Ref#	GL Number	Gross	Discount	Amount
27403	001-4930-6391.000	935.00	0.00	935.00
27403	001-4011-6720.000	4,420.00	0.00	4,420.00
27404	001-4015-6720.000	4,111.15	0.00	4,111.15

Check Amount 9,466.15

Check Number	Check Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
38941	08/26/2015	4686	AMERICAN RENTALS, INC.	1,900.75	1,900.75
		Printed	CANOPY, DUNK TANK, DOBLE RISER	0.00	

Ref#	GL Number	Gross	Discount	Amount
27418	001-4350-6585.000	1,900.75	0.00	1,900.75

Check Amount 1,900.75

Check Number	Check Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
38942	08/26/2015	10329	ASCE MEMBERSHIP	225.00	225.00
		Printed	ASCE 2015 MEMBERSHIP	0.00	

Ref#	GL Number	Gross	Discount	Amount
27447	001-4216-6386.000	225.00	0.00	225.00

Check Amount 225.00

Check Number	Check Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
38943	08/26/2015	0057-2	AT & T PHONE SERVICE	1,914.60	1,914.60
		Printed	PHONE LANDLINE JUN 28- JUL27	0.00	

Ref#	GL Number	Gross	Discount	Amount
27407	001-4020-6390.000	1,914.60	0.00	1,914.60

Check Amount 1,914.60

Check Number	Check Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
38944	08/26/2015	7019	BUSINESS CARD	2,032.71	2,032.71
		Printed	CREDIT CARD JULY 2015 RI	0.00	

Ref#	GL Number	Gross	Discount	Amount
27426	001-4530-6080.000	5.58	0.00	5.58
27426	001-4151-6386.000	245.00	0.00	245.00
27426	001-4020-6376.000	47.06	0.00	47.06
27426	201-4425-6150.000	101.25	0.00	101.25
27426	001-4020-6910.000	474.00	0.00	474.00
27426	001-4020-6515.000	102.01	0.00	102.01
27426	001-4020-6375.000	122.50	0.00	122.50
27426	001-4020-6396.000	375.00	0.00	375.00
27426	001-4350-6080.000	13.63	0.00	13.63
27426	001-4350-6585.000	546.68	0.00	546.68

Check Amount 2,032.71

Check Number	Check Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
38945	08/26/2015	10028	CITY OF SIGNAL HILL	34,204.84	34,204.84
		Printed	ADMIN-COST SHARING LAR UR2 WG	0.00	

Ref#	GL Number	Gross	Discount	Amount
27408	001-4216-6745.000	34,204.84	0.00	34,204.84

Check Amount 34,204.84

Check Number	Check Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
38946	08/26/2015	0136	CITY OF SOUTH GATE	75.00	75.00
		Printed	SIGNAL MAINTENANCE AUG 2015	0.00	

Ref#	GL Number	Gross	Discount	Amount
27424	201-4420-6771.000	75.00	0.00	75.00

Check Amount 75.00

Check Number	Check Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
38947	08/26/2015	5189	COMMUNITY DEVELOPMENT COMM	500.00	500.00
		Printed	CDBG PROGRAM INCOME	0.00	

Ref#	GL Number	Gross	Discount	Amount

Check Number	Check Date Void/Stop Date	Vendor# Status	Vendor Name Check Description	Gross Discount	Amount

Ref#	GL Number	Gross	Discount	Amount
27448	510-0000-4550.000	500.00	0.00	500.00

Check Amount 500.00

Check Number	Check Date	Vendor# Status	Vendor Name Check Description	Gross Discount	Amount
38948	08/26/2015	2514-1	COUNTY OF LOS ANGELES	262.04	262.04
		Printed	ALLOCATION OF NET OPERATING	0.00	

Ref#	GL Number	Gross	Discount	Amount
27412	001-4020-6375.000	262.04	0.00	262.04

Check Amount 262.04

Check Number	Check Date	Vendor# Status	Vendor Name Check Description	Gross Discount	Amount
38949	08/26/2015	2167	DAILY BREEZE PRESS TELEGRAM	1,330.80	1,330.80
		Printed	CLASSIFIED ADVERTISING	0.00	

Ref#	GL Number	Gross	Discount	Amount
27432	001-4008-6310.000	271.15	0.00	271.15
27433	001-4008-6310.000	295.77	0.00	295.77
27434	001-4008-6310.000	369.63	0.00	369.63
27435	001-4008-6310.000	394.25	0.00	394.25

Check Amount 1,330.80

Check Number	Check Date	Vendor# Status	Vendor Name Check Description	Gross Discount	Amount
38950	08/26/2015	10005	DAPEER, ROSENBLIT & LITVAK	5,743.38	5,743.38
		Printed	PROFESSIONAL SERVICES JUL 2015	0.00	

Ref#	GL Number	Gross	Discount	Amount
27415	510-4230-6755.000	5,449.38	0.00	5,449.38
27416	510-4230-6755.000	294.00	0.00	294.00

Check Amount 5,743.38

Check Number	Check Date	Vendor# Status	Vendor Name Check Description	Gross Discount	Amount
38951	08/26/2015	10327	DIAZ JESUS	84.00	84.00
		Printed	UMPIRE JULY 2015	0.00	

Ref#	GL Number	Gross	Discount	Amount
27423	001-4350-6250.000	84.00	0.00	84.00

Check Amount 84.00

Check Number	Check Date	Vendor# Status	Vendor Name Check Description	Gross Discount	Amount
38952	08/26/2015	9983	FIESTA TAXI COOPERATIVE, INC.	3,872.86	3,872.86
		Printed	DIAL A RIDE SERVICE JULY 2015	0.00	

Ref#	GL Number	Gross	Discount	Amount
27437	252-4750-6780.000	3,872.86	0.00	3,872.86

Check Amount 3,872.86

Check Number	Check Date	Vendor# Status	Vendor Name Check Description	Gross Discount	Amount
38953	08/26/2015	10325	FROM LOT TO SPOT, INC.	1,125.00	1,125.00
		Printed	FLTS SERVICES JULY 2015	0.00	

Ref#	GL Number	Gross	Discount	Amount
27422	235-4215-6720.000	1,125.00	0.00	1,125.00

Check Amount 1,125.00

Check Number	Check Date	Vendor# Status	Vendor Name Check Description	Gross Discount	Amount
38954	08/26/2015	10187	FUEL CREATIVE GROUP	5,281.25	5,281.25
		Printed	PROFESSIONAL SERVICE JULY 2015	0.00	

Ref#	GL Number	Gross	Discount	Amount
27413	001-4011-6720.000	5,281.25	0.00	5,281.25

Check Amount 5,281.25

Check Number	Check Date	Vendor# Status	Vendor Name Check Description	Gross Discount	Amount
38955	08/26/2015	2139-2	HDL COREN & CONE	1,250.00	1,250.00
		Printed	PROPERTY TAX 3TH QUARTER 2015	0.00	

Ref#	GL Number	Gross	Discount	Amount

Check Number	Check Date Void/Stop Date	Vendor# Status	Vendor Name Check Description	Gross Discount	Amount

Ref#	GL Number	Gross	Discount	Amount
27409	001-4151-6720.000	1,250.00	0.00	1,250.00

Check Amount 1,250.00

Check Number	Check Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
38956	08/26/2015	2139	HINDERLITER DELLAMAS & ASST	1,362.00	1,362.00
		Printed	SALES TAX 3RD QUATER 2015	0.00	

Ref#	GL Number	Gross	Discount	Amount
27411	001-4151-6720.000	1,362.00	0.00	1,362.00

Check Amount 1,362.00

Check Number	Check Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
38957	08/26/2015	6038	LGP EQUIPMENT RENTALS	599.67	599.67
		Printed	GEN & LIGHT TOWER RENTAL	0.00	

Ref#	GL Number	Gross	Discount	Amount
27417	001-4350-6585.000	599.67	0.00	599.67

Check Amount 599.67

Check Number	Check Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
38958	08/26/2015	10194	MAGANA GARCIA CECILIA	288.75	288.75
		Printed	ZUMBA INSTRUCTOR	0.00	

Ref#	GL Number	Gross	Discount	Amount
27443	001-4350-6210.000	288.75	0.00	288.75

Check Amount 288.75

Check Number	Check Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
38959	08/26/2015	10328	MMASC	75.00	75.00
		Printed	ANNUAL MEMBERSHIP	0.00	

Ref#	GL Number	Gross	Discount	Amount
27445	001-4215-6386.000	75.00	0.00	75.00

Check Amount 75.00

Check Number	Check Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
38960	08/26/2015	7014	NATIONWIDE ENVIRONMENTAL	9,391.39	9,391.39
		Printed	STREET & PARK SWEEPING AUG	0.00	

Ref#	GL Number	Gross	Discount	Amount
27446	201-4425-6778.000	9,391.39	0.00	9,391.39

Check Amount 9,391.39

Check Number	Check Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
38961	08/26/2015	8247	NETWORK INNOVATION ASSOCIATES	278.00	278.00
		Printed	SATELLITE NETWORK SEPTEMBER	0.00	

Ref#	GL Number	Gross	Discount	Amount
27428	001-4020-6742.000	278.00	0.00	278.00

Check Amount 278.00

Check Number	Check Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
38962	08/26/2015	1978	OFFICE DEPOT BUSINESS	390.10	390.10
		Printed	OFFICE SUPPLIES	0.00	

Ref#	GL Number	Gross	Discount	Amount
27438	001-4350-6080.000	25.05	0.00	25.05
27439	001-4350-6585.000	114.45	0.00	114.45
27439	001-4350-6080.000	11.99	0.00	11.99
27440	001-4020-6014.000	74.10	0.00	74.10
27441	001-4020-6080.000	7.60	0.00	7.60
27441	001-4020-6014.000	74.10	0.00	74.10
27442	001-4020-6014.000	74.10	0.00	74.10
27442	001-4350-6585.000	8.71	0.00	8.71

Check Amount 390.10

Check Number	Check Date / Void/Stop Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
38963	08/26/2015	1978-1	OFFICE DEPOT CREDIT PLAN	274.73	274.73
		Printed	OFFICE SUPPLIES	0.00	

Ref#	GL Number	Gross	Discount	Amount
27427	001-4020-6080.000	249.90	0.00	249.90
27427	001-4020-6014.000	24.83	0.00	24.83

Check Amount 274.73

Check Number	Check Date / Void/Stop Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
38964	08/26/2015	10137	PACHECO ROSARIO	162.50	162.50
		Printed	BALLET INSTRUCTOR	0.00	

Ref#	GL Number	Gross	Discount	Amount
27444	001-4350-6210.000	162.50	0.00	162.50

Check Amount 162.50

Check Number	Check Date / Void/Stop Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
38965	08/26/2015	0095	PETTY CASH	309.56	309.56
		Printed	PETTY CASH REIMBURSEMENT	0.00	

Ref#	GL Number	Gross	Discount	Amount
27406	201-4425-6150.000	16.33	0.00	16.33
27406	001-4020-6370.000	6.25	0.00	6.25
27406	001-4350-6585.000	54.50	0.00	54.50
27406	001-4350-6585.000	10.00	0.00	10.00
27406	001-4410-6389.000	101.62	0.00	101.62
27406	201-4425-6150.000	15.25	0.00	15.25
27406	001-4410-6140.000	105.61	0.00	105.61

Check Amount 309.56

Check Number	Check Date / Void/Stop Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
38966	08/26/2015	2802	SAM'S CLUB	127.18	127.18
		Printed	SNACK FOR CYF & CITY EVENTS	0.00	

Ref#	GL Number	Gross	Discount	Amount
27436	001-4020-6080.000	45.51	0.00	45.51
27436	710-6010-6013.000	54.46	0.00	54.46
27436	001-4350-6585.000	27.21	0.00	27.21

Check Amount 127.18

Check Number	Check Date / Void/Stop Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
38967	08/26/2015	8274	SANTOYO VICTOR	354.00	354.00
		Printed	UMPIRE JULY 2015	0.00	

Ref#	GL Number	Gross	Discount	Amount
27419	001-4350-6250.000	354.00	0.00	354.00

Check Amount 354.00

Check Number	Check Date / Void/Stop Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
38968	08/26/2015	0070	SOUTHERN CALIFORNIA EDISON	6,518.60	6,518.60
		Printed	ELECTRICITY BILLS	0.00	

Ref#	GL Number	Gross	Discount	Amount
27405	350-4430-6318.000	6,490.92	0.00	6,490.92
27405	201-4420-6318.000	27.68	0.00	27.68

Check Amount 6,518.60

Check Number	Check Date / Void/Stop Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
38969	08/26/2015	9995	THE BANK OF NEW YORK MELLON	3,598.00	3,598.00
		Printed	CUDAHY COMMUNITY DEVELOPMENT	0.00	

Ref#	GL Number	Gross	Discount	Amount
27410	610-4930-6820.000	3,300.00	0.00	3,300.00
27410	001-4930-6391.000	198.00	0.00	198.00
27410	001-4151-6710.000	100.00	0.00	100.00

Check Number	Check Date / Void/Stop Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
			Check Amount	3,598.00	
38970	08/26/2015	9991	TRANSTECH	29,360.50	29,360.50
		Printed	LUGO PARK SOCCER & RESTROOM	0.00	

Ref#	GL Number	Gross	Discount	Amount
27414	280-4410-6725.000	1,960.00	0.00	1,960.00
27449	510-7092-6725.000	21,835.90	0.00	21,835.90
27449	510-7091-6725.000	5,564.60	0.00	5,564.60

Check Amount 29,360.50

Check Number	Check Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
38971	08/26/2015	2859	UNDERGROUND SERVICE ALERT-SC	21.00	21.00
		Printed	DIG ALERT TICKETS	0.00	

Ref#	GL Number	Gross	Discount	Amount
27425	201-4425-6735.000	21.00	0.00	21.00

Check Amount 21.00

Check Number	Check Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
38972	08/26/2015	9707	VELOZ ALBERTO	213.00	213.00
		Printed	UMPIRE JULY 2015	0.00	

Ref#	GL Number	Gross	Discount	Amount
27420	001-4350-6250.000	213.00	0.00	213.00

Check Amount 213.00

Check Number	Check Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
38973	08/26/2015	8316	VELOZ RAMIRO	276.00	276.00
		Printed	UMPIRE JULY 2015	0.00	

Ref#	GL Number	Gross	Discount	Amount
27421	001-4350-6250.000	276.00	0.00	276.00

Check Amount 276.00

Check Number	Check Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
38974	08/26/2015	5631	WELLS LOCK & KEY	367.50	367.50
		Printed	KEY DUPLICATES	0.00	

Ref#	GL Number	Gross	Discount	Amount
27429	001-4020-6370.000	137.50	0.00	137.50
27430	001-4020-6370.000	65.00	0.00	65.00
27431	001-4020-6370.000	165.00	0.00	165.00

Check Amount 367.50

Check Number	Check Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
38975	08/26/2015	0197	LA COUNTY SHERIFF'S DEPARTMENT	283,421.28	283,421.28
		Printed	LAW ENFORCEMENT SERVICE JUNE	0.00	

Ref#	GL Number	Gross	Discount	Amount
27450	001-4501-6763.000	283,421.28	0.00	283,421.28

Check Amount 283,421.28

Check Number	Check Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
38976	08/26/2015	0197	LA COUNTY SHERIFF'S DEPARTMENT	60,946.64	60,946.64
		Printed	LAW ENFORCEMENT SERVICE JUNE	0.00	

Ref#	GL Number	Gross	Discount	Amount
27451	270-4501-6763.000	60,946.64	0.00	60,946.64

Check Amount 60,946.64

Check Number	Check Date	Vendor# / Status	Vendor Name / Check Description	Gross / Discount	Amount
38977	08/27/2015	9738	ARENT FOX LLP	2,000.00	2,000.00
		Printed	LEGAL SERVICES APRIL 2015	0.00	

Ref#	GL Number	Gross	Discount	Amount
27468	001-4005-6755.000	2,000.00	0.00	2,000.00

Check Number	Check Date Void/Stop Date	Vendor# Status	Vendor Name Check Description	Gross Discount	Amount
			Check Amount	2,000.00	
38978	08/27/2015	10212	ATLAS BACKFLOW	815.07	815.07
		Printed	REPAIR & RETEST BACKFLOW DEVIC	0.00	

Ref#	GL Number	Gross	Discount	Amount
27460	001-4410-6770.000	815.07	0.00	815.07

Check Amount 815.07

Check Number	Check Date	Vendor#	Vendor Name	Gross	Amount
38979	08/27/2015	8399	CABRERA JESSE	54.00	54.00
		Printed	UMPIRE JUNE 2015	0.00	

Ref#	GL Number	Gross	Discount	Amount
27454	001-4350-6250.000	54.00	0.00	54.00

Check Amount 54.00

Check Number	Check Date	Vendor#	Vendor Name	Gross	Amount
38980	08/27/2015	2167	DAILY BREEZE PRESS TELEGRAM	2,168.87	2,168.87
		Printed	CLASSIFIED ADVERTISING	0.00	

Ref#	GL Number	Gross	Discount	Amount
27461	001-4008-6310.000	369.63	0.00	369.63
27462	001-4008-6310.000	271.15	0.00	271.15
27463	001-4008-6310.000	271.15	0.00	271.15
27464	001-4008-6310.000	246.53	0.00	246.53
27465	001-4008-6310.000	443.49	0.00	443.49
27466	001-4008-6310.000	295.77	0.00	295.77
27467	001-4008-6310.000	271.15	0.00	271.15

Check Amount 2,168.87

Check Number	Check Date	Vendor#	Vendor Name	Gross	Amount
38981	08/27/2015	9680	MORENO MARK	54.00	54.00
		Printed	UMPIRE JUNE 2015	0.00	

Ref#	GL Number	Gross	Discount	Amount
27453	001-4350-6250.000	54.00	0.00	54.00

Check Amount 54.00

Check Number	Check Date	Vendor#	Vendor Name	Gross	Amount
38982	08/27/2015	10201	OLIVAREZ MADRUGA, LLP	79,048.11	79,048.11
		Printed	LEGAL SERVICES JUNE 2015	0.00	

Ref#	GL Number	Gross	Discount	Amount
27455	001-4005-6720.000	12,212.51	0.00	12,212.51
27455	610-4930-6755.000	41,389.95	0.00	41,389.95
27455	001-4930-6391.000	562.92	0.00	562.92
27455	001-4930-6755.000	4,202.50	0.00	4,202.50
27455	001-4005-6755.000	680.23	0.00	680.23
27455	001-4930-6391.000	789.75	0.00	789.75
27455	001-4005-6720.000	19,210.25	0.00	19,210.25

Check Amount 79,048.11

Check Number	Check Date	Vendor#	Vendor Name	Gross	Amount
38983	08/27/2015	0069-2	SIEMENS INDUSTRY, INC.	1,820.06	1,820.06
		Printed	TRAFFIC SIGNAL RESPONSES JUNE	0.00	

Ref#	GL Number	Gross	Discount	Amount
27457	350-4430-6775.000	783.25	0.00	783.25
27458	201-4420-6771.000	674.61	0.00	674.61
27459	201-4420-6771.000	362.20	0.00	362.20

Check Amount 1,820.06

Check Number	Check Date Void/Stop Date	Vendor# Status	Vendor Name Check Description	Gross Discount	Amount
38984	08/27/2015	10320	THE REGENTS OF THE UNIVERSITY	1,634.92	1,634.92
		Printed	STRATEGIC GROWTH COUNCIL	0.00	

Ref#	GL Number	Gross	Discount	Amount
27452	235-4215-6720.000	1,634.92	0.00	1,634.92

Check Amount 1,634.92

Check Number	Check Date Void/Stop Date	Vendor# Status	Vendor Name Check Description	Gross Discount	Amount
38985	08/27/2015	9991	TRANSTECH	240.00	240.00
		Printed	CUDAHY CITYWIDE STREET IMPROV	0.00	

Ref#	GL Number	Gross	Discount	Amount
27456	240-7080-6745.000	240.00	0.00	240.00

Check Amount 240.00

Total Checks:	**108**	**Bank Total(excluding void checks):**	**788,472.84**
Total Checks:	**108**	**Grand Total(excluding void checks):**	**788,472.84**

Attachment B

CITY OF CUDAHY

Payroll Warrants including payroll taxes and insurance premiums:

	August 6, 2015	August 20, 2015
Issued Warrants Number	19992 - 20051	20052 - 20102
Voided Warrants		
`	$ 6,276.66	$ 11,253.97
Direct Deposits (a)	51,518.81	50,741.72
CalPERS Direct Deposit (b)	25,323.69	
CalPERS Direct Deposit (c)	12,602.10	
Payroll taxes (d)	11,491.67	11,697.96
Total Amount	$ 107,212.93	$ 73,693.65
Note (a) - Employess / Council Members / Commissioners		
Note (b) - Payments for CalPERS medical insurance		
Note (c) - Payments for CalPERS retirement contributions		
Note (d) - Federal and State payroll taxes		

Attachment C

CITY OF CUDAHY

Cash and Investment Report by Fund August 2015

		July 1, 2015	Receipts YTD	Disbursements YTD	August 31, 2015	Receipts August 2015	Disbursements August 2015
001	General Fund	4,247,904.27	765,444.42	2,336,072.23	2,677,276.46	310,212.35	649,764.75
040	Drug Assets Seizure Fund	28,512.43	1,651.38	1,236.65	28,927.16	1,631.14	
201	State Gas Tax	1,131,489.38	66,401.80	122,825.02	1,075,066.16		65,027.40
235	Other Grants	-	0.00	14,740.86	(14,740.86)		14,740.86
240	Prop 1 B - Local Street Improv.	426,851.03	254.23	12,987.50	414,117.76		240.00
251	Prop C	303,062.72	61,981.71	109,936.07	255,108.36	35,110.59	20,866.45
252	Prop A	528,808.59	68,841.06	14,457.78	583,191.87	38,996.09	9,459.81
253	Measure R	674,025.63	43,086.75	88,983.63	628,128.75	24,417.90	6,387.70
255	TDA	21,297.00	0.00	21,297.00	-		
257	AQMD	39,132.03	22.00	2,309.48	36,844.55		
260	Used Oil	13,582.26	8.09	-	13,590.35		
261	California Beverage Container	6,723.30	4.00	-	6,727.30		
265	Recycling Grant	14,223.41	8.47	-	14,231.88		
270	C.O.P.S	183,838.19	112.88	64,361.24	119,589.83		60,946.64
280	County Park Bond	(149,084.19)	1,064.85	12,785.70	(160,805.04)		10,571.78
300	CAL Home	73,368.33	5,044.01	400.00	78,012.34		
350	Street Lighting Fund	54,101.62	2,167.87	24,652.25	31,617.24	1,421.40	7,534.42
510	CDBG	(123,218.86)	144,542.56	71,121.92	(49,798.22)	112,418.56	56,936.56
515	Federal STPL	357,690.30	213.02	-	357,903.32		
610	Successor Agency	2,376,586.79	0.00	65,383.98	2,311,202.81		63,378.03
710	Youth Foundation	29,230.04	11,403.22	2,839.56	37,793.70	123.55	2,647.31
720	Senior's Account	132.80	0.00	-	132.80		
730	Refuse Assessment	-	6,034.07	4,555.94	1,478.13	1,478.13	4,555.94
		10,238,257.07	1,178,286.39	2,970,946.81	8,445,596.65	525,809.71	973,057.65
	LAIF- CITY	7,170,945.82	4,672.93	1,300,000.00	5,875,618.75		
	Wells Fargo	3,067,311.31	1,173,613.46	1,670,946.81	2,569,977.96	525,809.71	973,057.65
	TOTAL	10,238,257.13	1,178,286.39	2,970,946.81	8,445,596.71	525,809.71	973,057.65

Total cash disbursements per August Demand and Payroll Reports	
AP disbursements	788,472.84
Payroll - August 6, 2015	107,212.93
Payroll - August 20, 2015	73,693.65
Add: Total Bank charges in August 2015	1,085.38
Add: Credit card charges - sales and user tax paid for CYF	2,592.85
Total Cash Disbursements per August Cash & Investment Report	973,057.65

City of Cudahy **Attachment D**

Summary of Cash Receipt/Disbursement by Month - FY2015

Date	All Funds			
	Cash Receipts		Disbursement	
July 2014	720,490.40		923,923.80	
August 2014	382,106.70		767,879.72	
September 2014	1,424,972.65		3,160,792.70	(b)
October 2014	471,491.06		786,581.62	
November 2014	421,325.22		691,734.37	
December 2014	850,582.56		892,504.79	
January 2015	3,491,089.91	(a)	1,051,651.89	
February 2015	599,153.80		696,856.77	
March 2015	862,605.62		2,192,685.05	(b)
April 2015	743,355.21		1,191,614.05	
May 2015	2,482,941.72		1,275,339.77	
June 2015	2,466,462.02	(a)	588,400.14	
Total:	14,916,576.87		14,219,964.67	

Note (a) - ROPS distribution from County included
Note (b) - ROPS payment included

Date	General Fund		
	Cash Receipts		Disbursement
July 2014	471,300.02		781,449.52
August 2014	260,467.68		611,378.49
September 2014	940,546.11		303,299.61
October 2014	292,356.65		626,514.92
November 2014	284,522.66		533,804.16
December 2014	357,716.42		704,427.61
January 2015	1,807,086.34	(1)	686,616.47
February 2015	361,051.74		261,378.22
March 2015	205,294.22		928,588.38
April 2015	368,848.22		619,116.39
May 2015	2,025,604.57	(1)	656,597.18
June 2015	214,465.92		284,937.60
Total:	7,589,260.55		6,998,108.55
Average Per Month:	632,438.38		583,175.71

Note (1) - bi-annual motor-vehicle-in-lieu included

Item Number
10B

STAFF REPORT

Date: October 12, 2015

To: Honorable Mayor/Chair and City Council/Agency Members

From: Jose E. Pulido, City Manager/Executive Director
By: Steven Dobrenen, Finance Director

Subject: **Consideration to Approve the Local Agency Investment Fund (LAIF) for the Month of August 2015**

RECOMMENDATION

The City Council is requested to approve the Local Agency Investment Fund (LAIF) Report for the month of August 2015 in the amount of $5,875,618.75.

BACKGROUND

1. In 1955, the Pooled Money Investment Account (PMIA) started. LAIF became part of the PMIA. The oversight is provided by the Pooled Money Investment Board (PMIB) and an in-house Investment Committee. The PMIB members consist of the State Treasurer, Director of Finance, and State Controller.

2. In 1977, LAIF was created as a voluntary program by Section 16429.1 et seq. of the California Government Code. The program was intended to be used as an investment alternative for California's local governments and special districts. The LAIF continues today under State Treasurer John Chiang's administration.

3. On August 1, 2015, the balance in LAIF was $5,875,618.75 (Attachment A).

4. On August 31, 2015, the balance in LAIF was $5,875,618.75 (Attachment A). Interest is distributed quarterly and will be received in October 2016.

ANALYSIS

The voluntary program offers local agencies the opportunity to participate in a major portfolio, which invests hundreds of millions of dollars, using the investment expertise of the State Treasurer's Office investment staff at no additional cost to the taxpayer.

All securities are purchased under the authority of Government Code Section 16430 and 16480.4. The State Treasurer's Office takes delivery of all securities purchased on a delivery versus payment basis using a third party custodian.

Cudahy Municipal Code Section 3.04.080 indicates, "Except as otherwise provided, no warrant shall be drawn or evidence of indebtedness issued unless there shall be at the time sufficient money in the treasury legally applicable to the payment of the same."

The report in Attachment A, in conjunction with the Demands and Payroll including the Investment Report by Fund for the month of August 2015, demonstrates the sufficiency of funds available to pay demands and payroll as required by Cudahy Municipal Code Section 3.04.080.

CONCLUSION

Once the City Council approves the August 2015 LAIF, the LAIF ending balance may be relied upon when determining whether or not there are sufficient funds available to pay demands and payroll as required by Cudahy Municipal Code Section 3.04.080.

FINANCIAL IMPACT

None.

ATTACHMENT

A. Local Agency Investment Fund Balance
B. Monthly Pooled Money Investment Report – August 2015

Attachment A

LOCAL AGENCY INVESTMENT FUND

General Account - City #98-19-225

Beginning Balance as of:	**August 01, 2015**	**$5,875,618.75**
Ending Balance as of	**August 31, 2015**	**$5,875,618.75**
		===========

John Chiang

Treasurer

State of California

POOLED MONEY INVESTMENT BOARD REPORT

AUGUST 31, 2015

STATE OF CALIFORNIA
STATE TREASURER'S OFFICE

POOLED MONEY INVESTMENT BOARD REPORT

AUGUST 2015

TABLE OF CONTENTS

POOLED MONEY INVESTMENT ACCOUNT

Summary of Investment Data
A Comparison of August 2015 with August 2014
(DOLLARS IN THOUSANDS)

	August 2015	August 2014	Change
Average Daily Portfolio ($)	65,521,420	54,142,620	+11,378,800
Accrued Earnings ($)	18,287	11,971	+6,316
Effective Yield (%)	0.330	0.260	+0.07
Average Life-Month End (In Days)	216	233	-17
Total Security Transactions			
Amount ($)	15,978,051	14,580,390	+1,397,661
Number	320	292	+28
Total Time Deposit Transactions			
Amount ($)	2,009,080	1,440,500	+568,580
Number	105	83	+22
Average Workday Investment Activity ($)	856,530	762,900	+93,630
Prescribed Demand Account Balances			
For Services ($)	2,038,700	2,076,199	-37,499

JOHN CHIANG
TREASURER
STATE OF CALIFORNIA

Investment Division Selected Investment Data
Analysis of the Pooled Money Investment Account Portfolio
(DOLLARS IN THOUSANDS)

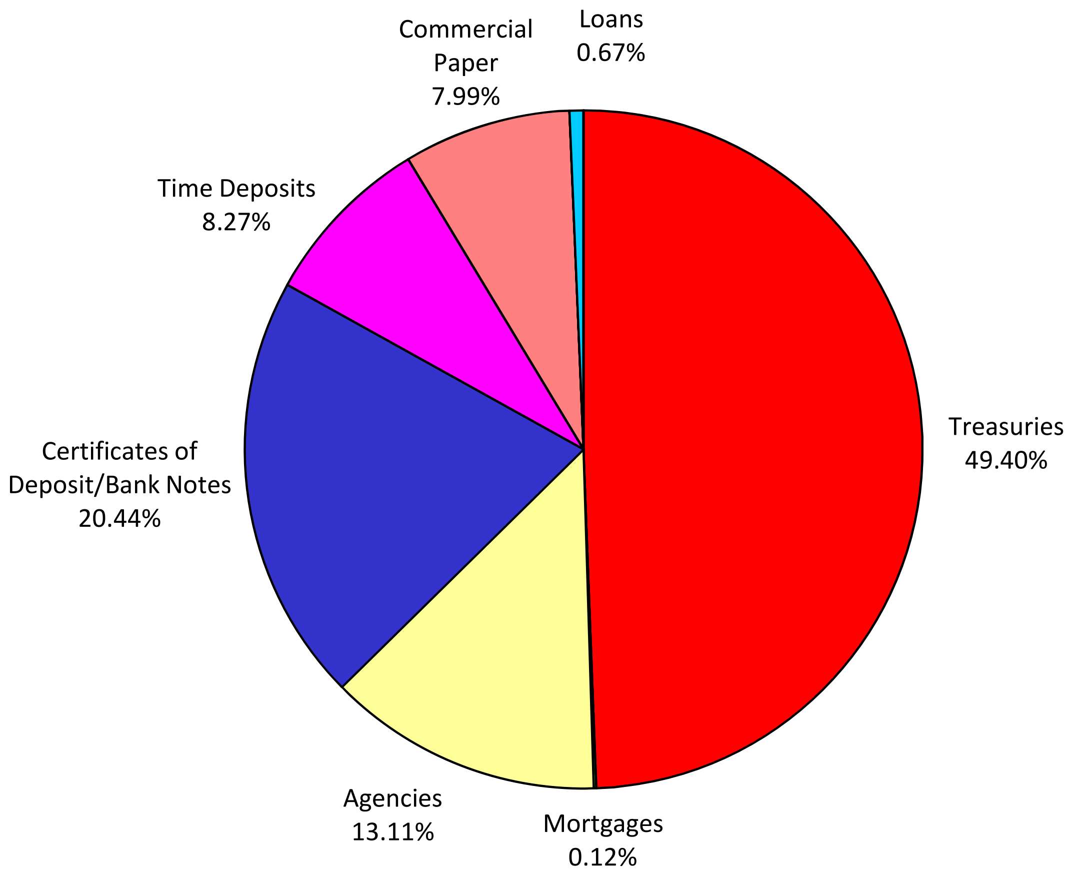
August 31, 2015

TYPE OF SECURITY	AMOUNT ($)	PERCENT OF PORTFOLIO	DIFFERENCE IN PERCENT OF PORTFOLIO FROM PRIOR MONTH
Government			
Bills	12,474,864	18.54	+0.35
Bonds	0	0.00	0
Notes	20,755,809	30.86	-0.77
Strips	0	0.00	0
Total Government	33,230,673	49.40	-0.42
Agency Debentures	1,974,927	2.94	+0.04
Certificates of Deposit	13,050,015	19.40	-0.20
Bank Notes	700,000	1.04	-0.03
Repurchases	0	0.00	0
Agency Discount Notes	6,537,401	9.72	-0.29
Time Deposits	5,561,540	8.27	-0.13
GNMAs	0	0.00	0
Commercial Paper	5,371,344	7.99	+1.21
FHLMC/Remics	83,266	0.12	-0.01
Corporate Bonds	0	0.00	0
AB 55 Loans	453,820	0.67	-0.01
GF Loans	0	0.00	0
Other	299,962	0.45	-0.16
Reversed Repurchases	0	0.00	0
Total (All Types)	67,262,948	100.00	

INVESTMENT ACTIVITY

	August 2015		July 2015	
	NUMBER	AMOUNT ($)	NUMBER	AMOUNT ($)
Pooled Money	320	15,978,051	471	23,437,210
Other	36	1,446,634	13	77,771
Time Deposits	105	2,009,080	155	4,114,000
Total	461	19,433,765	639	27,628,981
PMIA Monthly Average Effective Yield (%)	0.330		0.320	
Year to Date Yield Last Day of Month (%)	0.325		0.320	

Pooled Money Investment Account
Portfolio Composition
$67.3 billion
8/31/15



INVESTMENT TRANSACTIONS

DATE	a/ TYPE	DESCRIPTION	CPN (%)	MATURITY DATE	TRANS YIELD (%)	PAR ($) (000)	DAYS HELD	AMOUNT EARNED ($)	EFFECTIVE YIELD (%)
08/03/15	**REDEMPTIONS**								
	CP	TD USA		08/03/15	0.130	50,000	47	8,486.11	0.132
	CP	TD USA		08/03/15	0.130	50,000	47	8,486.11	0.132
	CP	TD USA		08/03/15	0.130	50,000	47	8,486.11	0.132
	CP	TD USA		08/03/15	0.130	50,000	47	8,486.11	0.132
	CP	BARTON		08/03/15	0.180	50,000	59	14,750.00	0.183
	CP	BARTON		08/03/15	0.180	50,000	59	14,750.00	0.183
	CP	BARCLY US		08/03/15	0.300	50,000	110	45,833.33	0.304
	CP	BARCLY US		08/03/15	0.300	50,000	110	45,833.33	0.304
	CP	BARCLY US		08/03/15	0.300	50,000	110	45,833.33	0.304
	CP	BARCLY US		08/03/15	0.300	50,000	110	45,833.33	0.304
	CP	TOYOTA		08/03/15	0.210	50,000	159	46,375.00	0.213
	CP	TOYOTA		08/03/15	0.210	50,000	159	46,375.00	0.213
	CP	CRC		08/03/15	0.260	50,000	180	65,000.00	0.264
	CP	CRC		08/03/15	0.260	50,000	180	65,000.00	0.264
	YCD	BNP	0.130	08/03/15	0.130	50,000	13	2,347.22	0.132
	YCD	BNP	0.130	08/03/15	0.130	50,000	13	2,347.22	0.132
	YCD	BNP	0.180	08/03/15	0.180	50,000	54	13,500.00	0.183
	YCD	BNP	0.180	08/03/15	0.180	50,000	54	13,500.00	0.183
	YCD	DNB	0.130	08/03/15	0.130	50,000	56	10,111.11	0.132
	YCD	DNB	0.130	08/03/15	0.130	50,000	56	10,111.11	0.132
	YCD	NORINCHUK	0.190	08/03/15	0.190	50,000	56	14,777.78	0.193
	YCD	NORINCHUK	0.190	08/03/15	0.190	50,000	56	14,777.78	0.193
	YCD	DNB	0.130	08/03/15	0.130	50,000	60	10,833.33	0.132
	YCD	DNB	0.130	08/03/15	0.130	50,000	60	10,833.33	0.132
	YCD	SOC GEN	0.200	08/03/15	0.200	50,000	60	16,666.67	0.203
	YCD	SOC GEN	0.200	08/03/15	0.200	50,000	60	16,666.67	0.203
	YCD	NORDEA	0.185	08/03/15	0.185	50,000	95	24,409.72	0.188
	YCD	NORDEA	0.185	08/03/15	0.185	50,000	95	24,409.72	0.188
08/03/15	**PURCHASES**								
	CP	TD USA		09/01/15	0.130	50,000			
	CP	TD USA		09/01/15	0.130	50,000			
	CP	GECC		09/02/15	0.100	50,000			
	CP	BARTON		09/30/15	0.220	50,000			
	CP	BARCLY US		11/02/15	0.250	50,000			
	CP	BARCLY US		11/02/15	0.250	50,000			
	YCD	DNB	0.120	08/11/15	0.120	50,000			
	YCD	DNB	0.120	08/11/15	0.120	50,000			
	YCD	NORINCHUK	0.170	09/01/15	0.170	50,000			
	YCD	NORINCHUK	0.170	09/01/15	0.170	50,000			
	YCD	NORINCHUK	0.170	09/01/15	0.170	50,000			
	YCD	LLOYDS	0.150	09/02/15	0.150	50,000			
	YCD	LLOYDS	0.150	09/02/15	0.150	50,000			
08/04/15	**REDEMPTIONS**								
	CP	MUFG UNION		08/04/15	0.130	50,000	6	1,083.33	0.132
	CP	MUFG UNION		08/04/15	0.130	50,000	6	1,083.33	0.132

INVESTMENT TRANSACTIONS

DATE	TYPE a/	DESCRIPTION	CPN (%)	MATURITY DATE	TRANS YIELD (%)	PAR ($) (000)	DAYS HELD	AMOUNT EARNED ($)	EFFECTIVE YIELD (%)
08/04/15	**REDEMPTIONS (Continued)**								
	CP	GE CO		08/04/15	0.080	50,000	20	2,222.22	0.081
	CP	GE CO		08/04/15	0.080	50,000	20	2,222.22	0.081
08/04/15	**NO PURCHASES**								
08/05/15	**NO REDEMPTIONS**								
08/05/15	**PURCHASES**								
	CP	GECC		08/14/15	0.100	50,000			
	CP	GECC		08/14/15	0.100	50,000			
	YCD	SOC GEN	0.130	08/18/15	0.130	50,000			
	YCD	SOC GEN	0.130	08/18/15	0.130	50,000			
08/06/15	**NO REDEMPTIONS**								
08/06/15	**PURCHASES**								
	CP	TOYOTA		09/24/15	0.160	50,000			
	CP	CAFCO		02/01/16	0.460	50,000			
	CP	CAFCO		02/01/16	0.460	50,000			
	TR	BILL		07/21/16	0.328	50,000			
	TR	BILL		07/21/16	0.328	50,000			
	YCD	NORINCHUK	0.170	09/08/15	0.170	50,000			
	YCD	NORINCHUK	0.170	09/08/15	0.170	50,000			
08/07/15	**REDEMPTIONS**								
	CD	MUFG UNION	0.150	08/07/15	0.150	50,000	36	7,500.00	0.152
	CD	MUFG UNION	0.150	08/07/15	0.150	50,000	36	7,500.00	0.152
	YCD	SOC GEN	0.110	08/07/15	0.110	50,000	7	1,069.44	0.112
	YCD	SOC GEN	0.110	08/07/15	0.110	50,000	7	1,069.44	0.112
	YCD	TOYKO-MIT	0.100	08/07/15	0.100	50,000	8	1,111.11	0.101
	YCD	TOYKO-MIT	0.100	08/07/15	0.100	50,000	8	1,111.11	0.101
	YCD	TOYKO-MIT	0.100	08/07/15	0.100	50,000	8	1,111.11	0.101
08/07/15	**PURCHASES**								
	CP	GE CO		09/02/15	0.100	50,000			
	CP	GE CO		09/02/15	0.100	50,000			
	CP	TOYOTA		10/26/15	0.230	50,000			
	CP	TOYOTA		10/26/15	0.230	50,000			
08/10/15	**REDEMPTIONS**								
	CP	BARTON		08/10/15	0.180	50,000	54	13,500.00	0.183
	YCD	BNP	0.100	08/10/15	0.100	50,000	10	1,388.89	0.101
	YCD	BNP	0.100	08/10/15	0.100	50,000	10	1,388.89	0.101

INVESTMENT TRANSACTIONS

DATE	a/ TYPE	DESCRIPTION	CPN (%)	MATURITY DATE	TRANS YIELD (%)	PAR ($) (000)	DAYS HELD	AMOUNT EARNED ($)	EFFECTIVE YIELD (%)
08/10/15	**REDEMPTIONS (Continued)**								
	YCD	SUMITOMO	0.150	08/10/15	0.150	50,000	14	2,916.67	0.152
	YCD	SUMITOMO	0.150	08/10/15	0.150	50,000	14	2,916.67	0.152
	YCD	SUMITOMO	0.150	08/10/15	0.150	50,000	14	2,916.67	0.152
	YCD	SUMITOMO	0.160	08/10/15	0.160	50,000	18	4,000.00	0.162
	YCD	SUMITOMO	0.160	08/10/15	0.160	50,000	18	4,000.00	0.162
	YCD	MONTREAL	0.060	08/10/15	0.060	50,000	20	1,666.67	0.061
	YCD	MONTREAL	0.060	08/10/15	0.060	50,000	20	1,666.67	0.061
	YCD	DNB	0.110	08/10/15	0.110	50,000	20	3,055.56	0.112
	YCD	DNB	0.110	08/10/15	0.110	50,000	20	3,055.56	0.112
	YCD	TOYKO-MIT	0.140	08/10/15	0.140	50,000	20	3,888.89	0.142
	YCD	TOYKO-MIT	0.140	08/10/15	0.140	50,000	20	3,888.89	0.142
	YCD	BNP	0.140	08/10/15	0.140	50,000	21	4,083.33	0.142
	YCD	BNP	0.140	08/10/15	0.140	50,000	21	4,083.33	0.142
	YCD	TOYKO-MIT	0.150	08/10/15	0.150	50,000	24	5,000.00	0.152
	YCD	TOYKO-MIT	0.150	08/10/15	0.150	50,000	24	5,000.00	0.152
08/10/15	**PURCHASES**								
	YCD	MONTREAL	0.130	09/04/15	0.130	50,000			
	YCD	BNP	0.150	09/08/15	0.150	50,000			
	YCD	BNP	0.150	09/08/15	0.150	50,000			
08/11/15	**REDEMPTIONS**								
	YCD	DNB	0.120	08/11/15	0.120	50,000	8	1,333.33	0.122
	YCD	DNB	0.120	08/11/15	0.120	50,000	8	1,333.33	0.122
	YCD	MONTREAL	0.060	08/11/15	0.060	50,000	21	1,750.00	0.061
	YCD	MONTREAL	0.060	08/11/15	0.060	50,000	21	1,750.00	0.061
	YCD	BNP	0.140	08/11/15	0.140	50,000	21	4,083.33	0.142
	YCD	BNP	0.140	08/11/15	0.140	50,000	21	4,083.33	0.142
	YCD	LLOYDS	0.140	08/11/15	0.140	50,000	25	4,861.11	0.142
	YCD	LLOYDS	0.140	08/11/15	0.140	50,000	25	4,861.11	0.142
08/11/15	**PURCHASES**								
	CP	GECC		09/04/15	0.110	50,000			
	CP	GECC		09/04/15	0.110	50,000			
	CP	GECC		09/04/15	0.110	50,000			
	CP	GECC		09/04/15	0.110	50,000			
	YCD	SUMITOMO	0.160	09/02/15	0.160	50,000			
	YCD	SUMITOMO	0.160	09/02/15	0.160	50,000			
	YCD	BNP	0.140	09/04/15	0.140	50,000			
	YCD	BNP	0.140	09/04/15	0.140	50,000			
	YCD	MONTREAL	0.130	09/08/15	0.130	50,000			
	YCD	MONTREAL	0.130	09/08/15	0.130	50,000			
	YCD	SE BANKEN	0.240	11/02/15	0.240	50,000			
	YCD	SE BANKEN	0.240	11/02/15	0.240	50,000			
08/12/15	**NO REDEMPTIONS**								

INVESTMENT TRANSACTIONS

DATE	a/ TYPE	DESCRIPTION	CPN (%)	MATURITY DATE	TRANS YIELD (%)	PAR ($) (000)	DAYS HELD	AMOUNT EARNED ($)	EFFECTIVE YIELD (%)
08/12/15	PURCHASES								
	YCD	TOKYO-MIT	0.170	09/09/15	0.170	50,000			
	YCD	TOKYO-MIT	0.170	09/09/15	0.170	50,000			
	YCD	CIBC	0.140	09/28/15	0.140	50,000			
	YCD	CIBC	0.140	09/28/15	0.140	50,000			
08/13/15	NO REDEMPTIONS								
08/13/15	PURCHASES								
	CP	MUFG UNION		08/19/15	0.110	50,000			
	CP	MUFG UNION		08/19/15	0.110	50,000			
	TR	BILL		07/21/16	0.355	50,000			
	TR	BILL		07/21/16	0.355	50,000			
	YCD	SWEDBANK	0.130	09/09/15	0.130	50,000			
	YCD	SWEDBANK	0.130	09/09/15	0.130	50,000			
	YCD	MONTREAL	0.130	09/28/15	0.130	50,000			
	YCD	MONTREAL	0.130	09/28/15	0.130	50,000			
	YCD	TOKYO-MIT	0.180	09/28/15	0.180	50,000			
	YCD	TOKYO-MIT	0.180	09/28/15	0.180	50,000			
08/14/15	REDEMPTIONS								
	CP	GECC		08/14/15	0.100	50,000	9	1,250.00	0.101
	CP	GECC		08/14/15	0.100	50,000	9	1,250.00	0.101
	YCD	SUMITOMO	0.160	08/14/15	0.160	50,000	24	5,333.33	0.162
	YCD	SUMITOMO	0.160	08/14/15	0.160	50,000	24	5,333.33	0.162
	YCD	SE BANKEN	0.110	08/14/15	0.110	50,000	29	4,430.56	0.112
	YCD	SE BANKEN	0.110	08/14/15	0.110	50,000	29	4,430.56	0.112
	YCD	NORINCHUK	0.160	08/14/15	0.160	50,000	29	6,444.44	0.162
	YCD	NORINCHUK	0.160	08/14/15	0.160	50,000	29	6,444.44	0.162
08/14/15	PURCHASES								
	YCD	BNP	0.130	08/31/15	0.130	50,000			
	YCD	BNP	0.130	08/31/15	0.130	50,000			
08/17/15	NO REDEMPTIONS								
08/17/15	PURCHASES								
	CP	GE CO		08/28/15	0.100	50,000			
	CP	GE CO		08/28/15	0.100	50,000			
	CP	GE CO		08/28/15	0.100	50,000			
	YCD	RABOBANK	0.140	08/31/15	0.140	50,000			
	YCD	RABOBANK	0.140	08/31/15	0.140	50,000			
08/18/15	REDEMPTIONS								
	YCD	SOC GEN	0.130	08/18/15	0.130	50,000	13	2,347.22	0.132
	YCD	SOC GEN	0.130	08/18/15	0.130	50,000	13	2,347.22	0.132

INVESTMENT TRANSACTIONS

DATE	a/ TYPE	DESCRIPTION	CPN (%)	MATURITY DATE	TRANS YIELD (%)	PAR ($) (000)	DAYS HELD	AMOUNT EARNED ($)	EFFECTIVE YIELD (%)
08/18/15	**REDEMPTIONS (Continued)**								
	YCD	BNP	0.130	08/18/15	0.130	50,000	20	3,611.11	0.132
	YCD	BNP	0.130	08/18/15	0.130	50,000	20	3,611.11	0.132
08/18/15	**PURCHASES**								
	CP	OLD LINE		11/18/15	0.270	50,000			
	YCD	SUMITOMO	0.140	08/28/15	0.140	50,000			
	YCD	SUMITOMO	0.140	08/28/15	0.140	50,000			
	YCD	SOC GEN	0.140	08/31/15	0.140	50,000			
	YCD	SOC GEN	0.140	08/31/15	0.140	50,000			
	YCD	SOC GEN	0.140	08/31/15	0.140	50,000			
	YCD	SOC GEN	0.140	08/31/15	0.140	50,000			
	YCD	BNP	0.150	08/31/15	0.150	50,000			
08/19/15	**REDEMPTIONS**								
	CP	MUFG UNION		08/19/15	0.110	50,000	6	916.67	0.112
	CP	MUFG UNION		08/19/15	0.110	50,000	6	916.67	0.112
	CP	CRC		08/19/15	0.140	50,000	37	7,194.44	0.142
	CP	CRC		08/19/15	0.140	50,000	37	7,194.44	0.142
	YCD	TOYKO-MIT	0.150	08/19/15	0.150	50,000	22	4,583.33	0.152
	YCD	TOYKO-MIT	0.150	08/19/15	0.150	50,000	22	4,583.33	0.152
	YCD	MIZUHO	0.200	08/19/15	0.200	50,000	64	17,777.78	0.203
	YCD	MIZUHO	0.200	08/19/15	0.200	50,000	64	17,777.78	0.203
	YCD	MIZUHO	0.200	08/19/15	0.200	50,000	64	17,777.78	0.203
	YCD	MIZUHO	0.200	08/19/15	0.200	50,000	64	17,777.78	0.203
	YCD	NORINCHUK	0.250	08/19/15	0.250	50,000	97	33,680.56	0.253
	YCD	NORINCHUK	0.250	08/19/15	0.250	50,000	97	33,680.56	0.253
08/19/15	**PURCHASES**								
	TR	BILL		07/21/16	0.358	50,000			
	TR	BILL		07/21/16	0.358	50,000			
08/20/15	**REDEMPTIONS**								
	TR	BILL		08/20/15	0.104	50,000	364	52,577.78	0.106
	TR	BILL		08/20/15	0.104	50,000	364	52,577.78	0.106
	TR	BILL		08/20/15	0.110	50,000	364	55,611.11	0.112
	TR	BILL		08/20/15	0.110	50,000	364	55,611.11	0.112
	TR	BILL		08/20/15	0.110	50,000	364	55,611.11	0.112
	TR	BILL		08/20/15	0.110	50,000	364	55,611.11	0.112
08/20/15	**PURCHASES**								
	CP	GE CO		09/08/15	0.100	50,000			
	CP	NISSAN		09/28/15	0.340	50,000			
	TR	BILL		08/18/16	0.410	50,000			
	TR	BILL		08/18/16	0.410	50,000			

INVESTMENT TRANSACTIONS

DATE	a/ TYPE	DESCRIPTION	CPN (%)	MATURITY DATE	TRANS YIELD (%)	PAR ($) (000)	DAYS HELD	AMOUNT EARNED ($)	EFFECTIVE YIELD (%)
08/20/15	**PURCHASES (Continued)**								
	YCD	BNP	0.140	08/27/15	0.140	50,000			
	YCD	BNP	0.140	08/27/15	0.140	50,000			
	YCD	TOKYO-MIT	0.130	08/28/15	0.130	50,000			
	YCD	TOKYO-MIT	0.130	08/28/15	0.130	50,000			
	YCD	MONTREAL	0.140	08/31/15	0.140	50,000			
	YCD	MONTREAL	0.140	08/31/15	0.140	50,000			
	YCD	CIBC	0.130	09/01/15	0.130	50,000			
	YCD	CIBC	0.130	09/01/15	0.130	50,000			
	YCD	DNB	0.140	09/28/15	0.140	50,000			
	YCD	DNB	0.140	09/28/15	0.140	50,000			
	YCD	SE BANKEN	0.120	10/01/15	0.120	50,000			
	YCD	SE BANKEN	0.120	10/01/15	0.120	50,000			
08/21/15	**NO REDEMPTIONS**								
08/21/15	**PURCHASES**								
	CD	MUFG UNION	0.200	10/01/15	0.200	50,000			
	CD	MUFG UNION	0.200	10/01/15	0.200	50,000			
	YCD	TORONTO	0.170	09/28/15	0.170	50,000			
	YCD	TORONTO	0.170	09/28/15	0.170	50,000			
	YCD	NORINCHUK	0.180	09/28/15	0.180	50,000			
	YCD	NORINCHUK	0.180	09/28/15	0.180	50,000			
	YCD	SOC GEN	0.180	10/01/15	0.180	50,000			
	YCD	SOC GEN	0.180	10/01/15	0.180	50,000			
08/24/15	**REDEMPTIONS**								
	DEB	IBRD	0.375	08/24/15	0.390	50,000	732	391,011.16	0.390
	DEB	IBRD	0.375	08/24/15	0.390	50,000	732	391,011.16	0.390
08/24/15	**PURCHASES**								
	CD	US BANK	0.160	12/01/15	0.160	50,000			
	CD	US BANK	0.160	12/01/15	0.160	50,000			
	CP	MUFG UNION		09/24/15	0.140	50,000			
	CP	TD USA		09/28/15	0.170	50,000			
	CP	TD USA		09/28/15	0.170	50,000			
	CP	NISSAN		10/01/15	0.350	50,000			
	DEB	FFCB	0.750	04/24/17	0.750	50,000			
	SBA FR	POOL #509697	0.400	09/25/40	0.400	32,356			
	YCD	MONTREAL	0.140	09/21/15	0.140	50,000			
	YCD	SUMITOMO	0.190	09/24/15	0.190	50,000			
	YCD	SUMITOMO	0.190	09/24/15	0.190	50,000			
	YCD	TOKYO-MIT	0.190	09/28/15	0.190	50,000			
	YCD	TOKYO-MIT	0.190	09/28/15	0.190	50,000			
	YCD	NORDEA	0.280	12/01/15	0.280	50,000			
	YCD	NORDEA	0.280	12/01/15	0.280	50,000			

INVESTMENT TRANSACTIONS

DATE	a/ TYPE	DESCRIPTION	CPN (%)	MATURITY DATE	TRANS YIELD (%)	PAR ($) (000)	DAYS HELD	AMOUNT EARNED ($)	EFFECTIVE YIELD (%)
08/24/15	**PURCHASES (Continued)**								
	YCD	MIZUHO	0.320	12/01/15	0.320	50,000			
	YCD	MIZUHO	0.320	12/01/15	0.320	50,000			
08/25/15	**NO REDEMPTIONS**								
08/25/15	**PURCHASES**								
	CP	BARCLY US		09/21/15	0.130	50,000			
	CP	BARCLY US		09/21/15	0.130	50,000			
	CP	GE CO		09/24/15	0.120	50,000			
	CP	GE CO		09/24/15	0.120	50,000			
	CP	TOYOTA		11/02/15	0.250	50,000			
	CP	TOYOTA		01/27/16	0.400	50,000			
	CP	CRC		02/17/16	0.480	50,000			
	TR	BILL		08/18/16	0.328	50,000			
	TR	BILL		08/18/16	0.328	50,000			
	TR	BILL		08/18/16	0.328	50,000			
	TR	BILL		08/18/16	0.328	50,000			
	TR	BILL		08/18/16	0.330	50,000			
	TR	BILL		08/18/16	0.330	50,000			
	TR	BILL		08/18/16	0.330	50,000			
	TR	BILL		08/18/16	0.330	50,000			
	YCD	DNB	0.140	09/24/15	0.140	50,000			
	YCD	DNB	0.140	09/24/15	0.140	50,000			
	YCD	DNB	0.140	09/24/15	0.140	50,000			
	YCD	DNB	0.140	09/24/15	0.140	50,000			
	YCD	BARCLAYS	0.130	09/28/15	0.130	50,000			
	YCD	BARCLAYS	0.130	09/28/15	0.130	50,000			
	YCD	SWEDBANK	0.130	09/28/15	0.130	50,000			
	YCD	SWEDBANK	0.130	09/28/15	0.130	50,000			
	YCD	SWEDBANK	0.130	09/28/15	0.130	50,000			
	YCD	SWEDBANK	0.130	09/28/15	0.130	50,000			
	YCD	BNP	0.170	09/30/15	0.170	50,000			
	YCD	BNP	0.170	09/30/15	0.170	50,000			
	YCD	TORONTO	0.190	11/02/15	0.190	50,000			
	YCD	TORONTO	0.190	11/02/15	0.190	50,000			
	YCD	TORONTO	0.190	11/02/15	0.190	50,000			
08/26/15	**NO REDEMPTIONS**								
08/26/15	**PURCHASES**								
	CD	MUFG UNION	0.160	10/01/15	0.160	50,000			
	CD	MUFG UNION	0.160	10/01/15	0.160	50,000			
	CD	MUFG UNION	0.160	10/01/15	0.160	50,000			
	YCD	SE BANKEN	0.110	09/21/15	0.110	50,000			
	YCD	SE BANKEN	0.110	09/21/15	0.110	50,000			
	YCD	SUMITOMO	0.190	09/24/15	0.190	50,000			
	YCD	SUMITOMO	0.190	09/24/15	0.190	50,000			

INVESTMENT TRANSACTIONS

DATE	TYPE a/	DESCRIPTION	CPN (%)	MATURITY DATE	TRANS YIELD (%)	PAR ($) (000)	DAYS HELD	AMOUNT EARNED ($)	EFFECTIVE YIELD (%)
08/26/15	**PURCHASES (Continued)**								
	YCD	NORINCHUK	0.170	09/30/15	0.170	50,000			
	YCD	NORINCHUK	0.170	09/30/15	0.170	50,000			
08/27/15	**REDEMPTIONS**								
	CP	GECC		08/27/15	0.100	50,000	36	5,000.00	0.101
	CP	GECC		08/27/15	0.100	50,000	36	5,000.00	0.101
	CP	GECC		08/27/15	0.100	50,000	36	5,000.00	0.101
	CP	GECC		08/27/15	0.100	50,000	38	5,277.78	0.101
	YCD	BNP	0.140	08/27/15	0.140	50,000	7	1,361.11	0.142
	YCD	BNP	0.140	08/27/15	0.140	50,000	7	1,361.11	0.142
	YCD	SUMITOMO	0.170	08/27/15	0.170	50,000	28	6,611.11	0.172
	YCD	SUMITOMO	0.170	08/27/15	0.170	50,000	28	6,611.11	0.172
	YCD	LLOYDS	0.150	08/27/15	0.150	50,000	30	6,250.00	0.152
	YCD	LLOYDS	0.150	08/27/15	0.150	50,000	30	6,250.00	0.152
	YCD	DNB	0.110	08/27/15	0.110	50,000	35	5,347.22	0.112
	YCD	DNB	0.110	08/27/15	0.110	50,000	35	5,347.22	0.112
	YCD	SE BANKEN	0.120	08/27/15	0.120	50,000	37	6,166.67	0.122
	YCD	SE BANKEN	0.120	08/27/15	0.120	50,000	37	6,166.67	0.122
	YCD	MIZUHO	0.200	08/27/15	0.200	50,000	59	16,388.89	0.203
	YCD	MIZUHO	0.200	08/27/15	0.200	50,000	59	16,388.89	0.203
	YCD	SCOTIA	0.130	08/27/15	0.130	50,000	64	11,555.56	0.132
	YCD	SCOTIA	0.130	08/27/15	0.130	50,000	64	11,555.56	0.132
08/27/15	**PURCHASES**								
	CP	GE CO		09/28/15	0.120	50,000			
	CP	GE CO		09/28/15	0.120	50,000			
	CP	GE CO		09/28/15	0.120	50,000			
	CP	GE CO		09/28/15	0.120	50,000			
	CP	TD USA		10/28/15	0.200	50,000			
	CP	TD USA		10/28/15	0.200	50,000			
	CP	TD USA		10/28/15	0.200	50,000			
	CP	TD USA		10/28/15	0.200	50,000			
	TR	BILL		08/18/16	0.343	50,000			
	TR	BILL		08/18/16	0.343	50,000			
	YCD	BNP	0.170	09/24/15	0.170	50,000			
	YCD	BNP	0.170	09/24/15	0.170	50,000			
	YCD	SE BANKEN	0.110	10/01/15	0.110	50,000			
	YCD	SE BANKEN	0.110	10/01/15	0.110	50,000			
08/28/15	**REDEMPTIONS**								
	CP	GE CO		08/28/15	0.100	50,000	11	1,527.78	0.101
	CP	GE CO		08/28/15	0.100	50,000	11	1,527.78	0.101
	CP	GE CO		08/28/15	0.100	50,000	11	1,527.78	0.101
	YCD	TOKYO-MIT	0.130	08/28/15	0.130	50,000	8	1,444.44	0.132
	YCD	TOKYO-MIT	0.130	08/28/15	0.130	50,000	8	1,444.44	0.132
	YCD	SUMITOMO	0.140	08/28/15	0.140	50,000	10	1,944.44	0.142
	YCD	SUMITOMO	0.140	08/28/15	0.140	50,000	10	1,944.44	0.142

INVESTMENT TRANSACTIONS

DATE	TYPE a/	DESCRIPTION	CPN (%)	MATURITY DATE	TRANS YIELD (%)	PAR ($) (000)	DAYS HELD	AMOUNT EARNED ($)	EFFECTIVE YIELD (%)
08/28/15	**REDEMPTIONS (Continued)**								
	YCD	LLOYDS	0.150	08/28/15	0.150	50,000	29	6,041.67	0.152
	YCD	LLOYDS	0.150	08/28/15	0.150	50,000	29	6,041.67	0.152
08/28/15	**PURCHASES**								
	CP	GE CO		09/08/15	0.100	50,000			
	CP	GE CO		09/08/15	0.100	50,000			
	CP	GE CO		09/08/15	0.100	50,000			
	CP	GE CO		09/08/15	0.100	50,000			
	CP	NISSAN		10/02/15	0.330	50,000			
08/31/15	**REDEMPTIONS**								
	TR	NOTE	0.375	08/31/15	0.512	50,000	725	507,175.84	0.511
	TR	NOTE	0.375	08/31/15	0.512	50,000	725	507,175.84	0.511
	YCD	MONTREAL	0.140	08/31/15	0.140	50,000	11	2,138.89	0.142
	YCD	MONTREAL	0.140	08/31/15	0.140	50,000	11	2,138.89	0.142
	YCD	SOC GEN	0.140	08/31/15	0.140	50,000	13	2,527.78	0.142
	YCD	SOC GEN	0.140	08/31/15	0.140	50,000	13	2,527.78	0.142
	YCD	SOC GEN	0.140	08/31/15	0.140	50,000	13	2,527.78	0.142
	YCD	SOC GEN	0.140	08/31/15	0.140	50,000	13	2,527.78	0.142
	YCD	BNP	0.150	08/31/15	0.150	50,000	13	2,708.33	0.152
	YCD	RABOBANK	0.140	08/31/15	0.140	50,000	14	2,722.22	0.142
	YCD	RABOBANK	0.140	08/31/15	0.140	50,000	14	2,722.22	0.142
	YCD	BNP	0.130	08/31/15	0.130	50,000	17	3,069.44	0.132
	YCD	BNP	0.130	08/31/15	0.130	50,000	17	3,069.44	0.132
	YCD	DNB	0.150	08/31/15	0.150	50,000	68	14,166.67	0.152
	YCD	DNB	0.150	08/31/15	0.150	50,000	68	14,166.67	0.152
	YCD	SCOTIA	0.120	08/31/15	0.120	50,000	96	16,000.00	0.122
	YCD	SCOTIA	0.120	08/31/15	0.120	50,000	96	16,000.00	0.122
08/31/15	**PURCHASES**								
	TR	NOTE	0.625	08/31/17	0.722	50,000			
	TR	NOTE	0.625	08/31/17	0.722	50,000			
	TR	NOTE	0.625	08/31/17	0.722	50,000			
	TR	NOTE	0.625	08/31/17	0.722	50,000			
	YCD	TOKYO-MIT	0.170	09/24/15	0.170	50,000			
	YCD	TOKYO-MIT	0.170	09/24/15	0.170	50,000			

FOOTNOTES

a/ The abbreviations indicate the type of security purchased, sold, or redeemed:

BA	Bankers Acceptances
BN	Bank Notes
CB	Corporate Bonds
CB FR	Floating Rate Corporate Bonds
CD	Negotiable Certificates of Deposit
CD FR	Floating Rate Negotiable Certificates of Deposit
CP	Commercial Paper
DEB	Federal/Supranational Agency Debentures – Federal Home Loan Bank (FHLB), Federal Home Loan Mortgage Corporation (FHLMC), Federal National Mortgage Association (FNMA), Federal Farm Credit Bank (FFCB), Federal Land Banks (FLB), Federal Intermediate Credit Banks (FICB), Central Bank for Cooperatives (CBC), Tennessee Valley Authority (TVA), Commodity Credit Corporation (CCC), International Bank for Reconstruction and Development (IBRD).
DEB FR	Federal/Supranational Agency Floating Rate Debentures – FHLB, FHLMC, FNMA, FFCB, FLB, FICB, CBC, TVA, CCC, IBRD.
DN	Federal/Supranational Agency Discount Notes- FHLB, FHLMC, FNMA, FFCB, FLB, FICB, CBC, TVA, CCC, IBRD.
PC	Federal Agency Mortgage-backed Pass-through Certificates – FHLMC, FNMA, Government National Mortgage Investment Conduit (GNMA)
POOL FR	Floating Rate Small Business Administration (SBA) Loan Pools
REMIC	Federal Agency Real Estate Mortgage Investment Conduits – FHLMC, FNMA
TR	U.S. Treasury Bills, Notes
YCD	Negotiable Yankee Certificates of Deposit
YCD FR	Floating Rate Negotiable Yankee Certificates of Deposit

b/ Industry standard purchase yield calculation

c/ Repurchase Agreement

d/ Par amount of securities purchased, sold or redeemed

e/ Securities were purchased and sold as of the same date

f/ Repurchase Agreement against Reverse Repurchase Agreement

g/ Outright purchase against Reverse Repurchase Agreement

h/ Security “SWAP” transactions

i/ Buy back agreement

RRP	Termination of Reverse Repurchase Agreement
RRS	Reverse Repurchase Agreement

TIME DEPOSITS

FINANCIAL INSTITUTION	DEPOSIT DATE	YIELD (%)	PAR AMOUNT ($)	MATURITY DATE
ALHAMBRA				
New Omni Bank, NA	03/06/15	0.110	1,000,000.00	09/04/15
New Omni Bank, NA	03/13/15	0.120	2,000,000.00	09/11/15
New Omni Bank, NA	06/18/15	0.040	5,000,000.00	09/17/15
New Omni Bank, NA	07/08/15	0.040	1,000,000.00	10/07/15
New Omni Bank, NA	04/16/15	0.110	2,000,000.00	10/15/15
New Omni Bank, NA	04/23/15	0.120	2,000,000.00	10/22/15
New Omni Bank, NA	07/23/15	0.060	2,000,000.00	10/22/15
New Omni Bank, NA	04/30/15	0.110	2,000,000.00	10/29/15
New Omni Bank, NA	08/06/15	0.100	2,000,000.00	11/05/15
New Omni Bank, NA	08/14/15	0.120	2,000,000.00	11/13/15
New Omni Bank, NA	08/27/15	0.080	8,000,000.00	12/03/15
AUBURN				
Community 1st Bank	03/20/15	0.210	2,000,000.00	09/18/15
Community 1st Bank	04/08/15	0.140	4,000,000.00	10/07/15
Community 1st Bank	04/22/15	0.130	2,000,000.00	10/21/15
Community 1st Bank	07/31/15	0.200	3,000,000.00	01/29/16
BREA				
Pacific Western Bank	03/18/15	0.180	40,000,000.00	09/16/15
Pacific Western Bank	07/10/15	0.040	10,000,000.00	10/09/15
Pacific Western Bank	07/29/15	0.160	40,000,000.00	01/27/16
Pacific Western Bank	08/26/15	0.220	50,000,000.00	02/24/16
BUENA PARK				
Uniti Bank	06/05/15	0.090	3,000,000.00	12/04/15
CHICO				
Tri Counties Bank	06/10/15	0.060	5,000,000.00	09/09/15
DIAMOND BAR				
Prospectors Federal Credit Union	03/12/15	0.140	4,000,000.00	09/10/15
EL MONTE				
Cathay Bank	03/20/15	0.200	50,000,000.00	09/18/15
Cathay Bank	05/28/15	0.120	50,000,000.00	11/19/15
Cathay Bank	07/24/15	0.180	50,000,000.00	01/22/16
ENCINO				
California United Bank	04/02/15	0.160	10,000,000.00	10/01/15

TIME DEPOSITS

FINANCIAL INSTITUTION	DEPOSIT DATE	YIELD (%)	PAR AMOUNT ($)	MATURITY DATE
FOLSOM				
Folsom Lake Bank	06/03/15	0.050	3,000,000.00	09/02/15
Folsom Lake Bank	07/15/15	0.050	1,500,000.00	10/14/15
Folsom Lake Bank	07/31/15	0.110	3,500,000.00	10/30/15
SAFE Credit Union	06/05/15	0.070	5,000,000.00	09/04/15
Sierra Vista Bank	06/26/15	0.050	1,000,000.00	09/25/15
Sierra Vista Bank	05/20/15	0.120	1,000,000.00	11/18/15
Sierra Vista Bank	08/05/15	0.190	1,500,000.00	02/03/16
FRESNO				
Central Valley Community Bank	03/12/15	0.140	5,000,000.00	09/10/15
Central Valley Community Bank	08/26/15	0.080	5,000,000.00	12/02/15
GOLETA				
Community West Bank	07/15/15	0.030	13,000,000.00	10/14/15
Community West Bank	06/04/15	0.090	14,000,000.00	12/03/15
Community West Bank	08/28/15	0.080	13,000,000.00	12/04/15
IRVINE				
Banc of California, NA	05/22/15	0.130	100,000,000.00	11/20/15
Banc of California, NA	07/30/15	0.190	50,000,000.00	01/28/16
CommerceWest Bank	06/12/15	0.040	5,000,000.00	09/11/15
CommerceWest Bank	07/16/15	0.040	5,000,000.00	10/15/15
CommerceWest Bank	07/31/15	0.080	2,500,000.00	10/30/15
CommerceWest Bank	08/06/15	0.100	2,500,000.00	11/05/15
First Foundation Bank	03/05/15	0.120	22,000,000.00	09/03/15
First Foundation Bank	04/10/15	0.140	12,000,000.00	10/09/15
First Foundation Bank	08/12/15	0.120	12,000,000.00	11/12/15
First Foundation Bank	06/05/15	0.110	10,000,000.00	12/04/15
Pacific Enterprise Bank	08/27/15	0.080	25,000,000.00	12/03/15
LAFAYETTE				
California Bank of Commerce	03/13/15	0.120	10,000,000.00	09/11/15
California Bank of Commerce	05/14/15	0.110	5,000,000.00	11/12/15
California Bank of Commerce	07/16/15	0.150	5,000,000.00	01/14/16
LODI				
Farmers & Merchants Bk Cen CA	06/03/15	0.030	35,000,000.00	09/02/15
Farmers & Merchants Bk Cen CA	06/10/15	0.040	20,000,000.00	09/09/15
Farmers & Merchants Bk Cen CA	07/08/15	0.040	25,000,000.00	10/07/15
Farmers & Merchants Bk Cen CA	07/17/15	0.040	35,000,000.00	10/16/15
Farmers & Merchants Bk Cen CA	07/23/15	0.060	35,000,000.00	10/22/15
LOS ANGELES				
1st Century Bank, NA	07/15/15	0.050	26,000,000.00	10/14/15
1st Century Bank, NA	08/14/15	0.140	20,000,000.00	11/13/15
Bank Leumi USA	07/22/15	0.080	30,000,000.00	10/21/15
Bank Leumi USA	08/05/15	0.120	20,000,000.00	11/04/15

TIME DEPOSITS

FINANCIAL INSTITUTION	DEPOSIT DATE	YIELD (%)	PAR AMOUNT ($)	MATURITY DATE
LOS ANGELES (Continued)				
BBCN Bank	06/03/15	0.030	90,000,000.00	09/02/15
BBCN Bank	06/12/15	0.040	75,000,000.00	09/11/15
BBCN Bank	07/09/15	0.060	90,000,000.00	10/08/15
BBCN Bank	07/15/15	0.050	45,000,000.00	10/14/15
Commonwealth Business Bank	06/05/15	0.020	5,000,000.00	09/04/15
Commonwealth Business Bank	06/12/15	0.040	5,000,000.00	09/11/15
Commonwealth Business Bank	06/19/15	0.030	5,000,000.00	09/18/15
Commonwealth Business Bank	06/26/15	0.030	5,000,000.00	09/25/15
Commonwealth Business Bank	07/03/15	0.040	10,000,000.00	10/02/15
Commonwealth Business Bank	07/10/15	0.040	5,000,000.00	10/09/15
Commonwealth Business Bank	07/17/15	0.040	3,500,000.00	10/16/15
Commonwealth Business Bank	07/31/15	0.080	10,000,000.00	10/30/15
Commonwealth Business Bank	08/14/15	0.120	5,000,000.00	11/13/15
Commonwealth Business Bank	08/21/15	0.090	11,000,000.00	11/20/15
CTBC Bank Corp. (USA)	07/01/15	0.110	50,000,000.00	01/06/16
CTBC Bank Corp. (USA)	07/16/15	0.130	50,000,000.00	01/14/16
CTBC Bank Corp. (USA)	07/30/15	0.170	10,000,000.00	01/28/16
Hanmi Bank	04/08/15	0.110	30,000,000.00	10/07/15
Hanmi Bank	08/06/15	0.220	30,000,000.00	02/04/16
Manufacturers Bank	06/11/15	0.060	50,000,000.00	09/10/15
Manufacturers Bank	07/10/15	0.060	100,000,000.00	10/09/15
Manufacturers Bank	07/17/15	0.060	50,000,000.00	10/16/15
Manufacturers Bank	08/13/15	0.150	35,000,000.00	11/12/15
Mission Valley Bank	04/15/15	0.120	7,000,000.00	10/14/15
Open Bank	03/13/15	0.120	5,000,000.00	09/11/15
Open Bank	03/20/15	0.180	2,000,000.00	09/18/15
Open Bank	03/25/15	0.120	10,000,000.00	09/23/15
Open Bank	06/11/15	0.110	5,000,000.00	12/10/15
Open Bank	07/08/15	0.120	2,000,000.00	01/06/16
Open Bank	08/12/15	0.250	10,000,000.00	02/10/16
Opus Bank	07/31/15	0.190	10,000,000.00	01/29/16
Pacific City Bank	06/11/15	0.040	10,000,000.00	09/10/15
Pacific City Bank	06/19/15	0.030	20,000,000.00	09/18/15
Pacific City Bank	07/10/15	0.040	30,000,000.00	10/09/15
Pacific City Bank	08/12/15	0.100	5,000,000.00	11/12/15
Pacific City Bank	08/19/15	0.090	1,800,000.00	11/18/15
Pacific Commerce Bank	06/19/15	0.030	10,000,000.00	09/18/15
State Bank of India (California)	04/09/15	0.150	12,000,000.00	10/08/15
State Bank of India (California)	04/15/15	0.140	23,000,000.00	10/14/15
State Bank of India (California)	04/23/15	0.140	13,000,000.00	10/22/15
State Bank of India (California)	08/06/15	0.130	12,000,000.00	11/05/15
State Bank of India (California)	08/19/15	0.120	10,000,000.00	11/18/15
State Bank of India (California)	08/20/15	0.150	10,000,000.00	11/19/15
Wilshire Bank	06/04/15	0.040	50,000,000.00	09/03/15
Wilshire Bank	06/10/15	0.040	39,000,000.00	09/09/15
Wilshire Bank	06/19/15	0.030	29,000,000.00	09/18/15
Wilshire Bank	07/10/15	0.040	78,000,000.00	10/09/15
Wilshire Bank	07/16/15	0.040	74,000,000.00	10/15/15
Wilshire Bank	08/14/15	0.120	30,000,000.00	11/13/15
Woori America Bank	06/16/15	0.060	20,000,000.00	09/16/15

TIME DEPOSITS

FINANCIAL INSTITUTION	DEPOSIT DATE	YIELD (%)	PAR AMOUNT ($)	MATURITY DATE
MANHATTAN BEACH				
Kinecta Federal Credit Union	08/07/15	0.150	35,000,000.00	11/06/15
Kinecta Federal Credit Union	05/28/15	0.130	25,000,000.00	11/19/15
Kinecta Federal Credit Union	08/07/15	0.180	15,000,000.00	12/04/15
MONTEREY				
1st Capital Bank	06/11/15	0.060	5,000,000.00	09/10/15
1st Capital Bank	07/23/15	0.080	1,000,000.00	10/22/15
1st Capital Bank	07/29/15	0.080	8,000,000.00	10/28/15
OAKDALE				
Oak Valley Community Bank	06/04/15	0.040	3,500,000.00	09/03/15
OAKLAND				
Beneficial State Bank	07/24/15	0.090	5,000,000.00	10/23/15
Beneficial State Bank	07/17/15	0.160	15,000,000.00	01/15/16
Beneficial State Bank	07/24/15	0.190	5,000,000.00	01/22/16
Community Bank of the Bay	06/05/15	0.110	5,000,000.00	12/04/15
Metropolitan Bank	06/11/15	0.110	4,500,000.00	12/10/15
Metropolitan Bank	07/10/15	0.110	1,500,000.00	01/08/16
Metropolitan Bank	07/16/15	0.130	1,000,000.00	01/14/16
Metropolitan Bank	07/31/15	0.170	2,000,000.00	01/29/16
Metropolitan Bank	08/27/15	0.230	1,000,000.00	02/25/16
ONTARIO				
Citizens Business Bank	06/05/15	0.040	25,000,000.00	09/04/15
Citizens Business Bank	06/10/15	0.060	25,000,000.00	09/09/15
Citizens Business Bank	07/08/15	0.060	40,000,000.00	10/07/15
Citizens Business Bank	07/22/15	0.070	50,000,000.00	10/21/15
Citizens Business Bank	08/12/15	0.120	50,000,000.00	11/12/15
Citizens Business Bank	08/19/15	0.110	30,000,000.00	11/18/15
Citizens Business Bank	07/31/15	0.190	30,000,000.00	01/29/16
Citizens Business Bank	08/05/15	0.190	30,000,000.00	02/03/16
PALOS VERDES ESTATES				
Malaga Bank, FSB	06/03/15	0.030	12,000,000.00	09/02/15
Malaga Bank, FSB	06/05/15	0.040	4,000,000.00	09/04/15
Malaga Bank, FSB	06/18/15	0.040	10,000,000.00	09/17/15
Malaga Bank, FSB	07/09/15	0.040	5,000,000.00	10/08/15
Malaga Bank, FSB	07/24/15	0.060	46,000,000.00	10/23/15
Malaga Bank, FSB	07/31/15	0.080	9,000,000.00	10/30/15
Malaga Bank, FSB	08/06/15	0.100	10,000,000.00	11/05/15
PASADENA				
American Plus Bank, NA	05/20/15	0.100	500,000.00	11/18/15
American Plus Bank, NA	06/17/15	0.130	2,000,000.00	12/17/15
American Plus Bank, NA	08/13/15	0.160	240,000.00	12/17/15
American Plus Bank, NA	08/26/15	0.220	1,000,000.00	02/24/16

TIME DEPOSITS

FINANCIAL INSTITUTION	DEPOSIT DATE	YIELD (%)	PAR AMOUNT ($)	MATURITY DATE
PASADENA (Continued)				
Community Bank	03/18/15	0.180	35,000,000.00	09/16/15
Community Bank	04/03/15	0.160	25,000,000.00	10/02/15
Community Bank	05/06/15	0.070	30,000,000.00	11/04/15
Community Bank	06/10/15	0.120	30,000,000.00	12/09/15
Community Bank	07/15/15	0.130	25,000,000.00	01/13/16
Community Bank	08/14/15	0.260	25,000,000.00	02/12/16
East West Bank	07/22/15	0.070	125,000,000.00	10/21/15
East West Bank	04/24/15	0.140	50,000,000.00	10/23/15
East West Bank	08/07/15	0.130	75,000,000.00	11/06/15
East West Bank	07/16/15	0.150	50,000,000.00	01/14/16
EverTrust Bank	08/19/15	0.090	10,000,000.00	11/18/15
EverTrust Bank	05/22/15	0.110	20,000,000.00	11/20/15
EverTrust Bank	06/10/15	0.100	20,000,000.00	12/09/15
Wescom Central Credit Union	06/25/15	0.080	50,000,000.00	09/24/15
Wescom Central Credit Union	07/29/15	0.100	50,000,000.00	10/28/15
Wescom Central Credit Union	08/28/15	0.120	50,000,000.00	12/04/15
PASO ROBLES				
Heritage Oaks Bank	06/10/15	0.060	25,000,000.00	09/09/15
PORTERVILLE				
Bank of the Sierra	06/04/15	0.060	15,000,000.00	09/03/15
Bank of the Sierra	06/11/15	0.060	20,000,000.00	09/10/15
Bank of the Sierra	07/09/15	0.060	10,000,000.00	10/07/15
Bank of the Sierra	07/24/15	0.080	20,000,000.00	10/23/15
Bank of the Sierra	08/06/15	0.120	15,000,000.00	11/05/15
Bank of the Sierra	08/13/15	0.150	20,000,000.00	11/12/15
RANCHO CORDOVA				
American River Bank	06/11/15	0.060	1,500,000.00	09/10/15
American River Bank	07/08/15	0.060	2,500,000.00	10/07/15
American River Bank	07/17/15	0.060	2,000,000.00	10/16/15
American River Bank	07/22/15	0.070	3,000,000.00	10/21/15
American River Bank	08/06/15	0.120	2,500,000.00	11/05/15
American River Bank	08/06/15	0.120	7,500,000.00	11/12/15
American River Bank	08/13/15	0.150	6,500,000.00	11/12/15
American River Bank	08/20/15	0.140	1,000,000.00	11/19/15
American River Bank	07/31/15	0.190	2,500,000.00	01/29/16
REDWOOD CITY				
Provident Credit Union	03/18/15	0.180	20,000,000.00	09/16/15
Provident Credit Union	04/16/15	0.130	20,000,000.00	10/15/15
Provident Credit Union	04/29/15	0.140	40,000,000.00	10/28/15
Provident Credit Union	08/19/15	0.090	20,000,000.00	11/18/15
Provident Credit Union	05/21/15	0.100	20,000,000.00	11/19/15
Provident Credit Union	06/12/15	0.110	20,000,000.00	12/11/15
Provident Credit Union	07/23/15	0.160	40,000,000.00	01/21/16

TIME DEPOSITS

FINANCIAL INSTITUTION	DEPOSIT DATE	YIELD (%)	PAR AMOUNT ($)	MATURITY DATE
RICHMOND				
Mechanics Bank	06/11/15	0.060	20,000,000.00	09/10/15
Mechanics Bank	07/15/15	0.050	20,000,000.00	10/14/15
Mechanics Bank	07/23/15	0.080	20,000,000.00	10/22/15
Mechanics Bank	08/13/15	0.150	20,000,000.00	11/12/15
ROCKLIN				
Five Star Bank	07/15/15	0.030	2,000,000.00	10/14/15
ROSEMEAD				
Pacific Alliance Bank	04/15/15	0.140	4,000,000.00	10/14/15
ROSEVILLE				
Umpqua Bank	06/17/15	0.060	100,000,000.00	09/16/15
Umpqua Bank	03/26/15	0.150	20,000,000.00	09/24/15
Umpqua Bank	05/14/15	0.130	50,000,000.00	11/12/15
SACRAMENTO				
Comerica Bank	07/08/15	0.060	50,000,000.00	10/07/15
Comerica Bank	07/15/15	0.050	75,000,000.00	10/14/15
Comerica Bank	08/05/15	0.110	50,000,000.00	11/04/15
Comerica Bank	08/12/15	0.120	25,000,000.00	11/12/15
Comerica Bank	08/27/15	0.100	75,000,000.00	12/03/15
Comerica Bank	06/10/15	0.120	25,000,000.00	12/09/15
Merchants National Bank of Sacramento	04/08/15	0.110	2,000,000.00	10/07/15
Merchants National Bank of Sacramento	04/29/15	0.120	2,000,000.00	10/28/15
Merchants National Bank of Sacramento	05/06/15	0.050	2,000,000.00	11/04/15
Merchants National Bank of Sacramento	08/19/15	0.110	2,000,000.00	11/18/15
Merchants National Bank of Sacramento	06/03/15	0.080	2,000,000.00	12/02/15
River City Bank	05/15/15	0.130	20,000,000.00	11/13/15
River City Bank	05/22/15	0.130	35,000,000.00	11/20/15
River City Bank	06/05/15	0.110	15,000,000.00	12/04/15
River City Bank	07/24/15	0.180	15,000,000.00	01/22/16
SAN DIEGO				
California Coast Credit Union	08/26/15	0.070	25,000,000.00	12/02/15
Mission Federal Credit Union	07/15/15	0.030	10,000,000.00	10/14/15
Mission Federal Credit Union	08/19/15	0.090	10,000,000.00	11/18/15
San Diego County Credit Union	07/15/15	0.010	50,000,000.00	10/14/15
San Diego County Credit Union	04/16/15	0.090	50,000,000.00	10/15/15
San Diego County Credit Union	07/16/15	0.020	50,000,000.00	10/15/15
San Diego County Credit Union	07/29/15	0.040	50,000,000.00	10/28/15
San Diego County Credit Union	05/15/15	0.090	50,000,000.00	11/13/15
San Diego County Credit Union	06/17/15	0.110	50,000,000.00	12/16/15
Seacoast Commerce Bank	05/06/15	0.050	1,000,000.00	11/04/15

TIME DEPOSITS

FINANCIAL INSTITUTION	DEPOSIT DATE	YIELD (%)	PAR AMOUNT ($)	MATURITY DATE
SAN DIEGO (Continued)				
Western Alliance Bank	03/13/15	0.140	50,000,000.00	09/11/15
Western Alliance Bank	05/14/15	0.130	15,000,000.00	11/12/15
Western Alliance Bank	05/20/15	0.120	25,000,000.00	11/18/15
Western Alliance Bank	06/19/15	0.160	50,000,000.00	12/18/15
Western Alliance Bank	07/09/15	0.130	25,000,000.00	01/07/16
Western Alliance Bank	08/13/15	0.270	50,000,000.00	02/11/16
Western Alliance Bank	08/18/15	0.280	50,000,000.00	02/17/16
SAN FRANCISCO				
Bank of San Francisco	06/26/15	0.030	8,000,000.00	09/25/15
Presidio Bank	05/06/15	0.070	10,000,000.00	11/04/15
Presidio Bank	08/20/15	0.140	10,000,000.00	11/19/15
Trans Pacific National Bank	06/19/15	0.030	3,000,000.00	09/18/15
Trans Pacific National Bank	07/24/15	0.060	2,000,000.00	10/23/15
SAN JOSE				
Heritage Bank of Commerce	03/27/15	0.140	15,000,000.00	09/25/15
Heritage Bank of Commerce	04/23/15	0.120	50,000,000.00	10/22/15
Heritage Bank of Commerce	05/15/15	0.130	13,000,000.00	11/13/15
Heritage Bank of Commerce	06/10/15	0.120	20,000,000.00	12/09/15
SAN RAMON				
Bank of the West	03/13/15	0.140	100,000,000.00	09/11/15
Bank of the West	07/30/15	0.180	134,000,000.00	02/04/16
SANTA ROSA				
Summit State Bank	06/05/15	0.040	12,000,000.00	09/04/15
Summit State Bank	07/24/15	0.060	3,500,000.00	10/23/15
Summit State Bank	07/29/15	0.060	4,000,000.00	10/28/15
Summit State Bank	05/06/15	0.050	8,000,000.00	11/04/15
Summit State Bank	06/19/15	0.140	7,000,000.00	12/18/15
Summit State Bank	07/15/15	0.110	5,000,000.00	01/13/16
Summit State Bank	07/16/15	0.130	9,000,000.00	01/14/16
SOUTH SAN FRANCISCO				
First National Bank of Northern California	06/03/15	0.080	4,000,000.00	12/02/15
First National Bank of Northern California	06/10/15	0.120	15,000,000.00	12/09/15
VACAVILLE				
Travis Credit Union	03/06/15	0.110	50,000,000.00	09/04/15
Travis Credit Union	07/09/15	0.110	50,000,000.00	01/07/16
WATSONVILLE				
Santa Cruz County Bank	06/26/15	0.030	20,000,000.00	09/25/15

TIME DEPOSITS

FINANCIAL INSTITUTION	DEPOSIT DATE	YIELD (%)	PAR AMOUNT ($)	MATURITY DATE
WEST SACRAMENTO				
Community Business Bank	07/08/15	0.120	3,000,000.00	01/06/16
TOTAL TIME DEPOSITS AUGUST 2015			**5,561,540,000.00**	

BANK DEMAND DEPOSITS
AUGUST 2015
($ in thousands)

DAILY BALANCES

DAY OF MONTH	BANK BALANCES	WARRANTS OUTSTANDING
1	$ 2,170,295	$ 4,250,503
2	2,170,295	4,250,503
3	2,014,460	3,749,072
4	2,146,914	3,118,344
5	2,408,545	3,102,182
6	2,270,565	3,167,881
7	2,534,104	3,902,734
8	2,534,104	3,902,734
9	2,534,104	3,902,734
10	1,959,048	2,681,363
11	2,288,333	2,450,305
12	1,989,755	2,883,883
13	2,076,384	2,738,238
14	2,223,302	2,823,670
15	2,223,302	2,823,670
16	2,223,302	2,828,150
17	2,195,843	2,828,150
18	2,328,620	2,250,555
19	2,236,433	2,516,814
20	2,241,553	2,343,137
21	2,187,974	2,050,344
22	2,187,974	2,050,344
23	2,187,974	2,050,344
24	2,064,075	1,854,779
25	2,312,466	1,625,333
26	2,276,880	2,650,626
27	2,299,309	1,929,098
28	2,201,215	3,289,223
29	2,201,215	3,289,223
30	2,201,215	3,289,223
31	2,293,007	2,598,035
AVERAGE DOLLAR DAYS	2,231,696 a/	

a/ The prescribed bank balance for August was $2,115,413. This consisted of $2,038,665 in compensating balances for services, balances for uncollected funds of $78,682 and a deduction of $1,934 for August delayed deposit credit.

DESIGNATION BY POOLED MONEY INVESTMENT BOARD
OF TREASURY POOLED MONEY INVESTMENTS AND DEPOSITS

1794

In accordance with sections 16480 through 16480.8 of the Government Code, the Pooled Money Investment Board, at its meeting on August 19, 2015, has determined and designated the amount of money available for deposit and investment as of August 12, 2015, under said sections. In accordance with sections 16480.1 and 16480.2 of the Government Code, it is the intent that the money available for deposit or investment be deposited in bank accounts and savings and loan associations or invested in securities in such a manner so as to realize the maximum return consistent with safe and prudent treasury management, and the Board does hereby designate the amount of money available for deposit in bank accounts, savings and loan associations, and for investment in securities and the type of such deposits and investments as follows:

1. In accordance with Treasurer's Office policy, for deposit in demand bank accounts as Compensating Balance for Services: $ 2,038,700,000

The active noninterest-bearing bank accounts designation constitutes a calendar month average balance. For purposes of computing the compensating balances, the Treasurer shall exclude from the daily balances any amounts contained therein as a result of nondelivery of securities purchased for "cash" for the Pooled Money Investment Account and shall adjust for any deposits not credited by the bank as of the date of deposit. The balances in such accounts may fall below the above amount provided that the balances computed by dividing the sum of daily balances of that calendar month by the number of days in the calendar month reasonably approximates that amount. The balances may exceed this amount during heavy collection periods or in anticipation of large impending warrant presentations to the Treasury, but the balances are to be maintained in such a manner as to realize the maximum return consistent with safe and prudent treasury management.

2. In accordance with law, for investment in securities authorized by section 16430, Government Code, or in term interest-bearing deposits in banks and savings and loan associations as follows:

	From	To	Transactions	In Securities (section 16430)*	Time Deposits in Various Financial Institutions (sections 16503a and 16602)*	Estimated Total
(1)	8/17/2015	8/21/2015	$ (1,012,000,000)	$ (6,472,500,000)	$ 5,460,500,000	$ (1,012,000,000)
(2)	8/24/2015	8/28/2015	$ 1,622,700,000	$ (4,849,800,000)	$ 5,460,500,000	$ 610,700,000
(3)	8/31/2015	9/4/2015	$ (2,862,300,000)	$ (7,712,100,000)	$ 5,460,500,000	$ (2,251,600,000)
(4)	9/7/2015	9/11/2015	$ (91,300,000)	$ (7,803,400,000)	$ 5,460,500,000	$ (2,342,900,000)
(5)	9/14/2015	9/18/2015	$ 3,584,100,000	$ (4,219,300,000)	$ 5,460,500,000	$ 1,241,200,000
(6)	9/21/2015	9/25/2015	$ 1,654,200,000	$ (2,565,100,000)	$ 5,460,500,000	$ 2,895,400,000
(7)	9/28/2015	10/2/2015	$ (6,499,100,000)	$ (9,064,200,000)	$ 5,460,500,000	$ (3,603,700,000)
(8)	10/5/2015	10/9/2015	$ (1,506,100,000)	$ (10,570,300,000)	$ 5,460,500,000	$ (5,109,800,000)
(9)	10/12/2015	10/16/2015	$ 357,200,000	$ (10,213,100,000)	$ 5,460,500,000	$ (4,752,600,000)
(10)	10/19/2015	10/23/2015	$ (107,100,000)	$ (10,320,200,000)	$ 5,460,500,000	$ (4,859,700,000)

From any of the amounts specifically designated above, not more than 30 percent in the aggregate may be invested in prime commercial paper under section 16430(e), Government Code.

Additional amounts available in treasury trust account and in the Treasury from time to time, in excess of the amounts and for the same types of investments as specifically designated above.

Provided, that the availability of the amounts shown under paragraph 2 is subject to reduction in the amount by which the bank accounts under paragraph 1 would otherwise be reduced below the calendar month average balance of $ 2,038,700,000.

POOLED MONEY INVESTMENT BOARD:

Signatures on file at STO
Chairperson

Member

Dated: August 19, 2015

Member

* Government Code

Item Number
10C

MINUTES
CUDAHY CITY COUNCIL REGULAR MEETING
SEPTEMBER 14, 2015 6:30 P.M.
COUNCIL CHAMBER - 14403 E. Pacific Avenue, Baldwin Park, 91706

1. CALL TO ORDER

The meeting was called to order by Mayor Markovich at 6:31 p.m.

2. ROLL CALL

The following Council Members were in attendance:

Council / Agency Member Garcia (arrived at 8:06 p.m.)
Council / Agency Member Guerrero
Council / Agency Member Sanchez
Vice Mayor / Vice Chair Hernandez
Mayor / Chair Markovich

3. PLEDGE OF ALLEGIANCE

The Pledge of Allegiance was led by Mayor / Chair Markovich.

4. PRESENTATIONS

A. Introduction of Deputy Sheriff Marino Gonzalez

Captain Steven Biagini of the East Los Angeles Sheriff Station introduced Deputy Marino Gonzalez specially assigned to the City of Cudahy.

C. Proclamation Recognizing September as Childhood Cancer Awareness Month

Mayor Markovich read the City proclamation recognizing September as Childhood Cancer Awareness Month.

E. Presentation of Potential Co-sponsorship of a Music Festival (Fiesta de Octubre by Bandachannel.com)

5. PUBLIC COMMENTS

Mayor Markovich announced this is the time set aside for citizens to address the City Council / Agency on matters relating only to items on the agenda and the limit on each speaker is three (3) minutes.

Pamela Munguia stated she is against the increase in fees.

Estefana Gonzalez stated she makes very little and is against increase for parking tickets and youth programs.

Sandra Orozco spoke on Rosario Pacheco contract cancellation, poster signs and parking tickets.

Gloria Sandoval stated she disagrees with increase in parking tickets and youth programs and asked the City to fix the streetlights.

Carmen Hernandez stated her husband makes minimum wage and she is against increasing fees for youth programs.

Adelina Garcia spoke against fee increases for youth programs and parking tickets. She also spoke on the Sheriff's response to Lugo Park.

Marcos Oliva thanked the City for the LA Works event; providing minutes; and addressed the business license fees for property rentals.

Patricia Covarrubia stated she is recording the meetings and she is against increases in taxes and youth programs.

Aide Castro representative for Assembly Member Rendon respectfully requested that the City Council approve co-sponsorship of the Health Fair with the Assembly Members office.

Javier Flores stated he does not agree with the rate hikes on sports.

William Tejada commended the City for the cancer proclamation and stated he is opposed to the fee and tax increases.

Silvia Palomares spoke on an incident at the park involving a City employee.

With no one else wishing to speak, Mayor Markovich closed Public Comments.

6. CITY COUNCIL COMMENTS / REQUESTS FOR AGENDA ITEMS

Mayor Markovich announced this is the time for the City Council / Agency Members to comment on any topics related to City Business and the limit on each speaker is three (3) minutes.

Council Member Guerrero spoke in opposition to the approved budget, budget deficit, civil rights injustice for constituents, aggressive code enforcement, quadrupling of fees, firing of part-time recreation and maintenance staff, and management bonuses and compensation increases.

Council Member Sanchez congratulated the cities of Bell, Maywood and Cudahy for the success of the LA Works event; announced an open forum to discuss parks and parking on Thursday at 5 p.m. in the Council Chamber; invited the public to participate in the monthly bike ride this Saturday at 10 a.m.; addressed misleading information regarding fee increases and lack of participation in budget sessions and stated the Council passed a balanced budget with one half million dollars allocated for Lugo Park Improvements; working with non-profits to absorb some of the costs.

Vice Mayor Hernandez gave kudos to City staff for the designated officer and neighborhood watch program in the City; announced the restructuring of Commissions and the Ad-Hoc Committee's recommendations; stated he is looking forward to the health festival and thanked the Banda Channel for their support; he said everyone has the right to speak publicly and voice your opinions; he addressed fee increases for parking and reminded everyone there is an overnight parking passes currently available.

Mayor Markovich apologized for his absence at the last meeting due to illness; he stated that differences of opinions are good and encouraged the public to keep coming to the meetings; he stated there was a great turnout at the LA Works event drawing over 1,000 people and brought southeast communities together; he announced he is in talks with the Los Angeles County Library regarding renovating the library to bring it up to the 21^{st} century; tree people bringing 500 trees to the City with a potential of securing a grant to bring an additional 5,000 trees to the City.

7. CITY MANAGER REPORT

City Manager Pulido stated there is misinformation being stated regarding budget. The goal for non-profits like AYSO Soccer Program is to help make programs affordable. Changing the way the City does business to provide better quality of service. He is continuing to reach out to other non-profit organizations for staffing and resources.

At the request of Council Member Sanchez, the City Manager reported that Council's attendance at the 2014 Strategic Planning Session included Mayor Markovich, Council Member Sanchez, former Council Member Oliva, and Council Member Garcia, and attendance for the 2015 Session included Mayor Markovich, Vice Mayor Hernandez and Council Member Sanchez.

Mr. Pulido announced he is working with the Sheriff's Department on a multi-year strategic plan to tackle issues. He is currently reviewing their draft report and within the month he will provide details via the City Manager report. He urged the public to ask questions and invited them to attend the first neighborhood watch meeting.

He is currently in negotiations with Cudahy LF, who is in the process of obtaining a casino license, and he is in negotiations to acquire property for a new casino that will provide potentially 700-1,000 jobs to the area.

Mayor Markovich departed the meeting at 7:37 p.m. and returned at 7:41 p.m.

8. WAIVER OF FULL READING OF RESOLUTIONS AND ORDINANCES

Recommendation: Approve the Waiver of Full Reading of Resolutions and Ordinances.

Motion: It was moved by Vice Mayor Hernandez, and seconded by Council Member Sanchez to waive full text reading of all Resolutions and Ordinances by single motion. The motion carried (3-0-1-1) by the following roll call vote:

AYES: Sanchez, Hernandez, Markovich
NOES: None.
ABSTAIN: Guerrero
ABSENT: Garcia

9. CONSENT CALENDAR (Items 9A through 9F)

Council Member Guerrero pulled items 9A and 9E for separate discussion.

Motion: It was moved by Council Member Sanchez, and seconded by Mayor Markovich to approve the remaining consent calendar items 9B, 9C, 9D and 9F with correction to August 24, 2015 minutes. The motion carried (3-0-1-1) by the following roll call vote:

AYES: Sanchez, Hernandez, Markovich
NOES: None.
ABSTAIN: Guerrero
ABSENT: Garcia

B. Approved the Local Agency Investment Fund (LAIF) Report for the month of July 2015 in the amount of $5,875,618.75.

C. Reviewed and approved the minutes of August 24, 2015 for the Regular Meeting of the City Council and the Joint Meeting of the City of Cudahy as Successor Agency to the Cudahy Development Commission (Agency) with correction by Council Member Sanchez.

D. Received and filed the Senior and Aging Citizen Commission Notice of Cancellation for July 13, 2015; Public Safety Commission Minutes of July 14, 2015; Planning Commission Minutes of July 20, 2015; and Parks and Recreation Commission Minutes of July 24, 2015.

F. Approved co-sponsorship of a health fair in partnership with Assembly Member Anthony Rendon's Office to take place on Saturday, October 17, 2015, from 10:00 a.m. to 2:00 p.m. to be held at Clara Street Park.

Council Member Guerrero pulled items 9A for separate discussion.

A. Consideration to Approve the City Demands and Payroll including the Cash and Investment Report for the month of July 2015

Finance Director Steven Dobrenen presented the staff report.

Council Member Guerrero stated he appreciated the year to date disbursements and year to date receipts and added it is important to monitor these transactions on a year to date basis. He explained that the $1.7 million disbursements minus $450,000 receipts leaves a $1.2 million deficiency, and even if $1 million is subtracted for non-recurring circumstances, it still leaves a deficit of $200,000 for just month of July. He said he will continue to revisit this on monthly basis.

Council Member Sanchez requested historical data from July 1, 2014 through June 30, 2015 for cash receipts and cash disbursements by month for trends. He stated that money received varies and is seasonal so he would like to see it averaged out over twelve months.

Recommendation: Approve the Demands and Payroll in the Amount of $1,996,824.31 including the Cash and Investment Report by Fund for the month of July 2015.

Motion: It was moved by Mayor Markovich, and seconded by Council Member Sanchez, to approve consent calendar Item 9A. The motion carried (3-1-0-1) by the following roll call vote:

AYES: Sanchez, Hernandez, Markovich
NOES: Guerrero
ABSTAIN: None.
ABSENT: Garcia

Council Member Guerrero pulled items 9E for separate discussion.

E. Consideration to Approve a Resolution of the Cudahy City Council Amending the Adopted Fringe Benefits and Salary Plan Establishing Provisions for All Full-time Employees, Hourly Employees, and Appointed Officials and Repealing Resolution No. 15-20B

Acting Human Resources Specialist Jennifer Hernandez presented the staff report.

Council Member Guerrero stated he will be voting no on this item because he voted no on the budget and the basis for this modification is the budget. He explained he is uncomfortable with the language stating it refers to City Manager as a position within the scope of the fringe benefit plan and later says the plan shall not supersede any employment agreement in place. He suggested that the language include that the City Manager employment agreement governs the benefit and compensation for the City Manager position and is outside the scope of this fringe and benefit plan. He said he is concerned about misinterpretation and the possibility for duplicative benefits.

City Manager Pulido responded that his employment agreement supersedes this plan and his agreement does not include the items being discussed. He also stated that he had not had an opportunity to meet with Council Member Guerrero to discuss this.

Vice Mayor Hernandez asked if there will be a recruitment, and City Manager Pulido responded in the affirmative.

Motion: It was moved by Mayor Markovich, and seconded by Council Member Sanchez, to approve Resolution No. 15-44, a resolution amending the Fringe Benefits and Salary Plan Establishing Provisions for all full-time employees, hourly employees, and appointed officials and repealing Resolution 15-20B. The motion carried (3-1-0-1) by the following roll call vote:

AYES: Sanchez, Hernandez, Markovich
NOES: Guerrero
ABSTAIN: None
ABSENT: Garcia

Council Member Garcia arrived at 8:06 p.m.

10. PUBLIC HEARING

A. Consideration to Approve Resolution No. 15-41, Establishing the Master Fee and Fine Schedule for Fiscal Year (FY) 2015-16, Introduce Ordinance No. 650, by First Reading Amending Cudahy Municipal Code (CMC) 3.40.040 through 3.40.060, and Introduce an Ordinance by First Reading, Amending CMC Chapter 5.08.360

Finance Director Steven Dobrenen presented the staff report.

Mayor Markovich opened the public hearing and called for public comment.

Carmen Hernandez spoke in opposition to fee increases.

Marcos Oliva asked for clarification on the rental property managers item and why the number is four units.

Pamela Munguia spoke in opposition to increasing fees.

Patricia Covarrubias spoke in opposition to fee increases.

William Tejada spoke in opposition to fee increases stating this is a low income community with limited resources.

With no one else wishing to speak, Mayor Markovich closed the public hearing.

City Council comments addressed parking citation fees and the appeals process; the increase in Park & Recreation Fees and General Fund subsidies; overnight parking pilot program, rental licenses; restoring fees to what they used to be; and how Cudahy's fees compare regionally.

Motion: It was moved by Mayor Markovich, and seconded by Vice Mayor Hernandez, to adopt Resolution No. 15-41, establishing Master Fee and Fine Schedule for FY 2015-16; Introduce Ordinance No. 650 by first reading, amending CMC Chapter 3.40.040 to 3.40.060 relating to the City's cost recovery for services provided for Leisure and Cultural (recreational) Activities; and Introduce an Ordinance by first reading, amending CMC Chapter 5.08.360 to temporarily suspend (through June 30, 2019) the business license tax requirements applicable to Rental Property Managers of rental properties with four or fewer units. The motion carried (4-1) by the following roll call vote:

AYES:	Garcia, Sanchez, Hernandez, Markovich
NOES:	Guerrero
ABSTAIN:	None
ABSENT:	None

B. Consideration to Approve Resolution No. 15-39, Adopting the 2015 Local Development Report (LDR) certifying that the City of Cudahy meets the Conformity Criteria of the 2010 Congestion Management Program (CMP)

Acting Community Development Director Michael Allen introduced Planning Technician Didier Murillo who presented the staff report.

Mayor Markovich opened the public hearing and called for public comment.

With no one wishing to speak, Mayor Markovich closed the public hearing.

Mayor Markovich called for City Council Comments and there were none.

Motion: It was moved by Mayor Markovich, and seconded by Council Member Sanchez, to approve Resolution No. 15-39 adopting the 2015 Local Development Report certifying that the City of Cudahy meets the conformance criteria of the 2010 Congestion Management Program (CMP). The motion carried unanimously by the following roll call vote:

AYES:	Garcia, Guerrero, Sanchez, Hernandez, Markovich
NOES:	None
ABSTAIN:	None
ABSENT:	None

C. Consideration to Adopt an Urgency Ordinance of the City Council of the City of Cudahy Adding Chapter 15.36 to Title 15 (Buildings and Construction) of the Cudahy Municipal Code Regarding Expedited Permitting Procedures for Small Residential Rooftop Solar Systems and Declaring the Urgency thereof in Accordance with Government Code Sections 36934 and 36937

Acting Community Development Director Michael Allen presented the staff report.

Mayor Markovich opened the public hearing and called for public comment.

With no one wishing to speak, Mayor Markovich closed the public hearing.

Mayor Markovich called for City Council Comments and there were none.

Motion: It was moved by Council Member Sanchez, and seconded by Vice Mayor Hernandez, to adopt Urgency Ordinance No. 654 adding Chapter 15.36 to Title 15 (Buildings and Construction) to the Cudahy Municipal Code (CMC) regarding expedited permitting procedures for small residential rooftop solar systems. The motion carried unanimously by the following roll call vote:

AYES:	Garcia, Guerrero, Sanchez, Hernandez, Markovich
NOES:	None
ABSTAIN:	None
ABSENT:	None

11. BUSINESS SESSION - None

12. COUNCIL DISCUSSION

Council Member Garcia:

Discussion ensued regarding City contracts for Urban Futures and HR Dynamics. Council Member Garcia requested that staff continue bringing the strategic plan forward with a third party and that staff provide the City Council with a copy of revised strategic plan.

Discussion ensued regarding the City procurement process and City contract oversight. Council Member Garcia requested that Council be included more in the process and directed the City Attorney to work with the City Manager to prepare a report on other cities' procurement processes. City Manager Pulido stated he will work with the Council to create an even more transparent process.

Council Member Guerrero:

Discussion ensued regarding Public Comment Protocol.

Motion: It was moved by Council Member Guerrero to bring public comment period that we ordinarily have at the end of the meeting to the front of the meeting and to allow the members of the public to express their viewpoint on anything within the purview of City business effective two weeks from now. The motion failed due to lack of a second.

Discussion ensued regarding Closed Session Protocol. Council Member Guerrero stated he is in contact with the City Attorney constantly to discuss closed session items and he advocates for enabling the recording of closed session to mitigate hostility and misconduct. City Attorney Olivarez confirmed he does discuss closed session items with Council Member Guerrero on a regular basis.

Motion: It was moved by Council Member Guerrero that the meetings henceforth be recorded and that the recordings be kept at the City Attorney's office. The motion failed due to lack of a second.

Council Member Guerrero then stated he would like to participate remotely in closed session proceedings on a regular basis and that the remote location be properly agendized.

Motion: It was moved by Mayor Markovich, and seconded by Vice Mayor Hernandez and carried to receive and file.

Council Member Sanchez:

Discussion ensued regarding of Cudahy en Marcha fundraised appropriations.

Motion: It was moved by Council Member Sanchez, and seconded by Vice Mayor Hernandez that the raised funds be transferred back to Cudahy en Marcha. The motion carried (4-0-1-0) by the following roll call vote:

AYES:	Garcia, Sanchez, Hernandez, Markovich
NOES:	None
ABSTAIN:	Guerrero
ABSENT:	None

Council Member Guerrero departed the meeting at 9:37 p.m.

Discussion ensued regarding the Ad-Hoc Committee Recommendation for City Commission Appointments. Council Member Sanchez distributed the Ad-Hoc's recommendation for vacancies and asked that an action item be brought forward at an upcoming meeting.

Motion: It was moved by Council Member Garcia, and seconded by Mayor Markovich to add Elizabeth Alcantar and Leslie Mendoza to the Planning Commission, move Gilbert Cuevas to the Parks and Recreation Commission and to bring this item back for formal action. The motion carried (4-0-0-1) by the following roll call vote:

AYES:	Garcia, Sanchez, Hernandez, Markovich
NOES:	None
ABSTAIN:	None
ABSENT:	Guerrero

Vice Mayor Hernandez requested that his two items, the Discussion of the Young Mayor Program, and the Discussion to bring a Resolution regarding Equal Wages for Gender Equality, be moved to the next City Council meeting.

13. ORAL COMMUNICATIONS (Closed Session)

Mayor Markovich announced that public comment is now open and limited to closed session items and the limit on each speaker is three (3) minutes.

With no members of the public wishing to speak, Mayor Markovich closed oral communications.

RECESS TO CLOSED SESSION

City Attorney Olivarez recessed the City Council / Agency meeting to Closed Session at 9:42 p.m. all members present with the exception of Council Member Guerrero.

14. CLOSED SESSION

City Attorney Olivarez read into the record the titles of the Closed Session Agenda Items as follows:

A. Closed Session pursuant to Government Code Section 54956.9(d) (2) and 54956.9(e) (1) – Conference with Legal Counsel to Discuss a Matter Involving Potential Litigation and/or Significant Exposure to Litigation – [Two (2) Matters] - This Matter will be heard jointly by the Cudahy City Council and the Cudahy City Council in its capacity as Successor Agency to the Cudahy Redevelopment Agency. Not discussed

B. Closed Session pursuant to Government Code Section 54956.9(d) (4) – Conference with Legal Counsel to Discuss a Matter Involving Possible Initiation of Litigation – [One (1) Matter]

C. Closed Session pursuant to Government Code Section 54956.8 – Conference with Real Property Negotiator Location of Property: 4819 Patata, 8420 S. Atlantic Ave. (APN 622-034-014, 032, 040-41), Cudahy, CA 90201 City's Negotiator(s): City Manager Jose E. Pulido Party Negotiating With: Cudahy LF, LLC Under Discussion: Discussion of both price and terms of payment as related to purchase of subject property

D. Closed session pursuant to Government Code section 54957(b)(1) – Public Employee Performance Evaluation

   Employee Title: City Manager

E. Closed Session Pursuant to Government Code Section 54957.6(a) – Conference with Labor Negotiator Regarding Represented Employees City's Designated Representative(s) for Negotiations: Jose Pulido, City Manager, Rhonda Strout-Garcia, Human Resources Consultant, Oliver Yee, Special Counsel Employee Organization: Cudahy Miscellaneous Employees Association (CMEA)

RECONVENE

Mayor Markovich reconvened the City Council / Agency meeting in Open Session at 11:35 p.m. with all members present with the exception of Council Member Guerrero.

15. CLOSED SESSION ANNOUNCEMENT

City Attorney Olivarez announced that Closed Session Item 14A was not discussed and direction was given on Items 14B, 14C, 14D and 14E but no final action was taken.

16. PUBLIC COMMENT

Mayor Markovich announced this is the time set aside for citizens to address the City Council / Agency on matters under the City Council's jurisdiction and the limit on each speaker is three (3) minutes.

With no one wishing to speak, Mayor Markovich closed Public Comment.

17. ADJOURNMENT

A motion was made by Mayor Markovich, and seconded by Council Member Garcia and carried to adjourn the City Council / Agency meeting at 11:36 p.m. to the Regular and Joint Meeting as Successor Agency to the Cudahy Development Commission on Monday, September 28, 2015 at 6:30 p.m.

____
Cristian Markovich
Mayor

ATTEST:

____
Laura Valdivia
Interim City Clerk

Item Number
10D

STAFF REPORT

Date: October 12, 2015

To: Honorable Mayor/Chair and City Council/Agency Members

From: Jose E. Pulido, City Manager/Executive Director
By: Michael Allen, Acting Community Development Director

Subject: **Consideration to Receive and File Aging and Senior Citizen Commission Minutes; Public Safety Commission Minutes; Planning Commission Minutes; and Parks and Recreation Commission Minutes**

RECOMMENDATION

The City Council is requested to receive and file the minutes for the:

1. Aging and Senior Citizen Commission meeting of August 10, 2015;
2. Public Safety Commission meeting of August 11, 2015;
3. Planning Commission meeting of August 17, 2015; and
4. Parks and Recreation Commission meeting of August 28, 2015.

BACKGROUND

1. On August 10, 2015, the Aging and Senior Citizen Commission held their regularly scheduled meeting.
2. On August 11, 2015, the Public Safety Commission held their regularly scheduled meeting.
3. On August 17, 2015, the Planning Commission held their regularly scheduled meeting.

4. On August 28, 2015, the Parks and Recreation Commission held their regularly scheduled meeting.

ANALYSIS

Below are the summaries for various City Commission meetings held in August 2015.

Aging and Senior Citizen Commission: Following is a summary of actions taken at the August 10, 2015 meeting:

Members Present:

Commissioner Cornejo
Commissioner Gessner
Chairperson Pro-Tem Pena
Chairperson Covarrubias

Business Session:

4A. A request to approve the minutes of the Regular Aging and Senior Commission meeting held on Monday, June 8, 2015.

Motion to approve by Chairperson Covarrubias, seconded by Commissioner Gessner. Approved by unanimous vote.

Public Safety Commission: Following is a summary of actions taken at the August 11, 2015 meeting:

Members Present:

Commissioner Cardonne
Commissioner Cruz
Chairperson Pro-Tem Carrera
Chairperson Parrish

Business Session:

4A. July monthly report from the Volunteers on Patrol.

Motion to receive and file by Chairperson Pro Tem Carrera, seconded by Commissioner Cruz. Approved by unanimous vote.

4B. July monthly report from the L.A. County Sheriff’s Department.

Motion to receive and file by Commissioner Cruz, seconded by Commissioner Cardonne. Approved by unanimous vote.

4C. July monthly report from Code Enforcement Department.

Motion to receive and file by Commissioner Cruz, seconded by Chairperson Parrish. Approved by unanimous vote.

4D. A request to approve the minutes of the regular Public Safety Commission Meeting held on July 14, 2015.

Motion to receive and file by Commissioner Cruz, seconded by Commissioner Cardonne. Approved by unanimous vote.

Planning Commission: Following is a summary of actions taken at the August 17, 2015 meeting:

Members Present:

Commissioner Alcantar
Commissioner de Santiago
Chairman Cuevas

Absent:

Vice Chairman Fuentes – Excused absence

Public Hearing:

6A. A public hearing of the City of Cudahy Planning Commission considering Ordinance No. 653, amending Cudahy Municipal Code Chapter 20.28 Development Agreements of Title 20 Zoning, Resolution PC 15-09.

Motion to approve by Commissioner Alcantar, seconded by Commissioner de Santiago. Approved by unanimous vote.

6B. A public hearing of the City of Cudahy Planning Commission recommending approval by Resolution No. PC 15-10 to the Cudahy City Council for Development Review Permit No. 41.503; construction of a new 1,500 square foot single family dwelling unit located at 4051 Olive Street in the Medium Density Residential Zone.

Motion to approve by Commissioner Alcantar, seconded by Commissioner de Santiago. Approved by unanimous vote.

Business Session:

7A. A request to approve the minutes of the Regular Planning Commission meeting held on July 20, 2015.

Commissioner de Santiago moved to approve, motion seconded by Commissioner Cuevas. Approved by unanimous vote.

<u>Parks and Recreation Commission:</u> Following is a summary of actions taken at the August 28, 2015 meeting:

Members Present:

Commissioner Rodriguez
Commissioner Reyes
Commissioner Covarrubias
Chairperson Ortega

Absent:
Chairperson Pro-Tem Venegas

Business Session:

4A. A request to approve the minutes of the Regular Parks and Recreation Commission meeting held on July 24, 2015.

Motion to approve item 4A made by Commissioner Ortega, seconded by Commissioner Rodriguez, approved by unanimous voice vote.

CONCLUSION

The City Council is requested to receive and file this report.

FINANCIAL IMPACT

None.

ATTACHMENTS

A. Minutes of the Aging and Senior Citizen Commission, August 10, 2015
B. Minutes of the Public Safety Commission, August 11, 2015
C. Minutes of the Planning Commission, August 17, 2015
D. Minutes of the Parks and Recreation Commission, August 28, 2015

MINUTES
Aging and Senior Citizen Commission
A Regular meeting held at Leo P. Turner
4835 Clara Street, Cudahy, CA 90201
Monday August 10, 2015 - 6:00pm

1. Chairperson Covarrubias called the meeting to order at 2:07 p.m.

2. ROLL CALL

Present: Commissioner Cornejo
Commissioner Gessner
Chairperson Pro-Tem Pena
Chairperson Covarrubias

Pledge of Allegiance was led by Chairperson Covarubias.

3. PUBLIC COMMENT

Chairperson Covarrubias announced that this was the time set aside for citizens to address the Senior Commission matters relating to Commission business.

Hearing no speakers Chairperson Covarrubias ordered the session closed.

4. BUSINESS SESSION

4A. A request to approve the minutes of the Regular Aging and Senior Commission meeting held on Monday, June 8, 2015.

Motion to approve item 4A made by Chairperson Covarrubias, seconded by Commissioner Gessner, approved by unanimous voice vote.

5. COMMISSION/CYF BUSINESS

Commissioner Gessner stated that Gilbert from Apple Care has decided to help support our Seniors for two months, donating music and other necessities for the festivities. He will help fund the month of October and December. Apple Care has also decided to donate free flu shots to the Seniors. The date will be provided later on.

Commissioner Gessner announced that a volunteer and fellow member of our community, Walt Gessner, has passed.

Commissioner Cornejo asked for an update of the Senior lunch program. He was informed that the lunch program is run by the Old Timers Foundation and lunches are served on a first come first serve bases. Commissioner Gessner informed the commission that the old timer's foundation donates vouchers twice a year for groceries.

Commissioner Cornejo asked for an explanation on how Club De Oro works. He stated that a couple had went to an activity held by Club De Oro but was asked for the wife to leave because she did not meet the age requirement. He would like to know if there is a way to have spouses who are under the age requirement to also participate in Club de Oro activities.

Commissioner Cornejo asked if the food distribution schedule has changed. He was informed that food distribution is the fourth Thursday of every month except for November and December, which is the third Thursday of the month.

Chairperson Covarrubias asked for an update for the senior trip to the OC Fair. She was informed that ten people had signed up. She asked if there was a way to have the seniors sign up for trips in Clara Park, as it is better access for seniors.

Commissioner Cornejo asked if the City still owned a bus, and if so can the senior have access to it for the trips. Dulce Aguilera stated that she will check with Victor Santiago if the City has a bus that the senior can use and give an update in the following meeting.

Chairperson Pro-Tem Pena stated that the seniors did not receive a cake for the birthday celebrations on Friday, July 31, 2015 but was given late on Monday August 3, 2015. She stated if we can please remind city hall staff to purchase the cake on time.

6. ADJOURNMENT

Hearing no objections Chairperson Covarrubias ordered the meeting to be adjourned.

The regular meeting of the Senior and Aging Commission meeting was adjourned at 2:41 p.m. on Monday, August 10, 2105 in the Council Chambers, 5220 Santa Ana St, Cudahy, California 90201.

PASSED, APPROVED AND ADOPTED this 26 day of June 2015

____
Chairperson Covarrubias

ATTEST:

____
Commission Recorder
Victor Santiago

Attachment B

MINUTES
CUDAHY PUBLIC SAFETY COMMISSION
A Regular Meeting to be held in the City Council Chambers
5240 Santa Ana Street, Cudahy, California
Tuesday- August 11, 2015 – 5:00 P.M.

1. CALL TO ORDER

Chairperson Parrish called the meeting to order at 5:00 p.m.

2. ROLL CALL

MEMBERS PRESENT: Commissioner Cardonne
Commissioner Cruz
Chairperson Pro Tem Carrera
Chairperson Parrish

Pledge of Allegiance was led by Chairperson Pro Tem Carrera.

A moment of silence was held in memory of Commissioner Gelder.

STAFF PRESENT: Commission Liaison Raul Mazariegos.

3. PUBLIC COMMENT

Chairperson Pro Tem Carrera announced that this was the time set aside for citizens to address the Public Safety Commission on matters relating to Commission business. Anyone wishing to speak, please fill out the form located at the Council Chambers entrance and submit it to the Commission Recorder when approaching the podium. **Each person will be allowed to speak only once and will be limited to five (5) minutes**. When addressing the Commission, please speak into the microphone and voluntarily state your name and address. The proceedings for this meeting are recorded on audio CD.

Hearing no speakers, Chairman Pro Tem Carrera closed public comment.

4. BUSINESS SESSION

4A. July monthly report from The Volunteers on Patrol.
(Verbal Report)

Recommendation: *Motion to receive and file the July report.*

Chairperson Pro Tem Carrera spoke of the National Night Out event.

MOTION: Chairperson Pro Tem Carrera moved the motion to approve item 4A. Motion was seconded by Commissioner Cruz which carried with the following voice vote:

Ayes:	Commissioners Cardonne, Cruz, Chairperson Pro Tem Carrera, Chairperson Parrish
Noes:	None
Abstention:	None
Absent:	None

4B. July monthly report from L.A County Sheriff's Department.
(Report attached)

Recommendation: Motion to receive and file the July report.

Sgt. Bearse provided an update on the National Night Out event.

A brief discussion ensued amongst the Commissioners and Staff.

MOTION: Commissioner Cruz moved the motion to receive and file the report for the month of July. Motion was seconded by Commissioner Cardonne which carried with the following voice vote:

Ayes:	Commissioners Cardonne, Cruz, Chairperson Pro Tem Carrera, Chairperson Parrish
Noes:	None
Abstention:	None
Absent:	None

4C. July monthly report from Code Enforcement Department.
(Report attached)

Recommendation: *Motion to receive and file the July report.*

Code Enforcement Officer Raul Mazariegos provided a brief report.

MOTION: Commissioner Cruz moved the motion to receive and file the report for the month of July. Motion was seconded by Chairperson Parrish which carried with the following voice vote:

Ayes:	Commissioners Cardonne, Cruz, Chairperson Pro Tem Carrera, Chairperson Parrish
Noes:	None
Abstention:	None
Absent:	None

4D. A request to approve the minutes of the regular Public Safety Commission Meeting held on July 14, 2015
(Minutes attached)

Recommendation: Motion to approve the minutes for the July 14, 2015 meeting.

MOTION: Commissioner Cruz moved the motion to approve item 4D. Motion was seconded by Commissioner Cardonne which carried with the following voice vote:

Ayes:	Commissioners Cardonne, Cruz, Chairperson Pro Tem Carrera, Chairperson Parrish
Noes:	None
Abstention:	None
Absent:	None

5. COMMISSION BUSINESS

Commissioner Cruz inquired when the Sherriff's Department was going to hold a citizen's academy.

Chairperson Pro Tem Carrera spoke about the National Night Out.

Commissioner Cruz commented on an incident that he witness were the Sheriffs Department was very helpful. He also inquired about the permanent parking.

Chairperson Pro Tem Carrera adjourned the meeting at 5:20 p.m.

6. ADJOURNMENT

I, Raul Mazariegos, Commission Liaison, certify that the foregoing minutes were approved by the Public Safety Commission at a regular meeting held on September 8, 2015.

____
Chairperson

____
Liaison

MINUTES
CUDAHY PLANNING COMMISSION
A Regular Meeting to be held in the City Council Chambers,
5240 Santa Ana Street, Cudahy, California,
Monday, August 17, 2015 – 6:00 P.M.

1. CALL TO ORDER

Chairman Cuevas called the meeting to order at 6:10 p.m.

2. ROLL CALL

Present:	Commissioner Alcantar Commissioner de Santiago Chairman Cuevas
Absent:	Vice Chairman Fuentes – Excused absence
Staff Present:	Acting Community Development Director, Michael Allen Planning Technician, Didier Murillo City Attorney, Isabel Birrueta

3. PLEDGE OF ALLEGIANCE

Pledge of Allegiance was led by Chairman Cuevas.

4. PUBLIC COMMENT

Chairman Cuevas announced that this was the time set aside for citizens to address the Planning Commission on matters relating to Commission business. When addressing the Commission please speak into the microphone and voluntarily state your name and address. **Each person will be allowed to speak only once and will be limited to five (5) minutes**. The proceedings of this meeting are recorded on audio CD.

Chairman Cuevas opened the public comment.

Having no speakers, Chairman Cuevas closed the public comment.

5. WAIVE FULL READING

5A. Approval to waive the full text reading of all resolutions on the agenda and declare that said titles which appear on the public agenda shall be determined to have been read by title only.

Recommendation: *Motion to waive the full text reading of all resolutions on the agenda.*

MOTION: Commissioner Alcantar moved the motion to approve item 5A, motion seconded by

Commissioner de Santiago which carried with the following roll call:

Ayes: Commissioner Alcantar, Commissioner de Santiago, Chairman Cuevas
Noes: None
Abstention: None
Absent: Vice Chairman Fuentes
Motion Approved

6. PUBLIC HEARING

6A. A Public Hearing of the City of Cudahy Planning Commission considering Ordinance No. 653, Amending Cudahy Municipal Code (CMC) Chapter 20.28 Development Agreements of Title 20 Zoning, Resolution PC 15-09

Recommendation: *Staff recommends Planning Commission approve Resolution No. PC 15-09*

A presentation was given by City Attorney, Isabel Birrueta. No clarifying questions were asked upon conclusion of the presentation.

Recommendation: *Staff recommends Planning Commission approve Resolution No. PC 15-09*

MOTION: Commissioner Alcantar moved the motion to approve item 6A, motion seconded by Commissioner de Santiago which carried with the following roll call:

Ayes: Commissioner Alcantar, Commissioner de Santiago, Chairman Cuevas
Noes: None
Abstention: None
Absent: Vice Chairman Fuentes
Motion Approved

6B. A Public Hearing of the City of Cudahy Planning Commission recommending approval by Resolution No. PC 15-10 to the Cudahy City Council for Development Review Permit (DRP) No. 41.503; Construction of a new 1,500 square foot Single Family Dwelling unit located at 4051 Olive Street in the Medium Density Residential (MDR) Zone.

Recommendation: *Staff recommends Planning Commission approve Resolution No. PC 15-10*

A presentation was given by Planning Technician, Didier Murillo. No clarifying questions were asked upon conclusion of the presentation.

Recommendation: *Staff recommends Planning Commission approve Resolution No. PC 15-10*

MOTION: Commissioner Alcantar moved the motion to approve item 6B, motion seconded by Commissioner de Santiago which carried with the following roll call:

Ayes: Commissioner Alcantar, Commissioner de Santiago, Chairman Cuevas

Noes: None
Abstention: None
Absent: Vice Chairman Fuentes
Motion Approved

7. BUSINESS SESSION

A. A request to approve the minutes of the Regular Planning Commission meeting held on July 20, 2015.
(Minutes attached)

Recommendation: *Staff recommends Planning Commission to approve the minutes of the regular Planning Commission meeting held on July 20, 2015.*

MOTION: Commissioner de Santiago moved the motion to approve item 7A, motion seconded by Chairman Cuevas which carried with the following roll call:

Ayes: Commissioner Alcantar, Commissioner de Santiago, Chairman Cuevas
Noes: None
Abstention: None
Absent: Vice Chairman Fuentes
Motion Approved

8. COMMISSION BUSINESS

Commissioner Alcantar thanked staff for providing the Planning Commission with flyers on an upcoming ***workshop; and asked if staff can send an electronic copy of the flyer. Acting Community Development Director, Michael Allen informed the Planning Commission that the flyer is available for download through the City's website.

Commissioner de Santiago informed staff that a few members of the community called into City Hall and asked the receptionist for information/details on the upcoming ***workshop, but the receptionist was unable to provide them with the information being requested. Planning Technician, Didier Murillo informed the Planning Commission that he was aware of the situation and apologized for the inconvenience; this all happened while he was out on Doctors appointments. The receptionist has been fully informed of the details for the workshop and will now be capable of providing members of the public with any answers on future phone calls receive. City Attorney, Isabel Birrueta recommended that the receptionist simply forward any phone calls pertaining to the *workshop to the Planning Department as they know all the pertinent details.

***(The City of Cudahy has teamed with UCLA & From Lot to Spot to create strategies to plan for future growth in Cudahy, while building a healthy, sustainable city for everyone! Join us September 17, 2015 as we engage in a hands-on workshop to share ideas around park needs and parking in Cudahy).*

9. ADJOURNMENT

The regular meeting of the Cudahy Planning Commission was adjourned at 6:28 p.m. August 17, 2015 in the City Council Chambers, 5240 Santa Ana St., Cudahy, California.

Attachment D

MINUTES
Cudahy Parks and Recreation Commission,
Cudahy Youth Foundation (CYF)
A Regular meeting held in the Council Chambers,
5220 Santa Ana St, Cudahy, CA 90201
Friday, August 28, 2015 - 6:00pm

1. Chairperson Covarrubias called the meeting to order at 6:00 p.m.

2. ROLL CALL

Present:	Chairperson Covarrubias Commissioner Ortega Commissioner Reyes Commissioner Rodriguez
Absent:	Chairperson Pro-Tem Venegas

Pledge of Allegiance was led by Commission Secretary

Presentation by Danil Pasillos - Mr. Pasillos presented the Commission/Cudahy Youth Foundation with a way to generate funds for the Cudahy Youth Foundation through fund raising.

3. PUBLIC COMMENT

Chairperson Covarrubias announced that this was the time set aside for citizens to address the Parks and Recreation Commission/Foundation on matters relating to Commission/Foundation business.

Hearing no speakers Chairperon Covarrubias ordered the session closed.

4. BUSINESS SESSION

4A*.* A request to approve the minutes of the Regular Parks and Recreation meeting held on Friday, July 24, 2015

Motion to approve item 4A made by Commissioner Ortega, seconded by Commissioner Rodriguez, approved by unanimous voice vote.

5. COMMISSION/CYF BUSINESS

Commissioners requested to get more information on the proposal by AYSO. Commission secretary let the Commission know that the proposal was still in the works, and that as soon as it was ready the City will give the Parks and Recreation Commission a detail report on the proposal.

Certificates of appreciation were handed out to the firework stand volunteers.

6. ADJOURNMENT

Hearing no objections Commissioner ordered the meeting to be adjourned.

The Regular meeting of the Cudahy Parks & Recreation Commission was adjourned at 6:43p.m. on Friday, August 28, 2015 in the Council Chambers, 5220 Santa Ana St, Cudahy, California 90201

PASSED, APPROVED AND ADOPTED this 25 day of September 2015

____
Chairperson Covarrubias

ATTEST:

____
Commission Recorder
Victor Santiago

Item Number
10E

STAFF REPORT

Date: October 12, 2015

To: Honorable Mayor/Chair and City Council/Agency Members

From: Jose E. Pulido, City Manager/Executive Director
By: Jennifer Hernandez, Acting Human Resources Specialist

Subject: **Consideration and Approval of a Resolution Adopting the Memorandum of Understanding (MOU) Between the City of Cudahy and the Cudahy Miscellaneous Employee's Association (CMEA) (July 1, 2015 – June 30, 2019)**

RECOMMENDATION

The City Council is requested to adopt a resolution approving the Memorandum of Understanding (MOU) between the City of Cudahy and the Cudahy Miscellaneous Employee's Association (July 1, 2015 - June 30, 2019).

BACKGROUND

1. On April 27, 2015, the City of Cudahy's Labor Negotiation team and the Cudahy Miscellaneous Employee's Association (CMEA) held its first labor negotiation meeting, where an initial proposal on behalf of the CMEA was presented.

2. In May of 2015, the City's Labor Negotiation team met with the City Council's ad-hoc committee, which involved Council members Chris Garcia and Baru Sanchez, to receive guidance on developing preliminary goals and expectations during the labor negotiation process.

3. During May – August 2015, several meetings took place between the City's Labor Negotiation team and the CMEA to discuss and negotiate the terms of a proposed MOU. During this period, City Labor Negotiators also reported out progress and received direction from the City Council during Closed Session of most regularly scheduled Council Meetings.

4. On September 24, 2015, the CMEA Negotiations team and the City of Cudahy’s Labor Negotiation team met and reached a tentative agreement for a proposed MOU for July 1, 2015 – June 30, 2019.

ANALYSIS

The City of Cudahy’s Negotiation team and the CMEA Negotiation team conducted negotiations sessions between April and September 2015. The City and CMEA ultimately exchanged MOU proposals and counter-proposals during that time. A tentative agreement was reached on September 24, 2015. The proposed CMEA MOU for 2015-2019 is attached.

Major items that have been tentatively agreed upon are as follows:

- Five PERS Members classified as Miscellaneous Tier 1 members, with a retirement formula of 2.7% @ 55, shall pay the entire 8% employee share of their member’s contributions to PERS by the end of the third year of the MOU. Since the City has been paying the full amount for employees, this item will result in long-term savings.

  Annual City Savings: $ 8,354.32 (2015), $8,151.84 (2016), $5,434.56 (2017)

  City Savings over three-year Period: $21,940.72

- All CMEA Members were granted a 10% salary increase over a four-year period (3% - July 1, 2015, 3% - July 1, 2016, 2% - July 1, 2017, 2% - July 1, 2018). For CMEA members with a retirement formula of 2.7% @ 55, the aforementioned salary increase will serve to offset the portion of their salary which will be paid toward the employee share of their PERS member contribution.

  Annual Cost to City: $14,901.12 (2015), $15,348.15 (2016), $10,539 (2017),
  $10749.85 (2018)

  Cumulative Cost to City: $51,538.19

- Medical benefits currently at 100% coverage for medical premiums have been reduced to up to the coverage amount for the Kaiser Plan, which will achieve long-term costs savings.

  Annual City Savings: $10,561.80

  City Savings over four-year Period: $42,247.20

- Dental benefits currently at 100% coverage for dental premiums will be reduced to an average cost of available plans for 2015 and will achieve immediate cost savings.

  Annual City Savings: $2,997.36

  City Savings over four-year Period: $11,989.44

- Life Insurance policies will be increased from $75,000 coverage to $100,000, at no additional cost to the City. This additional benefit was achieved by going out to market to evaluate the current rates for existing Life Insurance policies. The City was able to lock in a richer benefit for the same premium rate as the current coverage.

  Annual Cost to City: $0

  Cumulative Cost to City: $0

- Education Incentives have been reduced from 100% reimbursement for Cal State University level costs to a maximum reimbursement of $5,000 each year.

- Sick Leave Buy-Back and Retirement Cash-outs currently at 100% cash-out value have been reduced to 50% cash-out value, achieving long-term cost savings in comparison to previous years.

  Annual City Savings: $13,370.05

  City Savings over 4-year Period: $54,920.20

- A modified 9/80 employee work schedule, starting at 7:00 a.m. and ending at 5:00 p.m. Monday through Thursday, and every other Friday starting at 7:00 p.m. and ending at 4:00 p.m., with a one-hour unpaid lunch break, shall be implemented starting Friday, November 6, 2015.

- Floating Holidays have been reduced from two days per year (18 hours), to one day per year (10) hours.

Other tentatively agreed upon items include clarification and clean-up of the current MOU language (e.g., Grievance Procedure, Out of Class Pay, Acting Pay, etc.).

The CMEA Board worked very diligently with the City Labor Negotiation team to reach an agreement, which not only serves a financial benefit to the City, but also maintains a reasonable level of benefits for its members. This MOU brings Cudahy into alignment with what other cities are doing to address this issue.

CONCLUSION

The City Council is requested to adopt a resolution, approving the MOU between the City and the CMEA, which commences retroactively to July 1, 2015 and terminates June 30, 2019, replacing the previous MOU, which expired on June 30, 2015.

If the MOU is not approved, the terms and conditions of the expired MOU will remain in place. Also, the City will need to extend the current contract with Liebert Cassidy Whitmore LLP, in order to continue the negotiation process as funds for the current contract have almost been exhausted. The CMEA bargaining unit will also continue to pay extra fees for their special legal representation.

FINANCIAL IMPACT

The financial impact of the MOU is approximately $8,000 in cost savings over a three-year period, with additional cost savings over a long-term period, as the City will no longer be responsible for the PERS Tier 1 Miscellaneous Member’s Employee contribution share of 8%. 80% of the CMEA membership belongs to this plan.

The City will revisit costs and savings associated with the execution of the MOU during the Mid-Year Fiscal Year 2015-2016 City Budget review to update departmental appropriations. The City’s appropriated budget for full-time membership employees during the Fiscal Year 2015-2016 is $829,127.

ATTACHMENTS

A. Proposed Resolution approving the Memorandum of Understanding (MOU) between the City of Cudahy and the Cudahy Miscellaneous Employee’s Association (July 1, 2015 - June 30, 2019).

B. Draft Memorandum of Understanding between the City of Cudahy and the Cudahy Miscellaneous Employee’s Association for July 1, 2015 – June 30, 2019.

RESOLUTION NO. _____

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF CUDAHY ADOPTING THE MEMORANDUM OF UNDERSTANDING BETWEEN THE CITY OF CUDAHY AND THE CUDAHY MISCELLANEOUS EMPLOYEE'S ASSOCIATION (JULY 1, 2015 – JUNE 30, 2019)

WHEREAS, the City of Cudahy, hereinafter referred to as the "City", and the Cudahy Miscellaneous Employee's Association, hereinafter referred to as "CMEA" have met and conferred in accordance with the Meyers-Milias-Brown Act and Government Labor Code §3500; and

WHEREAS, the City and the CMEA have memorialized the agreement in a written Memorandum of Understanding for a four-year term, commencing July 1, 2015 and terminating on June 30, 2019.

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF CUDAHY HEREBY RESOLVES AS FOLLOWS:

SECTION 1. The Memorandum of Understanding between the City and the CMEA, attached hereto, is hereby approved in substantially the form thereof together with any additions thereto or changes therein deemed necessary or advisable by the City Manager.

SECTION 2. The City Manager is authorized to sign the Memorandum of Understanding.

SECTION 3. The Interim City Clerk shall certify the adoption of this Resolution.

PASSED, APPROVED, AND ADOPTED by the City Council of the City of Cudahy at its regular meeting on this 12th day of October, 2015.

____
Cristian Markovich
Mayor

ATTEST:

____
Laura Valdivia
Interim City Clerk

APPROVED AS TO FORM:

____
Isabel Birrueta
Assistant City Attorney

CERTIFICATION

STATE OF CALIFORNIA)
COUNTY OF LOS ANGELES) SS:
CITY OF CUDAHY)

I, Laura Valdivia, Interim City Clerk of the City of Cudahy, hereby certify that the foregoing Resolution No. ____ was passed and adopted by the City Council of the City of Cudahy, signed by the Mayor and attested by the City Clerk at a regular meeting of said Council held on the 12th day of October, 2015, and that said Resolution was adopted by the following vote, to-wit:

AYES:

NOES:

ABSTAIN:

ABSENT:

____
Laura Valdivia
Interim City Clerk

CITY OF CUDAHY

MEMORANDUM OF UNDERSTANDING

PURSUANT TO THE CALIFORNIA

MEYERS - MILIAS - BROWN ACT

JULY 1, 2015 - JUNE 30, 2019

BY AND BETWEEN

THE CUDAHY MISCELLANEOUS EMPLOYEES' ASSOCIATION

AND

THE CITY OF CUDAHY

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CITY OF CUDAHY

MEMORANDUM OF UNDERSTANDING

BY AND BETWEEN

THE CUDAHY MISCELLANEOUS EMPLOYEES' ASSOCIATION

AND

THE CITY OF CUDAHY

This Memorandum of Understanding has been prepared pursuant to Government Code Sections 3500 through 3510 as amended, which is generally referred to as the Meyers-Milias-Brown Act.

This Agreement has been developed as a result of request of the Cudahy Miscellaneous Employees' Association. The items in this Agreement are subject to the approval of the City Council of the City of Cudahy and will be placed into effect upon the adoption of the necessary ordinances and resolutions by the City Council, if acceptable to them, in accordance with the terms and conditions hereinafter set forth.

The parties agree that the provisions contained herein shall be subject to all applicable laws and shall cover the period July 1, 2015 through June 30, 2019, unless otherwise provided.

RECOGNITION

The City hereby recognizes the Cudahy Miscellaneous Employees' Association as the majority representative of the employee representation unit consisting of the classifications listed in attached Salary Plan, exhibit "A".

Nothing contained herein shall be construed to deny those employees who do not belong to the CMEA from representing themselves.

ACCESS TO WORK LOCATIONS

Reasonable access to employee work locations shall be granted to officers of the Association and its official representatives for the purpose of processing grievances or contacting members of the Association concerning business within the scope of representation. Such officers or representatives shall not enter any work locations without the consent of the City or its authorized representative. Access shall be restricted so as not to interfere with the normal operations of the City or with established safety or security requirements.

Solicitation of membership and activities concerned with the internal management of an employee organization, such as collecting dues, campaigning for office, conducting elections, and distributing literature, will not be permitted during working hours.

THE SALARY PLAN

A. Salary Increases

All members shall receive a 3% increase to their base rate effective July 1, 2015; a 3% increase to their base rate effective July 1, 2016; a 2% increase to their base rate effective July 1, 2017, and a 2% increase to their base rate effective July 1, 2018.

B. The Salary Plan

The Salary Plan is attached hereto as Exhibit A.

C. Eligibility for Merit Salary Advancement

Eligibility for Salary Step Increases

1. Salary step increases shall be considered on a merit basis only, and then only at the following times, and in accordance with subsection below.

2. All full time appointments shall be made at the first step of the salary schedule assigned that class, unless prior written approval of the City Manager is obtained for appointments at a higher step in the assigned schedule.

3. No salary advancements shall be made so as to exceed the maximum rate established in the salary schedule for the class to which the employee's position is allocated.

Qualification for Salary Step Advancement

1. Shall not be automatic but, shall be based upon merit, dependent upon increased service value of an employee to the City as exemplified by recommendations of his supervisor, length of service, performance record, special training undertaken, and other objective evidence.

2. Only employees rated as meeting the standard of work performance expected of City employees shall be qualified to advance to the salary steps B, C, D and E.

3. If an employee does not receive a merit increase as a result of the performance evaluation, the employee may appeal through the grievance procedure.

D. <u>Merit Evaluation</u>

1. Every employee shall receive an objective, written job performance rating, no sooner than Five (5) weeks before, nor later than five (5) weeks after the completion of the six month probationary period, and annually thereafter but not later than January 31 of each subsequent year, and upon a change of employment status. Nothing in this Section shall prohibit the department head or authorized supervisor from giving an additional objective rating to an employee between those periods of time described in this Section.

2. It shall be the duty of the department head to delegate the responsibility of every employee's rating to that level of supervision having immediate knowledge of the employee's work. An employee shall be rated by his immediate supervisor and that rating shall be reviewed by the department head.

E. Eligibility for Merit Longevity

Upon approval of the appointing power, regular employees who have completed ten (10) continuous years of service may be eligible to receive merit longevity pay provided that:

1. The employee has maintained eligibility for salary Step J and,

~~2.~~ The employee has been evaluated in the tenth year as "Exceeds standards" as defined by a comprehensive rating at or above the middle column of the current reporting form, or the equivalent rating on any revised reporting form. Eligible employees shall be paid, in addition to their respective regular rate of pay, a stipend of ~~percentage amount equal to~~ 5% of the employee's ~~the next pay range above their~~ base pay rate; and after twenty (20) years, the percentage amount of the stipend shall increase to 7.5% of the employee's base pay rate~~equal to one and one-half (1-1/2) pay steps above their regular rate of pay~~.

F. Qualification for Merit Longevity

Merit longevity is to be provided as continuing incentive to career employees. Such payment shall continue with approval of the City Manager, only during such period as an eligible employee continues to "Exceeds standards" as defined above, and shall be terminated by the City Manager when the quality of service, as evidenced by the performance rating of such employee, does not merit such additional compensation.

G. Eligibility for Promotion Increases

1. Any employee receiving a promotion shall receive a salary increase equivalent to one pay range or shall be placed on the first step of the salary schedule for the class to which he is promoted, whichever is greater.

2. Any employee receiving a promotion who would otherwise have been eligible to receive a merit increase within sixty (60) days of the effective date of such promotion, shall be granted the merit increase prior to the application of provision G.1 of this Section.H. Acting Pay

An employee who has been designated by the City to serve in an acting capacity for thirty (30) consecutive work days or more shall receive Step A of the pay range for the classification in which the employee is performing active duties, or a stipend of 5% of the employee's base pay, whichever is greater. Service in an acting capacity shall not be used as a basis for, or in support of, a request for reclassification. The City Manager or designee may determine that a position filled pursuant to an acting assignment shall be filled based on a competitive process to afford an equal opportunity for internal/external candidates.

I. Out-Of-Class Pay

The City may temporarily assign employees to work out of classification. The selection of employees for an out-of-classification assignment shall be at the discretion of the City Manager or designee. A temporary out-of-class stipend of 5% of the employee's base pay shall be authorized with advance approval by the Department Head, upon consultation and approval from the City Manager or designee, when an employee is designated and scheduled to work in an out of class assignment. Paid holidays shall be considered as days actually worked. Other forms of authorized leave such as sick leave, emergency leave and vacation shall not be considered as days actually worked.

VACATION

A. Basis of Accrual

Full-time employees covered by this Agreement shall accrue paid vacation leave on the following scheduled basis:

Year of Service	Hours Per Year	Monthly Accrual
0-5	80	6.7 Hrs.
6 -10	120	10.0 Hrs.
11+	160	13.4 Hrs.

B. Vacation Accrual

All employees shall be entitled to accrue vacation earned during two full calendar years of employment. Department Heads shall encourage the taking of accrued vacation leave. If for some specific reason an employee wishes to accrue vacation leave in excess of the limits established herein, he/she must submit a request in writing to his/her Department Head listing this reason.

The Department Head and City Manager shall review and may grant such request if it is in the best interest of the City. The excess of the limit shall be determined by the Department Head and the City Manager. It is not the intent of this section to penalize an employee who is not able to utilize his/her accumulated vacation because of scheduling problems within the individual department.

Those employees who will have more than two years accumulation of vacation on the books at the end of the fiscal year will be notified two months prior to the end of the fiscal year to reduce their accrued vacation to the two year maximum. At the end of each calendar year, an employee may be entitled to be paid in lieu of accumulated vacation time provided that fifty (50) hours of accrued time remains on the books. A written request must be submitted to the City Manager by December 1 of each calendar year for the amount of hours to be paid in lieu of accumulated time on the books. When separation is caused by death of any employee, payment shall be made to the estate of such employee or, in applicable cases, as provided by the California Probate Code.

C. Effect of Holiday on Vacation Leave

In the event one or more authorized municipal holidays fall within a vacation leave, such holiday shall not be charged as vacation leave, but shall be credited as a holiday.

D. Effect of Leave of Absence on Accrual of Vacation Leave

The granting of any leave of absence without pay exceeding fifteen (15) consecutive calendar days shall cause the employee's annual vacation earned during the calendar year to be reduced proportionately for each month or major portion of a month that the employee is on leave of absence without pay.

E. Compensation for City Work During Vacation Prohibited

Other than "exempt" employees, no person shall be permitted to work for compensation for the City in any capacity, except compensation for mandated court appearances, during the time of his/her paid vacation leave from City service. This clause shall not limit the City's right to recall an employee from vacation in the event of an emergency and place him/her on regular pay status.

F. Scheduling Vacation

An employee may take his/her annual vacation leave at any time during the year, contingent upon approval by his/her Department Head. An employee shall normally provide two weeks notice in advance of the day(s) he/she is requesting vacation time off. When a family emergency arises which necessitates the use of vacation time, an employee shall provide as much advance notice as possible considering the particular circumstances. The Department Head should consider an employee's length of service when assigning vacation periods. Vacation leave may be taken in a minimum of 30 minute increments.

G. Terminal Vacation Pay

An employee with regular status separating from City service, who has accrued vacation leave, shall be entitled to terminal pay in lieu of such vacation. No leave credit will be earned on terminal leave payments. When separation is caused by death of any employee, payment shall be made to the estate of such employee or, in applicable cases, as provided by the Probate Code of the State.

SICK LEAVE

A. Accrual of Sick Leave

Employees shall be granted sick leave with pay at the rate of eight (8) hours for each full month of service, and any sick leave accrued but unused in any year shall be accumulated to a maximum accumulation of 480 hours.

Sick leave shall not be considered a right which an employee may use at his/her discretion, but shall be allowed only in cases of actual sickness or non-job incurred disability, or in the event of a personal necessity, making it impossible for the employee to perform his/her normal work assignments. Sick leave usage for personal necessities other than sickness or disability is allowed to a maximum of twelve (12) days (96 hours) per fiscal year with advanced Department Head approval. Sick leave may also be used for scheduled doctor, dental and optometry appointments, when advanced Department Head approval has been received.

B. Proof of Illness

In order to receive compensation while absent from duty on sick leave, the employee must notify his/her immediate supervisor prior to the time set for the beginning of his/her regular duties. The Department Head may request a certificate issued by a licensed physician or other satisfactory proof of illness before sick leave is granted. Sick leave with pay in excess of three (3) consecutive working days shall be granted only after presentation of a written statement by a physician certifying that the employee's condition prevented him/her from performing the duties of the position. Employees shall be required to complete a leave compensation form when returning to work after utilizing sick leave. Violation of sick leave privileges may result in disciplinary action and/or loss of pay when in the opinion of the Department Head the employee has abused such privileges.

C. Effect of Leave of Absence on Sick Leave Accrual

The granting of any leave of absence without pay exceeding fifteen (15) consecutive calendar days shall cause the employees' normal rate of sick leave accumulation to be extended by the number of calendar days for which such leave of absence has been granted less the first fifteen calendar days of such leave. Observed holidays occurring during sick leave shall not be counted as a day of sick leave.

D. Sick Leave Buy-Back

On July 1 of each year, employees may sell back at 50% value of the maximum 96 hours of sick leave that they have accrued but did not utilize during the previous fiscal year. This is subject to the condition that an employee must leave at least 58 hours of sick leave on the books prior to being eligible for any sick leave buy back. Sick leave buy-back shall be based on the employee's actual rate of pay on June 30 of the fiscal year in which it was accumulated. Employees who are eligible to sell back unused sick leave retain the option of maintaining all or a portion of their accumulated sick leave on the books. Upon retirement from employment with the city, all accumulated sick leave is eligible to be sold back at 50% value of the maximum of 192 hours of sick leave that they have accrued but did not utilize based on the employee's rate of pay at the time of separation.

BEREAVEMENT

Whenever a full-time employee is compelled to be absent from duty by reason of death or critical illness (where death appears imminent) of members of the employee's immediate family (father, mother, brother, sister, spouse, children, mother-in-law, father-in-law, grandmother, grandfather, or grandchildren) such person shall be entitled to bereavement leave with pay up to three (3) working days. The employee shall furnish satisfactory evidence of such death or critical illness to his/her Department Head. Bereavement leave shall not be allowed in any case where in the preceding six (6) calendar months, a leave on the grounds of critical illness of that same relative has been granted. Absences under this Section shall not be charged against sick leave.

INDUSTRIAL

A. Any employee who is compelled to be absent from duty on account of an on-the-job injury or illness which, by the determination of the Administrative Officer, would be compensated under Worker's Compensation Laws of the State of California had the absence extended to the seventh day or which thereafter is compensated under Workers' Compensation Laws, shall be entitled to receive the difference between any disability compensation due him under Workers' Compensation Laws and his/her salary, provided that such benefits shall not be paid for longer than twelve (12) months in the aggregate for any one such injury or illness.

B. Sick leave shall not be charged during absence as set forth in Section A above.

C. Neither sick leave nor vacation shall be accumulated during absence set forth in Section A above.

D. Any employee who claims or receives the benefits provided in this section shall furnish to the City Manager or designee satisfactory evidence of his/her right to receive such benefits, as well as verification of the amount of the disability compensation he/she has received or is entitled to receive.

TEMPORARY DISABILITY LEAVE

Upon submission of an appropriate certificate from a licensed physician, an employee may be granted temporary disability leave. The employee utilizing temporary disability leave may utilize all sick leave accredited to him/her and upon the expiration of sick leave, may utilize any accredited annual vacation leave. When both sick leave and annual vacation leave credit are exhausted, the remainder of the absence required will be on the basis of leave without pay. If leave without pay is utilized, no accruals of leave or benefits will be credited to the employee. The leave without pay will constitute a break in continuous service with the City, unless the City Manager authorizes otherwise.

PREGNANCY DISABILITY LEAVE

Employees may continue in employment during pregnancy, subject to the City Rules and Regulations, and relevant State and Federal Laws.
An employee who is disabled because of pregnancy, childbirth, or a related medical condition is entitled to an unpaid leave for up to the number of hours she would normally work within four calendar months (one-third of a year or 17 1/3 weeks). Requests for pregnancy disability leave must be submitted in writing with reasonable advance notice of the medical need for the leave. All leaves must be confirmed in writing, have an agreed-upon specific date of return, and be submitted to Human Resources.

If pregnancy disability leave is required, the employee shall provide a certificate in writing from a licensed physician which shall advise the City that: the employee is disabled from working by pregnancy, childbirth or a related medical condition; 2) the date on which the employee became disabled by pregnancy, childbirth or a related medical condition; and 3) the estimated duration or end date of the leave.

MILITARY LEAVE

Military leave with pay shall be granted in accordance with applicable state and federal law.

JURY DUTY

When called to jury duty, an employee, having provided at least five working days written notice, shall be entitled to his/her regular compensation provided he/she deposits his/her fees for service with the City. Employees released early from jury duty shall report to their supervisor for assignment for the duration of the shift. Employees shall be entitled to keep mileage reimbursement pay while on jury duty.

LEAVE OF ABSENCE WITHOUT PAY

A leave of absence without pay may be made by an employee who has exhausted all accrued leave balances. The City Manager may consider an extended leave of absence as a reasonable accommodation and/or whether such an extended leave of absence would present an undue hardship on the City, following an interactive process when the unpaid leave involves a serious health condition and disability. For non-medical requests, the City Manager will evaluate the nature of the request, and impact on the City, and may grant a non-medical leave of absence not to exceed one year. The procedure in requesting an extension shall be the same as that in requesting the original leave provided that the request for the extension is made no later than fourteen (14) calendar days prior to the expiration of the original leave.

HOLIDAYS

A. Designated City Holidays

Every employee shall be entitled to the following paid holidays each year and such other as may be designated by action of the City Council:

1. New Year's Day – January 1
2. The third Monday in January (Martin Luther King Jr. Day)
3. The third Monday in February (Presidents' Day)
4. The last Monday in May (Memorial Day)
5. Independence Day (July 4th)
6. The first Monday in September (Labor Day)
7. Veterans Day- Observed on November 11th
8. Thanksgiving Day
9. Christmas Eve- December 24
10. Christmas Day- December 25
11. One floating holiday.

If the Friday after Thanksgiving or Good Friday fall on a regularly scheduled work day, it shall be considered a designated holiday. Alternatively, if the Friday after Thanksgiving or Good Friday fall on the employees regular day off, it shall not be considered a designated holiday.

B. Procedure if Holiday Falls on a Sunday

When a designated holiday above (e.g. Veterans Day, Christmas Day, New Year's Day or July 4th) falls on a Sunday, the following Monday shall be treated as a designated holiday.

C. Floating Holidays

Except as provided in Section D below, all floating holidays shall be used in full day increments. Employees will be credited with 10 hours for each floating holiday that he/she is entitled to and will be charged the same 10 hours when he/she uses it. A floating holiday shall be equivalent to one full day off and no additional compensation, or time off, will be granted. Department Head approval of floating holiday leave shall be obtained prior to its use and with no less than 72 hours notice. All accumulated floating holiday hours shall be combined and labeled as vacation hours.

D. Floating Holiday for New Employees

Employees hired during the fiscal year shall receive a pro-rated credit for the floating holiday based on date of hire.

HOURS OF WORK

Employees shall work a 9/80 work schedule, starting at 7:00 a.m. and ending at 5:00 p.m. Monday through Thursday, and every other Friday starting a 7:00 a.m. and ending at 4:00 p.m., with a one-hour unpaid lunch break. The Department Head will consider requests in writing to work alternative work schedules on an individual basis based on the needs of the City. The City Manager may change an employee's work period, workweek, or hours at any time to meet the needs of the City.

~~Employees shall work a 4/10 work schedule, Monday through Thursday, starting at 7:00 a.m. and ending at 6:00 p.m., with a one-hour unpaid lunch break. The Department HeadCity Manager will consider requests in writing to work alternative work schedules on an individual basis based on the needs of the City. The City Manager may change an employee's work period, workweek, or hours at any time to meet the needs of the City.~~

ATTENDANCE

Employees shall be in attendance at work in accordance with the rules regarding hours of work, holidays, and leaves. Failure on the part of an employee who is absent without leave to return to duty within 24 hours after due notice to return to duty has been issued shall be cause for discipline up to and including termination.

OVERTIME

It is the policy of the City of Cudahy to avoid the necessity for overtime work whenever possible. However, in cases of emergency, or whenever public interest or necessity requires, any employee may be directed by designated authority and is expected to perform overtime work. Under such circumstances, management will seek volunteers to perform overtime work. In the event that no volunteers step forward, a draft of employees shall take place and be based upon seniority. All overtime work, with the exception of emergency conditions, must have the approval of the City Manager prior to the actual performance of work. Failure to obtain such approval may subject the employee to disciplinary action up to and including termination. Only non-exempt employees are eligible to receive overtime pay.

Except as stated herein, for all workweeks in which there is no designated holiday that falls during the workweek or a day in which the employee is sent home due to an unexpected City closure, or by management due to lack of work or an act of God, the employee shall be eligible for overtime pay (time and one half the employee's regular rate of pay as that term is used in the Fair Labor Standards Act) for time worked over 40 hours per workweek. In a workweek where there is a designated holiday that falls during the workweek or a day in which the employee is sent home due to an unexpected City closure, or by management due to lack of work or an act of God and is thus unable to work their regularly scheduled shift, and the employee has not taken any time off or leave during that same week (e.g. vacation, sick or other personal leave), the employee shall be eligible for overtime pay (time and one half) for time worked beyond the employee's scheduled shift(s) during that workweek.

A. The City of Cudahy has enacted a special provision internally for non-exempt employees to provide compensatory time off in lieu of monetary overtime compensation at a rate of one and one-half (1 1/2) hours for compensatory time for each hour of overtime worked.

B. <u>Exempt Classified Staff Employees</u> - Are paid a salary that reflects the full responsibility of the position, including being *on-call* or being *called back* to work, and are not eligible to receive overtime, On-Call or Call-Back pay.

C. <u>Non-exempt Classified Staff Employees</u> - May be required to be available and/or to work outside the regular schedule. The two types of status and pay related to those circumstances are On-Call (Standby) and Call-Back.

E. <u>Overtime Pay for Saturdays, Sundays and Holidays</u> – When an employee is not regularly scheduled to work on Saturdays and Sundays, the employee shall receive overtime pay (time and one half) for all time worked on those days. When an employee works on a designated City holiday, the employee shall receive overtime pay (time and one half) for all time worked on the holiday.

F. <u>Consent to Work Overtime</u> – The City does not require notice to or consent from employees when scheduling overtime hours. The City shall provide an employee with as much advance notice as possible of a work schedule change in those situations where the City wants to avoid placing an employee into overtime status. This advance scheduling allows the City to avoid the overtime situation by readjusting the workday and by scheduling time off for the employee so that the employee's time worked does not exceed 40 hours within the workweek.

G. At the City Manager's Discretion, payment of overtime may be approved on a case by case basis.

COMPENSATORY TIME OFF

Compensatory time off is an alternative method of overtime payment to non-exempt employees. In lieu of paying a non-exempt employee for overtime worked, employees may be granted compensatory time off at the overtime rate of one and one half (1 ½) for each hour of overtime worked. Employees shall have the option of receiving overtime pay for any overtime worked. Use of earned compensatory time off must be approved in advance by the Department Head or designee. The maximum accrual limit for compensatory time off is 120 hours.

ON-CALL (STANDBY) PAY

On-Call (Standby) status is a designated shift within any 24 consecutive hours. Such shifts may vary in beginning and ending times from department to department, and are subject to change by administrative decision as dictated by work load needs. On-Call shift hours usually coincide with regular shift hours. Any Classified Staff employee may be assigned to an On-Call status, which requires the employee to be accessible, available, and able to report for duty if called.

Department Heads are responsible for determining the need for On-Call availability and for assigning Classified Staff employees to On-Call status. The supervisor of the employee assigned to On-Call status shall maintain a roster of all qualified employees who may be required to be On-Call. An equitable rotation policy shall be followed in requiring employees to be On-Call.

On-Call pay will be provided for assigned On-Call shifts. The minimum On-call pay per 24-hour period shall be 2 hours. These 2 hours shall not be considered towards overtime or compensated time. The employing department will choose a single level of accrued compensatory time that will be provided to all non-exempt employees in On-Call Status.

CALL BACK PAY

Call back duty occurs when an employee is unexpectedly ordered by the department to return to duty following the termination of his/her normal shift or is working prior to his/her regularly scheduled shift. An employee called back to duty shall be paid a minimum of two (2) hours compensation at the overtime rate commencing when he/she reports for duty.
A nonexempt Classified Staff employee who is called back to work from On-Call status or otherwise at a time not previously scheduled shall receive compensatory time as follows:

a) A minimum of two (2) hours of compensatory time at rate equal to time and one-half the regular hourly pay rate even when the time actually spent back on the job is less than two (2) hours.
b) Compensatory time for actual hours worked at time and one-half the regular hourly pay rate, if hours worked exceeds two (2).

c) Actual hours worked for Call-Back purposes means only that time spent at the work site. Time spent in route to or from the work site is not included as time worked.
d) Call-Back is mandatory and employee must return to work within a reasonable time frame (2 hours).
e) Employees shall be contacted based on a rotating schedule.

Compensatory time off can only be used in lieu of pay for Call-Back time worked in accordance with Cudahy overtime policies.

BILINGUAL PAY

A. City departments may request a bilingual pay stipend for an employee based on the employee's use of a non-English language as part of his/her regular job duties. Requests may be made on the basis of oral translation duties only or oral and written translations. Requests are reviewed by Human Resources to determine whether there is a need for the bilingual skills based on the employee's job duties. If the request is approved by Human Resources, the employee must pass the examination described below.

B. Human Resources is responsible for the development of examination content and rating criteria to evaluate an employee's ability to speak or write a non-English language. The examination may be administered by employees who have already been certified in that language, under the direction of Human Resources, or by an outside vendor selected by Human Resources.

C. Approved and certified employees shall be compensated with a bilingual pay stipend in the amount of $75.00 per month for oral translation duties, and $125.00 per month for oral and written translations.

HEALTH INSURANCE

The City shall contribute towards health insurance benefits as listed below:

A) Medical Insurance: the City shall contribute toward the coverage of employees and their dependents in the medical insurance program available through the Public Employee's Retirement System as provided for under the Public Employee's Medical and Hospital Care Act as follows:

Effective Upon MOU Adoption:

The City shall contribute an amount up to 100% of the coverage amount for the Kaiser Permanente plan that corresponds to the employee's coverage.

B) Dental Insurance: the City shall offer a dental plan for employees and their dependents. The City will contribute towards the purchase of said dental coverage if the employee elects coverage as follows:

Effective Upon MOU Adoption:
The City shall contribute an amount up to the average amount of the dental plans available that corresponds to the employee's coverage.

C) Vision Insurance: the city shall offer vision care insurance for employees and their dependents. The City will contribute towards the purchase of said vision care coverage if the employee elects coverage as follows:

Effective Upon MOU Adoption:
The City shall contribute 100% of the coverage amount that corresponds to the employee's coverage.

D) Life Insurance: the City agrees to provide a term life insurance policy in the amount of $100,000 per employee. The premium for such insurance shall be paid by the City.

E) Disability Insurance: the City will provide a sixty (60) day Long Term Disability policy. 100% of the premium coverage for such insurance shall be paid by the City.

RETIREMENT PLAN

The City contracts with the California Public Employees Retirement System (CalPERS) for retirement benefits.

<u>First Tier Retirement Formula for "Classic Members" – 2.7% at 55 (Effective July 1, 2008)</u>
For unit members covered under the 2.7% at 55 retirement formula, who are defined as "classic members" under the Public Employees' Pension Reform Act of 2013 (PEPRA) (i.e. not defined as "new members" under Gov. Code section 7522.04(f)):
Effective Upon MOU Adoption – Classic members shall pay 3% of "compensation earnable" as defined in Gov. Code section 20636, representing the members' employee's contribution to CalPERS.

Effective July 1, 2016 – Classic members shall pay an additional 3% for a total of 6% of "compensation earnable" as defined in Gov. Code section 20636, representing the members' employee's contribution to CalPERS.

Effective July 1, 2017 – Classic members shall pay an additional 2% for a total of 8% of "compensation earnable" as defined in Gov. Code section 20636, representing the members' employee's contribution to CalPERS.

<u>Second Tier Retirement Formula for "Classic Members" – 2% at 60 (Effective October 16, 2011)</u>
For unit members covered under the 2% at 60 retirement formula, who are defined as "classic members" under the PEPRA (i.e. not defined as "new members" under Gov. Code section 7522.04(f)), shall be responsible for paying the entire employee's contribution rate of 7% of "compensation earnable" as defined in Gov. Code section 20636.

<u>Third Tier Retirement Formula for "New Members" – 2% at 62 (Effective January 1, 2013)</u>
Pursuant to Gov. Code section 7522.30, unit members, who are defined as "new members" under PEPRA, Gov. Code section 7522.04(f), shall be responsible for paying the employee contribution of 50% of the total normal cost of the plan, as defined by CalPERS.

EDUCATION INCENTIVE

The City will reimburse employees for 100% of the cost of books, materials, parking and tuition up to a maximum reimbursement equivalent to a part-time Cal State tuition per fiscal year for courses taken at any state college, state university, private university or community college, not to exceed $5,000 per employee per year. Courses must be related to the job, to a potential promotional position, or to general educational requirements as approved by the City Manager upon recommendation of the Department Head. The City Manager or designee must approve all courses in advance in order for the employee to be eligible for the reimbursement.

In order for an employee to be reimbursed for a course, proof of successful completion must first be furnished. In graded courses, a letter grade of "C" or better is required. In a "Pass/Fail" grading system, a "Pass is required. In a "Credit/No Credit" grading system, a "Credit" is required for approval.

Reimbursement for books will not be permitted until proof of successful completion of the course has been furnished. A sales receipt for the purchased books must also be submitted with the request for reimbursement.

Courses from a private university or college may also be considered; however, reimbursement for such courses shall not exceed the amount permitted for a similar course at a state college or university.

The educational reimbursement will be provided upon completion of coursework. The employee must remain employed by the City or the employee must repay the cost based on the following scale:

- 100% of the reimbursement if employee leaves within 6 months,
- 75% of the reimbursement if employee leaves after 6 months,
- 50% of the reimbursement if employee leaves after 12 months,
- 25% of the reimbursement if employee leaves after 18 months,
- 0% of the reimbursement if employee leaves after two years.

EDUCATIONAL SEMINARS

Employees wishing to further their education through short-term courses or one-day seminars at City expense may do so but only with written Department Head approval.
The department head shall consider the following before granting such approval:

1. Necessity and applicability to the individual.
2. Alternative training methods.
3. Department staffing needs and/or schedules.
4. Amount budgeted for training and education.
5. Fiscal approval by the City Manager.

PROBATIONARY PERIOD

A. An original or promotional appointment is an at-will employment, subject to a probationary period of not less than six (6) months, except that the City Manager may extend the probationary period for any position up to an additional six (6) months or for a marginal employee who is on probation for up to an additional three (3) months. During the probationary period an employee may be terminated at any time with or without cause. During the probationary period the employee's supervisor shall attempt to counsel the probationary employee on a periodic basis, prior to the end of the probationary period regarding his/her performance.

B. If the service of the probationary employee has been satisfactory to the appointing authority, then the appointing authority shall file with the City Manager or designee a merit rating including a statement, in writing, to such effect and stating that the retention of such employee in the service of the City is desired. If the services of the employee are deemed to be unsatisfactory and his employment is to be terminated at or before the expiration of the probationary period, the appointing authority shall file with the Personnel Officer, a statement in writing setting forth this action to be taken.

C. All probationary periods shall extend to the first day of the month following the period of probation.

D. Rejection Following Promotion: Any employee rejected during the probationary period following a promotional appointment or at the conclusion of the probationary period by reason of failure of the appointing power to file a statement that his services have been satisfactory, or at the discretion of the employee, shall be reinstated to the position from which he was promoted unless charges are filed and he/she is discharged in the manner provided in the Personnel Ordinance and the rules for positions in the classified service.

UNIFORMS

The City shall purchase uniforms for designated employees as budgeted, but not to exceed $500/year.

MILEAGE REIMBURSEMENT

Employees shall be reimbursed for the use of their vehicle for City Business at the allowable rate per mile as stated by the IRS the current rate in effect at the time during the period of this agreement. Employees shall be reimbursed upon submittal of a monthly reimbursement form with Department Head approval.

HOME COMPUTER PURCHASE PROGRAM

The City agrees to provide an employee home computer purchase program in the form of a $3,000, 24-month, interest-free loan. Employees are allowed to purchase a new computer only after the first loan has been paid off. The City reserves the right to determine the details and specific terms of such a program. Should the employee separate from the City prior to paying off the loan, the balance of the loan becomes due and payable immediately.

CELL PHONE STIPEND

Employees who are not issued cell phones by the City and use their personal cell phones for minimal work-related use are eligible to receive a monthly stipend in the amount of $20. Employees who believe they are eligible to receive the stipend shall make a request to the City Manager for the stipend. The City Manager or designee shall then decide whether the employee is eligible for the stipend.

The following City positions are issued cell phones by the City, and employees holding these positions are not eligible to receive the cell phone stipend: Maintenance Leader, Maintenance Supervisor, and Code Enforcement Officer.

TIME OFF FOR EXAMINATION

Any employee classified in competitive service shall be entitled to necessary time off with pay for the purpose of taking qualifying or promotional examinations pertaining to positions in competitive service of the City.

SUBSTANCE ABUSE POLICY

The City of Cudahy and the Association have a vital interest in maintaining safe, healthful and efficient working conditions. Being under the influence of a drug or alcohol on the job may pose serious safety and health risks not only to the user but to co-workers and the citizens of Cudahy. The possession, use or sale of an illegal drug or of alcohol on the job also poses unacceptable risks for safe, healthful and efficient operations. "On the job" means while on City premises, at work locations, or while on duty or being compensated on an "on call status."

The City of Cudahy and the Association recognize that their future is dependent on the physical and psychological well-being of all employees. The City and the Association mutually acknowledge that a drug and alcohol-free work environment benefits Cudahy's employees and citizens.

The purpose of this section is to define the City's drug and alcohol policy as well as the possible consequences of policy violation.

A. Possession, sale, use or being under the influence of drugs or alcohol while on the job is strictly prohibited.

B. When reasonable suspicion exists that the employee is under the influence of drugs or alcohol on the job, the City may require an employee to submit to a drug/alcohol examination, including, but not limited to, a substance screening. Substance screening means the testing of urine or other body fluids as reasonably deemed necessary by a physician to determine whether an employee has a restricted substance in their system.

1. Reasonable suspicion is cause based upon objective facts sufficient to lead a reasonably prudent supervisor to suspect that an employee is under the influence of drugs or alcohol so that the employee's ability to perform the functions of the job is impaired or so that the employee's ability to perform his/her job safely is reduced.

2. Post-accident testing under this Article shall be conducted based on reasonable suspicion as defined in this Section and shall not be automatic, unless as required by law per Department of Transportation (DOT) Federal Motor Carrier Safety Administration Regulations (FMCSA).

C. Any manager or supervisor requesting an employee to submit to a substance screening shall document in writing the facts constituting reasonable suspicion and shall give the employee a copy. The employee shall be given an opportunity to provide additional facts. An employee who is then ordered to submit to a substance abuse screening may request to be represented. Because time is of the essence in substance screening, a representative must be available within a reasonable time or the employee will then be ordered to submit to substance screening. An employee who refuses to submit to a substance screening may be considered insubordinate and shall be subject to disciplinary action up to and including termination.

D. The supervisor, or designee, shall transport the suspected employee to the testing facility. Testing shall occur on City time and be paid for by the City. Employee urine samples, or other body fluids, will be by a certified system which includes methods or mechanisms designed to assure the integrity of the sample. The facility used for testing shall be certified by the National Institute on Drug Abuse and comply with established guidelines for "chain of custody" to insure that identity and integrity of the sample is preserved throughout the collecting, shipping, testing and storage process.

E. Any positive test for alcohol or drugs will be confirmed by a scientifically sound method. An employee who tests positive on a confirmatory test will be given the opportunity to discuss the results with a physician to be designated by the City. The employee should be prepared at that time to show proof of any valid medical prescription for any detected substance or to otherwise explain, if he or she so chooses, a positive test result.

F. While use of medically prescribed medications and drugs is not per se a violation of this policy, this policy shall establish that no employee shall operate a City vehicle or dangerous machinery or equipment while taking any kind of medication or drugs which are clearly marked that they may cause significant drowsiness or impair an employee's performance. An employee shall notify his/her supervisor, before beginning work, when taking such medications or drugs. In the event there is a question regarding an employee's ability to safely and effectively perform assigned duties while using such medications or drugs, clearance from a physician designated by the City may be required. The City reserves the right to send an employee home on sick leave under these circumstances.

G. Employees with substance abuse problems are encouraged to participate voluntarily in the City-sponsored Employee Assistance Program (EAP). Assistance through the EAP may be sought by an employee with complete confidentiality and without adverse consequences to his/her employment. Employees should be aware, however, that a request for assistance through the EAP will not insulate the employee from disciplinary action already contemplated. Depending upon the facts surrounding the reasonable suspicion determination, positive test result, and/or other violation of this policy or other City/department rules and regulations, the City may refer an employee to the EAP. Such referral could, at the discretion of the City, be made available to the employee as an alternative to disciplinary action. Referral would be subject to agreement by the employee to enroll, participate in and successfully complete rehabilitation and/or counseling program and other terms and conditions in a "Last Chance Agreement."

1. It is the City's intent to use the EAP option for first offenders except the City reserves the right to discipline for those offenses, which are a significant violation of City/department rules and regulations or where violation did or could have resulted in serious injury or property damage.

2. Consequences of a Positive Controlled Substance and/or Alcohol Test. A covered employee who tests positive for a controlled substance and/or alcohol may be subject to disciplinary action, up to and including termination from employment.

As a result of a positive controlled substance and/or alcohol random test, a temporary non-safety sensitive job assignment for an employee who is removed from the performance of safety sensitive duties or who is restricted from driving non-commercial City vehicles, may be approved by the department head based on the availability of meaningful work to meet operational need.

An employee must use accrued leave time or request personal leave of absence without pay if time off from work is necessary for any treatment or rehabilitation program. The costs of rehabilitation or treatment services, whether or not covered by the employee's medical plan, are the ultimate responsibility of the employee.

PEACEFUL PERFORMANCE

Apart from and in addition to existing restrictions upon work stoppages, the Association hereby agrees that neither it nor its officers, agents, or representatives shall incite, encourage, or participate in any strike, sympathy strike, walkout, slowdown, speedup, sick-out, or other work stoppage during the life of this Agreement for any cause or dispute whatsoever, either with the Association or with any other person or organization. In the event of work stoppage as enumerated above, the Association, its officers, agents and representatives shall do everything within their power to end or avert the same. The City reserves its rights to exercise all available legal and equitable remedies in the event of a violation. Any employee engaging in or assisting any work stoppage as enumerated above, or refusing to perform duly assigned services in violation of this Article, shall be subject to discipline up to and including termination. The City reserves the right to selectively discipline employees hereunder.
It is understood that violation of this Article by the Association will warrant the withdrawal of any rights, privileges or services provided for in this Agreement and/or legal action by the City of redress.

The inclusion of this Article in this agreement shall in no way be deemed to stop the City from seeking any form of legal, equitable, or administrative relief to which it may be entitled during the term of this agreement.

GRIEVANCE PERIOD

A. Definition of Grievance

A grievance is an alleged violation of a specific provision of this MOU or the City of Cudahy Personnel Rules and Regulations that adversely affects the grievant. This grievance procedure applies to all unit members. The grievance procedure cannot be utilized to challenge the content of a performance evaluation, a disciplinary action, or rejection from probation.

B. Statement of Grievance

The grievance filed by the grievant should include the following information: the date of the alleged violation; the specific provision(s) of the MOU or personnel rule that were allegedly violated; a description of all facts regarding how the alleged violation occurred; and a list of all persons who are witnesses or are involved.

C. Timelines

Failure of the City to comply with the time limits of the grievance procedures allows the grievant to appeal to the next level of review. Failure of the grievant to comply with the time limits of the grievance procedures constitutes an abandonment of the grievance. The parties may extend time limits by mutual written agreement in advance of a deadline.

D. Grievance Procedure

1. Step One: Informal Resolution with Supervisor – The employee must first work in good faith to resolve the grievance informally through discussion with his/her immediate supervisor no later than 14 calendar days after the event giving rise to grievance has occurred. The supervisor shall attempt to resolve the matter with the employee, and, within a reasonable amount of time, issue a decision on the matter in writing to the employee.

2. Step Two: Department Head – If the employee believes that the grievance has not been resolved through Step One, the employee may submit a written Statement of the Grievance to his/her department head. The employee must submit the Statement of the Grievance within 14 calendar days of receiving the written decision by the immediate supervisor. The department head shall consider, discuss the grievance with the grievant, and investigate as he/she deems appropriate, and shall, within 14 calendar days of receipt of the written Statement of the Grievance, submit his/her decision in writing to the grievant.

3. Step Three: City Manager – If the employee believes that the grievance has not been resolved through Step Two, the employee may appeal the grievance decision of the department head to the City Manager. Such appeal must be filed within 14 calendar days of the date of the department head's written decision. The City Manager shall consider, discuss the grievance with the grievant, and investigate as he/she deems appropriate, and shall, within 21 calendar days of receipt of the written Statement of the Grievance, submit his/her decision in writing to the grievant. The decision of the City Manager shall be final.

E. Representation

A grievant may have a representative of his/her choice at any stage of the grievance procedure, except that the grievant may not be represented by an employee he/she supervises, or by his/her supervisor. The grievant and designated representative of the grievant (if the representative is a City employee) shall receive release time for the time during grievance meetings. 48 hours prior to the schedule grievance meeting, the grievant shall inform his/her immediate supervisor, department head or City Manager whether he/she shall be represented at the grievance meeting, and shall identify the representative.

F. Withdrawal of Grievance

Any grievance may be withdrawn by the grievant at any time in writing. Withdrawal of a grievance shall be with prejudice and shall remove the right of the grievant to refile the grievance on the same set of facts.

MANAGEMENT FUNCTIONS

1. Manage the City.
2. Scheduling working hours.
3. Establish, modify or change work schedule standards.
4. Institute changes in procedures.
5. Direct the work force, including the right to hire, promote, demote, transfer, suspend, discipline, layoff, or discharge any employee.
6. Determine the location of any new facilities, buildings, departments, divisions or subdivisions thereof, and the relocation, sale, leasing or closing of facilities, departments, divisions, and subdivisions thereof.
7. Determine services to be rendered.
8. Determine the layout of buildings and equipment and materials to be used therein.
9. Determine processes, techniques, methods, and means of performing work.
10. Determine the size, character, and use of inventories.

11. Determine financial policy, including accounting procedure.
12. Determine the administrative organization of the City.
13. Determine selection, promotion, or transfer of employees.
14. Determine the size and characteristics of the work force.
15. Determine the allocation and assignment of work force.
16. Determine policy affecting the selection of new employees.
17. Determine the establishment of quality and quantity standards and the judgment of quality and quantity of work required.
18. Determine administration of discipline.
19. Determine control and use of City property, materials and equipment.
20. Schedule work periods and determine the number and duration of work periods.
21. Establish, modify, eliminate, or enforce rules and regulations.
22. Place work with outside firms.
23. Determine the kind and number of personnel necessary.
24. Determine the methods and means by which such operations are to be conducted.
25. Require employees, where necessary, to take in-service training courses during working hours.
26. Determine duties to be included in any job classification.
27. Determine the necessary of overtime and the amount of overtime required.
28. Take any necessary action to carry out the mission of the City in case of an emergency.
29. Prescribe a uniform dress to be worn by designated employees.
30. Determine an on call system for employees.

The exercise of the foregoing powers, rights, authority, duties, and responsibilities by the City, the adoption of policies, rules, regulations, and practices in furtherance thereof, and the use of judgment and discretion in connection therewith, shall be limited only by the specific and express terms of this Agreement, and then only to the extent such specific and express terms are in conformance with the law.

Any dispute arising out of or in any way connected with either the existence of, or the exercise of any of the above described rights of the City is not subject to the grievance provision unless such dispute is otherwise grievable under another Article of this Agreement.

CONSTRUCTION

Nothing contained in this Memorandum of Understanding, or any attachment thereto, is intended to, in any way, modify, interpret, construe, or change existing or future law which may cover the topic. For purposes of these references, law shall include the Constitution and all relevant Federal statutes, and all final appellate court decisions on the issue. References contained herein the matters covered by the law are included simply for the purpose of drawing the attention of the parties to legal requirements related to City employees and the government of the City.

FULL UNDERSTANDING, MODIFICATIONS, WAIVER

It is intended that this Agreement sets forth the full and entire understanding of the parties regarding the matters set forth herein, and any other prior or existing understanding or agreements by the parties, whether formal or informal, regarding any such matters are hereby superseded or terminated in their entirety.

Except as specifically provided herein, it is agreed and understood that each party hereto voluntarily and unqualifiedly waives its right, and agrees that the other shall not be required to negotiate with respect to any subject or matter covered herein during the term of this Agreement.

Any agreement, alteration, understanding, variation, waiver, or modification of any of the terms or provisions contained herein shall not be binding upon the parties hereto, and if required, approved and implemented by the City Council.

The waiver of any breach, term or condition of this Agreement by either party shall not constitute a precedent in the future enforcement of all its terms and provisions.

SAVINGS CLAUSE

This Memorandum of Understanding is subject to all applicable Federal, State, and City laws, ordinances, resolutions, and any lawful rules and regulations enacted by the City Council. If any part or provision of this Memorandum of Understanding is in conflict or inconsistent with such applicable provisions of Federal, State, or City laws, ordinances, resolutions, or is otherwise held to be invalid or unenforceable by any tribunal suspended and superseded by such applicable law or regulations, and the remainder of this Memorandum of Understanding shall not be affected thereby.

For Cudahy Miscellaneous Employees Association

For the City of Cudahy

____

Aracely Villaseñor, CMEA Board

____

Jose Pulido, City Manager

____

Maria Ibarra, CMEA Board

____

Cristian Markovich, Mayor

____

Aurelio Trujillo, CMEA Board

ATTEST:

____

Laura Valdivia, Interim City Clerk

EXHIBIT A
SALARY RANGES

RANGES	POSITION	7/1/2015 Salary Range	7/1/2016 Salary Range	7/1/2017 Salary Range	7/1/2018 Salary Range
24		7969 - 9952	8208 - 10251	8372 - 10456	8450 - 10665
23		7592 - 9482	7820 - 9766	7976 - 9961	8136 - 10161
22		7235 - 9035	7452 - 9306	7601 - 9492	7753 - 9682
21		6894 - 8609	7101 - 8868	7243 - 9045	7387 - 9226
20		6569 - 8204	6766 - 8450	6902 - 8619	7040 - 8792
19		6259 - 7817	6447 - 8052	6576 - 8213	6708 - 8377
18	Assitant Engineer (B)	5966 - 7450	6145 - 7674	6268 - 7827	6393 - 7984
17	Senior Accountant	5687 - 7102	5857 - 7315	5974 - 7461	6094 - 7610
16		5419 - 6767	5581 - 6970	5693 - 7110	5807 - 7252
15		5165 - 6451	5320 - 6644	5427 - 6777	5535 - 6913
14		4923 - 6149	5071 - 6333	5173 - 6460	5276 - 6589
13		4692 - 5859	4832 - 6035	4929 - 6156	5028 - 6279
12	Account Technician	4530 - 5657	4666 - 5827	4759 - 5944	4854 - 6062
11	Maitenance Superintendent	4472 - 5585	4606 - 5753	4699 - 5868	4793 - 5985
10		4260 - 5320	4388 - 5480	4476 - 5589	4565 - 5701
9	Maintenance Foreman	4057 - 5067	4179 - 5219	4262 - 5323	4348 - 5430
	Senior Code Enforcement Officer				
	Planning Assistant				
	Recreation Supervisor				
	Assistant Engineer (A)				
8	Code Enforcement Officer	3867 - 4829	3983 - 4974	4062 - 5073	4144 - 5175
	Administrative Assistant				
	Senior Administrative Analyst				
7	Account Clerk	3717 - 4642	3829 - 4782	3905 - 4877	3983 - 4975
6	Senior Recreation Coordinator	3684 - 4601	3795 - 4739	3871 - 4834	3948 - 4931
	Department Secretary				
	Maintenance Leader				
5	Administrative Clerk II	3508 - 4381	3613 - 4513	3686 - 4603	3759 - 4695
	Recreation Coordinator				
	Municipal Officer				
4	Secretary	3344 - 4177	3445 - 4302	3514 - 4388	3584 - 4476
3	Maintenance Worker	3190 - 3984	3286 - 4103	3351 - 4185	3418 - 4269
2		3039 - 3795	3130 - 3909	3192 - 3987	3256 - 4066
1	Cashier/Receptionist	2899 - 3621	2986 - 3730	3046 - 3804	3107 - 3880
	Administrative Clerk I				

Exhibit A

Compensation Schedule Effective

July 1, 2015

Association Steps										
Ranges	A	B	C	D	E	F	G	H	I	J
A1	2899	2972	3046	3122	3200	3280	3362	3447	3533	3621
A2	3039	3114	3192	3272	3354	3438	3524	3612	3702	3795
A3	3190	3270	3351	3435	3521	3609	3699	3792	3887	3984
A4	3344	3428	3514	3602	3692	3784	3878	3975	4075	4177
A5	3508	3596	3686	3778	3872	3969	4068	4170	4274	4381
A6	3684	3776	3871	3968	4067	4168	4273	4379	4489	4601
A7	3717	3810	3905	4003	4103	4206	4311	4419	4529	4642
A8	3867	3963	4062	4164	4268	4375	4484	4596	4711	4829
A9	4057	4159	4263	4369	4478	4590	4705	4823	4943	5067
A10	4260	4367	4476	4588	4702	4820	4940	5064	5190	5320
A11	4472	4584	4699	4816	4937	5060	5186	5316	5449	5585
A12	4530	4643	4759	4878	5000	5125	5253	5385	5519	5657
A13	4692	4809	4929	5052	5179	5308	5441	5577	5716	5859
A14	4923	5046	5173	5302	5435	5570	5710	5852	5999	6149
A15	5165	5295	5427	5563	5702	5844	5990	6140	6294	6451
A16	5419	5554	5693	5835	5981	6131	6284	6441	6602	6767
A17	5687	5829	5975	6124	6277	6434	6595	6760	6929	7102
A18	5966	6115	6268	6424	6585	6750	6918	7091	7269	7450
A19	6259	6416	6576	6741	6909	7082	7259	7440	7626	7817
A20	6569	6734	6902	7074	7251	7433	7618	7809	8004	8204
A21	6894	7066	7243	7424	7609	7800	7995	8195	8399	8609
A22	7235	7416	7601	7791	7986	8185	8390	8600	8815	9035
A23	7592	7782	7976	8176	8380	8590	8805	9025	9250	9482
A24	7969	8168	8373	8582	8796	9016	9242	9473	9710	9952

Exhibit A

Compensation Schedule Effective

July 1, 2016

Association Steps										
Ranges	A	B	C	D	E	F	G	H	I	J
A1	2986	3061	3138	3216	3296	3379	3463	3550	3639	3730
A2	3130	3208	3288	3370	3455	3541	3629	3720	3813	3909
A3	3286	3368	3452	3538	3627	3717	3810	3906	4003	4103
A4	3445	3531	3619	3710	3802	3897	3995	4095	4197	4302
A5	3613	3704	3796	3891	3989	4088	4190	4295	4403	4513
A6	3795	3890	3987	4087	4189	4294	4401	4511	4624	4739
A7	3829	3925	4023	4123	4226	4332	4440	4551	4665	4782
A8	3983	4082	4184	4289	4396	4506	4619	4734	4852	4974
A9	4179	4283	4390	4500	4613	4728	4846	4967	5092	5219
A10	4388	4498	4610	4725	4843	4964	5089	5216	5346	5480
A11	4606	4722	4840	4961	5085	5212	5342	5476	5612	5753
A12	4666	4782	4902	5025	5150	5279	5411	5546	5685	5827
A13	4832	4953	5077	5204	5334	5467	5604	5744	5888	6035
A14	5071	5198	5328	5461	5598	5737	5881	6028	6179	6333
A15	5320	5453	5590	5730	5873	6020	6170	6324	6482	6644
A16	5581	5721	5864	6011	6161	6315	6473	6635	6800	6970
A17	5857	6004	6154	6308	6465	6627	6793	6962	7136	7315
A18	6145	6298	6456	6617	6783	6952	7126	7304	7487	7674
A19	6447	6608	6773	6943	7116	7294	7477	7664	7855	8052
A20	6766	6936	7109	7287	7469	7656	7847	8043	8244	8450
A21	7101	7278	7460	7647	7838	8034	8235	8440	8651	8868
A22	7452	7638	7829	8025	8225	8431	8642	8858	9079	9306
A23	7820	8015	8216	8421	8632	8847	9069	9295	9528	9766
A24	8208	8413	8624	8839	9060	9287	9519	9757	10001	10251

Exhibit A

Compensation Schedule Effective

July 1, 2017

Association										
Steps										
Ranges	A	B	C	D	E	F	G	H	I	J
A1	3046	3122	3200	3280	3362	3446	3533	3621	3711	3804
A2	3192	3272	3354	3438	3524	3612	3702	3795	3889	3987
A3	3351	3435	3521	3609	3699	3792	3887	3984	4083	4185
A4	3514	3601	3692	3784	3878	3975	4075	4177	4281	4388
A5	3686	3778	3872	3969	4068	4170	4274	4381	4491	4603
A6	3871	3968	4067	4168	4273	4379	4489	4601	4716	4834
A7	3905	4003	4103	4206	4311	4419	4529	4642	4758	4877
A8	4062	4164	4268	4375	4484	4596	4711	4829	4949	5073
A9	4262	4369	4478	4590	4705	4823	4943	5067	5193	5323
A10	4476	4588	4702	4820	4940	5064	5190	5320	5453	5589
A11	4699	4816	4936	5060	5186	5316	5449	5585	5725	5868
A12	4759	4878	5000	5125	5253	5385	5519	5657	5799	5944
A13	4929	5052	5179	5308	5441	5577	5716	5859	6006	6156
A14	5173	5302	5434	5570	5709	5852	5999	6149	6302	6460
A15	5427	5562	5702	5844	5990	6140	6293	6451	6612	6777
A16	5693	5835	5981	6131	6284	6441	6602	6767	6936	7110
A17	5974	6124	6277	6434	6595	6759	6928	7102	7279	7461
A18	6268	6424	6585	6750	6918	7091	7269	7450	7636	7827
A19	6576	6740	6909	7082	7259	7440	7626	7817	8012	8213
A20	6902	7074	7251	7432	7618	7809	8004	8204	8409	8619
A21	7243	7424	7609	7800	7994	8194	8399	8609	8824	9045
A22	7601	7791	7986	8185	8390	8600	8815	9035	9261	9492
A23	7976	8176	8380	8590	8804	9024	9250	9481	9718	9961
A24	8372	8582	8796	9016	9242	9473	9709	9952	10201	10456

Exhibit A

Compensation Schedule Effective

July 1, 2018

Association Steps										
Ranges	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**
A1	3107	3185	3264	3346	3430	3515	3603	3693	3786	3880
A2	3256	3337	3421	3506	3594	3684	3776	3870	3967	4066
A3	3418	3504	3591	3681	3773	3868	3964	4063	4165	4269
A4	3584	3674	3765	3859	3956	4055	4156	4260	4367	4476
A5	3759	3853	3950	4048	4150	4253	4360	4469	4580	4695
A6	3948	4047	4148	4252	4358	4467	4579	4693	4810	4931
A7	3983	4083	4185	4290	4397	4507	4620	4735	4853	4975
A8	4144	4247	4353	4462	4574	4688	4805	4925	5048	5175
A9	4348	4456	4568	4682	4799	4919	5042	5168	5297	5430
A10	4565	4679	4796	4916	5039	5165	5294	5427	5562	5701
A11	4793	4912	5035	5161	5290	5422	5558	5697	5839	5985
A12	4854	4976	5100	5228	5358	5492	5630	5770	5915	6062
A13	5028	5153	5282	5414	5550	5688	5831	5976	6126	6279
A14	5276	5408	5543	5682	5824	5969	6119	6271	6428	6589
A15	5535	5674	5816	5961	6110	6263	6419	6580	6744	6913
A16	5807	5952	6101	6253	6410	6570	6734	6903	7075	7252
A17	6094	6246	6402	6562	6726	6895	7067	7244	7425	7610
A18	6393	6553	6717	6885	7057	7233	7414	7599	7789	7984
A19	6708	6875	7047	7223	7404	7589	7779	7973	8173	8377
A20	7040	7216	7396	7581	7771	7965	8164	8368	8577	8792
A21	7387	7572	7761	7955	8154	8358	8567	8781	9001	9226
A22	7753	7947	8145	8349	8558	8772	8991	9216	9446	9682
A23	8136	8339	8548	8761	8980	9205	9435	9671	9913	10161
A24	8540	8753	8972	9196	9426	9662	9904	10151	10405	10665

Item Number
11A

STAFF REPORT

Date: October 12, 2015

To: Honorable Mayor/Chair and City Council/Agency Members

From: Jose E. Pulido, City Manager
By: Michael Allen, Acting Community Development Director

Subject: **Consideration to Adopt a Resolution approving the City of Cudahy's Natural Hazard Mitigation Plan (NHMP)**

RECOMMENDATION

The City Council is requested to adopt a resolution approving the City of Cudahy's NHMP.

BACKGROUND

1. In 2000, the U.S. Federal Legislation passed the Disaster Mitigation Act of 2000, setting forth declarations and definitions relating to disaster relief and is used as a central document for the activities of the Federal Emergency Management Agency (FEMA).

2. On May 7, 2012, City Council awarded a Professional Services Agreement to Earth Consultants International, Inc. for the development and preparation of the City of Cudahy's NHMP.

3. From 2012 to 2015, Earth Consultants has held multiple workshops and meetings with stakeholder groups, the NHMP Steering Committee, and the NHMP Advisory Committee (outlined in Appendix A and B of the NHMP).

4. On July 27, 2013, Earth Consultants made a presentation during the monthly Neighborhood Watch meeting summarizing the objective of the NHMP, and preliminary findings regarding the natural hazards identified.

5. On August 7, 2013, Earth Consultants attended Cudahy's National Night Out providing a booth which participants were invited to review and comment on maps highlighting findings of the NHMP.

6. On July 25, 2015, the draft NHMP was noticed and available for public review at all City facilities and on the City’s website.

7. On October 2, 2015, the Public Hearing and Notice of Adoption of the Cudahy NHMP were published in the Press Telegram.

ANALYSIS

The Federal Disaster Mitigation Act of 2000 (DMA 2000), Section 322 (a-d), as a condition of receiving Federal disaster mitigation funds, requires local governments, including counties, cities, and tribes in the United States, to complete a Local Hazards Mitigation Plan. These Plans are to identify the hazards that have occurred or may occur in the study area, and provide mitigation strategies, or action items, designed to save lives and reduce the destruction of property.

The City has addressed this requirement by completing a Local Natural Hazards Mitigation Plan (the Mitigation Plan or “the Plan”) that describes and analyzes several issues of concern to the City, including earthquakes, floods, and severe weather. Furthermore, the Plan provides resources and information, in addition to action items and programs, that are meant to assist Cudahy in reducing risk and preventing loss from future natural hazard events. Per Federal requirements, this Plan is to be reviewed and updated every five years.

Adoption of the Local 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, City Council is responsible for adopting the Local Hazards Mitigation Plan. The local agency governing body has the responsibility and authority to promote sound public policy regarding natural hazards. City Council will need to periodically re-adopt the Plan as it is revised to meet changes in the natural hazard risks and exposures in the community.

If approved, the Local Natural Hazards Mitigation Plan will be significant in the future growth and development and redevelopment of the community. The City will use a resolution to adopt the Local Hazards Mitigation Plan Update. The adoption process is scheduled for July 2015.

Summary of Findings

Analysis of the natural hazards that could impact the City indicates that there are three main hazards (earthquakes, flooding, and severe weather) that could impact the City, causing sufficient damage that a Federal emergency could be declared. The hazard most devastating to Cudahy would be an earthquake on any of the three faults that extend below or are located near the City, which include the Puente Hills thrust fault, the Compton-Los Alamitos thrust fault, and the Newport-Inglewood fault. An earthquake under or near the City has the potential to cause extensive damage due to ground shaking, liquefaction, earthquake-induced ground deformation in the form of uplift, and inundation due to catastrophic failure of dams and water storage reservoirs in and upgradient from the City.

Secondary impacts associated with such an earthquake include urban fires ignited by fallen appliances, broken gas mains, and fallen electrical lines, and the release of hazardous materials from broken containers.

Flooding due to intense rainfall can also cause damage in some sections of Cudahy, especially adjacent to the now-channelized Los Angeles River. Other hazards with the potential to cause significant losses in the city are grouped under "severe weather," and include Santa Ana winds, tornadoes, thunderstorms, high heat and excessive heat events, and drought.

The goals of the NHMP describe the overall direction that the City of Cudahy, through its departments, agencies, organizations, and citizens, can take toward reducing its risk to natural hazards. The goals of the Plan are stepping-stones between the broad direction of the mission statement of the Plan and specific recommendations outlined in the action items. The main goals of the Plan for Cudahy are to:

- Protect life and property;
- Increase public awareness of natural hazards and mitigation measures that can be implemented to reduce the impact these hazards may pose to the community;
- Preserve and enhance the natural systems to provide natural hazard mitigation functions;
- Develop partnerships among stakeholders with an interest in hazard reduction to facilitate the implementation of mitigation measures; and
- Strengthen the City's emergency service.

Each section of the NHMP provides information and resources to assist City staff and the public in understanding the hazard-related issues facing Cudahy's 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 NHMP is organized in three volumes. Volume I contains the Executive Summary followed by Sections 1 through 5: Introduction, Community Profile, Risk Assessment, Goals and Action Items, and Plan Maintenance. Volume II contains the three natural hazard sections (Sections 6 through 8) and Volume III includes the appendices.

CONCLUSION

The City's NHMP is a federally mandated process where City government works hand in hand with citizens to prioritize and craft a plan that is consistent with FEMA's requirements and approved by City Council.

The Plan acts as a guiding document for directing efforts and budget towards mitigation efforts where necessary. Adopting the NHMP will keep the City eligible to receive earmarked mitigation grant funding, and to apply for additional federal mitigation grants. Additionally, adoption of this plan will also make the City eligible to receive post-disaster recovery funding from the State and Federal emergency management agencies.

FINANCIAL IMPACT

There is no fiscal impact associated with adoption of the Cudahy Natural Hazards Mitigation Plan.

ATTACHMENTS

A. Resolution
B. Draft NHMP
C. Public Notice Confirmation

Attachment A

RESOLUTION NO. 15-_____

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF CUDAHY APPROVING AND ADOPTING THE CITY OF CUDAHY NATURAL HAZARDS MITIGATION PLAN

WHEREAS, The Disaster Mitigation Act (DMA) of 2000 was adopted by the Federal Government and among other things, requires local authorities to prepare a Hazard Mitigation Plan (HMP) which will be utilized to protect citizens, critical facilities, infrastructure, private property and the environment from natural hazards through varying means, including increasing public awareness and identifying resources available for risk reduction and loss prevention; and

WHEREAS, the HMP was prepared through a process which included the Disaster Council, Local Business Owners and the General Public; and

WHEREAS, the HMP is a five year plan subject to evaluation on an annual basis with a revision to be prepared every five years based on the continuing evaluation of the HMP.

NOW, THEREFORE BE IT RESOLVED by the Mayor and Councilmembers of the City of Cudahy that the City of Cudahy Natural Hazards Mitigation Plan (Exhibit "A") is hereby approved and adopted and is to be implemented as outlined in the plan.

ADOPTED AND APPROVED by the City of Cudahy at its regular meeting on this ______ day of ___________________, **2015**.

____
Cristian Markovich
Mayor

ATTEST:

____
Laura Valdivia
Interim City Clerk

CERTIFICATION

STATE OF CALIFORNIA)
COUNTY OF LOS ANGELES) SS:
CITY OF CUDAHY)

I, Laura Valdivia, Interim City Clerk of the City of Cudahy, hereby certify that the foregoing Resolution No. 15-______ was passed and adopted by the City Council of the City of Cudahy, signed by the Mayor and attested by the City Clerk at a regular meeting of said Council held on the _______ day of _________________, 2015, and that said Resolution was adopted by the following vote, to-wit:

AYES:

NOES:

ABSENT:

ABSTAIN:

____
Laura Valdivia
Interim City Clerk

2015 Local Natural Hazards Mitigation Plan

Mitigation Actions to Make Natural Disasters a "Thing of the Past"

Earth Consultants International

Local Natural Hazards Mitigation Plan

Prepared for:

Community Development Department
5220 Santa Ana Street
Cudahy, California 90201

Prepared by:

Earth Consultants International
1642 East Fourth Street
Santa Ana, California 92701

September 2015

Acknowledgements

City of Cudahy Staff

Michael Allen, Acting Community Development Director
Aaron Hernandez, Assistant City Engineer
Vince Altuna, Building Inspector
Didier Murillo, Planning Technician
Raul Mazariegos, Code Enforcement Officer
Greg Castanon, Maintenance Supervisor
Jennifer Hernandez, Acting Human Resources Specialist
Jose Pulido, City Manager
Victor Ferrer, Former City Clerk
Saul Bolivar, Former Director of Community Development

City Council

Cristian Markovich, Mayor
Christian Hernandez, Vice Mayor
Chris Garcia, Council Member
Jack Guerrero, Council Member
Baru Sanchez, Council Member

Other Reviewers and Supporters of the Project

Lucille Roybal-Allard, U.S. Congress Representative (40^{th} District)
Javier Valencia, Los Angeles County Sheriff Office
City of Cudahy Residents Who Participated in the Public Workshops

Earth Consultants International, Inc.

Tania Gonzalez, Project Manager
Maria Herzberg, GIS Analyst
Danielle Madugo, HazUS Analyst

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Local Natural Hazards Mitigation Plan

Volume I: Mitigation Action Plan

EXECUTIVE SUMMARY

Plan Authority and Adoption

The Federal Disaster Mitigation Act of 2000 (DMA 2000), Section 322 (a-d), as a condition of receiving Federal disaster mitigation funds, requires local governments, including counties, cities, and tribes in the United States, to complete a Local Hazards Mitigation Plan. These Plans are to identify the hazards that have occurred or may occur in the study area, and provide mitigation strategies, or action items, designed to save lives and reduce the destruction of property. The City of Cudahy has addressed this requirement by completing a Local Natural Hazards Mitigation Plan (the Mitigation Plan or "the Plan") that describes and analyzes several issues of concern to the City, including earthquakes, floods, and severe weather. Furthermore, the Plan provides resources and information, in addition to action items and programs, that are meant to assist Cudahy in reducing risk and preventing loss from future natural hazard events. Per Federal requirements, this Plan is to be reviewed and updated every five years.

Adoption of the Local 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, City Council is responsible for adopting the Local Hazards Mitigation Plan. The local agency governing body has the responsibility and authority to promote sound public policy regarding natural hazards. City Council needs to periodically re-adopt the Plan as it is revised to meet changes in the natural hazard risks and exposures in the community. The approved Local Natural Hazard Mitigation Plan will be significant in the future growth and development and redevelopment of the community. The City of Cudahy will use a resolution to adopt the Local Hazard Mitigation Plan Update. The adoption process is scheduled for July 2015.

Summary of Findings

Analysis of the natural hazards that could impact the City of Cudahy indicates that there are three main hazards (earthquakes, flooding, and severe weather) that could impact the city, causing sufficient damage that a Federal emergency could be declared. The hazard most devastating to Cudahy would be an earthquake on any of three faults that extend below or are located near the City, including the Puente Hills thrust fault, the Compton-Los Alamitos thrust fault, and the Newport-Inglewood fault. An earthquake under or near the City has the potential to cause extensive damage due to ground shaking, liquefaction, earthquake-induced ground deformation in the form of uplift, and inundation due to catastrophic failure of dams and water storage reservoirs in and upgradient from the city. Secondary impacts associated with such an earthquake include urban fires ignited by fallen appliances, broken gas mains, and fallen electrical lines, and the release of hazardous materials from broken containers.

Flooding due to intense rainfall can also cause damage in some sections of Cudahy, especially adjacent to the now-channelized Los Angeles River. Other hazards with the potential to cause significant losses in the city are grouped under the severe weather header, and include Santa Ana winds, tornadoes, thunderstorms, high heat and excessive heat events, and drought. These weather events are discussed, with emphasis on their historical incidence and potential future impacts to the Cudahy area.

How is the Plan Organized?

The Mitigation Plan contains a five-year action plan, background on the purpose and methodology used to develop the Plan, a profile on the City of Cudahy, sections on natural hazards that have occurred or have the potential to impact the City, and a number of appendices. All of the sections are described in detail in Section 1, the Plan Introduction.

Plan's Mission

The mission of the Cudahy Local 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 resources available for risk reduction and loss prevention, and identifying and implementing activities to guide the City towards building a safer, more sustainable community.

Plan's Goals

The goals of the Mitigation Plan describe the overall direction that the City of Cudahy, through its departments, agencies, organizations, and citizens, can take toward reducing its risk to natural hazards. The goals of the Plan are stepping-stones between the broad direction of the mission statement and the specific recommendations outlined in the action items. The main goals of Cudahy's Mitigation Plan are:

- Protect life and property,
- Increase public awareness of natural hazards and mitigation measures that can be implemented to reduce the impact these hazards may pose to the community,
- Preserve and enhance the natural systems to provide natural hazard mitigation functions,
- Develop partnerships among stakeholders with an interest in hazard reduction to facilitate the implementation of mitigation measures, and
- Strengthen the City's emergency services.

Action Items

The action items are a list of activities that Cudahy's government and citizens can implement to reduce risk in the community. Some action items have community-wide application, whereas others can be implemented on an individual basis by residents and business owners.

Chapter 4 includes all of the action items developed for the Plan, including both multi-hazard action items, and hazard-specific action items. Each action item is followed by the following information:

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 time line for implementation. Short-term action items are activities which Cudahy's agencies are capable of implementing with existing resources and authorities within one to two years. Long-term action items may require new or additional resources or authorities, and may take between three and five years (or more) to implement.

Ideas for Implementation

Each action item includes ideas for implementation and potential resources, which may include grant programs or human resources.

Plan Goals Addressed

The Plan needs to be regularly monitored and evaluated to measure its success in achieving its goals once implementation begins. To that end, the plan goals addressed by each action item are included – they provide the means by which the success of each action can be measured.

Partner Organizations

Partner Organizations are agencies or public/private sector organizations that may be able to assist in the implementation of action items by providing relevant resources to the coordinating organization. The partner organizations listed in the Resource Directory (Appendix A) of the City of Cudahy's Local Natural Hazards Mitigation Plan are potential partners recommended by the Hazard Mitigation Advisory Board. These organizations, however, were not contacted during the development of the Mitigation Plan, and should therefore be contacted by the coordinating organization to establish their commitment of time and resources to action items.

Constraints

Constraints may apply to some of the action items. These constraints may be a lack of City staff, lack of funds, or vested property rights, which might expose the City of Cudahy to legal action as a result of adverse impacts on private property.

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

The Plan Maintenance Section (Section 5) of this document details the formal process that will ensure that the Cudahy Local 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's government intends to incorporate the mitigation strategies outlined in this Plan into existing planning mechanisms such as the City's General Plan, Building and Safety Codes, and community development plans.

Coordinating Body

The City of Cudahy Hazard Mitigation Strategic Committee will be responsible for coordinating implementation of Plan action items and undertaking the formal review process. The City's Manager, or his or her designee, can and will assign representatives from City agencies and other organizations to serve in this committee, as appropriate, including, but not limited to, the current Hazard Mitigation Advisory Committee members.

Convener

City Council will adopt the City of Cudahy Local Natural Hazard Mitigation Plan, and the Hazard Mitigation Advisory Committee will take responsibility for Plan implementation. The City Manager, or designee, 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 of Cudahy addresses statewide planning goals and legislative requirements through its General Plan, Capital Improvement Plans, and City Building and Safety Codes. The Local Natural Hazard Mitigation Plan provides a series of recommendations that are closely related to the goals and objectives of these existing planning programs. The City of Cudahy will have the opportunity to implement recommended mitigation action items through existing programs and procedures.

Economic Analysis of Mitigation Projects

A study conducted in 2005 by the National Institute of Building Sciences through its Multihazard Mitigation Council has found that on average, every dollar spent by FEMA on hazard mitigation provides the country with about four dollars in future benefits. This figure does not include the more than 200 lives and nearly 5,000 injuries that are expected to be prevented over the next 50 years by these programs. Thus, money spent on hazard mitigation is money well spent.

But, where is this pre-disaster mitigation money best spent? To answer this question, the Federal Emergency Management Agency (FEMA) uses two different but valid approaches to identify and measure the costs and benefits associated with natural hazard mitigation strategies or projects: 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. These exercises can also help prioritize the implementation of action items based on the limited resources available.

Formal Review Process

Cudahy's Local Natural Hazards Mitigation Plan will be evaluated on an annual basis to determine the effectiveness of its programs, and to reflect changes in land development or programs that may affect the mitigation priorities. The evaluation process includes a firm schedule and time line, and identifies the local agencies and organizations participating in the evaluation of the Plan. The convener 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.

Continued Public Involvement

The City of Cudahy is dedicated to involving the public directly in the continual review and update of its Local Natural Hazard Mitigation Plan. Copies of the Plan will be made available at City Hall. The existence and location of these copies will be published on the City's website and in City newsletters. The Plan also includes the address and phone number of the City's Emergency Services Coordinator, who is responsible for keeping track of public comments on the Plan. This site also contains an email address and phone number to which people can direct their comments and concerns.

SECTION I: INTRODUCTION

Throughout history, the residents of southern California, including the city of Cudahy, have experienced and dealt with a variety of natural hazards common to the area. In the 1700s and 1800s, when there were fewer people in the region and everyone depended directly on the land and local weather for their food and welfare, the natural events that disrupted their lives were typically recorded in journals, letters, newspaper articles, and more recently, photographs. In the 1900s, as people began to attempt to understand and modify their environment to reduce the impact of natural hazards on the local population and the landscape, these events were also recorded in scientific journals. Many of these sources are referred to in the following sections in an effort to document the area's past exposure to specific natural hazards, and in the process, assess the region's potential future risks. This is especially important because as the population of southern California increases, natural hazards have the potential to pose an even higher risk to the social, economic and political welfare of the region.

California is the eighth (2012, 2013) largest economy in the world (Center for Continuing Study of the California Economy, July 2013). People originally from all over the United States and the world now call southern California home because of its gentle Mediterranean climate, geographical attributes (the ocean and the mountains are both within a two-hour drive) and ample job opportunities. However, the southern California terrain is the product of powerful natural forces forming and tearing down mountains at remarkable rates by geological standards, and when humans interact with this changing environment, there is a high possibility for the population to be negatively impacted. Thus, a natural event, such as an earthquake or flood, clearly has the potential to cause significant damage at the personal, local, and regional levels in the forms of loss of life, injuries, destroyed or impaired structures and infrastructure, loss of income, and the high costs associated with disaster response and recovery.

In addition to earthquakes and floods, the city of Cudahy, like most of southern California, is also subject to severe weather hazards, including strong windstorms, drought, temperature extremes, and the occasional tornado. Thus, earthquakes, floods and severe weather events are the natural hazards that are covered in most detail in this document, given that it is possible to minimize the losses that result from these hazards through careful planning and community participation in the implementation of mitigation measures. Man-made hazards, such as firestorms and the release of hazardous materials, are also likely to impact Cudahy, but these hazards are not covered in this document. The City recognizes that these hazards should be included in future versions of this Plan.

Why Develop a Local Natural Hazards Mitigation Plan?

As the costs of damage from natural disasters continue to increase, communities realize the importance of identifying effective ways to reduce their vulnerability to disasters. Hazard mitigation plans assist communities in reducing their risk from natural hazards by identifying resources, information, and strategies for risk reduction, while helping to guide and coordinate mitigation activities throughout the area. With these aims in mind, the City of Cudahy has prepared this document, its first Local Natural Hazards Mitigation Plan (the Plan).

This Plan provides a set of action items that if implemented can help reduce the risk from natural hazards and prepare the community to resist the impact of potential future natural hazard events. The Plan aims to accomplish this through education and outreach programs, by fostering the development of partnerships, and by implementing preventive activities (such as land use programs) that limit or guide development in areas at risk from natural hazards. The Plan discusses the City's current hazard conditions, and provides actions that are consistent with current City standards and other relevant Federal, State or regional regulations, including FEMA requirements.

The resources and information contained within the Mitigation Plan:

1) Establish a basis for coordination and collaboration among agencies and the public in the city of Cudahy,
2) Identify and prioritize future mitigation projects, and
3) Assist in meeting the requirements of federal assistance programs.

The Local Natural Hazards Mitigation Plan works in conjunction with other City plans, including the City's Safety Element of the General Plan and the City's Emergency Operations Plan. This Plan is tied to these other documents by reference.

Section 322 (a-d) of the Federal Disaster Mitigation Act of 2000 (DMA 2000) requires that local governments, as a condition of receiving Federal disaster mitigation funds, have a mitigation plan that:

1) Describes the hazards, risks and vulnerabilities specific to the community,
2) Identifies and prioritizes mitigation actions,
3) Encourages the development of local mitigation, and
4) Provides technical support for these efforts.

This Local Hazard Mitigation Plan for the City of Cudahy meets these requirements.

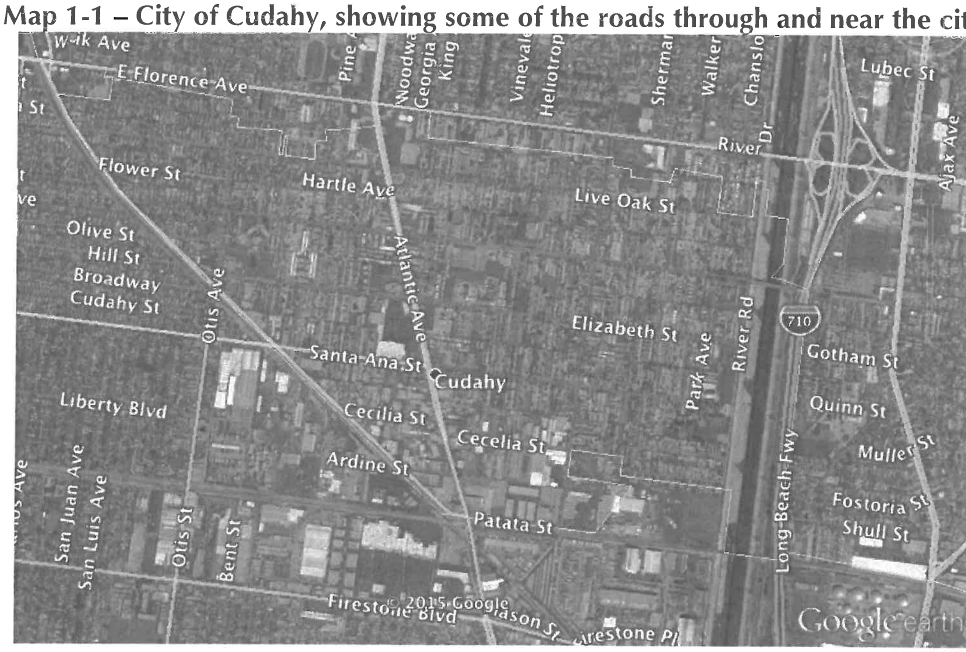
Scope and Impact of the Plan

Cudahy's Local Natural Hazards Mitigation Plan affects the entire City (see Map 1-1 below). This Plan provides a framework that permits the City to plan for the main natural hazards that have the potential to impact the Cudahy area. The resources and background information in the Plan are applicable City-wide, and the goals and recommendations can lay the groundwork for local mitigation plans and partnerships.

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 are required to have Safety Elements, one of seven mandatory elements of their General Plans. Safety Elements document the natural hazards specific to the area, and provide the framework by which ordinances to reduce these hazards are implemented. However, Safety Elements are typically updated only once every 15 to 25 years, and are often superseded by other local and statewide planning regulations. With the requirements for Local Hazard Mitigation Plans, the Federal Emergency Management Agency (FEMA) has essentially exported the California municipal Safety Element idea to the rest of the United States, but they also have expanded on it by requiring a more publicly open and economically quantifiable planning process for community disaster reduction, and a means by which the document is reviewed yearly and updated every five years. Safety Elements traditionally emphasize hazard mapping and develop forward-looking land use planning policies to minimize those hazards. FEMA has directed that, following the hazard mapping effort, an emphasis be placed on hazard mitigation policies that are based on quantifiable vulnerability, loss, and risk analysis. FEMA also requires extensive public participation during the preparation of hazard mitigation plans because they recognize that without public education and citizen buy-in of mitigation needs, it is nearly impossible to mobilize the level of support necessary to fully begin to deal with multi-hazard mitigation over multi-decadal timescales.

Map 1-1 – City of Cudahy, showing some of the roads through and near the city.



Source: GoogleEarth

The continuing challenge faced by local officials and state government is to keep local hazard mitigation plans effective in responding to the changing conditions and needs of California's diverse and growing communities without forgetting the effect that low-probability but high-risk natural events (such as major earthquakes, which can skip entire generations and are therefore likely to be dismissed over time) can have on the built environment. 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 the hazards. Planning for natural hazards therefore calls for local plans to include inventories, policies, and ordinances to guide the safe development and re-development of areas that history shows can be greatly impacted by infrequent but large-magnitude natural hazard events. 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 the development and implementation of risk reduction strategies and policies lies with local jurisdictions. Local jurisdictions, however, are not alone. There are numerous partners and resources at the regional, State and Federal levels that can assist cities with these efforts. For example, there are several California and Federal agencies that conduct research and provide public education materials on natural hazards and natural hazard mitigation. Some of these key agencies include:

- The California Governor's Office of Emergency Services (Cal OES) is responsible for disaster mitigation, preparedness, response, recovery, and the administration of federal funds after a major disaster declaration. Their online resources include extensive information on natural and man-made hazards, and hazard preparedness for individuals and families, businesses and organizations, schools, and governments. Cal OES provided the City of Cudahy with grant money to complete this document.

- 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. Many publications, research data and website information provided by SCEC were used in the Earthquake section of this report.

- The California Geological Survey (CGS) and the U.S. Geological Survey (USGS) are responsible for geologic hazard characterization, public education, and the development of partnerships aimed at reducing risk. The Earthquake and Flood Hazards sections of the Plan utilized maps, publications and consensus reports issued by the California Geological Survey and the U.S. Geological Survey.

- 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. Dam inundation maps and other data prepared and/or administered by the DWR and other departments under the DWR were used in the Flood Hazards section of the Plan.

- The Federal Emergency Management Agency (FEMA) requires the preparation of these Hazard Mitigation Plans, and to help in the process, the agency provides extensive resources in the form of how-to-guides, flood insurance maps, and online information on how to plan, prepare and mitigate hazards. FEMA also provides preparedness grants and hazard mitigation assistance.

- The National Oceanic and Atmospheric Administration (NOAA) keeps records of storms and other natural hazard events for all regions of the United States. The NOAA database was used extensively in the Flood and Severe Weather Hazards sections of this Plan.

Information provided by all of these agencies was used extensively in the preparation of this document. Specific publications and webpages authored by these agencies that were referenced during the preparation of this Plan are identified in the appropriate section and are listed in Appendix I: References. For additional resources, also refer to Appendix A.

Plan Methodology

Information in the Mitigation Plan is based on research from a variety of sources, including those mentioned in the section above, Information provided by City staff and residents during the Staff and Public workshop meetings, respectively, and other sources identified in Appendix I. The consultant was helped on this effort by staff from the City of Cudahy, who facilitated the Steering and Advisory committee meetings and public workshops. The research methods and various contributions to the Plan include:

Input From the Steering and Advisory Committees

The Hazard Mitigation Advisory Committee guided development of the Mitigation Plan and played an integral role in developing the mission, goals, and action items for the Mitigation Plan. The committee consisted of representatives from public departments in the City of Cudahy and regional organizations, including:

- ✓ City of Cudahy Community Development Department, Planning Division
- ✓ City of Cudahy Community Development Department, Building and Safety Division
- ✓ City of Cudahy Community Development Department, Engineering Division
- ✓ City of Cudahy Community Development Department, Code Enforcement Division
- ✓ City of Cudahy Community Services Department, Maintenance Division
- ✓ Los Angeles County Sheriff Department, and
- ✓ City of Cudahy Finance Department, Grants Coordinator.

Recognizing that work "by committee" often needs to be streamlined to be effective, representatives from the Planning Division, the Building and Safety Division and the Engineering Division currently form the Cudahy Hazard Mitigation Steering Committee. Individuals from these divisions have the added responsibility of overseeing implementation of the Plan. Additional information regarding the responsibilities of the committees is provided in Section 5.

Stakeholder Interviews

Information regarding the various natural hazards that can impact the City of Cudahy has been made available to the public in a variety of forums since 2005, when the City participated in the preparation of a Multi-Hazard Disaster Mitigation Plan with the City of Maywood that was never completed. Nevertheless, several meetings were held with City of Cudahy Staff to discuss the natural hazards the city is susceptible, the process of preparing a Disaster Mitigation Plan, and the preparation of draft mitigation actions. These meetings and the tasks accomplished at that time are summarized in Appendix B. Then in 2010 the City updated its General Plan, including an update to the Safety Element. The General Plan update, including the Safety Element, is posted on the City's website (http://www.cityofcudahy.com/planning.html). The Safety Element, including the policies therein, was referred to extensively during the preparation of this report. This Natural Hazards Mitigation Plan builds on the work started in 2005 and 2010, but includes the most recently published findings and interpretations regarding the potential for seismic and flooding hazards in the region. This report also addresses recent concerns regarding the anticipated increased severity of weather events in response to global climate change.

Presentations to various stakeholders have been made across the City, both as part of the original, unfinished 2005 Multi-Jurisdictional Disaster Mitigation Plan effort, the 2010 General Plan update, and for this project. The Draft version of the Plan was posted on the City's website to allow for, and provide ongoing citizen/stakeholder information and participation. Two public meetings to present the findings of the Plan, and to seek input regarding the Goals and Action Items, were held in July and August, 2013.

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 the 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 City's General Plan, the Zoning Ordinance, the Building Codes, the City's Municipal Code, 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 and objectives, including proposed strategies, programs and actions that can be implemented to reduce or minimize long-term vulnerabilities;
- A plan maintenance process, which describes the method and schedule of

monitoring, evaluating and updating the Plan and integration of the Hazard Mitigation Plan into other planning mechanisms;

- Formal adoption by the City Council; and

- Plan review by both FEMA and Cal OES.

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

Cudahy's consultant and City staff examined existing mitigation plans from around the country, current FEMA hazard mitigation planning standards (386 series) and the State of California Natural Hazards Mitigation Plan Guidance.

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

- California's State Hazard Mitigation Plan (2013)
- City of Long Beach Natural Hazards Mitigation Plan
- City of Pasadena Natural Hazards Mitigation Plan
- City of Torrance Hazards Mitigation Plan
- City of Glendale Hazards Mitigation Plan
- City of Newport Beach Hazards Mitigation Plan, and
- Los Angeles Specific Planning Guidebook provided by the DMACs of Area C.

Hazard Specific Research

Cudahy's consultant and staff collected data and compiled research on the natural hazards that have historically impacted the southern California area, and identified three main types of hazards that have the potential to cause the most damage in the City. City staff also weighed in on the natural hazards with the potential to impact the community through a questionnaire that they filled out during the kick-off meeting. The hazards of most concern in the city given their geographic extent, past occurrence, and probability of occurrence in the future include earthquakes, flooding, and severe weather. Research materials used include publications by federal agencies such as FEMA, the U.S. Geological Survey and NOAA; state agencies such as CGS and OES; the City's Safety Element, and other sources. The City's consultant conducted research by referencing historical local sources, interviewing City of Cudahy employees and residents who provided invaluable data regarding past local disasters, and locating information specific to Cudahy and neighboring communities in historical documents. Once the technical background section of the report had been prepared, and the findings of the research had been disseminated to both City staff and residents alike, City staff proposed and then evaluated the feasibility and potential effectiveness of the mitigation activities, resources and programs, and potential action items based on their experience in implementing the action items in the Safety Element, and from feedback from stakeholder interviews.

Public Workshops and Public Input

As mentioned above, two public workshops were held in July and August 2013 to present the Draft Plan to the public and solicit feedback regarding the prioritization of the draft goals and action items. The July workshop included a PowerPoint presentation summarizing the objective of the plan, and preliminary findings regarding the natural hazards identified. The slides were in English, but the presentation was given in both English and Spanish, as a high percentage of the residents present at the meeting were native Spanish-speakers. 52 people signed in at the door, and at least 200 people were in the room during the presentation. During the August public presentation, which coincided with Cudahy's Town-Out Night, poster-sized copies of the maps prepared for the Plan were hung in a booth, with participants invited to review and comment on the maps and the Plan. Input received from the attendees was taken into consideration when preparing the final document. The Draft Plan was also placed on the City's website for review by interested residents. Additional information regarding these community meetings and public outreach efforts is provided in Appendix B.

Using the Plan

Each section of the Local Natural Hazards Mitigation Plan provides information and resources to assist City staff and the public in understanding the hazard-related issues facing Cudahy's 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 the user to refer to specific sections of interest to him or her. It also allows City government to review, update and add other sections when new data become available, or when the City has resources that can be used specifically to update or expand this document. The ability to update individual sections of the Hazard 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 Local Hazards Mitigation Plan that remains current and relevant to the City of Cudahy.

The City of Cudahy's Local Natural Hazards Mitigation Plan is organized in three volumes. Volume I contains the Executive Summary followed by Sections 1 through 5: introduction, Community Profile, Risk Assessment, Goals and Action Items, and Plan Maintenance. Volume II contains the three natural hazard sections (Sections 6 through 8) and Volume III includes the appendices. Each section of the Plan is described below.

Volume I: Mitigation Action Plan

Executive Summary

The Executive Summary outlines the legal authority and adoption of the Plan, summarizes the findings of the study, and spells out the Plan's mission, goals, and the elements of the action items. The Summary also briefly describes how the plan should be implemented, monitored and evaluated, and the coordinating body in charge of adoption, implementation and review of the Plan.

Section 1: Introduction

The Introduction describes the background and purpose of developing the Local Natural Hazard Mitigation Plan for the City of Cudahy.

Section 2: Community Profile

This section presents the history, geography, demographics, and socioeconomics of the City of Cudahy, with emphasis on the census data used in the loss estimation analyses. This section serves as a tool to provide an historical perspective of natural hazards in the City, and a springboard to understand how natural hazards can impact the City in the future.

Section 3: Risk Assessment

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

Section 4: Multi-Hazard and Hazard-Specific Goals and Action Items

This section provides information on the process used to develop goals and action items that cut across the thee main natural hazards addressed in the Natural Hazard Mitigation Plan (the Multi-Hazard Action Items), and also includes the hazard-specific action items. Section 4 is the "Policy Document" that establishes the specific action items that the City will undertake to reduce its risk to natural hazards.

Section 5: Plan Maintenance

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

Volume II: Hazard Specific Information

Hazard-specific information on three natural hazards is addressed in this Plan. Chronic hazards, such as storm flooding and strong Santa Ana winds, occur with some regularity and may be forecast through historic evidence and scientific methods. Catastrophic hazards do not occur with the frequency of chronic hazards, but notwithstanding, they can have devastating impacts on life, property, and the environment. In southern California, because of its geology and terrain, earthquakes, floods, and windstorms have the potential to be catastrophic as well as chronic hazards.

The hazards addressed in the Plan include:

Section 6: Earthquakes

This section includes a detailed discussion of strong ground shaking, liquefaction and other types of surface ground deformation, and after-earthquake fires.

Section 7: Floods

This section discusses Cudahy's vulnerability to storm-induced flooding and catastrophic inundation due to failure of dams and above-ground reservoirs.

Section 8: Severe Weather Events

This section discusses the potential for personal, structural, and economic damage caused by high winds, drought, and extreme temperatures, among other severe weather events.

Each of the hazard-specific sections includes information on the history, hazard causes and characteristics, hazard assessment, risk analysis to the community as a result of these events, and local, state, and national resources available to mitigate or reduce the impact of these hazards. The mitigation actions that the City has chosen to implement to reduce these hazards are all grouped together in Section 4.

Volume III: Resources

The Plan appendices are designed to provide users of Cudahy's Local Natural Hazards Mitigation Plan with additional information to assist them in understanding the contents of the Plan, and potential resources to assist them with implementation.

Appendix A: Plan Resource Directory

This appendix provides a resource directory, which includes City, regional, State, and national resources and programs that may be of technical and/or financial assistance to the City of Cudahy during Plan implementation.

Appendix B: Public Participation Process

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

Appendix C: Benefit Cost Analysis

This appendix 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 appendix provides a list of acronyms for City, regional, state, and federal agencies and organizations that may be referred to within Cudahy's Local Natural Hazards Mitigation Plan.

Appendix E: Glossary

This appendix provides a glossary of terms used throughout the Plan.

Appendix F: California Disasters

This appendix lists major California disasters since 1950.

Appendix G: List of Dams

This appendix provides a list of major dams and reservoirs in Los Angeles County.

Appendix H: Maps

This appendix contains the maps referenced throughout the Plan.

Appendix I: References

This appendix contains a listing of references used in the preparation of the Plan.

Appendix J: Plan Adoption

Documentation regarding the formal adoption of the Plan.

SECTION 2: COMMUNITY PROFILE

Why Plan for Natural Hazards in the City of Cudahy?

Earthquakes, floods, and strong winds have previously exposed the Los Angeles metropolitan area, including the city of Cudahy, to the financial and emotional costs of recovery. Natural hazards impact residents, property, the environment, and the economy. These same natural hazards have the potential to pose a future negative impact on the city. Furthermore, as more people move to areas vulnerable to these conditions, the risk associated with these natural hazards increases. The historical record shows that even in those parts that are essentially "built-out" (i.e., have little or no vacant land remaining for development), population density generally continues to increase as low-density housing is replaced with medium- and high-density development projects. This in effect places even more people at risk from the hazards that can impact the area. In short, the risk associated with natural hazards increases as more people move to vulnerable areas.

Given that natural hazards are inevitable, and that populations in hazardous areas are increasing in response to development pressures, there is a need to develop strategies, coordinate resources, and increase public awareness to reduce the risk and losses from future natural hazard events. Identifying the risks posed by natural hazards, and developing strategies to reduce their impact can assist in protecting life and property. In Cudahy, local residents and businesses can work together with City staff to create a natural hazards mitigation plan that addresses the potential natural hazards of most concern to Cudahy's residents.

Geography and the Environment

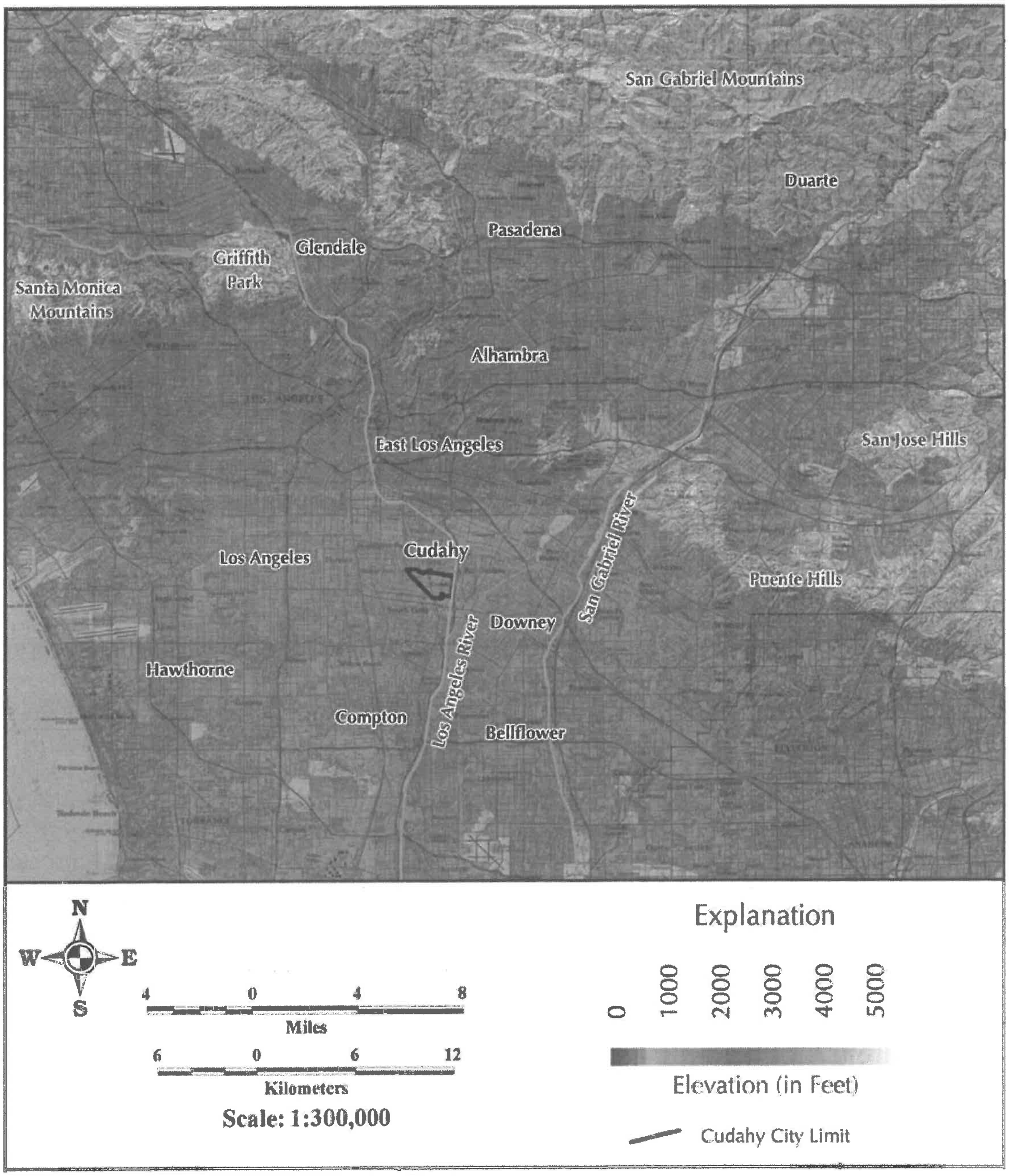
The city of Cudahy has an area of 1.08 square miles and is located in the south-central portion of Los Angeles County, eight miles southeast of downtown Los Angeles (see Map 2-1). The city is located immediately west of the Los Angeles River and the Long Beach Freeway (I-710). Cities surrounding Cudahy include Bell to the north, Huntington Park to the west, Bell Gardens to the east, and South Gate to the south (see Map 2-2). Elevation in the city ranges from 135 to 110 feet above sea level, with the highest point near Cudahy's northwestern corner. The ground gently slopes to the southeast.

Regional access to and from Cudahy is provided by the Long Beach Freeway, with access to the freeway provided by Florence Avenue to the north of the city, and Firestone Boulevard to the south. There are no freeway on- or off-ramps in Cudahy. Major arterial highways and roadways in the area include Atlantic Avenue, which runs approximately north-south through the center of Cudahy, and Florence Avenue, just north of the City, which runs east-west. Collector streets extending through the city include Clara, Elizabeth and Santa Ana streets running east to west, and Otis and Wilcox avenues running north to south.

Two railroads run along Cudahy's southern and western areas, locally defining the City's boundaries (see Map 2-2). The Southern Pacific Railroad runs along the city's southern boundary; approximately seven trains daily pass along this railroad segment. The Union Pacific Electric

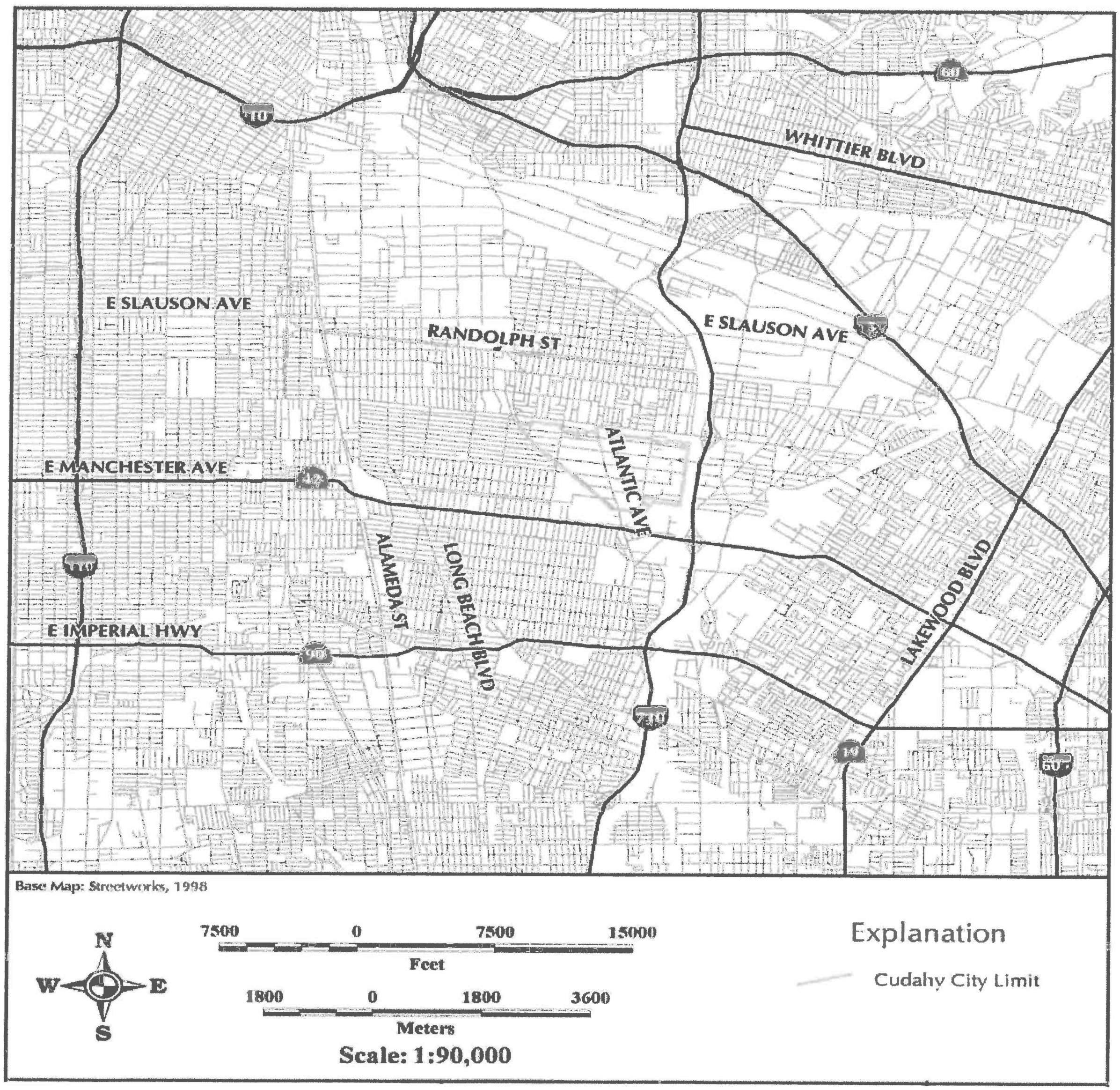
Railroad passes along Cudahy's western boundary; this railroad track sees five to six trains daily. Neither train company provides local service to Cudahy.

Map 2-1: Physiographic Map of Cudahy and Surrounding Areas
(Note the location of the Los Angeles and San Gabriel Rivers, and the San Gabriel Mountains to the north)



Several of the hazards discussed in this document have the potential to disrupt automobile traffic and shut down the local and regional transit systems. For example, an earthquake can damage the freeway overpasses so that they are unsafe to cross. Localized urban flooding can render roads unusable. A severe winter storm has the potential to disrupt the daily driving routine of hundreds of thousands of people. Strong Sana Ana winds can also make driving hazardous, especially for high-profile vehicles such as trailer trucks.

Map 2-2: Major Roads In and Near Cudahy and Surrounding Areas



Major Rivers and Other Bodies of Water

The nearest major river to the city of Cudahy is the Los Angeles River, which runs along the city's eastern boundary. The Los Angeles River poses a potential impact on Cudahy, as discussed in Section 7. Normally this river channel is dry, carrying significant water flow only during and after a major rainstorm. The river channel is managed by the Los Angeles County Flood Control District and the city of Cudahy is protected by a levee wall. However, portions of the city are within the 500-year flood zone. Cudahy is downstream of several water retention structures, including the Hansen and Sepulveda dams. Should either of these two dams fail catastrophically, the entire city is at risk of inundation. This is also discussed further in Section 7.

The city of Cudahy is located approximately 13.5 north and 14 miles east of the Pacific Ocean, respectively. It is thus not at risk of being impacted by coastal hazards such as tsunamis, storm surges, rogue waves, or sea-level rise.

Climate

As the rest of southern California, Cudahy enjoys a Mediterranean-type climate, with mild, sunny winters, and warm, dry summers. Average maximum temperatures in the city of Cudahy range from about 68 degrees in the winter months (December to January) to 84 degrees in the summer months (July and August). Average minimum temperatures range from 49 degrees in the winter to 66 degrees Fahrenheit in the summer. However the temperatures can vary significantly, particularly when Santa Ana winds blow, bringing higher temperatures and very low humidity. Table 2-1 shows the average temperatures in the Los Angeles Civic Center area, near Cudahy.

Table 2-1: 24-Hour-Average Monthly Temperature Near Cudahy

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
°C	14.6	15.6	15.9	17.3	18.7	20.9	23.5	23.9	23.1	20.9	17.2	14.6	18.8
°F	58.3	60.1	60.6	63.1	65.7	69.6	74.3	75.0	73.6	69.6	63.0	58.3	65.8

Source: Los Angeles CVC CNTR, Los Angeles County data derived from NCDC TD 9641 Clim 81 1961-1990 Normals. 30 years between 1961 and 1990. From http://www.worldclimate.com

Rainfall in the Cudahy area averages between about 14.9 and 17.1 inches of rain per year, based on records from the Los Angeles Civic Center and Montebello, respectively. The Civic Center record is based on 43 complete years of data between 1950 and 1995, and is thus probably more representative of long-term averages (see Table 2-2). But the term "average" means very little in this region, as annual rainfall amounts have ranged from one-third the normal amount to more than double the normal amount. For example, during 1898, total rainfall for the year was 4.83 inches, whereas in 1941 it was 31.28 inches, and in 1983, it was 34.40 inches (Los Angeles Times, http://articles.latimes.com/2009/feb/02/local/me-annual-rain-graphic2).

Table 2-2: Average Monthly Precipitation in Los Angeles Civic Center (top) and in Montebello (bottom), in inches

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Inches	3.6	3.0	2.6	1.1	0.2	0.1	0.0	0.1	0.3	0.2	1.7	1.9	**14.9**
Inches	3.8	4.2	4.3	0.9	0.1	0.0	0.0	0.0	0.5	0.6	1.5	1.0	**17.1**

Data for Los Angeles Civic Center based on 43 complete years between 1950 and 1995. Data for Montebello based on 7 complete years between 1979 and 1995.
Source: www.worldclimate.com

Furthermore, 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," generally within a winter season. Compounding the problem during wet years, because the Los Angeles metropolitan basin is largely built out and paved over, water falling at higher elevations flows along streets and parking lots, rather than infiltrating into the ground, and this runoff can have a sudden impact on adjoining communities at lower elevations.

Minerals and Soils

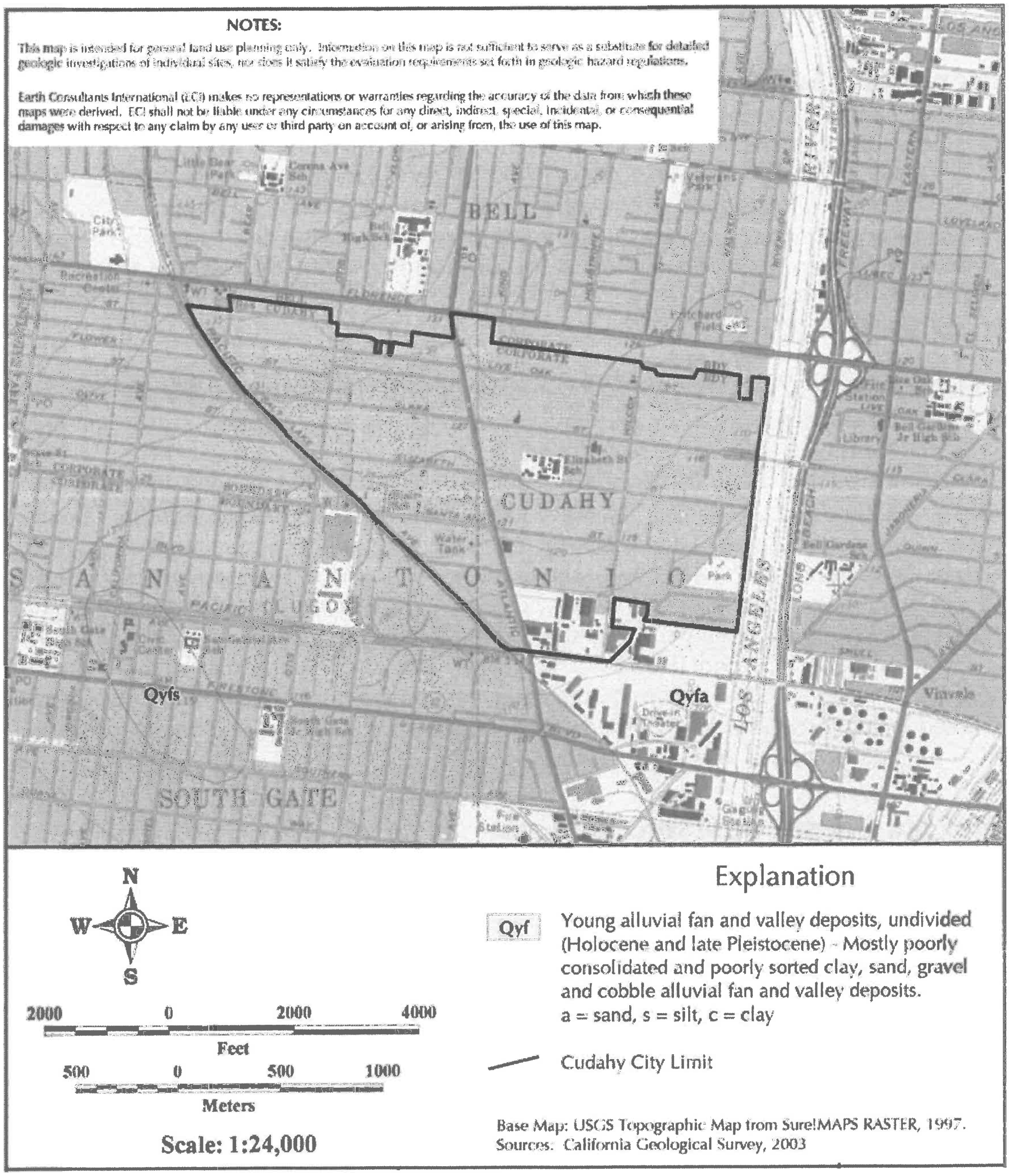
The sediments and soils underlying the city of Cudahy determine to some extent the potential geologic hazards that may occur in the area, such as the susceptibility of the city to earthquake-induced liquefaction, the presence of expansive or corrosive soils, and the potential for slope failures. Therefore, understanding the geologic characteristics of the sediments underlying Cudahy is an important first step in hazard mitigation and avoiding at-risk development. The types and characteristics of the unconsolidated sediments, soils, and, at depth, the bedrock, that underlie the city are also a reflection of the geologic and climatic processes that have affected this region in the past several million years.

The city of Cudahy is underlain by non-marine sediments consisting predominantly of sand, silt and gravel deposited by the Los Angeles River and similar ancestral drainages (river-lain sediments are referred to as alluvium). For a geologic map of the Cudahy area, refer to Map 2-3. The sandy soils that underlie at shallow depth the Cudahy area are susceptible to liquefaction, as discussed further in Section 6, but are not expansive. These sediments were eroded from the mountains to the north, were moved downhill and downgradient by both gravity and alluvial (river) processes, and then deposited on the valley floor. These alluvial deposits, of Holocene and Pleistocene age (ranging in age from a few hundred years at or near the surface to approximately 300,000 years old at depth), are approximately 550 feet thick in the Cudahy area (Ponti and others, 2007). These non-marine deposits are underlain by a sequence of marine sedimentary rocks consisting of sandstone, siltstone and shale that in this area may be as much as 20,000 feet thick (Wright, 1991). These sedimentary rocks were deposited over millions of years when the area now referred to as the Los Angeles Basin was under ocean water.

Other Significant Geologic Features

The city of Cudahy lies in the Peninsular Ranges, a geologic/geomorphic province characterized by a northwest-trending structural grain aligned with the San Andreas fault, and represented by a series of northwest-trending faults, mountain ranges and valleys stretching from the base of the Santa Monica Mountains on the north to the Mexican border to the south. Earthquake faults in this region are mainly of the strike-slip type, and where they have been most recently active, they have deformed the landscape and altered drainage patterns. An example of such faulting in the Los Angeles area is the Newport-Inglewood fault zone, which trends southeasterly across the Los Angeles Basin. Predominantly right-lateral in movement, the Newport-Inglewood fault is responsible for uplifting the chain of low hills and mesas that extends from Beverly Hills to Newport Beach across the relatively flat coastal plain (including Beverly Hills, Cheviot Hills, Dominguez Hills, Signal Hill, and Newport Mesa). The location and structure of the fault zone is known primarily from a compilation of surface mapping and deep, subsurface data, driven initially by an interest in oil exploration (all of the hills and mesas have yielded petroleum), and later by a interest in evaluating earthquake hazards. The fault is an active structure and was the source of the 1933 magnitude (M) 6.4 Long Beach earthquake. Despite the name, this earthquake was actually centered closer to Newport Beach, near the mouth of the Santa Ana River (Hauksson and Gross, 1991) (see Section 6).

Map 2-3: Geologic Map of Cudahy and Surrounding Areas



In recent years, scientists have discovered that the northern end of the province, primarily the Los Angeles metropolitan area, is underlain by a series of deep-seated, low-angle thrust faults. Given that these faults do not reach the surface they are called "blind thrusts." Faults of this type are thought to be responsible for the uplift of many of the low hills in the Los Angeles Basin, such as the Repetto and Montebello Hills. Previously undetected blind thrust faults were responsible for the M5.9 Whittier Narrows earthquake in 1987, and the destructive M6.7 Northridge earthquake in 1994.

The Los Angeles Basin experiences many small tremors every year, but its history has been shaped by several relatively infrequent, but powerful earthquakes. The first historical earthquake was recorded in 1769, when the Portola expedition was camped next to the Santa Ana River in what is now the Olive community in the city of Orange, but earthquakes undoubtedly have shaken the area for millennia. Other more recent earthquakes were recorded in 1812, 1857, 1933 (Long Beach), 1987 (Whittier Narrows), and 1994 (Northridge). The 1857 Fort Tejon event was a large earthquake with a 7.9 estimated magnitude on the San Andreas fault. The earthquake caused only minor damage because the epicentral area was largely unpopulated, but it was felt from Marysville south to San Diego, and as far east as Las Vegas. A similar-sized earthquake today would result in thousands of casualties and billions of dollars in property loss. Given that paleoseismological research indicates that great earthquakes (i.e., M>7.6 occur on the San Andreas fault at intervals between 45 and 332 years, with an average interval of 140 years, another similar earthquake on the San Andreas fault is considered likely in the not-too-distant future, if not already overdue. This fact alone should encourage local governments to strengthen their infrastructure and prepare for "the Big One." Furthermore, as discussed in Section 6, there are other lesser-known faults closer to Cudahy that have the potential to cause more damage to the city than the more-distant San Andreas fault. The earthquake hazard to the Los Angeles basin and the cities therein, such as the city of Cudahy, is severe.

Community History

The first known inhabitants of the Los Angeles Basin, including the Cudahy area, were Native Americans from the Tongva (or Tobikhar) nation. Together with the Chumash to the north, in the Santa Barbara region, and the Kymeyaay nation to the south, in what is now San Diego County, these groups occupied a 4,000-square-mile area that extended from the Mojave Desert in the east to the Channel Islands offshore. When Spanish explorer Juan Cabrillo sailed past southern California in 1542, the first Europeans to sight the California coastline, the Tongva are thought to have numbered between 5,000 and 10,000 individuals (Lepowsky, 2004).

Intense contact between the Spanish and the Tongva only began more than 200 years later, however, when the first land expedition by Europeans into what is now Los Angeles County was led by Gaspar de Portola in 1769. This was followed in 1771 with the founding of the Mission of San Gabriel Arcángel. Many of the Tongva were relocated to the mission grounds and surrounding areas, generally as laborers forced to learn the European style of farming and livestock husbandry, to tend to the mission's orchards, fields and animals. Old World diseases brought by the Spanish led to the rapid collapse of the Tongva people in the late 18th century.

In 1810, the King of Spain awarded a land grant to Don Antonio Maria Lugo, a Corporal who did 17 years of service for the King at the Presidio in Santa Barbara. The land grant, referred to as Rancho San Antonio, extended from the hills south of the San Gabriel valley southward to the Dominguez Hills, and from the eastern boundary of the Pueblo of Los Angeles to the San Gabriel River, a 29,513-acre area. The Rancho included the present-day cities of Bell, Bell Gardens, Commerce, Cudahy, Huntington Park, Lynwood, Maywood, South Gate, Vernon, and Walnut Park. The grant was confirmed in 1838 by Mexican governor Juan B. Alvarado, and then, following the Mexican-American War, ownership of the land grant by Mr. Lugo was honored by the Treaty of Guadalupe Hidalgo. In 1855, Don Antonio divided the Rancho among his eight sons and daughters, reserving a 4,239-acre homestead for himself. This homestead, referred to as the Lugo Ranch, included the area where Cudahy is now located. When Don Antonio Lugo died in 1860, his son Vincent inherited the ranch.

In 1862, severe storms caused the Los Angeles and San Gabriel rivers to overflow their banks, followed in 1863-64 by droughts. These back-to-back disasters caused crops to fail, and hundreds of thousands of cattle died due to lack of food, economically ruining many of the Spanish landowners, including several in the Lugo family. In May 1864, Isaac Heyman foreclosed a mortgage on Vincent Lugo's 4,239-acre tract. The tract was sold at public auction for $0.95 an acre. Between 1864 and 1893, portions of the tract were bought and sold by many parties.

Then, in 1908, Michael Cudahy, an Irish-American industrialist who made his money in the meatpacking business in Nebraska, bought 2,800 acres of what had been part of the Lugo Ranch, and subdivided it into one-acre lots. These lots were in most cases 50 to 100 feet wide and 600 to 800 feet deep, with the depth equivalent to a city block. These parcels, referred to as "railroad lots" were particularly appealing to displaced farmers from the South and the Midwest that arrived in southern California in the 1910s and 1920s. The depth of the lot allowed them to keep a large vegetable garden, an orchard, and a chicken coop and/or stable, giving the area a rural feel (http://www.cityofcudahy.com/about/history.asp; http://www.reference.com/browse/cudahy).

In the earliest days, development in southern California was a cycle of boom and bust. World War II changed that. Military personnel and defense workers arrived in southern California to fill the logistical needs created by the war effort. The population increased dramatically, and the available housing and existing commercial centers proved inadequate for the influx of people. Most Cudahy residents were blue collar workers (and their families) who worked at the many steel and automobile plants that had sprung up in the area. 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 Los Angeles Basin was virtually built out.

The City of Cudahy was incorporated in 1960. In the 1960s and 1970s, as a result of increasing property values as well as changes in zoning permits and property tax assessment formulas, many Cudahy residents sold off their properties to real estate developers who radically re-developed the town, significantly increasing its population density in the process. Also in the 1970s, many of the factories closed down and the white American residents left Cudahy for jobs and housing in the San Gabriel and San Fernando valleys. The typical Cudahy lots that originally contained only a small one- or two-story house were re-developed with at least two duplex or triplex stucco apartment buildings, and oftentimes two- or three-story apartment buildings that stretched the length of the property, containing dozens of units.

Population and Demographics

The City's small area and existing housing stock control to a large extent the number of people that can call Cudahy home. As a result, population counts for Cudahy have not varied significantly since 1990, as shown in Table 2-3. According to U.S. Census data, in 2010 Cudahy had a population of 23,805, 403 less people than in the year 2000. Since 2010, the city's population has grown at an estimated rate of between 1.0 and 1.3 percent, with the population estimate for 2013 at 24,103 people, still lower than in 2000. Nevertheless, Cudahy is one of the most densely populated cities in California, and in the United States as a whole, with about 22,050 people per square mile in 2010 (still considerably shy of the nearly 67,000 people per square mile in Manhattan, New York).

Table 2-3: Historical Population Counts, City of Cudahy

Year	Population
1970	16,998
1980	18,275
1990	22,817
2000	24,208
2010	23,805
2012 (estimated)	24,039
2013 (estimated)	24,103

Sources: General Population by City, Los Angeles County, 1960-2000, U.S. Census (http://www.laalmanac.com/population/po27.htm); http://quickfacts.census.gov/qfd/states/06/0617498.html

The slight increase in population since the 1990s is most likely the result of in-fill development and/or an increase in the number of people living together in the same household. The average household size in Cudahy is 4.25, compared to the California average of 2.93. Families in Cudahy are also, on average, larger, with 4.41 members (the State's average family size is 3.52). It is important to note that given that the surrounding infrastructure supporting the city and its residents has not been upgraded significantly over the years, an increase in population creates greater service loads on the existing roads and utilities, and on the available services.

Densely populated areas also pose a special challenge because of the large number of people being exposed to natural hazards at the same time. Essentially, high population densities increase risk. For example, high-density housing increases the chances of structure fires spreading from one building to the next. Narrow residential streets and narrow passageways between buildings make it more difficult for emergency response vehicles and personnel to reach those in need, and the high ratio of residents to emergency responders affects response times. In Cudahy, the long, narrow lots, now typically occupied by high-density housing, slow down and hinder emergency response by the Fire Department. In short, high-population densities pose a challenge to the agencies responsible for preparing for and responding to hazard events.

History shows that natural hazards do not discriminate, but the impacts in terms of vulnerability and the ability to recover vary greatly among different segments of the population. According to Peggy Stahl of FEMA's Preparedness, Training, and Exercise Directorate, "80 percent of the disaster burden falls on the public, and a disproportionate percentage of that burden is placed upon special needs groups, including the elderly, women, children, minorities, and the poor" (http://www.colorado.edu/hazards/workshop/archives/2000/s16.html). As the events associated with Hurricane Katrina in the Gulf Coast showed, vulnerable populations are often disproportionately impacted by natural hazards. Discussions about natural hazards that include local citizen groups, insurance companies, and other public and private sector organizations, including small business owners and residents, can help ensure that all members of the community are part of the decision-making processes.

As the paragraphs below illustrate, Cudahy's residents include a large proportion of women as heads of households, children, minorities, and low-income families and individuals. All of these groups have the potential to be significantly impacted by a natural disaster. Furthermore, a very large proportion of Cudahy's residents rent, rather than own the buildings that they live in. Renters and landlords are generally less likely to take on mitigation actions that will make their structures more hazard resistant. Furthermore, landlords are typically not eligible for FEMA funding following a disaster, a situation that can significantly delay the repair of rental units so that they can be re-occupied. All of these conditions can hinder the processes of disaster preparedness and recovery, unless a concerted effort is made to educate the entire population on the hazards likely to impact the community, and on mitigation actions that can be implemented by individual households and small businesses to reduce the impacts from these hazards. Renters in particular, should be aware that FEMA typically does offer help to eligible renters impacted by a disaster in the form of free referral services to find alternate housing, and in some instances, money to rent a different place to live for a limited period of time.

Table 2-4: Age Distribution of the Population in Cudahy Compared to California

Age	California (%)	Cudahy (%)
Under 5 years	6.8	9.1
5 to 9 years	6.7	9.6
10 to 14 years	6.9	10.5
15 to 19 years	7.5	10.8
20 to 24 years	7.5	8.4
25 to 34 years	14.3	16.2
35 to 44 years	13.9	13.8
45 to 54 years	14.0	10.9
55 to 59 years	5.9	4.4
60 to 64 years	4.9	1.8
65 to 74 years	6.2	3.0
75 to 84 years	3.7	1.2
85 years and over	1.6	0.3

The 2010 Census data for Cudahy shows that a large proportion of households in the city are headed by women. Specifically, of the estimated 5,616 households in the city, 1,556 households (amounting to 27.7 percent) are headed by women, with no husband present. This percentage is almost twice the 13.4 percent for the State. Households in Cudahy headed by men with no wife present are estimated at 679 (amounting to 12.1 percent of the total). Although this is a significantly lower number than women-headed households, percentage-wise it is also more than twice the State average of 5.9 percent. The number of households with married couples is estimated at 2,744 (48.9 percent of the total), just slightly below the State average of 49.3 percent.

The median age in Cudahy is 25.7 years, almost 10 years younger than the median age for the State as a whole of 35.2 years. Table 2-4 shows the estimated age distribution for Cudahy's residents based on the 2008-2012 American Community Survey 5-Year Estimates data. Compared to State averages, households in Cudahy include a larger proportion of children under the age of 18. Specifically, nearly two-thirds (66.2 percent) of the households in Cudahy have children under the age of 18 living in them.

As the data presented in Tables 2-5 and 2-6 show, almost half (47.9 percent) of Cudahy's population is foreign born, with 99.1 percent of those born in Latin America. Furthermore, 76.4 percent of Cudahy's residents, including both those born in the United States and abroad, are of Mexican ancestry. Another 19.1 percent of the population has other Hispanic or Latino ancestry, primarily from countries in Central America. Only 3.4 percent of Cudahy's population is not Hispanic or Latino in origin. These numbers are significant for emergency response and recovery, especially following an earthquake. Hispanics, especially those of Mexican ancestry, generally prefer to camp out in parks and other open spaces rather than return to their house soon after an earthquake, even if their house appears not to be damaged. This is because in 1985, following the Mexico City earthquake, many who returned to their houses after the main shock were injured or killed when their weakened houses collapsed during a strong aftershock. This response was noticed in both 1987 and 1994, after the Whittier Narrows and Northridge earthquakes, respectively. However, as the population gets younger, with a larger percentage of the population having never experienced an earthquake, this response may change.

Another significant component of Cudahy's demographics is that only 7.8 percent of the population speaks English only, and 53.4 percent speak English less than "very well," with 91.6 percent of the population speaking Spanish. This means that all communications aimed at hazard reduction, emergency preparedness, and mitigation actions need to be bilingual, in both English and Spanish, to reach the largest possible percentage of the city's population.

Table 2-5: Place of Birth Statistics for Cudahy Residents Compared with California

	California	Cudahy
Born in United States	**71.7%**	**51.7%**
Born in California	53.8%	49.7%
Born in Different State	18.0%	2.1%
Born in Puerto Rico, U.S. Islands, or Abroad, to American Parents	**1.2%**	**0.4%**
Foreign Born	**27.1%**	**47.9%**

Table 2-6: Population Breakdown, by Race, in the City of Cudahy

	City of Cudahy
American Indian / Alaska Native	1.03%
Asian	0.5%
Black or African American	1.3%
Native Hawaiian or Other Pacific native	0.0%
White	59.4%
Some other race	36.5%
Two or more races	2.2%
Population by Hispanic or Latino Origin (of any race)	
Persons of Hispanic or Latino origin	96.6%
Persons not of Hispanic or Latino origin	3.4%

According to the 2010 U.S. Census data, the median household income in Cudahy in 2010 was $39,263. The percentage of individuals living in poverty in the city of Cudahy is 29.9 percent, significantly higher than the State's 15.3 percent. Of these, 40.3 percent are under 18 years of age, and 24.3 percent are over the age of 65 (see Table 2-7 below). Cudahy families below the poverty line amount to 29.3 percent of the total population, again, significantly higher than the State's 11.5 percent.

Table 2-7: Percentage of Families and People in Cudahy (and California) whose Income in the Past 12 Months is Below the Poverty Levels (2008-2012 5-Year Estimates)

	California	Cudahy
All Families	11.5%	29.3%
With related children under 18 years	17.0%	36.5%
With related children under 5 years	15.1%	33.3%
Married couple families	6.9%	21.7%
With related children under 18 years	10.0%	27.2%
With related children under 5 years	6.8%	37.0%
Families with female householder, no husband present	26.6%	44.7%
With related children under 18 years	35.6%	51.7%
With related children under 5 years	39.3%	34.1%
All people	15.3%	29.9%
Under 18 years	21.3%	40.3%
65 years and over	9.5%	24.3%

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.

Housing and Community Development

The City of Cudahy is for the most part built out; there are only a few vacant parcels, and a few lots with large backyards that could be re-developed into higher-density buildings. In the last few years there has been little to no development or re-development in the City, most likely a reflection of the weak economic conditions that prevailed between 2007 and 2012 (see Table 2-8). With consumer and business confidence increasing through 2014, renewed redevelopment and infill are expected, with older structures replaced with newer buildings.

Both a large regional earthquake and a 500-year flood will result in a large percentage of Cudahy households and residents to be displaced, in numbers likely to be too large for the City to respond to effectively (see Sections 6 and 7). Displaced households may need alternative short-term shelter, provided by family, friends, temporary rentals, or public shelters established by the City, County or by relief organizations such as the Red Cross. Long-term alternative housing may require import of mobile homes, net emigration from the impacted area, and/or, the eventual repair or reconstruction of new public and private housing. Given that a significant percentage of the city's population is economically disadvantaged, and that a large percentage of the housing units in Cudahy are rental properties (see Table 2-9), a damaging natural hazard event has the potential to not only significantly impact Cudahy's residents, but the City's makeup, as many residents may chose to find alternate housing elsewhere, in other cities. The number of people seeking short-term public shelter is of most concern to emergency response organizations. The longer-term impacts on the housing stock are of great concern to local governments, such as cities and counties.

Table 2-8: Year Housing Structures in Cudahy Were Built (and Comparison with California)

Year Housing Structure was Built	California (% of Total)	Cudahy, Total Number, (% of Total)
Built 2010 or later	0.2%	9, (0.2%)
Built 2000 to 2009	11.6%	387, (6.6%)
Built 1990 to 1999	10.6%	534, (9.2%)
Built 1980 to 1989	15.4%	926, (15.9%)
Built 1970 to 1979	18.4%	876, (15.0%)
Built 1960 to 1969	13.8%	1,223, (21.0%)
Built 1950 to 1959	14.0%	989, (17.0%)
Built 1940 to 1949	6.5%	486, (8.3%)
Built 1939 or earlier	9.6%	397, (6.8%)

Source: U.S. Census Bureau, Selected Housing Characteristics, 2008-2012 American Community Survey 5-Year Estimates, accessed on Nov. 30, 2014.
Total Estimated Housing Units in California: 13,667,226; Total Estimated Housing Units in Cudahy: 5,827

Housing stock is in many direct and indirect ways one of the most important commodities in a city. As mentioned above, if a natural disaster, such as an earthquake or flood damages several houses in the city, this has a significant impact not only on the residents of those structures, but on the City also. An extreme, but real example of this is New Orleans; more than two years after Hurricane Katrina, entire neighborhoods were vacant, the houses still in ruins. Many past residents of these communities started new lives in other cities and states and have not come back. In 2013, there were 120,000 less people in New Orleans than in 2005, substantially diminishing New Orleans' tax base. New Orleans is rebuilding and recovering, but it has taken time.

Table 2-9: Selected Housing Characteristics in Cudahy

	California	Cudahy
Total Housing Units		**5,827**
Occupied housing units		5,616 (96.4%)
Vacant housing units		211 (3.6%)
Owner-occupied	56%	1,024 (18.2%)
Renter-occupied	44%	4,592 (81.8%)
Units in Structure		
1-unit, detached	58.2%	2,751 (47.2%)
1-unit, attached	7%	389 (6.7%)
2 units	2.6%	139 (2.4%)
3 or 4 units	5.5%	290 (5.0%)
5 to 9 units	6.1%	501 (8.6%)
10 to 19 units	5.3%	633 (10.9%)
20 or more units	11.4%	665 (11.4%)
Mobile homes	3.8%	456 (7.8%)
Housing Statistics		
Average household size of owner-occupied units	2.98	4.32
Average household size of renter-occupied units	2.86	4.23
Median value of owner-occupied units	$383,900	$203,300
Median monthly rent	$1,209	$1,112

Table 2-10: Employment and Industry

Principal Employment Activities	California	Cudahy
Management, Business, Science, and Arts occupations	36.7%	8.2%
Service occupations	18.3%	22.0%
Sales and Office occupations	24.7%	21.3%
Natural resources, Construction, and Maintenance occupations	9.3%	16.5%
Production, Transportation, and Material moving occupations	10.9%	32.1%
Major Industries		
Manufacturing	10.1%	18.9%
Retail trade	11.1%	16.7%
Educational services, and Health care and Social assistance	20.9%	12.5%
Transportation, and Warehousing and Utilities	4.7%	10.8%

Cudahy is a "bedroom community." Only about 5.9 percent of workers live and work in Cudahy, whereas nearly 7,600 workers (out of the more than 9,100 workers employed; 2008-2012 American Community Survey 5-Year Estimates by the U.S. Census Bureau) commute out of Cudahy during the daytime to jobs elsewhere. Unemployment in Cudahy is higher than the State average: in July 2013, unemployment in Cudahy was 15.0 percent compared to the State's 9.3 percent. Analysis of 2010 U.S. Census data indicates that Cudahy is the 4th least-educated city in California, with 37.9 percent of its population not having completed the ninth grade. This is reflected to some extent in the occupations and industries that Cudahy workers are most commonly engaged in (see Table 2-10).

Transportation, Commuting Patterns and Essential Services

Southern Californian's love for their private automobiles is well known, with automobiles being the dominant means of transportation in the region. This is true of Cudahy also, with 65.6 percent of the city's residents in the work force commuting alone via car, truck or van. This percentage is lower than the State average of 73 percent, however. 18.9 percent of Cudahy residents in the labor force carpool to work, compared to the 11.5 percent statewide. Public transportation is used by 7.1 percent of the Cudahy labor force, and another 3.6 percent walk to work (compared to 5.1 and 2.8 percent, respectively for California overall). Only 3.1 percent of Cudahy's labor force work from home (the State average is 5.2 percent). The mean travel time to work (commute) for Cudahy residents is 30.9 minutes.

Public transportation in Cudahy is provided by several bus lines operated by the Metropolitan Transit Authority (MTA). MTA Lines 260 and 762 run along Atlantic Avenue. MTA Shuttle Line 611 serves Wilcox Avenue, short sections of Cecelia and Patata streets, a short section of Atlantic Boulevard, and Santa Ana Street. MTA Shuttle Line 612 serves Florence Avenue and Otis Street. Line 111/311 runs east-west along Florence Avenue, starting at the Norwalk Metro Green Line station, and stopping at the Florence Blue Line Metro Station on Florence Avenue.

The City of Cudahy also maintains its own local transit service, the Cudahy Area Rapid Transit (or CART), a free transportation service to the general public financed through local Proposition A funds. CART operates a fixed-route service throughout the city that runs Monday through Saturday, and a dial-a-ride service that provides door-to-door pickup and delivery for doctor appointments in adjacent areas. This dial-a-ride service is available Monday through Friday, and reservations need to be made 24 hours in advance.

The City contracts for police services with the Los Angeles County Sheriff's Department, and fire protection is provided by the Los Angeles County Fire Department. Cudahy is part of the Los Angeles Unified School District.

The General Plan for the City of Cudahy addresses the use and re-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, and the conservation of natural resources such as clean water and open spaces. However, the environment of most cities in southern California is nearly identical with that of their immediate neighbors and the transition from one incorporated municipality to another is often seamless to most people. This means that many of the environmental challenges need to be addressed on a regional scale, rather than on a city-by-city basis, to effect change. Although the area's exposure to natural hazards is similar to that of several neighboring communities, a city's response to that vulnerability can often be addressed independently. For example, liquefaction susceptible sediments underlie large portions of the Los Angeles River floodplain, oblivious to corporate boundaries. However, a city can choose to implement more strict building codes to study and mitigate the hazard posed by liquefaction, or even restrict development in the most highly susceptible areas, thereby reducing its risk to a level below that of adjoining municipalities with a similar susceptibility but less stringent development codes.

Mitigation activities are also 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.

SECTION 3: RISK ASSESSMENT

What is a Risk Assessment?

Risk assessment is the process of estimating or calculating the potential losses (in terms of life, injuries, and property and economic damage) resulting from a hazard event. To conduct this analysis, it is necessary to identify and understand the hazards that can impact the community (hazard identification and hazard profiling), assess the vulnerability of the people, buildings and infrastructure that can be impacted by each hazard identified (vulnerability assessment and asset inventory), and estimate the potential losses (risk analysis). Each of these tasks or steps in the process, as it pertains to the city of Cudahy, is described further below:

Hazard Identification

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 Cudahy and its residents and visitors can be impacted by: a) earthquakes (and secondary hazards triggered by earthquakes, including dam and water reservoir failures), 2) storm flooding, 3) strong winds (such as Santa Ana winds and tornadoes), and 4) severe weather (primarily high and excessive heat, and drought).

Man-made hazards that could impact the area include urban fires, terrorist attacks using weapons of mass destruction, accidental releases of hazardous chemical and biological materials, aviation accidents, and civil unrest events. At this time, and for this document, the City has chosen to address only natural hazards, and specifically the hazards of earthquakes, floods, and severe weather. These are the hazards with the potential to cause the most damage, in terms of losses, in Cudahy. Each of these hazards is described in detail in the following sections. The geographic impact of each of the identified hazards in Cudahy is identified where possible, although several of the hazards have a regional extent that exceeds the boundaries of the city. Maps that show the estimated geographic reach of these hazards are an important element of this document. These maps are included within the section that describes the hazard being considered (Section 6: Seismic Hazards; Section 7: Flood Hazards; and Section 8: Severe Weather Hazards), and all together in Appendix H (see list of maps in Table 3-1 below).

Profiling Hazard Events

This process describes the causes and characteristics of each hazard, how it has affected the city of Cudahy in the past, and what parts of Cudahy's population, infrastructure, and environment have historically been vulnerable to each specific hazard. A profile of each hazard discussed in this Plan is provided in Sections 6 through 8. Therefore, for a description of the history of hazard-specific events, please see the appropriate hazard section.

Table 3-1: List of Maps that are Part of This Plan (Plates are in Appendix H)

Map / Plate	Map Title	Section of the Plan
2-1 / H-1	Physiographic Map of Cudahy and Surrounding Areas	Section 2
2-2 / H-2	Major Roads in Cudahy, California and Surrounding Areas	Section 2
2-3 / H-3	Geologic Map, Cudahy, California	Section 2
3-1 / H-4	Critical Facilities In and Near Cudahy, California	Section 3
6-1 / H-5	Local Active and Potentially Active Faults	Section 6
6-2	Ground Shaking Zones in California	Section 6
6-3 / H-6	Faults and Historical (1800-2014) Seismicity Map, Cudahy, California	Section 6
6-4 / H-7	Notable Regional Earthquakes	Section 6
6-5	Scenario for a M7.1 Earthquake on the Puente Hills Fault Showing Estimated Intensity Values in the Region Resulting from this Event	Section 6
6-6	Scenario for a M6.9 Earthquake on the Onshore Newport-Inglewood Fault Showing Estimated Intensity Values in the Region Resulting from this Event	Section 6
6-7	Scenario for a M6.8 Earthquake Near the North End of the Whittier Fault Showing Estimated Intensity Values in the Region Resulting from this Event	Section 6
6-8	Scenario for a M6.6 Earthquake on the Santa Monica Fault Showing Estimated Intensity Values in the Region Resulting from this Event	Section 6
6-9	Intensity Map for a Magnitude 7.8 Earthquake Scenario on the San Andreas Fault (Repeat of the 1857 Fort Tejon Earthquake)	Section 6
6-10 / H-8	Seismic Hazards Map, Cudahy, California	Section 6
6-11 / H-9	Census Tracts used in the HazUS Analyses	Section 6
7-1 / H-10	FEMA Flood Zones In and Near Cudahy	Section 7
7-2 / H-11	Dams Upstream from Cudahy and Dam Inundation Areas Through Cudahy	Section 7
7-3 / H-12	Dam Inundation Area Near Cudahy as a Result of Hansen Dam Failing	Section 7
7-4 / H-13	Dam Inundation Area Near Cudahy as a Result of Sepulveda Dam Failing	Section 7

Note: These maps were derived from publicly available sources. Care was taken in the creation of these maps, but the maps are provided "as is." The City of Cudahy cannot accept any responsibility for errors, omissions or positional accuracy, and therefore, there are no warranties that accompany these maps. Although information from land surveys may have been used in the creation of these maps, this does not mean that the maps represent or constitute a land survey. Users are cautioned to field verify the information on these products before making any decisions.

Vulnerability Assessment/Inventorying Assets

This is a combination of hazard identification with an inventory of the existing property development(s) and population(s) exposed to a hazard. The city of Cudahy is built out, so new development, if and when it occurs, will be in the form of infill or replacement of existing structures. Re-development will provide an opportunity to build more seismically resistant structures, potentially with green components that make better use of existing resources, and that incorporate some of the new technologies aimed at reducing the heat island effects discussed in Section 8.

During the vulnerability assessment it is especially important to assess the expected performance of critical facilities. Critical facilities provide essential products and services to the general public that are necessary to preserve the welfare and quality of life, and fulfill important public safety, emergency response, and/or disaster recovery functions (additional information on critical facilities is provided in a subsection below). The critical facilities in and near Cudahy have been identified and are illustrated in Map 3-1 and Plate H-4 (Appendix H).

As shown on Map 3-1, given the small area of Cudahy, several facilities that provide critical services to the city and its residents are not located in Cudahy. As a result, the performance of those facilities outside City limits during an earthquake or flood event has not been fully assessed, as the HazUS risk analyses (Sections 6 and 7) were limited to the census tracts that best represent the city's boundaries. It is important to realize that in the urban setting that defines Cudahy and the surrounding Los Angeles metropolitan area, a large-scale disaster, such as an earthquake or flood, will not be confined to corporate boundaries. Differences in the magnitude of the disaster, however, will be defined in great part by how each city in the impact area has prepared for, responds to, and recovers from the event. Thus, having a detailed plan in place that addresses the specific vulnerabilities of the city, and provides mitigation measures that are implemented to reduce the hazard to critical facilities and other public and private properties can make the community significantly more disaster-resistant. That is the main goal of this Plan.

Risk Analysis

The purpose of this task is to estimate the potential losses in a geographic area over a given period of time by assessing the damage, injuries, and financial costs likely to be sustained. 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 by which to measure the potential effects of a given hazard on the assets in the area.

Assessing Vulnerability/ Analyzing Development Trends

This task 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 comprehensive description of the character of Cudahy in the Community Profile section (see Section 2).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 Cudahy can help to identify 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 the community being analyzed, in addition to participating organizations and agencies. Each hazard-specific section of the Plan includes a section on hazard identification using data and information obtained from City, County or State agency sources.

A loss estimate for the city of Cudahy was conducted for the hazard of earthquakes (see Section 6). Three earthquake scenarios were considered. These estimates were done using HazUS, a standardized methodology for earthquake loss estimation based on a geographic information system (GIS). HazUS was created as a project of the National Institute of Building Sciences, funded by the Federal Emergency Management Agency (FEMA), and it is based on guidelines and procedures developed to make standardized loss estimates at a regional scale (allowing estimates to be compared from region to region). HazUS is designed for use by State, regional and local governments in planning for loss mitigation, emergency preparedness, response and recovery. HazUS addresses nearly all aspects of the built environment, and many different types of losses. The earthquake component has been tested against the experience of several past earthquakes, and against the judgment of experts.

The HazUS program also has components to estimate losses as a result of hurricanes and floods. HazUS was used to estimate the assets that would be impacted by a 500-year flood event in the City (see Section 7). A quantitative vulnerability assessment for severe weather events was not conducted, but qualitative assessments based on the losses reported in past (historical) similar events are provided where data were available (Section 8).

There are numerous strategies that Cudahy can take to reduce risk. These strategies are described in the action items presented in Section 4, classified by hazard type and priority. Action items that address two or more hazards simultaneously are also presented in Section 4. Mitigation strategies can help reduce disruption to critical services, reduce the risk to human life, and alleviate damage to personal and public property and infrastructure.

Critical Facilities and Infrastructure

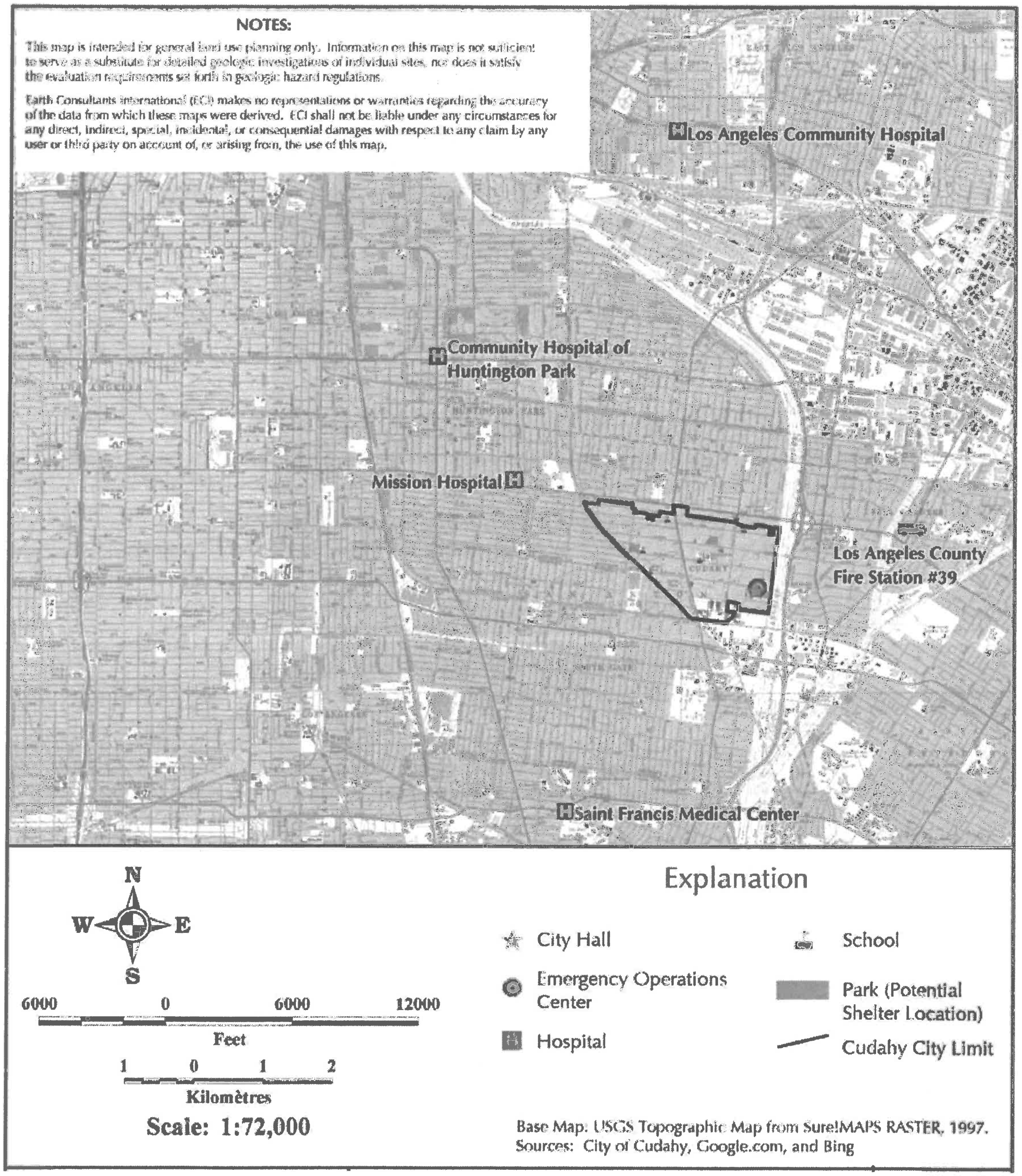
Critical facilities are those parts of a community's infrastructure that must remain operational after a disaster. Critical facilities include hospitals, fire and police stations, emergency operation centers, communication centers, and schools, especially if used as shelters. A vulnerability assessment for these facilities involves comparing the locations of these facilities to the hazardous areas identified in the city. Other important facilities often considered in risk assessments include:

- **High-risk facilities**, if severely damaged, may result in a disaster far beyond the facilities themselves. Examples include power plants, dams and flood control structures, freeway interchanges, bridges, and industrial plants that use or store explosives, toxic materials or petroleum products.

- **High-occupancy facilities** have the potential of resulting in a large number of casualties or crowd-control problems. This category includes high-rise buildings, large assembly facilities, and large multifamily residential complexes.

- **Dependent-care facilities**, such as preschools and schools, rehabilitation centers, prisons, group care homes, and nursing homes, house populations with special evacuation considerations.

Map 3-1: Critical Facilities In and Near Cudahy that Provide Services to Cudahy Residents



- **Economic facilities** are those facilities that should remain operational to avoid severe economic impacts. These facilities include banks, archiving and vital record-keeping facilities, airports, and large industrial or commercial centers.

- 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.

- **Lifelines** are those services that are critical to the health, safety and functioning of the community. They are particularly essential for emergency response and recovery after a disaster. Furthermore, certain critical facilities designed to remain functional during and immediately after a disaster, such as an earthquake, may be able to provide only limited services if the lifelines they depend on are disrupted. Lifeline systems include water, sewage, electrical power, communication, transportation (highways, bridges, railroads, and airports), natural gas, and liquid fuel systems.

Some of the critical facilities in and near the city of Cudahy are shown on Map 3-1.

Federal Requirements for Risk Assessment

Federal regulations for hazard mitigation plans outlined in 44 CFR Part 201 include a requirement for risk assessment. This 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 three natural hazards profiled in this Mitigation Plan, including earthquakes, floods, and severe weather. The Federal criteria for risk assessment and information on how Cudahy's Natural Hazard Mitigation Plan meets those criteria are outlined in Table 3-2 below.

Table 3-2 - Federal Criteria for Risk Assessment

Section 322 Plan Requirement	How is this addressed?
Identifying Hazards	Each hazard section (Sections 6 through 8) provides a description of the natural condition or phenomenon and its potential impact on the city of Cudahy. To the extent GIS data are available for these hazards, maps that identify the areas most likely to be impacted by each hazard have been developed for the City of Cudahy. These Hazard Maps are listed in Table 3-1 and are included in Appendix H.
Profiling Hazard Events	Each hazard section (Sections 6 through 8) includes documentation on the history of past hazard events, and the causes and characteristics of the hazard in the city.
Assessing Vulnerability: Identifying Assets	Where data are available, the vulnerability assessment for each hazard addressed in the mitigation plan includes an inventory of critical facilities within hazardous areas. Each hazard section provides information on vulnerable areas in the city (Sections 6, 7 and 8). Mitigation actions for each of these hazards are provided in Section 4..
Assessing Vulnerability: Estimating Potential Losses	The Risk Assessment Section of this Plan (Section 3) identifies key critical facilities and lifelines 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 were available (Sections 6, 7 and 8).
Assessing Vulnerability: Analyzing Development Trends	The Community Profile Section of this Plan (Section 2) provides a description of development trends in the city, including its geography and environment, population and demographics, land use and development, housing and community development, employment and industry, and transportation and commuting patterns.

Summary of Risk Assessment for the City of Cudahy

Disaster (or Hazard) Mitigation Plans such as this one are to evaluate the hazards that are most likely to impact the community for which the Plan is being prepared. There are many types of natural hazards, but not all apply to a given area. A qualitative assessment of Cudahy's vulnerability to a variety of natural hazards was conducted as part of the discussions with the Advisory Committee, and based on the findings of the literature search for past natural disaster events that have impacted this part of the Los Angeles basin. The results of this assessment are presented in Table 3-3 below.

The analyses conducted for this study indicate that Cudahy is most likely to be impacted by strong ground shaking due to earthquakes, high winds, extreme temperatures (high to excessive heat), and drought (Table 3-3). An earthquake on a fault nearby, or directly under the City, would be the worst-case scenario for Cudahy, with extensive structural, economic, and social implications. Although such an event is expected to occur infrequently, perhaps only once every few generations, the potential damage to the City and the surrounding area can be so severe as to defer growth of the region for years.

The HazUS analyses conducted for Cudahy indicate that an earthquake on the Puente Hills thrust fault has the potential to cause significant damage in the city. An earthquake on the Newport-Inglewood fault could cause slight to moderate damage, whereas an earthquake on the San Andreas fault, given its distance from Cudahy, would generate only slight damage. Out of the approximately 3,775 buildings in the region, between about 74 and 1,163 buildings could be at least moderately damaged as a result of the three earthquake scenarios considered. These numbers account for between 2% and 32%, respectively of the total number of buildings in the area. An earthquake on the Puente Hills thrust fault has the potential to impact several of Cudahy's critical facilities.. The potable water system is expected to perform well, but nearly 2,000 households are expected to be without electric power for at least three days, and hundreds of people may be without power for a month after the earthquake. Specifics regarding these earthquake loss estimates are provided in Section 6 of this report.

Other earthquake sources in the region that have the potential to cause damage similar to what the Puente Hills thrust is estimated to generate include the Compton-Los Alamitos, and the Lower and Upper Elysian Park thrust faults. Both the Compton-Los Alamitos and Lower Elysian Park thrust faults have not been studied much, and thus, their seismic risk to the region is still somewhat uncertain. However, given the location of these faults relative to Cudahy, if active, they do have the potential to cause strong to very strong ground shaking. Other faults farther away but still capable of generating significant damage to Cudahy similar to that expected as a result of an earthquake on the Newport-Inglewood fault include the Whittier, Raymond, Hollywood and Verdugo faults.

Table 3-3: Natural Hazards With the Potential to Impact the City of Cudahy

Hazard	Geographic Extent			Historical Occurrence in Cudahy	Probability of Occurrence			Potential Risk			Score*	Rank
	Widespread	Moderate	Small		High	Med.	Low	High	Med.	Low		
Earthquake												
Strong ground shaking	X			Yes (most recently in 1987)		X		X			8	**1**
Surface fault rupture or Surface Deformation		X		No		X			X		6	3
Liquefaction		X		Unknown		X			X		6	3
Flooding												
Riverine flooding due to storm	X			Yes		X			X		7	**2**
Coastal flooding	Not Applicable			No	Not Applicable			Not Applicable			0	
Dam inundation	X			No			X		X		6	3
Tsunami	Not Applicable			No	Not Applicable			Not Applicable			0	
Sea-level rise	Not Applicable			No	Not Applicable			Not Applicable			0	
Wildfires	Not Applicable			No	Not Applicable			Not Applicable			0	
Landslides	Not Applicable			No	Not Applicable			Not Applicable			0	
Erosion			X	Yes			X			X	3	6
Windstorms												
Santa Ana winds	X			Yes	X				X		8	**1**
Thunderstorms		X		Yes (2000)	X			X			8	**1**
Tornadoes			X	Yes (1983)		X			X		5	4
Hurricanes		X					X			X	4	5
Other Severe Weather												
High – excessive heat	X			Yes	X				X		8	**1**
Extreme cold	X			No?			X			X	5	4
Drought	X			Yes	X				X		8	**1**
Volcanic Eruptions	(as a result of a distant source)		X	No			X			X	3	6

Score: Based on the number of points earned by summing the geographic extent, probability of occurrence and potential risk as follows: Widespread or high = 3 points; moderate or medium = 2 points; and small or low = 1 point. Maximum number of points = 9.
Rank: 1 = highest (has a wide geographic extent, a high probability of occurrence, and poses a high risk to the community; 7 = lowest.

Damage as a result of a 500-year flood event along the Los Angeles River is not expected to impact the entire region, but it will impact the eastern half of Cudahy, where several of the City's critical facilities are located. Even if the facilities themselves are not impacted, the roads providing ingress and/or egress from these facilities could be flooded, hindering evacuation efforts and emergency response. Flooded streets can also result in significant traffic delays, causing short-lived but substantial economic losses to the community, in addition to posing a hazard or nuisance to residents and motorists (depending on the water level reached). As with earthquakes, flooding in this scale is not expected to occur more than once in several decades (and thus skip generations). Damage to structures and contents could also amount to millions of dollars; however, the economic costs associated with such an event are expected to be less than as a result of an earthquake on a nearby fault.

An overlay comparison of the dam inundation pathways map (Figure 7-2, Plate H-11) with the critical facilities map (Map 3-1, Plate H-4) shows that not only the entire city is located within a dam inundation area, but most critical facilities that provide services to Cudahy are also located within this dam inundation area. However, the probability of catastrophic dam failure, although not zero, is very small, as it requires several conditions to occur simultaneously, including an earthquake or storm so severe as to compromise the structural integrity of the dam, a reservoir behind the dam full or nearly full of water, and the sudden, complete release of enough water to overflow the banks of the river or channel.

High winds, unlike earthquakes and flooding, occur often. Although high winds are regional in extent, damage as a result of high winds tends to be localized. The costs associated with wind damage are, on a per event basis, fairly small, but given their frequency of occurrence, over the long-term, costs associated with wind damage can add up. Similarly, the severe weather hazards of extreme temperatures and drought are regional in extent, but the damages tend to be localized. The costs associated with extreme temperature and drought events are hard to quantify. Given the regional impact of these events, communities may feel powerless to mitigate them. However, there are a variety of strategies that communities can implement to reduce or eliminate the impact that high or excessive heat and drought events may pose on their residents. Some of these potential mitigation actions are discussed in Section 8; those that Cudahy has chosen to implement are listed in Section 4.

Natural hazard mitigation strategies can reduce the impacts concentrated at critical facilities and public infrastructure, in addition to large employment and industrial centers that provide the economic core of the region. 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.

Table 3-4: Critical Facilities at Potential Risk from the Natural Hazards Discussed in this Plan

Hazard	Earthquake			Flooding		Severe Weather		
Facility	**Strong Ground Shaking**	**Surface Rupture and/or Ground Deformation**	**Liquefaction**	**Storm-Induced Stream and Street Flooding**	**Dam Inundation**	**High Winds (Various causes)**	**Temperature Extremes**	**Drought**
City Hall and Emergency Operations Center	✓		✓	✓	✓	✓	✓	✓
Teresa Hughes Elementary School	✓		✓		✓	✓	✓	✓
Jaime Escalante Elementary School	✓	Possible	✓		✓	✓	✓	✓
Park Avenue Elementary School	✓		✓	✓	✓	✓	✓	✓
Elizabeth Learning Center	✓		✓		✓	✓	✓	✓
Ellen Ochoa Learning Center	✓	Possible	✓	✓	✓	✓	✓	✓
Blair School	✓		✓		✓	✓	✓	✓
Bell High School	✓		✓		✓	✓	✓	✓
South Region #3 Elementary School	✓	Possible	✓	✓	✓	✓	✓	✓
Huntington Park Community Hospital	✓		✓		✓	✓	✓	✓
Los Angeles Community Hospital	✓		✓		✓	✓	✓	✓
Mission Hospital of Huntington Park	✓		✓		✓	✓	✓	✓
St. Francis Medical Center	✓		✓		✓	✓	✓	✓
Los Angeles County Fire Station #39	✓		✓	✓	✓	✓	✓	✓
Cudahy Park	✓		✓	✓	✓	✓	✓	✓
Clara Street Park	✓		✓		✓	✓	✓	✓
Lugo Park	✓		✓		✓	✓	✓	✓
Cudahy River Park	✓		✓	✓	✓	✓	✓	✓

Notes:
Parks are included here as they can function as potential shelter locations.

Some of the critical facilities are not located directly in an area susceptible to a given hazard, but are located nearby, and access to/from the facility could be hindered. For example, ground deformation, liquefaction, and flooding all have the potential to limit access to the hospitals that serve Cudahy. If the bridges across the Los Angeles River are damaged by ground shaking, ground deformation, or flood scour, emergency response personnel from Fire Station #39 may not be able to cross the river and provide assistance to Cudahy residents.

All facilities are susceptible to the effects of severe weather and dam inundation. The damages resulting from severe weather are expected to be significantly less than those resulting from an earthquake or flood event. The potential for dam inundation is not zero, but it is considered to be low.

SECTION 4: GOALS and MITIGATION ACTIONS

The ultimate goal of Local Hazard Mitigation Plans is hazard mitigation. For the purposes of this study, this means a risk-based approach to reduce or eliminate, if possible, the long-term risk to life, property and infrastructure from natural hazards. Thus, a successful hazard mitigation strategy provides a mechanism by which, during the process of preparing for, responding to, and recovering from natural hazards, the community reduces its vulnerability to future hazard events. Historically, communities impacted by a natural hazard will repair the damage and reconstruct to similar pre-disaster conditions. Such efforts may expedite the return to normalcy, but in the process engender a cycle of damage, reconstruction, and repeated damage. Hazard mitigation involves the implementation of actions that enable the community to not only respond effectively to a disaster, but to recover in such a way that the post-disaster repairs and reconstruction truly strengthen it. This Local Hazards Mitigation Plan Update outlines opportunities that the City of Cudahy can use to increase the community's resiliency to future natural hazard events.

This section also provides information on the process used to develop goals and action items aimed at reducing the impact of several natural hazards on the City of Cudahy. The action items were developed after an in-depth review of the City's vulnerabilities and capabilities as described in Sections 2, and 6 through 8. The mitigation actions are classified by the hazard that they address, with action items that address two or more hazards concurrently referred to as multi-hazard action items.

Hazard Mitigation Overview

Many Federal and State programs have been implemented over the years to reduce losses created by natural hazards. Several of these programs are described in detail in the appropriate sections of the Plan – the reader is referred to Sections 6 through 8 for additional information. The most significant of these programs are summarized below.

National Flood Insurance Program

The National Flood Insurance Program (NFIP) was created by the U.S. Congress in 1968. Although a community's participation in the NFIP is voluntary, in order to receive assistance and funding from FEMA following a flood, the community must participate in the program. The City of Cudahy has participated in the NFIP since 1983 (City ID No. 060657). Development in the flood prone areas of the City is regulated in accordance with Title 16 – Floodplain Regulations of the City's Municipal Code.

The Community Rating System (CRS) is a voluntary part of the National Flood Insurance Program (NFIP) that seeks to coordinate all flood-related activities, reduce flood losses, facilitate accurate insurance rating, and promote public awareness of flood insurance by creating incentives for a community to pursue beyond the minimum requirements of the NFIP. CRS ratings are on a ten-point scale, from 1 to 10, with 1 being the best rating. Residents who live within FEMA's Special Flood Hazard Areas (SFHA) receive a 5% reduction in flood insurance rates for every one-point improvement in the Community's CRS rating. As of October 1, 2014, the City of Cudahy is not included in the list of CRS-eligible communities, which means that if there were any residential structures within the SFHA, the property owners would not be eligible to receive a discount on their flood insurance rates.

Records of repetitive loss properties in the City of Cudahy were not available.

Senate Bill 1241

At the State level, and to address the increasing losses associated with wildfires at the wildland-urban interface, Senate Bill 1241 (2012 Kehoe Statutes) requires that cities revising their Housing Element of the General Plan on or after January 1, 2014 also review and update their Safety Element to address the risk of fire in State Responsibility Areas and in very high fire hazard severity zones. Given Cudahy's location in the midst of an extensively developed area of the Los Angeles Basin, the City is not located in either a State Responsibility Area or in a very high fire hazard severity zone. Thus, the provisions of Senate Bill 1241 do not apply to Cudahy.

Assembly Bill 2140

AB 2140 provides a financial incentive for local agencies to adopt a Local Hazard Mitigation Plan as a component of the Safety Element of their General Plan. The City of Cudahy adopted its latest Safety Element of the General Plan in 2010. The City will link this Hazard Mitigation Plan by reference to their 2010 Safety Element, especially since several of the policies in the Safety Element are included as action items in this document.

Plan Components

Mission

The mission of the City of Cudahy's 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 is being achieved by increasing public awareness, documenting the resources available for risk reduction and loss prevention, and identifying and implementing activities that will help the City of Cudahy become a safer, more disaster-resilient and sustainable community.

Goals

The goals are stepping-stones between the broad direction of the mission statement and the action items. The Plan Goals help guide the direction of future activities aimed at reducing risk and preventing loss from natural hazards. Essentially, the goals provide a framework by which to promote sound public policy designed to protect from natural hazards the City's residents and visitors, the City's critical facilities and infrastructure, private property and the environment. The goals listed here serve as checklist items that City staff, Council members and the public can refer back as City departments and other organizations begin implementing the action items. These goals have been prioritized by the City, with the most important goal (protect life and property) listed first. Other goals include emergency services, public awareness, public participation, partnerships and implementation, and natural systems. Elements of each of these goals are described further below.

Protect Life and Property

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

- Reduce losses and repetitive damages from chronic (frequently recurring) hazard events while promoting insurance coverage for catastrophic hazards.

- Improve hazard assessment information from which to make recommendations to discourage new development and encourage preventive measures for existing development in areas particularly vulnerable to natural hazards.

Emergency Services

- Establish policy to ensure that mitigation projects to strengthen critical and essential facilities, services, and infrastructure, where needed, are considered and prioritized.

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

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

Public Awareness

- Develop and implement educational and outreach programs that increase public awareness of the risks associated with natural hazards.

- Keep the public informed of natural hazards mitigation initiatives and activities through community meetings, local newspapers, the City's website, newsletters, utility bill inserts, and other similar media.

- Provide information on tools, partnership opportunities, and funding resources that can help in the implementation of mitigation activities.

Public Participation

- Obtain input from City staff and the public when updating the Disaster Mitigation Plan and other similar efforts, including during the process of developing and prioritizing the Plan goals and action items and the assignment of responsibilities, taking into consideration the expected efficacy of the proposed action items and the proposed timelines.

Partnerships and Implementation

- Strengthen communication and coordinate participation among and within City departments, other agencies, citizens, non-profit organizations, businesses, and industry so that there is a mutual, vested interest in the implementation of the action items.

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

Natural Systems

- Balance the need to protect and manage the natural resources and areas in the City (such as the channel of the Los Angeles River) with the need for hazard mitigation to protect lives and property in the developed areas, to reduce any conflict that may arise between these two objectives.

- Whenever possible, preserve, rehabilitate, and enhance the natural systems in ways that also provide natural hazard mitigation functions.

Components of the Plan's Actions

The Actions are activities that City departments, other organizations, businesses and residents can implement to reduce risk. Each action item includes an estimate of the length of time it will take to implement. All Action Items identified by Cudahy's Advisory Committee are short-term, meaning that City Staff hope to implement them within the next two years. Although optimistic, this aggressive schedule illustrates the City's strong desire to reduce their hazard vulnerabilities as soon as possible. There are several mitigation activities that the City conducts on an on-going basis, as part of its development and permit processing, or upgrading of existing facilities. These activities are also listed in this document, as they are an important component in the City's efforts to reduce its vulnerability to natural disasters.

As discussed above, this section identifies the action items that the Advisory Committee has identified as priorities. The action items are listed together to make this document as user-friendly as possible. This provides the reader with a concise document that clearly establishes the path the City has chosen to reduce its vulnerability to natural hazards over the next five-year period. It also allows the City departments and organizations identified as responsible for the implementation of the action items to see and manage their charges more effectively.

Mitigation Plan activities may be considered for funding through Federal and State grant programs, and when other funds are made available through the City. To help ensure activity implementation, each action item includes information on its timeline and coordinating organization(s). Upon implementation, the coordinating organization(s) may look to partner with other organizations for resources and technical assistance. A description of possible partner organizations is provided in Appendix A, the Resource Directory of this Plan.

Many of the action items included here mirror or complement the policies in the City's 2010 Safety Element of the General Plan and the City's municipal code, but wherever possible, have been written to be more specific in that they identify the coordinating organization, timeline for implementation, goal(s) being addressed, and potential constraints, in accordance with FEMA's requirements. In the Safety Element, the policies are not prioritized, and are typically not assigned to a specific department. Other action items herein were developed as a result of the data collection and research process, whereby specific concerns were identified, or as a result of input from City departments during meetings of the Advisory Committee, or input from the public during the public participation process.

Significantly, even though this document addresses natural hazards, the City of Cudahy is undertaking the implementation of several policies (action items) identified in their 2010 General Plan that address both natural and man-made hazards at the same time (and are thus classified as multi-hazard action items). The City is also implementing or plans to implement in the near future (within the next five years, if not sooner) several action items to reduce the potential impacts from man-made hazards such as urban fires and hazardous materials. Because both urban fires and the release of hazardous materials could occur as a result of strong ground shaking, implementation of these activities is compatible with the goals of this Plan. As a result, action items that the City has identified to address man-made hazards are also included here.

Coordinating Organization

The coordinating organization is the department or agency that is willing and able to organize resources, find appropriate funding, or oversee activity implementation, monitoring, and evaluation. Coordinating organizations may include local, City, or regional agencies or departments, and private entities that are capable of or responsible for implementing activities and programs.

Timeline

Action items typically include both short- and long-term activities. The City of Cudahy has identified mostly short-term actions. Each action item includes an estimate of the timeline for implementation as provided by members of the Plan's Advisory Committee.

Plan Goals Addressed

The Plan goals addressed by each action item are included as a way to monitor and evaluate how well the Hazards Mitigation Plan is achieving its goals once implementation begins.

Constraints

Constraints to the immediate implementation of the action items are typical, usually because of limited resources, as described further below. Constraints may include a lack of City staff to do the work, lack of funds, vested property rights that might expose the City to legal action as a result of adverse impacts on private property, or as a result of other similar economic, political, social or legal reasons.

Project Evaluation Worksheets

Every jurisdiction has limitations on the number of mitigation activities that can be completed within a given period of time, usually because of limited economic resources. This forces jurisdictions and agencies to review and select the most cost-effective mitigation projects first, in essence prioritizing mitigation projects by their return on investment. Given the competition for available funding, multi-hazard action items are generally attractive and more likely to be implemented first. The challenge is to maintain a balance between mitigating projects that can be implemented readily and for a relatively small amount of money, with longer-term projects that cost more but have the potential to more significantly reduce the City's vulnerability to natural hazards.

Through discussion and self-analysis, the Advisory Committee used the STAPLEE (Social, Technical, Administrative, Political, Legal, Economic, and Environmental) criteria (see Tables 4-1 and 4-2), during the process of prioritizing the mitigation actions presented here. Each member of the committee, representing different coordinating organizations within the City, ranked the action items identified under their purview individually. By following this process, the committee members considered the social, technical, administrative, political, legal, economic and environmental implications and considerations associated with each proposed action. The rankings provided were then averaged to identify those action items that the group as a whole considers most beneficial or more feasible, and thus of highest priority.

Table 4-1: The STAPLEE Process

SOCIAL	Community Acceptance	Effect on Segment of Population			
TECHNICAL	Technical Feasibility	Long-term Solution	Secondary Impacts		
ADMINISTRATIVE	Staffing	Funding Allocated	Maintenance/Operations		
POLITICAL	Political Support	Local Champion	Public Support		
LEGAL	State Authority	Existing Local Authority	Potential Legal Challenge		
ECONOMIC	Benefit of Action	Cost of Action	Contributes to Economic Goals	Outside Funding Required	
ENVIRONMENTAL	Effects on Land/Water	Effect on Endangered Species	Effect on HAZMAT / Waste Sites	Consistent with Community Environmental Goals	Consistent with Federal Laws

FEMA also requires local governments to analyze the benefits and costs of a range of mitigation actions that can reduce the effects of each hazard within their community. Benefit-cost analysis is used in hazard mitigation to evaluate whether the benefits to life and property protected through mitigation efforts exceed the cost of the mitigation activity. Conducting a benefit-cost analysis (BCA) for a mitigation activity can assist communities in determining whether a project is worth undertaking now, in order to avoid disaster-related losses later. The analysis is based on calculating the frequency and severity of a hazard, avoided future damage, and risk.

A hazard mitigation plan must demonstrate that a process was employed that emphasized a review of benefits and costs when prioritizing the mitigation actions. The BCA review must be comprehensive to the extent that it can evaluate the monetary and non-monetary benefits and costs associated with each action. The BCA should at least consider the following questions:

1. How many people will benefit from the action?
2. How large is the area that would be impacted?
3. How critical are the facilities that benefit from the action?
4. Are there any environmental constraints associated with the action, and if so, is the overall benefit to the community greater than the environmental costs?

The Advisory Committee considered these questions in their development and prioritization of the mitigation actions. Those actions that were considered to not provide an appropriate benefit/cost ratio were either given a lower ranking, or were excluded from the final list presented in Table 4-3. As the City begins to implement the action items selected, they can further evaluate the benefit-cost analysis of a specific action using the FEMA-provided Project Evaluation Worksheet included at the end of this section (Table 4-5). This worksheet is based on the "STAPLEE" process, whereby the Social, Technical, Administrative, Political, Legal, Economic, and Environmental benefits of a given proposed action are weighed against the costs of implementing it (see Tables 4-1 and 4-2). The data on these worksheets can help the Hazards Mitigation Advisory Committee determine the most cost-effective mitigation solutions for the community. Some projects may need a more detailed BCA, but this worksheet provides a first-screening methodology.

Table 4-2: STAPLEE Review and Selection Criteria

CRITERIA	SPECIFIC IMPACT	DESCRIPTION of GRADING SCALE for EACH IMPACT
Social	Acceptance	Is the action perceived as socially acceptable to a wide segment of the population? Values range from 0 to 3, with 0 = public indifferent to action; 1 = somewhat popular; 2 = popular; 3 = very popular.
	Effect on Segment of Population	Is the action item likely to impact (positively or negatively) a particular segment of the population? Values range from -3 to 3 with -3 = will negatively impact a segment of the population; 0 = will have no effect; 3 = will have a very positive effect on a segment of the population.
Technical	Feasibility	Is the action feasible given our current knowledge or science? 0 = No; 1 = somewhat; 2 = moderately; 3 = absolutely.
	Long-Term Solution	Is implementation of this action going to reduce the hazard permanently? 0 = no; 1= slightly; 2= somewhat; 3 = yes.
Administrative	Staffing	Is there staff currently at the City doing this work? Does it involve 1 person, or more? The resulting number is a weighted sum of individual components, as described below:
		Is there staff currently at the City doing this work? 0 = no; 1 = yes, 1 person; 2 = yes, 2 or more but not enough to do the proposed work; 3 = yes, several, enough to get the work done. -1 = City needs to hire someone to do the work; -2 = City needs to hire 2 people to do the work; -3 = City needs to hire several people to get this done.
	Funding allocated	0 = no funding currently allocated; 1 = some funding allocated, need a lot more $; 2 = funding available, enough to do the basics; 3 = funding available to do the work without cutting corners.
	Maintenance	Does this action require constant maintenance and upgrade? 0 = no, this is a one-time expenditure; -1= some minor maintenance required; -2 = constant maintenance by 1 individual required; -3 = constant maintenance and upgrade required, effort requires 2 or more individuals assigned to task.
Political	Public support	Is the action going to be popular with the public? -3 to 3, with -3 = very unpopular; 0 = no public reaction, indifferent; and 3 = very popular.
	Political support	Is the action going to be popular with the Mayor and City Council? -3 to 3, with -3 = very unpopular; 0 = no reaction, indifferent; and 3 = very popular.
Legal	State authority	Is there a State mandate or a recommendation to have this done? 0 = no; 1= there is minor State interest in doing this; 2= there is a strong support at the State level to do this; 3 = there is a State mandate to do this, generally with a target date for implementation.
	Local authority	Is there a local mandate or recommendation to implement this action? 0 = no; 1 = there is minor local support to get this done; 2 = there is strong local support to get this done; 3 = there is a City mandate to get this done.
	Possible legal action?	Is this action likely to get challenged in court? 0 = no; -1 = a small possibility; -2 = yes, some people might object enough to go to court; -3 = yes, expect several neighbors to challenge this in court.

CRITERIA	SPECIFIC IMPACT	DESCRIPTION of GRADING SCALE for EACH IMPACT
Economic	Benefit	The economic benefits of implementing this action. 0 = no benefit; 1= small benefit; 2= benefit; 3 = great benefit.
	Cost	The economic costs of implementing this action: 0 = no costs; -1 = small cost; -2 = some cost; -3= very expensive.
	Outside Funding	Is there outside funding available to implement this action? 0 = no; 1 = small amounts of money, not enough to get it done; 2 = funding available; 3 = enough money available to get this done.
Environmental	Impacts on Environment (Land, Water, Endangered Species, etc.)	Does this action have a positive or negative impact on the environment? -3 = severe negative impact on environment; 0 = no impact; 3 = very positive impact on environment.
	Consistent with Community's Environmental Goals	Is the proposed action consistent with the City's environmental goals? -3 = goes against all goals to protect the environment; 0 = has no impact on the local environmental goals; 3 = is very consistent with the City's environmental goals.

Hazard Mitigation Actions

Table 4-3 lists the hazard mitigation actions that the City of Cudahy has chosen to implement in the next five years. Potential funding sources for several of these mitigation actions include:

PDM	Pre-Disaster Mitigation (FEMA funding)
HMGP	Hazard Mitigation Grant Program (FEMA funding)
CDBG	Community Development Block Grant (from the California Department of Housing and Community Development)
FHA	Federal Highway Administration
CalOES	California Office of Emergency Services
FHA	Federal Highway Administration
Caltrans	California Department of Transportation

Multi-hazard action items are those activities that if implemented, can reduce the potential impacts from two or more of the natural hazards identified in the Plan (earthquakes, flooding, severe weather), or that address two or more hazards, including natural or man-made (the natural hazards mentioned above, and urban fire, and hazardous materials). Cudahy favors multi-hazard mitigation actions because of their wide-reaching benefits, especially in light of the limited funds and small number of City personnel available to take on these activities. Action items that tie directly to the policies of the City's Safety Element of the General Plan are identified by the appropriate policy number in parentheses. The action items are listed in order based on the results of the prioritization conducted using a simplified STAPLEE analysis. The spreadsheet supporting the prioritization results is presented in Table 4-4.

Table 4-3: Hazard Mitigation Actions, City of Cudahy

Ongoing and Short-Term Actions	Responsible Agency	Potential Funding Source(s); Constraints	Timeline	Plan Goals Addressed
Multi-Hazards: To prepare for, and respond to a variety of potential natural and man-made hazards, the City of Cudahy conducts or will conduct the following activities:				
MH-1: Provide for the highest quality of fire, police, and health protection possible, within reasonable economic limits, for Cudahy residents (Safety Element Policy 2.2).	Community Development; Building and Safety	General Fund. Limited funding and available personnel.	Ongoing	Emergency services; Partnerships and implementation; Public awareness
MH-2: Maintain the City's emergency response system (Safety Element Policy 2.1).	Community Development; Building and Safety	General Fund. Limited funding and available personnel.	Ongoing	Emergency services; Protect life and property
MH-3: Establish emergency procedures for evacuation and/or relief of identified hazards in the City (Safety Element Policy 1.5).	Public Works; Building and Safety	General Fund. Limited funding and available personnel.	1 Year	Protect life and property; Public awareness; Partnerships and implementation
MH-4: Continue to adopt and enforce the most up-to-date California Building Code and California Fire Code with local amendments, and continue to support the training of City staff in the provisions of the latest codes, to provide for seismic safety and fire safety design.	Building and Safety; Fire Department.	Development review fees. Limited funding and available personnel.	Ongoing	Protect life and property; Public awareness
MH-5: Maintain a list of available emergency shelters in the area. This shall include schools, auditoriums, gymnasiums, hospitals, and other structures which have large open areas to accommodate cots and provide mass care and emergency assistance. Additional structures shall be explored and agreements sought with property owners for the potential use of the facilities in	Emergency Services Coordinator	General Fund. Limited funding and available personnel.	1 Year	Emergency services; Partnerships and implementation

Ongoing and Short-Term Actions	Responsible Agency	Potential Funding Source(s); Constraints	Timeline	Plan Goals Addressed
cases of disaster or emergency.				
MH-6: Continue code enforcement efforts to promote property maintenance, with an emphasis on the identification of nuisances that endanger public health and safety, and provide technical support or other incentives to allow expedient correction of the problem.	Building and Safety	Individual funds with CDBG funds when available to qualifying homeowners and property owners. Limited funding and available personnel.	Ongoing	Protect life and property; Public awareness; Partnership and implementation
MH-7: Work towards the continued rehabilitation or renovation of structures, including existing residential units, which do not meet current seismic safety standards and electrical code requirements. City shall coordinate with homeowners' associations in the enforcement of CC&Rs regarding property maintenance.	Code Enforcement; Building and Safety	Individual funds with CDBG funds when available to qualifying homeowners and property owners. Limited funding and available personnel; upgrades are considered voluntary and thus not enforceable, except in certain circumstances.	Ongoing	Protect life and property; Public awareness
MH-8: Continue to evaluate the environmental impacts of new development and provide mitigation measures prior to development approval, as required by the California Environmental Quality Act (CEQA). Adequate environmental review shall be provided for major projects, and those that have the potential to adversely impact the environment. In compliance with CEQA, assign responsibilities for the verification of the implementation of mitigation measures.	Community Development	Development fees and General fund. Limited funding and available personnel.	Ongoing	Protect life and property; Natural systems; Public awareness
MH-9: Work with the County of Los Angeles on the provision of adequate, safe infrastructure and public services in Cudahy, including setting priorities for	Public Works	General fund, FHA, Caltrans and CalOES funding, depending on project. Limited funding and available personnel.	Ongoing	Partnerships and implementation

Ongoing and Short-Term Actions	Responsible Agency	Potential Funding Source(s); Constraints	Timeline	Plan Goals Addressed
infrastructure and public service projects through the City's capital improvement program. Coordinate with State and regional agencies on addressing planning and environmental issues that affect Cudahy.				
MH-10: Regularly update and implement the City's Multi-Hazard Functional Plan for Emergency Operations. Annual reviews and drills shall be performed to keep City staff informed of their responsibilities.	Emergency Services Coordinator	General fund. Limited funding and available personnel.	Ongoing	Emergency services; Partnerships and implementation
MH-11: Solicit volunteers to assist City operations during a disaster. (Safety Element Policy 2.3)	Community Development; Community Services	General fund. Limited funding and available personnel.	6 Months – 1 Year	Partnerships and implementation; Public Awareness
MH-12: Continue to use the City's newsletter, local newspapers, and other social media to increase the public's awareness of safety, crime prevention, fire prevention, earthquake preparedness, and other practical safety measures. Shall offer earthquake preparedness, first aid and CPR classes as part of the recreational and library programs in the City.	Community Services	General fund. Limited funding and available personnel.	6 Months to 1 Year	Public Awareness
MH-13: Prepare and provide safety information in both English and Spanish in the City's newsletter and other media sources, to ensure that a large segment of the population is exposed to critical information on how to prevent, prepare for, respond to, and recover from a disaster. (Safety Element Policy 2.5)	Community Services	General fund. Limited funding and available personnel.	6 Months – 1 Year	Public Awareness; Protect Life and Property

Ongoing and Short-Term Actions	Responsible Agency	Potential Funding Source(s); Constraints	Timeline	Plan Goals Addressed
MH-14: Encourage, support, and provide incentives for the maintenance, conservation, and revitalization of existing residential units, for the purposes of increasing public safety, promoting energy conservation, and conserving older housing units in good condition to maintain the units as affordable housing options. (Modified from Housing Element Policies 3.6 and 3.8)	Code Enforcement; Community Development; Building and Safety	General Fund and CDBG Funds that the City will continue to apply for, to be used to offer technical assistance and loans under the Tenant Minor Home Repair Program, providing low-interest loans, grants and technical assistance to property owners. Limited funding and available personnel.	Ongoing	Public Awareness; Protect Life and Property
MH-15: Work with the LAUSD, the Fire Department, and local law enforcement officials to offer classes to school-age children and other interested parties on earthquake and emergency preparedness, fire prevention, crime prevention, hazard protection and other safety issues. (Safety Element Policy 2.6).	Community Services; LAUSD; Los Angeles County Fire Department	General fund. Limited funding and available personnel.	6 Months – 1 Year	Partnerships and implementation; Public Awareness
MH-16: Develop health and safety programs as part of the recreational services the City provides to its residents.	Parks and Recreation; Community Development	General fund. Limited funding and available personnel.	Ongoing	Public Awareness
Earthquake and Geologic Hazards: To reduce the City's vulnerability to seismic and geologic hazards, Cudahy currently implements or will implement the following actions:				
EGH-1: In cooperation with the local utility providers, conduct a seismic evaluation of gas lines, water distribution pipelines, sewer lines and critical railways and roadways that extend through Cudahy, and seek funding to strengthen those lifelines found to be at risk.	Public Works, Community Development and local utility providers	General Fund, FMA, Caltrans, CalOES and other funding sources, depending on project. Limited funding and available personnel	2 Years	Partnerships and implementation; Protect life and property

Ongoing and Short-Term Actions	Responsible Agency	Potential Funding Source(s); Constraints	Timeline	Plan Goals Addressed
EGH-2: As part of the development review process, continue to require the preparation of geologic studies prior to the approval of critical facilities, uses which involve the assembly of large numbers of people, large-scale residential developments, and major commercial and industrial projects. The studies shall help define the potential environmental impacts that seismic and geologic hazards may have on the project, as required by the California Environmental Quality Act (CEQA).	Community Development	Development review fees. Limited funding and available personnel, but for the most part self-funded.	Ongoing	Protect life and property; Public awareness; Emergency services
EGH-3: Develop and make available to all residents and businesses literature on hazard prevention and disaster response, including information on how to earthquake-proof residences and places of business, and information on what to do before, during, and after an earthquake. Issue reminders periodically to encourage the review and renewal of earthquake-preparedness kits and other emergency preparedness materials and procedures.	Community Development – Planning Division	General Fund. Limited funding and available personnel.	1 Year	Public awareness; Protect life and property
EGH-4: Conduct seismic evaluations of existing essential / critical facilities such as schools, childcare centers, and retirement homes. Seek funding sources to retrofit facilities at risk.	Community Development, Los Angeles Unified School District, and property owners.	General Fund, School District funding, PDM and HMGP. Limited funding and available personnel.	2 Years	Protect life and property; Public awareness; Emergency services

Ongoing and Short-Term Actions	Responsible Agency	Potential Funding Source(s); Constraints	Timeline	Plan Goals Addressed
EGH-5: Require seismic and geologic studies prior to the design and construction of critical facilities (hospitals, schools, fire stations, etc.) (Safety Element Policy 1.1).	Planning Division	Development fees; General fund. Limited funding and available personnel.	Ongoing	Protect life and property; Emergency services
EGH-6: Continue to require liquefaction assessment studies for qualifying projects proposed in the City, as the entire region is susceptible to liquefaction. In areas where geotechnical testing shows the sediments are susceptible to liquefaction, require the implementation of mitigation measures as a condition of approval.	Community Development: Planning and Building and Safety Divisions	Development review fees. No constraints.	Ongoing	Protect life and property; public awareness
EGH-7: Communicate to owners of potentially hazardous buildings, including pre-1952 reinforced masonry, soft-story, and multi-family residential buildings, the potential hazards associated with these construction types, and encourage them to assess the seismic vulnerability of their structures and conduct seismic retrofitting as necessary to improve the building's resistance to seismic shaking.	Community Development; Code Enforcement.	General Fund; the retrofitting of structures shall be the responsibility of individual property owners with CDGB funds, if available, for qualified homeowners. Code enforcement can be financed through the CDBG funds. Limited funds and available personnel; retrofits are considered voluntary and thus not enforceable, except in certain circumstances.	Ongoing	Public awareness; Protect life and property; Partnerships and implementation
EGH-8: Develop and maintain contingency plans designed to help Cudahy residents and business owners to respond and recover from an earthquake as quickly and effectively as possible. (Safety Element Policy 2.4)	Code Enforcement	General Fund and CDBG. Limited funding and available personnel.	Ongoing	Public awareness; Emergency services
EGH-9: Conduct an inventory of substandard structures, including mobile homes, and utilize the Uniform Building Code abatement process to eliminate these hazards through appropriate actions	Public Works; Building and Safety	CDBG funds when possible, if available to qualifying homeowners and property owners; General fund and CDBG funds for code enforcement. Rehabilitation of substandard structures shall be the	Ongoing	Protect life and property; Public awareness

Ongoing and Short-Term Actions	Responsible Agency	Potential Funding Source(s); Constraints	Timeline	Plan Goals Addressed
specific to each structure, such as rehabilitation, maintenance, or replacement programs (Modified from Safety Element Policy 1.3; Housing Element Policy 3.6).		responsibility of individual property owners. Limited funding and available personnel for inspection and enforcement.		
EGH-10: Evaluate the aboveground water storage tanks in the City to assess their potential inundation hazard in the event of catastrophic failure, and ensure that all tanks are fitted with the appropriate seismic safeguards, including shut-off valves, in accordance with the most recent water tank design guidelines.	Public Works, Building and Safety, and owners/operators of the tanks	General Fund. Limited funding and available personnel.	6 months	Protect life and property; Partnerships and implementation
EGH-11: Regulate the location of new essential or critical facilities in areas that would be directly affected by seismic and geologic hazards (including ground deformation due to folding and liquefaction), to ensure that the facility will not be located in an area susceptible to damage from a seismic or geologic hazard.	Community Development	Development review fees, General Fund, PDM or HMGP funds for existing facilities that are located in high hazard zones. Limited funding and available personnel.	Ongoing	Emergency services; Protect life and property
Flood Hazards: To reduce the impacts of storm flooding in the City, Cudahy will continue to implement the following actions:				
FH-1: Minimize the detrimental effects of the flood control channel and the existing Southern California and Union Pacific Railroad right-of-ways within City boundaries.	Public Works in cooperation with the railway operators, the Los Angeles County Flood Control District, and U.S. Army Corps of Engineers	General Fund, FMA. Limited funding and available personnel.	Ongoing	Protect life and property; Natural systems
FH-2: Continue to participate in management programs of the County of Los Angeles for water conservation, liquid and solid waste management, and flood control. (Conservation Element Policy	Building and Safety, Los Angeles County, Central Basin Municipal Water District	General Fund. Limited funding and available personnel.	Ongoing	Partnerships and implementation; Public awareness

Ongoing and Short-Term Actions	Responsible Agency	Potential Funding Source(s); Constraints	Timeline	Plan Goals Addressed
1.1)				
Severe Weather Hazards: To reduce the impacts that severe weather may pose on the residents of Cudahy, their properties and businesses, and the City's infrastructure, the City will implement the following activities:				
SWH-1: Continue to require the undergrounding of utilities in all new developments.	Building and Safety Division	Development fees.	Ongoing	Protect life and property; Natural systems
SWH-2: Require that new developments, whether residential, commercial, or industrial, include greening options that reduce the heat-island effect, including cool pavements, and green or cool roofs.	Planning Division	Development fees. Limited funding and personnel.	Ongoing	Public awareness;
SWH-3: Develop a greening program to increase the number of trees and vegetation along streets and public areas.	Planning Division	Development fees; General Fund. Limited funding and personnel.	2 Years	Public Awareness; Natural systems
Urban Fire Hazards: To reduce as much as feasible the loss of life and damage to property as a result of structure fires, the City of Cudahy has implemented the following actions:				
UFH-1: Continue to require smoke detectors in private homes upon their transfer of ownership. (Safety Element Policy 2.8)	Code Enforcement	General Fund. Limited funding and available personnel.	Ongoing	Protect life and property; Public awareness
UFH-2: Require that every building in the City be accessible to Fire Department apparatus by way of access roads capable of supporting the imposed loads of the vehicles, and of not less than 20 feet of unobstructed width, clean to the sky, and with adequate turning radius. Fire lanes are needed when an exterior wall of a building is located more than 150 feet from a public vehicle access, in conformance with the roadway standards established by the County of Los Angeles Fire Department to ensure access for	Building and Safety; Los Angeles County Fire Department's Fire Prevention Bureau	Development fees. Limited funding and available personnel.	Ongoing	Protect life and property; Emergency services

Ongoing and Short-Term Actions	Responsible Agency	Potential Funding Source(s); Constraints	Timeline	Plan Goals Addressed
firefighting equipment to all areas of the City.				
UFH-3: Continue to request that the Fire Department and local law enforcement officials comment on proposed large developments during the environmental review process. (Safety Element Policy 1.6)	Community Development: Planning and Building and Safety; Los Angeles County Fire Department; Los Angeles County Sheriff	Development review fees. Limited funding and available personnel.	Ongoing	Protect life and property; Public awareness, Partnerships and implementation
UFH-4: Continue implementation of fire prevention programs to promote fire safety in the City. This includes fire prevention and protection information and tips in local media sources; regular inspections by Fire Department personnel to existing structures, for compliance with fire safety standards and regulations.	Building and Safety; Los Angeles County Fire Department	General fund. Limited funding and available personnel.	Ongoing	Public awareness; Partnerships and implementation
UFH-5: Work with the Los Angeles County Fire Department to correct identified deficiencies in the fire protection and emergency services in the City.	Community Development, Los Angeles County Fire Department	General fund. Limited funding and available personnel.	Ongoing	Emergency services; Partnerships and implementation
UFH-6: Regularly monitor the water quality, distribution and supply facilities to determine if capacity is adequate to meet emergency fire flow needs. (Safety Element Policy 2.7).	Public Works; Community Development	General fund; PDM. Limited funding and available personnel.	Ongoing	Emergency services; Protect life and property; Partnerships and implementation
UFH-7: Will increase awareness among the population of the hazards of fire and ways to prevent fires. (Safety Element Policy 1.4).	Building and Safety; Los Angeles County Fire Department	General Fund. Limited funding and available personnel.	1 Year	Public awareness; Protect life and property

Ongoing and Short-Term Actions	Responsible Agency	Potential Funding Source(s); Constraints	Timeline	Plan Goals Addressed
Hazardous Materials Management: To prevent soil, air, and groundwater contamination in the area, and reduce the impact that toxic substances or hazardous materials may have on the residents of Cudahy, the City will implement or continue to implement the following actions:				
HM-1: Support the enforcement of State and Federal laws on the control of hazardous wastes, landfills and other issues. (Safety Element Policy 1.2).	Public Works; Building and Safety	General Fund. Limited funding and available personnel.	Ongoing	Partnerships and implementation; Protect life and property
HM-2: Provide, to the maximum extent feasible, for separation of sensitive receptors, such as schools and hospitals, from sources of toxic emissions. (Air Quality Element Policy 9.2).	Planning Division	General fund. Limited funding and available personnel.	Ongoing	Protect life and property; Public awareness
HM-3: Provide, to the maximum extent feasible, for the protection of receptors from significant health risk caused by exposure to toxic and hazardous pollutants. (Air Quality Element Policy 10.3).	Planning Division; Code Enforcement	General fund. Limited funding and available personnel.	Ongoing	Protect life and property
HM-4: Develop a public awareness program to encourage residents to practice conservation measures and discourage carelessness in activities that affect the environment. The program shall include articles on various environmental issues such as air, water, hazardous materials, land, energy, etc. Subjects to be covered include water conservation tips, energy conservation alternatives and rebate programs, and the hazards of disposing household hazardous waste with municipal wastes.	Planning Division; Community Services	General Fund. Limited funding and available personnel.	1 Year	Public awareness; Natural systems
HM-5: Develop deterrents to toxic waste dumping in the City, and inform residents	Code Enforcement	General fund. Limited funding and available personnel.	1 Year	Public awareness; Natural systems

Ongoing and Short-Term Actions	Responsible Agency	Potential Funding Source(s); Constraints	Timeline	Plan Goals Addressed
and businesses of fines and penalties associated with such acts. Waste incineration will be regulated or prohibited, depending on the physical, chemical and environmental characteristics of the materials.				
HM-6: Implement the County's Hazardous Waste Management Plan, including the development and maintenance of an inventory of hazardous materials users and generators, and incorporation of the County's Emergency Response programs into the City's Emergency Response Plan. Will continue to work with the County's Fire Department on requiring users and generators of hazardous materials to prepare safety procedures for responding to accidental spills and emergencies.	Community Development; Los Angeles County Fire Department; Community Services	General fund; fees from users and generators of hazardous waste. Limited funding and available personnel.	Ongoing	Partnerships and implementation; Protect life and property; Emergency services
HM-7: Develop and institute programs to assist residents and businesses to dispose of household quantities of hazardous materials. (Safety Element Policy 1.7).	Code Enforcement, Community Services	Cal-OES, Republic Trash Hauler, General Fund. Limited funding and available personnel.	6 Months – 1 Year	Public awareness; Partnerships and implementation
HM-8: Promote the remediation of historic dumpsites and other identified contaminated sites in the City. (Safety Element Policy 1.9)	Public Works	General Fund; Brownfields. Limited funding and available personnel.	Ongoing	Protect life and property; Public awareness; Natural systems

Table 4-4: Hazard Mitigation Action Ranking Worksheet – City of Cudahy

Action Number (refer to Table 4-3)	Priority	Average Score (Out of Maximum Possible of 3.0)
MH-1	Medium to High	3.0
MH-2	Medium to High	3.0
MH-3	Medium to High	2.8
MH-4	High	2.75
MH-5	High	2.75
MH-6	High	2.6
MH-7	High	2.6
MH-8	Medium to High	2.5
MH-9	High	2.4
MH-10	Medium to High	2.4
MH-11	Medium to High	2.2
MH-12	Medium	2.2
MH-13	Medium	2.0
MH-14	Medium	1.8
MH-15	Low to Medium	1.8
MH-16	Medium	1.4
EGH-1	High	2.8
EGH-2	High	2.75
EGH-3	Medium	2.6
EGH-4	Medium	2.6
EGH-5	Medium	2.6
EGH-6	High	2.5
EGH-7	Medium	2.25
EGH-8	High	2.0
EGH-9	Medium	2.0
EGH-10	Medium	2.0
EGH-11	High	1.8
FH-1	High	2.8
FH-2	Moderate	2.8
SWH-1	High	2.4
SWH-2	Moderate	1.6
SWH-3	Moderate	1.6
UFH-1	High	2.8
UFH-2	High	2.8
UFH-3	Medium to High	2.8
UFH-4	High	2.6
UFH-5	High	2.6
UFH-6	High	2.25
UFH-7	Moderate	2.2
HM-1	High	2.5
HM-2	High	2.5
HM-3	High	2.5
HM-4	Medium	2.5
HM-5	High	2.2
HM-6	High	1.8
HM-7	Medium	1.6
HM-8	Low to Medium	1.2

Committee members were asked to rate the proposed mitigation actions as to their priority as High (Score = 3), Medium (Score = 2) to Low (Score =1). In addition, the overall impacts to the community from each individual action were rated using the same scale. The values provided for each action were averaged. Note that while some action items are identified as having a high priority, their average scores, of less than 2.0, show that the committee members found those action items likely to be unpopular, too costly, or difficult to implement, in accordance with the STAPLEE criteria.

Table 4-5: Project Evaluation Worksheet

Jurisdiction:				Contact:			
Project Title				Phone:			
Agency:				E-mail:			
Hazard(s):							
Flood Zone:		Base Flood Elevation:			Erosion Rate:		
Critical Facility/Population At Risk:							
Environmental Impact:				Historic Preservation Impact:			
High		Medium		Low		High		Medium		Low	
Importance to Protection of Life/Property and Disaster Recovery				Risk of Hazard Impact:			
High		Medium		Low		High		Medium		Low	
Estimated Cost:				Project Duration:			
Value of Facility:				Value of Contents:			
Source(s) of Financing:							
Project Objectives:							
Project Description:							
Proposal Date:							

Evaluation Category	Considerations	Comments
Social	Community Acceptance	
	Adversely Affects Segments of the Population	
Technical	Technical Feasibility	
	Long Term Solution	
	Secondary Impacts	
Administrative	Staffing	
	Funding Allocated	
	Maintenance / Operations	
Political	Political Support	
	Plan Proponent	
	Public Support	
Legal	Authority	
	Action Subject to Legal Challenge	
Economic	Benefit	
	Cost of Action	
	Contributes to Economic Goals	
	Outside Funding Required	
Environmental	Affects Land / Water Bodies	
	Affects Endangered Species	
	Affects Hazardous Materials and Waste Sites	
	Consistent with Community Environmental Goals	
	Consistent with Federal Laws	

SECTION 5: PLAN MAINTENANCE

The plan maintenance section of this document details the formal process that will ensure that this Hazards Mitigation Plan remains an active and relevant document. The plan maintenance process includes the following:

1. a schedule for monitoring and evaluating the Plan annually and producing a Plan revision every five years,
2. a description of how the City of Cudahy will integrate public participation throughout the plan maintenance process, and
3. an explanation of how the City of Cudahy 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.

Monitoring and Implementing the Plan

Plan Adoption

City Council is responsible for adopting Cudahy's Natural Hazards Mitigation Plan. This governing body has the authority to promote sound public policy regarding natural hazard mitigation. Once the Plan is adopted, the City Emergency Services Coordinator will be responsible for submitting the Plan 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, Cudahy will gain eligibility for Hazard Mitigation Grant Program funds.

Coordinating Body

The City of Cudahy Hazard Mitigation Steering Committee will be responsible for coordinating implementation of the Plan's action items and undertaking the formal review process. The City Manager, or designee, will assign representatives from City agencies, including, but not limited to, the current Hazard Mitigation Steering Committee members. At this time, the Hazard Mitigation Steering Committee consists of representatives from the following City Departments and agencies:

- Community Development, Planning Division
- Community Development, Building and Safety Division, and
- Public Works Department

The Steering Committee is supported by a larger body of advisors representing several other agencies and organizations that have a vested interest in managing or reducing the natural hazards in the city of Cudahy. This larger body, referred to as the Hazard Mitigation Advisory Committee, has responsibility for reviewing the Plan and providing input on the action items proposed and their prioritization. The current Advisory Committee members include representatives from the following local agencies and organizations:

- City of Cudahy, Community Development Department
- City of Cudahy, Public Works Department
- County of Los Angeles Sheriff Department
- County of Los Angeles Fire Department
- City of Cudahy Community Services Department
- City of Cudahy Parks and Recreation Department

In order to make this committee as broad and useful as possible, the City Mayor, or designee, may engage other relevant organizations and agencies, including:

- An elected official
- A representative from the Chamber of Commerce
- Community Planning Organization representatives
- A representative from the City Manager's office
- Representatives from the nearby hospitals
- Representatives from the Los Angeles Unified School District
- A representative from the Office of Disaster Management, and
- Local residents

Additional resources at the State and Federal levels, in the form of ad-hoc committee members that could be invited to participate in Cudahy's Natural Hazards Mitigation program, could be drawn from the following agencies:

- California Geological Survey
- Federal Emergency Management Agency
- California Governor's Office of Emergency Services
- Red Cross
- Salvation Army

The Hazard Mitigation Steering Committee will meet no less than bi-annually. Meeting dates will be scheduled once the final Plan has been adopted by City Council and approved by the appropriate FEMA office. 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

City Council will adopt Cudahy's Hazard Mitigation Plan, and the Hazard Mitigation Steering Committee will take responsibility for Plan implementation. The City Mayor, or designee, will serve as a convener to facilitate the meetings of the Hazard Mitigation Steering and Advisory Committees, and will assign tasks such as updating and presenting the Plan to the members of the committees. Plan implementation and evaluation will be a shared responsibility among all of the Hazard Steering Committee members. Future updates of the Plan will require participation of the Advisory Committee.

Implementation through Existing Programs

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

The Hazard Mitigation Plan provides a series of recommendations, many of which are closely related to the goals and objectives of existing planning programs. The City of Cudahy will have the opportunity to implement recommended mitigation action items through existing programs and procedures.

The City of Cudahy Building and Safety Department, the Los Angeles County Fire Department, the City's Public Works Department, and the Los Angeles County Sheriff Department are responsible for administering the Building and Fire Codes, and other regulations designed to improve safety of the community, such as the policies in the Safety Element of the General Plan. In addition, the Hazard Steering Committee will work with other agencies at the state level to review, develop and implement Building and Safety Codes that are adequate to mitigate or reduce the damage posed 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 areas that the Hazard Mitigation Plan action items are 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 Steering and Advisory Committees will provide an opportunity for committee members to report back on the progress made on the integration of mitigation planning elements into City planning documents and procedures.

Economic Analysis of Mitigation Projects

FEMA's approaches to identify the costs and benefits associated with natural hazard mitigation strategies, measures, or projects, fall into two general categories: benefit/cost analysis and cost-effectiveness analysis. Conducting a 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.

Given federal funding, the Hazard Mitigation Advisory Committee will use a FEMA-approved benefit/cost analysis approach to identify and prioritize mitigation action items. A copy of a Project Evaluation Worksheet modeled after the STAPPLE cost benefit analysis process preferred by FEMA, is included at the end of Chapter 4. For other projects and funding sources, the Hazard Mitigation Advisory Committee may 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 of the Plan.

Evaluating and Updating the Plan

Formal Review Process

The City of Cudahy 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 time line, 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 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 Steering Committee members. The designated committee members will have three months to make appropriate changes to the Plan before submitting it to the Hazard Mitigation Advisory Committee members, and presenting it to City Council. The Hazard Mitigation Steering Committee will also notify all holders of the City 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 of Cudahy is dedicated to involving the public directly in review and updates of the Hazard 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 on the Plan. Copies of the Plan will be kept at the front desk of City Hall. The Plan will also be placed on the City's website for review by the public, or alternatively, the existence and location of copies of the Plan will be publicized on the City's website and newsletters. In addition, information on how to obtain copies of the Plan and any proposed changes will be posted on the City's website. This site will list an e-mail 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 when deemed necessary by the Hazard Mitigation Advisory Committee. The meetings will provide the public with a forum at which they can express their concerns, opinions, or ideas about the Plan. The City's Public Information Officer will be responsible for using City resources to publicize the annual public meetings and maintain public involvement through the City's public access channel, web page, and newspapers or newsletters.

Local Natural Hazards Mitigation Plan

Volume II: Hazard-Specific Information

SECTION 6: SEISMIC HAZARDS

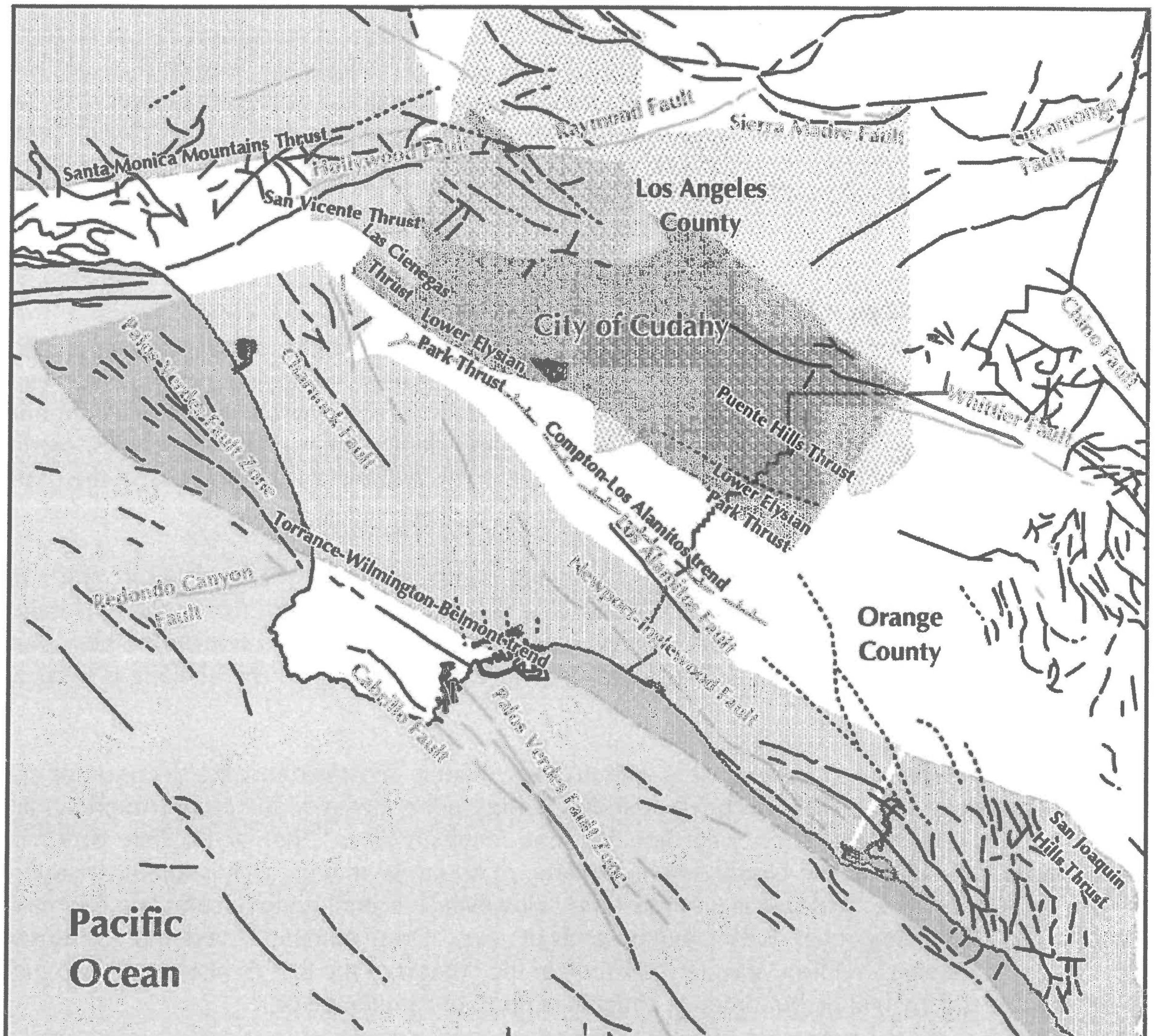
Why Are Earthquakes a Threat to the City of Cudahy?

While Cudahy is at risk from many natural and man-made hazards, an earthquake is the event with the greatest potential for far-reaching loss of life or property, and economic damage. This is true for most of southern California, since damaging earthquakes occur relatively frequently, affect widespread areas, trigger many secondary effects, and can overwhelm the ability of local jurisdictions to respond. Earthquake-triggered geologic effects include ground shaking, surface fault rupture, landslides, liquefaction, subsidence, and seiches. Earthquakes can also cause human-made hazards such as urban fires, dam failures, and toxic chemical releases.

In California, recent earthquakes in or near urban environments have caused relatively few casualties. This is due more to luck than design. For example, when a portion of the Nimitz Freeway in Oakland collapsed at rush hour during the 1989, M_W 7.1 Loma Prieta earthquake, the freeway was uncommonly empty because so many were watching the World Series. The 1994, M_W 6.7 Northridge earthquake occurred before dawn, when most people were home safely in bed. Despite such good luck, California's urban earthquakes have resulted in significant losses. The moderate-sized Northridge earthquake caused 54 deaths, more than 1,500 injuries and nearly $30 billion in damage. 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. Several collapsed bridges and overpasses created commuter havoc on the freeway system. Extensive damage was caused by ground shaking, with shaking-induced liquefaction and dozens of fires after the earthquake causing additional damage. This moderately sized earthquake resulted in record economic losses, and yet the Los Angeles metropolitan area, including the city of Cudahy, is at risk from earthquakes that could release more than ten times the seismic energy of the Northridge earthquake.

Historical and geological records show that California has a long history of seismic events. The state is probably best known for the San Andreas fault, a 750-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 on the southern San Andreas fault at about 130-year intervals. 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. The San Andreas fault, however, is only one of dozens of known faults that criss-cross southern California. Some of the better-known faults include the Sierra Madre, Newport-Inglewood, Whittier, Elsinore, Hollywood, and Palos Verdes faults. Of these, the Newport-Inglewood fault zone extends within about six miles to the southwest of Cudahy (see Map 6.1), whereas the Whittier fault is about seven miles to the northeast. Seismologists are in agreement that a magnitude 6.0 to 6.5 earthquake on the Newport-Inglewood fault has the potential to cause more damage and casualties than a "great" quake on the San Andreas fault, because the San Andreas fault is farther away from the urban centers of southern California. There are also several "blind" faults that underlie southern California. ["Blind" faults do not break the surface, but rather occur thousands of feet below the ground. They are not less of a seismic hazard, though]. The northern portion of Cudahy is underlain by one of these "blind" faults, namely, the Puente Hills thrust fault.

Map 6-1: Local Active and Potentially Active Faults
(shaded areas denote the planes of buried thrust faults)



Modified from: Dolan, Shaw, and Pratt, 2002; Grant et al., 1999; and Jennings, 1994.

Map Explanation

Blind thrust fault ramp; red hachures show the surface projection of the locus of active folding along the tip of the thrust ramp. The thrust fault ramps are shown from deepest to shallowest by gray, green, and blue shading, respectively.

Fault Showing Evidence of Historic Rupture (Active).

Fault Showing Evidence of Holocene Rupture (Active).

Fault Showing Evidence of Quaternary and Late Quaternary Rupture (Potentially Active).

Great advances in earthquake engineering have been made in the last two decades as a result of the lessons learned from the 1994 Northridge, California, 1995 Kobe, Japan, 1999 Izmit, Turkey and 1999 Chi-Chi, Taiwan earthquakes. However, many California communities remain unprepared, in part because changes to the building code are not retroactive and thus older structures have not been strengthened. Although it is not possible to prevent earthquakes, their destructive effects can be minimized. Comprehensive hazard mitigation programs that include the identification and mapping of hazards, prudent planning, public education, emergency exercises, enforcement of building codes, and expedient retrofitting and rehabilitation of weak structures can significantly reduce the scope of an earthquake's effects and avoid disaster. Local governments, emergency relief organizations, and residents must take action to develop and implement policies and programs to reduce the effects of earthquakes.

Earthquake Basics - Definitions

The outer 10 to 70 kilometers of the Earth consist of enormous blocks of moving rock, called **plates**. There are about a dozen major plates, which slowly collide, separate, and grind past each other. In the uppermost plates, friction locks the plate edges together, while movement continues at depth. Consequently, the near-surface rocks bend and deform near plate boundaries, storing strain energy. Eventually, the frictional forces are overcome and the locked portions of the plates move. The stored strain energy is released in waves.

By definition, the break or fracture between moving blocks of rock is called a **fault**, and such differential movement produces a **fault rupture**. The place where the fault first ruptures is called the **focus** (or **hypocenter**). The released energy waves radiate out in all directions from the rupture surface, making the earth vibrate and shake as the waves travel through. This shaking is what we feel in an **earthquake**.

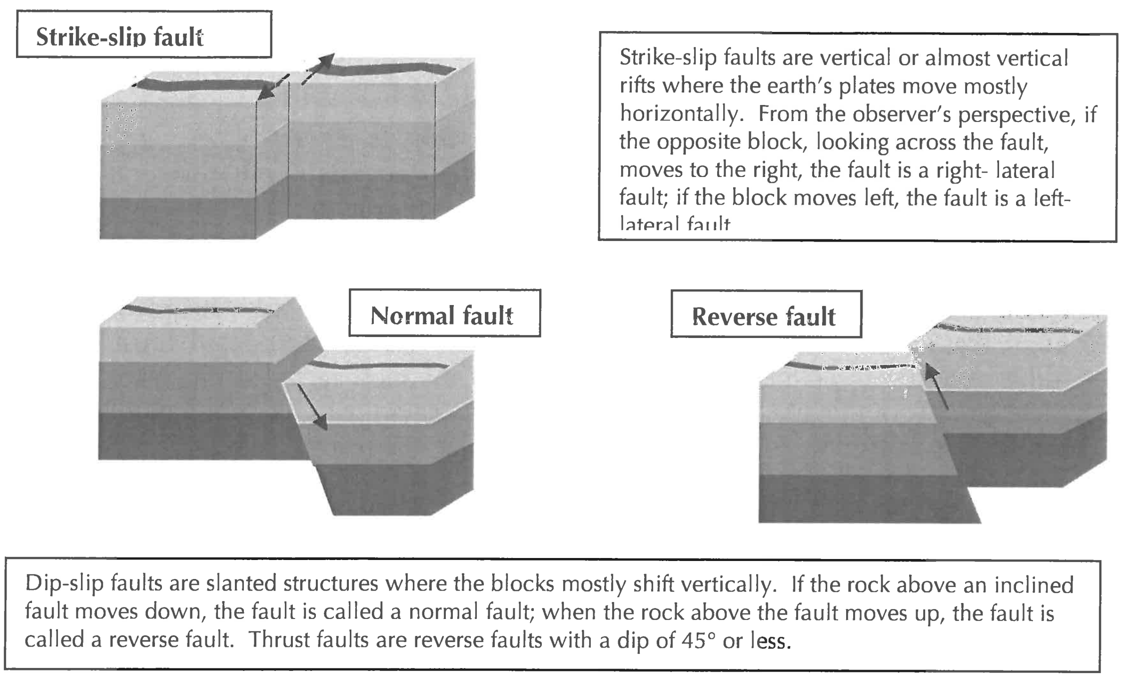
Although earthquakes can occur in areas with no known faults, most earthquakes occur on or near plate boundaries. Given that California straddles the boundary between the North American and Pacific plates, it experiences many earthquakes, and relatively often. The Pacific Plate is moving northwesterly, relative to the North American Plate, at about 50 mm/yr. This is about the rate at which fingernails grow, and seems unimpressive. However, it is enough to accumulate enormous amounts of strain energy over dozens to thousands of years. Despite being locked in place most of the time, in another 15 million years (a short time in the context of the Earth's history), due to plate movements, Cudahy will be hundreds of kilometers north of San Francisco.

Although the San Andreas fault marks the actual separation between the Pacific and North American plates, only about 70 percent of the plate motion occurs on the San Andreas fault itself. The rest is distributed among other faults of the San Andreas system, including the San Jacinto, Whittier-Elsinore, Newport-Inglewood, Palos Verdes, plus several offshore faults; and among faults of the Eastern Mojave Shear Zone, a series of faults east of the San Andreas fault that were responsible for the 1992 Landers and 1999 Hector Mine earthquakes. Thus, the zone of plate-boundary earthquakes and ground deformation covers an area that stretches from the Pacific Ocean to Nevada.

Because the Pacific and North American plates are sliding past each other, with relative motions to the northwest and southeast, respectively, all of the faults mentioned above are aligned northwest-southeast, and are **strike-slip faults** (see Figure 6-1). On average, strike-slip faults are nearly vertical breaks in the rock, and when a strike-slip fault ruptures, the rocks on either side of the fault slide horizontally past each other.

However, about 70 miles northwest of Cudahy, there is a kink in the San Andreas fault, commonly referred to as the "Big Bend." Near the Big Bend, the two plates do not slide past each other. Instead, they collide, causing localized compression, resulting in folding and **thrust faulting** (see Figure 6-1). Thrust faults meet the surface of the Earth at a low angle, dipping 25 to 45 degrees from the horizontal. Thrusts are a type of **dip-slip fault**, where rocks on opposite sides of the fault move up or down relative to each other. When a thrust fault ruptures, the top block of rock moves up and over the rock on the other side of the fault.

Figure 6-1: Main Types of Faults



Few faults are simple, planar breaks in the Earth. They more often consist of smaller **strands**, with a similar orientation and sense of movement. Sometimes geologists group strands into **sections** or **segments**, which are believed capable of rupturing together during a single earthquake. The more extensive the fault, the bigger the earthquake it can produce. Therefore, multi-strand fault ruptures generally produce larger earthquakes.

Large-magnitude earthquakes that occur near urban centers have the potential to cause the most damage. Thus, fault dimensions and proximity to urban centers are key parameters in any hazard assessment. In addition, it is important to know a fault's style of movement (i.e. is it dip-slip or strike-slip), the age of its most recent activity, its total displacement, and its slip rate (all discussed below). These values are helpful in estimating how often a fault produces damaging earthquakes, and the size of the earthquake that will be generated the next time that fault ruptures.

Total displacement is the length, measured in kilometers (km), of the total movement that has occurred along the fault over as long a time as the geologic record reveals. It is usually estimated by measuring the distance between geologic features (such as a distinctive rock formation) that have been split apart and separated (**offset**) by the cumulative movement of the fault over many earthquakes. **Slip rate** is a speed, expressed in millimeters per year (mm/yr). Slip rate is estimated by measuring an amount of offset accrued during a known amount of time, obtained by dating the ages of geologic features. Slip rate data also are used to estimate a fault's **earthquake recurrence interval**. Sometimes referred to as "repeat time" or "return interval," the recurrence interval represents the average amount of time that elapses between major earthquakes on a fault. Geologists generally derive the recurrence interval for a fault by excavating a series of trenches across the fault to obtain **paleoseismic** evidence of the earthquakes that have occurred during prehistoric time. If the sediments exposed in the trenches are suitable for dating and the earthquake record is well preserved, geologists can date (typically with a certain margin of error) the past earthquakes, and from that data, develop an average earthquake recurrence interval for that fault segment.

In southern California, ruptures along thrust faults have built the Transverse Ranges geologic province, a region with an east-west trend to its landforms and underlying geologic structures. This orientation is anomalous, virtually unique in the western United States, and a direct consequence of the plates colliding at the Big Bend. Many of southern California's most recent damaging earthquakes have occurred on thrust faults that are uplifting the Transverse Ranges, including the 1971 San Fernando, the 1987 Whittier Narrows, the 1991 Sierra Madre, and the 1994 Northridge earthquakes. In addition to generating stronger ground shaking than a similar-magnitude earthquake on a strike-slip fault, thrust faults are also particularly hazardous because many are **blind**, that is, they do not extend to the surface of the Earth. These blind thrust faults are extremely difficult to detect before they rupture. Some of the most recent earthquakes, like the 1987 Whittier Narrows earthquake, and the 1994 Northridge earthquake, occurred on blind thrust faults.

When comparing the sizes of earthquakes, the most meaningful feature is the amount of energy released. Thus scientists most often consider **seismic moment**, a measure of the energy released when a fault ruptures. We are more familiar, however, with scales of **magnitude,** which measure amplitude of ground motion. Magnitude scales are logarithmic. Each one-point increase in magnitude represents a ten-fold increase in amplitude of the waves as measured at a specific location, and a 32-fold increase in energy. That is, a magnitude 7 earthquake produces 100 times (10 x 10) the ground motion amplitude of a magnitude 5 earthquake. Similarly, a magnitude 7 earthquake releases approximately 1,000 times more energy (32 x 32) than a magnitude 5 earthquake. Scientists now use the **moment magnitude (M_w)** scale to relate energy release to magnitude; this scale has replaced the Richter scale, which is no longer used by seismologists.

An early measure of earthquake size still used today is the seismic **intensity scale**, which is a qualitative assessment of an earthquake's effects at a given location. Although it has limited scientific application, intensity is still widely used because it is intuitively clear and quick to determine. The most commonly used measure of seismic intensity is called the Modified Mercalli Intensity (MMI) scale, which has 12 levels of damage (see Table 6-1).

A given earthquake will have one moment and, in principle, one magnitude, although there are several methods of calculating magnitude, which give slightly different results. However, one earthquake will produce several intensities because intensity effects vary with the location (distance), soil conditions, and perceptions of the observer.

Table 6-1: Abridged Modified Mercalli Intensity Scale

Intensity Value and Description		Average Peak Velocity (cm/sec)	Average Peak Acceleration (g = gravity)
I.	Not felt except by a very few under especially favorable circumstances (I Rossi-Forel scale). Damage potential: None.	<0.1	<0.0017
II.	Felt only by a few persons at rest, especially on upper floors of high-rise buildings. Delicately suspended objects may swing. (I to II Rossi-Forel scale). Damage potential: None.	0.1 – 1.1	0.0017 – 0.014
III.	Felt quite noticeably indoors, especially on upper floors of buildings, but many people do not recognize it as an earthquake. Standing automobiles may rock slightly. Vibration like passing of truck. Duration estimated. (III Rossi-Forel scale). Damage potential: None.		
IV.	During the day felt indoors by many, outdoors by few. At night some awakened. Dishes, windows, doors disturbed; walls make creaking sound. Sensation like a heavy truck striking building. Standing automobiles rocked noticeably. (IV to V Rossi-Forel scale). Damage potential: None. Perceived shaking: Light.	1.1 – 3.4	0.014 - 0.039
V.	Felt by nearly everyone; many awakened. Some dishes, windows, and so on broken; cracked plaster in a few places; unstable objects overturned. Disturbances of trees, poles, and other tall objects sometimes noticed. Pendulum clocks may stop. (V to VI Rossi-Forel scale). Damage potential: Very light. Perceived shaking: Moderate.	3.4 – 8.1	0.039-0.092
VI.	Felt by all; many frightened and run outdoors. Some heavy furniture moved, few instances of fallen plaster and damaged chimneys. Damage slight. (VI to VII Rossi-Forel scale). Damage potential: Light. Perceived shaking: Strong.	8.1 - 16	0.092 -0.18
VII.	Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures; some chimneys broken. Noticed by persons driving cars. (VIII Rossi-Forel scale). Damage potential: Moderate. Perceived shaking: Very strong.	16 - 31	0.18 - 0.34
VIII.	Damage slight in specially designed structures; considerable in ordinary substantial buildings with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, and walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Persons driving cars disturbed. (VIII+ to IX Rossi-Forel scale). Damage potential: Moderate to heavy. Perceived shaking: Severe.	31 - 60	0.34 - 0.65
IX.	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb; great in substantial buildings with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken. (IX+ Rossi-Forel scale). Damage potential: Heavy. Perceived shaking: Violent.	60 - 116	0.65 – 1.24
X.	Some well-built wooden structures destroyed; most masonry and frame structures destroyed; ground badly cracked. Rails bent. Landslides considerable from river banks and steep slopes. Shifted sand and mud. Water splashed, slopped over banks. (X Rossi-Forel scale). Damage potential: Very heavy. Perceived shaking: Extreme.	> 116	> 1.24
XI.	Few, if any, (masonry) structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipelines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.		
XII.	Damage total. Waves seen on ground surface. Lines of sight and level distorted. Objects thrown into air.		

Modified from Bolt (1999); Wald et al. (1999).

Causes of Earthquake Damage

Causes of earthquake damage can be categorized into three general areas: strong shaking, various types of ground failure that are a result of shaking, and ground displacement along the rupturing fault.

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, and is typically reported as the peak horizontal ground acceleration estimated as a percentage of **g**, the acceleration of gravity. Full characterization of shaking potential, though, requires estimates of peak (maximum) ground displacement and velocity, the duration of strong shaking, and the periods (lengths) of waves that will control each of these factors at a given location. The strength of ground shaking also depends on the source, path, and site effects. Estimates of the ground shaking that different locations in California are likely to experience have been mapped, as shown on Map 6-2.

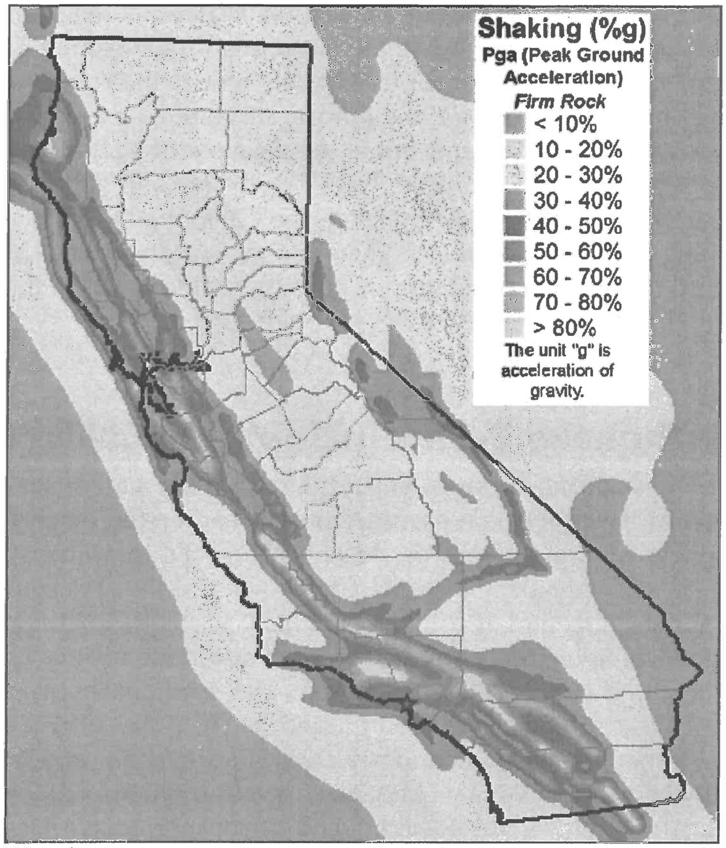
- **Source effects** include earthquake size, location, and distance, plus directivity of the seismic waves (for example, the 1995, M_W 6.9, Kobe, Japan earthquake was not much bigger than the 1994, M_W 6.7 Northridge, California earthquake, but Kobe caused much worse damage. During the Kobe earthquake, the fault's orientation and movement directed seismic waves into the city, whereas during the Northridge earthquake, the fault's motion directed waves away from populous areas.

- **Path effects** refer to how the seismic waves change direction as they travel through the Earth's contrasting layers, just as light bounces (reflects) and bends (refracts) as it moves from air to water. Sometimes seismic energy gets focused into one location and causes damage in unexpected areas (focusing of the seismic waves generated by the 1989 M_W 7.1 Loma Prieta earthquake caused damage in San Francisco's Marina district, some 100 km distant from the rupturing fault).

- **Site effects** refer to how seismic waves interact with the ground surface. Seismic waves slow down in the loose sediments and weathered rock at the Earth's surface; as they slow, their energy converts from speed to amplitude, which heightens shaking (amplification). Therefore, buildings on poorly consolidated and thick soils will typically see more damage than buildings on consolidated soils and bedrock. Amplification can also occur in areas on deep, sediment-filled basins and on ridge tops. Seismic waves can also get trapped at the surface and reverberate (resonate). Whether resonance will occur depends on the period (the length) of the incoming waves – long-period seismic waves, which are created by large earthquakes, are most likely to reverberate and cause damage in long-period structures, like bridges and high-rises. ("Long-period structures" are those that respond to long-period waves.) Shorter-period seismic waves, which tend to die out quickly, will most often cause damage fairly near the fault, and they will cause most damage in shorter-period structures such as one- to three-story buildings. Very short-period waves are most likely to cause near-fault, interior damage, such as to equipment.

Earthquake damage also depends on the characteristics of human-made structures. The interaction of ground motion with the built environment is complex. Governing factors include a structure's height, construction, and stiffness, architectural design, condition, and age.

Map 6-2: Ground Shaking Zones in California
(Map shows areas of ground shaking with a 10 percent chance of exceedance in 50 years – the pink and red zones can experience higher ground shaking because they are closer to active faults. The blue star shows the approximate location of Cudahy.)



Source: http://www.consrv.ca.gov/CGS/rghm/pshamap/pshamain.html

Liquefaction typically occurs within the upper 50 feet of the surface, where saturated, loose, fine- to medium-grained soils (sand and silt) are present. Earthquake shaking suddenly increases pressure in the water that fills the pores between soil grains, causing the soil to lose strength and behave as a liquid. This process can be observed at the beach by standing on the wet sand near the surf zone. Standing still, the sand will support your weight. However, when you tap the sand with your feet, water comes to the surface, the sand liquefies, and your feet sink.

Liquefaction-related effects include loss of bearing strength, ground oscillations, lateral spreading and flow failures or slumping. The excess water pressure is relieved by the ejection of material upward through fissures and cracks. When soils liquefy, the structures built on them can sink, tilt, and suffer significant structural damage. Buildings and their occupants are at risk when the ground can no longer support the buildings.

Earthquake-induced landslides and rockfalls are secondary earthquake hazards that occur from ground shaking. Gravity inexorably pulls hillsides down, and earthquake shaking enhances this on-going process. Landslides and rockfalls can destroy roads, buildings, utilities, and other critical facilities necessary to respond and recover from an earthquake. Many communities in southern

California with steep slopes have a high likelihood of being impacted by earthquake-induced landslides or rockfalls. This is not the case in Cudahy, so this hazard will not be discussed further in this document.

Primary ground rupture due to fault movement typically results in a relatively small percentage of the total damage in an earthquake, yet being too close to a rupturing fault can result in extensive damage. It is difficult, although not impossible, to safely reduce the effects of this hazard through building and foundation design. Therefore, the primary mitigation measure is to avoid active faults by setting structures back from the fault zone. Application of this measure is subject to the requirements of the Alquist-Priolo Earthquake Fault Zoning Act and guidelines established by the California Geological Survey – previously known as the California Division of Mines and Geology – and the State Mining and Geology Board. There are no known faults at or near the surface in Cudahy, so the hazard of surface fault rupture is not expected to occur in the study area. For this reason, this hazard will not be discussed further in this document.

History of Earthquake Events in Southern California

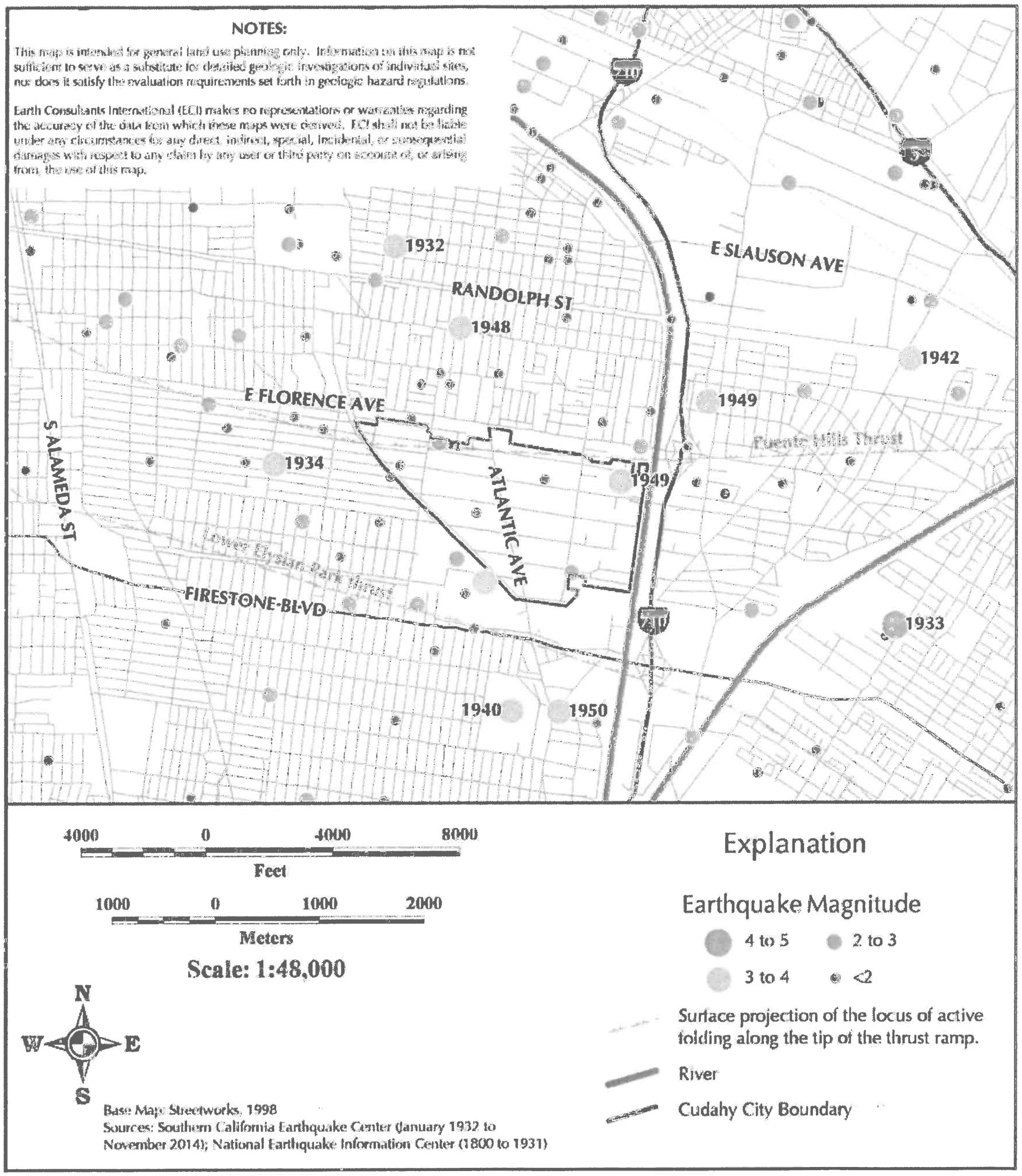
To better understand earthquake hazards, scientists study past earthquakes by looking at their records, and by studying the effects that past earthquakes had on the ground surface and the built environment. Historical earthquake records are either from the instrumental period (since about 1932, when the first seismographs were deployed), or pre-instrumental. In the absence of instrumentation, the detection and record of earthquakes are based on observations and felt reports, and are dependent upon population density and distribution. Since California was sparsely populated in the 1800s, our record of pre-instrumental earthquakes is relatively incomplete. However, two very large earthquakes, the Fort Tejon in 1857 (M7.9) and the Owens Valley in 1872 (M7.6), are evidence of the tremendously damaging potential of earthquakes in southern California. More recently, two M7.3 earthquakes struck southern California, in Kern County (1952) and Landers (1992), and a M7.1 earthquake struck the Mojave Desert (Hector Mine, in 1999). The damage from these five large earthquakes was limited because they occurred in sparsely populated areas. A similarly sized earthquake closer to southern California's population centers has the potential to place millions of people at risk.

Since seismologists started recording and measuring earthquakes, there have been tens of thousands of recorded earthquakes in southern California, most with a magnitude below 3.0. These recordings show that only the easternmost portion of southern California may be beyond the reach of a damaging earthquake (green areas in Map 6-2). Table 6-2 lists the moderate to large historical earthquake events that have affected southern California. Map 6-3 shows the historical seismicity in the immediate vicinity of Cudahy. The map shows that small earthquakes, of magnitude of 4 or less, have occurred historically in the area, especially between 1932 and 1950, but, no moderate to large earthquakes have occurred beneath Cudahy in historical times. Map 6-4 shows the most significant earthquakes in the southern California region. Those earthquakes known or inferred to have been felt strongly in the Cudahy area, or that led to the passage of important legislation, are discussed further below. For the known or inferred epicentral location of most of these earthquakes, refer to Map 6-4.

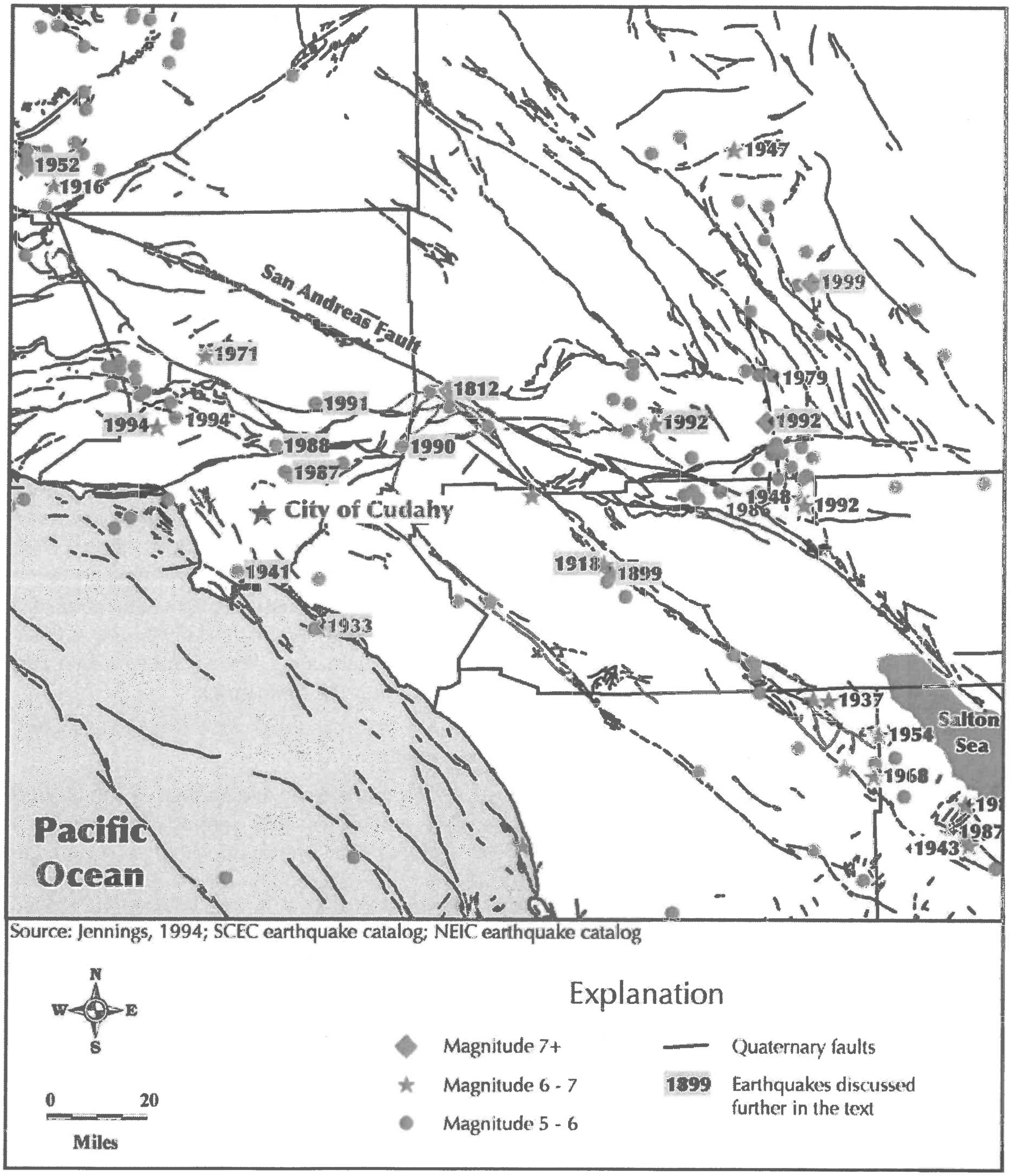
Table 6-2: Historical (1769 – July 2014) Earthquakes in the Southern California Region with Magnitudes > 5.0

1769	Orange County - Los Angeles Basin	1941	Wilmington
1800	San Diego Region	1943	Big Bear Lake Region
1812	Wrightwood	1944	Desert Hot Springs – Cabazon Region
1812	Santa Barbara Channel	1947	Desert Hot Springs – Yucca Valley Region
1827	Los Angeles Region, offshore Malibu	1951	San Clemente Island
1852	Fort Tejon area, east of Lebec	1952	Tehachapi, Kern County Region
1855	Los Angeles Region	1952	Tehachapi aftershocks
1857	Great Fort Tejon Earthquake	1954	West of Wheeler Ridge
1858	San Bernardino Region	1968	Near Santa Cruz Island
1862	San Diego Region	1969	Offshore San Nicolas Island
1880	Moreno Valley – Perris Region	1970	Lytle Creek, east of Mount Baldy
1883	West of Frazier Park	1971	San Fernando
1889	Mountains north of Morongo Valley	1971	San Fernando aftershocks
1892	San Jacinto or Elsinore Fault	1973	Point Mugu
1893	Pico Canyon	1978	Offshore Santa Barbara
1894	Lytle Creek Region	1981	Offshore, Channel Islands Region
1894	San Diego Region	1986	North Palm Springs
1899	Lytle Creek region	1987	Whittier Narrows
1899	San Jacinto and Hemet	1987	Whittier Narrows aftershock
1899	San Jacinto and Hemet aftershocks	1988	Between Lebec and Tehachapi
1905	San Bernardino Region	1990	Claremont area
1907	San Bernardino Region	1991	North of Pasadena
1910	Glen Ivy Hot Springs	1992	Landers
1912	Offshore, west of Malibu	1992-199	Landers aftershocks
1916	Tejon Pass Region	1992	Big Bear
1918	San Jacinto	1994	Northridge
1923	San Bernardino Region	1994	Northridge aftershocks
1925	Santa Barbara	1997	West of Santa Clarita
1925	Santa Barbara aftershocks	1999	Hector Mine
1926	Mountains north of Carpinteria	1999	Hector Mine aftershocks
1930	Offshore Malibu	2005	Southeast of Anza
1930	Seven Oaks Dam area, two events	2005	South shores of Salton Sea
1933	Long Beach	2008	Chino Hills
1933	Long Beach aftershocks	2010	Baja California, South of Mexicali
1935	Mountains north of Morongo Valley	2010	Baja California aftershocks
1938	Santa Ana Mountains	2010	Northwest of Borrego Springs
1940	Mountains north of Northridge	2012	North of Brawley
1941	Carpinteria and Santa Barbara	2012	North of Brawley
1941	Lebec	2014	La Habra Heights

Map 6-3: Faults and Historical Seismicity In and Near Cudahy



Map 6-4: Historical Earthquakes in Southern California
(most of the yellow highlighted earthquakes are described further in the text)



Source: Jennings, 1994; SCEC earthquake catalog; NEIC earthquake catalog

Unnamed Earthquake of 1769

On July 28, 1769 the first recorded earthquake in southern California was noted by the Spanish explorers traveling north with Gaspar de Portola. At the time of the earthquake, the explorers were camped at the location of the present-day community of Olive, in the city of Orange, on the east bank of the Santa Ana River. Father Juan Crespo, who kept a daily account of the expedition, reported a strong mainshock followed by five days of moderate aftershocks. An estimated magnitude of at least 6.0 has been assigned to the main earthquake based on the explorers' account (Teggart, 1911). The source for this earthquake is unknown, and still being debated by the paleoseismology community. Some researchers have suggested that this earthquake, of possible magnitude 7.3, may have caused coastal uplift in the northern Orange County region, with the causative fault being a blind thrust under the San Joaquin Hills (Grant et al., 2002). The nearby Elsinore and Newport-Inglewood faults are also been considered possible sources for the earthquake.

Wrightwood Earthquake of December 12, 1812

This large earthquake occurred on December 8, 1812 and was felt throughout southern California. Based on accounts of damage recorded at missions in the earthquake-affected area, an estimated magnitude of 7.5 has been calculated for the event (Toppozada et al., 1981). Subsurface investigations and tree ring studies show that the earthquake likely ruptured the Mojave section of the San Andreas fault near Wrightwood, and may have been accompanied by a significant surface rupture between Cajon Pass and Tejon Pass (Jacoby, Sheppard and Sieh, 1988; www.scecdc.scec.org/quakedex.html). The worst damage caused by the earthquake occurred significantly west of the San Andreas fault at San Juan Capistrano Mission, where the roof of the church collapsed, killing 40 people. The earthquake also damaged walls and destroyed statues at San Gabriel Mission and damaged missions in the Santa Barbara area. Strong aftershocks caused earthquake-damaged buildings to collapse for several days after the mainshock.

Unnamed Earthquake of December 21, 1812

The Wrightwood earthquake was followed by a strong earthquake on December 21st that caused widespread damage in the Santa Barbara area. The effects of this second earthquake are sometimes attributed to the December 12th event, giving the impression that a single large earthquake caused significant damage from Santa Barbara to San Diego. This second earthquake had an estimated magnitude 7 and was either located offshore, within the Santa Barbara Channel, or it may have occurred inland, in Santa Barbara or Ventura counties (www.scecdc.scec.org/quakedex.html). The earthquake destroyed the church at the Mission in Santa Barbara, the Mission of Purísima Concepción near present-day Lompoc, and the Mission at Santa Inéz (www.johnmartin.com/eqs/00000077.htm). The earthquake also caused a tsunami that may have traveled up to 1/2 mile inland near Santa Barbara.

Unnamed Earthquake of 1855

This earthquake occurred on July 11, 1855 and was felt across southern California from Santa Barbara to San Bernardino. Light to moderate damage was reported in the Los Angeles area, where 26 houses experienced cracked walls and the bell tower of the San Gabriel Mission was knocked down (www.sfmuseum.org/alm/quakeso.html). Because damage was limited primarily to the Los Angeles area, this earthquake is postulated to have occurred on a local fault such as the Hollywood-Raymond, Whittier or Newport-Inglewood faults, or on one of the many blind thrust faults that underlie this area.

San Jacinto Earthquake of 1899

This earthquake occurred at 4:25 in the morning on Christmas Day, in 1899. The main shock is estimated to have had a magnitude of 6.5. Several smaller aftershocks followed the main shock, and in the town of San Jacinto, as many as thirty smaller tremors were felt throughout the day. The epicenter of this earthquake is not well located, but damage patterns suggest it occurred near the town of San Jacinto, with the causative fault most likely being the San Jacinto fault. Both the towns of San Jacinto and Hemet reported extensive damage, with nearly all brick buildings either badly damaged or destroyed. Six people were killed in the Soboba Indian Reservation as a result of falling adobe walls. In Riverside, chimneys toppled and walls cracked (Claypole, 1900). The main earthquake was felt over a broad area that included San Diego to the southwest, Needles to the northeast, and Arizona to the east. No surface rupture was reported, but several large "sinks" or subsidence areas were reported about 10 miles to the southeast of San Jacinto.

San Jacinto Earthquake of 1918

The magnitude 6.8 San Jacinto earthquake occurred on April 21, 1918 at 2:32 P.M. Pacific Standard Time, near the town of San Jacinto. The earthquake caused extensive damage to the business districts of San Jacinto and Hemet, where many masonry structures collapsed, but because it occurred on a Sunday, when these businesses were closed, the number of fatalities and injuries was low. Several people were injured, but only one death was reported. Minor damage as a result of this earthquake was reported outside the San Jacinto area, and the earthquake was felt as far away as Taft (west of Bakersfield), Seligman (Arizona), and Baja California.

Long Beach Earthquake of 1933

This M_w 6.4 earthquake occurred on March 10, 1933, at 5:54 in the afternoon, following a strong foreshock the day before. The location of the earthquake's epicenter has been re-evaluated, and determined to have occurred approximately 3 miles south of present-day Huntington Beach, offshore of Newport Beach (see Map 6.4). However, it caused extensive damage in Long Beach, hence its name. The earthquake occurred on the Newport-Inglewood fault, a right-lateral strike slip fault that extends across the western portion of the Los Angeles basin. The Newport-Inglewood fault did not rupture the surface during this earthquake, but substantial liquefaction-induced damage was reported. The earthquake caused 120 deaths, and over $50 million in property damage (Wood, 1933). In the Cudahy area, the earthquake produced Modified Mercalli Intensities of VI-VII (http://earthquake.usgs.gov/earthquakes/states/events/1933_03_11_iso.php). Many strong aftershocks occurred through March 16th.

Although primary ground rupture of the Newport-Inglewood fault was not observed, secondary cracking, minor slumping, and lateral movement of unconsolidated sediments occurred throughout the region. Road surfaces along the shore between Long Beach and Newport Beach were damaged by settlement of road fills that had been placed on marshy land. In urban areas, unreinforced masonry buildings were most severely damaged, especially in areas of artificial fill or water-soaked alluvium. In one part of Compton, most buildings built on unconsolidated sediments and artificial fill were destroyed. In Long Beach, many buildings collapsed, were pushed off their foundations, or had walls or chimneys knocked down. In Newport Beach, 800 chimneys were knocked down at the roofline and hundreds of houses were destroyed (www.anaheimcocom.com/quake.htm). As a result, building codes were improved. Damage to school buildings was especially severe; fortunately, children were not present in the classrooms at that time, otherwise, the death toll would have been much higher. This earthquake led to the passage of the Field and

Riley Acts by the State legislature. The Field Act regulates school construction, and gives the Division of the State Architect authority and responsibility for approving the design and supervising the construction of public schools. The Riley Act regulates the construction of buildings larger than two-family dwellings.

Torrance-Gardena Earthquakes of 1941

In 1941, two small earthquakes struck the southern Los Angeles basin, affecting surrounding communities. Although these earthquakes were relatively minor, they occurred close to the surface and caused significant, although localized damage. The first Torrance earthquake (with a magnitude of 4.7) occurred on October 21st at 10:57 P.M., Pacific Standard Time and was located east of Carson, near the present-day interchange of the 405 and 710 freeways. Shaking up to intensity level VII was reported in the communities of Wilmington, Gardena, Lynwood, Hynes and Signal Hill where walls were cracked and chimneys damaged. In some cases, houses that had not been adequately repaired after the 1933 Long Beach earthquake were damaged again. No injuries were reported and damage estimates totaled $100,000 (www.scecdc.scec.org/quakedex.html).

A second earthquake (of magnitude 5.1) occurred less than a month later, on November 14 at 12:42 A.M. Pacific Standard Time, near Wilmington. Shaking during the second earthquake was reportedly stronger than the first, locally reaching intensity level VIII (Table 6-1) and felt as far away as Cabazon, Carpinteria, and San Diego. Gas and water mains burst near the epicenter and storefronts in the business districts of Torrance and Gardena collapsed, crushing parked cars. Damage to local oilfields was significant - well casings and equipment were damaged and a 55,000 gallon oil tank ruptured, flooding nearby streets with oil. Production of several wells was lowered or stopped. No injuries were reported, although damage attributed to the second event totaled $1 million (www.scecdc.scec.org/quakedex.html).

San Fernando (Sylmar) Earthquake of 1971

This M_w 6.6 earthquake occurred on the San Fernando fault zone, the western-most segment of the Sierra Madre fault, on February 9, 1971, at 6:00 in the morning. The surface rupture caused by this earthquake was nearly 12 miles long, and occurred in the Sylmar-San Fernando area, approximately 24 miles (38 km) northwest of Cudahy. The maximum slip measured at the surface was nearly 6 feet.

The earthquake caused over $500 million in property damage and 65 deaths. Most of the deaths occurred when the Veteran's Administration Hospital collapsed. Several other hospitals, including the Olive View Community Hospital in Sylmar suffered severe damage. Newly constructed freeway overpasses also collapsed, in damage scenes similar to those that occurred 23 years later during the 1994 Northridge earthquake. Loss of life could have been much greater had the earthquake struck at a busier time of day. As with the Long Beach earthquake, legislation was passed in response to the damage caused by the 1971 earthquake. In this case, the building codes were strengthened and the Alquist Priolo Special Studies (now known as the Earthquake Fault Zone) Act was passed in 1972.

Whittier Narrows Earthquake of 1987

The Whittier Narrows earthquake occurred on October 1, 1987, at 7:42 in the morning, with its epicenter located approximately 8 miles (13 km) to the northeast of Cudahy (Hauksson and Jones, 1989). This magnitude 5.9 earthquake occurred on a previously unknown, north-dipping concealed thrust fault (blind thrust) now called the Puente Hills fault (Shaw and Shearer, 1999). Modified Mercalli intensities in the VII to VIII range were reported from Monrovia and Pasadena in the north, to beyond Whittier in the southeast. Modified Mercalli intensities in the VI range were reported farther out, in an 1,500-square-kilometer area (http://earthquake.usgs.gov/earthquakes/states/events/1987_10_01.php).

The earthquake caused eight fatalities, over 900 injured, and $358 million in property damage. Severe damage was confined mainly to communities east of Los Angeles, including in Cudahy, and near the epicenter. Areas with high concentrations of unreinforced masonry (URM) buildings, such as the "uptown" district of Whittier, the old downtown section of Alhambra, and the "Old Town" section of Pasadena, were severely impacted. Several tilt-up buildings partially collapsed, including tilt-up buildings built after 1971, that were built to meet improved building standards, but were of irregular configuration, revealing seismic vulnerabilities not previously recognized. Residences that sustained damage usually were constructed of masonry, were not fully anchored to their foundations, or were houses built over garages with large openings. Many chimneys collapsed and in some cases, fell through roofs. Wood-frame residences, in contrast, sustained relatively little damage, and no severe structural damage to high-rise structures in downtown Los Angeles was reported.

Pasadena Earthquake of 1988

The Pasadena earthquake occurred at 3:38 in the morning on December 3, 1988, directly underneath the city of Pasadena. The M_L5.0 earthquake occurred on the Raymond fault (Hauksson and Jones, 1991), and helped determine that the Raymond fault is a left-lateral strike-slip fault (prior to this earthquake, the geological community was divided on this issue – the fault forms a well-defined scarp that many attributed to reverse faulting). This earthquake was also notable because it was followed by an unusually small number of aftershocks, and these were of small size (the largest was only a magnitude 2.4).

Sierra Madre Earthquake of 1991

The Sierra Madre earthquake occurred on June 28, 1991 at 7:43 in the morning. The M_w 5.8 earthquake probably occurred on the Clamshell-Sawpit Canyon fault, an offshoot of the Sierra Madre fault zone in the San Gabriel Mountains (Haukson, 1994). Because of its depth and moderate size, it caused no surface rupture, but it did trigger rockslides that blocked some of the local mountain roads. Roughly $40 million in property damage occurred in the San Gabriel Valley; unreinforced masonry buildings were hardest hit, and many brick chimneys collapsed. Two deaths resulted from this earthquake – one person was killed in Arcadia, and one person in Pasadena died from a heart attack. In all, at least 100 others were injured, though the injuries were mostly minor.

Landers and Big Bear Earthquakes of 1992

On the morning of June 28, 1992, most people in southern California were awakened at 4:57 by the largest earthquake to strike California in 40 years. Named "Landers" after a small desert community near its epicenter, the earthquake had a magnitude of 7.3. Centered in the Mojave Desert, approximately 120 miles from Los Angeles, the earthquake caused relatively little damage for its size (Brewer, 1992). It released about four times as much energy as the very destructive Loma Prieta earthquake of 1989, but fortunately, it did not claim as many lives (one child died when a chimney collapsed). The power of the earthquake was illustrated by the length of the ground rupture it left behind. More than 50 miles of surface rupture occurred as a result of this earthquake. The earthquake ruptured five separate faults: Johnson Valley, Landers, Homestead Valley, Emerson, and Camp Rock faults (Sieh et al., 1993). Other nearby faults also experienced triggered slip and minor surface rupture. The average right-lateral strike-slip displacement was about 10 to 15 feet, with a maximum of up to 18 feet observed. Modified Mercalli Intensities of VI were reported in communities near Cudahy (such as South Gate) as a result of this earthquake (http://earthquake.usgs.gov/earthquakes/dyfi/events/ci/landers/us/index.html).

The magnitude 6.4 Big Bear earthquake struck little more than 3 hours after the Landers earthquake on June 28, 1992 at 8:05:30 A.M. PDT. This earthquake is technically considered an aftershock of the Landers earthquake (indeed, the largest aftershock), although the Big Bear earthquake occurred over 20 miles west of the Landers rupture, on a fault with a different orientation and sense of slip than those involved in the main shock. From its aftershock, the causative fault was determined to be a northeast-trending left-lateral fault. The Big Bear earthquake did not break the ground surface, and, in fact, no surface trace of a fault with the proper orientation has been found in the area. The Big Bear earthquake caused a substantial amount of damage in the Big Bear area, but fortunately, it claimed no lives. However, landslides triggered by the quake blocked roads in the mountainous areas, aggravating the clean-up and rebuilding process (SCEC, 2001).

Northridge Earthquake of 1994

The Northridge Earthquake of January 17, 1994 woke up most of southern California at 4:30 in the morning. The earthquake's epicenter was located 20 miles to the west-northwest of downtown Los Angeles, on a previously unknown blind thrust fault now called the Northridge (or Pico) Thrust. Although moderate in size, this earthquake produced the strongest ground motions ever instrumentally recorded in North America. The M_w 6.7 earthquake is one of the most expensive natural disasters to have impacted the United States. Damage was widespread, sections of major freeways collapsed, parking structures and office buildings collapsed, and numerous apartment buildings suffered irreparable damage. Damage to wood-frame apartment houses was very widespread in the San Fernando Valley and Santa Monica areas, especially to structures with "soft" first floor or lower-level parking garages. The high accelerations, both vertical and horizontal, lifted structures off of their foundations and/or shifted walls laterally. The death toll was 57, and more than 1,500 people were seriously injured. Most damage was focused in the northern Los Angeles area, but intensities in the VI-VII were recorded in the area around Cudahy, causing scattered light to moderate damage (http://earthquake.usgs.gov/earthquakes/dyfi/events/ci/northrid/us/index.html). Despite the losses, gains made through earthquake hazard mitigation efforts of the last two decades were obvious. Retrofits of masonry building helped reduce the loss of life, hospitals suffered less structural damage than in 1971 San Fernando earthquake, and emergency response was exemplary.

Hector Mine Earthquake of 1999

Southern California's most recent large earthquake was a widely felt magnitude 7.1. It occurred on October 18, 1999, in a remote region of the Mojave Desert, 47 miles east-southeast of Barstow. Modified Mercalli Intensities of IV to V were reported in cities near Cudahy, including Bell, South Gate, and Compton (http://earthquake.usgs.gov/earthquakes/dyfi/events/ci/hectormi/us/index.html). The Hector Mine earthquake is not considered an aftershock of the M 7.3 Landers earthquake of 1992, although Hector Mine occurred on similar, north-northwest trending strike-slip faults within the Eastern Mojave Shear Zone. Geologists documented a 25-mile (40-km) long surface rupture and a maximum right-lateral strike-slip offset of about 16 feet on the Lavic Lake fault.

Baja California Earthquake of 2010

A magnitude 7.2 earthquake that occurred just south of the U.S. / Mexico border on Easter Sunday, April 4, 2010, at 3:40:42 PM PDT, was felt throughout Mexico, southern California, Arizona, and Nevada. Analysis of the waveforms suggests that there were two sub-events, with the first one rupturing an 18-km section of the Pescadores fault, followed, six to 12 seconds later by a second, larger event on the Borrego fault. Both of these faults are part of the Laguna Salada fault system, which is the southern extension of the Elsinore fault. Surface rupture continued northward to just past the border into California. The main earthquake caused triggered slip of up to a few centimeters on several faults in the Salton Sea area, and as far north as in the Mecca Hills. Secondary effects, including liquefaction, rockfalls and shattering were reported along a wide area in the El Centro and Brawley region, and westward toward San Diego. More than 4,000 aftershocks had been recorded ten days after the main shock (http://www.scsn.org/2010sierraelmayor.html). A peak instrumental ground acceleration of 1.1g was recorded at the Salton Sea. Similar or stronger shaking may have occurred closer to the epicenter, but given the lack of instrumentation in that area, went unrecorded. Many of the aftershocks occurred along the Elsinore, San Jacinto, and the southern extension of the San Andreas fault through the Brawley area. Based on observations reported by many residents, shaking in the Cudahy area a result of this earthquake was light, in the Modified Mercalli intensity III to IV range (http://earthquake.usgs.gov/earthquakes/dyfi/events/ci/14607652/us/index.html).

La Habra Earthquake of 2014

The magnitude 5.1 earthquake that occurred on Friday, March 28, 2014 at 9:09 PM local time was felt from the Mexican border to the San Joaquin Valley. In Cudahy, the shaking as a result of this earthquake was reported as moderate, consistent with a Modified Mercalli intensity of V. The earthquake, although only moderate in size, caused structural damage to several apartment buildings and a few houses near its epicenter. Water mains and gas lines ruptured in La Habra and Fullerton. As many as 2,000 residents were without power immediately following the earthquake, and approximately 100 customers were still without power almost 24 hours after the temblor. Minor injuries due to broken glass and people trying to leave their residences were reported. The source (fault) for this earthquake is still being investigated by the seismological community; some have suggested the Puente Hills thrust fault, but the northeast trend defined by the hundred plus aftershocks may suggest a previously unknown fault that is somehow related to the Puente Hills thrust fault or the Whittier fault. Additional information regarding the source of this earthquake is anticipated as the seismological community reviews the ground motion data generated by this event.

Earthquake Hazard Assessment

Choosing Earthquakes for Planning and Design

It is often useful to create a **design earthquake scenario** to study the effects of a particular earthquake on a building or a community. Typically, such scenarios have considered the largest earthquake believed possible to occur on a fault or fault segment, referred to as the **maximum magnitude earthquake (M_{max})**. Building codes usually consider other scenarios for the design of structures, using the ground motion with a statistical probability of being exceeded in a given length of time, with different earthquake scenarios considered depending on the application, such as the planned use, lifetime, or importance of a facility. Traditionally, the more critical the structure, the longer the time period used between earthquakes and the larger the design earthquake that has been used. Seismic design parameters in the most recent version of the California Building Code (2013 edition) are based on the **risk-targeted maximum considered earthquake**, with a ground motion that has a 2 percent probability of being exceeded in 50 years and a recurrence interval of about 2,500 years, with an adjustment for risk. Risk is defined as the probability that damage will occur to the proposed structure. Buildings are designed to withstand a 1-percent probability of collapsing in 50 years. **Seismic design parameters** define what kinds of earthquake effects a structure must be able to withstand. These include peak ground acceleration, duration of strong shaking, the periods of incoming strong motion waves, and the orientation of maximum response of the earthquake's motion.

Geologists, seismologists, engineers, emergency response personnel and urban planners typically have used maximum magnitude and maximum considered earthquakes to evaluate the seismic hazard of a site or area. The assumption is that if we plan for the worst-case scenario, we establish safety margins. As a result, smaller earthquakes, which are more likely to occur, can be dealt with effectively.

As is true for most of the Los Angeles Basin, many potential earthquake sources pose a threat to Cudahy. Thus it is also important to consider the overall likelihood of damage from a plausible suite of earthquakes. This approach is called **probabilistic seismic hazard analysis (PSHA)**, and typically considers the likelihood of exceeding a certain level of damaging ground motion that could be produced by any or all faults within a 100-km (62-mile) radius of the project site, or in this case, the city of Cudahy.

Regardless of which fault causes a damaging earthquake, there will always be **aftershocks**. By definition, these are smaller earthquakes that happen close to the **mainshock** (the biggest earthquake of the sequence) in time and space. These smaller earthquakes occur as the Earth adjusts to the regional stress changes created by the mainshock. The bigger the mainshock, the greater the number of aftershocks, the larger the aftershocks will be, and the wider the area in which they might occur. On average, the largest aftershock will be 1.2 magnitude units less than the mainshock. This is an average, and there are many cases where the biggest aftershock is larger than the average predicts. The key point is that any major earthquake will produce aftershocks large enough to cause additional damage, especially to already weakened structures. Consequently, post-disaster response planning must take damaging aftershocks into account.

In California, many agencies are focused on seismic safety issues, including the California Geological Survey (CGS), the State's Seismic Safety Commission (SSC), the United States Geological Survey (USGS), the Governor's Office of Emergency Services (OES), the Applied Technology Council (ATC), and the California Institute of Technology (Cal Tech). A number of other universities and private foundations also invest time and resources in seismic studies and seismic hazard mitigation. Many of 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, ground shaking, ground motion amplification, liquefaction, earthquake induced landslides, and for coastal areas, tsunami inundation zones. Seismic hazard maps have been published and are available for many communities in California through the California Geological Survey. Some of the most significant earthquake-induced hazards with the potential to impact the city of Cudahy are described below.

Seismic Shaking

Seismic shaking is the seismic hazard that has the greatest potential to severely impact Cudahy given the city's proximity to several active seismic sources (faults). To give the City a better understanding of the hazard posed by these faults, we conducted a deterministic seismic hazard analysis to compute the Peak Horizontal Ground Accelerations (PHGA – that is, the ground shaking) that can be expected at Cudahy's City Hall due to earthquakes occurring on any of the known active or potentially active faults within 100 km (62 miles) of the city.

The fault database (including fault locations and earthquake magnitudes of the maximum magnitude earthquakes for each fault) used to conduct these seismic shaking analyses is that used by the California Geological Survey (CGS) and the U.S. Geological Survey (USGS) (Peterson and others, 1996; Cao and others, 2003). Peak ground acceleration (ground shaking) depends on the size of the earthquake, the proximity of the rupturing fault, and local soil conditions. Effects of soil conditions are estimated by use of an attenuation relationship. To develop these relationships, scientists analyze recordings of earthquake shaking on similar soils during earthquakes of various sizes and distances. The peak ground acceleration estimates obtained from these analyses can be then used to provide a general indication of relative earthquake risk at a given site. For individual projects however, site-specific analyses that consider the precise distance from a given site to the various faults in the region, as well as the local near-surface soil types, should be conducted.

Cudahy's City Hall, like the rest of the city, is built on unconsolidated alluvial deposits, which can amplify earthquake shaking. To quantify the degree of amplification, velocity measurements of earthquake shear-waves and other site-specific sub-surface analyses would be needed. A generalized estimate, however, can be obtained by using any of several attenuation relations that have been developed for soft soils in the western U.S. For the purposes of this report, we used deterministic analysis software by Blake (2000), and the attenuation relationships of Boore and others [1997, for a soil with a near-surface shear-wave velocity of 250 meters per second (m/s)], Bozorgnia, Campbell and Niazi [1999, for Holocene soils], and Abrahamson and Silva [1995, 1997, for soil] to estimate the PHGA at City Hall. Similar analyses were made for a random location near the northern portion of the city, to evaluate the expected differences in ground shaking across Cudahy. The results of these analyses are summarized in Table 6-3 below.

Table 6-3 shows:

- The closest approximate distance, in miles and kilometers, between Cudahy's City Hall and each of the main faults considered in the analysis;
- the maximum magnitude earthquake (M_{max}) each fault is estimated capable of generating;
- the intensity of ground motion, expressed as a fraction of the acceleration of gravity (g), that could be experienced in the Cudahy area if the M_{max} occurs on one of these faults (values given range from the median to median plus 1 sigma standard deviation); and
- the Modified Mercalli seismic Intensity (MMI) values estimated to be felt in the City as a result of the M_{max} on each one of these faults.

Those faults that can cause peak horizontal ground accelerations of about 0.1g or greater (Modified Mercalli Intensities greater than VII) in the Cudahy area are listed in Table 6-3. For a map showing most of these faults, refer to Map 6-1. Those faults included in Table 6-3 that would have the greatest impact on the Cudahy area, or that are thought to have a higher probability of causing an earthquake, are described in more detail in the following pages.

Table 6-3: Estimated Horizontal Peak Ground Accelerations and Seismic Intensities in the Cudahy Area

Fault Name	Distance to Cudahy (km)	Distance to Cudahy (mi)	Magnitude of M_{max} *	PGA (g) from M_{max}	MMI from M_{max}
Puente Hills Blind Thrust Fault	1.2	0.7	7.2	0.53-1.38	X-XII
Compton Thrust*	2.9	1.8	6.8	0.4-0.8	X-XII
Upper Elysian Park Thrust Fault	10.5	6.5	6.4	0.29-0.58	IX-X
Newport-Inglewood (LA Basin)	10.8	6.7	7.1	0.29-0.60	IX-X
Whittier	15.5	9.6	6.8	0.21-0.44	VIII-X
Raymond	16.7	10.4	6.5	0.22-0.40	IX-X
Hollywood	17.1	10.6	6.4	0.20-0.38	VIII-IX
Verdugo	18.2	11.3	6.9	0.23-0.47	VIII-X
Santa Monica	23.8	14.8	6.6	0.17-0.32	VIII-IX
Palos Verdes	23.9	14.9	7.3	0.17-0.39	VIII-IX
Sierra Madre	25.4	15.8	7.2	0.20-0.42	VIII-X
San Jose	28.6	17.8	6.4	0.14-0.25	VIII-IX
Clamshell-Sawpit	29.9	18.0	6.5	0.14-0.27	VIII-IX
Malibu Coast	32.6	20.3	6.7	0.13-0.27	VIII-IX
Northridge (East Oak Ridge)	34.2	21.3	7.0	0.13-0.29	VIII-IX
Chino – Central Avenue	35.1	21.8	6.7	0.12-0.26	VII-IX
Sierra Madre (San Fernando)	35.7	22.2	6.7	0.12-0.25	VII-IX
San Joaquin Hills	38.5	23.9	6.6	0.12-0.24	VII-IX
San Gabriel	39.6	24.6	7.2	0.11-0.25	VII-IX
Cucamonga	45.6	28.3	6.9	0.11-0.24	VII-IX
Anacapa - Dume	46.9	29.1	7.5	0.14-0.31	VIII-IX
Simi – Santa Rosa	59.3	36.8	7.0	0.09-0.20	VII-VIII
Santa Susana	48.6	30.2	6.7	0.10-0.20	VII-VIII
Newport – Inglewood (Offshore)	47.6	29.6	7.1	0.09-0.20	VII-VIII
San Andreas (1857 rupture)	61.1	38.0	7.8	0.10-0.25	VII-IX
San Andreas (Whole Southern)	61.1	38.0	8.0	0.11-0.27	VII-IX

Abbreviations used in Table 6-3:
mi – miles; **km** – kilometer; **M_{max}** – maximum magnitude earthquake; **PGA** – peak ground acceleration as a percentage of g, the acceleration of gravity; **MMI** – Modified Mercalli Intensity.
* The M_{max} reported herein are based on the fault parameters published by the CGS (Cao et al., 2003; CDMG, 1996). However, as described further below in the text, recent paleoseismic studies suggest that some of these faults, like the Whittier and Sierra Madre faults, can generate even larger earthquakes than those listed above. In general, areas closer to a given fault will generally experience higher accelerations than areas farther away.

*The peak ground motions for the Compton fault are estimates, as this fault is currently not part of the CGS database.

The ground motions presented in Table 6-3 are based on the largest earthquake that each fault, or fault segment, is believed capable of generating, referred to as the ***maximum magnitude***

earthquake (M_{max}). This deterministic approach is useful to study the effects of a particular earthquake on a building or community. However, since many potential earthquake sources pose a hazard to the region, it is also important to consider the overall likelihood of damage from a plausible suite of earthquakes, including earthquakes of different sizes on the same fault. This approach is called ***probabilistic seismic hazard analysis*** (PSHA), and typically considers the likelihood of exceeding a certain level of damaging ground motion that could be produced by any or all faults within a given radius of the project site, or in this case, the city of Cudahy. Most seismic hazard analyses consider a distance of 100 km (62 miles), but this is arbitrary. PSHA has been utilized by the U.S. Geological Survey to produce national seismic hazard maps such as those used by the Uniform Building Code, the International Building Code and the California Building Code.

We also ran the interactive ground motion module from the U.S. Geological Survey (http://earthquake.usgs.gov/research/hazmaps/design/; https://geohazards.usgs.gov/deaggint/2008/) to estimate the ground motions that have a 10 and 2 percent probability, respectively, of being exceeded in 50 years in the vicinity of Cudahy's City Hall. [Seismic design parameters in the California Building Code are based on the maximum considered earthquake, with a ground motion that has a 2 percent probability of being exceeded in 50 years and a recurrence interval of about 2,500 years.] For Cudahy, the estimated level of ground motion that has a 10 percent probability of being exceeded in 50 years is approximately 0.39g. The level of ground motion with a 2 percent probability of being exceeded in 50 years is 0.71g. The deaggregation analysis suggests that the principal sources responsible for these levels of shaking are the Puente Hills and Upper Elysian Park thrust faults, and the Whittier fault. These faults are discussed further below. These levels of shaking are in the moderate to high range for southern California. Seismic shaking as a result of these ground accelerations would be perceived as severe to violent, and damage would be in the moderate to heavy range, impacting particularly older and poorly constructed buildings. For further discussion on the anticipated damage in Cudahy as a result of a possible earthquake on the Puente Hills thrust fault, considered the worst-case scenario for the City, continue reading this section.

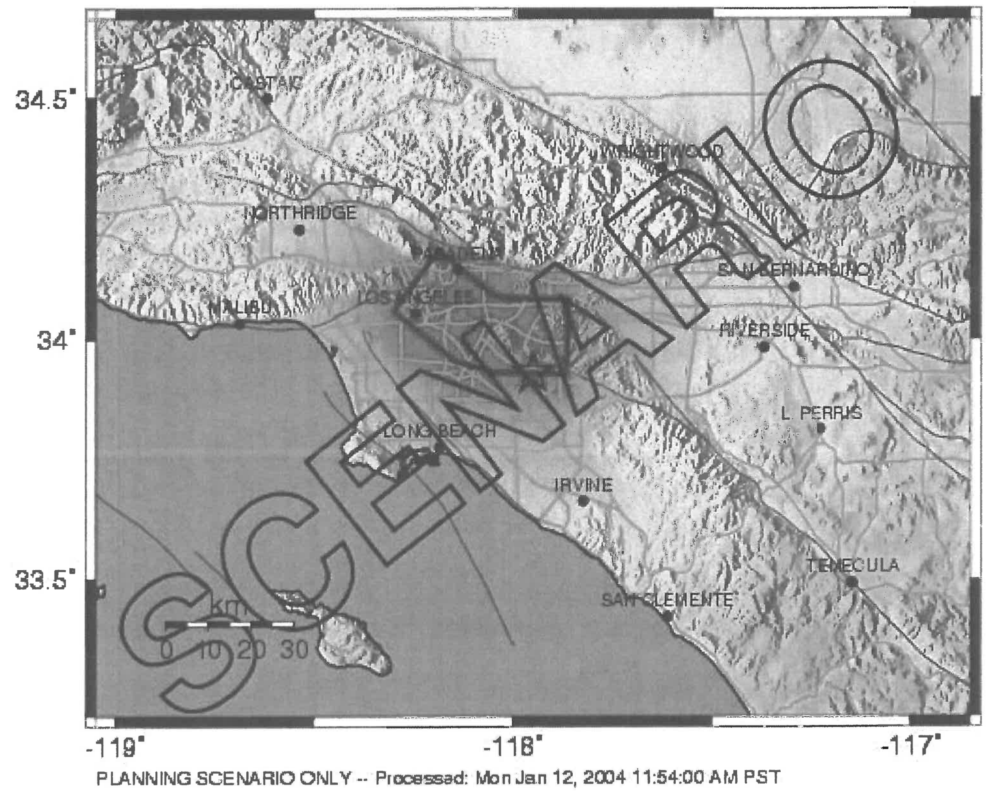
Seismic Shaking Sources

Puente Hills Thrust Fault

In 1999, Shaw and Shearer announced the discovery of a blind thrust fault that extends from the Los Angeles metropolitan area southeastward to northern Orange County. The fault does not extend upward to the surface, which is why it is called blind, although it is expressed at the surface by a series of low hills, including the Puente Hills on its eastern end. These hills have risen over the surrounding landscape in response to movement on the underlying fault; Dolan and others (2003) believe that the hills rise 1 to 2 meters (3 to 6 feet) every time the Puente Hills thrust fault breaks in a large magnitude earthquake of M_w 7.2 to 7.5. The surface projection of the Puente Hills thrust fault ramp runs just south of Cudahy's northern limits (see Map 6-3), making this fault the seismic source closest to the city.

Dolan and others' (2003) studies suggest that the fault has experienced four large earthquakes in the past about 11,000 years. Smaller earthquakes that rupture only a section of the fault are also possible, as evidenced by the Whittier Narrows earthquake of 1987, which is now attributed to rupture of a small, deep patch of the Santa Fe Springs segment of the Puente Hills thrust. Thrust faults typically generate stronger ground shaking than strike-slip faults, as the ground above the plane of the fault is moved up and over the underlying plane. Ground shaking from earthquakes on these types of faults is also felt over a broader area, tends to last longer, and has more of the lower frequency seismic waves. All of these characteristics are especially damaging to high-rise buildings and large structures, like freeway overpasses. In fact, a 2005 study on the impact that an earthquake on the Puente Hills fault would have on Los Angeles estimates between 3,000 and 18,000 fatalities, and more than $250 billion in total losses (Field et al., 2005), making this fault "The Big One" for the Los Angeles area.

Map 6-5: Scenario for a M7.1 Earthquake on the Puente Hills Fault Showing Estimated Intensity Values in the Region Resulting from this Event



PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	<.17	.17-1.4	1.4-3.9	3.9-9.2	9.2-18	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	8.1-16	16-31	31-60	60-116	>116
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	[illegible]	[illegible]

Source: http://earthquake.usgs.gov/earthquakes/shakemap/sc/shake/Puente_Hills_se/

A magnitude 7.1 earthquake on the Puente Hills thrust fault is thought capable of generating ground accelerations in the Cudahy area of between 0.53g and 1.38g (see Map 6-5 above). The perceived shaking as a result of these peak ground accelerations would be in the severe to extreme range, with moderate to very heavy damage potential (Modified Mercalli intensities in the X to XII range). If the fault breaks in a larger magnitude earthquake, the ground motions could be even stronger. According to Dolan and others (2003), this fault last ruptured several thousand years ago, although when exactly is unknown. Therefore, there is the possibility that this fault could rupture again in the not-too-distant future.

Compton Thrust Fault

The Compton Thrust fault is a blind thrust fault in the southwestern portion of the Los Angeles basin. The fault is part of the Compton-Los Alamitos fault system, postulated to extend over 50 miles from the Los Angeles Basin southeast into northwestern Orange County. Little is known about this fault because it does not break the surface. However, Shaw and Suppe (1996) calculated a slip rate of 1.4 +/- 0.4 mm/yr based on modeling of deep seismic data. In 1997, Mueller reported that geologic structures and units overlying the fault are not deformed, including a 1,900 year-old peat deposit and a 15,000 to 20,000 year-old aquifer, suggesting that the fault is not active. As a result of Mueller's (1997) work, the Compton fault was taken off the CGS active fault database. More recent work, however, suggests that the Compton fault has generated several large-magnitude earthquakes in the Holocene, with a minimum slip rate of about 1.5 mm/yr (Leon et al., 2007). Oil-well records and seismic lines reviewed by Yeats and Verdugo (2010) show that the Compton-Los Alamitos fault is associated at depth with the Newport-Inglewood fault. In fact, survey records indicate that uplift occurred along the Compton-Los Alamitos trend during the 1933 Long Beach earthquake (Barrows, 1974), indicating that this structure accommodated some of the strain released during that earthquake.

Although associated with the Newport-Inglewood fault, the Compton-Los Alamitos fault is thought capable of generating a thrust-type earthquake on its own. For the purposes of this study, we assumed that the Compton fault has the potential to generate at a minimum a magnitude 6.8 earthquake. Given that at its closest approach, the surface projection of the fault is less than 2 miles from Cudahy (see Map 6-3), strong ground shaking would be expected, with peak horizontal ground accelerations estimated at between 0.4g and 0.8g. Higher accelerations are expected in the communities immediately south of the surface projection of the fault (see Map 6-1), as this fault is south-dipping, and the block south of the fault would move up relative to the block on its north side.

Upper Elysian Park Fault

The Upper Elysian Park fault is one of several blind thrust faults that underlie the Los Angeles metropolitan area, such as the Puente Hills thrust fault discussed above (see Map 6-1). Of these, the Upper Elysian Park blind fault is closest to the surface (Map 6-1), and extends from about the Silver Lake district to the Whittier Narrows area, a distance of approximately 11 miles (18 km) (Oskin et al. 2000). Repeated movement on this fault has formed several gently rolling, east-west trending hills in downtown Los Angeles that are the surface expression of this fault at depth. These hills are thought to move upward, relative to the surrounding landscape, at a rate of about 23.6 to 33.5 inches (60 to 85 cm) per earthquake event, with these earthquakes occurring about every 2,800 to 3,900 years.

Oskin et al. (2000) also estimated that the Upper Elysian Park fault is capable of generating earthquakes of between magnitude 6.2 and 6.5. The CGS (Cao et al., 2003) uses a maximum magnitude earthquake of 6.4 for this fault. Such an earthquake is thought capable of generating peak horizontal ground accelerations in the Cudahy area of between 0.29g and 0.58g, with Modified Mercalli intensity values in the IX to X range. Shaking as a result of these ground motions would be perceived as severe, with moderate to heavy damage.

Lower Elysian Park Fault

The Whittier Narrows earthquake of October 1, 1987 first alerted geologists to the presence of blind thrust faults underneath the Los Angeles basin. In 1989, Davis and others used oil field data to construct cross-sections showing the sub-surface geology of the basin, and proposed that the Whittier Narrows earthquake occurred on a 20- to 38-km- (12- to 24-mile) long thrust ramp they called the Elysian Park thrust fault (it has since been renamed the Lower Elysian Park fault to differentiate it from the Upper Elysian Park thrust of Oskin and others (2000) discussed above. Davis and others (1989) modeled the [Lower] Elysian Park as a shallow-angle, reverse fault 6 to 10 miles below the ground surface, generally located between the Whittier fault to the southeast and the Hollywood fault to the west-northwest. Then, in 1996, Shaw and Suppe re-interpreted the subsurface geology of the Los Angeles basin and proposed a new model for what they call the Elysian Park trend. The revised fault of Shaw and Suppe (1996) starts at a depth of approximately 10 km (6.2 miles) and dips to the northeast at an angle of about 22 degrees. The surface projection of the tip of the fault plots near the southern boundary of Cudahy, as shown on Map 6-3.

Shaw and Shearer (1999) also relocated the main shock and aftershocks of the 1987 earthquake, and showed that the earthquake sequence occurred on an east-west trending buried thrust they called the Puente Hills buried thrust (see discussion above). Furthermore, Shaw and Shearer (1999) suggested that the Lower Elysian Park thrust fault is no longer active. As a result, the California Geological Survey (Petersen and others, 1996; Cao and others, 2003) took the fault off the active faults of California database. However, given that research is being conducted to better characterize the blind thrust faults that underlie the Los Angeles basin, the Lower Elysian Park thrust fault may undergo additional interpretations, and future studies could show that the fault is active.

As modeled, the Lower Elysian Park thrust fault is approximately 34±3 km (21.1±1.9 miles) long, and, based on its length, if active, could generate earthquakes of about magnitude 6.9 to 7.1. Movement on this fault, if it occurred during an earthquake, would be expressed at the surface as uplift over a broad area as the fault is too deep to cause surface fault rupture. Ground shaking in the Cudahy area as a result of such an earthquake would be similar to thatose calculated for an earthquake on the Puente Hills thrust fault. At this time, however, the likelihood of an earthquake occurring on this fault is considered very low, given our current understanding of these buried thrusts.

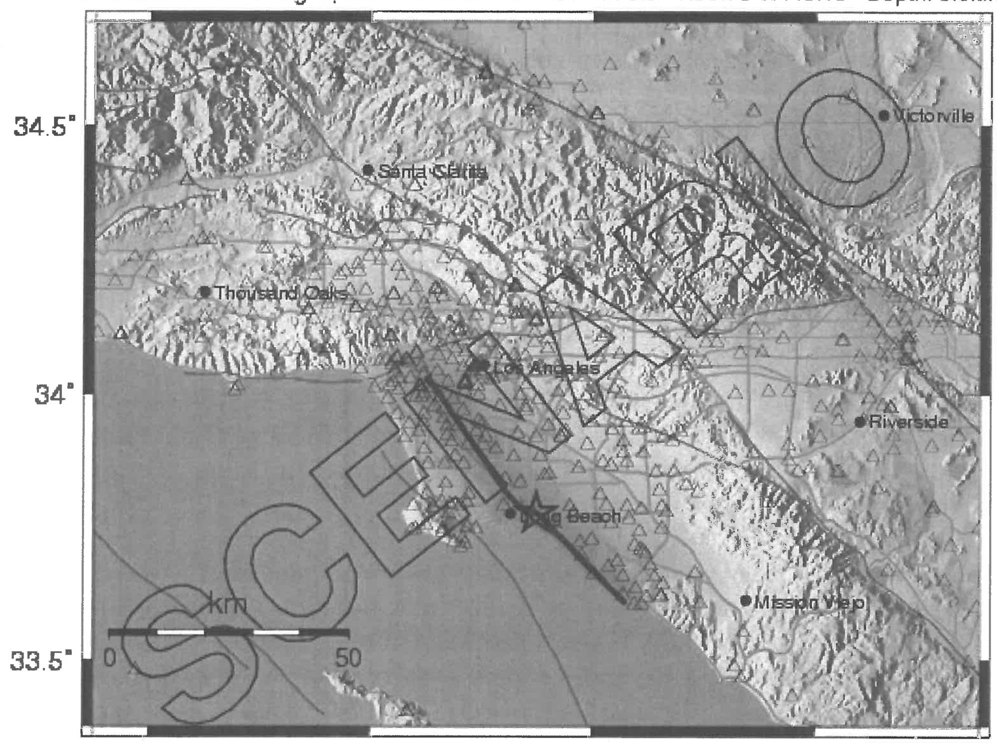
Newport-Inglewood Fault Zone

The northwest-trending Newport-Inglewood fault zone (NIFZ) is 145 miles long and extends onshore from Santa Monica south to Newport Beach. At Newport Beach, the fault continues offshore and lines up with a deep submarine canyon (Fischer and Mills, 1991) known as the Newport Submarine Canyon. The offshore segment of the fault joins the Rose Canyon fault, which extends southeasterly through San Diego to the international border. The Newport-Inglewood fault zone is discontinuous, consisting of a series of left-stepping en echelon fault strands, each up to 4 miles long. Onshore, the fault zone is marked by a series of uplifts and anticlines including, from south to north, Newport Mesa, Huntington Mesa, Bolsa Chica Mesa, Alamitos Heights and Landing Hill, Signal Hill and Reservoir Hill, Dominguez Hills, Rosecrans Hills, and Baldwin Hills (Barrows, 1974). These anticlines are traps for oil and have been drilled successfully since the beginning of the last century.

The slip rate for the NIFZ is poorly constrained at between 0.3 to 3.5 mm/yr. A study by Woodward-Clyde Consultants in 1979 calculated a slip rate of 0.5 mm/yr for the southern onshore segment of the NIFZ. This is consistent with long-term slip rates of 0.31 – 0.52 mm/yr calculated by Freeman and others (1992) by correlating sediment layers on one side of the fault to a best match on the opposite side of the fault. More recent paleoseismic studies by Grant and others (1997) also suggest a slip rate of between 0.34 to 0.55 mm/yr for the onshore segment. Fischer and Mills (1991) estimated a slightly higher slip rate of between 1.3 and 3.5 mm/yr for the offshore segment of the NIFZ between San Mateo Point and Newport Beah with an earthquake recurrence interval of between 200 and 800 years. Lindvall and Rockwell (1995) calculated a maximum slip rate of 2 mm/yr for the Rose Canyon fault, the southern continuation of the NIFZ.

Map 6-6: Scenario for a M6.9 Earthquake on the Onshore Newport-Inglewood Fault Showing Estimated Intensity Values in the Region Resulting from this Event

Scenario Date: Fri Aug 3, 2001 05:00:00 AM PDT M 6.9 N33.78 W118.13 Depth: 6.0km



PLANNING SCENARIO ONLY – Map Version 4 Processed Tue Nov 30, 2010 02:00:43 PM PST

PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	<.17	.17-1.4	1.4-3.9	3.9-9.2	9.2-18	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	8.1-16	16-31	31-60	60-116	>116
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

Source: http://earthquake.usgs.gov/earthquakes/shakemap/sc/shake/Newport_Inglewood6.9_se/

Paleoseismic studies by Grant and others (1997) and Shlemon and others (1995) have shown that the onshore segment of the NIFZ has had three to five ground rupturing earthquakes in the past 11,700 (+/-700 years). This is consistent with the recurrence interval calculated by Fischer and Mills (1991) for the offshore segment of the NIFZ. The last significant earthquake on the NIFZ was the magnitude 6.3 Long Beach earthquake that did not break the ground surface. A maximum earthquake of magnitude 7.1 on the onshore segment of the NIFZ has the potential to generate strong ground motions in the Cudahy area, with peak horizontal ground accelerations of between 0.29g and 0.60g (see Table 6-3). This would be perceived as very strong to severe shaking (see Map 6-6, which shows the intensities anticipated in the region as a result of a magnitude 6.9 earthquake scenario). A 7.1 earthquake on the offshore segment of the NIFZ could generate peak horizontal ground acceleration in the Cudahy area of between 0.09g and 0.20g.

Elsinore (Whittier – Chino – Central – Elsinore) Fault Zone

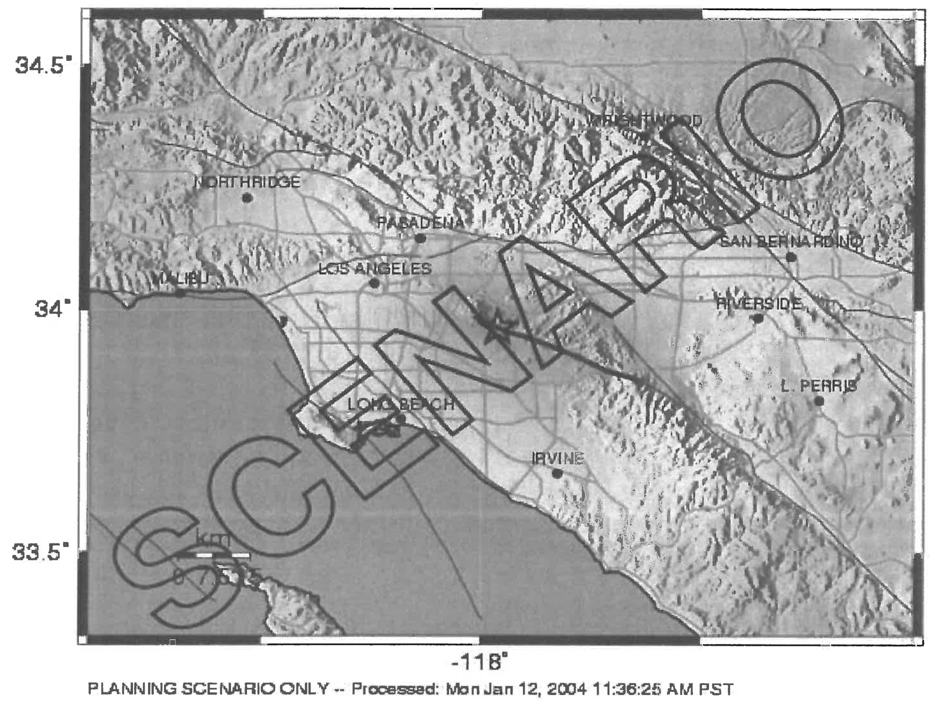
The 125-mile (200-km) long Elsinore fault zone is part of the San Andreas fault system in southern California and accommodates about ten percent of the motion between the Pacific and North American plates (WGCEP, 1995). The fault zone extends northwesterly from the US-Mexico border to nearly the north end of the Los Angeles Basin. South of the Santa Ana River, the fault consists of a series of stepping traces in a relatively narrow zone, and together, these are referred to as the Elsinore fault. North of the Santa Ana Mountains, the Elsinore fault splits into the Whittier and Chino faults. The fault zone has historically produced a ~M 6 earthquake on the Glen Ivy segment of the Elsinore fault (Toppozada and Parke, 1982; Rockwell et al., 1986), a M>6.9 event on the Laguna Salada fault (Rockwell, 1989; Mueller and Rockwell, 1995), and a M7.2 event on the Pescadores/Borrego faults, also part of the Laguna Salada fault system. These events indicate that the Elsinore fault zone is active and capable of producing destructive earthquakes.

The Whittier fault is considered one of the most prominent structural features of the Los Angeles basin. The fault zone extends from the Santa River northwestward to the Whittier Narrows area, a distance of approximately 24 miles (38 km). Much of the movement of the Whittier fault is late Pleistocene and younger, as indicated by tilted, locally overturned and faulted bedrock less than 2 million years old, and faulted alluvium.

No major historical earthquakes have been attributed to the Whittier fault. However, trenching studies have documented recurrent movement of this fault in the past 17,000 years (Gath et al., 1992; Patterson and Rockwell, 1993). Based on radiocarbon dating of faulted and unfaulted alluvium exposed in trenches, the two most recent surface rupturing earthquakes on this fault occurred between 1,400 and 2,200 years ago, and 3,000 and 3,100 years ago, respectively (Patterson and Rockwell, 1993). These values give a minimum recurrence interval of 760 (+640, -274) years (WGCEP, 1995). Based on these trenching studies, the Whittier fault is thought to be moving at a rate of about 2.5 +/- 1 mm/yr. Since a minimum of at least 1,400 years has passed since the last surface-rupturing event occurred on the Whittier fault, the fault is at or near the end of its cycle and is likely to generate an earthquake in the not too distant future..

The Chino fault bounds the eastern flank of the Chino Hills and extends from the Los Serranos area of Chino Hills southwestward to Corona, a distance of approximately 13 miles (21 km). For decades, the Chino fault was considered primarily a reverse, potentially active fault, but more recent studies have shown that it is primarily a right-lateral strike-slip fault (with a minor reverse component), and that it has moved at least once in the Holocene (the past about 11,000 years) (Treiman, 2002; Walls and Gath, 2001). Given these findings, the fault was upgraded to active, and zoned under the guidelines of the Alquist-Priolo Earthquake Fault Zone Act (Treiman, 2002). The Central Avenue fault is to the east of the Chino fault, buried under sediments of the Chino Basin. This fault forms a barrier to ground water but at this time is not thought to be an active structure (Treiman, 2002).

Map 6-7: Scenario for a M6.8 Earthquake Near the North End of the Whittier Fault Showing Estimated Intensity Values in the Region Resulting from this Event



PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	<.17	.17-1.4	1.4-3.9	3.9-9.2	9.2-18	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	8.1-16	16-31	31-60	60-116	>116
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

Source: http://earthquake.usgs.gov/earthquakes/shakemap/sc/shake/Whittier6.8_se/

The rate of slip on the Chino fault is still being resolved. Fault experts believe that the Elsinore fault, which has a slip rate of 5 to 6 mm/yr, is transferring that strain northward onto the Whittier and Chino faults. As discussed above, studies of the Whittier fault suggest that it has a slip rate of 2 to 3 mm/yr, which means that the Chino fault could be carrying a similar amount of strain. A paleoseismic study of the Chino fault conducted by Walls and Gath (2001) however, yielded a late Quaternary slip rate for this fault of only 0.36 to 0.51 mm/yr, although laterally offset outcrops of the Miocene-aged Soquel sandstone suggest a long-term slip rate of 0.7 to 2.2 mm/yr (Madden et al., 2007). If the Chino fault is indeed now slipping at a rate of less then 1 mm/yr, then some of the strain from the Elsinore fault may be responsible for aseismic (not earthquake-induced) folding and uplifting of the Chino (Puente) Hills. Future studies of the Chino fault are expected to better define its slip rate and potential seismic hazard to the region.

The deterministic analysis for Cudahy estimates peak ground accelerations of about 0.21g to 0.44g for a magnitude 6.8 earthquake on the Whittier segment, and 0.12g to 0.26g for a magnitude 6.7 earthquake on the Chino segment. Some geologists believe that the Whittier fault is capable of generating a 7.1 magnitude earthquake. Such an earthquake would result in stronger ground shaking in the Cudahy area than the values reported here. See the Modified Mercalli intensities estimated from a magnitude 6.8 earthquake scenario on the Whittier fault on Map 6-7, above.

Raymond Fault

The Raymond fault zone is about 15.5 miles (25 km) long and extends southwesterly from Monrovia, where it intersects the Sierra Madre fault at the foot of the San Gabriel Mountains, across the eastern and southern margins of Pasadena, to the northern reaches of Arcadia, San Marino and South Pasadena. A sharp gravity gradient and aerial photo lineaments suggest that the western end of the fault may connect to the eastern end of the Hollywood fault (Chapman and Chase, 1979; Crook et al., 1987; Dolan et al., 2001).

The fault is gently arcuate and convex to the south, and locally produces a very obvious south-facing scarp; the scarp is especially well defined near the middle of the fault trace (Crook et al., 1987; Weaver and Dolan, 2000). This led many geologists to originally favor reverse slip as the predominant sense of motion for the fault (Buwalda, 1940, as reported in Crook et al., 1987). However, deflected channels, shutter ridges, sag ponds and pressure ridges along the fault's main traces indicate that the Raymond fault is primarily a strike-slip fault (Jones et al., 1990). This sense of motion was substantiated by the seismological record, especially by the mainshock and aftershock sequence to the 1988 Pasadena earthquake of local magnitude (M_L) 5.0 that occurred on this fault (Jones et al., 1990; Hauksson, 1994).

Several paleoseismic studies of the Raymond fault have been conducted, mostly across the North Branch of the fault. Crook et al. (1987) excavated a trench near Eaton Wash that exposed a 36-foot wide fault zone that reportedly disturbed all sedimentary units to within about 1 foot of the surface, and they also investigated the fault at other locations. Dolan et al. (2000) excavated more than 25 trenches in almost the same location as Crook et al.'s (1987) trench, while Weaver and Dolan (2000) conducted paleoseismic trenching of the Raymond fault in San Marino and at the Los Angeles Arboretum in Arcadia. Together these studies show that the most recent surface rupture on the western and central portions of the Raymond fault occurred between 1,000 and 2,000 years ago (Weaver and Dolan, 2000), and that between five and eight earthquakes occurred on this fault between 2,000 and 40,000 years ago. This yields a maximum average recurrence interval of between 5,700 and 10,000 years for earthquakes on the Raymond fault (Crook et al., 1987; Weaver and Dolan, 2000). Weaver and Dolan (2000) calculated a shorter recurrence interval of ~ 3,300 years for events between 41,500 and 31,500 years ago, based on evidence for three to five events during this time period. All of these earthquakes may be the result of clustering of activity on the Raymond fault during that 10,000-year period (not an unusual occurrence based on studies of other faults, such as the San Andreas), or it could be that the fault has caused several other earthquakes in the more recent past that were not well expressed in the trenches studied, and are therefore missing in the paleoseismic record. Dolan et al.'s study yielded a minimum late Holocene slip rate for the Raymond fault of ~ 4 +1/-0.5 mm/yr (Marin et al., 2000).

A conservative magnitude 6.9 earthquake on the Raymond fault would generate peak ground accelerations in the Cudahy area of about 0.23g to 0.47g. The shaking would be perceived as very strong to severe, and damage would be in the moderate to heavy ranges. However, the paleoseismic data suggest that this fault is capable of generating larger earthquakes, in the 7.0 magnitude range (Dolan et al., 2000b). If this is the case, stronger ground shaking as a result of an earthquake on this fault could be experienced in the Los Angeles region, including Cudahy.

Malibu Coast – Santa Monica – Hollywood Fault Zone

The Hollywood fault is the eastern 9-mile (14 km) long segment of the Malibu – Santa Monica – Hollywood fault system that forms the southern margin of the Santa Monica Mountains (locally known as the Hollywood Hills). It has also been considered the westward extension of the Raymond fault. From east to west, the Hollywood fault traverses the Hollywood section of Los Angeles, and the cities of West Hollywood and Beverly Hills. Movement on the Hollywood fault over geologic time is thought responsible for the growth of the Hollywood Hills, which is why earlier researchers characterized this fault as a northward-dipping reverse fault. However, studies by Dolan et al. (1997, 2000) and Tsutsumi et al. (2001) showed that the Hollywood fault is primarily a left-lateral strike-slip fault. A lateral component of movement on this fault is consistent with its linear trace and steep, 80- to 90-degree dips (reverse faults typically have irregular, arcuate traces and shallow dips).

Subsurface studies by Dolan et al. (2000) suggest that the Hollywood fault moves infrequently. The most recent surface-rupturing earthquake on this fault appears to have occurred 7,000 to 9,500 years ago, and another earthquake appears to have occurred in the last 10,000 to 22,000 years (Dolan et al., 2000a). These data suggest that the fault either has a slow rate of slip (of between 0.33 and 0.75 mm/yr), or that it breaks in large-magnitude events. Interestingly, the recent past history of earthquakes on the Hollywood fault is remarkably similar to that of the Sierra Madre fault. Paleoseismologists are researching the possibility that earthquakes on the Sierra Madre fault trigger rupture of the Santa Monica – Hollywood fault system. If this is the case, then large earthquakes in the Los Angeles region may cluster in time, releasing a significant amount of strain over a geologically short time period, followed by lengthy periods of seismic quiescence.

The Santa Monica segment is a north-dipping, high angle fault that extends for a distance of approximately 22 miles (35 km), through the communities of Pacific Palisades, Westwood, Beverly Hills and Santa Monica, and offshore. The left-lateral, oblique-slip fault was identified in the subsurface from a review of oil wells; at the surface it forms a gentle escarpment that was first recognized as fault controlled in 1992 (Dolan and Sieh, 1992). The fault was trenched at the Veterans Hospital site in Santa Monica, and inferred to have experienced two to three surface-rupturing events in the last 16,000 to 17,000 years (the most recent event is thought to have occurred between 1,000 and 3,000 years ago); at least six other rupture events may have occurred on the fault in the past 50,000 years (Dolan and others, 1995; Dolan and others, 2000). From this trench exposure, Dolan and others (1995) estimated a slip rate on this fault of 1.0-1.5 mm/yr. More recently, Dolan and others (2000) calculated a dip-slip rate of 0.5-0.6 mm/yr.

The Malibu Coast fault is a complex zone of reverse and left-stepping, en echelon, left-lateral strike-slip faults that parallel the west-trending coastline in the Malibu area of southern California. The onshore traces of the fault zone are moderately well expressed by an alignment of benches, saddles and linear drainages, but youthful landsliding and erosion make it difficult to determine the fault's recency of activity. The offshore section of the fault zone is not well defined.

Map 6-8: Scenario for a M6.6 Earthquake on the Santa Monica Fault Showing Estimated Intensity Values in the Region Resulting from this Event

PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	< .17	.17-1.4	1.4-3.9	3.9-9.2	9.2-18	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	8.1-16	16-31	31-60	60-116	>116
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

Source: http://earthquake.usgs.gov/earthquakes/shakemap/sc/shake/StaMonica6.6_se/

The Malibu Coast fault has moved in the late Quaternary, but the timing of the most recent surface-rupturing earthquake on this fault is poorly constrained. Treiman (1994) reports no evidence for Holocene displacement along most of the onshore fault traces. Probable Holocene displacement has been reported on one, and possibly two, secondary faults (Drumm, 1992; Rzonca and others, 1991), but recent studies suggest that some of these secondary faults have not moved in the past 11,000 years. These data suggest that many of the fault traces onshore are no longer active, or that they move very infrequently. Treiman (1994, 2000) favors the first alternative, as he has suggested that the slip rate of the fault has diminished from about 1 to 2 mm/yr in the Quaternary to 0.5 mm/yr in the late Quaternary, to nearly zero in the Holocene. Alternatively, the active strands of the fault may have moved southward, analogous to several other range-fronting faults, such as the Sierra Madre and Cucamonga faults. Further studies of the Malibu Coast fault are necessary to resolve these questions.

The Malibu Coast – Santa Monica – Hollywood fault system has not produced any damaging historical earthquakes, and it has had only relatively minor seismic activity. However, the faults are considered active. Based on its length, the Hollywood fault is thought capable of generating a Mw ~6.4 to 6.6 earthquake. A conservative magnitude 6.4 earthquake on the Hollywood fault is thought capable of generating peak ground accelerations of about 0.20g to 0.38g in Cudahy. A magnitude 6.6 earthquake on the Santa Monica fault is estimated capable of causing peak horizontal ground accelerations of between 0.17g and 0.32g in Cudahy (see Map 6-8). A magnitude 6.7 earthquake on the Malibu Coast, given that it is farther away, is anticipated to generate peak ground motions of about 0.13g to 0.27g in Cudahy. If all three fault segments ruptured together, the resulting >M7 earthquake could generate stronger ground shaking in Cudahy.

Verdugo Fault

The Verdugo fault is a 13 to 19-mile (21 to 30 km) long, southeast-striking fault that that extends along the northeastern edge of the San Fernando Valley, and at or near the southern flank of the Verdugo Mountains, through the cities of Glendale and Burbank. Weber and others (1980) first reported southwest-facing scarps 2 to 3 meters high in the alluvial fan deposits in the Burbank and west Glendale areas, and other subsurface features indicative of faulting. These investigators relied on these scarps, offset alluvial deposits at two localities, and a subsurface groundwater cascade beneath Verdugo Wash to suggest that movement on the Verdugo fault is youthful, but no age estimates were provided. Weber and others (1980) further suggested that this fault is a shallow, north-dipping reverse fault responsible for uplift of the Verdugo Mountains, and proposed that the fault zone is approximately 1 km wide. For nearly 20 years after Weber et al.'s (1980) report, the Verdugo fault was not studied, but in the past 15 years or so, recognizing the potential threat that this fault poses to the Los Angeles metropolitan region, several researchers have started to investigate it.

Some researchers have relied on deep subsurface data, primarily oil well records and geophysical data to review the subsurface geology of the San Fernando Valley area, including the characteristics of the Verdugo fault (Tsutsumi and Yeats, 1999; Langenheim et al., 2000; Pujol et al., 2001). Results of these studies suggest that the Verdugo fault changes in character from a reverse fault adjacent to the Pacoima Hills, near its northwestern terminus, to a normal fault at the southwest edge of the Verdugo Mountains. To the north, the Verdugo fault appears to merge with both the Mission Hills and Northridge Hills faults. To the south, the fault is on trend with the Eagle Rock fault, but it is still unclear whether these faults are connected. Vertical separation on the Verdugo fault is at least 3,300 feet, based on the structural relief between the valley floor and the crest of the Verdugo Mountains and other indicators (Tsutsumi and Yeats, 1999). Even though some of the data suggest that the Verdugo fault is a reverse fault, there are some researchers who have proposed that the Verdugo fault is a left-lateral strike-slip fault (Walls et al., 1998).

Other investigators have taken a more direct, hands-on approach to study this fault, but finding locations suitable for trenching has been difficult in the extensively developed San Fernando Valley. Dolan and Tucker (1999) tried to better define the location and recency of activity of the Verdugo fault by conducting geological and geophysical studies across the inferred trace of the fault in Glendale. They used closely spaced boreholes drilled in a line perpendicular to the trend of the fault, and ground penetrating radar to look for stratigraphic anomalies that could be suggestive of faulting. They identified one possible anomaly that could be the Verdugo fault and excavated a trench across the suspect area. However, the sediments exposed in the trench were too friable to maintain the trench open long enough to conduct their study.

Slip rate on the Verdugo fault is poorly constrained, and currently estimated at about 0.5 mm/yr (CDMG, 1996). The fault's recurrence interval is unknown; however, the fault's southern segment is thought to have ruptured during the Holocene, and the fault is therefore considered active (Jennings, 1994). Based on its length, the Verdugo fault is thought capable of generating magnitude 6.0 to 6.8 earthquakes. A middle-of-the-road magnitude 6.4 earthquake on this fault would generate peak ground accelerations in the Cudahy area of about 0.23g to 0.47g, with intensities in the VIII to X range. A magnitude 6.8 earthquake would generate stronger ground shaking.

Palos Verdes Fault Zone

The 80- to 115 km-long Palos Verdes fault zone is located primarily offshore and extends in a southeasterly direction from Santa Monica Harbor to the southern San Pedro Channel (Map 6-1). The short onshore segment of the fault extends for 9 miles (15 km) from Redondo Beach to San Pedro and follows the northeastern flank of the Palos Verdes Hills. Offshore, to the southeast, the fault trends across Los Angeles Harbor, and onto the continental shelf where it splays into two discontinuous sub-parallel strands and continues southeast as the Coronado Bank fault zone. Northwest of Redondo Beach, the fault is thought to end in a horsetail splay in Santa Monica Bay, although some scientists suggest the fault continues northwesterly and joins the Dume fault (Stephenson et al., 1995). The fault is located about 15 miles southwest of Cudahy at its closest point.

Davis and others (1989) and Shaw and Suppe (1994) modeled the Palos Verdes fault as a southwest-dipping back thrust above a blind thrust. Calculated vertical rates of deformation for the fault based on uplifted marine terraces range from 0.2 to 0.7 mm/yr (Clarke et al., 1985) to 3 mm/yr (Ward and Valensise, 1994). Geomorphic studies, however, indicate the fault has a significant right-lateral component. McNeilan and others (1996) used an offset channel in the Los Angeles Harbor to derive a right-lateral slip rate of 3 mm/yr.

Based on its length and uplift rate, the Palos Verdes fault could produce an earthquake of magnitude 7.3. Given its location relative to Cudahy, an earthquake of that size could generate ground shaking in the city of about 0.17g to 0.39g, with Modified Mercalli intensities of VIII to IX.

Sierra Madre Fault Zone

The Sierra Madre fault zone is a north-dipping reverse fault zone approximately 47 miles (75 km) long that extends along the southern flank of the San Gabriel Mountains from San Fernando to San Antonio Canyon, where it continues southeastward as the Cucamonga fault. The Sierra Madre fault has been divided into five segments, each with a different rate of activity.

The northwestern-most segment of the Sierra Madre fault (the San Fernando segment) ruptured in 1971, causing the M_w 6.7 San Fernando (or Sylmar) earthquake. As a result of this earthquake, the Sierra Madre fault has been known to be active. In the 1980s, Crook and others (1987) studied the Transverse Ranges using general geologic and geomorphic mapping, coupled with a few trenching locations. Based on this work, they suggested that segments of the Sierra Madre fault east of the San Fernando segment have not generated major earthquakes in several thousands of years, and possibly as long as 11,000 years. By California's definitions of active faulting, most of the Sierra Madre fault would therefore be classified as not active. Then, in the mid-1990s, Rubin et al. (1998)

trenched a section of the Sierra Madre fault in Altadena and determined that this segment had ruptured at least twice in the last 15,000 years, causing magnitude 7.2 to 7.6 earthquakes. This suggests that the Los Angeles area is susceptible to infrequent, but large earthquakes on the Sierra Madre fault. Rubin et al.'s (1998) trenching data show that during the last earthquake, the ground was displaced along the fault as much as 13 feet (4 meters) at the surface, and that total displacement in the last two events adds up to more than 34 feet (10.5 meters).

Although the fault apparently slips at a slow rate of between 0.5 and 1 mm/yr (Walls et al., 1998), over time, it can accumulate a significant amount of strain. The paleoseismic data obtained at the Altadena site were insufficient to estimate the recurrence interval and the age of the last surface-rupturing event on this segment of the fault. However, Tucker and Dolan (2001) trenched the east Sierra Madre fault at Horsethief Canyon and obtained data consistent with Rubin et al.'s (1998) findings. At Horsethief Canyon, the Sierra Madre fault last ruptured about 8,000 to 9,000 years ago. A recurrence interval of about 8,000 years was calculated using a slip rate of 0.6 mm/yr and a slip per event of 15 feet (5 meters). Therefore, if the last event occurred more than 8,000 years ago, it is possible that these segments of the Sierra Madre fault are near the end of their cycle, and are likely to generate an earthquake in the not-too-distant future.

The deterministic analysis for the Cudahy City Hall area estimates peak ground accelerations of about 0.20g to 0.42g, based on a magnitude 7.2 earthquake on the central segment of the Sierra Madre fault. A larger earthquake on this fault could generate stronger peak ground accelerations. If the San Fernando section of the fault ruptured again in an event similar to the 1971 earthquake, peak ground accelerations of about 0.12g to 0.25g could be expected in Cudahy.

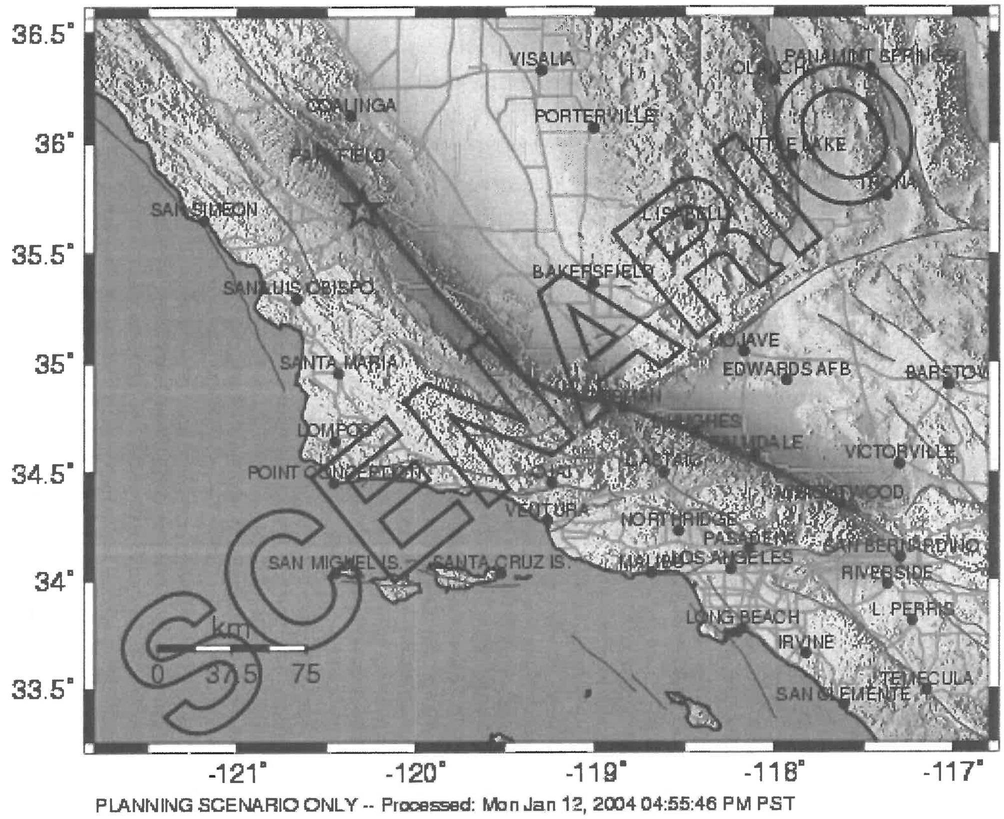
San Andreas Fault Zone

The San Andreas fault is the principal boundary between the Pacific and North American plates, and as such, it is considered the "Master Fault" because it has frequent (geologically speaking), large earthquakes, and it controls the seismic hazard in southern California. The fault extends over 750 miles (1,200 kilometers), from near Cape Mendocino in northern California to the Salton Sea region in southern California. At its closest approach, the San Andreas fault is approximately 38 miles (61 km) north-northeast of Cudahy.

Large faults, such as the San Andreas fault, are generally divided into segments in order to evaluate their future earthquake potential. The segments are generally defined at discontinuities along the fault that may affect the rupture length. Each segment is assumed to have a characteristic slip rate (rate of movement averaged over time), recurrence interval (time between moderate to large earthquakes), and displacement (amount of offset during an earthquake). While this methodology has some value in predicting earthquakes, historical records and studies of prehistoric earthquakes show that it is possible for more than one segment to rupture during a large quake or for ruptures to overlap into adjacent segments.

The last major earthquake on the southern portion of the San Andreas fault was the 1857 Fort Tejon (M 7.9) event. This is the largest earthquake reported in California. The 1857 surface rupture broke a 300-km long section of the fault, resulting in displacements of as much as 27 feet (9 meters) along the rupture zone. Peak ground accelerations in the Cudahy area as a result of the 1857 earthquake are estimated to have been between about 0.10g and 0.25g. Rupture of these fault segments as a group, during a single earthquake, is thought to occur with a recurrence interval of between 104 and 296 years. Map 6-9 shows the seismic intensities that would be expected in the southern California areas if a repeat of the 1857 earthquake occurred. If all the southern segments of the San Andreas fault broke together in a magnitude 8.0 earthquake, peak ground accelerations of between about 0.11g and 0.27g could be felt in Cudahy.

Map 6-9: Intensity Map for a Magnitude 7.8 Earthquake Scenario on the San Andreas Fault (Repeat of the 1857 Fort Tejon Earthquake)



PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	<.17	.17-1.4	1.4-3.9	3.9-9.2	9.2-18	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	8.1-16	16-31	31-60	60-116	>116
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

Source: http://earthquake.usgs.gov/eqcenter/shakemap/sc/shake/1857_se/

Liquefaction and Related Ground Failure

Liquefaction is a geologic process that causes various types of ground failure. Liquefaction typically occurs in loose, saturated sediments primarily of sandy composition, in the presence of ground accelerations over 0.2g (Borchardt and Kennedy, 1979; Tinsley and Fumal, 1985). When liquefaction occurs, the sediments involved have a total or substantial loss of shear strength, and behave like a liquid or semi-viscous substance. Liquefaction can cause structural distress or failure due to ground settlement, a loss of bearing capacity in the foundation soils, and the buoyant rise of buried structures. The excess hydrostatic pressure generated by ground shaking can result in the formation of sand boils or mud spouts, and/or seepage of water through ground cracks.

As indicated above, there are three general conditions that need to be met for liquefaction to occur. The first of these – strong ground shaking of relatively long duration – can be expected to occur in the Cudahy area as a result of an earthquake on any of several active faults in the region, as discussed above. The second and third conditions – loose, unconsolidated sediments consisting primarily of silty sand and sand, and water-saturated sediments within about 50 feet of the surface occur throughout the entire area. Therefore, anywhere in Cudahy there is the potential for liquefaction-induced ground displacements to occur during an earthquake (see Map 6-10).

New construction proposed in Cudahy should include liquefaction evaluation studies, and if the site-specific studies indicate the potential for liquefaction-induced displacements, mitigation measures need to be implemented as part of the project. Given that the City is built out, a nearby moderate to strong earthquake could cause extensive damage to existing buildings and infrastructure. The City should be prepared to respond to damage and disruption in the event of an earthquake.

The types of ground failure typically associated with liquefaction are explained below.

Lateral Spreading – Lateral displacement of surficial blocks of soil as the result of liquefaction in a subsurface layer is called lateral spreading. Even a very thin liquefied layer can act as a hazardous slip plane if it is continuous over a large enough area. Once liquefaction transforms the subsurface layer into a fluid-like mass, gravity plus inertial forces caused by the earthquake may move the mass downslope towards a cut slope or free face (such as a river channel or a canal). Lateral spreading most commonly occurs on gentle slopes that range between 0.3° and 3°, and can displace the ground surface by several meters to tens of meters. Such movement damages pipelines, utilities, bridges, roads, and other structures. During the 1906 San Francisco earthquake, lateral spreads with displacements of only a few feet damaged every major pipeline. Thus, liquefaction compromised San Francisco's ability to fight the fires that caused about 85 percent of the damage (Tinsley et al., 1985).

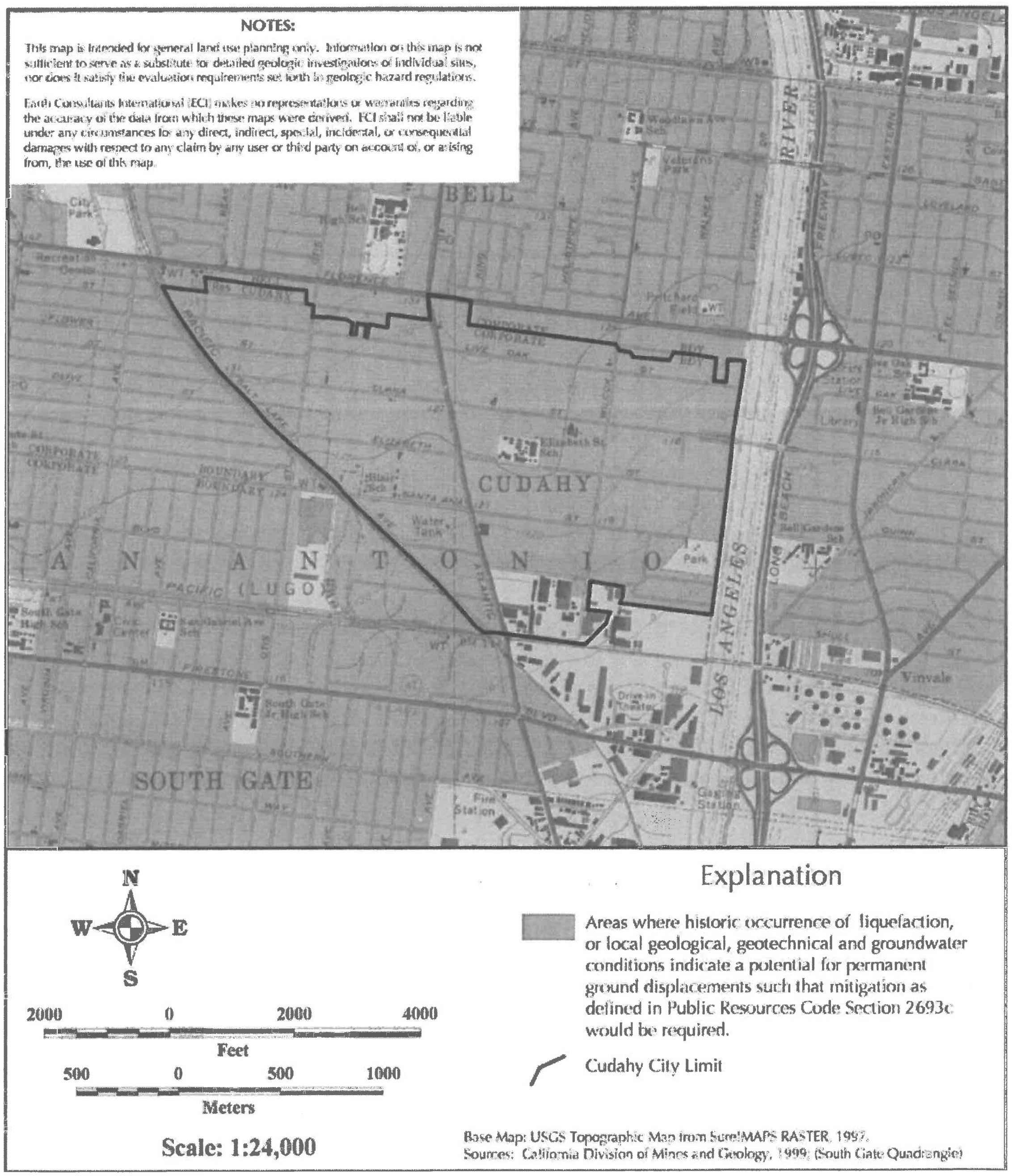
Flow Failure – The most catastrophic mode of ground failure caused by liquefaction is flow failure. Flow failure usually occurs on slopes greater than 3 degrees. Flows are principally liquefied soil or blocks of intact material riding on a liquefied subsurface. Displacements are often in the tens of meters, but in favorable circumstances, soils can be displaced for tens of miles, at velocities of tens of miles per hour. For example, the extensive damage to Seward and Valdez, Alaska, during the 1964 Great Alaskan earthquake was caused by submarine flow failures (Tinsley et al., 1985).

Ground Oscillation – When liquefaction occurs at depth but the slope is too gentle to permit lateral displacement, the soil blocks that are not liquefied may separate from one another and oscillate on the liquefied zone. The resulting ground oscillation may be accompanied by the opening and closing of fissures (cracks) and sand boils, potentially damaging structures and underground utilities (Tinsley et al., 1985).

Loss of Bearing Strength – When a soil liquefies, loss of bearing strength may occur beneath a structure, possibly causing the building to settle and tip. If the structure is buoyant, it may float upward. During the 1964 Niigata, Japan earthquake, buried septic tanks rose as much as 3 feet, and structures in the Kwangishicho apartment complex tilted as much as 60 degrees (Tinsley et al., 1985).

Ground Lurching – Soft, saturated soils have been observed to move in a wave-like manner in response to intense seismic ground shaking, forming ridges or cracks on the ground surface. At present, the potential for ground lurching to occur in a given area can be predicted only generally. Areas underlain by thick accumulation of colluvium and alluvium appear to be the most susceptible to ground lurching. Under strong ground motion conditions, lurching can be expected in loose, cohesionless soils, or in clay-rich soils with high moisture content. In some cases, the deformation remains after the shaking stops (Barrows et al., 1994).

Map 6-10: Seismic Hazards in Cudahy



Vulnerability Assessment

The effects of earthquakes span a large area, and large earthquakes occurring in the southern California area would be felt throughout the region. However, the degree to which 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 hazardous materials facilities; extensive sewer, water, and natural gas pipelines; earthen dams; petroleum pipelines; and other critical facilities, not to mention private property and businesses. Secondary earthquake hazards, such as liquefaction and earthquake-induced landslides, can be just as devastating as ground shaking.

Damage to the building stock in the area is expected to vary. Older, pre-1945 steel frame structures may have unreinforced masonry such as bricks, clay tiles and terra cotta tiles as cladding or infilling. Cladding in newer buildings may be glass, infill panels or pre-cast panels that may fail and generate a band of debris around the building exterior (with considerable threat to pedestrians in the streets below). Structural damage may occur if the structural members are subject to plastic deformation that can cause permanent displacements. If some walls fail while others remain intact, torsion or soft-story problems may result. Overall, modern steel frame buildings have been expected to perform well in earthquakes, but the 1994 Northridge earthquake broke many welds in these buildings, a previously unanticipated problem.

Buildings are often a combination of steel, concrete, reinforced masonry and wood, with different structural systems on different floors or different sections of the building. Combination types that are potentially hazardous include: concrete frame buildings without special reinforcing, precast concrete and precast-composite buildings, steel frame or concrete frame buildings with unreinforced masonry walls, reinforced concrete wall buildings with no special detailing or reinforcement, large capacity buildings with long-span roof structures (such as theaters and auditoriums), large unengineered wood-frame buildings, buildings with inadequately anchored exterior cladding and glazing, and buildings with poorly anchored parapets and appendages (FEMA, 1985). Additional types of potentially hazardous buildings may be recognized after future earthquakes.

Mobile homes are prefabricated housing units that are placed on isolated piers, jackstands, or masonry block foundations (usually without any positive anchorage). Floors and roofs of mobile homes are usually plywood, and outside surfaces are covered with sheet metal. Mobile homes typically do not perform well in earthquakes. Severe damage occurs when they fall off their supports, severing utility lines and piercing the floor with jackstands.

In addition to building types, there are other factors associated with the design and construction of the buildings that also have an impact on the structures' vulnerability to strong ground shaking. Some of these conditions are discussed below:

- **Building Shape** – A building's vertical and/or horizontal shape can be important. Simple, symmetric buildings generally perform better than non-symmetric buildings. During an earthquake, non-symmetric buildings tend to twist as well as shake. Wings on a building tend to act independently during an earthquake, resulting in differential movements and cracking. The geometry of the lateral load-resisting systems also matters. For example, buildings with one or two walls made mostly of glass, while the remaining walls are made of concrete or brick, are at risk. Asymmetry in the placement of bracing systems that provide a building with earthquake resistance, can result in twisting or differential motions.

- **Pounding** – Site-related seismic hazards may include the potential for neighboring buildings to "pound," or for one building to collapse onto a neighbor. Pounding occurs when there is little clearance between adjacent buildings, and the buildings "pound" against each other as they deflect during an earthquake. The effects of pounding can be especially damaging if the floors of the buildings are at different elevations, so that, for example, the floor of one building hits a supporting column of the other. Damage to a supporting column can result in partial or total building collapse.

Damage to the region's critical facilities and infrastructure need to be considered and planned for. **Critical facilities** are those parts of a community's infrastructure that must remain operational after an earthquake. Critical facilities include schools, hospitals, fire and police stations, emergency operation centers, and communication centers.

- **High-risk facilities**, if severely damaged, may result in a disaster far beyond the facilities themselves. Examples include power plants, dams and flood control structures, freeway interchanges, bridges, and industrial plants that use or store explosives, toxic materials or petroleum products.

- **High-occupancy facilities** have the potential of resulting in a large number of casualties or crowd-control problems. This category includes high-rise buildings, large assembly facilities, and large multifamily residential complexes.

- **Dependent-care facilities**, such as preschools and schools, rehabilitation centers, prisons, group care homes, and nursing homes, house populations with special evacuation considerations.

- **Economic facilities**, such as banks, archiving and vital record-keeping facilities, airports, and large industrial or commercial centers, are those facilities that should remain operational to avoid severe economic impacts.

It is crucial that critical facilities have no structural weaknesses that can lead to collapse. For example, the Federal Emergency Management Agency (FEMA, 1985) has suggested the following seismic performance goals for **health care facilities**:

- The damage to the facilities should be limited to what might be reasonably expected after a destructive earthquake and should be repairable and not be life-threatening.
- Patients, visitors, and medical, nursing, technical and support staff within and immediately outside the facility should be protected during an earthquake.
- Emergency utility systems in the facility should remain operational after an earthquake.
- Occupants should be able to evacuate the facility safely after an earthquake.
- Rescue and emergency workers should be able to enter the facility immediately after an earthquake and should encounter only minimum interference and danger.
- The facility should be available for its planned disaster response role after an earthquake.

Lifelines are those services that are critical to the health, safety and functioning of the community. They are particularly essential for emergency response and recovery after an earthquake.

Furthermore, certain critical facilities designed to remain functional during and immediately after an earthquake may be able to provide only limited services if the lifelines they depend on are disrupted. Lifeline systems include water, sewage, electrical power, communication, transportation (highways, bridges, railroads, and airports), natural gas, and liquid fuel systems. The improved performance of lifelines in the 1994 Northridge earthquake, relative to the 1971 San Fernando earthquake, shows that the seismic codes upgraded and implemented after 1971 have been effective. Nevertheless, the impact of the Northridge quake on lifeline systems was widespread and illustrates the continued need to study earthquake impacts, to upgrade substandard elements in the systems, to provide redundancy in systems, to improve emergency response plans, and to provide adequate planning, budgeting and financing for seismic safety.

Some of the observations and lessons learned from the Northridge earthquake are summarized below (from Savage, 1995; Lund, 1996).

- Several electrical transmission towers were damaged or totally collapsed. Collapse was generally due to foundation distress in towers that were located near ridge tops where amplification of ground motion may have occurred. One collapse was the result of a seismically induced slope failure at the base of the tower.
- Damage to above ground water tanks typically occurred where piping and joints were rigidly connected to the tank, due to differential movement between the tank and the piping. Older steel tanks not seismically designed under current standards buckled at the bottom (called "elephant's foot"), in the shell, and on the roof. Modern steel and concrete tanks generally performed well.
- The most vulnerable components of pipeline distribution systems were older threaded joints, cast iron valves, cast iron pipes with rigid joints, and older steel pipes weakened by corrosion. In the case of broken water lines, the loss of fire suppression water forced fire departments to utilize water from swimming pools and tanker trucks.
- Significant damage occurred in water treatment plants due to sloshing in large water basins.
- A number of facilities did not have an emergency power supply or did not have enough power supply capacity to provide their essential services.
- Lifelines within critical structures, such as hospitals and fire stations, may be vulnerable. For instance, rooftop mechanical and electrical equipment is not generally designed for seismic forces. During the Northridge quake, rooftop equipment failed causing malfunctions in other systems.
- A 70-year old crude oil pipeline leaked from a cracked weld, spreading oil for 12 miles down the Santa Clara River.
- A freight train carrying sulfuric acid was derailed causing an 8,000-gallon acid spill and a 2,000-gallon diesel spill from the locomotive.

The above list is by no means a complete summary of the earthquake damage, but it does highlight some of the issues pertinent to the Cudahy area. All lifeline providers should make an evaluation of the seismic vulnerability within their systems a priority. The evaluation should include a plan to fund and schedule the needed seismic mitigation.

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. 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. A HazUS loss estimation was conducted for the City of Cudahy as part of this study.

HazUS-MH™ is a standardized methodology for earthquake loss estimation based on a geographic information system (GIS). [HazUS-MH™ stands for Hazard US, Multi-Hazard version]. A project of the National Institute of Building Sciences, funded by the Federal Emergency Management Agency (FEMA), it is a powerful advance in mitigation strategies. The HazUS project developed guidelines and procedures to make standardized earthquake loss estimates at a regional scale. With standardization, estimates can be compared from region to region. HazUS is designed for use by state, regional and local governments in planning for earthquake loss mitigation, emergency preparedness, response and recovery. HazUS addresses nearly all aspects of the built environment, and many different types of losses. The methodology has been tested by comparing scenario results with actual losses generated by several past earthquakes. Subject to several limitations noted below, HazUS can produce results that are valid for the intended purposes.

Loss estimation is an invaluable tool, but it must be used with discretion. Loss estimation analyzes casualties, damage and economic loss in great detail. It produces seemingly precise numbers that can be easily misinterpreted. Loss estimation's results, for example, may cite 4,054 left homeless by a scenario earthquake. This is best interpreted by its magnitude. That is, an event that leaves 4,000 people homeless is clearly more manageable than an event causing 40,000 homeless people; and an event that leaves 400,000 homeless would overwhelm the state's resources. However, another loss estimation that predicts 6,000 people homeless should probably be considered equivalent to the 4,054 result. Because HazUS results make use of a great number of parameters and data of varying accuracy and completeness, it is not possible to assign quantitative error bars. Although the numbers should not be taken at face value, they are not rounded or edited because detailed evaluation of individual components of the disaster can help mitigation agencies ensure that they have considered all the important options.

The more community-specific the data that are input to HazUS, the more reliable the loss estimation. HazUS provides defaults for all required information. These are based on best-available scientific, engineering, census and economic knowledge. The loss estimations in this report have been tailored to Cudahy by considering the soil type that underlies the city, including the potential for liquefaction.

As useful as HazUS seems to be, the loss estimation methodology has some inherent uncertainties. These arise in part from incomplete scientific knowledge concerning earthquakes and their effect upon buildings and facilities, and in part from the approximations and simplifications necessary for comprehensive analyses.

Users should be aware of the following specific limitations:

- HazUS is driven by statistics, and thus is most accurate when applied to a region, or a class of buildings or facilities. It is least accurate when considering a particular site, building or facility.
- Losses estimated for lifelines may be less than losses estimated for the general building stock.
- Losses from smaller (less than M 6.0) damaging earthquakes may be overestimated.
- Pilot and calibration studies have not yet provided an adequate test concerning the possible extent and effects of landsliding; therefore, the earthquake scenarios do not include losses associated with earthquake-induced slope failure.
- The indirect economic loss module is still relatively new and experimental. While output from pilot studies has generally been credible, this module requires further testing.
- The databases that HazUS draws from to make its estimates are often incomplete or outdated (as discussed above, efforts were made to improve some of the datasets used for the analysis, but for some estimates, the software still relies on the year 2000 census tracts data). This is another reason the loss estimates should not be taken completely at face value.

The loss estimates include physical damage to buildings of different construction and occupancy types, damage to essential facilities and lifelines, number of after-earthquake fires and damage due to fire, and the amount of debris that is expected. The model also estimates the direct economic and social losses, including casualties and fatalities for three different times of the day, the number of people left homeless and number of people that will require shelter, number of hospital beds available, and the economic losses due to damage to the places of businesses, loss of inventory, and (to some degree) loss of jobs. The indirect economic losses component is still experimental; the software developers have checked the estimations against actual past earthquakes, such as the 1989 Loma Prieta, 1994 Northridge, and 2001 Nisqually, Washington earthquakes, but indirect losses are hard to measure, and it typically takes years before these monetary losses can be quantified with any degree of accuracy. Therefore, this component of HazUS is still considered experimental.

HazUS breaks **critical facilities** into two groups: essential facilities and high potential loss (HPL) facilities. Essential facilities provide services to the community and should be functional after an earthquake. Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. The essential facility module in HazUS determines the expected loss of functionality for these facilities. The damage probabilities for essential facilities are determined on a site-specific basis (i.e., at each facility). Economic losses associated with these facilities are computed as part of the analysis of the general building stock. Data required for the analysis include occupancy classes (current building use) and building structural type, or a combination of essential facilities building type, design level and construction quality factor. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

HazUS divides the **lifeline** inventory into two systems: 1) transportation and 2) utility lifelines. The transportation system includes seven components: highways, railways, light rail, bus, ports, ferry and airports. The utility lifelines include potable water, wastewater, natural gas, crude and refined oil, electric power and communications. If site-specific lifeline utility data are not provided for these analyses, HazUS performs a statistical calculation based on the population served.

General Building Stock Type and Classification: HazUS provides damage data for buildings based on these structural types:

- Concrete
- Mobile home
- Precast concrete
- Reinforced-masonry bearing walls
- Steel
- Unreinforced-masonry bearing walls, and
- Wood frame

and based on these occupancy (usage) classifications:

- Residential (single-family and other residential)
- Commercial
- Industrial
- Agriculture
- Religion
- Government, and
- Education

Loss estimation for the general **building stock** is averaged for each census tract. Building damage classifications range from slight to complete. As an example, the building damage classification for wood frame buildings is provided below. Wood-frame structures comprise the most numerous building type in Cudahy.

Wood, Light Frame:

- *Slight Structural Damage*: Small plaster or gypsum-board cracks at corners of door and window openings and wall-ceiling intersections; small cracks in masonry chimneys and masonry veneer.
- *Moderate Structural Damage*: Large plaster or gypsum-board cracks at corners of door and window openings; small diagonal cracks across shear wall panels exhibited by small cracks in stucco and gypsum wall panels; large cracks in brick chimneys; toppling of tall masonry chimneys.
- *Extensive Structural Damage*: Large diagonal cracks across shear wall panels or large cracks at plywood joints; permanent lateral movement of floors and roof; toppling of most brick chimneys; cracks in foundations; splitting of wood sill plates and/or slippage of structure over foundations; partial collapse of "room-over-garage" or other "soft-story" configurations; small foundations cracks.
- *Complete Structural Damage*: Structure may have large permanent lateral displacement, may collapse, or be in imminent danger of collapse due to cripple wall

failure or failure of the lateral load resisting system; some structures may slip and fall off the foundations; large foundation cracks.

Estimates of building damage are provided for "High", "Moderate" and "Low" seismic design criteria. Buildings of newer construction (e.g., post-1973) are best designated by "High." Buildings built after 1940, but before 1973, are best represented by "Moderate." If built before about 1940 (i.e., before significant seismic codes were implemented), "Low" is most appropriate.

HazUS estimates two types of **debris**. The first is debris that falls in large pieces, such as steel members or reinforced concrete elements. These require special treatment to break into smaller pieces before they are hauled away. The second type of debris is smaller and more easily moved with bulldozers and other machinery and tools. This type includes brick, wood, glass, building contents and other materials.

Casualties are estimated based on the observation that there is a strong correlation between building damage (both structural and non-structural) and the number and severity of casualties. In smaller earthquakes, non-structural damage, (such as toppled bookshelves and broken windows) is typically responsible for most of the casualties. In severe earthquakes where there is a large number of collapses and partial collapses, there is a proportionately larger number of fatalities. Data regarding earthquake-related injuries are, however, not of the best quality, nor are they available for all building types. Available data often have insufficient information about the type of structure in which the casualties occurred and the casualty-generating mechanism. HazUS casualty estimates are based on the injury classification scale described in Table Table 6-4.

In addition, HazUS produces casualty estimates for **three times of day**:

- Earthquake striking at 2:00 a.m. (population at home)
- Earthquake striking at 2:00 p.m. (population at work/school)
- Earthquake striking at 5:00 p.m. (commute time).

Table 6-4: Injury Classification Scale

Injury Severity Level	Injury Description
Severity 1	Injuries requiring basic medical aid without requiring hospitalization.
Severity 2	Injuries requiring a greater degree of medical care and hospitalization, but not expected to progress to a life-threatening status.
Severity 3	Injuries which pose an immediate life-threatening condition if not treated adequately and expeditiously. The majority of these injuries are the result of structural collapse and subsequent entrapment or impairment of the occupants.
Severity 4	Instantaneously killed or mortally injured.

The Severity 1 and Severity 2 casualties are most likely related to people running outside and in the process bumping into overturned furniture, walking barefoot on broken glass, and otherwise being hurt by non-structural elements, and by structural damage to residential structures and manufactured housing. Severity 3 and Severity 4 casualties are anticipated as a result of damage to residential structures other than single-family housing.

Displaced Households/Shelter Requirements – Earthquakes can cause loss of function or habitability of buildings that contain housing. Displaced households may need alternative short-term shelter, provided by family, friends, temporary rentals, or public shelters established by the City, County or by relief organizations such as the Red Cross. Long-term alternative housing may require import of mobile homes, occupancy of vacant units, net emigration from the impacted area, or, eventually, the repair or reconstruction of new public and private housing. The number of people seeking short-term public shelter is of most concern to emergency response organizations. The longer-term impacts on the housing stock are of great concern to local governments, such as cities and counties.

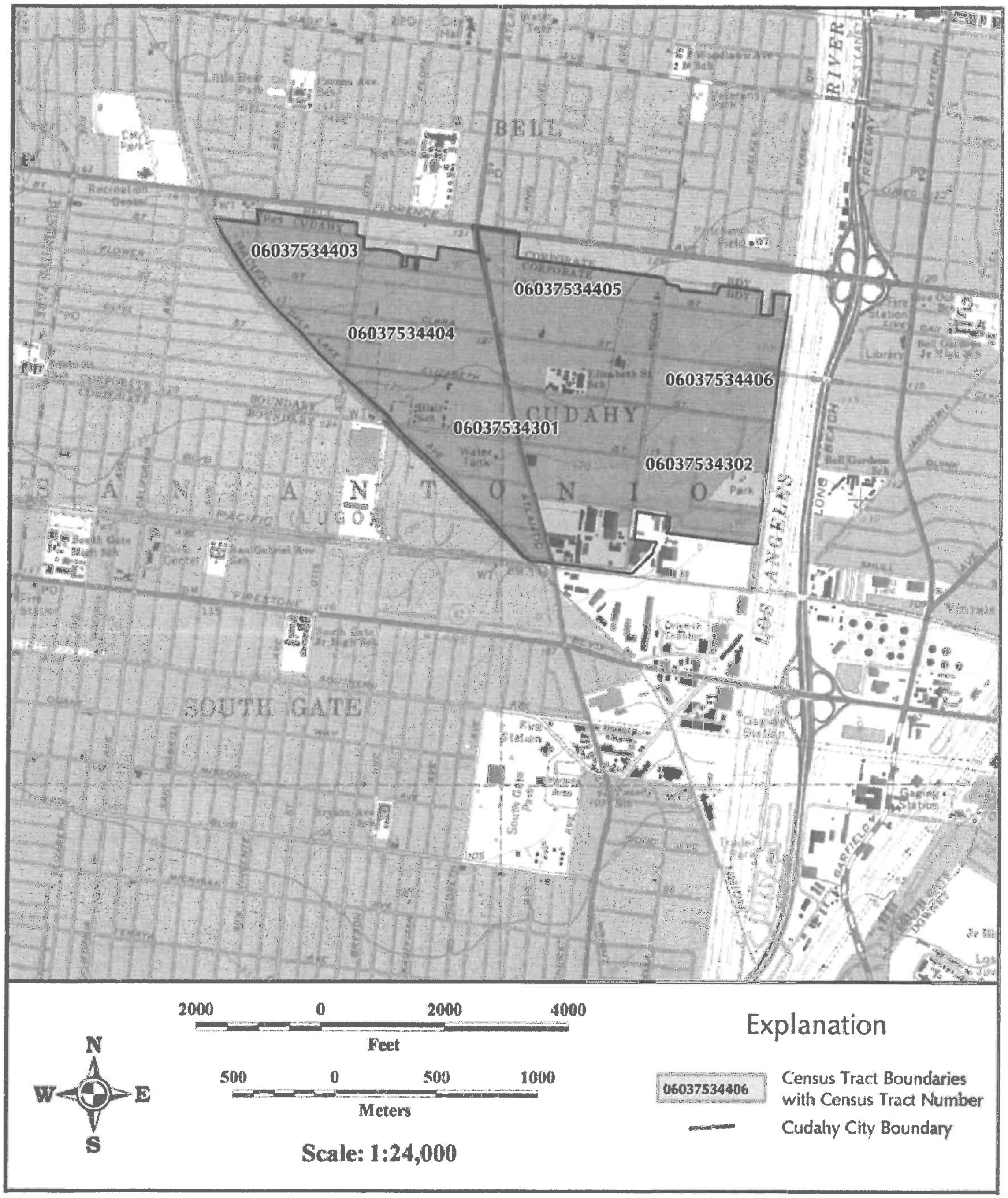
Economic Losses – HazUS estimates structural and nonstructural repair costs caused by building damage and the associated loss of building contents and business inventory. Building damage can cause additional losses by restricting the building's ability to function properly. Thus, business interruption and rental income losses are estimated. HazUS divides building losses into two categories: (1) direct building losses and (2) business interruption losses. Direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. Business interruption losses are associated with inability to operate a business because of the damage sustained during the earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake. HazUS does not calculate business interruption losses due to failure of the lifeline systems (such as electric power outages).

Earthquakes may produce indirect economic losses in sectors that do not sustain direct damage. All businesses are forward-linked (if they rely on regional customers to purchase their output) or backward-linked (if they rely on regional suppliers to provide their inputs) and are thus potentially vulnerable to interruptions in their operation. Note that indirect losses are not confined to immediate customers or suppliers of damaged enterprises. All of the successive rounds of customers of customers and suppliers of suppliers are affected. In this way, even limited physical earthquake damage causes a chain reaction, or ripple effect, that is transmitted throughout the regional economy.

HazUS Earthquake Scenarios for the Cudahy Area

HazUS relies on census data, which are reported by geographical areas or tracts. Six census tracts combined closely match the City of Cudahy boundaries (see Map 6-11). We used the population counts provided by the HazUS 2002 database, which indicates a population of 24,282 people in the 1.12 square mile area. This number is just slightly larger than the 2010 census figure of 23,805 and the 2012 population estimate of 23,893, and is considered representative of the slight population growth expected in the area (http://www.scag.ca.gov/resources/pdfs/2013LP/Cudahy.pdf).

Map 6-11: Census Tracts used in the HazUS Analyses



Three specific earthquake scenarios were modeled:

1) an earthquake on the southern San Andreas fault rupturing the southernmost section of the fault (the ShakeOut scenario prepared by the U.S. Geological Survey in the Fall of 2008 (see the ShakeMap for this scenario in Figure 6-9),
2) an earthquake on the Puente Hills thrust fault originating on the section of the fault that underlies the northernmost section of Cudahy, and
3) an earthquake on the onshore section of the Newport Inglewood fault.

Specifics about each of these earthquake-producing faults were provided in the seismic sources section above, and in Table 6-5.

Table 6-5: HazUS Earthquake Scenarios for the City of Cudahy

Fault Source	Magnitude	Description
Southern San Andreas	7.8	A large earthquake that ruptures the entire southern San Andreas fault using the USGS ShakeOut scenario. This earthquake was modeled because of its high probability of occurrence, and because it is considered the worst-case scenario for southern California, although, as the results included herein show, this earthquake is definitely not the worst-case scenario for Cudahy.
Puente Hills Thrust Fault	7.1	Lower probability but high-risk earthquake event on a buried thrust. The HazUS results indicate that this earthquake scenario has the potential to cause significant damage in Cudahy. Similar damage could be expected if an earthquake occurs on the Compton-Los Alamitos or Lower Elysian Park faults.
Newport-Inglewood	6.9	Low probability but high-risk right-lateral strike-slip event with the potential to impact the Los Angeles basin.

Of the three earthquake scenarios modeled for the city, the results indicate that a M_w 7.1 earthquake on the Puente Hills Thrust fault has the potential to cause far more damage in Cudahy than a larger, but more distant earthquake on the San Andreas fault, or a not so-distant earthquake on the Newport-Inglewood fault. Specifics regarding the anticipated damage as a result of these three earthquake sources are summarized in the sub-sections below.

Building Damage

The HazUS database estimates that there are about 3,775 buildings in the region, with a total building replacement value (excluding contents) of $763 million. Approximately 96 percent of the buildings considered in the analysis (and 80 percent of the building value) are associated with residential housing. In terms of building construction types found in the region, wood-frame construction makes up approximately 83 percent of the building inventory; the remaining 17 percent is distributed between the other general building types.

Estimates of building damage are provided for "High," "Moderate" and "Low" seismic design criteria. Buildings of newer construction (e.g., post-1973) are best designated by "high." Buildings built after 1940, but before 1973, are best represented by "moderate" criteria. If built before about

1940 (i.e., before significant seismic codes were implemented), "low" is most appropriate. The building inventory for the six census tracts considered indicates that about 4 percent of the housing units were built before 1940. About 56 percent of the building units were built between 1940 and 1969; and nearly 27 percent of the units were built after 1980. The remaining about 13 percent was built in the decade between 1970 and 1979. Therefore, almost two-thirds of the housing stock in Cudahy can be described as in the "moderate" category for seismic design criteria.

The HazUS models estimate that between 74 and 1,163 buildings will be at least moderately damaged in response to the earthquake scenarios presented herein, with the lower number representative of damage as a result of an earthquake on the San Andreas fault, and the higher number representing damage as a result of an earthquake on the Puente Hills thrust fault. These figures represent about 2 and 32 percent, respectively, of the total number of buildings considered in the analysis. Table 6-6 summarizes the expected damage to buildings by general occupancy type, whereas Table 6-7 summarizes the expected damage to buildings in the region, classified by construction type.

Table 6-6: Number of Buildings* Damaged, by Occupancy Type

Scenario	Occupancy Type	Slight	Moderate	Extensive	Complete	Total
San Andreas	Agriculture	0	0	0	0	0
	Commercial	10	3	1	0	14
	Education	1	0	0	0	1
	Government	0	0	0	0	0
	Industrial	4	2	1	0	7
	Other Residential	130	32	21	13	196
	Religion	0	0	0	0	0
	Single Family	138	1	0	0	139
	Total	**284**	**38**	**23**	**13**	**357**
Puente Hills Thrust	Agriculture	1	1	0	0	2
	Commercial	23	38	27	14	102
	Education	3	3	1	1	8
	Government	0	0	0	0	0
	Industrial	7	12	10	6	35
	Other Residential	143	86	232	177	638
	Religion	1	1	1	0	3
	Single Family	1,822	541	11	0	2,374
	Total	**2,000**	**682**	**282**	**198**	**3,162**
Newport-Inglewood	Agriculture	1	0	0	0	1
	Commercial	38	23	3	0	64
	Education	3	1	0	0	4
	Government	0	0	0	0	0
	Industrial	12	9	3	0	24
	Other Residential	195	260	65	1	521
	Religion	1	1	0	0	2
	Single Family	1,150	75	0	0	1,225
	Total	**1,400**	**369**	**71**	**1**	**1,841**

* Based on a total of 3,775 buildings in the region.

Although wood-frame buildings comprise the largest number of buildings in the area, and therefore one would expect that most of the buildings damaged would be wood-frame structures, the data show that the building type that will suffer the most damage is manufactured housing. An earthquake on the Puente Hills thrust fault is anticipated to cause at least moderate damage to 587 wood-frame buildings, comprising about 18.7 percent of the total number of wood-frame buildings in the region, and to 412 manufactured homes, equal to 100 percent of the manufactured homes in the study area. The other building types, by construction type, that are anticipated to suffer at least moderate damage as a result of an earthquake on the Puente Hills thrust fault include steel (91 percent of the total number of buildings of that type in the study area), precast (82 percent), reinforced masonry (69 percent) and concrete (67 percent).

An earthquake on the Newport-Inglewood fault is expected to cause at least moderate damage to nearly 12 percent of the buildings in the Cudahy region. Only about 2.5 percent of the wood-frame buildings will experience at least moderate damage, but more than 76 percent of the manufactured homes will be at least moderately damaged. This earthquake scenario is also anticipated to cause at least moderate damage to nearly 36 percent of the steel buildings, 21 percent of the concrete buildings, 30 percent of the precast structures, and nearly 15 percent of the reinforced masonry structures.

Table 6-7: Number of Buildings* Damaged, by Construction Type

Scenario	Structure Type	Slight	Moderate	Extensive	Complete	Total
San Andreas	Wood	149	2	0	0	151
	Steel	5	3	2	1	11
	Concrete	5	2	0	0	7
	Precast	4	1	0	0	5
	Reinforced Masonry	4	1	0	0	5
	Unreinforced Masonry	0	0	0	0	0
	Manufactured Housing	114	31	21	13	179
	Total	**281**	**40**	**23**	**14**	**358**
Puente Hills Thrust	Wood	1,959	574	11	2	2,546
	Steel	3	12	20	9	44
	Concrete	11	13	9	7	40
	Precast	5	14	9	4	32
	Reinforced Masonry	19	34	12	5	70
	Unreinforced Masonry	2	5	4	4	15
	Manufactured Housing	0	31	213	168	412
	Total	**1,999**	**683**	**278**	**199**	**3,159**
Newport-Inglewood	Wood	1,238	80	0	0	1,319
	Steel	15	14	2	0	31
	Concrete	16	8	1	0	25
	Precast	12	9	1	0	22
	Reinforced Masonry	21	11	1	0	33
	Unreinforced Masonry	6	4	1	0	11
	Manufactured Housing	92	243	64	2	400
	Total	**1,400**	**369**	**70**	**2**	**1,841**

* Based on a total of 3,775 buildings in the region.

An earthquake on the San Andreas fault is expected to cause at least moderate damage to less than 0.06 percent of the wood-frame buildings in Cudahy, but to nearly 36 percent of the manufactured homes in the region. The San Andreas earthquake scenario is anticipated to cause at least moderate damage to 0.45 percent of the concrete, 0.29 percent of the precast, and nearly 0.01 percent of the reinforced masonry buildings in Cudahy. Notice that wood-frame structures are expected to perform quite well in an earthquake caused by a distant fault because wood has the flexibility necessary to withstand the long-period waves associated with such an earthquake, unlike other less ductile construction types.

As a percentage of the building damage by occupancy type, the model estimates that about 83 percent of the residential structures, including single-family homes and others (i.e., multi-family residential buildings, including duplexes, condominiums and apartments) will suffer at least slight damage from an earthquake on the Puente Hills thrust fault; more than 29 percent will have at least moderate damage. Nearly 94 percent of the industrial structures and 94 percent of the commercial structures in the city will be at least slightly damaged by an earthquake on the Puente Hills Thrust fault; 76 and 72 percent, respectively will suffer at least moderate damage. These figures indicate that an earthquake on the Puente Hills thrust fault will cause significant economic impact to Cudahy and surrounding cities.

Alternatively, a large-magnitude earthquake on the San Andreas fault is expected to cause at least moderate damage to less than 2 percent of the residential structures in Cudahy, including to single-family residences and other types. Such an earthquake is anticipated to cause at least moderate damage to about 8.1 and 3.7 percent of the industrial and commercial structures, respectively, in the Hazus study area. The Puente Hills thrust fault earthquake scenario is also anticipated to cause at least moderate damage to about 56 percent of the educational buildings in the city, whereas the San Andreas fault scenario is expected to cause only slight damage to about 11 percent of the educational buildings. An earthquake on the Newport-Inglewood is anticipated to cause at least moderate damage to 24 percent of the commercial structures, nearly 31 percent of the industrial structures, and almost 48 percent of the residential structures that are not single-family homes. Only about 2.6 percent of the single-family residential buildings are estimated to suffer at least moderate damage as a result of the Newport-Inglewood earthquake scenario.

Casualties

Table 6-8 provides a summary of the casualties estimated for the earthquake scenarios on the San Andreas fault and the Puente Hills thrust fault. Casualty estimates as a result of an earthquake on the Newport-Inglewood fault are described in the text below. In Cudahy, the casualty estimates as a result of an earthquake occurring either during peak commuting loads (at 5 o'clock in the afternoon) or peak educational, commercial and industrial loads (at 2 o'clock in the afternoon) are, for all practical purposes, identical regardless of the earthquake scenario.

An earthquake on the Puente Hills thrust fault during the day is anticipated to cause approximately 100 Severity 1 and Severity 2 casualties combined, due to damage to both commercial and residential structures. This earthquake is also estimated to result in about ten combined Severity 3 and 4 casualties. These numbers highlight the structural deficiencies anticipated in commercial and other-residential structures (over 72 percent of the commercial buildings, and nearly 73 percent of the other-residential structures, are expected to experience at least moderate damage during an earthquake on the Puente Hills Thrust fault).

Table 6-8: Estimated Casualties*

Type and Time of Scenario			**Level 1:** Medical treatment without	**Level 2:** Hospitalization but not life threatening	**Level 3:** Hospitalization and life threatening	**Level 4:** Fatalities due to scenario
San Andreas Fault	2A.M. (max. residential occupancy)	Commercial	0	0	0	0
		Commuting	0	0	0	0
		Educational	0	0	0	0
		Hotels	0	0	0	0
		Industrial	0	0	0	0
		Other Residential	6	1	0	0
		Single-Family	0	0	0	0
		Total	**6**	**1**	**0**	**0**
	2 P.M. (max educational, industrial, and commercial)	Commercial	2	1	0	0
		Commuting	0	0	0	0
		Educational	1	0	0	0
		Hotels	0	0	0	0
		Industrial	0	0	0	0
		Other Residential	1	0	0	0
		Single-Family	0	0	0	0
		Total	**4**	**1**	**0**	**0**
	5 P.M. (peak commute time)	Commercial	1	0	0	0
		Commuting	0	0	0	0
		Educational	0	0	0	0
		Hotels	0	0	0	0
		Industrial	0	0	0	0
		Other Residential	2	1	0	0
		Single-Family	0	0	0	0
		Total	**3**	**1**	**0**	**0**
Puente Hills Thrust Fault	2A.M. (max. residential occupancy)	Commercial	0	0	0	0
		Commuting	0	0	0	0
		Educational	0	0	0	0
		Hotels	0	0	0	0
		Industrial	0	0	0	0
		Other Residential	79	19	2	4
		Single-Family	13	2	0	0
		Total	**92**	**21**	**2**	**4**
	2 P.M. (max educational, industrial, and commercial)	Commercial	36	10	3	3
		Commuting	0	0	0	0
		Educational	28	9	1	3
		Hotels	0	0	0	0
		Industrial	3	1	0	0
		Other Residential	18	4	0	1
		Single-Family	3	0	0	0
		Total	**88**	**24**	**4**	**7**
	5 P.M. (peak commute) time)	Commercial	39	11	2	4
		Commuting	0	0	0	0
		Educational	2	1	0	0
		Hotels	0	0	0	0
		Industrial	2	1	0	0
		Other Residential	29	7	1	1
		Single-Family	5	0	0	0
		Total	**77**	**20**	**3**	**5**

*Based on a population base of 24,208.

An earthquake on the San Andreas fault at any time during the day or night is expected to cause a limited number of Severity 1 injuries as a result of damage to residential structures other than single-family, and during the day, damage to commercial and educational structures.

An earthquake on the Newport-Inglewood fault is estimated to cause Severity 1 and 2 casualties only. An earthquake on this fault at 2 o'clock in the morning is estimated to result in twelve Severity 1 injuries, and one Severity 2 injuries, with nine of these occurring in residential structures other than single-family homes. A Newport-Inglewood fault earthquake at either 2 o'clock or 5 o'clock in the afternoon is estimated to cause seven Severity 1 and one Severity 2 casualties.

Damage to Critical and Essential Facilities

HazUS breaks critical facilities into two groups: (1) essential facilities, and (2) high potential loss (HPL) facilities. Essential facilities are those parts of a community's infrastructure that must remain operational after an earthquake. Buildings that house essential services include hospitals, emergency operation centers, fire and police stations, schools, and communication centers. HPL or high-risk facilities are those that if severely damaged, may result in a disaster far beyond the facilities themselves. Examples include power plants, dams and flood control structures, and industrial plants that use or store explosives, extremely hazardous materials or petroleum products in large quantities.

Other critical facilities not considered in the HazUS analysis but that should be considered in both emergency preparedness and emergency response operations given their potential impact on the community include: (1) High-occupancy facilities, such as high-rise buildings, large assembly facilities, and large multi-family residential complexes because of the potential for a large number of casualties or crowd-control problems; (2) dependent care facilities, such as preschools, schools, rehabilitation centers, prisons, group care homes, nursing homes, and other facilities that house populations with special evacuation considerations; and (3) economic facilities, such as banks, archiving and vital, record-keeping facilities, and large industrial or commercial centers, that should remain operational to avoid severe economic impacts.

The critical facilities that were considered in the earthquake scenarios for the Cudahy area include five (5) schools, one (1) emergency operations center (in City Hall), and zero (0) fire stations and police stations. There are also no hospitals within the six census tracts considered in the analyses. The expected damage to these essential facilities as a result of the earthquake scenarios conducted for this study is summarized in Table 6-9 below.

6-9: Estimated Damage to Critical Facilities as a Result of Three Earthquake Scenarios

Earthquake Scenario	Facility Type	Total #	Number of Facilities		
			With at Least Moderate Damage >50%	With Complete Damage >50%	With Functionality >50% on Day 1
San Andreas	Schools	5	0	0	5
	EOC	1	0	0	1
Puente Hills Thrust	Schools	5	1	1	0
	EOC	1	1	0	0
Newport-Inglewood	Schools	5	1	0	4
	EOC	1	0	0	0

The earthquake scenarios indicate that an earthquake on the San Andreas fault is not likely to cause damage to any of the critical and essential facilities in the study area. An earthquake on the Puente Hills thrust fault, on the other hand, is likely to cause significant damage to City Hall and the local schools. None of the schools or City Hall is estimated to be more than 50 percent functional after the Puente Hills fault earthquake scenario. City Hall, in particular, is not expected to be even 30 percent functional 30 days after the earthquake, and only slightly above 50 percent functional a full three months after the earthquake. Given that the City's Emergency Operations Center is located in City Hall, this is a significant concern. The Newport-Inglewood earthquake scenario is anticipated to cause at least moderate damage to one of the five schools considered in the analysis. City Hall is anticipated to perform fairly well, but it is not expected to be more than 50 percent functional immediately after the earthquake.

Utility Systems Damage

The HazUS inventory for the Cudahy area does not include specifics regarding the various lifeline systems in the city, therefore, the model estimated damage to the potable water and electric power using empirical relationships based on the number of households served in the area. The results of the analyses regarding the functionality of the potable water and electric power systems in the city for the three earthquakes discussed herein are presented in Table 6-10. According to the models, the Puente Hills thrust fault earthquake scenario will severely impact the electric power system; nearly two thousand households in the city are expected to not have electric power even three days after an earthquake. In contrast, an earthquake on the San Andreas or Newport-Inglewood faults is not anticipated to leave any households without electricity or water even on the day of the earthquake.

The potable water system is expected to perform quite well in all three earthquake scenarios considered. Nevertheless, in the event that the potable water system does not perform as well as anticipated, residents are advised to have drinking water stored as part of their earthquake emergency kits. These drinking water reserves should be enough to last all members of the household (including pets) at least 3 days, and preferably one week.

Table 6-10: Expected Performance of Potable Water and Electricity Services

Scenario	Utility	Number of Households without Service*				
		Day 1	Day 3	Day 7	Day 30	Day 90
San Andreas	Potable Water	0	0	0	0	0
	Electricity	0	0	0	0	0
Puente Hills Thrust	Potable Water	0	0	0	0	0
	Electricity	3,549	1,994	704	119	5
Newport-Inglewood	Potable Water	0	0	0	0	0
	Electricity	0	0	0	0	0

*Based on Total Number of Households = 5,419

Fire Following Earthquake

History shows that earthquake-induced fires have the potential to be the worst-case fire-suppression scenarios for a community because an earthquake typically causes multiple ignitions distributed over a broad geographic area, with the potential to severely tax the local fire suppression agencies. Furthermore, if fire fighters are involved with search and rescue operations, they are less available to fight fires. Fire suppression efforts can also be limited by a water distribution system that has been impaired by the earthquake. Thus, many factors affect the severity of fires following an earthquake, including ignition sources, types and density of fuel, weather conditions, functionality of the water systems, and the ability of firefighters to suppress the fires. The principal causes of earthquake-related fires are open flames, electrical malfunctions, gas leaks, and chemical spills. Downed power lines may ignite fires if the lines do not automatically de-energize. Unanchored gas heaters and water heaters have in the past been common problems, as these readily tip over during strong ground shaking; State law requires new and replaced gas-fired water heaters to be attached to a wall or other support.

The major urban conflagrations of yesteryear in major cities were often the result of closely built, congested areas of attached buildings with no fire sprinklers, no adequate fire separations, no Fire Code enforcement, and narrow streets. In the past, fire apparatus and water supplies were also inadequate in many large cities, and many fire departments were comprised of volunteers. Many of these conditions no longer apply to the cities of today. Nevertheless, major earthquakes can result in fires and the loss of water supply, as it occurred in San Francisco in 1906, and in Kobe, Japan in 1995. A large portion of the structural damage caused by the great San Francisco earthquake of 1906 was the result of fires rather than ground shaking.

The moderately sized, M6.7 Northridge earthquake of 1994 caused 15,021 natural gas leaks that resulted in three street fires, 51 structure fires (23 of these caused total ruin) and the destruction, by fire, of 172 mobile homes. The 51 structure fires were caused by overturned water heaters (20), other overturned or damaged gas appliances (8), broken interior gas lines (8), broken gas meter set assemblies (2), street fires due to breaks in gas mains (7), and other unknown causes (8). The mobile home fires were primarily the result of failure of the supports leading to breakage of the gas risers, and breakage of the interior gas lines due to overturned water heaters and other appliances (Savage, 1995). The Southern California Gas Company reported 35 breaks in its natural gas transmission lines and 717 breaks in its distribution lines. About 74 percent of the leaks were corrosion related. In one incident, the earthquake severed a 22-inch gas transmission line and a motorist ignited the gas while attempting to restart his stalled vehicle. Response to this fire was impeded by the earthquake's rupture of a water main; as a result, five nearby homes were destroyed. Elsewhere, one mobile home fire started when a ruptured transmission line was ignited by a downed power line. In many of the destroyed mobile homes, fires erupted when inadequate bracing allowed the houses to slip off their foundations, severing gas lines and igniting fires.

A regional earthquake scenario that involves rupture of the entire southern section of the San Andreas fault was conducted in 2008 for the ShakeOut Scenario (Jones and others, 2008; Scawthorn, 2008). The scenario estimates that as a result of a magnitude 7.8 earthquake on the southern San Andreas, a total of 206 ignitions would occur in Orange County. This estimate does not include ignitions that are suppressed by responding citizens. Of the estimated 206 ignitions that will require fire department response, 165 would develop into large fires, each requiring the response of more than one fire engine company. The estimated ultimate burnt area in the County would be equivalent to about 37,000 single-family dwellings (Scawthorn, 2008). Using the 1994 Northridge earthquake as proxy, about half of the ignitions are expected to be electric related, about a quarter would be gas related, and the rest would be the result of a variety of causes, including chemical reactions. Also based on the Northridge earthquake, about 70 percent of all ignitions will occur in residential structures. Although city-specific estimates were not computed as part of the ShakeOut scenario, the data clearly highlight the hazard associated with earthquake-induced fires. Response to these fires will be hindered by a damaged water distribution system, overwhelmed local fire department resources, overwhelmed 911 centers, and extremely delayed response from strike teams coming in from outlying areas due to damage to the transportation system and traffic disruption (Scawthorn, 2008).

HazUS uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area as a result of an earthquake. For the earthquake scenarios ran for Cudahy, HazUS estimates between 3 and 5 ignitions immediately following an earthquake, with the San Andreas fault earthquake scenario triggering 3 ignitions, the Newport-Inglewood fault causing 4 ignitions, and the Puente Hills fault triggering 5 ignitions (Table 6-11). The burnt area resulting from these ignitions will vary depending on wind conditions. Normal wind conditions of about 10 miles per hour (mph) are expected to result in burn areas of between about 1.13 and 1.93 percent of the city's area. If Santa Ana wind conditions are present at the time of the earthquake, the burnt areas can be expected to be larger.

Table 6-11: Fires Following an Earthquake

EQ Scenario	No. of Ignitions	Approximate Burn Area (% of city)	No. of Displaced Individuals	Building Value Destroyed (Million $)
San Andreas	3	1.13	293	9.20
Puente Hills Thrust	5	1.93	502	15.74
Newport-Inglewood	4	1.56	412	12.85

Debris Generation

The models estimate that between 2 and 55.7 thousand tons of debris will be generated by the earthquake scenarios considered in this study (see Table 6-12). Of the total amount, brick and wood comprise between 31 and 45 percent of the total, with the remainder consisting of reinforced concrete and steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 116 to 2,228 truckloads (assuming 25 tons per truck) to remove the debris generated by the earthquakes modeled.

Table 6-12: Debris Generated by Earthquake Scenarios

EQ Scenario	Brick/Wood (1000s Tons)	% Total	Reinforced Concrete/Steel (1000s Tons)	% Total	Total	No. of Truckloads
San Andreas	1.05	36	1.85	64	2.9	116
Puente Hills Thrust	17.2	31	38.5	69	55.7	2,228
Newport-Inglewood	3.15	45	3.85	55	7	280

Building-Related Losses

Total economic losses include building- and lifeline-related losses based on the region's available inventory. Direct building losses (or capital stock losses in Table 6-13) are the estimated costs to repair or replace the damage caused to the buildings and its contents. It includes structural and non-structural damage to the building itself, and damage to the contents, and in the case of businesses, damage to inventory. Income losses, or business interruption losses, are losses associated with the inability to operate a business because of the damage it sustained during the earthquake. Income loss estimates also include the temporary living expenses for those people displaced from their homes because of the earthquake. Income losses, however, do not include losses related to the inability to operate the business because of lifeline outages or damage to the transportation network limiting access to a business.

Table 6-13: Building-Related Economic Loss Estimates (in Million $)

	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
San Andreas Fault Earthquake Scenario							
Income Losses	Wage	0.00	0.00	0.29	0.07	0.01	0.37
	Capital-Related	0.00	0.00	0.24	0.05	0.00	0.29
	Rental	0.01	0.05	0.10	0.03	0.00	0.19
	Relocation	0.00	0.18	0.15	0.10	0.03	0.47
	Subtotal	0.01	0.2	0.78	0.25	0.04	1.31
Capital Stock Losses	Structural	0.09	0.28	0.25	0.40	0.03	1.06
	Non-Structural	1.33	2.04	1.07	1.40	0.16	6.00
	Content	0.75	0.66	0.66	0.93	0.09	3.10
	Inventory	0.00	0.00	0.03	0.20	0.00	0.23
	Subtotal	2.17	2.99	2.02	2.93	0.28	10.39
Total		**2.18**	**3.22**	**2.79**	**3.18**	**0.32**	**11.70**
Puente Hills Thrust Earthquake Scenario							
Income Losses	Wage	0.00	0.14	3.81	0.47	0.12	4.53
	Capital-Related	0.00	0.06	2.97	0.31	0.04	3.38
	Rental	0.56	2.37	1.88	0.19	0.05	5.05
	Relocation	2.15	3.03	2.88	0.74	0.54	9.33
	Subtotal	2.71	5.60	11.54	1.70	0.75	22.30
Capital Stock Losses	Structural	2.85	5.41	5.45	3.00	0.59	17.29
	Non-Structural	16.27	27.26	13.31	10.15	2.06	69.05
	Content	6.05	6.10	5.93	6.71	0.86	25.66
	Inventory	0.00	0.00	0.31	1.43	0.00	1.73
	Subtotal	25.16	38.77	25.00	21.28	3.51	113.73
Total		**27.88**	**44.37**	**36.54**	**22.99**	**4.25**	**136.02**

The model estimates that total building-related losses in the city of Cudahy will range from less than $12 million for an earthquake on the San Andreas fault, to $136 million for an earthquake on the Puente Hills thrust fault. Between 11 and 16 percent of these estimated losses would be related to business interruption in the city. Damage to residential occupancies accounts for the largest loss, ranging from about 46 to 53 percent of the total building-related economic loss estimates. Table 6-13 provides a summary of the estimated economic losses anticipated as a result of the San Andreas and Puente Hills thrust earthquake scenarios considered herein. The total economic losses to the region include the costs of repairing or replacing the damaged lifeline systems, as discussed above.

Seismic Hazard Mitigation Activities

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.

California Earthquake Mitigation Legislation

California is painfully aware of the threats it faces from earthquakes. Since the 1800s, 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 built up, the risk will continue to increase. In response to this concern, for decades now the Legislature has passed laws to strengthen the built environment and protect the citizens. Table 6-14 provides a sampling of some of the 200 plus laws in the State's codes.

Table 6-14: 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.

City of Cudahy Codes

Implementation of earthquake mitigation policy most often takes place at the local government level. The City of Cudahy Building and Safety Department enforces building codes pertaining to earthquake hazards. The City has adopted the provisions of the 2013 California Building Code, a modification to the 2012 Uniform Building Code with more restrictive amendments based upon the local geographic, topographic and climatic conditions. The City of Cudahy, along with dozens of other local jurisdictions, have worked together to make these amendments to the California Building Code consistent with the rest of southern California.

The City of Cudahy Planning Department enforces the zoning and land use regulations relating to seismic hazards. Generally, these codes and regulations seek to discourage development in areas that could be prone to flooding 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. The Building and Safety Department is responsible for the enforcement of building, plumbing, electrical and mechanical codes. It also enforces ordinances and codes to ensure that buildings are safe by providing inspection services and plan check for new construction. The Building and Safety Department strives to protect the residents of a city by enforcing construction regulations.

Information about the City's departments, codes and policies, handouts, bulletins, forms required for permit applications, fees, etc., are available from the City's website at http://www.cityofcudahy.com. Look for the link to the City's departments, and then refer to the Community Development section, which oversees the Planning Department and the Building and Safety Department and is responsible for the review of all development plans, permit issuance, zoning, and development-related applications (such as Conditional Use Permits) as well as the drafting and maintenance of City plans and codes. The Planning and Building and Safety Departments are listed and described under that link. Community Development staff is also available to help at Cudahy's City Hall.

Businesses/Private Sector

Natural hazards have a devastating impact on businesses. In fact, according to the Institute for Business and Home Safety (IBHS), approximately 25 percent of all businesses do not reopen following a major disaster. Business owners and homeowners alike can protect their investment by identifying the risks associated with the natural and man-made disasters that their area is susceptible to (which this Plan covers), and then creating and implementing an action plan that defines the steps to take should a disaster strike. To help business owners with this effort, the IBHS has developed "Open for Business," a disaster planning toolkit to help guide businesses in preparing for and dealing with the adverse affects natural hazards (available from https://www.disastersafety.org/open-for-business/). 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. The U.S. Small Business Administration also provides helpful information and checklists that can be used for this purpose (http://www.sba.gov/content/disaster-planning).

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 were required by January 1, 2008 to survive earthquakes without collapsing or posing the threat of significant loss of life (life safety level). Provisions were made to allow this deadline to be extended to January 1, 2013 if compliance by the 2008 deadline would result in diminished capacity of healthcare services to the community. Subsequent amendments have provided for additional extensions, with the final date by which all hospitals must comply with the provisions of the act being January 1, 2020. To grant an extension to a hospital, the Office of Statewide Health Planning and Development (OSHPD) must consider the structural integrity of the building, the loss of essential healthcare services to the community if the hospital closed, and the financial hardship that the hospital would experience in complying with the provisions of the Act. 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 statewide.

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 subgradations 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" (Health and Safety Code Section 130005).

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 percent) of California's operating hospitals are in the highest category of collapse risk."

Earthquake Education

Earthquake research and education activities are conducted at several major universities in the southern California region, including Cal Tech, University of Southern California (USC), University of California - Los Angeles (UCLA), University of California – Santa Barbara (UCSB), University of

California – Irvine (UCI), and University of California – San Diego (UCSD), and San Diego State University (SDSU).

The local clearinghouse for earthquake information is the Southern California Earthquake Center (SCEC) located at the University of Southern California, Los Angeles, CA 90089. Administrative offices are located on the first floor of the Zumberge Hall of Science on Trousdale Parkway, Telephone: (213) 740-5843, Fax: (213) 740-0011, Email: SCECinfo@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 fifteen 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 15 other southern California counties, sponsors the Emergency Survival Program (ESP), an educational program for learning how to prepare for earthquakes and other disasters (http://lacoa.org/esp.htm). Many school districts have very active emergency preparedness programs that include earthquake drills and periodic disaster response team exercises. Many schools also participate in the Great ShakeOut earthquake scenario drills sponsored by the Southern California Earthquake Center, typically in October of every year. For additional information about resources and how to participate in these drills, refer to www.shakeout.org.

Earthquake Resource Directory

Local and Regional Resources

Southern California Earthquake Center (SCEC)

Level: Regional — Hazard: Earthquake — www.scec.org

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.

Western States Seismic Policy Council (WSSPC)

Level: Regional — Hazard: Earthquake — www.wsspc.org

801 K Street, Suite 1236

Sacramento, CA 95814 — Ph: 916-444-6816 — Fx: 916-444-8077

Notes: The WSSPC develops seismic policies and share information to promote programs intended to reduce earthquake-related losses.

Earthquake Country Alliance (ECA)

Level: Regional   Hazard: Earthquake   http://www.earthquakecountry.org/
Ph: 213-740-1560   Fx:

Notes: The Earthquake Country Alliance is a public-private partnership of people, organizations and regional alliances that work together to improve preparedness, mitigation and resiliency.

State Resources

California Department of Transportation (CalTrans)

Level: State   Hazard: Multi   http://www.dot.ca.gov/
3347 Michelson Drive, Suite 100   District 12 Offices
Irvine, CA 92612-0611   Ph: 949-724-2000   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.

California Resources Agency

Level: State   Hazard: Multi   http://resources.ca.gov/
1416 Ninth Street   Suite 1311
Sacramento, CA 95814   Ph: 916-653-5656   Fx: 916-653-8102

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.

California Geological Survey

Level: State   Hazard: Multi   www.consrv.ca.gov/cgs/index.htm
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.

California Geological Survey: Southern California Regional Office

Junipero Serra Building   320 W. 4th Street, Suite 850
Los Angeles, CA 90013   Ph: 213-239-0877   Fx: 213-239-0894

California Department of Conservation

Level: State   Hazard: Multi   www.consrv.ca.gov
801 K Street, MS-24-01
Sacramento, CA 95814   Ph: 916-322-1080   Fx: 916-445-0732

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.

California Seismic Safety Commission

Level: State Hazard: Earthquake www.seismic.ca.gov
1755 Creekside Oaks Drive Suite 100
Sacramento, CA 95833-3637 Ph: 916-263-5506 Fx:

Notes: The Seismic Safety Commission investigates earthquakes, researches earthquake-related issues and reports, and recommends to the Governor and Legislature, policies and programs needed to reduce earthquake risk. Some of the duties of the Commission include managing California's Earthquake Hazards Reduction Program, reviewing seismic activities funded by the State, providing a consistent policy direction for earthquake-related programs for all agencies at all government levels, proposing and reviewing earthquake-related legislation, conducting public hearings on seismic safety issues, recommending earthquake safety programs to governmental agencies and the private sector, and investigating and evaluating earthquake damage and reconstruction efforts following earthquakes..

Governor's Office of Emergency Services (Cal OES)

Level: State Hazard: Multi www.oes.ca.gov
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.

Federal and National Resources

Building Seismic Safety Council (BSSC)

Level: National Hazard: Earthquake www.bssconline.org
1090 Vermont Ave., NW Suite 700
Washington, DC 20005-4905 Ph: 202-289-7800 Fx: 202-289-1092

Notes: The Building Seismic Safety Council (BSSC) develops and promotes building earthquake risk mitigation regulatory provisions for the nation. Provides a forum that fosters improved seismic safety provisions for the use by the building community in the planning, design, construction, regulation and utilization of buildings.

Federal Emergency Management Agency, Region IX

Level: Federal Hazard: Multi www.fema.gov
1111 Broadway Suite 1200
Oakland, CA 94607-4052 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 http://www.fema.gov/what-mitigation/federal-insurance-mitigation-administration
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 a number of programs and activities which provide citizens Protection, with flood insurance; Prevention, with mitigation measures and Partnerships, with communities throughout the country.

United States Geological Survey
Level: Federal Hazard: Multi http://www.usgs.gov/
345 Middlefield Road
Menlo Park, CA 94025 Ph: 650-853-8300 Fx:
Notes: The USGS provides 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.

Insurance Institute for Business and Home Safety
Level: National Hazard: Multi www.disastersafety.org
4775 E. Fowler Avenue
Tampa, FL 33617 Ph: 813-286-3400 Fx: 813-286-9960
The Institute for Business & Home Safety (IBHS) is a nonprofit association that engages in communication, education, engineering and research. The Institute works to reduce deaths, injuries, property damage, economic losses and human suffering caused by natural disasters.

Publications

"Land Use Planning for Earthquake Hazard Mitigation: Handbook for Planners" by Wolfe, Myer R. et. al., (1986) University of Colorado, Institute of Behavioral Science, National Science Foundation.

This handbook provides techniques that planners and others can utilize to help mitigate for seismic hazards. It provides information on the effects of earthquakes, sources on risk assessment, and effects of earthquakes on the built environment. The handbook also gives examples on application and implementation of planning techniques to be used by local communities.

Contact: Natural Hazards Research and Applications Information Center
Address: University of Colorado, 482 UCB, Boulder, CO 80309-0482
Phone: (303) 492-6818
Fax: (303) 492-2151
Website: http://www.colorado.edu/UCB/Research/IBS/hazards

"Public Assistance Debris Management Guide", FEMA (July 2000).

The Debris Management Guide was developed to assist local officials in planning, mobilizing, organizing. and controlling large-scale debris clearance, removal, and disposal operations, Debris management is generally associated with post-disaster recovery. While it should be compliant with local and county emergency operations plans, developing strategies to ensure strong debris management is a way to integrate debris management within mitigation activities. The "Public Assistance Debris Management Guide" is available in hard copy or on the FEMA website.

"A Safer, More Resilient California: The State Plan for Earthquake Research," California Seismic Safety Commission (2004).

This is a 5-year statewide earthquake research plan that contains identifies research activities, and provides strategies to receive federal funding to implement the plan. For additional information and to review many more publications issued by the CSSC, refer to their website at http://www.seismic.ca.gov/pub.html.

"Putting Down Roots in Earthquake Country," Southern California Earthquake Center, 2011 edition.

An updated version of a classic booklet that discusses the earthquake risk in California and provides homeowners with specific information on how to earthquake-proof their homes and be prepared for an earthquake. The document is available online from www.earthquakecountry.org/roots. A Spanish version of the pamphlet is also available from the same site.

"7 Steps to an Earthquake Resilient Business – A Supplemental Guide to Putting down Roots in Earthquake Country," Southern California Earthquake Center, 2008.

This booklet provides information helpful to business owners to earthquake-proof their place of business, keeping their employees safe, and prevent work stoppages or business closure. This document is also available from www.earthquakecountry.org/roots/.

Refer to the References section (Appendix I) for a listing of the reports referenced in this section and other resources.

SECTION 7: FLOOD HAZARDS

Why are Floods a Threat to the City of Cudahy?

Floods are natural and recurring events that only become hazardous when man encroaches onto floodplains, modifying the landscape and building structures in the areas meant to convey excess water during floods. Floodplains have been alluring to populations for millennia since they provide level ground and fertile soils suitable for agriculture, access to water supplies, and transportation routes. Unfortunately, these benefits come with a price – flooding is one of the most destructive natural hazards, responsible for more deaths per year than any other geologic hazard. Furthermore, average annual flood losses (in dollars) have increased steadily over the last decades as development in floodplains has increased. In 2005, the U.S. Department of Homeland Security reported that flood damage costs nationwide exceed $5 billion per year, and that more than 900 lives were lost to flooding events between 1992 and 2001. In short, flooding poses a threat to life and safety, and can cause severe damage to public and private property.

Under the *National Flood Insurance Program*, a flood is:

a) a general and temporary condition or 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) mudslides (i.e., mudflows) which are caused by flooding and are akin to a river of liquid and flowing mud on the surfaces of normally dry land areas, or

b) the collapse or subsidence of land along the shore of a lake or other body of water as a result of erosion or undermining caused by waves or currents of water exceeding anticipated cyclical levels or suddenly caused by an unusually high water level in a natural body of water, accompanied by a severe storm, or by an unanticipated force of nature, such as flash flood or abnormal tidal surge, or by some similarly unusual and unforeseeable event which results in flooding.

This very broad definition of flooding is used in this document to address the potential for partial or complete inundation of normally dry areas in Cudahy as a result of storms and catastrophic failure of reservoirs. Given the city's inland location, the flooding hazard posed by rogue waves, tsunamis, and sea level rise is considered nil; these flooding sources are not discussed further herein.

The city of Cudahy and surrounding areas are, like most of southern California, subject to unpredictable seasonal rainfall. The region is currently undergoing one of the driest periods in history, but the historical record also shows that every few years the region is subject to periods of intense and sustained precipitation that result in flooding. Flood events that occurred in 1969, 1978, 1980, 1983, 1992, 1995, 1998, and 2005 have caused an increased awareness of the potential for public and private losses as a result of this hazard, particularly in highly urbanized parts of floodplains and alluvial fans. As the population in Los Angeles County increases, there is an increased pressure to build on flood-prone areas, and in localities upstream of already developed areas. With increased development, there is also an increase in impervious surfaces, such as asphalt, concrete and roofs. Water that used to be absorbed into the ground becomes runoff to downstream areas. If storm drain systems are not designed or improved to convey these increased flows, areas that may have not flooded in the past may be subject to flooding in the future.

Cudahy lies near the center of the greater floodplain of the Los Angeles and San Gabriel Rivers. Prior to man's intervention in historic times, these rivers collected runoff from the surrounding mountains, spreading storm water and sediment loads across the basin. The local mountains are high enough to capture moisture from strong winter storms, and the steep, rocky canyons are capable of discharging torrential flows of water and debris onto the floodplain below. Upon entering the basin, the natural rivers were rarely confined to a distinct channel and often radically changed their courses, building up in this manner the present basin floor and creating the underlying aquifers. When Spanish explorers first encountered the basin in the late 1700s, the Los Angeles River floodplain was heavily vegetated and dotted with vast marshes, shallow lakes, and small ponds. In the late 1800s and early 1900s, the rapidly developing basin was subject to several episodes of severe flooding. In response, natural channels were dredged, marshes were filled, and major rivers in the basin were confined to artificial channels in order to control flooding and sedimentation. These efforts included channelization of the Los Angeles River, a portion of which now forms the eastern boundary of the city of Cudahy.

The 50-plus miles-long Los Angeles River begins in the foothills of the Santa Monica Mountains, then flows east across the San Fernando Valley, where it is joined by major tributaries draining the western San Gabriel Mountains. It then turns south, passing through the Hollywood Hills and the Glendale Narrows, onto the broad coastal plain where it receives water from several more tributaries. Eventually reaching the Long Beach Harbor, it drains a total watershed of about 834 square miles. The U.S. Army Corps of Engineers and Los Angeles County have built and continue to maintain numerous regional flood control structures within the Los Angeles River system, including channels, levees, flood-control basins, and debris basins. Intimately tied to the flood-control effort is water conservation; part of the County's flood-control policy is to capture the maximum amount of storm runoff that is feasible, and return it to the underlying aquifers via soft-bottom channels and spreading grounds. Most of the features described above lie upstream of Cudahy, providing significant protection to the city from the kind of severe flooding and sedimentation that occurred in the past. Nevertheless, the city still suffers from localized flooding during major storms.

Because the Cudahy area, like most of the Los Angeles basin, is now densely urbanized, runoff is largely controlled by streets, retention basins, storm drains, and flood control channels.

History of Flooding in the City of Cudahy

Floods of consequence to the city of Cudahy are typically of the flash flood type, of short duration, but with high peak volumes and high velocities. This type of flooding occurs in response to the local geology and geography and the built environment (human-made structures). The mountains to the north of the city consist of rock that is predominantly impervious to water so little precipitation infiltrates the ground; rainwater instead flows along the surface as runoff. When a major storm moves in, water collects rapidly and runs off quickly, making a steep, rapid descent from the mountains onto the alluvial fans and ultimately into the Los Angeles River.

Stream gage records show that the annual peak streamflow in the Los Angeles River near Cudahy is typically less than about 4,000 cubic feet per second (cfs), with many years actually measuring considerably less than 1,000 cfs. However, peak flows have occasionally exceeded 4,000 cfs, most dramatically in the winters of 1937-38 and 1977-78 when flows reached nearly 8,000 cfs. In the decades between 1930 and 1980, the records show that annual peak discharges generally increased overall. This may indicate that climate was generally wetter in the last few decades (possibly as a result of climate change), or it could mean that with increased development upstream, the river has received more runoff.

Historic Flooding in Los Angeles County

There are several 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. Records show that since 1811, the Los Angeles River has flooded 30 times, roughly about once every 6 to 7 years. But averages are deceiving, for the Los Angeles basin goes through periods of drought and then periods of above-average rainfall. For example, between 1868 and 1884, a period of 16 years, there were no major floods, but this was followed by a series of wet years with floods in 1885, 1886, 1889 and 1891. A similar cluster of wet years was recorded in the 1990s.

Table 7-1: Historical Floods in Los Angeles County

Year	Comments
1770-1771	Great flooding on the Los Angeles River recorded by Father Juan Crespi. River overflowed its channel.
1771-1772	Flooding recorded by Spanish Mission Fathers. San Gabriel Mission crops destroyed.
1775-1776	Due to heavy flooding, San Gabriel Mission was moved about 6 miles back from the river.
1779-1780	Flooding recorded by Spanish Mission Fathers. Flows filled riverbed and flooded the lowlands where wheat and barley had been planted.
1811	Flooding reported, although records are sparse.
1815	Flooding washes away the original Plaza in Los Angeles. River changes course at Alameda and 4th Street to cut west and join Ballona Creek. From there it emptied into Santa Monica Bay.
1822	A great flood on the Los Angeles River "covered all the lowlands and reached a greater height than was ever known before."
1824-25	The greatest of the earlier recorded floods. Los Angeles River changed its course back from the Ballona wetlands to San Pedro. Before this storm, the river would spread over the entire area, filling depressions at the surface and forming lakes, ponds and marshes, rarely discharging its waters into the sea. The 1825 floods cut a riverway to the ocean, draining the marshlands and causing the forests to disappear.
1832	Heavy flooding caused the drainage near Compton to change so that many lakes and ponds that "had been permanent, became dry a few years thereafter." Drainage of these ponds and lakes completed the destruction of the forests that used to cover a large part of southern Los Angeles County.
1849–1860	Floods of various magnitudes occurred in 1849-1850, 1851-1852, and 1859-1860.
1861-62	The "great flood" or the "Noachian deluge of California." Fifty inches of rain fell during December and January. The entire valley from Los Angeles to the ocean was a great lake. Part of the river split and drained into Ballona Creek. San Gabriel River also overflowed its banks and started a new channel.

Year	Comments
1867-68	Floods spill over the river channel and create a large, temporary lake out to Ballona Creek. San Gabriel River breaks out of its channel and washes thousands of acres of land.
1884	Two periods of intense rainstorms separated by 6 to 8 days. The first storms caused little damage. The second washed all but one of the bridges across the Los Angeles River, washed away many houses, and drowned several people. Parts of Los Angeles flooded 3 to 4 feet deep.
1886-87	A good part of Los Angeles was inundated. The levees were damaged and railway communication was impossible for 2 to 3 weeks.
1889	Flood on Christmas Day caused much damage; bridges and levees washed away; the old San Gabriel, new San Gabriel and Los Angeles Rivers joined near Downey and formed one body. Los Angeles River overtopped its channel.
1914	Heavy flooding in January and February. Great damage to Los Angeles harbor.
1916-1938	Flooding in 1916. Minor floods causing damage in certain areas reported in 1918, 1921-1922, 1926, 1927, 1931, 1932, 1934, 1936, and 1937.
1934	Moderate to severe flooding starting January 1. Over 40 dead in La Cañada – Glendale area. Debris flow killed 12 people who had taken shelter in the Montrose Legion Hall.
1938	Series of storms beginning December 1937. March floods exceeded all previous floods for which records were available. Large tracts inundated; bridges, highways and railroads severely damaged. 87 people killed, over $78 million (1938 dollars) in damage.
1941-1944	Los Angeles River floods five times.
1952	Moderate flooding.
1969	Recurrent precipitation during January and February nearly approached the largest total since 1884. Nearly 40 people died as direct result of the floods in southern California, and more than 10,000 had to be evacuated.
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.
1994-1995	Heavy flooding throughout California. The total damages are estimated at $2 billion.
1997-98	The 1997 floods caused extensive damage in 48 California counties, including Los Angeles County. Total damages estimated at $1.8 billion. The 1998 El Niño storms also caused damage, but this was less than it could have been because many had taken measures to reduce their risk following the 1997 storms.
2003-2004	The rains followed the extensive fires of 2003; in many areas, canyons chocked with ashes and debris caused debris flows that did substantial damage downstream.
2004-05	The second-wettest year on record in the Los Angeles Basin; the rains caused extensive damage in some areas, triggering landslides and debris flows. In January, flooding and landsliding caused 28 deaths, 8 injuries, affected 500, and caused $200 million in damages. Between 17-23 February, flooding in Los Angeles County alone killed 9 people, affected 150, and caused $250 million in damages.
2005-06	Flooding due to intense precipitation between Dec. 31 and Jan. 18 killed 3 people, affected 3,600, and caused $245 million in damages in northern and southern California, and in Nevada.

Year	Comments
2010-2011	California winter storms caused flooding, debris flows and mudflows in several counties, especially along the foothills, and in areas previously burned by wildland fires. Major Disaster Declaration issued on January 26, 2011. Another powerful winter storm caused flash floods in March 2011.
Oct. 2012	A cold and unstable air mass produced strong thunderstorms and flash floods across Los Angeles County. The strongest storms occurred across the San Fernando and San Gabriel Valleys. Water flooding 3 to 4 feet high was reported along all lanes of I-710 in the **Bandini** neighborhood just north of **Cudahy**.
Feb.-March 2014	Strong winter storm generated heavy showers and thunderstorms that produced flash flooding and debris flows across Los Angeles County. Flash flooding and debris flows were reported near the Colby fire burn area in the San Gabriel Valley near Glendora and Azusa. Several homes were damaged. In Lakeview Terrace, two women were trapped when a wall of water swept across their driveway into the street.

Sources: http://www.em-dat.net/disasters/; htpp://www.fema.gov

What Factors Create Flood Risk?

Climate

Flooding occurs when climate, geology, and hydrology combine to create conditions where water flows outside of its usual course. In the city of Cudahy, geography and climate may combine to create seasonal flooding conditions. The Santa Monica, Santa Susana, and Verdugo Mountains for the most part do not reach heights above three thousand feet. In contrast, the western San Gabriel Mountains reach elevations of more than seven thousand feet. These higher ridges often trap east-moving winter storms. Although downtown Los Angeles averages just fifteen inches of rain a year, some mountain peaks in the San Gabriel Mountains receive more than forty inches of precipitation annually.

Naturally, this rainfall moves rapidly down stream, often with severe consequences for anything in its path. The intensity of the runoff increases in hillside areas recently burned by wildfires, where vegetation has not yet formed a protective ground cover that helps keep the soil in place. Furthermore, the oils in many of the plants native to southern California, when burned, react with the soils, making them water repellant. As a result, less rainwater than usual infiltrates the ground, and instead makes its way downstream as runoff, carrying ashes and other burned debris with it.

In general, areas closer to the San Gabriel Mountains receive higher precipitation amounts than areas located farther south on the basin plain. This is because, as explained above, the mountains often capture precipitation from strong, east-moving Pacific storms. For example, the average yearly precipitation in the Cudahy area is about 14 inches, whereas the northern part of the basin receives about 23 to 24 inches per year. "Averages" however, are not particularly representative of rainfall in the southern California area, as illustrated with the following discussion about downtown Los Angeles: the average annual rainfall in Los Angeles for the past about 125 water years is 14.9 inches, but rainfall during this time period ranged from only 4.35 inches in 2001-2002 to 38.2 inches in 1883-1884. In fact, only in fifteen of the past 125 years has the annual rainfall been within plus or minus 10 percent of the 14.9-inch average, and only in 38 of the past 125 years has the annual rainfall been within plus or minus 20 percent of the average value. [A water year is the 12-month period from October 1 through September 30 of the second year.

Often a water year is identified only by the calendar year in which it ends, rather than by giving the two years.] This makes the Los Angeles basin a land of extremes in terms of annual precipitation.

There are three types of storms that produce precipitation in southern California: winter storms, local thunderstorms, and summer tropical storms (or monsoons). These are described below.

- **Winter Storms** are characterized by heavy and sometimes prolonged precipitation over a large area. These storms usually occur between November and April and are responsible for most of the precipitation recorded in southern California. The storms originate over the Pacific Ocean and move eastward (and inland). The mountains, such as the San Gabriel and San Bernardino Mountains, form a rain shadow, slowing down or stopping the eastward movement of this moisture. A significant portion of the moisture is dropped on the mountains as snow. If large storms are coupled with snowmelt from these mountains, large peak discharges can be expected in the main watersheds at the base of the mountains.

  Some of the severe winter storm seasons that have historically impacted the southern California area have been related to El Niño events. El Niño is the name given to a phenomenon that starts every few years, typically in December or early January, in the southern Pacific off the western coast of South America, but whose impacts are felt worldwide. Briefly, warmer than usual waters in the southern Pacific are statistically linked with increased rainfall in both the southeastern and southwestern United States, droughts in Australia, western Africa and Indonesia, reduced number of hurricanes in the Atlantic Ocean, and increased number of hurricanes in the Eastern Pacific. Two of the largest and most intense El Niño events on record occurred during the 1982-83 and 1997-98 water years. These are also two of the worst storm seasons reported in southern California.

- **Thunderstorms and Monsoons:** Other relatively regular sources of heavy rainfall, particularly in the mountains and adjoining cities, are summer tropical storms. Tropical rains or monsoons are infrequent, and typically occur in the summer or early fall. These storms originate in the warm, southern waters off Baja California, in the Pacific Ocean, and move northward into southern California. Tropical storms that have dropped significant rainfall in the southern California area in the last 150 years or so are listed in Table 7-2 below. Thunderstorms can occur at any time, but are usually more prevalent in the higher mountains during the summer. Thunderstorms usually impact relatively small areas.

Table 7-2: Tropical Storms That Affected Southern California Between 1858 and July 2014

Month-Year	Date(s)	Source of Storm; Area(s) Affected	Rainfall
Oct. 1858	2-3rd	The only known historical hurricane that made a landfall in southern California; 75 mph winds estimated in San Diego, tropical storm along the coastline north to Long Beach; intense rain reported from San Diego to Santa Barbara.	>7"
July 1902	20th & 21st	Deserts and southern mountains. El Niño of 1901-02.	up to 2"

Month-Year	Date(s)	Source of Storm; Area(s) Affected	Rainfall
Aug. 1906	18th & 19th	Deserts and southern mountains. El Niño of 1905-06.	up to 5"
Sept. 1910	15th	Mountains of Santa Barbara County.	2"
Aug. 1921	20th & 21st	Deserts and southern mountains. La Niña of 1920-21.	up to 2"
Sept. 1921	30th	Deserts. La Niña of 1920-21.	up to 4"
Sept. 1929	18th	Southern mountains and deserts.	up to 4"
Sept. 1932	28th - Oct 1st	Mountains and deserts, 15 fatalities. El Niño of 1932-33.	up to 7"
Aug. 1935	25th	Southern valleys, mountains and deserts.	up to 2"
Sept. 1939 (during El Niño of 1938-39)	4th - 7th	Southern mountains, southern and eastern deserts.	up to 7"
	11th & 12th	Deserts, central and southern mountains.	up to 4"
	19th - 21st	Deserts, central and southern mountains.	up to 3"
	25th	Tropical cyclone that made a landfall in San Pedro, with sustained winds of 50 mph. Only known tropical cyclone to make a landfall in Southern California. 93 people died; 45 onshore and 48 offshore, at sea. Ten houses washed away in Belmont Shores.	5"
		Surrounding mountains.	6 to 12"
Sept. 1945	9th & 10th	Central and southern mountains.	up to 2"
Sept. 1946	30th - Oct 1st	Southern mountains.	up to 4"
Aug. 1951	27th - 29th	Southern mountains and deserts; many roads washed out in the Imperial Valley. El Niño of 1951-52.	2 to 5"
Sept. 1952	19th - 21st	Central and southern mountains. El Niño of 1951-52.	up to 2"
July 1954	17th - 19th	Deserts and southern mountains. El Niño of 1953-54.	up to 2"
July 1958	28th & 29th	Deserts and southern mountains. El Niño of 1957-58.	up to 2"
Sept. 1960	9th & 10th	Hurricane Estelle dissipated west of Central Baja California; southern mountains at and near Julian.	3.40"
Sept. 1963	17th - 19th	Tropical storm Katherine made landfall in northern Baja California; impacted central and southern mountains. El Niño of 1963-64	up to 7"
Sept. 1967	1st - 3rd	Hurricane Katrina in Baja California; impacted southern mountains and deserts.	2"
Sept. 1972	3rd	Remnants of Hurricane Hyacinth made landfall between Los Angeles and San Diego with 25-mph winds and rainfall in the central and southern mountains. El Niño of 1972-1973.	Up to 1"

Month-Year	Date(s)	Source of Storm; Area(s) Affected	Rainfall
Oct. 1972	6th	Hurricane Joanne made landfall in northern Baja; maintained tropical storm strength into Arizona; rain in southeast deserts. El Niño of 1972-1973.	up to 2"
Sept. 1976	10th & 11th	As a result of the tropical storm Kathleen; impacted the central and southern mountains; sustained winds of 57 mph at Yuma. Killed 12 people in the U.S.; 70-80% of Ocotillo was destroyed; caused millions of dollars in damage. El Niño of 1976-1977.	6 to 12"
Aug. 1977	n/a	Hurricane Doreen dissipated over the southern California coastal waters. Widespread flooding; extensive crop damage. In Los Angeles and south, up to 2" of rain.	2"
		Mountains. El Niño of 1977-78.	up to 8"
Oct. 1977	6th & 7th	Remnants of Hurricane Heather tracked into southern Arizona; impacted southern mountains and deserts.	up to 2
Sept. 1978	5th & 6th	Remnants of Hurricane Norman impacted the mountains. El Niño of 1977-78.	3"
Sept. 1982	24th - 26th	Remnants of Hurricane Olivia; impacted the mountains. Strong El Niño of 1982-83.	up to 4"
Sept. 1983	20th & 21st	Hurricane Manuel dissipated off west coast of northern Baja California; impacted the southern mountains and deserts. Strong El Niño of 1982-83.	up to 3"
Oct. 1983	7th	Remnants of Hurricane Priscella scattered light rain across southern California.	n/a
Sept. 1984	10-11th	Hurricane Marie dissipated off the west coast of northern Baja California; scattered rain in coastal areas.	n/a
Aug. 1997	17-19th	Tropical storm Ignacio dissipated near the south-central California coast with gale-force winds over coastal waters. Part of the strong El Niño of 1997-98.	n/a
Sept. 1997	n/a	Hurricane Linda, the strongest storm recorded in the eastern Pacific with 180 mph winds, threatened to come ashore southern California as a subtropical storm. The storm turned away, but caused high surf, 18-foot high waves, showers and thunderstorms.	
Sept. 1997	25th	Hurricane Nora crossed into southern California and Arizona from Baja California. Brought heavy rain to parts of the region, causing millions of dollars in damage to agriculture.	n/a
Sept. 2004	10-19th	Mid-level moisture from hurricane Javier spread over northern Mexico and southwestern United States.	n/a
July 2006	31st	Remnants of Tropical storm Emilia brought rain to southern California that helped extinguish the House Fire.	n/a
Sept. 2007	20-22nd	Thunderstorms and showers; flooding watch in Santa Catalina Island; rain throughout the southern California area.	n/a
July 2012	18-20th	Remnants of Hurricane Fabio generated scattered showers and thunderstorms in the Los Angeles basin.	n/a

Month-Year	Date(s)	Source of Storm; Area(s) Affected	Rainfall
Aug. 2013	25-26th	Moisture from the remnants of Tropical storm Ivo caused flash flooding and mudslides in San Bernardino County and Arizona. One motorist drowned in Needles. In the Antelope Valley, flash flooding was reported in the communities of Quartz Hill and Leona Valley.	3 to 4"

Sources: http://www.fema.gov/nwz97/eln_scal.shtm; http://usatoday.com/weather/whhcalif.htm; http://www.nhc.noaa.gov; Chenoweth and Landsea, 2004 (on the 1858 Hurricane); http://www.nasa.gov/topics/earth/features/earth20121017.htm; http://en.wikipedia.org/wiki/List_of_California_hurricanes

Much research in the last decade has focused on the study of a meteorological phenomenon called the **Atmospheric River** (AR). ARs are narrow streams of water vapor transported in the lower atmosphere that are probably responsible for most of the very large storms on the west coast of the United States. Typically packing high wind speeds, ARs are no more than 400 to 500 kilometers wide, but are thousands of kilometers long, sometimes extending across whole ocean basins. When ARs traveling across the Pacific Ocean collide with the mountain ranges in the west coast, the vapor is forced upwards, where it condenses and rains out, leading to significant flooding (Ralph and Dettinger, 2011).

The U.S. Geological Survey's (USGS) Multi Hazards Demonstration Project (MHDP) has been combining various science disciplines to test and improve the resiliency of communities to natural disasters. By developing a disaster scenario (such as the 2008 ShakeOut Earthquake Scenario discussed in Section 6) scientists, engineers, and other experts are engaging emergency planners, first responders, businesses, universities, insurance companies, government agencies and the public in preparing for a major natural disaster. The second major project of the MHDP, after the 2008 ShakeOut Scenario, is a catastrophic winter storm scenario consisting of a hypothetical (but not unrealistic) Pacific storm striking the west coast of California, similar in intensity to the 1861-1862 series of storms that resulted in state-wide flooding that left the central coast impassible, the capital underwater for three months, and the State bankrupt.

Named the ARkStorm (for Atmospheric River 1,000), the impacts of such a storm are expected to overwhelm the State's flood protection system, which is normally designed to control the 100- to 200-year storm runoff. Property damages and business disruptions from the ARkStorm, if it happened today, are estimated to be on the order of $725 billion, nearly three times the loss expected from the hypothetical southern California ShakeOut earthquake (Porter et al., 2011). The USGS report indicates an ARkStorm is not only plausible, but probable, and may not be a worst case. The geological record suggests that six megastorms have occurred in California in the last 1,800 years – all more severe than the 1862 event. The products of the ARkStorm Scenario are intended to be used by emergency planners, policymakers and other to review disaster preparedness, conduct risk assessments and disaster drills, explore ways to adequately fund response and recovery, plan future hazards mapping, and educate the public.

Geography and Geology

The mountains bordering the Los Angeles Basin are very steep and consist of rock types that are fairly impervious to water. Consequently, little precipitation infiltrates the ground; rainwater instead flows across the surface as runoff, collecting in the major drainages that pass through the basin. When a major storm moves in, water collects rapidly and runs off quickly, making a steep, rapid descent from the mountains into man-made and natural channels within developed areas. Because of the steep terrain, scarcity of vegetation, and the constant shedding of debris from mountain slopes (primarily as dry ravel and rock falls), floodwaters often carry large amounts of mud, sand, and rock fragments. Sheet flow occurs when the capacities of the existing channels (either natural or man-made) are exceeded and water flows over and into the adjacent areas.

The greater Los Angeles Basin has been shaped by erosion and sedimentation for millennia. Most of the mountains that ring the basin are continually being uplifted at a very fast rate (geologically speaking), during earthquakes on the region's many active faults. The rapid uplift has resulted in steep, rugged slopes underlain by brittle, fractured rock, thereby creating a landscape that is very susceptible to erosion. Over time, rivers and streams emanating from the mountain front have carried boulders, rocks, gravel, sand, and silt down these slopes to the valleys and coastal plain where sedimentary deposits are locally as much as twenty thousand feet thick. This sediment generally acts as a sponge, absorbing vast quantities of water received as precipitation 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, in some years of heavy rain, flooding is minimal because the ground is relatively dry. The same amount of rain following a wet period, when the ground is already saturated, can cause extensive flooding.

Built Environment

The greater Los Angeles basin is essentially built out. This leaves scant open land to absorb rainfall. This lack of open ground forces water to remain on the surface and accumulate rapidly. If it were not for the massive flood control system that has been built over the years, with its concrete-lined rivers and stream beds, flooding in the Los Angeles basin would be a much more common occurrence. And the tendency is towards even less and less open land. In-fill building is becoming a much more common practice in many areas: Developers frequently tear down older homes, which typically cover up to 40 percent of the lots that they occupy, and replace each of them with three or four town homes or apartments, which may cover 90-95 percent of the lot. This increase in impervious surfaces (including concrete walkways, and roofs) results in a direct increase in runoff.

Another potential reason for recurrent storm flooding in developed areas is "asphalt creep." The street space between the curbs of a street is a part of the flood control system. Water leaves the adjacent properties and accumulates in the streets, where it is directed towards the underground portion of the flood control system. The carrying capacity of a given 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 its engineered capacity.

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 floodwaters 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 Flood-Prone Areas Are Identified

The Federal Emergency Management Agency (FEMA) is mandated by the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973 to evaluate flood hazards. To promote sound land use and floodplain development, FEMA prepares and provides Flood Insurance Rate Maps (FIRMs) for local and regional planners. Flood risk information presented on FIRMs is based on historic, meteorological, hydrologic, and hydraulic data, as well as topographic surveys, open-space conditions, flood control works, and existing development.

Rainfall-runoff and hydraulic models are utilized by the FIRM program to analyze flood potential, adequacy of flood protective measures, surface-water and groundwater interchange characteristics, and the variable efficiency of mobile (sand bed) flood channels. It is important to realize that FIRMs only identify potential flood areas based on the conditions at the time of the study, and do not consider the impacts of future development. To prepare FIRMs that illustrate the extent of flood hazards in a flood-prone community, FEMA conducts engineering studies referred to as Flood Insurance Studies (FISs). Using information gathered in these studies, FEMA engineers and cartographers delineate Special Flood Hazard Areas (SFHAs) on FIRMs. SFHAs are those areas subject to inundation by a "**base flood,**" which FEMA sets as a 100-year flood (see definitions below).

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 floodwater. The floodplain is made up of two sections: the floodway and the flood fringe.

Floodway

Floodways are defined for regulatory purposes. Unlike floodplains, floodways do not reflect a recognizable geologic feature. For National Flood Insurance Program (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 floodwaters 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 floodway of the Los Angeles River is immediately east of Cudahy. NFIP 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. Generally, the flood fringe is defined as "the land area which is outside of the stream flood way but is subject to periodic inundation by regular flooding." This is the area where development is most likely to occur, and where precautions to protect life and property need to be taken.

100-Year Flood

The 100-year flood, also called the **Base Flood**, 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. A **100-year flood** is defined by looking at the long-term average period between floods of a certain size, and identifying the size of flood that has a 1 percent chance of occurring during any given year. This base flood has a 26 percent chance of occurring during a 30-year period, the length of most home mortgages. However, a recurrence interval such as "100 years" represents only the long-term average period between floods of a specific magnitude; rare floods can in fact occur at much shorter intervals or even within the same year.

Development

For floodplain ordinance purposes, development is broadly defined as "any man-made 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 located within the area of special flood hazard." 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, whereas 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.

Special Flood Hazard Area (SFHA)

Using information gathered in Flood Insurance Studies, FEMA engineers and cartographers delineate Special Flood Hazard Areas on FIRMs. SFHAs are those areas subject to a high risk of inundation by a "base flood" which FEMA sets as a 100-year flood. As discussed further in the next section, SFHAs are regulated zones, requiring the mandatory purchase of flood insurance. They are also subject to special standards and regulations that apply to new construction, and in some cases, existing buildings. Floodplain regulations required by the NFIP apply only to properties located in a SHFA. However, these are minimum requirements, and local jurisdictions may regulate areas outside of the SHFAs, based on knowledge specific to their area.

Flood Mapping Methods, Products and Programs

Flood Insurance Rate Maps and Flood Insurance Studies

Flood Insurance Rate Maps (FIRMs) and Flood Insurance Studies (FISs) are the basis for implementing floodplain regulations and for delineating flood insurance purchase requirements, as these studies assess the probability of flooding at a given location. FIRMs are developed using water surface elevations combined with topographic data and 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. FIRMs are the official maps produced by FEMA that delineate Special Flood Hazard Areas (SFHAs) in communities where National Flood Insurance Program (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.

Communities find it particularly useful to overlay flood hazard areas on tax assessment parcel maps and land use maps. This allows a community to evaluate the flood hazard risk for a specific parcel during review of a development request. FIRM maps can be imported directly into GIS, which allows for GIS analysis of flood hazard areas. 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.

In addition to their original purpose of setting insurance rates and regulating flood hazards, FIRMs are now widely used by local and regional planners for other purposes, including land-use planning, emergency preparedness and response, natural resource management, and risk assessment. Given their wide usage, it is important to note that there are many uncertainties inherent in the establishment of FEMA flood zones (Larsen, 2009). Specific limitations of FIRM maps that communities should be aware of are discussed below:

- It is important to realize that FIRMs only identify potential flood areas based on the conditions at the time of the study, and do not consider the impacts of changes in the area since the maps were developed, or the impacts that future changes may have on the flood hazard. Conditions that affect the maps and the decisions made on their basis may include changes in corporate boundaries, changes in population, man-made and natural changes to the landscape, removal of vegetation, changes to hydrologic systems, construction of flood control facilities, and potential climate changes. These modifications to the environment may increase or reduce the area susceptible to flooding. Many Flood Insurance Studies that were first completed in the late 1970s and early 1980s have not been updated since, and are thus significantly under-estimating the current flood risk in areas where extensive development has occurred since the maps were created.

- The level of detail studied and presented on the maps, as well as the boundaries of the area studied, depend on the type of flood hazard, the funding available, and the risk of flood damage at the time. For instance, areas studied by approximate methods do not provide BFEs on the map, and some study areas are limited in extent. Essentially, not all 100-year and 500-year floodplains have been yet mapped.

- The maps do not necessarily identify all areas susceptible to flooding, such as drainages of small size, areas of localized ponding during storms, or areas where drainages are restricted by temporary or permanent structures.

- The analytical process used to construct these maps relies on many assumptions and limited data. The data used may be too old, incomplete, interpolated, and/or inaccurate. For example, in relatively flat floodplains, small elevation errors in the topography can result in large errors in flood zone boundaries.

- One major drawback is the very short time period for which we have meteorological records. Research on some parts of southern California has shown that slight climate fluctuations between wet and dry cycles have occurred since the late 1800s (Hereford and Longpre, 2009). Global climate change is still intensely debated, but many scientists now believe even slight global warming could bring an increase in precipitation overall, although the specific effects on the Los Angeles region, including Cudahy, are not known.

- Long-term changes in the watershed or floodplain, primarily as a result of man's activities, are even harder to predict. Flood control structures, such as berms and levees, can actually increase the flood risk to other areas. The design of high-density developments often requires taking drainages that used to be spread over a wide area and constricting them into narrow channels, thereby increasing the velocity and erosive power of the flow, and perhaps leading to overtopping. Consequently, there are clearly limitations in using hydrologic calculations based on past, imperfect records to predict the future.

- Larsen (2009) also argues that the process of placing a line on a map (flood zone boundaries) incorrectly conveys a sense of certainty about the risk. Since the public and policy makers typically make decisions based on these lines on a map, the potential risk to adjacent properties outside the margins defined by those lines is often underestimated.

Notwithstanding the information in the paragraphs above, the FIS for Los Angeles County that includes the Cudahy area was last updated in August 2008, and is thus relatively current. This document includes community descriptions, flooding sources (including the Los Angeles River), information on historical flooding, existing flood protection measures, hydrologic and hydraulic analyses, and definition of potential flood areas.

The NFIP also reduces flood losses through regulations that focus on building codes and sound floodplain management. In the city of Cudahy, the NFIP and related building code regulations went into effect in 1983 (City ID No. 060657). 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. Furthermore, because Cudahy is a participating member of the NFIP, flood insurance is available to any property owner in the city. In fact, to secure financing to buy, build, or improve structures in a Special Flood Hazard Area (SFHA), property owners are required to purchase flood insurance. Lending institutions that are federally regulated or federally insured must determine if the structure is located in a SFHA and must provide written notice requiring flood insurance.

FEMA recommends that most property owners, whether residential or commercial, purchase and keep flood insurance, even if they are not located in a mapped flood hazard zone. Keep in mind that approximately 20 to 25 percent of all flood claims occur outside of mapped high flood risk areas, and typical homeowner or business insurance policies do not cover flooding. Residents or business owners that rent property can also purchase coverage for the contents of their homes or business inventories. In low to moderate risk areas, property owners should ask their agents if they are eligible for the FEMA Preferred Risk Policy, which provides inexpensive flood insurance protection. Insured property owners can be reimbursed for all covered losses, even if the flood is not officially declared a Federal disaster area. Residents should also be aware that localized flooding could be caused by a temporary situation, such as a storm drain inlet or culvert that becomes blocked by debris during a storm.

FEMA also recommends that residents do not forgo purchasing insurance, assuming instead that Federal disaster assistance will pay for flood damage. This is because in order to receive assistance, a community must first be declared a Federal disaster area, and these declarations are issued in less than 50 percent of flood events. Furthermore, Federal assistance is usually in the form of a loan, which must be repaid with interest. If uninsured property owners do receive Federal assistance, they must purchase flood insurance to remain eligible for future disaster relief.

Mapped Flood Areas Outside of the 100-Year Flood Zone

The FIRMs that include the Cudahy area also show the estimated limits of areas with moderate to low risk of flooding. The flood having a 0.2 percent annual chance of occurring (also called the 500-year flood) is usually the basis for these categories, with moderate risk defined as the zone between the limits of the 100-year and 500-year floods, and low risk defined as the area outside of the 500-year flood limits. These zones may also include areas where the base flood is less than one foot deep, where the drainage basin is small (less than one square mile), or areas that are protected from the base flood by levees. Flood insurance is available for properties in these zones, but is not mandated by the NFIP.

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 man-induced flooding.

In order to address this lack of data, jurisdictions can make efforts to develop more localized flood hazard maps. One method that has been employed includes using high-water marks from flood events or aerial photos, in conjunction with the FEMA maps, to better reflect the true flood risk.

Community Rating System

The Community Rating System (CRS) is a voluntary part of the National Flood Insurance Program (NFIP) that seeks to coordinate all flood-related activities, reduce flood losses, facilitate accurate insurance ratings, and promote public awareness of flood insurance by creating incentives for a community to pursue beyond the minimum requirements of the NFIP. Any community that is in full compliance with the NFIP's minimum floodplain management requirements may apply to join the CRS. CRS ratings are on a ten-point scale, from 1 to 10, with 1 being the best rating. Residents of CRS communities who live within FEMA's Special Flood Hazard Areas (SFHAs) receive a 5 percent reduction in flood insurance rates for every one-point improvement in the community's CRS rating. As of October 1, 2014, the City of Cudahy is not included in the list of CRS-eligible communities. For additional information on the Community Rating System, including how to go about becoming eligible, refer to https://www.fema.gov/national-flood-insurance-program-community-rating-system.

FEMA's Multi-Hazard Flood Map Modernization Program

Because many flood maps and related products were outdated and available only on unalterable paper products, FEMA started its Map Modernization Program (Map Mod) in 2003 to reduce reliance on paper maps and transition to digital processes for distributing and reading flood maps. The program also included collecting new flood data for unmapped areas. Based on funding limitations and feedback from stakeholders, FEMA changed its goals midway through the program. Rather than try to create digitized flood maps for the entire nation, it was decided to improve the accuracy of the newly updated maps by establishing two criteria: 1) a floodway boundary standard that would insure flood maps match the topographic data used (although use of the standard itself does not validate the accuracy of the topographic data); and 2) guidelines to determine whether an existing flood study is adequate for current use or if an updated study is needed. The adjusted goal, which was met, was to have 65 percent of the continental U.S. land area and 92 percent of the population covered by digital maps by 2008 (National Research Council, 2009). The state-of-the-art technology and advanced engineering used to complete the Map Mod program, including increased collaboration between FEMA and regional, state and local partners, laid the foundation for FEMA's Risk MAP program described below.

Risk Mapping, Assessment and Planning (Risk MAP) Program

With the Risk MAP Program approved in March 2009, FEMA has moved away from simply portraying flood hazard zones on maps to more accurately communicating and assessing risk to the local community. Building on the digitized maps, FEMA developed a five-year plan to fill in data gaps, increase public awareness, increase their outreach on flood risks, support state and local agencies in risk-based mitigation planning, and provide an enhanced digital platform that improves communication and sharing of risk data (https://www.fema.gov/national-flood-insurance-program-flood-hazard-mapping/map-modernization). In 2011, FEMA started a multi-year project to improve their guidelines and standards for flood risk analysis and mapping, the goal being to bring better overall consistency, clarity, and efficiency to the mapping process. The result of this work was publication of a compendium document covering all standards applicable to the Risk MAP program (FEMA, 2013). FEMA plans to issue updates to their mapping policies on a semi-annual basis (FEMA, 2014).

Storm Flooding Characteristics

There are several types of flooding that have historically affected the southern California region, including the Los Angeles basin: riverine flooding, urban flooding, hillside debris flows, and coastal flooding. Given that the city of Cudahy is located some distance away from both the ocean and the mountains, the main sources of flooding in the city are riverine and urban. These two types of flooding are discussed below.

Riverine Flooding

Riverine flooding is the overbank flooding of rivers and streams. This process in a natural environment adds sediment and nutrients to the flooded area, cyclically enhancing the fertility of the soils, which is why floodplains have been the breadbaskets of civilizations through the ages. However, large floods have the potential to cause significant damage to man-made structures and cause significant loss of life. 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.

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

This type of flooding occurs as a result of land being converted from agricultural fields or woodlands to roads and parking lots, in the process losing 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 floodwaters that rise very rapidly and peak with violent force. The flooding of developed areas often occurs when the amount of water generated from rainfall and runoff exceeds the capability of the storm drain system to remove and transport it.

Inundation Due to Catastrophic Failure of Water Retention Structures

Seismically induced inundation refers to flooding that occurs when water retention structures (such as dams) fail due to an earthquake. Failure of these structures can also result from other causes, such as overtopping, foundation problems, or construction errors. 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.

Flooding Due to Dam Failure

Statutes governing dam safety are defined in Division 3 of the California State Water Code (California Department of Water Resources, 1986). These statutes empower the California Division of Dam Safety to monitor the structural safety of dams that are greater than 25 feet in dam height or have more than 50 acre-feet in storage capacity. Dams under Federal ownership and operation, such as those owned by the U.S. Army Corps of Engineers, are not reviewed by, nor are they under the jurisdiction of the California Division of Dam Safety.

There are several reasons why dams can fail. Some of these include: erosion and piping of the soil in earth embankment dams, failure of the materials used in the dam construction (such as settlement and cracking of the concrete in concrete dams), failure (as a result of faulting or landsliding) of the dam foundation or sides, overtopping of the dam due to flooding that exceeds the capacity of the dam, poor maintenance of the dam, and deliberate acts of sabotage (https://www.fema.gov/why-dams-fail).

There have been a total of 45 dam failures in California since the 19th century. Those that have occurred in southern California are listed in Table 7-3. The two most significant of these, St. Francis Dam in 1928 and the Baldwin Hills Dam in 1963, are described further below.

Table 7-3: Dam Failures in Southern California

Dam Name	Location	Year	Failure Mechanism
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.

St. Francis Dam, completed in 1926 in the San Francisquito Canyon near Saugus, was originally 185 feet high and 600 feet long. In response to increased population pressures, the storage capacity of the dam was increased by raising the dam's height to 205 feet. This was accomplished without increasing the width of the base to compensate for the increased height, a significant issue since this was a curved concrete gravity dam, with its stability derived from a balance between the vertical and horizontal loads. Around midnight on March 12-13, 1928, a massive landslide occurred along the dam's left abutment; more than 1.5 million tons of schist bedrock slid down and against the dam's 271 tons of concrete. That, combined with the already unstable dam base resulting from the increased height, led to the catastrophic failure of the dam. A flood wave more than 140 feet high swept down the Santa Clara valley toward the Pacific Ocean. Even 42 miles down-canyon, by Santa Paula, the wall of water was estimated at 25 feet high. Almost everything in its path was destroyed: livestock, structures, railways, bridges, and orchards. By the time it was over, parts of Ventura County were under 70 feet of mud and debris. Over 420 people were killed, with 179 bodies never recovered, and damage estimates topped $20 million. The City of Los Angeles paid over $14 million in damages (Rogers, 2007).

The failure of this dam resulted in several positive changes, including the requirement for engineering geologic input in dam projects (it had been absent before then), increased dam safety legislation in California, the review of all federal dams, professional engineering registration, and state-mandated arbitration hearings for all victims of natural disasters (Rogers, 2007).

The Baldwin Hills dam, an earthen dam that created a 20-acre, 70-feet high reservoir to supply drinking water to West Los Angeles residents, failed on Saturday, December 14, 1963 at 3:38 in the afternoon. The hilltop reservoir was built in 1951 across the surface trace of several faults and cracks associated with the Newport-Inglewood fault zone and uplift of the Baldwin Hills. A water-injection program to enhance the recovery of petroleum in the adjacent Inglewood oil field was begun in 1954, with a full-scale program instituted in 1957. The injection program caused renewed movement on the faults, including one under the reservoir that experienced normal movement. Movement on the fault caused the reservoir lining to fail; a pencil-thin crack widened to a 75-foot gash, allowing 250 million gallons of treated water to surge out, with the flood sweeping northward in a V-shaped path roughly bounded by La Brea Avenue and Jefferson and La Cienega boulevards. The residences within a square-mile area were inundated with mud and debris, 277 homes were destroyed, and five lives were lost. The loss of life would have been much greater had a caretaker not given the alarm several hours beforehand, allowing the police to just barely evacuate the area. Total property damages were estimated at $12 million, in addition to the loss of the reservoir itself (Hamilton and Meehan, 1971).

Figure 7-1: Failure of the Baldwin Hills Dam

Dark spot in upper right hand quadrant shows the beginning of the break in the dam.

This is one of the first disaster events documented in a live helicopter broadcast – the live telecast of the collapse from a KTLA-TV helicopter is considered the precursor to airborne news coverage that is now routine everywhere. It took 77 minutes for the impounded reservoir to empty, but it took a generation for the neighborhood below to recover, illustrating the severe, long-term impact of these disasters. Furthermore, failure of this reservoir foreshadowed the end of urban-area earthen dams as a major element of the Department of Water and Power's water storage system. It also prompted a tightening of Division of Safety of Dams control over reservoirs throughout the State.

Flooding Due to Failure of Above-Ground Water Storage Tanks

Seismically induced inundation can also occur if strong ground shaking causes structural damage to above-ground water tanks. If a tank is not adequately braced and baffled, sloshing water can lift a water tank off its foundation, splitting the shell, damaging the roof, and bulging the bottom of the tank (elephants foot) (EERI, 1992). Movement can also shear off the pipes leading to the tank, releasing water through the broken pipes. These types of damage occurred during southern California's 1992 Landers, 1992 Big Bear, and 1994 Northridge earthquakes. The Northridge earthquake alone rendered about 40 steel tanks non-functional (EERI, 1995), including a tank in the Santa Clarita area that failed and inundated several houses below. As a result of lessons learned from recent earthquakes, new standards for design of steel water tanks were adopted in 1994 (Lund, 1994). The new tank design includes flexible joints at the inlet/outlet connections to accommodate movement in any direction.

Water lost from tanks during an earthquake can significantly reduce the water resources available to suppress earthquake-induced fires. Damaged tanks and water mains can also limit the amount of water available to residents after a severe earthquake. Groundwater wells can be damaged during an earthquake, limiting the water available to those communities dependent on the damaged wells. Therefore, it is of paramount importance that the water storage tanks in the area retain their structural integrity during an earthquake, so water demands after an earthquake can be met. In addition to evaluating and retrofitting to meet current standards, this also requires that the tanks be kept at near full capacity as much as practical.

Hazard Assessment

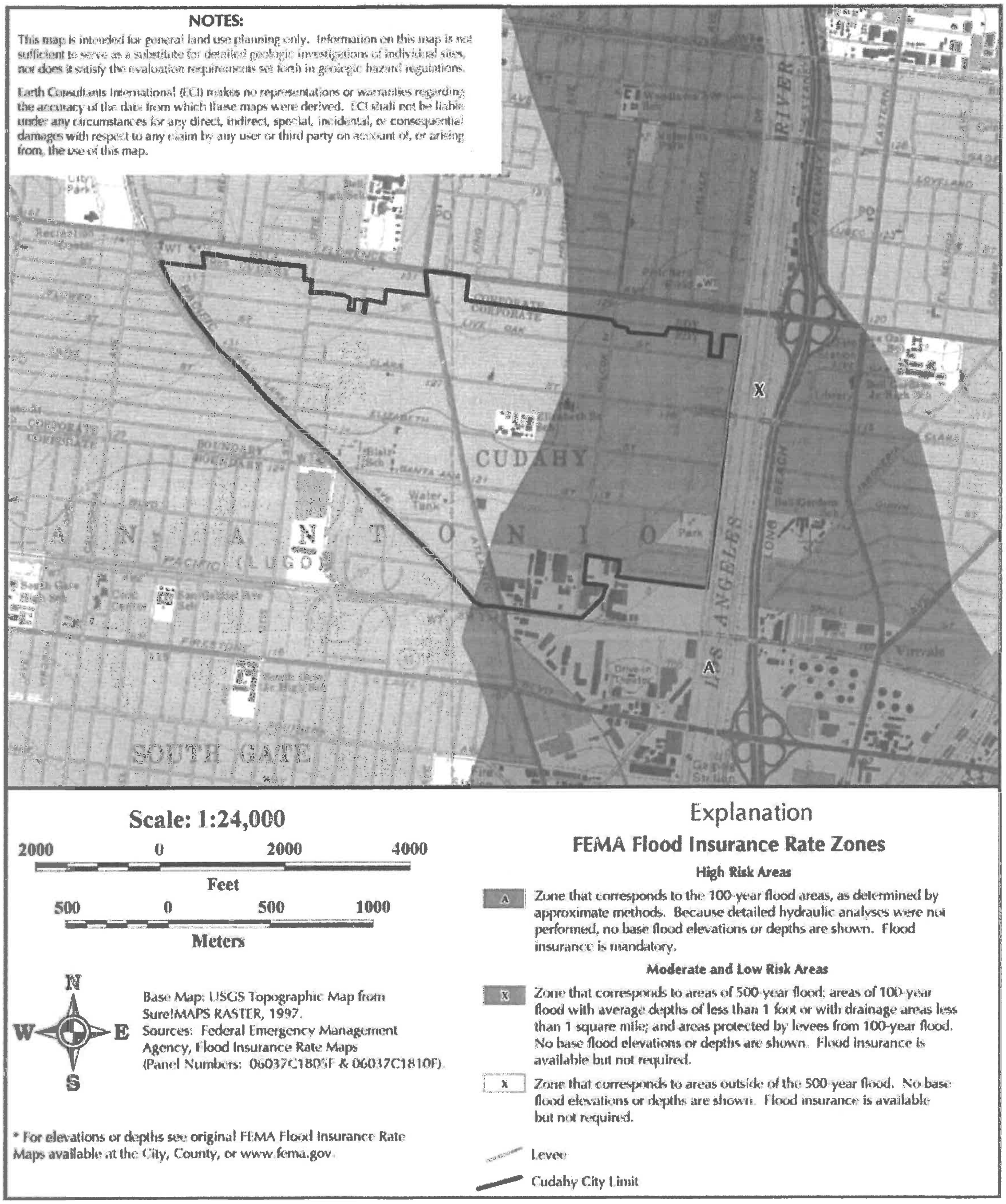
Hazard Identification

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.

Flood Hazard Mapping and Flooding Potential in the City of Cudahy

As mentioned above, the city of Cudahy has participated in the National Flood Insurance Program since 1980. The extent of flooding on the Los Angeles River, the primary flood threat to Cudahy, has been analyzed through Flood Insurance Studies. The potential flood zones mapped by FEMA in the city are shown on the Flood insurance Rate Maps (FIRMs). Map 7-1 shows the FIRM inundation limits for both the 100-year (in red) and the 500-year (in blue) flood events. The 100-year flood zone occurs entirely outside City limits, but the 500-year flood zone impacts the eastern approximately one-third of Cudahy. Cudahy has a high concentration of impervious surfaces that both collect water and concentrate the flow of water. During periods of urban flooding, streets can become swift moving rivers and low-lying areas can fill with water. Storm drains, if backed up with vegetation and debris, can result in unintentional localized flooding.

Map 7-1: FEMA Flood Zones In and Near Cudahy



Flood damage has occurred several times along Fostoria Street, at the southeastern limits of Cudahy. Here, street drainage flows easterly and into a small gated drain at the eastern end of the street that empties the water into the Los Angeles River through a flap gate. However, when the area experiences moderate to strong rainfall and the water level in the Los Angeles River rises to or above the level of the outlet, the flap gate closes, causing water to backup and pond in the street, flooding the roadway and, if the water rises above the street level, the adjacent residences. City staff use portable pumps to try to prevent damage to private property, but these efforts have often not been enough.

In August 1999, the City asked the Los Angeles County Department of Public Works to evaluate the situation and work with the City to find a permanent solution to this problem. The County referred to a 1990 study that had found that the existing flood-control system, consisting of a catch basin with a 24-inch reinforced concrete pipe at the end of Fostoria Street, is only capable of handling a storm with a frequency of less than one year, and that this capacity is reduced if the debris basins are not maintained. Increasing the reinforced concrete pipe's diameter to 36 inches was considered but found to not solve the problem, as the elevation of the outlet at the Los Angeles River would not change. As of the writing of this document, this drainage problem in the city has not been resolved. The City of Cudahy considers this their most significant drainage issue. Similar flap gates into the channel of the Los Angeles River occur at the eastern end of several other streets in Cudahy, but the one in Fostoria Street is the only one that results in repeat flooding of residences.

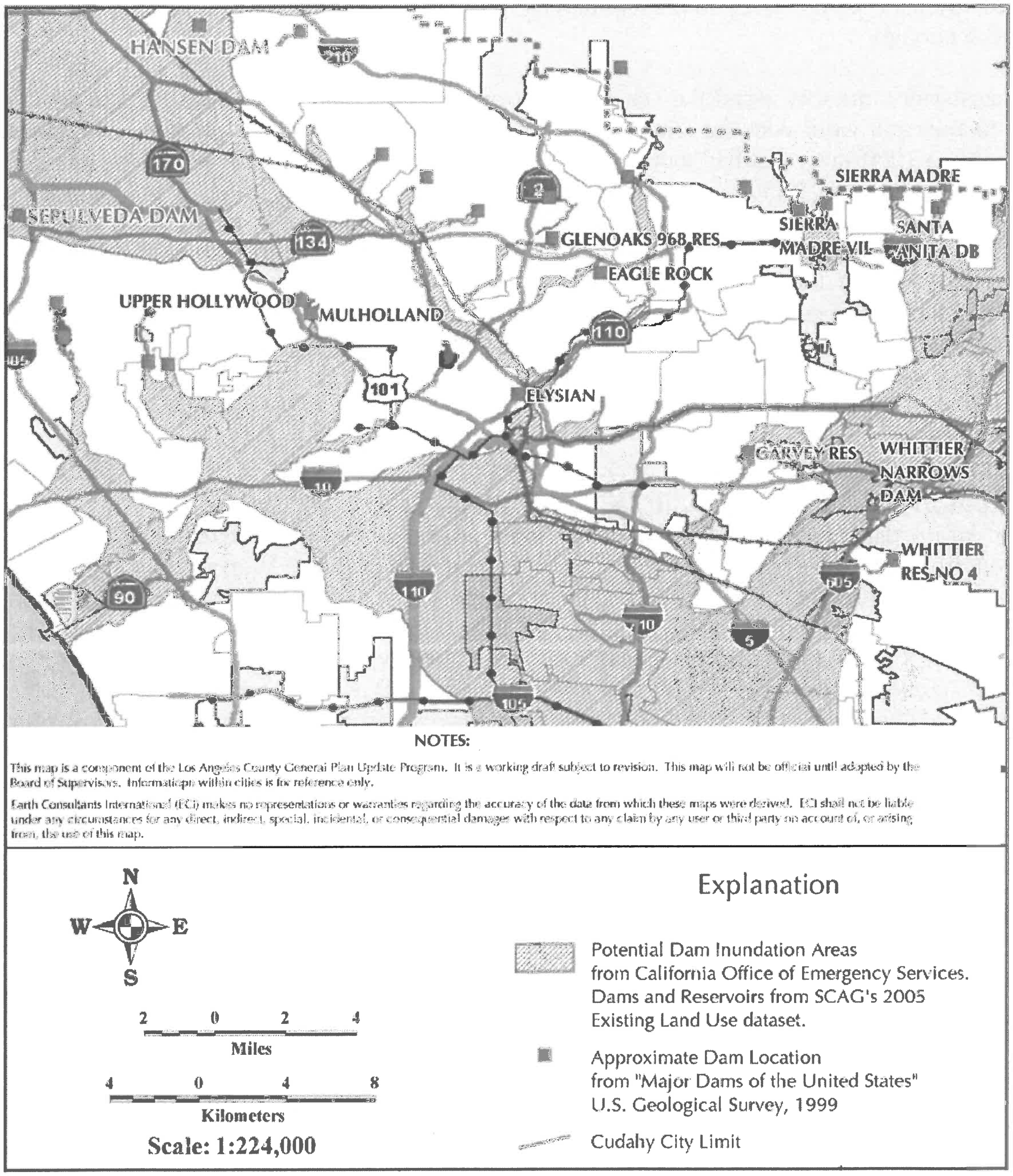
Inundation Due to Catastrophic Failure of Water Storage Structures

There are no dams within Cudahy, however there are numerous water retention structures up-gradient from the city. The Los Angeles County Department of Public Works maintains about 15 dams, 143 debris basins and 29 spreading grounds, most of which are upstream of Cudahy (those closest to Cudahy are shown on Map 7-2, and for a list of major dams in Los Angeles County, refer to Appendix G). Some are domestic water reservoirs, and some are used for flood control and therefore contain water only during and after strong rainfall events. Failure of several of these structures, if filled with water at the time, could inundate portions of Cudahy. Possible loss of life, injuries, and damage to private and public property could occur if one of these dams upstream from Cudahy failed. Many of these are under State jurisdiction. Dams under State jurisdiction are required to have inundation maps that show the potential flood limits in the remote, yet disastrous possibility, that a dam is catastrophically breached. Inundation maps are prepared by dam owners to help with contingency planning; these inundation maps in no way reflect the structural integrity or safety of the dam in question.

Several of the retention structures upgradient from Cudahy are federally owned. Specifically, the U.S. Army Corps of Engineers maintains five major flood control basins within the Los Angeles River system, all of which are upstream from Cudahy (Hansen Dam, Lopez Dam, Santa Fe Dam, Sepulveda Dam, and Whittier Narrows Dam). Given their storage capacity, two of these dams, Hansen and Sepulveda dams, have the greatest potential to inundate the city (for the locations of these structures see Map 7-2). Each of these structures is discussed further below.

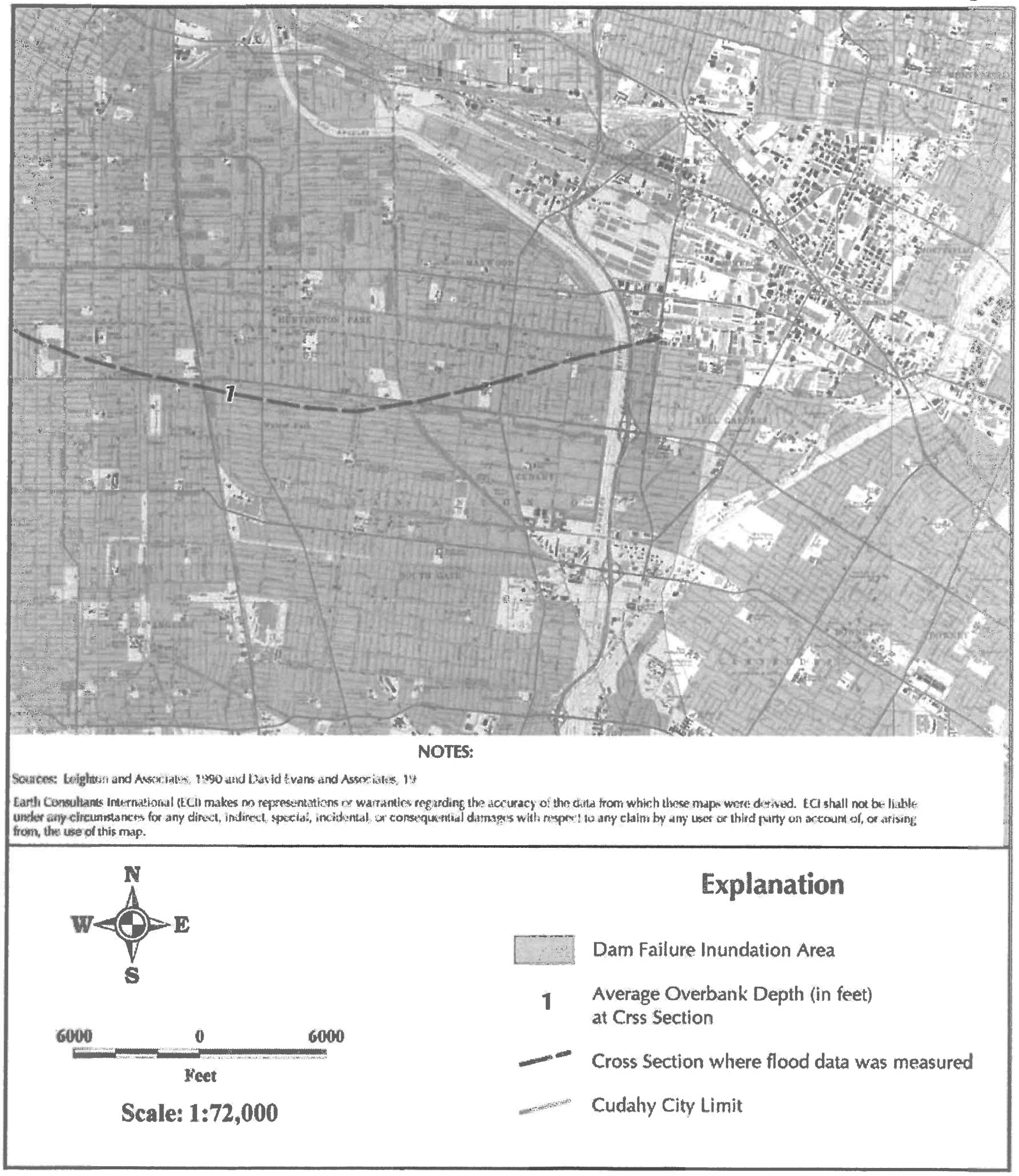
Hansen Dam was built in 1940 by the U.S. Army Corps of Engineers (USACE); USACE is still the dam operator. The dam was built as a flood control structure in great part in response to the 1938 floods. Located in the Lake View Terrace area of the San Fernando Valley, the structure dams the drainage formed by the confluence of Big Tujunga Wash and Little Tujunga Creek, main tributaries to the Los Angeles River. The dam is 97 feet (30 meters) high and 2 miles (3.2 kilometers) long, and together with Sepulveda Dam and Lopez Dam, is considered an essential component in reducing the flood risk in the Los Angeles River basin.

Map 7-2: Dams Upstream from Cudahy and Dam Inundation Areas Through Cudahy



Based on a screening portfolio risk analysis made in 2009, Hansen Dam has been assigned a Dam Safety Action Class III (DSAC III) rating, a classification given to dams that are considered significantly inadequate due to a combination of life, economic, or environmental consequences should it fail. Its probability of failure is considered moderate to high, given that a maximum magnitude earthquake in the region could result in deformation at the interface between the embankment and the outlet. This deformation could result in loss of embankment height, and thus overtopping of the structure. Overtopping would result in a probable maximum flood in areas downgradient from the dam.

Map 7-3: Dam Inundation Area Near Cudahy as a Result of Hansen Dam Failing



To mitigate this potential hazard, the USACE has implemented a series of interim risk reduction measures, including inspections of the dam by a special inspection team should the historic maximum high pool elevation of 1040 feet is reached. The USACE has also committed to updating the Emergency Action and Notification Sub-Plan (EAP) on an annual basis. Map 7-3 shows the potential inundation area through the city of Cudahy should this dam fail. The floodwaters are estimated to reach an average overbank depth of 1 foot in and near the Cudahy area.

Sepulveda Dam is an earth-filled embankment with a reinforced concrete gated spillway and gated outlet works. As with Hansen Dam, the Sepulveda Dam was constructed by the USACE in response to the 1938 floods, which killed 144 people. Construction of Sepulveda Dam was completed in December 1941. The dam is a flood-risk reduction project that extends across the Los Angeles River, six miles above the confluence of Tujunga Wash with the Los Angeles River. The dam regulates flow on the Los Angeles River to reduce the risk of flooding below the dam. The dam and its associated reservoir also serve recreational, agricultural, and wildlife mitigation purposes.

Sepulveda Dam also received a Dam Safety Action Class III (DSAC III) rating based on a Screening Portfolio Risk Analysis completed in May 2008. The dam has a DSAC III rating because: 1) it has a potential for deformation between the embankment and the outlet interface as a result of a Maximum Credible Earthquake, 2) the deformation of the embankment could cause loss of embankment height, and 3) failure from overtopping could occur as a result of a Maximum Probable Flood.

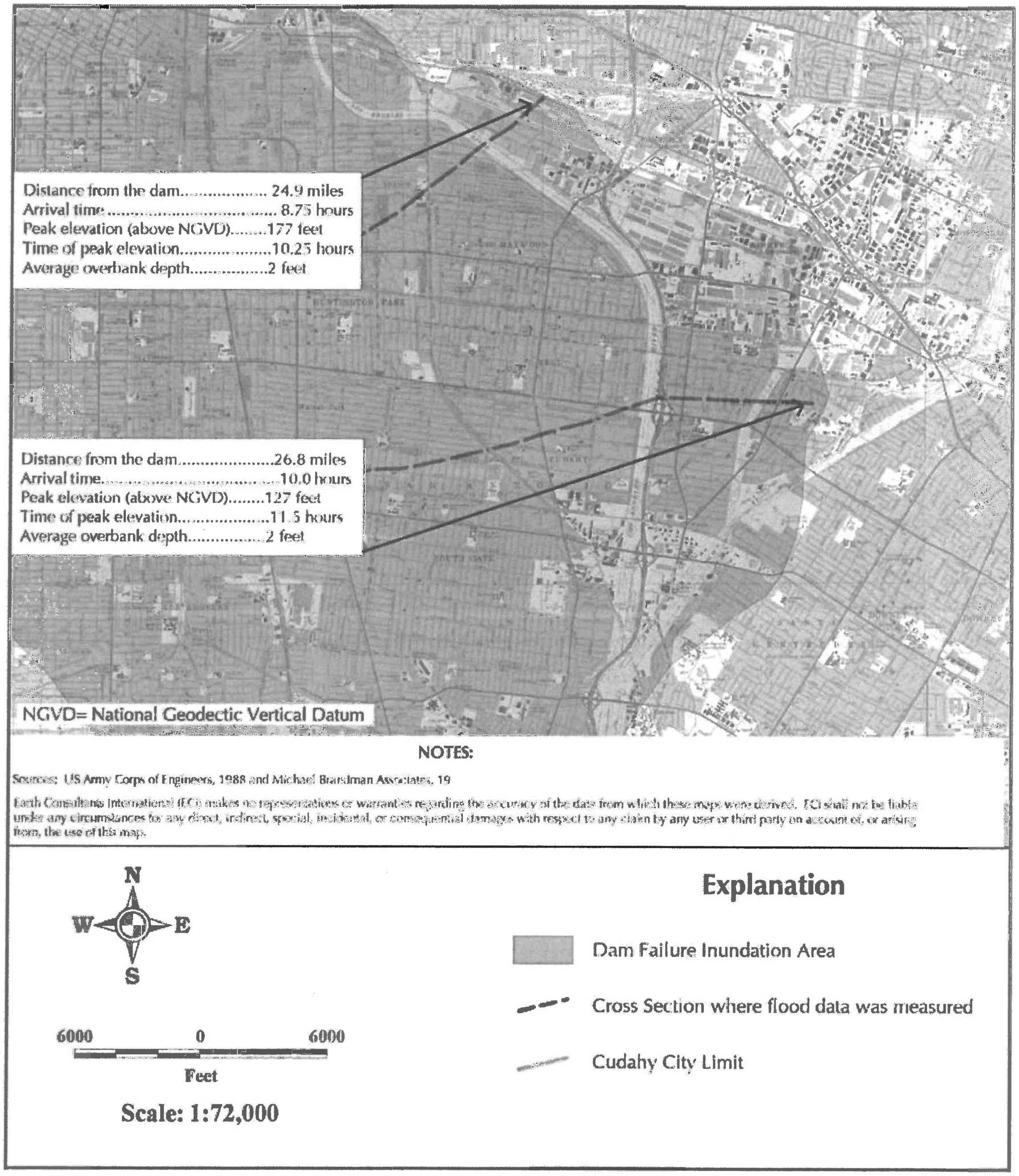
Interim Risk Reduction Measures (IRRMs) that have been implemented by the USACE for Sepulveda Dam include inspection and monitoring of the downstream toe for potential seepage and groundwater monitoring when the pool reaches an elevation of 700 feet above mean sea level National Geodetic Vertical Datum (NGVD) for more than one day, or when groundwater data indicate that seepage is possible. In addition, the USACE updates the dam's Emergency Action Plan annually to include the notification (contact) lists and special inspections to investigate seepage at the embankment. Lastly, by 2014, the USACE was to implement a plan to stockpile materials, including gravel, fill and geotextiles, at a location near the toe of the dam to be used for emergency repair of the embankment if necessary (w.spl.usace.army.mil/Media/FactSheets/tabid/1321/Article/477350/dam-safety-program.aspx). Sepulveda Dam's potential inundation area in and near the city of Cudahy is shown in Map 7-4. According to this map, the floodwaters, should Sepulveda Dam fail while full of water, would reach the Cudahy area approximately 10 hours after the dam failed, with the water reaching an average overbank depth of about 2 feet.

Inundation Due to Catastrophic Failure of Aboveground Water Tanks

A review of maps of the Cudahy area shows that there are three water tanks within city boundaries. Two of these are located along the City's northern boundary, just south of Florence Avenue and east of Atlantic Avenue. This location is immediately north of the surface projection of the Puente Hills thrust fault, and thus, potentially within the zone of deformation if that section of the fault causes an earthquake. The third tank is located south of Santa Ana Street and west of Atlantic Avenue.

Because the entire metropolitan area of Los Angeles, including the city of Cudahy and neighboring communities, is susceptible to strong seismic ground motion, all above-ground water storage tanks in and upstream from Cudahy should incorporate earthquake-resistant designs. These should include flexible pipe joints that can accommodate some movement during seismic events, reducing the potential for breakage of the pipes, leading to accidental releases of water.

Map 7-4: Dam Inundation Area Near Cudahy as a Result of Sepulveda Dam Failing



The tanks located within Cudahy are at risk of experiencing very strong ground shaking if the Puente Hills or Lower Elysian Park thrust faults generate an earthquake with its epicenter at or near the city. For this reason, these tanks should be evaluated and their inundation paths should be evaluated, to determine whether or not habitable structures, and especially essential facilities, such as schools, are located within the floodway. Ideally, in the event of catastrophic breakage, the water stored in these tanks is either contained within the site, or is discharged to a storm drain or channel that limits the impacted area.

Vulnerability Assessment – Community Flood Issues

Vulnerability assessment is the second step of flood-hazard assessment. It combines the floodplain boundary, generated through hazard identification, with an inventory of the properties within the floodplain. Understanding the population and property exposed to this hazard can assist in reducing risk and preventing loss from future events.

We conducted a vulnerability assessment for Cudahy using a modified approach using HazUS (additional information regarding the approach used is provided in the following paragraphs.) HazUS is a regional multi-hazard loss estimation model developed by FEMA and the National Institute of Building Sciences. The primary purpose of HazUS is to provide a methodology and software application to develop multi-hazard losses at a regional scale. Local, state and regional officials can use these loss estimates to evaluate the area's vulnerability to multi-hazards and prepare for emergency response and recovery. Additional information regarding HazUS, including its uses and limitations, is provided in Section 6 – Earthquake Hazards.

The modified HazUS analysis used looked at the number of structures within the FEMA-mapped 500-year flood zone in Cudahy. The results of the analysis are presented below and in the following Risk Analysis section. The flood vulnerability assessment was conducted using a digital version of the Flood Insurance Rate Map presented on Map 7-1 as a "user-supplied hazard" that was converted to a HazUS compatible format. We them ran an enhanced quick-look analysis that provides information on the number and types of buildings that are within the pathway of the 500-year flood and would thus be damaged.

What is Susceptible to Damage During a Flood Event?

The largest impact on communities from flood events is the loss of life and property. Nationwide, during certain years, property losses resulting from flood damage are extensive. Property loss from floods strikes both private and public property. Although there has been no significant recent flooding in Cudahy, localized flooding does occur sporadically, and portions of the city are located within a FEMA-mapped 500-year flood zone, as shown on Map 7-1.

The type of property damage caused by flood events depends on the depth and velocity of the floodwaters. Faster moving floodwaters 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. In some regions, extensive damage can be caused by basement flooding. 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.

The Cudahy region analyzed with HazUS is approximately 1 square mile in area and contains 44 census blocks. The region contains over 5,000 households, and has a population of 24,208 people (2010 Census Data were used for this analysis). There are an estimated 3,774 buildings in the region, with a total building replacement value, excluding contents, of $764 million (in 2006 dollars). Approximately 95.8 percent of the buildings, and 80.35 percent of the building value, are associated with residential housing (see Table 7-4). Hundreds of residential and commercial structures in Cudahy are at risk of being impacted by flooding due to their geographic location within the floodplain (see Map 7-1). The building exposure by occupancy type in the region is provided in Table 7-4 below. A 500-year flood would impact the eastern half of the city. Table 7-5 shows the building exposure by occupancy type for the area of the city within the 500-year flood zone.

Table 7-4: Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure (in thousands of $)	Percent of Total
Residential	613,847	80.3
Commercial	80,018	10.5
Industrial	55,604	7.3
Agricultural	178	0.0
Religion	2,816	0.4
Government	753	0.1
Education	10,783	1.4
Totals	763,999	100.00

Table 7-5: Building Exposure by Occupancy Type for the 500-Year Flood Scenario

Occupancy	Exposure (in thousands of $)	Percent of Total
Residential	380,945	77.0
Commercial	53,708	10.9
Industrial	50,477	10.2
Agricultural	118	0.0
Religion	1,074	0.2
Government	753	0.2
Education	7,676	1.6
Totals	494,751	100.00

Note that the building exposure in the 500-year flood zone amounts to almost 65 percent (in dollars) of the entire building stock in the city. Given that residential structures account for more than 80 percent of the buildings in the region, it is not surprising that a large percentage of the flood-exposed buildings are residential structures. However, several commercial, industrial and educational structures are also located in the 500-year flood zone.

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. The critical facilities in Cudahy located within the 500-year flood zone include City Hall, Park Avenue Elementary School, Ellen Ochoa Learning Center, South Region #3 Elementary School, and Los Angeles County Fire Station #39 (for the location of these facilities refer to Map 3-1, and compare this map with Map 7-1). Cudahy Park and Cudahy River Park, which are listed as potential shelter locations, are also within the flood zone.

If either Hansen Dam or Sepulveda Dam fail while full, the entire city of Cudahy will be impacted by the flood waters (Maps 7-3 and 7-4). All residential, commercial, industrial, educational, and critical structures within the city and adjoining areas will be under at least one foot of water.

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 of Cudahy 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.

As mentioned above, the results presented here are based on the FEMA maps available for the city of Cudahy and vicinity. More specific, but time-consuming and therefore costly analyses can be made using data that is based on a hydrological analysis of landscape features. Changes in the landscape, often associated with human development, can alter the flow velocity and the severity of the 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 estimate the effects of certain flood events on individual properties. These site-specific analyses were not conducted for this study; however, a limited analysis of the impact that a 500-year flood (a low probability but high-risk event) would have on Cudahy was completed. The results of this analysis are presented in the following sections.

General Building Stock Exposure and Potential Building-Related Losses

HazUS estimates that about 556 buildings in Cudahy will be at least moderately damaged during a 500-year flood event. This is more than 42 percent of the total number of buildings within the 500-year flood exposure area. An estimated 3 buildings (all manufactured homes) will be completely destroyed. These figures do not include structures outside of the mapped flood zones that could still be impacted by street flooding due to storm drain obstructions. The expected building damage by occupancy type is summarized in Table 7-6, and the expected building damage by building type is summarized in Table 7-7.

Table 7-6: Expected Building Damage by Occupancy Type as a Result of the 500-Year Flood

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**	**%**	**0**	**0**	**Count**	**%**
Agriculture	0	0	0	0	0	0	0	0	0	0	0	0
Commercial	5	83.33	1	16.67	0	0	0	0	0	0	0	0
Education	0	0	0	0	0	0	0	0	0	0	0	0
Government	0	0	0	0	0	0	0	0	0	0	0	0
Industrial	3	75	1	25	0	0	0	0	0	0	0	0
Religion	0	0	0	0	0	0	0	0	0	0	0	0
Residential	13	2.29	144	25.4	361	63.67	14	2.47	32	5.64	3	0.53
Totals	**21**		**146**		**361**		**14**		**32**		**3**	

Building-related losses can be divided into two categories: direct building losses and business interruption losses. Direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. Business interruption losses are the losses associated with the inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood. The total building-related losses in Cudahy as a result of a 500-year flood event are estimated at $68.08 million, which represents nearly 14 percent of the total replacement value for the buildings in the study region. The vast majority of these losses (99 percent) are related to direct building losses. The residential occupancies make up more than 61 percent of the total loss. Table 7-8 summarizes the building-related losses estimated for Cudahy.

Table 7-7: Expected Building Damage by Building Type as a Result of the 500-Year Flood

	1-10		11-20		21-30		31-40		41-50		Substantially	
Building Type	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**	**%**	**0**	**0**	**Count**	**%**
Concrete	4	100	0	0	0	0	0	0	0	0	0	0
Manufactured Housing	0	0	0	0	0	0	0	0	12	80	3	20
Masonry	1	14.29	2	28.57	4	57.14	0	0	0	0	0	0
Steel	2	66.67	1	33.33	0	0	0	0	0	0	0	0
Wood	14	2.56	143	26.09	357	65.15	14	2.55	20	3.65	0	0
Totals	**21**		**146**		**361**		**14**		**32**		**3**	

Table 7-8: Building-Related Losses in Cudahy as a Result of a 500-Year Flood (in Millions of Dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss	Building	25.34	2.71	3.10	0.37	31.51
	Content	16.04	6.16	7.90	2.04	34.14
	Inventory	0.00	0.42	1.60	0.00	2.02
	Subtotal	*41.38*	*11.29*	*12.60*	*2.41*	*67.67*
Business Interruption	Income	0.00	0.05	0.00	0.01	0.07
	Relocation	0.13	0.02	0.00	0.01	0.16
	Rental Income	0.04	0.01	0.00	0.00	0.06
	Wage	0.00	0.07	0.00	0.05	0.13
	Subtotal	*0.17*	*0.15*	*0.01*	*0.07*	*0.40*
Totals		**41.56**	**11.44**	**12.61**	**2.48**	**68.08**

Inundation as a result of catastrophic dam failure would result in significant more damage in Cudahy, given that the entire city is expected to be flooded.

Manufactured Homes

Many older manufactured home parks are located in floodplain or low-lying 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 (and for earthquake preparedness, also). 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. Statewide, the 1996 floods destroyed 156 housing units. Of those units, 61 percent were mobile homes and trailers.

The flood analysis conducted for this study indicates that the mobile homes in Cudahy located within the 500-year floodplain are extremely vulnerable to flooding losses, with all manufactured homes within the flood zone experiencing more than moderate damage (see Table 7-6).

Business and Industry

Storm-flooding 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. Roof leaks can impact the contents; in extreme cases, leaks can cause damage to sensitive electrical equipment, with the potential to cause the affected business thousands of dollars in material losses and potential loss of revenue. 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, and loans to make building improvements, such as new roofs. Given that there are several commercial structures within the 500-year flood zones, business-related losses associated with damage to the structures and their contents or inventory, and business interruption losses associated with lost wages, loss of income, and relocation and rental income losses can be anticipated.

The HazUS model indicates that commercial and industrial properties in Cudahy within the flood zone will experience significant damage as a result of a 500-year event. Table 7-8 shows that the anticipated losses to commercial and industrial occupancies, combined, would amount to more than $24 million. Most of these losses are related to building and contents damage.

Essential Facilities

As indicated previously, several essential and critical facilities that provide services to Cudahy residents are located within the 500-year flood zone. For the HazUS analysis, only those facilities within the HazUS study area were considered. The model indicates that two schools, the Park Avenue Elementary School and the Ellen Ochoa Learning Center, will be impacted by the 500-year flood, with significant loss of use. In fact, both schools may not be 100 percent functional for more than 12 months after the flood event.

Similarly, City Hall, and the Emergency Operations Center located therein, are also expected to be impacted by the 500-year flood, with significant loss of functionality.

Furthermore, and equally significant, several essential facilities outside of City limits that provide essential services to Cudahy's residents may be inaccessible from Cudahy as a result of the floodwaters.

Public Infrastructure

Publicly owned facilities are a key component of daily life for all citizens of Los Angeles County, including Cudahy residents. Damage to public water and sewer systems, transportation networks, flood control facilities, emergency facilities, and offices can hinder the ability of the government to deliver services.

History shows that extensive flooding of streets can be anticipated during a major storm. Cudahy's City Hall and other essential service buildings, can be expected to be impacted by severe flooding associated with a 500-year, or as a result of localized flooding resulting from storm drain obstructions. The economic losses associated with the cleanup and repair of the flooded areas would be substantial. It is thus important for the City and other responsible agencies to conduct regular inspections of culverts and storm drains to remove debris that may obstruct the flow of water during storms. This should reduce the potential for urban flooding in most areas.

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

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. Scour at highway bridges involves sediment-transport and erosion processes that cause streambed material to be removed from the bridge vicinity. Nationwide, several catastrophic collapses of highway and railroad bridges have occurred due to scouring and a subsequent loss of support of foundations. This has led to a nationwide inventory and evaluation of bridges (Richardson and others, 1993).

Scour processes are generally classified into separate components, including pier scour, abutment scour, and contraction scour. *Pier scour* occurs when flow impinges against the upstream side of the pier, forcing the flow in a downward direction and causing scour of the streambed adjacent to the pier. *Abutment scour* happens when flow impinges against the abutment, causing the flow to change direction and mix with adjacent main-channel flow, resulting in scouring forces near the abutment toe. *Contraction scour* occurs when flood-plain flow is forced back through a narrower opening at the bridge, where an increase in velocity can produce scour. *Total scour* for a particular site is the combined effects from all three components. Scour can occur within the main channel, on the flood plain, or both. While different materials scour at different rates, the ultimate scour attained for different materials is similar and depends mainly on the duration of peak stream flow acting on the material (Lagasse and others, 1991).

The State of California participates in the bridge inventory and evaluation program and a state-designated inspector must inspect all state, county, and city bridges every two years. The inspections are rigorous, looking at everything from seismic capability to erosion and scour. A bridge classified as structurally deficient either has a significant defect such that a speed or weight limit must be applied to the bridge to ensure its safety, or its approaches flood regularly. A functionally obsolete bridge is one whose design is not suitable for its current use, such as lack of safety shoulders or the inability to handle current traffic volume, speed, size, or weight.

There is only one bridge under City ownership and jurisdiction, the bridge carrying Clara Street over the Los Angeles River (based on the Local Bridge Inventory List issued by Caltrans at http://www.dot.ca.gov/hq/LocalPrograms/hbrr99/hbrr99a.htm). This bridge is not rated as either structurally deficient or functionally obsolete. This is not the case for the three bridges across the Los Angeles River under City of Bell ownership: the bridge carrying Florence Avenue across the river is rated as functionally obsolete (its railings, transitions and guardrails do not meet current standards), whereas the bridges carrying Gate Avenue and Slauson Avenue across the river are both rated as structurally deficient (the deck of the Slauson Avenue bridge is in serious condition, and its railings, transitions and guardrails do not meet current standards). To the south, the bridge in South Gate carrying Firestone Boulevard across the Los Angeles River is also rated as structurally deficient (its deck is in poor condition, and its railings, approach guardrails and transitions doe not meet currently acceptable standards). The bridges carrying Florence Avenue, Slauson Avenue and Firestone Boulevard are all considered to be stable for the assessed or calculated scour condition (http://nationalbridges.com/). Scour data for the bridges carrying Clara Street and Gate Avenue were not available.

Shelter Requirements

Given the number of residential structures located within the 500-year flood zones, a significant storm has the potential to displace residents from their homes due to the flood and the associated potential evacuation. HazUS estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. The model estimates 3,550 households in Cudahy will be displaced, with this figure including households evacuated from within and very near to the flooded area. Furthermore, HazUS estimates that 10,650 people, out of a total population of 24,208 will seek temporary shelters. This is a serious concern, as the City does not have the facilities or resources to accommodate that many people in public shelters.

Flood Mitigation Action Items

Flooding issues in Cudahy are considered minor, however, recent regional storms have shown that storm damages to structures and businesses can cost thousands if not millions of dollars to repair. In most cases, these loss estimates do not include lost revenue due to business interruption. A HazUS analysis for Cudahy to estimate the losses in the city as a result of a low-probability but high-risk 500-year flood indicates that such an event would cause substantial damage to the residential, commercial and industrial structures in the flood zone. At least two schools and City Hall would be impacted, with significant loss of functionality. Because the City's Emergency Operations Center is located in City Hall, and nearly half of the city's population would be in need of temporary shelter during and immediately after the 500-year storm, effective response to this event from City staff is expected to be significantly impaired. Catastrophic failure of either Hansen Dam or Sepulveda Dam while full of water would impact the entire city of Cudahy. Fortunately, such event has a very low probability of occurrence.

Flood mitigation activities listed here include current mitigation programs and activities that are being implemented by the City of Cudahy, the County of Los Angeles, the U.S. Army Corps of Engineers, and other agencies and organizations. The most significant, recurrent flooding problem in the city of Cudahy is along Fostoria Street. During moderate to strong rainfall events, if the water level in the Los Angeles River rises to or above the level of the outlet drain at the eastern end of Fostoria Street, water backs up and ponds in the street, flooding the roadway. If the water rises above the street level, the adjacent residences are flooded too.

The City of Cudahy addresses its localized flooding problems as they arise, typically by deploying pumps to the impacted areas when a storm hits. However, these efforts have at times not been enough to prevent damage. The City has tried to work with the Los Angeles County Department of

Public Works to evaluate the problem and find a permanent solution. However, an analysis conducted in 1990 found that increasing the diameter of the outlet pipe did not resolve the situation, as the elevation of the outlet into the Los Angeles River floodway would not change. Alternative mitigation measures to address this issue, such as a larger debris basin and/or changes to the Los Angeles River channel or its storage capacity upstream from this area, need to be considered.

The main flood control services provider for the city of Cudahy is the Los Angeles County Department of Public Works (LACDPW). Together with the U.S. Army Corps of Engineers, the LACDPW regulates flood levels by adjusting water flows upstream of flood-prone areas. The main flood control systems in the Cudahy area include the Los Angeles River Flood Control Channel and associated levees. Construction of the channel took place in the late 1930s through the 1950s. Trapezoidal or rectangular in shape, the channel is generally concrete-lined to prevent erosion and scour (certain sections of the channel have a natural bottom and support plants and wildlife). The channel was designed for a 100-year storm to carry the storm water run-off from the hillsides to the north. The river has very little natural flow most of the year; flows during the dry seasons generally consist of reclaimed water from reclamation plants upstream and/or urban runoff from irrigation, etc.

Current efforts to increase public open space in southern California are been paired with the need to restore and preserve natural systems that provide wildlife habitat and help to mitigate flood events. The River Project, a non-profit organization, is working to develop land use policy along the Los Angeles River for the purpose of reclaiming the natural riverfront and reviving the surrounding watersheds. As part of their efforts, they are transforming previously neglected properties along the river into public parks and publicly owned open spaces that optimize flood storage while providing riparian habitat. They also advocate for the re-establishment of more natural waterways, including the removal of concrete bottoms, which allows rainwater to replenish the underlying aquifers instead of flowing out to sea.

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. Dam owners are also required to prepare and submit emergency response plans to the State Office of Emergency Services, the lead State agency for the State dam inundation-mapping program. The U.S. Army Corps of Engineers have developed Emergency Action Plans and Notification Sub-Plans for both Hansen Dam and Sepulveda Dam; these documents are reviewed and updated at least annually to ensure that contact information is up to date. Because both of these structures have been found to be potentially at risk of failure as a result of an earthquake, or as a result of overtopping, the USACE has implemented several Interim Risk Reduction Measures (IRRMs) for these flood-control structures. For additional information refer to the section on Inundation Due to Catastrophic Failure of Water Storage Structures.

Cities and counties are also required by State law to have in place emergency procedures for the evacuation and control of populated areas within the limits of dam inundation. In addition, legislation requires real estate disclosure upon sale or transfer of properties in the inundation area (AB 1195 Chapter 65, June 9, 1998; Natural Hazard Disclosure Statement).

Flood Resource Directory

The following resource directory lists the resources and programs that can assist county communities and organizations. The resource directory will provide contact information for local, county, regional, State and Federal programs that deal with natural hazards. For additional information, refer to Appendix A.

County Resources

Los Angeles County Public Works Department
900 S. Fremont Ave.
Alhambra, CA 91803
Ph: 626-458-5100

Sanitation District of Los Angeles County
1955 Workman Mill Road
Whittier, CA 90607
Ph: 562-699-7411 x2301

State Resources

Governor's Office of Emergency Services (Cal OES)
P.O. Box 419047
Rancho Cordova, CA 95741-9047
Ph: 916 845- 8911
Fx: 916 845- 8910

California Resources Agency
1416 Ninth Street, Suite 1311
Sacramento, CA 95814
Ph: 916-653-5656

California Department of Water Resources (DWR)
1416 9th Street
Sacramento, CA 95814
Ph: 916-653-6192

California Department of Conservation: Southern California Regional Office
655 S. Hope Street, #700
Los Angeles, CA 90017-2321
Ph: 213-239-0878
Fx: 213-239-0984

Federal Resources and Programs

Federal Emergency Management Agency (FEMA)

FEMA provides maps of flood hazard areas, various publications related to flood mitigation, funding for flood mitigation projects, and technical assistance. FEMA also operates the National Flood Insurance Program. FEMA' s mission is to reduce loss of life and property and protect the nation's critical infrastructure from all types of hazards through a comprehensive, risk-based, emergency management program of mitigation, preparedness, response and recovery.

Federal Emergency Management Agency, Region IX
1111 Broadway, Suite 1200
Oakland, CA 94607
Ph: 510-627-7100
Fx: 510-627-7112

Federal Emergency Management Agency, Mitigation Division
500 C Street, S.W.
Washington, D.C. 20472
Ph: 202-566-1600

FEMA' s List of Flood Related Websites
This site contains a long list of flood related Internet sites from "American Heritage Rivers" to "The Weather Channel" and is a good starting point for flood information on the Internet.
Contact: Federal Emergency Management Agency, Phone: (800) 480-2520
Website: http://www.fema.gov/nfip/related.htm

National Flood Insurance Program (NFIP)
In Southern California, many cities lie within flood zones as defined in FEMA Flood Maps. The City of Newport Beach is a community within a designated flood zone. As a result, flood insurance is available to citizens in the floodzone that adopt and implement NFIP building standards. The standards are applied to development that occurs within a delineated floodplain, a drainage hazard area, and properties within 250 feet of a floodplain boundary. These areas are depicted on federal Flood Insurance Rate Maps available through the county.
National Floodplain Insurance Program (NFIP)
500 C Street, S.W.
Washington, D.C. 20472
Ph: 202-566-1600

Other National Resources

The Floodplain Management Association
The Floodplain Management website was established by the Floodplain Management Association (FMA) to serve the entire floodplain management community. It includes full-text articles, a calendar of upcoming events, a list of positions available, an index of publications available free or at nominal cost, a list of associations, a list of firms and consultants in floodplain management, an index of newsletters dealing with flood issues (with hypertext links if available), a section on the basics of floodplain management, a list of frequently asked questions (FAQs) about the Website, and a catalog of Web links.
Floodplain Management Association
P.O. Box 50891

Sparks, NV 89435-0891
Ph: 775-626-6389
Fx: 775-626-6389

The Association of State Floodplain Managers

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. ASFPM fosters communication among those responsible for flood hazard activities, provides technical advice to governments and other entities about proposed actions or policies that will affect flood hazards, and encourages flood hazard research, education, and training. The ASFPM Web site includes information on how to become a member, the organization's constitution and bylaws, directories of officers and committees, a publications list, information on upcoming conferences, a history of the association, and other useful information and Internet links.

Contact: The Association of State Floodplain Managers
Address: 2809 Fish Hatchery Road, Madison, WI 53713 Phone: (608) 274-0123
Website: http://www.floods,org

National Weather Service

The National Weather Service provides flood watches, warnings, and informational statements for rivers in the City of Newport Beach.

National Weather Service
520 North Elevar Street
Oxnard, CA 93030
Ph: 805-988- 6615

Office of Hydrology, National Weather Service

The National Weather Service s Office of Hydrology (OH) and its Hydrological Information Center offer information on floods and other aquatic disasters, This site offers current and historical data including an archive of past flood summaries, information on current hydrologic conditions, water supply outlooks, an Automated Local Flood Warning Systems Handbook, Natural Disaster Survey Reports, and other scientific publications on hydrology and flooding.

National Weather Service, Office of Hydrologic Development
1325 East West Highway, SSMC2
Silver Spring, MD 20910
Ph: 301-713-1658
Fx: 301-713-0963

National Resources Conservation Service (NRCS), US Department of Agriculture

NRCS provides a suite of federal programs designed to assist state and local governments and landowners in mitigating the impacts of flood events. The Watershed Surveys and Planning Program and the Small Watershed Program provide technical and financial assistance to help participants solve natural resource and related economic problems on a watershed basis. The Wetlands Reserve Program and the Flood Risk Reduction Program provide financial incentives to landowners to put aside land that is either a wetland resource, or that experiences frequent flooding. The Emergency Watershed Protection Program (EWP) provides technical and financial assistance to clear debris from clogged waterways, restore vegetation, and stabilizing riverbanks.

The measures taken under EWP must be environmentally and economically sound and generally benefit more that one property.
National Resources Conservation Service
14th and Independence Ave., SW, Room 5105-A
Washington, DC 20250
Ph: 202-720-7246
Fx: 202-720-7690

USGS Water Resources (http:// water.usgs.gov)
This web page offers current US water news; extensive current (including real-time) and historical water data; numerous fact sheets and other publications; various technical resources; descriptions of ongoing water survey programs; local water information; and connections to other sources of water information.
USGS Water Resources
6000 J Street Placer Hall
Sacramento, CA 95819-6129
Ph: 916-278-3000
Fx: 916-278-3070

Bureau of Reclamation
The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public. The Bureau provides leadership and technical expertise in water resources development and in the efficient use of water through initiatives including conservation, reuse, and research. It protects the public and the environment through the adequate maintenance and appropriate operation of Reclamation's facilities and manages Reclamation's facilities to fulfill water user contracts and protect and/or enhance conditions for fish, wildlife, land, and cultural resources.
Mid Pacific Regional Office
Federal Office Building
2800 Cottage Way
Sacramento CA 95825-1898
Ph: 916- 978-5000
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The Corps of Engineers administers a permit program to ensure that the nation's waterways are used in the public interest. Any person, firm, or agency planning to work in waters of the United States must first obtain a permit from the Army Corps of Engineers. The Corps is responsible for the protection and development of the nation's water resources, including navigation, flood control, energy production through hydropower management, water supply storage and recreation.
US Army Corps of Engineers
P.O. Box 532711
Los Angeles CA 90053- 2325
Ph: 213-452- 3921

American Public Works Association
2345 Grand Boulevard, Suite 500
Kansas City, MO 64108-2641
Ph: 816-472-6100
Fx: 816-472-1610

Publications

Federal Emergency Management Agency, 2011, Engineering Principles and Practices for Retrofitting Flood-Prone Residential Structures: FEMA P-259, Third Edition, December 2011.
Provides engineering design and economic guidance on what constitutes feasible and cost-effective retrofitting measures for flood-prone residential structures.

Federal Emergency Management Agency, 2009, Homeowners' Guide to Retrofitting: FEMA P-312, Second Edition, December 2009.
Guide specifically for homeowners who want information on protecting their houses from flooding. Homeowners who need clear information about the options available and straightforward guidance that will help make decisions. The guide is written for readers who have little or no knowledge of flood protection methods or building construction techniques.

NFIP Community Rating System Coordinator's Manual
Indianapolis, Indiana.
This informative brochure explains how the Community Rating System works and what the benefits are to communities. It explains in detail the CRS point system, and what activities communities can pursue to earn points. These points then add up to the "rating" for the community, and flood insurance premium discounts are calculated based upon that "rating." The brochure also provides a table on the percent discount realized for each rating (1-10). Instructions on how to apply to be a CRS community are also included.
Contact: NFIP Community Rating System
Phone: (800) 480-2520 or (317) 848-2898
Website: http://www.fema.gov/nfip/crs

Floodplain Management: A Local Floodplain Administrator's Guide to the NFIP
This document discusses floodplain processes and terminology. It contains floodplain management and mitigation strategies, as well as information on the NFIP, CRS, Community Assistance Visits, and floodplain development standards.
Contact: National Flood Insurance Program Phone: (800) 480-2520
Website: http://www.fema,gov/nfip/

Flood Hazard Mitigation Planning: A Community Guide, (June 1997), by the Massachusetts Department of Environmental Management.
This informative guide offers a 10-step process for successful flood hazard mitigation. Steps include: map hazards, determine potential damage areas, take an inventory of facilities in the flood zone, determine what is or is not being done about flooding, identify gaps in protection, brainstorm alternatives and actions, determine feasible actions, coordinate with others, prioritize

actions, develop strategies for implementation, and adopt and monitor the plan.
Contact: Massachusetts Flood Hazard Management Program Phone: (617) 626-1250
Website: http://www.magnetstate.ma.us/dem/programs/mitigate

Reducing Losses in High Risk Flood Hazard Areas: A Guidebook for Local Officials, (February 1987), FEMA-116.

This guidebook offers a table on actions that communities can take to reduce flood losses. It also offers a table with sources for floodplain mapping assistance for the various types of flooding hazards. There is information on various types of flood hazards with regard to existing mitigation efforts and options for action (policy and programs, mapping, regulatory, non-regulatory). Types of flooding which are covered include alluvial fan, areas behind levees, areas below unsafe dams, coastal flooding, flash floods, fluctuating lake level floods, ground failure triggered by earthquakes, ice jam flooding, and mudslides.
Contact: Federal Emergency Management Agency Phone: (800) 480-2520
Website: http://www.fema,gov

SECTION 8: SEVERE WEATHER

Why is Severe Weather a Threat to the City of Cudahy?

Severe weather, such as high winds, hail, excessive precipitation, dust storms, heat spells and drought, have the potential to cause significant damage to property and infrastructure, cause serious social disruption, and result in injuries and/or loss of life. Many of these hazards can create conditions that disrupt essential systems such as public utilities, telecommunications, and transportation routes. Flooding associated with excessive precipitation is discussed in Section 7. This section discusses primarily high winds, temperature extremes, and drought. Historical occurrences of these conditions in the Los Angeles region are summarized as background information, in addition to definitions and terminology associated with each. Climate variability and its effects on regional weather patterns and increased potential for severe weather hazards are also discussed. Finally, where appropriate, based on the historical data presented, mitigation measures that can reduce the potential impacts of these hazards are provided.

High Winds

This section discusses the specific hazards associated with unusual and potentially damaging wind activity based on scientific data and historical records. In southern California, strong winds may be associated with Santa Ana conditions, thunderstorm-related strong winds and tornadoes, and macrobursts and microbursts. Each of these strong wind conditions is discussed further in the subsections below.

Definitions and Setting

Wind is air that is in motion relative to the earth. It generally has both horizontal and vertical components, but the horizontal component generally dominates (National Research Council, Committee on Natural Disasters – NRC, CND, 1993). Due to friction, wind speed drops off at the ground surface, with approximately 50% of the transition in wind speed due to the frictional forces exerted by the ground surface occurring in the first six feet above the ground. As a result, "near-surface wind is the most variable of all meteorological events" (NRC, CND, 1993), and it generally consists of a combination of high-frequency oscillations in both speed and direction superimposed on a more consistent flow with a prevailing speed and direction. With an increase in wind speed, the high-frequency oscillations can become more abrupt and of greater amplitude – these are referred to as wind gusts. Because wind speeds vary as a function of height, time and the terrain upwind, it is difficult to obtain a value that is representative of the wind speeds over a large region. The recommended convention for measuring wind speed is at a height of 33 feet (10 m), in flat, open terrain, such as that provided by an airport field. Temporal variations are taken into account by averaging speed and direction over a given time, typically 1-minute averages for sustained wind, and 2- to 5-second averages for peak or extreme winds. The mean annual wind speed for the contiguous 48 states is 8 to 12 miles per hour (mph), with most areas of the country frequently experiencing 50-mph winds (NRC, CND, 1993).

To better appreciate the impact that wind has on the sea and land, and the wind speeds required to move different objects, refer to the Beaufort Scale in Table 8-1, below. This scale was developed by Sir Francis Beaufort in 1805 to illustrate and measure the effect that varying wind speed can have on sea swells and structures. Note that the highest wind speeds in the Beaufort Scale approach the lowest wind speed on the Fujita Scale presented in Table 8-2.

Table 8-1: The Beaufort Scale

Beaufort Force	Wind Speed (mph/ knots)	Wind Description – State of Sea – Effects on Land
0	< 1; <1	Calm – Mirror-like – Smoke rises vertically.
1	1 - 3 / 1 - 3	Light – Scaly ripples; no foam crests – Smoke drifts show direction of wind, but wind vanes do not.
2	4 - 7 / 4 - 6	Light Breeze – Small but pronounced wavelets; crests do not break – Wind vanes move; leaves rustle; you can feel wind on face.
3	8 - 12 / 7 - 10	Gentle Breeze – Large wavelets; crests break; glassy foam; a few whitecaps – Leaves and small twigs move constantly; small, light flags are extended.
4	13 - 18 / 11 - 16	Moderate Breeze – Small (1-4 ft) waves; numerous whitecaps – Wind lifts dust and loose paper; small tree branches move.
5	19 - 24 / 17 - 21	Fresh breeze – Moderate (4-8 ft) waves taking longer to form; many whitecaps; some spray – Small trees with leaves begin to move.
6	25 - 31 / 22 - 27	Strong Breeze – Some large (8-13 ft) waves; crests of white foam; spray – Large branches move; wires whistle.
7	32 - 38 / 28 - 33	Near Gale – Sea heaps up; waves 13-20 ft; white foam from breaking waves blows in streaks with the wind – Whole trees move; resistance felt walking into the wind.
8	39 - 46 / 34 - 40	Gale – Moderately high (13-20 ft) waves of greater length; crests break into spin drift, blowing foam in well-marked streaks – Twigs and small branches break off trees; difficult to walk.
9	47 - 54 / 41- 47	Strong Gale – High waves (20 ft) with wave crests that tumble; dense streaks of foam in wind; poor visibility from spray – Slight structural damage; shingles blow off roofs.
10	55 - 63 / 48 - 55	Storm – Very high (20-30 ft) waves with long, curling crests; sea surface appears white from blowing foam; heavy tumbling of sea; poor visibility – Trees broken or uprooted; considerable structural damage.
11	64 – 73 / 56 - 63	Violent Storm – Waves high enough (30-45 ft) to hide small and medium-sized ships; sea covered with patches of white foam; edges of wave crests blown into froth; poor visibility – Seldom experienced inland; considerable structural damage.
12	> 74 / > 64	Hurricane – Sea white with spray; foam and spray render visibility almost non-existent; waves over 45 ft high – Widespread damage; very rarely experienced on land.

Sources: www.spc.noaa.gov/faq/tornado/beaufort.html; http://www.stormfax.com/beaufort.htm

Types of High Winds in Southern California

Santa Ana Winds

Most incidents of high wind in southern California are the result of ***Santa Ana wind*** conditions. Santa Ana winds are generally dry, often dust-bearing, winds that blow from the east or northeast toward the coast, and offshore (Figure 8-1). These winds commonly develop when a region of high atmospheric pressure builds over the Great Basin – the arid high plateau that covers most of Nevada and parts of Utah, between the Sierra Mountains on the west and the Rocky Mountains to the east. Clockwise circulation around the center of this high-pressure area forces air downslope from the plateau. As the air descends toward the California coast, it may warm at a rate of about 5 degrees Fahrenheit per 1,000 feet elevation, although this does not always happen. Since the air originates in the high deserts of Utah and Nevada, it starts out already very low in moisture; if heated, it dries out even further. The wind picks up speed as it hits the passes and canyons in the coastal ranges of southern California, blowing with exceptional speed through the Santa Ana Canyon (from where these strong winds derive their name). Forecasters at the National Weather Service usually reserve the use of "Santa Ana" winds for those with sustained speeds over 25 knots (1 knot = 1.15 mph); as they move through passes and canyons, these winds may reach speeds of 35 knots, with gusts of up to 50 to 60 knots (see Table 8-1).

Santa Ana winds are common in the southern California area, with Santa Ana conditions expected yearly in the region, typically in the fall through early spring. For the most part these winds are a nuisance, bringing dust indoors, breaking tree branches, and causing minor damage. For people with respiratory ailments, however, Santa Ana winds often mean headaches, sinus pain, difficulty breathing, and even asthma attacks. Strong Santa Ana winds can cause extensive damage to trees, utility poles, vehicles and structures, and can even be deadly. In 2003, for example, two deaths were blamed on these strong winds: a downed tree struck and killed a woman in San Diego, and a passenger in a vehicle was struck by a flying pickup truck cover (http://cbsnew.com/ January 8, 2003 article). Wildfires in southern California often occur during Santa Ana wind conditions, when the air humidity is low to very low. Because the winds fan and help spread these fires, Santa Ana wind conditions are always serious concerns to fire fighters.

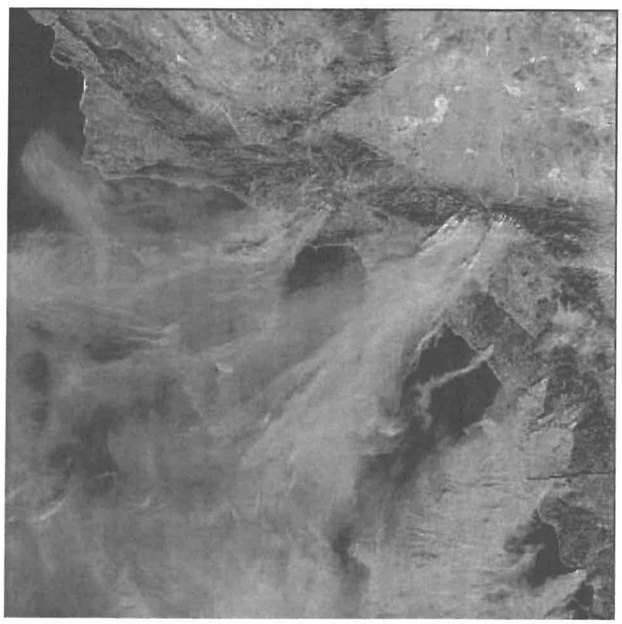
Thunderstorm-Related Tornadoes

A variety of mechanisms give rise to ***thunderstorms***, but most often these develop when warm, moist air meets a cold front, producing strong winds, and sometimes tornadoes, and hail. More than 100,000 thunderstorms occur every year in the United States, and more than 10,000 of these are considered severe, resulting in annual property losses in excess of $1 billion (National Research Council's Committee on Natural Disasters, 1993). Most of these occur in the central Great Plains and the southeastern coastal states, but thunderstorms do occur in every state. A thunderstorm is officially labeled as severe if: 1) it produces a tornado, 2) has winds in excess of 58 mph, or 3) produces surface hail greater than 0.75 inch in diameter. An exceptionally severe thunderstorm can generate several tornadoes and downbursts.

Tornadoes are "violently rotating columns of air extending from a thunderstorm to the ground (http://www.nssl.noaa.gov/edu/safety/tornadoguide.html; see Figure 8-2). Although tornadoes occur in many parts of the world, they are most common during the spring and summer months in the Central Plains of the United States, east of the Rocky Mountains. In the spring, tornadoes often form where warm, moist air from the east meets hot, dry air from the west (this boundary is called a "dryline"). In the winter and early spring, tornadoes can form when strong frontal weather systems originating in the Central states move eastward. Thunderstorms, and associated tornadoes, can also form at the range front, where near-ground air is forced to move "upslope" along the ascending mountain slopes. In California, tornadoes are occasionally generated by strong storms. Although the number of tornadoes reported in California is only a fraction of those reported in the central states, California does get its share of these. In the 30 years between 1959 and 1988, 133 tornadoes were reported in California, for an average of 4 tornadoes a year (NRC-CND, 1993).

Tornadoes can also accompany tropical storms and hurricanes as they move on land, where they usually occur ahead of the path of the storm center as it comes onshore (http://www.nssl.noaa.gov/edu/safety/tornadoguide.html). Weak tornadoes that form over warm water are called ***waterspouts***. Occasionally, waterspouts can move on land and become tornadoes. ***Funnel clouds*** are cone-shaped or needle-like clouds that extend downward from the main cloud base but do not extend to the ground surface. If a funnel cloud touches the ground, it becomes a tornado; if it touches or moves across water, it is a waterspout. Waterspouts that have moved onto land are more often reported in southern California in the fall and winter, but some have also been reported in the spring. For example, on April 6, 1926, a waterspout that came on land at National City, near San Diego, unroofed several homes and injured eight people; one on February 12, 1936 unroofed two homes, blew down five oil derricks and injured six people.

Figure 8-1: View From Space of Smoke from the October 2003 Fires in Southern California, Carried Offshore by Strong Santa Ana Winds



Source: Image by Jacques Descloitres, MODIS Rapid Response Team at NASA/GSFC, obtained from the archives at http://visibleearth.nasa.gov/

Figure 8-2: View of a Tornado

Source:
http://www.photolib.noaa.gov/700s/nssl0123.jpg

To measure the intensity, area and strength of a tornado, in 1973 Dr. Ted Fujita (then with the University of Chicago) and Allen Pearson (at the time director of the National Severe Storm Forecast Center) introduced the Fujita-Pearson Tornado Intensity Scale (see Table 8-2). An improvement over the scale first published by Dr. Fujita in 1971, this scale compared the estimated wind velocity with the corresponding amount of damage to human-built structures and vegetation (a component first introduced by Fujita) and the width and length of the tornado path (the component added by Pearson). The scale classified tornadoes into six levels (from F0 to F5) with larger numbers indicating more damaging and larger tornadoes (the Fujita scale smoothly divided wind speed between the highest Beaufort level and Mach 1.0 into 12 levels – F0 through F12, but recognized that an F6 tornado would be inconceivable, and indeed no tornado above F5 has ever been measured. The Fujita-Pearson scale was used to classify all tornadoes reported after its introduction, in addition to retroactively classify all tornadoes reported since 1950 that were listed in the National Oceanic and Atmospheric Administration's (NOAA) national tornado database.

Table 8-2: The Fujita-Pearson Tornado Damage Scale

Scale	Wind Speed Estimate (mph)	Average Damage Path Width (feet)	Typical Damage
F0	40 - 72	30 - 150	**Light** damage (gale tornado). Some damage to chimneys and television antennas; twigs and branches break off trees; winds push over shallow-rooted trees; sign boards are damaged.
F1	73 – 112	100 - 500	**Moderate** damage (weak tornado). Winds peel off roofs; windows break; light trailer homes are pushed off their foundations or overturned; some trees are uprooted or snap; moving autos are pushed off the road; attached garages may be destroyed. Hurricane speed starts at 74 mph.
F2	113 – 157	360 - 820	**Considerable** damage (strong tornado). Roofs are torn off frame houses, leaving strong walls upright; weak rural buildings are demolished; trailer homes are destroyed; large trees snap or are uprooted; railroad boxcars are pushed over; light objects become airborne missiles; cars are blown off highways.
F3	158 – 206	650 – 1,650	**Severe** damage (severe tornado). Roofs and some walls are torn off well-constructed frame structures; some rural buildings are completely demolished; trains are overturned; steel-framed hangars and warehouse-type structures are torn; cars are lifted off the ground; most trees are uprooted, snapped or leveled.
F4	207 – 260	1,300 – 3,000	**Devastating** damage (devastating tornado). Well-constructed frame houses are leveled, leaving piles of debris; steel structures are badly damaged; trees are de-barked by small flying objects; cars and trains are thrown some distances or roll considerable distances; large objects become missiles.
F5	261 – 318	~ 3,600	**Incredible** damage (incredible tornado). Strong, whole-frame houses are lifted off their foundations and carried considerable distances; steel-reinforced concrete structures are badly damaged; automobile-sized missiles are generated and carried through the air >100 meters; trees are debarked.
F6	319 – 379		**Inconceivable** damage: These winds are unlikely. Should a tornado with maximum speed in excess of F5 occur, the extent and type of damage may not be conceived. A number of airborne missiles, such as refrigerators, water heaters, storage tanks, automobiles, etc. create serious secondary damage on structures.

Fujita's wind estimates have since been found to be inaccurate, with the original wind speed estimates higher than the wind speeds actually required to incur the damage described in each category, especially for tornadoes classified as F3 or larger. In response to these criticisms, a new **Enhanced Fujita** (EF) **Scale** for tornado damage was developed between 2004 and 2006. The EF scale, which was officially implemented in the United States on February 1, 2007, is considered an improvement over the old scale: engineers and meteorologists estimated the wind speeds in the new scale (although actual speed winds have not been empirically measured), and records of past tornadoes were reviewed to better equate the wind speeds with the storm damage reported. The new scale also includes more types of structures and vegetation in the damage assessment, and better accounts for differences in construction quality. Similar to the original Fujita scale, the EF Scale also has six levels of tornado damage, EF-0 to EF-5 (see Table 8-3). A researcher assigning a level of damage to a tornado using the EF scale needs to refer to a list of 28 different damage indicators (DI) or types of structures and vegetation, and then the degree of damage (DoD) for each. Damage indicators include barns or farm outbuildings, residences, manufactured homes (with distinctions made for single-wide and double-wide), apartments, masonry buildings, strip malls, automobile lots, elementary schools, low-, middle- or high-rise buildings (each a different category of indicator), electrical transmission lines, free-standing towers, and softwoods or hardwood trees. The new scale is likely to be modified or updated as new tornado data become available.

Table 8-3: Enhanced Fujita Scale

Scale	Wind Speed Estimate		Relative Frequency (%)
	mph	Km/h	
EF-0	65 - 85	105 - 137	53.5
EF-1	86 - 110	138 - 178	31.6
EF-2	111- 135	179 – 218	10.7
EF-3	136 – 165	219 – 266	3.4
EF-4	166 – 200	267 – 322	0.7
EF-5	> 200	> 322	< 0.1

Macrobursts and Microbursts

Storm researcher Dr. Ted Fujita first coined the term "***downburst***" to describe a strong, straight-direction surface wind in excess of 39 miles per hour (mph) caused by a small-scale, strong downdraft from the base of a thundershower and thunderstorm cell. Unlike tornadoes, the origin of a downburst is downward-moving air from a thunderstorm's core (as opposed to the upward movement of air associated with tornadoes). Downbursts are further classified into macrobursts and microbursts.

Macrobursts are downbursts with winds up to 117 mph that spread across a path greater than 2.5 miles wide at the surface, and which last from five to 30 minutes. ***Microbursts*** are confined to smaller areas, less than 2.5 miles in diameter from the initial point of downdraft impact. An intense microburst can result in winds near 170 mph but often lasts less than five minutes. Like tornadoes, microbursts can do significant damage: When a microburst hits a tree, the winds strip the limbs and branches off it; a microburst that hits a house has the potential to flatten the structure. After striking the ground, a powerful outward-running gust can generate significant damage along its path. Damage associated with a microburst appears to have been caused by a tornado, except that the damage pattern away from the impact area is characteristic of straight-line winds, rather than the twisted pattern typical of tornado damage.

Microbursts are particularly dangerous to aircraft landing or taking off, and have caused several planes to crash, with resultant loss of life. Microbursts have also been responsible for capsizing and sinking ships, causing structural damage in many communities, lifting roofs off structures, downing electrical lines, and generally causing millions of dollars in damage. Most of the microbursts reported have occurred in the northeastern and central parts of the United States, including New York, New Jersey, Massachusetts, Ohio, and Kansas, but microbursts have also been reported in Arizona and Utah (http://en.wikipedia.org/wiki/Microburst#Danger_to_aircraft), and in southern California. On March 29, 1998, in a Lake Elsinore neighborhood, an apparent microburst uprooted a tree and ripped two 20-foot sections of roofing tiles from a home. A funnel cloud was also spotted that afternoon near Dulzura, to the east-southeast of San Diego. On August 12, 2012, also in the Lake Elsinore area, a microburst knocked down several power poles and trees, and damaged the roofs of several houses (http://latimesblogs.latimes.com/lanow/2012/08/microburst-blamed-tornado-type-activity-riverside-county.html; http://www.pe.com/localnews/riversidecounty/riverside/riverside-headlines-index/20120812-lake-elsinore-tornado-touchesdown more-expected.ece?ssimg=677704#ssStory677446).

Dust Storms

Dust storms are high wind events common in arid and semi-arid regions. Strong winds pick up sand and other particulates and transport them by saltation and suspension to another location, where they are deposited. Dust storms are significant erosive agents, with both short- and long-term impacts on people, structures and other property, and on the environment. In the short-term, a dust storm causes reduced visibility, which can affect motorists and aircraft. Fine particulates in the air will enter the respiratory pathways and can cause serious health conditions, including nose, ear and eye infections, sinus infections, asthma, dry eyes (a condition that if left untreated can led to blindness), silicosis, and even premature death. Dust storms can also spread virus spores and contaminants that can result in skin rashes and other infections. Long-term impacts of dust storms include loss of productivity from agricultural fields that have had their organic-rich, topsoil removed, whereas the deposition of sand and dirt elsewhere can bury and destroy crops and landscaping. Sandblasting of buildings, signs, fences, and vehicles can have both an aesthetic and structural impacts; in the long term the damage due to continuous pitting may require the replacement of a structure.

Historic Southern California Windstorms

As mentioned above, Santa Ana winds are common in the southern California region, typically in the fall through spring. Some of the strong winds in the winter are associated with winter storms emanating from Alaska and Canada. The desert areas are also subject to high winds associated with short-duration tropical thunderstorms emanating from the south. These storms typically occur in the summer months, between July and September.

The National Climatic Data Center (NCDC) lists about 60 high wind events and thunderstorms in the Los Angeles County area between 1952 and July 2014 (http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms; http://www.wrh.noaa.gov/sgx/document/weatherhistory.pdf)). Those storms in the NCDC database that impacted or are inferred to have impacted the City of Los Angeles and immediate area are included in Table 8-4 below. This table also includes exceptional historical storms dating back to 1880 that impacted the southern California area, causing extensive damage either directly, or indirectly. These strong, damaging winds have often fanned wildfires that consumed thousands of acres and destroyed many homes. Please note that this list will most likely not include all damaging windstorms that have impacted the Los Angeles area, as some events may have been so localized as to have not made it into the National Climatic Data Center database.

Table 8-4: Major Windstorms in the Los Angeles Metropolitan Area (1939 – July 2014) and Strong Winds Reported in Los Angeles County (1880 - July 2014)

Date	Description, Including Location and Damage Reported
November 13, 1880	Severe Santa Ana winds and sandstorms caused extensive damage throughout the southern California area.
September 24-25, 1939	Tropical storm that lost hurricane status shortly before moving onshore at San Pedro had sustained winds of 50 mph. At least 48 people died from sinking boats.
November 19-29, 1956	Strong and prolonged Santa Ana winds fanned a fire north of Descanso that burned 44,000 acres and killed 11. Two wooden bridges and a power plant were destroyed. A 100-mph gust was recorded on November 20 at a forest lookout near Saugus.
November 21-22, 1957	Extremely destructive Santa Ana winds fanned a 28,000-acre brush fire west of Crystal Lake. Flying debris forced people indoors in some areas. Extreme turbulence due to a downdraft injured 12 out of 33 people on an airplane near Ontario.
November 5-6, 1961	Strong Santa Ana winds fanned fires in Topanga Canyon, Bel Air and Brentwood; 103 firemen were injured; $100 million in economic losses, including 484 buildings (mostly residential) and 6,090 acres scorched.
January 18-28, 1969	Strong storm winds caused power outages and falling trees in southern California; four killed by downed trees.
November 30 – December 1, 1982	Widespread strong winds associated with a big storm resulted in 1.6 million homes without power.
November 23, 1986	Strong Santa Ana winds hit Los Angeles, its foothills and mountains. Gusts to 54 mph recorded; gusts to 70 mph estimated. An unfinished house in Glendale was blown to bits; numerous beach rescues needed for sailors and windsurfers. Two sailboat masts were snapped in a boat race in the Channel Islands.
December 4, 1987	Thunderstorm caused winds gusting to 60 mph in the Westminster area, and 55 mph at Newport Beach. In Westminster, the winds damaged 40 mobile homes, 9 of which were ripped out of the ground, leaving 24 people homeless. Winds knocked down power lines in Newport Beach.
February 16-19, 1988	Very strong Santa Ana winds with gusts to 90 mph in Newport Beach, 70+ mph in the San Gabriel Mountain foothills; gusts to 76 mph at Monument Peak – Mt. Laguna; 63 mph at Ontario, and 50 mph at Rancho Cucamonga. Numerous trees and power lines downed resulting in power outages along the foothills of the San Gabriel and San Bernardino mountains. Mobile home overturned and shingles torn off roofs in Pauma Valley; Fontana schools closed due to wind damage; three killed when truck overturned and burned; one killed when stepped on downed power line. Power outages impacted 200,000 customers in Los Angeles and Orange counties. Grass fires. Roof damage widespread in communities around Glendale and Burbank, and at John Wayne Airport. Boats torn from moorings at Newport Harbor.
November 28, 1989	Strong Santa Ana winds with gusts to 70 mph at Rialto Airport. Several tractor-trailer trucks were overturned east of Los Angeles.
February 23, 1993	A local television station reported tornado-like winds damaged 11 homes in Azusa. Most of the damage was to roofs and fallen trees. No funnel cloud was sighted. Several cars sustained damage.

Date	Description, Including Location and Damage Reported
October 26-27, 1993	Strong Santa Ana winds with gusts to 62 mph at Ontario. Twenty fires in the southern California area, including the Laguna Hills Fire. Four dead, 162 injured, $1 billion in property losses alone; 194,000 acres destroyed.
April 2, 1994	Strong winds knocked down a dozen trees stretching from West Covina to Cal Poly in Pomona. Winds were part of a cold front and associated upper low pressure system which moved through the area. Some minor street flooding and many car accidents were also reported.
November 28, 1996	Strong northwest winds ahead of a cold front impacted the entire southern California area, with sustained winds of about 40 mph, and gusts up to 60 mph. Many downed trees and power lines were reported.
December 14, 1996	Strong Santa Ana winds with gusts to 111 mph at Fremont Canyon and 92 mph in Rialto, toppled trees and electric poles, smashed windows, knocked out power to tens of thousands across southern California. Two deaths in Fontana; one man killed by a live power line that was blown on him; the second died when a tree branch fell onto his van. Minor injuries (3 total) in Orange and San Diego counties. In Crestline, a radio tower was blown down and the roof blown off the transmitter building. I-15 near Devore closed for 15 hours where two trailers flipped.
November 26, 1997	A line of severe thunderstorms developed across the San Gabriel Mountains and the San Gabriel Valley. Trained observer reported winds gusting up to 74 mph.
December 10-12, 1997	Santa Ana winds with gusts to 96 mph at Pine Valley; 87 mph in Upland. Flying debris killed 2 construction workers, one in Riverside, and another in Irvine. Fish farm in Sun City reported more than $1 million in structural damages; extensive damage to the avocado crop; boats damaged and sunk at Coronado and Avalon.
February 3-4, 1998	Strong storm winds with gusts to 60 mph and heavy downpours. The strongest winds were clocked in Orange County and the mountains of San Bernardino County in advance of the storm. Wind gusts to 60 mph downed trees and caused scattered power outages. Moderate to heavy rain flooded intersections in coastal areas; snow fell as low as 4,500 feet. Two young illegal immigrants near Campo died, and 12 others suffered from exposure to strong winds, cold temperatures and rain.
May 13, 1998	Strong thunderstorm winds produced damage across parts of the Long Beach area. At a car dealership, the roof of a couple of service bays was blown off. Next door, a 600-square-foot section of roof was torn off an aircraft instrumentation company.
August 31, 1998	Strong thunderstorm winds, estimated at 60 mph, knocked down several trees with diameters of one foot or greater in the La Verne area. A spotter reported that strong thunderstorm winds also knocked down several trees in the Glendora area. In Duarte, strong thunderstorm winds estimated at 58 mph, knocked several trees and power lines.
September 2, 1998	A series of severe thunderstorms affected the San Gabriel Valley, bringing strong winds and heavy rain. The strong winds knocked down numerous trees and power lines across the area. In Pomona, several houses had parts of their roofs blown off. Also, a helicopter pilot reported a funnel cloud near the Pomona area. At the Lily of the Valley Mobile Home Village in Saugus, numerous trees were uprooted. Also, several automobiles and roof awnings were damaged.
December 9-10, 1998	Santa Ana winds with 101-mph gusts at Modjeska Canyon, 93-mph gusts at Fremont Canyon, 52-mph gusts in Santa Ana, and 83-mph gusts at Ontario disrupted transportation, power and daily activities. Winds toppled trees and power lines, overturned vehicles, and caused property damage. 180,000 customers left without electric power; 17 trucks were blown over along I-15 and Highway 60. Seven students at CSU in San Bernardino were knocked down and injured. Trees fell on passing motorists in Fontana. A total of 24 injuries reported, with property damage amounting to $1.1 million.

Date	Description, Including Location and Damage Reported
December 21-22, 1999	Strong Santa Ana winds; 68-mph gust at Campo, 53-mph gust at Huntington Beach; 44-mph gust in Orange. Widespread power and phone outages due to fallen trees knocked down lines and snapped poles. Large dust cloud over the San Jacinto Valley that reached height of 500 feet closed highways and sandblasted cars. Gusty winds spread a fire in Glendale to an adjacent house, causing two injuries and $50K in damages. Three wildfires in San Diego County. $227K in property damage reported throughout the region.
February 23, 2000	A powerful Pacific storm brought heavy rain, thunderstorms and snow to southern California. In central Los Angeles, gusty thunderstorm winds damaged roofs and blew down power lines. A fallen power line electrified a metal fence which electrocuted a woman. Fortunately, the woman only suffered minor injuries.
March 5, 2000	A severe thunderstorm struck Long Beach. Downburst winds, gusting up to 70 mph, blew down numerous power poles near the intersection of Stearn Street and Redondo Lane.
April 18, 2000	A severe thunderstorm struck the southern sections of Los Angeles County producing powerful microburst winds, estimated at between 80 and 100 mph. In Paramount, over 30 mobile homes sustained structural damage and one mobile home was blown over; factories were also damaged. From Paramount, the storm moved across the communities of **Bellflower, Downey**, Norwalk, Whittier, La Mirada, Rowland Heights and Diamond Bar. Along the storm's path, widespread structural damage was reported to homes and businesses, including the destruction of chimneys and concrete walls. In addition, numerous trees and power poles were blown down. In Norwalk, a 100-foot eucalyptus tree was blown down across I-5, closing all southbound lanes for over three hours.
December 25-26, 2000	Santa Ana winds; 87-mph gust at Fremont Canyon. Damage and injuries reported in Mira Loma, and in Orange and Riverside counties. 50-mph winds in northern Orange County toppled utility poles leaving about 25,000 customers in Tustin, Garden Grove, Orange, Santa Ana and Westminster without power for a few hours. Across the Inland Empire, winds knocked down power poles, trees, signs and fences at 23 separate locations. Many trees were uprooted. Power disrupted to 9,000 homes and businesses. Four injuries and $665K in property damage reported.
February 13, 2001	A powerful Pacific storm brought heavy rain, heavy snow and gusty winds to central and southern California. Gusty south winds of 40 to 60 mph developed in the mountains, whereas in the coastal and valley areas of Ventura and Los Angeles counties, southeast winds of 30 to 50 mph developed, causing some damage. The worst wind damage was in San Pedro Harbor where several docks were damaged and one boat sank.
April 20, 2001	Strong thunderstorm winds struck Los Angeles county near the community of Baldwin Hills. Two 4-inch diameter trees and one 2-foot diameter tree were blown down along South Redondo Avenue, near the intersection of La Brea Avenue and Jefferson Boulevard. One person was injured when his vehicle ran into the debris along South Redondo Avenue.
December 7-8, 2001	Santa Ana winds with gust to 87-mph at Fremont Canyon affected most of southern California. Trees, power lines and signs were toppled. Two construction workers were injured when a 20-foot-high brick wall they were working next to collapsed. Several major freeways were closed to high profile vehicles. Power outages affected about 40,000 customers. Three injuries and $250K in property damage. Winds fanned the Potrero Fire.
December 14, 2001	West winds of 25 to 35 mph with local gusts to 52 mph knocked down some small trees and power lines in the community of Sylmar.
March 13, 2002	Gusty west winds between 30 and 40 mph knocked down some trees across Los

Date	Description, Including Location and Damage Reported
	Angeles County, producing some minor damage. In Los Angeles, the gusty winds knocked over a 50-foot tree onto a van. In Studio City, the winds knocked down a tree onto a UPS truck. In Hollywood, the winds knocked down a tree onto a car. No injuries were reported with any of the incidents.
January 5-7, 2003	Strong, widespread Santa Ana winds with 100-mph gust at Fremont Canyon, 90-mph gust at Ontario; 80-mph gust at Upland. Winds toppled power poles in Orange; blew over a mobile derrick in Placentia, crushing two vehicles; and delayed Metrolink rail service. Interstates 8, 10 and 15 were blocked for several hours due to large trucks blown over. Dust storms forced closure of I-215. One commercial plane sustained damage at Ontario Airport; others had to be diverted. As a result of the winds and toppled poles, thousands of people in northeastern Orange County were without power. Two dead, 11 injured. Widespread property damage, road closures, and wildfires. $3.3 million in property damage and $28 million in crop damage.
June 6, 2003	Powerful Santa Ana winds buffeted Ventura and Los Angeles counties. Northeast winds gusting up to 75 mph knocked down numerous trees and power lines across the area. On Highway 126 in Ventura County, road closures were reported due to downed trees. In the Santa Monica Mountains area, north of Malibu, the Santa Ana winds fueled a 2,200-acre brush fire which destroyed two structures.
October 25-28, 2003	Strong Santa Ana winds; 45-mph at Ontario, 43-mph at Fremont Canyon. Extensive wildfires consumed hundreds of thousands of acres; killed more than 20 people, and caused more than $1 billion in damage. The Verdale Fire, aided by the winds, burned 8,680 acres of land in the northwest portion of Los Angeles County. Fortunately, that fire did not destroy any residences or caused any injuries or deaths.
November 25, 2003	Powerful Santa Ana winds buffeted Los Angeles and Ventura counties. Thousands were left without power as the winds snapped power lines. Many communities reported numerous trees were blown down. In Glendale, snapped power lines sparked three house fires.
January 2, 2006	A severe thunderstorm moved through the community of Claremont in Los Angeles County. Law enforcement reported numerous trees and power lines down due to thunderstorm winds gusting to 68 mph.
November 29, 2006	Offshore winds with sustained speeds of 54 mph and 73-mph gust at Fremont Canyon; 58-mph gust at Ontario, caused widespread property damage and power outages as a result of downed power lines, poles and trees. Caltrans reported more than 100 calls in 4 hours reporting downed street signs, trees and power lines. About 15,000 people lost power in Orange County. $30K in property damage.
January 4 - 6, 2007	Strong winds across southern California damaged or downed power poles; damaged trees and felled tree limbs. Blowing dust reduced visibility to near zero along I-215 and the Ramona Expressway, and small, wind-driven wildfires occurred along I-15. $700K in property damage.
September 20-22, 2007	An unseasonably cold early season storm moved south from western Canada, bringing significant weather to sections of southern California. Gusty winds knocked down power poles across sections of Los Angeles County, including seven power poles near Hollywood.
October 20-24, 2007	A strong surface high pressure developed over the Great Basin and produced a strong and long-lasting Santa Ana wind event across southern California. This particular event was the strongest and most widespread in recent memory with peak wind gusts over 100 mph reported at Laguna Peak and Whitaker Peak. The offshore winds produced very warm and dry conditions across the area, fanning nine different wildfires across Santa Barbara, Ventura and Los Angeles counties. Four of the wildfires exceeded 700 acres with one fire burning nearly 60,000 acres.

Date	Description, Including Location and Damage Reported
October 27, 2009	A powerful early-season storm brought very strong and gusty northerly winds to southwestern California. Strong winds gusting to 81 mph were reported in the mountains, filtering down to the valleys, where windy gusts between 58 and 63 mph were reported. The strong winds knocked down some power lines and trees, producing power outages across the area.
January 18-22, 2010	A series of powerful winter storms affected central and southern California bringing heavy rain, flash flooding, gusty winds, and heavy snow to the area. Strong southerly winds were common as each storm moved across the area with wind gusts as high as 71 mph reported in some spots. Along with the rain and snow, some severe weather occurred across the area with reports of waterspouts, straight-line winds and even a weak tornado in the city of Ventura. California Highway Patrol reported severe thunderstorm wind gusts that knocked down several trees in the **Downey** and Pico Rivera areas. Thunderstorm wind gusts were estimated at 60 mph.
November 30 – December 1, 2011	A cold, low-pressure system over Arizona generated strong north to northeast offshore winds over most of the Los Angeles and Ventura counties. The City of Pasadena declared a local state of emergency because of downed power lines and the streets littered with tree limbs. About 300,000 utility customers in southern California experienced power outages.

Sources: NCDC database (http://www.ncdc.noaa.gov/stormevents/), and compilation by the National Weather Service office in San Diego (http://www.wrh.noaa.gov/sgx/document/weatherhistory.pdf).

As discussed above, although most tornado activity in the United States occurs in the Midwest states, ***tornadoes*** can and do occur in California. The Tornado Project, a company that researches, compiles and makes tornado information available on the web at www.tornadoproject.com, indicates that 41 tornadoes of Fujita Scale F0 to F2 have been reported in Los Angeles County between 1918 and 2000. The National Oceanic and Atmospheric Agency (NOAA) lists 42 tornadoes, 10 funnel clouds and five waterspouts between 1952 and 2014, with six of those since the year 2000. Table 8-5 lists the tornadoes, funnel clouds and waterspouts reported in Los Angeles County, including a description of the damage caused, if any or if available in the literature. The data available indicate that in the last about 60 years, tornadoes in Los Angeles County have killed three, injured at least 55, and caused more than $62 million in property damage.

Table 8-5: Tornadoes, Funnel Clouds and Waterspouts Reported In and Near Los Angeles County between 1918 and July 2014

Date and Location	Time	Dead	Injured	Fujita Scale	Damage Description
January 26, 1918	13:30	0	0	F2	No data available
April 5, 1926	NA	0	0	F2	No data available. A tornado was also reported that day in National City, near San Diego, that destroyed 2 homes and injured 8.
March 15, 1930	11:40	0	4	F2	No data available.
March 2, 1934	13:40	0	0	F2	No data available.
February 12, 1936	15:30	0	0	F0	No data available.
November 11, 1944	21:00	0	0	F2	No data available.
March 16, 1952	NA	3	NA	NA	Tornado in Santa Monica left 3 dead and caused damage.

Date and Location	Time	Dead	Injured	Fujita Scale	Damage Description
December 20, 1952	14:00	0	0	F1	No data available.
January 18, 1955	11:01	0	0	F1	No data available, except that $2.5K in damages reported.
May 9, 1956	08:30	0	1	F0	No data available, except that $25K in damages reported.
February 19, 1962	16:00	0	0	F1	No data available, except that $2.5K in damages reported. A tornado was also reported in Irvine that day. That tornado uprooted trees and toppled power poles.
May 14, 1962	12:00	0	0	F1	No data available, except that $25K in damages reported.
November 9, 1964	07:00	0	0	F1	No data available, except $2.5K in damages reported.
November 7, 1966	13:00	0	10	F2	Ten people injured; $250K in damages reported. Tornadoes also occurred in Newport Beach and Costa Mesa, where property damage was reported.
April 18, 1967	18:00	0	0	F0	No data available.
May 8, 1977	10:00	0	0	F1	No data available, except for $2.5M in damages reported.
January 4, 1978	15:15	0	0	F1	No data available.
February 9-10, 1978	22:30	0	6	F1	Tornadoes in El Segundo and Huntington Beach. In El Segundo, trees were hurled onto parked cars. Power poles were knocked down along a 1-mile stretch. In Huntington Beach, 6 were injured. $3 million in property damage.
January 31, 1979	10:45	0	0	F1	No data available.
January 28, 1980	13:15	0	0	F0	No data available.
March 29, 1982	21:30	0	0	F1	No data available.
November 9, 1982	9:30 11:30 12:00 12:00	0 0 0 0	0 0 0 0	F1 F2 F2 F0	Seven tornadoes touched down in the Los Angeles Basin and Orange County areas. Three of the tornadoes began as waterspouts at Pt. Mugu, Malibu and Long Beach. The Long Beach waterspout moved ten miles inland, becoming an F2 tornado. Another tornado reached F2 strength in Van Nuys. Two other tornadoes were reported in Garden Grove and Mission Viejo. Property damage reported, especially as a result of the Long Beach waterspout/ tornado. Over $5.5M in damages.
March 1, 1983	07:40 08:15	0 0	30 1	F2 F0	Two tornadoes in the Los Angeles area. In all, 30 people were injured and 100 homes were damaged. The F2 tornado damaged seven businesses and 50 homes in **South Central** Los Angeles, caused 30 injuries and lifted about one mile before reaching the Civic Center. $25M in damages. The F0 tornado injured a motorist when his Cadillac was lifted 15 feet and carried across a

Date and Location	Time	Dead	Injured	Fujita Scale	Damage Description
					highway in San Marino.
September 30, 1983	07:00	0	0	F0	No data available except that $250K in damages reported.
September 30, 1983	22:35	0	3	F1	No data available, except that $2.5K in damages reported (this number may be confused with $ amount reported for tornado earlier in the day – see above).
May 30, 1984	09:15	0	0	F0	No data available.
June 5, 1987	15:15	0	0	F0	No data available, except that $25M in damages reported.
January 16, 1990	21:20	0	0	F0	No data available.
March 19, 1991	02:00	0	0	F0	No data available. Tornadoes also reported in East City Heights and San Carlos areas of San Diego. On March 20, tornadoes reported in Riverside, Muscoy, and in Camp Pendleton.
March 20, 1992	19:00	0	0	F1	No data available.
January 14, 1993	1:40	0	0	F1	A strong wind associated with an intense rain storm ripped through a small section of the city of Los Angeles. At least 50 trees were uprooted. Three houses and two cars were damaged. $500K in damages.
January 17, 1993	23:45	0	0	F0	A small tornado caused minor damage to fences, powerlines and small trees. $50K in damages.
February 7, 1994	15:45	0	0	F0	A weak tornado touched down along Sunland Boulevard and San Fernando Road in Sun Valley. Windows were blown out and trees were uprooted. One tree smashed onto a car. Property damage of shattered windows and torn roofs, causing $50K in damages. A tornado was also reported between Newport Beach and Tustin in Orange County.
April 27, 1994	16:00	0	0	NA	A helicopter pilot reported a funnel cloud just east of downtown Los Angeles. No damage reported. On the 26th, a waterspout was reported 11 miles southwest of Camp Pendleton.
June 16, 1995	12:55	0	0	F0	A severe thunderstorm spawned a tornado that briefly touched down on the 14800 block of Dalman Street in Whittier. Witnesses said it tore through a chain link gate, swirled rubbish cans in the air, and snapped off 10-foot long tree branches. A rain gutter was also torn from a house.
March 14, 1996	15:10 17:01	0 0	0 0	F0 F0	Funnel cloud was reported just west of Century City, and a waterspout was reported in Santa Monica. On the 13th, funnel clouds were observed in Irvine, Moreno Valley and northwest of Hemet.
January 20, 1997	09:15	0	0	F0	A strong cold front produced a waterspout near Point Fermin in the San Pedro Bay.

Date and Location	Time	Dead	Injured	Fujita Scale	Damage Description
July 21, 1997	15:55-14:20	0	0	F0	A small and weak tornado developed about 15 miles east of the Palmdale area. No damage was reported
January 9, 1998	14:00-14:15	0	1	F1	A small tornado swept through eastern sections of Long Beach. The tornado developed over Los Altos Park and traveled northeast to Studebaker Road. The most significant damage occurred to a Lucky's Supermarket where a 60x60-foot section of roof collapsed. Cubberley Elementary School also lost a section of its roof. Other minor damage occurred from fallen trees and power lines. One minor injury was reported.
February 24, 1998	1:10	0	0	F0	A thunderstorm spawned a funnel cloud over eastern sections of Long Beach. The funnel cloud affected homes on Ultimo and Los Altos streets. One home suffered significant damage when an acacia tree fell onto it. Ten other homes suffered minor damage including shattered windows and smashed fences.
March 13, 1998	19:25	0	0	F0	A spotter in Long Beach reported a funnel cloud. Waterspouts were also observed between Long Beach, Huntington Beach, and Catalina. Funnel clouds were reported in Phelan and Hesperia.
March 31, 1998	13:30	0	0	F0	A spotter in the Santa Monica area reported two funnel clouds. Numerous funnel clouds were reported in Orange and San Diego counties on the 31st and on April 1st.
May 5, 1998	9:27	0	0	F0	A funnel cloud developed over the community of Manhattan Beach. Only very minor damage was reported.
September 2, 1998	14:55	0	0	F0	A series of severe thunderstorms affected the San Gabriel Valley, bringing strong winds and heavy rain. A helicopter pilot reported a funnel cloud near the Pomona area.
April 1, 1999	14:00	0	0	F0	A small tornado touched down in the community of Chatsworth. Two mobile homes were damaged. Several waterspouts observed off the Orange and San Diego county coastlines, and a funnel cloud was reported 3 miles off La Jolla.
June 3, 1999	17:15	0	0	F0	Los Angeles County Fire Department reported three funnel clouds south of San Pedro, just off Point Fermin. A weather spotter reported a funnel cloud west of Palos Verdes.
February 16, 2000	16:30	0	0	F0	A cold and unstable air mass generated heavy showers and thunderstorms across central and southern California. In Covina, a weak tornado developed, damaging four mobile homes. Fortunately, no one was injured.

Date and Location	Time	Dead	Injured	Fujita Scale	Damage Description
March 4, 2000	11:45	0	0	F0	A weather spotter reported a funnel cloud near Point Vicente, in Rancho Palos Verdes.
August 28, 2000	13:45	0	0	F0	A very weak tornado developed in the Antelope Valley, near the community of Littlerock. No damage was reported.
January 12, 2001	08:49 11:57	0 0	0 0	F0 F0	Pilots reported waterspouts about 5 miles southeast of Los Angeles International and 20 miles southeast of Long Beach airports, respectively.
February 11, 2001	12:10	0	0	F0	The Coast Guard reported a waterspout south of Huntington Beach.
December 21, 2001	00:40	0	0	F0	In the community of Walnut, a weak tornado touched down in the early morning hours. Several homes sustained minor roof damage and about 30 trees were knocked down. No injuries were reported.
December 28-29, 2004	23:00 00:15 00:20	0 0 0	0 0 0	F0 F0 F0	A powerful Pacific storm brought heavy rain, snow and tornados to central and southern California. On the coastal plain of Los Angeles county, weak tornados were reported in Long Beach, Inglewood and Whittier. The tornados only produced minor damage, including downed trees and damaged roofs.
August 15, 2005	18:02	0	0	F0	A weak tornado touched down briefly about 8 miles northeast of the Palmdale Airport. The tornado was nearly-stationary. No reports of injuries or damage were received.
September 1, 2007	15:20	0	0	EF0	A pilot at the Lancaster airport reported a weak tornado on ground to the southeast of the airport. No damage or injuries were reported.
February 7, 2009	NA	0	0	NA	Thee waterspouts were reported 8 miles south of San Pedro.

Sources: NCDC database (http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms), The Tornado Project (http://www.tornadoproject.com/), and compilation by the National Weather Service office in San Diego (http://www.wrh.noaa.gov/sgx/document/weatherhistory.pdf).

Given the extensive hardscaping (i.e., asphalt and concrete paving, in addition to structures) and landscaping in the Los Angeles metropolitan area, ***dust storms*** are not common, as the are few sources of sand for the winds to pick up. Dust storms and dust devils can occur in areas recently excavated, typically as a result of grading, unless best management practices to control the dust are implemented. The NCDC database lists only three dust storm events (referred to as dust devils) in the Los Angeles County area, all related to the same strong wind event in 1997 (see Table 8-6), with no events reported between 2000 and July 2014. Given the many instances of strong winds reported in the region (see Tables 8-4 and 8-5), this list is very likely under-representing the hazard of dust storms in the Los Angeles area.

Table 8-6: Dust Storms Reported in Los Angeles County in 1997

Date	Description, Including Location and Damage Reported
April 1-2, 1997	Strong northwest winds, gusting up to 65 mph, developed across the valleys of Los Angeles county. At 4:15 PM on April 1st, a dust devil developed in the Palmdale area, destroying two storage sheds. On April 2nd, at 2:15 PM, a dust devil developed over a mobile home park in La Verne, where two mobile homes had their roofs blown off. Then at 2:30 PM, a dust devil developed in the Glendale area. The dust devil blew down a tree onto an automobile.

Sources: NCDC database (http://www.ncdc.noaa.gov/stormevents/) and compilation by the National Weather Service office in San Diego (http://www.wrh.noaa.gov/sgx/document/weatherhistory.pdf).

Other Extreme Weather Events

Hail

Hail is solid precipitation consisting of fragments of water ice called hailstones. These can be irregular in shape, oval or rounded, and can vary in size from 0.2 inch (5 mm) in diameter, to nearly 8 inches (20 cm), although hail more than 4 inches in diameter is unusual. The stones can range from soft to very hard. Hail is produced in thunderstorms with strong upward motion of the air, similar to a tornado, and freezing levels at relatively low elevations. A hailstone forms as a result of super-cooled water that freezes around an ice-condensing particle, such as a grain of sand, a bit of compacted snow, or even a particle of pollen or other debris carried up into the atmosphere by the thunderstorm updrafts. The resulting hailstone may be carried upward into colder sections of the atmosphere, all the while collecting additional super-cooled water droplets. Once it gets too heavy for the wind to keep it aloft, it falls to the ground as hail. Hailstones have rings like an onion, with translucent ice layers alternating with white, opaque layers. It is believed that the translucent layers are formed in those sections of clouds where water occurs as droplets, whereas the opaque, white sections form in areas where water vapor predominates. Hailstones also form by accretion, with smaller stones sticking together to form larger, irregular stones. These are often lumpy or even spiky on the outside.

With current weather detection methods, such as weather satellites and radar, it is possible to detect thunderstorms that will produce hail. Severe weather warnings are generally issued in the United States for hail that is more than about 1 inch (2.5 cm) in diameter.

The NOAA lists 21 hail events in Los Angeles County between 1959 and 2014. A few more hail storms were identified from other sources. Those events that are known or inferred to have impacted communities near Cudahy are listed in Table 8-7 below. The data suggest that hail storms in the region, although not common, have generated minor to moderate damage to property. No injuries or deaths were reported as a result of the hail storms listed, but the data may be incomplete. Besides the events described below, hailstorms in Los Angeles County occurred on May 21, 1980, August 22, 1984, and November 4, 1987, but the data available are not sufficient to determine where these storms occurred, or if they caused damage.

Table 8-7: Hail Events in the Los Angeles County Area Between 1957 and July 2014

Date	Description, Including Location and Damage Reported
October 20-21, 1957	Widespread thunderstorms. Hail formed 18-inch high drifts in East Los Angeles.
February 11, 1959	Hail reported in Los Angeles County, with hailstones to 1.25-inches in diameter. Additional data not available.
September 2, 1960	Storm dropped hail in several parts of southern California, including Riverside County, San Bernardino, and possibly Los Angeles County. Some hailstones measured more than 2.75-inches in diameter and weighed over 1 pound. This is the largest known hail to hit southern California.
January 30-31, 1979	Golf ball-sized hail reported in Los Angeles County, although specific details are lacking.
October 3, 1986	Rain and thunderstorms hit the Los Angeles area. 1.5-inches of rain in Pasadena, 1.02 inches in Los Angeles. Three inches of hail piled up in Pasadena. Classes were cancelled at CSU-Northridge because of hail. Several serious traffic accidents in Pasadena.
April 18, 2000	A severe thunderstorm struck southern sections of Los Angeles County. The thunderstorm produced large hail and powerful microburst winds, estimated at between 80 and 100 mph (see Tabl3 8-4). In **Downey**, ¾-inch hail was reported along with the powerful microburst winds.
November 12, 2003	A large and powerful thunderstorm produced heavy rain in excess of 5 inches in less than two hours, flash flooding and hail across South Central Los Angeles County. Hail accumulations in the area were over 5 inches. Numerous intersections were flooded with several feet of water, stranding thousands of motorists during rush hour. Over 130 homes and businesses experienced significant damage due to flooding and hail. Damage was so significant that **South Central Los Angeles County** was declared a state disaster area. Total damage estimates of approximately $3.5 million.
August 15, 2005	A weather spotter in La Crescenta reported ¾-inch hail.
October 17, 2005	A severe thunderstorm produced large hail in the valleys of Los Angeles county. Near Pasadena, 1-1/4-inch diameter hail was reported by a weather spotter, as well as ¾-inch diameter hail in the community of El Monte.
December 27, 2006	California Highway Patrol reported hail between ½- and 1-inch in diameter in the community of Sherman Oaks, near the intersection of Sepulveda and Greenleaf.
May 22, 2008	A cold and unseasonable upper level low pressure system brought strong winds, strong thunderstorms and flash flooding to southern California. Over East-Central Los Angeles County, strong thunderstorms developed, producing damaging winds and heavy rain. In Azusa, severe thunderstorm winds knocked power poles and lines. In Baldwin Park, small hail accumulated to a depth of 1 inch. Significant flooding and lane closures were reported along Interstate 10 and Interstate 605. At the **Santa Fe Recreational Dam**, hail between quarter- and golf ball-size was reported along with wind gusts to 60 mph
March 1, 2014	A powerful winter storm brought significant weather to the southern California area, including rainfall ranging from 1 to 4 inches across the coastal areas, and between 6 and 12 inches in the mountains and foothills. A trained weather spotter reported hail up to 1.5 inches in diameter in the community of Walnut. No property damage was reported.

Sources: NOAA database (http://www.ncdc.noaa.gov/stormevents/) and compilation by the National Weather Service office in San Diego (http://www.wrh.noaa.gov/sgx/document/weatherhistory.pdf).

Snow and Ice

Snow and ice normally do not come to mind at the mention of southern California, although some of the mountain communities do receive substantial precipitation in the form of snow and ice during the winter months. Sudden drops in temperature, combined with reduced visibility due to the snow, have stranded hikers in the mountains of Los Angeles County. Historically, there have been a few instances of snow at lower elevations in or near the Los Angeles Basin area. Those events listed in the NCDC and the National Weather Service databases that are known or inferred to have impacted the Cudahy area and vicinity are listed in Table 8-8.

Table 8-8: Significant Heavy Snow and Ice Events in Southern California That Likely Impacted the Los Angeles County Area Between 1932 and July 2014

Date	Description, Including Location and Damage Reported
January 15, 1932	Extensive snow fall impacted the southern California area. Up to 2 inches of snow all over the Los Angeles Basin, including 1 inch at the Los Angeles Civic Center; beaches were whitened. Elsewhere, 18 inches in Julian, 17 inches at Mt. Laguna, 14 inches at Cuyamaca, and 6 inches at Descanso.
January 9-11, 1949	An extensive snowstorm blanketed the region, with snow 4 to 8 inches deep down to the 1,000-foot elevation. Fourteen inches in Woodland Hills, 8 inches in La Canada and Catalina Island, 4 inches in Pasadena, 1 inch in Laguna Beach and Long Beach. Transportation throughout the area was greatly impacted. Power outages and emergencies throughout. A plane crash near Julian killed five and injured one. Camping group stranded at Cuyamaca.
February 22-25, 1987	Snow reported throughout the southern California area, with 24 inches at Mt. Laguna, 12-17 inches in the San Bernardino Mountains, 4 inches in one hour at Lake Hughes. Snow pellets reported in coastal areas, including 2 to 3 inches in Huntington Beach. Slight snow reported on the 25th in Tarzana, Northridge, Torrance, Fontana and Redlands. Roads and schools closed in the mountain areas. An aircraft accident due to a snow squall near Anza killed four.
December 16-17, 1987	Snow fell throughout southern California, including for two minutes at Malibu Beach. One foot of snow fell in the mountains north and east of Los Angeles, 24 inches in Julian. Disneyland closed due to weather; other theme parks and stretches of the I-5 and I-15 closed through the mountains. Numerous accidents resulted in fatalities. Due to the snow, all schools closed in the mountains of San Diego County and 16,000 students were sent home in the Santa Clarita Valley.
February 7-9, 1989	Snow reported from the beaches in Los Angeles to the desert in Palm Springs; 15 inches in the mountains, 3 inches at Palmdale. Major road closures and numerous traffic accidents reported.
December 21, 1998	An unseasonably cold air mass produced a three-night period of sub-freezing temperatures across central and southern California. Agricultural interests suffered heavy crop losses. The California Department of Food and Agriculture reported over $83 million in crop losses across the four-county area.

Sources: NOAA database (http://www.ncdc.noaa.gov/stormevents/), and compilation by the National Weather Service office in San Diego (http://www.wrh.noaa.gov/sgx/document/weatherhistory.pdf.

Temperature Extremes

Temperature extremes are responsible for more deaths in the United States on a yearly basis than all other extreme weather events combined, including flooding. Based on data collected by the Centers for Disease Control and Prevention (CDC, as reported in Goklany, 2007), between 1979 and 2002, an average of 358 people were killed annually by excessive heat. Extreme cold is even more deadly; an average of 680 people died in the United States each year due to cold weather between 1979 and 2002 (Goklany, 2007). In addition to the significant loss of life and injuries, temperature extremes also cause significant economic losses in agricultural production, and in transportation, energy and infrastructure costs.

Heat waves, which are periods of excessive heat, typically exceeding 95 degrees Fahrenheit, often with high levels of humidity, and lasting more than three days, can be deadly by pushing the human body beyond its limits. The heat itself is not deadly, but dehydration and loss of salts through sweating can lead to blood clots that can result in heart attacks or strokes; people with weak hearts may not be able to deal with the increased blood flow necessary to keep the body cool. Sensitive populations include older adults, children, and those that are sick or overweight. Those at greatest risk of dying during a heat wave are city-dwelling seniors that don't have access to an air-conditioned environment for at least part of the day. [Urban areas, due to the heat-absorbing properties of asphalt and concrete, are generally hotter than rural areas.] Athletes that don't take extra precautions or don't decrease their usual exercise routine in response to the high heat can also be impacted by a life-threatening, heat-induced illness such as heat exhaustion or heat stroke. These heat-induced illnesses can also impact outdoor workers, such as those in the agricultural or construction fields, that are not acclimatized, and do not have access to water and shade, or do not slow down and take cool-down breaks in the shade. Poor air quality often occurs during heat waves if a stagnant atmospheric condition develops, trapping dust and air contaminants near the ground surface. The resulting brown haze can cause serious respiratory problems in the elderly, infants, asthmatics, and others with compromised immune systems.

In addition to the potential injuries and loss of life brought on by heat waves, excessive heat can impact agricultural production, both of livestock and crops. Poultry, in particular, do poorly during heat waves. Millions of birds died during a severe heat wave that impacted the Midwestern states in 1980. Crops can also be adversely impacted by excessive heat and/or drought. Increased irrigation, with concurrent increased production costs, is generally necessary to prevent permanent damage to certain crops, such as vegetables and leafy greens.

High heat and ***excessive heat*** events that have occurred historically in the southern California area and that are known or inferred to have impacted the Los Angeles basin area are listed in Table 8-9. High heat events are periods of high heat that either did not last for at least three days, or where the heat and/or humidity levels were not sufficiently high to be defined as an excessive heat event. The data provided in Table 8-9 is most likely not comprehensive, but it does suggest that periods of temperature extremes have occurred historically in the region, and thus, that periods of excessive heat can be anticipated in the future, especially as a result of climate change.

The definition and effects of ***extreme cold*** vary across different areas of the country. In southern California, where we are not generally accustomed to cold weather, temperatures near freezing are considered "extreme cold." A cold wave, where temperatures drop rapidly within a 24-hour period, can be devastating to susceptible and unprotected populations, crops, livestock and wildlife. Exposure to extreme cold can lead to several life-threatening health conditions, including frostbite and hypothermia. ***Frostbite*** is an injury to the body, typically to the extremities such as fingers, toes, ear lobes or nose, caused by freezing body tissue. The main symptoms include a loss of feeling in the affected area, often combined with a pale, gray, white or yellow, and possibly waxy, appearance. Immediate medical attention is generally required, and the affected area should be slowly re-warmed to avoid further tissue damage. ***Hypothermia*** is an abnormally low body temperature (typically below 95 degrees Fahrenheit). Warning signs include uncontrollable shivering, disorientation, memory loss, slurred speech, drowsiness, and apparent exhaustion. Medical attention should be provided immediately if at all possible, and the body should be slowly warmed.

Populations vulnerable to cold weather include (but are not limited to) the homeless, older adults, persons with medical conditions, including heart disease, diabetes, high blood pressure, mental illness, and cognitive disorders, infants and small children under the age of five, pregnant women, persons of limited economic resources that cannot afford to keep their home warm, people who are socially isolated, and people who are caught outside in the storm, unprepared. The use of space heaters, barbeques, and fireplaces to keep structures warm increase the potential for structural fires and the risk of carbon monoxide poisoning.

Crop damage and livestock kills due to cold weather have historically cost the southern California area billions of dollars. For example, the December 1990 winter storms cost the state of California $3.4 billion in direct and indirect losses, whereas the 2002 winter caused more than $2 million in crop and property damage to the southern California area alone. Extreme cold events that are known or inferred to have impacted the Los Angeles basin area through July 2014 are also listed in Table 8-9.

Table 8-9: Historical High Heat, Excessive Heat and Extreme Cold Events Reported in Southern California that Impacted or Are Inferred to Have Impacted the Los Angeles Basin Area

Date	Description, Including Location and Damage Reported
June 11, 1877	**High heat:** 112° observed in Los Angeles. It could be an all-time record, but official records didn't begin until 20 days later.
March 28-29, 1879	**High heat:** 99° in Los Angeles, high for March.
January 9, 1888	**Extreme cold:** Cold wave with freezing temperatures impacted the citrus-growing areas with substantial loss of the citrus crop.
August 25, 1891	**High heat:** 109° in Los Angeles.
December 23-30, 1891	**Extreme cold:** A cold wave hit the southern California area, with 1-inch thick ice on oranges on trees in Mission Valley.
April 23, 1910	**High heat:** 110° in Los Angeles, a record for April.
January 6-7, 1913	**Extreme cold:** A killing freeze caused extensive damage to the citrus crop all over California. This led to the establishment of the U.S. Weather Bureau's Fruit Frost forecast program.
June 16, 1917	**Excessive heat:** The most destructive heat wave of record in California history climaxes at Mecca with a temperature of 124 degrees.
February 25, 1921	**High heat:** 92° in Los Angeles, the hottest ever in February.
September 18-22, 1939	**Excessive heat:** Heat wave with 106 degrees on the 21st. Los Angeles experienced 100-degree weather for seven consecutive days, with a peak of 107 degrees on the 20th. On the 22nd, the low temperature in Los Angeles was 84°, the highest minimum on record. Eight heat-related deaths in Los Angeles.
August 31 to September 7, 1955	**Excessive heat:** On September 1st, it was 110° in Los Angeles, and all-time record, and 104° in San Diego.

Date	Description, Including Location and Damage Reported
October 14, 1961	**High heat:** Hot Santa Ana winds drove the temperature to 110° in Long Beach (the hottest in the nation), 105° in Los Angeles, and over 100° in many coastal and inland locations.
October 20-29, 1965	**Excessive heat:** Very long heat wave, with a peak of 104° in San Diego on the 22nd. Los Angeles had ten consecutive days with afternoon highs reaching 100°.
November 1, 1966	**High heat:** 101° at Los Angeles airport, 100° in Los Angeles, the all time November high. Santa Ana winds fanned a fire that killed 16 firefighters.
September 25-30, 1970	**Excessive heat:** Drought in southern California came to a climax, with hot Santa Ana winds that sent the temperature soaring to 105° in Los Angeles.
September 12, 1971	**High heat:** 103° in Los Angeles.
January 16-18, 1987	**Extreme cold:** A very cold air mass remained over the region, bringing low temperatures. Extensive damage to the avocado crop, with losses in the millions of dollars; 2 homeless people died of hypothermia on the 17th.
April 21-22, 1987	**High heat:** Rare springtime, weak Santa Ana winds event brought high temperatures to the region. 93° reported in Los Angeles.
October 3-4, 1987	**Excessive heat:** Dry, hot weather, with 108° both days in Los Angeles (a record for October).
December 25-26, 1987	**Extreme cold:** Very cold temperatures in the region caused extensive damage to the avocado and citrus crops.
February 10-11, 1988	**High heat:** Record heat brought on by Santa Ana conditions, with 88° at Los Angeles.
March 25-26, 1988	**High heat:** 95° in Los Angeles and Santa Maria, 90° in San Diego. Several brush fires reported.
December 24-30, 1988	**Extreme cold:** A week of sub-freezing temperatures in southern California; 5 people died directly from the cold weather.
April 6-7, 1989	**Excessive heat:** Daily high temperature records broken at all recording stations in southern California. Many record-highs set for April, including 106° in Los Angeles, 104° in Riverside, 103° in Escondido, 101° in Tustin, 95° in Victorville, and 76° in Big Bear Lake. Part of a major heat wave that lasted from late March into early April.
May 5, 1990	**High heat:** The high of 101° in downtown Los Angeles was 8° higher than their previous record for that date.
December 21-23, 1990	**Extreme cold:** An arctic air mass produced record cold temperatures in the region, such as a low of 29 degrees at Redondo Beach on the 22nd. Throughout the state, December 1990 brought record-low temperatures to many areas, causing $3.4 billion in damages to public buildings, utilities, residential burst pipes, and especially, crop and fruit tree damage. Thirty-three counties were included in a disaster declaration, and as a result, the State established the State Agency Freeze Disaster Task Force, and the development of the State Agency Freeze Disaster Action Plan of 1991.
August 17, 1992	**Excessive heat:** Tropical air brought high temperatures and heat index values to Los Angeles and vicinity the entire week. On the 17th, it was 99°, with a heat index of 110°.
February 20, 1995	**High heat:** 95° in LA, the highest temperature on record for February.
August 29-31, 1998	**Excessive heat:** Record heat in the region, with 112° in Yorba Linda and the Wild Animal Park, 110° at El Cajon, Hemet and Riverside; 108° at Ramona, 106° in Vista and Escondido, over 100° in most of Orange County, 114° in Dulzura on the 29th. Blazes at Camp Pendleton and Lake Jennings.
December 21, 1998	**Extreme cold:** An unseasonably cold air mass produced a three-night period of sub-freezing temperatures across central and southern California. Agricultural interests suffered heavy crop losses. The California Department of Food and Agriculture reported

Date	Description, Including Location and Damage Reported
	over $83 million in crop losses across the four-county area.
June 3, 1999	**Extreme cold:** Unseasonably cold air mass brings record low temperatures this late in the season to the southern California area. The high temperature of 38° at Mt. Wilson became the lowest high temperature on record for June.
January 28-31, 2002 February 1-3, 2002	**Extreme cold**: Very cold weather reported throughout the southern California area caused water pipes to freeze and burst, damaged vegetable and flower crops, and caused homeless shelters to fill to capacity. $230K in property damage and $1.8M in crop damage reported. One death directly attributed to cold spell. Most freezing damage occurred in January, but the hard freezes continued in the valleys and deserts into early February. Overnight lows in the single digits were common at mountain resort locations.
September 1, 2002	**High heat:** Tropical heat wave; 118° in Dulzura, 113° in Temecula, 112° in Riverside and Menifee. Sharp temperature gradients, with areas adjacent to the coastline 10 to 30 degrees cooler than areas slightly farther inland (77° at Newport Beach vs. 107° in Santa Ana, 10 miles away; 72° at Oceanside Harbor vs. 87° at Oceanside Airport, 2 miles away).
April 26-27, 2004	**High heat:** Record highs for April set, with 103° at the Wild Animal Park, 100° at Yorba Linda on the 26^{th}.
December 1-3, 2004	**Extreme cold:** 30s at the coast, 20s in the inland valleys and deserts, in the 10s and single-digits in the mountains. Crop damage reported.
July 22, 2006	**High heat:** A major heat wave with humidity hit southern California with record minimum temperatures recorded in most places. Sixteen killed by the heat, with many more treated for heat-related illnesses. Power outages reported.
August 15-26, 2006	**Excessive heat:** The combination of strong high pressure aloft and high relative humidity produced excessive heat conditions across the mountains and valleys of Los Angeles County and the mountains of Ventura County. Heat index values ranged from 100° to 105° in the mountains to between 105° and 119° across valley areas.
September 1-4, 2007	**Excessive heat**: A strong high pressure and easterly flow brought hot, humid weather to much of southern California. Temperatures exceeded 110° in the Inland Empire and high deserts, and 115° in the lower deserts. Humidity levels were quite high for the region. At least six people died of heat-related causes; the actual number is probably higher.
June 20, 2008	**High heat**: High temperatures were recorded in the Inland Empire area, including 105-111° in the valleys and 115-118° in the lower deserts. The relatively short duration of the heat spell and the lack of humidity kept this episode from meeting the excessive heat criteria. News reports indicated that several people were treated for heat-related illnesses, but no specifics were provided.

Sources: NOAA database (http://www.ncdc.noaa.gov/stormevents/), and compilation by the National Weather Service office in San Diego (http://www.wrh.noaa.gov/sgx/document/weatherhistory.pdf).

Drought

Drought is defined as an extended period of below-average precipitation relative to levels normal for that region. Given this definition, drought can occur almost anywhere in the world, and has impacted human populations throughout history. Extended drought periods, posing a severe impact on ecosystems and agriculture, have been responsible for damaged local economies, political unrest, many mass migrations, and even the collapse of civilizations. Because drought occurs over a lengthy period of time, measured in months to years (and even decades), rather than in seconds to days (such as earthquakes, tornadoes, hurricanes and floods), its impacts are generally difficult to recognize until severe damage has occurred. It is also difficult to predict when a drought will pass. As a result of climate change and global warming, some regions of the world are expected to experience drought more often, or possibly even change permanently to a more arid condition, impacting local populations severely. Wide variations in climate response, such as severe winters with significant, flood-inducing precipitation and strong winds, and very hot summers, are also possible due to climate change. These conditions are already been observed in some areas of the world.

In the southwestern United States, variations in precipitation levels are often tied to oceanic and atmospheric weather cycles such as the El Niño – Southern Oscillation (ENSO) and La Niña events. These are natural climate phenomena related to annual differences in the sea-surface temperature (SST) and air pressure in the equatorial Pacific Ocean that affect climate the world over. The El Niño conditions occur when warming of the Pacific Ocean SST occurs in concert with an oscillation in air pressure, referred to as the Southern Oscillation, between the eastern and western Pacific Ocean. La Niña conditions are associated with a cooling of the Pacific Ocean SST in the same area off the western coast of South America. These warming (El Niño) or cooling (La Niña) episodes affect the climate in North America during the winter and early spring months (typically between December and February, but can last through multiple seasons). These conditions are often modulated by other climate cycles, such as the Pacific Decadal Oscillation, the North Atlantic Oscillation, and the Atlantic Multidecadal Oscillation. The Pacific Decadal Oscillation, in particular, impacts the southwestern United States in a cycle that lasts 20 to 30 years characterized by warming or cooling of the surface water in the Pacific Ocean facing the western coast of North America. The interaction of all of these climate cycles makes it difficult to forecast the strength and length of El Niño and La Niña events.

During El Niño events, a widened Pacific jet stream draws tropical moisture over southern California, causing an increase in precipitation and storms. El Niño episodes thus increase the likelihood of extreme winter storms, storm-related high winds and flash flooding in the Los Angeles region. During La Niña events, the jet stream stays up in the Pacific Northwest, causing increased precipitation in Washington and Oregon, and less precipitation in the southwestern and southeastern states. Thus, La Niña episodes increase the likelihood of drought and Santa Ana wind conditions in southern California. Most severe weather episodes reported historically in southern California, including the high winds, tornadoes, and floods reported in this document, can be associated with El Niño and La Niña events.

In the period between the years 2000 and 2014, the Los Angeles area has been impacted by drought conditions five separate times, in 2002, 2004, 2007-08, 2009, and 2013-14. These drought episodes are described further in the following paragraphs. Often times, the region is reported to be abnormally dry.

Between April and June 2002, the area was described as experiencing moderate drought conditions. By the middle of June 2002, and at least through the middle of November, the situation was upgraded to severe. Rains in November and December improved the situation, first to abnormally dry, and then to normal, a condition that prevailed through most of 2003. Normal to abnormally dry conditions were reported in the first four months of 2004, with moderate drought conditions first reported in the week of May 4, 2004. The moderate drought conditions prevailed through August, when moderate to severe drought conditions were reported. Moderate to severe drought conditions occurred between August and the end of October 2004. Alternating abnormally dry to normal conditions were reported between November 2004 and December 2006. In January 2007, Los Angeles County was reported to be in a moderate drought, with most major reservoirs in southern California reporting water storage at about 80% of their 30-year average. In the middle of February 2007, the situation was upgraded to severe drought, and between March 13, 2007 and January 1, 2008, the area experienced extreme drought conditions. By August and September 2007, local agencies were using radio and television advertisements to encourage water conservation, especially after a court-ordered reduction in water supplies from the Sacramento River Delta raised concerns about a possible water crisis in the region. Rainstorms at the end of 2007, and in January 2008 helped downgrade the situation to abnormally dry levels, at least through the middle of June 2008.

In June 2008 the Governor issued a state-wide drought declaration due in great part because of the dry conditions reported in the northern part of the state. Voluntary water conservation was encouraged through public broadcasts and in printed media. Moderate drought conditions were reported in the Los Angeles County from the middle of June 2008 to the end of May 2009. As a result, the state-wide drought declaration remained in effect. Municipalities and water districts in the region instituted water conservation measures. Although several storms brought rain to the area in February 2009, it was not enough to make a difference, and by the end of the month the Governor had issued a State of Emergency for all of California, calling for all residents to decrease their water use. By the beginning of June, the area was in a severe drought, prompting the State of Emergency for continued drought to remain in effect, with water cuts required for certain agricultural activities. On September 17, 2009, the USDA granted a Secretarial Disaster designation for several parts of California, including Orange, San Bernardino, San Diego and Riverside counties, primarily for agricultural losses due to the drought. Several storms brought rain to the region in October and November, and by December 2009, most of the region had received between 150% and 250% of normal precipitation levels. Abnormally dry to normal conditions were reported for all of 2010 and 2011.

Most of 2012 was reported as abnormally dry, except for the month between March 13 and April 13, when moderate drought conditions prevailed. Similarly, the first half of 2013 was abnormally dry. Beginning in July 2013, the Los Angeles area was upgraded to severe drought conditions. Then in February 2014, the Los Angeles region was classified as in an extreme drought, and on July 1, 2014, in an exceptional drought (http://droughtmonitor.unl.edu). Beginning on August 1, 2014, the State imposed the first-ever statewide restrictions on outdoor water use, banning car washing without a nozzle on a hose, using water to clean driveways or sidewalks, over-landscaping, and using potable water in ornamental fountains. Fines of up to $500 can be assessed to those that do not abide by these new restrictions.

Severe Weather Hazard Assessment

The previous sections describe the various extreme weather conditions that have impacted and are likely to again impact the Los Angeles basin. By reviewing the historical record we can better understand the geographic extent of the hazards, the intensity of the events likely to impact the study area, and their probability of occurrence. Each of the severe weather conditions covered above is discussed further in the paragraphs below, with an emphasis on how they pertain specifically to the Los Angeles basin area, including the city of Cudahy.

High Winds

Windstorms are significant chronic events that cumulatively cause extensive damage, with property losses in the millions of dollars, in addition to potential injuries and loss of life. A high wind event in the region can range from a short-term microburst or tornado lasting only a few seconds to minutes, to either Santa Ana or thunderstorm-related wind conditions that can last for several days.

The data in Table 8-4 show that high winds can occur in the Los Angeles Basin almost any time during the year, but primarily during the months of September through April. More specifically, **Santa Ana wind** conditions occur most often in the fall and winter months, between October and February, with most events occurring in November and December. These winds tend to impact a large geographic area. Similarly, high winds accompanying **winter storms** approaching from the north or northeast also occur most often between November and February, although winter storms can occur as early as August, and as late as May. **Tropical storms** that make landfall in Baja California and move north into Arizona and California generally occur between May and September, but most of these impact the San Diego and desert areas and don't make it as far north as the Los Angeles Basin.

The data presented in Table 8-4 may give the impression that windstorm events have increased in frequency over time. This may be in part the result of an incomplete historical record rather than a change in wind frequency (although storms that are stronger and occur more often are characteristics of climate change). The records are likely missing data because: 1) there were less people in the area that could be impacted by these natural hazards, and 2) only unusually damaging storms would be recorded in newspapers, journals and other sources. Using the record since the year 2000 only, the study area is impacted by windstorms approximately once or twice per year, on average, but there is significant variability from year to year. For example, in the years 2001, 2003 and 2007, the area was impacted by four high wind events each year, but in 2004, 2005, and 2008, no high wind events were reported for the central Los Angeles region.

The records (see Table 8-5) indicate that **tornadoes** can occur in the Los Angeles basin area at any time of the year, but that they do occur more often between November and March, with most events occurring equally in January and March. The tornado numbers also vary significantly from year to year. Using only the records between 1990 and 2013, which are deemed to be more complete than those for previous decades, we find that in some years there is substantial tornado activity, while in others, there is none. For example, six tornadoes were reported in the region in 1998, and three tornadoes were reported in 2000 and 2001, but no tornadoes were reported in 2002, 2003, 2006, 2008, 2010, 2011, 2012 and 2013. Tornadoes and microbursts usually impact a relatively small geographic area. Tornadoes in the southern California area have for the most part been size F0 or F1, but even these tornadoes are capable of causing extensive property damage, injuries and potential loss of life.

Based on the data presented in Table 8-6, winds in the Los Angeles basin generally do not produce **dust storms**, most likely due to the extensive development in the area limiting the availability of dust. For dust storms to occur, there has to be a source of sand, dirt, or ash present, generally the result of vegetation stripping, either as a result of man-made activities (such as farming, grading during construction), an antecedent natural disaster (drought, forest fire, volcanic event, or a flood event depositing loose sand and silt), or a natural condition (desert). Depending on the availability of sand and other debris, and the regional extent of the wind event responsible for picking up and transporting the dust, a dust storm will be either local or regional in extent. Santa Ana wind conditions, given their regional extent and their wind strength, have the capacity to move large amounts of dust great distances if there is a source available (see the Photo on Figure 8-1 showing ash and smoke from wildfires being transported hundreds of miles out to sea).

Unlike flood hazards, which are generally confined to a discrete area that can be mapped, windstorms may travel in any direction, and are only partly affected by topography (with stronger winds usually observed in canyons and passes, where the winds are funneled by the surrounding topographic highs). Given that we cannot predict when or where a windstorm will occur, nor its intensity, the conservative approach is to assume that a high wind event can take place anywhere in the Los Angeles basin area, including Cudahy, anytime during the year, but preferentially between September and April.

Hail

The data presented in Table 8-7 suggest that hail conditions in the Los Angeles area can occur almost year-round, as hail events have occurred historically in all months except March, June and July. October has the largest number of hail-producing thunderstorms in the area. Based on the damage descriptions, these events are typically localized, impacting a relatively small area, and generally lasting 30 minutes or less. The hailstones produced by these storms are typically small to medium in size, ranging between 0.5 and 1.5 inches in diameter. The one exception is a thunderstorm reported in 1960 that impacted a large regional area, with hail reported in San Diego, Riverside, and San Bernardino. The large hailstones produced by this storm (2.75 inches in diameter and over 1 pound in weight) caused significant property damage, although a dollar amount was not assigned. No deaths or injuries as a result of these hail events were reported. This particular event indicates that the southern California area can be affected by severe but very unusual (very low probability) thunderstorms with the right atmospheric conditions to produce large hailstones.

Snow and Ice

Winter storms that bring snow and ice to the Los Angeles basin occur very infrequently, with only six such events reported between 1932 and 2013. The winter storms responsible occurred between December and February, and the amount of snow reported was generally small. Nevertheless, almost all of these events caused significant traffic disruption in the local freeways and roadways, and aviation accidents were reported in two instances. In the mountain areas, heavy snow and ice can accumulate on roof-tops, overhead utility lines, and on tree branches, resulting in significant property damage. Traffic accidents caused by unsafe road conditions and road closures due to slope failures and snowdrifts add to the property loss. If the storm impacts low-lying agricultural areas, the losses to crops and livestock can amount to millions of dollars.

Temperature Extremes

Table 8-9 includes twelve **extreme cold** events that have impacted or are inferred to have impacted the Los Angeles basin between 1888 and 2013. Since 1987, eight deaths in the region have been directly attributed to cold weather. Most of these events, as expected, occurred in December, January and February, during the winter months. One extreme cold event was interestingly reported in early June (1999), when a winter storm brought unseasonably low temperatures to the southern California area, with up to 3 inches of snow reported in the mountains above the 5,500-foot elevation in Los Angeles, San Bernardino, Riverside and San Diego counties. Property and crop damage is not well accounted for, but it can add to millions of dollars (a 2007 freeze caused $600 thousand in property damage and $11.1 million in crop damage in San Bernardino County alone).

Table 8-9 also includes 11 **excessive heat** and 18 **high heat** events between 1877 and 2013. At least 22 people reportedly died from high heat in southern California in 2006 and 2007, although this number may be underestimated. High heat events have been reported historically in all months of the year, except for December and January. Excess heat events have occurred most often in August and September, but isolated excess heat events have also been reported in April, June and October. Property and crop losses associated with these events amount to billions of dollars, especially if the damage as a result of the fires associated with these heat waves is included in the loss count.

Temperature extreme events tend to be regional in scale, although to some extent they are controlled by elevation, with high and excess heat impacting low-lying inland areas preferentially, and extreme cold more likely to impact the higher elevation areas. Given that the city of Cudahy is located at an approximate elevation of 110 to 135 feet above mean sea level and relatively close to the Pacific Ocean, it enjoys cooler summers than the inland communities to the east, and generally milder winters than the mountain communities to the north and northwest. However, the heat-absorbing properties of the asphalt and concrete in the area's urban environment can increase the mean air temperature. This is called the "heat island effect." According to the Environmental Protection Agency (EPA, http://www.epa.gov/hiri/), the annual mean air temperature in a city with more than one million inhabitants (such as the Los Angeles metropolitan area, which includes many cities including Cudahy) can be 1.8 to 5.4 degrees Fahrenheit higher (warmer) than surrounding rural areas. In the evening, the temperature can be as much as 22 degrees Fahrenheit higher. Communities in heat islands can have increased summertime peak energy demands, higher air conditioning costs, higher pollution and higher levels of greenhouse gas emissions, higher heat-related illness and mortality rates, and water quality issues.

Drought

Southern California has a Mediterranean climate, with cool, wet winters and hot, dry summers. Average rainfall in the Cudahy area is less than 15 inches per year, with great variability from year to year. The historical record for the last 14 years (2000-2014) shows that abnormally dry and drought conditions, meaning less precipitation than normal for the region, are relatively common, with five moderate to exceptional drought events reported during that period. It is difficult to predict the effects that climate change may have on the local weather, but it is possible that we will see increasingly larger fluctuations in the weather, with more severe drought periods some years, and more intense rainfall and storm activity in others. Both extremes can tax resources, with substantial impacts to the impacted communities, in the form of increased costs in disaster preparedness, response and recovery from these extreme weather events. These impacts are regional in extent.

Severe Weather Damage Assessment

As past events show, severe weather in the Los Angeles area and elsewhere has the potential to impact life and limb, property (structures), utilities, infrastructure and transportation systems. Damage to each of these elements is described further below, with an emphasis on the potential damage to the Cudahy area.

Structural Damage

Depending on its age, condition, and structural design, any structure may be susceptible to windstorm damage. However, buildings with weak reinforcements are most susceptible. Wind pressure can create a direct and frontal assault on a structure, pushing walls, doors, and windows inward. Conversely, passing currents can create lift suction forces that pull building components and surfaces outward and/or upward. Under extreme wind forces, the roof or entire building can fail or sustain considerable damage. Mobile homes are particularly susceptible to windstorm damage, as past examples of wind damage in this part of the Los Angeles region shows. Debris carried by the wind may also contribute indirectly to the failure of building envelopes, sidings or walls.

Hail can and will cause significant damage to structures. The structural components most often damaged by hail include roofs (including glass roofs and roof-mounted solar panels), skylights, window awnings, and windows. Cold waves can cause poorly insulated water pipes to freeze, which in turn can result in substantial property and structural damage.

Lifelines and Critical Facilities, Infrastructure

Lifelines and critical facilities should remain accessible, if at all possible, during a natural hazard event. The impact of closed transportation arteries may be increased if a blocked road, freeway overpass or bridge is critical to access a hospital or other emergency facilities. Population growth and new infrastructure in the region could result in a higher probability for damage to occur from severe weather as more lives and property are exposed to these hazards.

As mentioned above, windstorms may damage buildings, power lines, and other property and infrastructure due to falling trees and branches. Of the severe weather events discussed in this report, windstorms have historically been one of the principal causes of power outages in the southern California area (wildfires and excessive heat events being the others). For example, in 2007, a severe thunderstorm knocked down seven power poles near Hollywood. Storms can cause the temporary closure of roads to vehicular traffic. Windstorms can disrupt power to critical and essential facilities and disrupt land-based communications as well.

Given that tree limbs can break in winds of about 45 mph, and the broken limbs can be carried by the wind more than 75 feet from their source, overhead power lines can be damaged even in relatively minor windstorm events. Uprooted trees and downed utility poles can fall across the public right-of-way, blocking roads and bridges, damaging traffic signals and streetlights, and thus disrupting transportation. Downed trees can also bring electric power lines down to the pavement or ground, where they become serious, life-threatening, sources of electric shock. Roads blocked by fallen trees during a windstorm may severely impact people attempting to access emergency services. Emergency response operations can be compromised when roads are blocked or when power supplies are interrupted.

During wet winters, saturated soils cause trees to become less stable and more vulnerable to uprooting from high winds. Industry and commerce can suffer losses from interruptions in electric services and from extended road closures, and can also sustain direct losses to buildings, personnel and other vital equipment.

Although extreme cold is not common in the Los Angeles Basin, Cudahy residents visiting the local mountains during the winter should be aware that extreme cold is typically only one of the hazards associated with winter storms. Residents and visitors to an area impacted by a winter storm may have to deal with other potential hazards including icy roadways, strong winds, and power outages. Vehicular accidents and falls on icy sidewalks are two leading causes of injuries during winter storms. Structural fires can also become more hazardous in extreme cold conditions, especially if the water supply has become unreliable due to water main breaks that hinder firefighting efforts. Cold weather can also impact the transportation of goods, especially of produce and livestock, cause significant engine wear and tear, and the freezing and thawing can damage roadways.

The high demand for air-conditioning during a heat wave has a significant impact on the electric transmission system. The heat itself can cause overhead electric lines to sag and short-out. As a result of demand exceeding supply, in addition to the physical damage to the electric transmission lines, it is not uncommon for electric companies to institute or be forced to establish rolling black-outs during periods of excessive heat. Excessive heat can also buckle roads, stress engines, and distort rail lines. All of these conditions add up, increasing the costs of transporting goods. Heat waves also have an impact on the water resources and water infrastructure, with increased demand for water.

Public Services

Severe weather hazards can have a significant impact on the local economy and impose a hardship on the affected communities and their residents. A windstorm has the potential to displace residents, which may require the City to provide short-term and/or long-term shelters to accommodate these individuals, in addition to providing for other emergency response activities such as cleanup and repair. This has the potential to impact the City of Cudahy economically, as City funds would have to be tapped into to respond adequately to the needs of the impacted members of the community.

As mentioned above, severe weather events can be major hindrances to emergency response and disaster recovery. For example, if transportation routes are compromised by fallen debris, and loss of power occurs in the area, emergency response facilities like hospitals, fire stations, and police stations may find it difficult to function effectively. Windstorms, especially Santa Ana winds, are often also associated with wildfires and can fan structural fires, which can make it difficult for the responding fire fighters to control the fire and prevent its spread to adjacent structures. This can result in enormous losses to property, in addition to injuries and loss of life.

Severe windstorms, depending on their regional effect, may require the involvement of City, county and state maintenance personnel responding to cleanup and repairs during and following the events. Similarly, maintenance crews may be required to secure certain facilities ahead of a potential storm, provided sufficient advanced notice is given, and that municipal crews are available to respond on fairly short notice.

Segments of the population that due to economic reasons or other circumstances do not have the resources to cool or heat their living environment during hot summers or cold winters, respectively, may be at risk from temperature-related illnesses or death. City and County agencies may have to respond during extreme temperature events, and transport susceptible individuals to cooling centers or heated shelters, as necessary. If fires occur during a heat wave, there is usually an increased use of water for fire-fighting purposes, which can tax the available resources, reducing water supply and water pressure.

Severe Weather Mitigation Activities

Strong winds, dust storms, temperature extremes and drought can have both short- and long-term impacts on the region's economy, and on the health and wellbeing of residents and visitors. Even more severe weather, with higher temperatures, stronger winds, and more intense flooding, could be the norm as a result of global climate change. Although many of these events are regional in scope, a community can implement measures that can locally help to reduce the effects of severe weather, while allowing the city to respond proactively and effectively when a storm, strong wind, extreme heat or drought episode impacts the region.

Widespread weather observation stations and networks, in addition to great advancements in computer modeling and a better, if not yet comprehensive understanding of atmospheric processes, have greatly facilitated the forecasting of meteorological events such as winter storms, windstorms, and extreme temperature events. Weather forecasts, combined with an increased use of internet and media resources, permit the wide dissemination of weather warnings in real time, with the potential to greatly reduce the effect of extreme weather events on people and property. Utility companies, relief organizations, and government officials can and should use weather warnings to anticipate an increase in demand for electricity, heating oil or gas, shelters for the homeless, and maintenance and emergency response personnel.

Windstorm Mitigation

Windstorm mitigation activities include current mitigation programs and activities that are being implemented by State and City agencies. As discussed extensively in the paragraphs above, one of the most common problems associated with windstorms are power outages resulting from fallen power poles, and downed trees and branches coming in contact with and disrupting nearby distribution power lines. Fallen trees can cause power lines to short-circuit and conductors to overload. Wind-induced damage to the power system can result in power outages that, at best, inconvenience, and at worst, pose a life-threatening situation to customers; incur costs to make repairs; and in some situations, can cold-start a fire. As a result, and in an effort to reduce damage to the power supply, one of the strongest and most widespread existing mitigation strategies pertain to tree clearance. Specifically, California law requires utility companies to maintain clearances (specified distances based on the type of voltage running through the line) between electric lines and all vegetation. Enforcement of the following California Public Resources Code Sections provides guidance on tree regulations: 4293 – Power Line Clearance Required; 4292 –

Power Line Hazard Reduction; 4291 – Reduction of Fire Hazards Around Buildings; and 4171 – Public Nuisances (www.cpuc.ca.gov/js.asp).

Failure to allow a utility company to comply with the law can result in liability to the homeowner for damages or injuries resulting from a vegetation hazard. Many insurance companies do not cover these types of damages if the policyholder has refused to allow the hazard to be eliminated. Undergrounding of overhead utility lines can help reduce the impact of windstorms on the power system, while improving the aesthetics of the community.

Temperature Extreme Mitigation Opportunities

There are four main mitigation strategies being used by communities impacted by the heat island effect. These include increased use of trees and vegetation, green roofs, cool roofs, and cool pavements (http://www.epa.gov/hiri/mitigation/index.htm). Each one of these mitigation strategies is described further below.

Trees and vegetation lower surface and air temperatures by providing shade and through evapotranspiration, whereby they release moisture to the immediate surrounding area. Shaded areas can be as much as 20 to 45 degrees Fahrenheit cooler than nearby unshaded areas, while evapotranspiration can help reduce peak summer temperatures by 2 to 9 degrees Fahrenheit (Akbari and others, 1997; Huang and others, 1990, Kurn and others, 1994). Trees and vegetation planted around buildings, and shading pavement in parking lots and on streets are very effective. Deciduous trees and vines planted on the west side of buildings so that they shade the windows and roofs are especially useful in cooling the adjacent structure during the summer. These effects can result in decreased demand for air conditioning, improved air quality, and lower greenhouse gas emissions (as a result of a decrease in energy demands). As an added bonus, trees also remove air pollutants, sequester and store carbon, improve stormwater control and water quality (by reducing runoff, and by absorbing and filtering rainwater), reduce noise levels, help reduce the risk of heat-related illnesses and death, create wildlife habitats, improve aesthetics, and increase property values (http://www.epa.gov/hiri/mitigation/index.htm).

The primary costs associated with planting and maintaining trees or other vegetation include purchasing materials, initial planting, and ongoing maintenance activities such as pruning, pest and disease control, and irrigation. A study of urban forestry programs in five U.S. cities showed a range of expenditures, with annual costs ranging from almost $15 per tree in the Desert Southwest region, to $65 per tree in Berkeley, California. Pruning is often the greatest expenditure, accounting for roughly 25–40% of total annual costs (approximately $4–$20/tree). Administration and inspection costs can be the next largest expenditure, ranging from approximately 8–35% of annual expenses (about $4–$6/tree). Tree planting accounted for just 2–15% of total annual urban forestry expenditures (roughly $0.50–$4/tree) in the cities studied. Although the benefits of urban forestry can vary considerably by community and tree species, the benefits are almost always higher than the costs. The five-city study discussed above found that, on a per-tree basis, the cities accrued benefits ranging from about $1.50–$3.00 for every one dollar invested. These cities spent roughly $15–$65 annually per tree, with net annual benefits ranging from approximately $30–$90 per tree (McPherson and others, 2005; http://www.epa.gov/hiri/mitigation/index.htm).

A ***green roof***, or rooftop garden, is a vegetative layer grown on a rooftop. Green roofs provide shade and remove heat from the air through evapotranspiration, reducing temperatures of the roof surface and the surrounding air. On hot summer days, the surface temperature of a green roof can be cooler than the air temperature, whereas the surface of a conventional rooftop can be up to 90 degrees Fahrenheit (50°C) warmer. Green roofs can be installed on a wide range of buildings, from industrial facilities to private residences. They can be as simple as a 2-inch covering of hardy groundcover or as complex as a fully accessible park complete with trees.

In addition to mitigating urban heat islands, green roofs absorb heat and act as insulators to the buildings, reducing the need for cooling in the summer, and heating in the winter, which computes to lower energy costs and improves human health and comfort. As with trees and vegetation, green roofs can decrease the impact of air pollution and greenhouse gas emissions, provide habitat for many species, and increase the aesthetic value of the structure and neighborhood. Green roofs can also reduce and slow stormwater runoff, and reduce pollutants from rainfall (Liu and Baskaran, 2003; http://www.greenroofs.com).

While the initial costs of green roofs are higher than those of conventional materials, building owners can help offset the difference through reduced energy and stormwater management costs, and potentially by the longer lifespan of green roofs compared with conventional roofing materials. The estimated costs of installing a green roof start at about $10 per square for a simple roof, to $25 per square foot for intensive roofs. Annual maintenance costs have been calculated at between $0.75 to $1.50 per square foot (Clark et al., 2008; Gartland, 1990).

Cool roofs have a high solar reflectance, or albedo, which helps to reflect sunlight and heat away from a building, reducing roof temperatures. A high thermal emittance is also important, particularly in climates that are warm and sunny like southern California. Together, these properties help roofs absorb less heat and stay up to 50–60 degrees Fahrenheit (28–33°C) cooler than conventional materials during peak summer weather. Cool roofs have wide applications, and have been used for commercial, industrial and residential purposes for more than 20 years. Energy-efficient roofing products are ranked using the ENERGY STAR program, which provides consumers with information on these products.

Cool roofs transfer less heat to the building underneath, keeping the building cooler and thus reducing the need for air conditioning. This in turn reduces air pollution and greenhouse gas emissions the lowering the need for energy use. As with green roofs, the lower summer temperatures inside the building improve human health and comfort, helping to prevent heat-related illnesses and deaths.

Cool roofs do deflect some of the desired heat gain during the winter, although this may not be critical in the southern California region. A California study found that cool roofs provide an average yearly net savings of almost $0.50 per square foot. This number includes the price premium for cool roofing products, increased heating costs in the winter as well as summertime energy savings, savings from downsizing cooling equipment, and reduced labor and material costs over time due to the longer life of cool roofs compared with conventional roofs (http://www.epa.gov/heatisland/mitigation/coolroofs.htm).

Cool pavements use paving materials that reflect more solar energy, enhance water evaporation, or have otherwise been modified to remain cooler than conventional pavements. Cool pavements can be created with existing paving technologies (such as asphalt and concrete), as well as newer approaches such as the use of coatings or grass paving. Given that conventional paving materials can reach peak summertime temperatures of 120–150 degrees Fahrenheit (48–67°C), and given that large area are covered by pavements in urban areas, cool pavements are an important element to consider in heat island mitigation.

These pavements can indirectly help reduce energy consumption, air pollution, and greenhouse gas emissions. Depending on the technology used, cool pavements can improve stormwater management and water quality, increase surface durability, enhance nighttime illumination, and reduce noise. Permeable pavements, in particular, can allow stormwater to soak into the underlying soil, reducing runoff and, in the process, filtering pollutants. The open pores in permeable pavements can also reduce tire noise, and can improve safety by reducing water spray from moving vehicles and increasing traction through better water drainage. Cool pavements used in parking lots and other areas where people congregate (such as school parking lots and playgrounds) can provide a more comfortable environment.

Severe Weather Resource Directory

Federal Resources and Programs:

Environmental Protection Agency, Reducing Urban Heat Islands: Compendium of Strategies, 32p. Available at http://www.epa.gov/heatisland/mitigation/index.htm

State Resources:

California Division of Forestry and Fire Protection
1416 9th Street
P.O. Box 944246
Sacramento, California 94244-2460
Ph: 916-653-5123

Governor's Office of Emergency Services (Cal-OES)
P.O. Box 419047
Rancho Cordova, CA 95741-9047
Ph: 916-845-8911
Fax: 916-845-8910

California Department of Transportation (Cal Trans)
120 S. Spring Street
Los Angeles, CA 90012
Ph: 213-897-3656

References and Relevant Publications:

Akbari, H., Kurn, D., and others, 1997, Peak power and cooling energy savings of shade trees: Energy and Buildings, Vol. 25, pp. 139–148.

Akbari, H., Rose, L., and Taha, H., 1999, Characterizing the Fabric of the Urban Environment: A Case Study of Sacramento, California, Lawrence Berkeley National Laboratory, Paper LBNL-44688, 65p.

Clark, C., Adriaens, P., and Talbot, F.B., 2008, Green roof valuation: a probabilistic economic analysis of environmental benefits: Environmental Science and Technology, Vol. 42, No. 6, pp. 2155–2161.

Gartland, L., 1990, Cool Roof Energy Savings Evaluation for City of Tucson.

Glazier, G. and Samuels, S., 1991, Effects of Road Surface Texture on Traffic and Vehicle Noise: Transportation Research Record, Vol. 1312, pp. 141-144.

Huang, J., Akbari, H., and Taha, H., 1990, The Wind-Shielding and Shading Effects of Trees on Residential Heating and Cooling Requirements: American Society of Heating, Refrigerating and Air-Conditioning Engineers, ASHRAE Winter Meeting in Atlanta, Georgia.

Konopacki, S., Gartland, L., Akbari, H., and I. Rainer, I., 1998, Demonstration of Energy Savings of Cool Roofs: Lawrence Berkeley National Laboratory, Paper LBNL-40673, 120p.

Konopacki, S. and Akbari, H., 2001, Measured Energy Savings and Demand Reduction from a Reflective Roof Membrane on a Large Retail Store in Austin: Lawrence Berkeley National Laboratory, Paper LBNL-47149, 33p.

Kurn, D., Bretz, S., Huang, B., and Akbari, H., 1994, The Potential for Reducing Urban Air Temperatures and Energy Consumption through Vegetative Cooling: American Council for an Energy Efficient Economy ACEEE Summer Study on Energy Efficiency in Buildings, Pacific Grove, California, 31p.

Levinson, R., Akbari, H., Konopacki, S., and Bretz, S., 2002, Inclusion of Cool Roofs in Nonresidential Title 24 Prescriptive Requirements: Lawrence Berkeley National Laboratory, Paper LBNL-50451, 64p.

Liu, K. and Baskaran, B., 2003, Thermal Performance of Green Roofs Through Field Evaluation: National Research Council of Canada, Report No. NRCC-46412, 11p.

McPherson, E.G., Simpson, J.R., Peper, P.J., Maco, E., and Q. Xiao, Q., 2005, Municipal forest benefits and costs in five US cities: Journal of Forestry, Vol. 103, No. 8, pp. 411–416.

Miller, W.A., Desjarlais, A., Parker, D.S., and Kriner, S., 2004, Cool Metal Roofing Tested for Energy Efficiency and Sustainability: CIB World Building Congress, Toronto, Ontario, Canada, May 1-7, 2004.

Peck, S. and Kuhn, M., 2003, Design Guidelines for Green Roofs: Canada Mortgage and Housing Corporation and the Ontario Association of Architects, 22p.

Rose, L., Akbari, H., and Taha, H., 2003, Characterizing the Fabric of the Urban Environment: A Case Study of Greater Houston, Texas: Lawrence Berkeley National Laboratory, Paper LBNL-51448, 65p.

Local Natural Hazards Mitigation Plan

Volume III: Appendices

APPENDIX A: MASTER RESOURCE DIRECTORY

The Resource Directory provides contact information for local, regional, State, and Federal agencies and organizations that are currently involved in hazard mitigation activities. The Hazard Mitigation Advisory Committee may refer 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 maintain and update this master resource directory. This directory may be used by various community members interested in hazard mitigation information and projects.

American Public Works Association			
Level: National	Hazard: Multi	http://www.apwa.net	
2345 Grand Boulevard		Suite 700	
Kansas City, MO 64108-2625		Ph: 800-848-APWA	Fax: 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.			

Association of State Floodplain Managers			
Level: Federal	Hazard: Flood	www.floods.org	
575 D'Onofrio Drive		Suite 200	
Madison, WI 53719		Ph: 608-828-3000	Fax: 608-828-6319
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.			

Building Seismic Safety Council (BSSC)			
Level: National	Hazard: Earthquake	www.bssconline.org	
1090 Vermont Avenue, NW		Suite 700	
Washington, DC 20005		Ph: 202-289-7800	Fax: 202-289-1092
Notes: The Building Seismic Safety Council (BSSC) develops and promotes building earthquake risk mitigation regulatory provisions for the nation. The BSSC supports advances in building science and technology to improve the built environment.			

California Department of Transportation (CalTrans) (District 7)			
Level: State and Local	Hazard: Multi	www.dot.ca.gov/; www.dot.ca.gov/dist12/	
100 S. Main Street			
Los Angeles, CA 90012		Ph: 213-897-3656	Fax:
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. Caltrans – District 17 office serves Los Angeles and Ventura Counties.			

California Natural Resources Agency			
Level: State	Hazard: Multi	http://resources.ca.gov/	
1416 Ninth Street		Suite 1311	
Sacramento, CA 95814		Ph: 916-653-5656	Fax: 916-653-8102
Notes: The California Natural 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.			

California Geological Survey (CGS)			
Level: State	Hazard: Multi	http://www.consrv.ca.gov/CGS/	
801 K Street		MS 12-30	
Sacramento, CA 95814		Ph: 916-445-1923	Fax: 916-445-5718
Notes: The California Geological Survey develops and disseminates technical information and advice on California's geology, geologic hazards, and mineral resources. The Southern California Regional Office is located in the Junipero Serra Building, 320 W. 4th Street, Suite 850, Los Angeles, CA 90013, Ph: 213-239-0877; Fax: 213-239-0894.			

California Environmental Resources Evaluation System (CERES)			
Level: State	Hazard: Multi	http://ceres.ca.gov/	
901 P Street		Suite 350	
Sacramento, CA 95814		Ph: 916-651-0770	Fax:
Notes: CERES is an information system developed by the California Natural Resources Agency to facilitate access to a variety of electronic data describing California's environments. The aim of the program is to facilitate environmental analysis and planning by integrating natural and cultural resource information from multiple contributors and making it available and useful to a wide range of users. It is an excellent website for access to environmental information and links to other websites.			

California Department of Water Resources (DWR)			
Level: State	Hazard: Flood	http://wwwdwr.water.ca.gov	
1416 9th Street			
Sacramento, CA 95814		Ph: 916-653-5791	Fax: 916-653-4684
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. The agency was created by the State Legislator to plan, design, construct, and oversee the building of the nation's largest state-built water development and conveyance system. The DWR protects, conserves, develops, and manages much of California's water supply, including the State Water Project.			

California Department of Conservation			
Level: State	Hazard: Multi	www.consrv.ca.gov	
801 K Street		MS-24-01	
Sacramento, CA 95814		Ph: 916-322-1080	Fax: 916-445-0732
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. The Department oversees the California Geological Survey, The California Division of Oil, Gas and Geothermal Resources, the Office of Mine Reclamation, the State Mining and Geology Board, the California Farmland Conservancy Program, and the State Watershed Program, among others.			

California Planner's Information Network (CALPIN)		
Level: State	Hazard: Multi	www.calpin.ca.gov
Notes: The Governor's Office of Planning and Research (OPR) State Clearinghouse and Planning Unit 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.		

Community Rating System (CRS) (of the National Flood Insurance Program)			
Level: Federal	Hazard: Flood	http://www.fema.gov/national-flood-insurance-program-community-rating-system	
500 C Street, S.W.			
Washington, D.C. 20472		Ph: 202-566-1600	Fax:

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.

Environmental Protection Agency (EPA), Region 9 (Pacific Southwest)

Level: Regional	Hazard: Multi	http://www2.epa.gov/aboutepa/epa-region-9-pacific-southwest	
75 Hawthorne Street			
San Francisco, CA 94105		Ph: 415-947-8000	Fax: 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. The EPA Southern California Field Office is located at 600 Wilshire Boulevard, Suite 1460, Los Angeles, CA 90017.

Federal Emergency Management Agency (FEMA), Region IX

Level: Federal	Hazard: Multi	www.fema.gov	
1111 Broadway		Suite 1200	
Oakland, CA 94607		Ph: 510-627-7100	Fax: 510-627-7112

Notes: The Federal Emergency Management Agency is tasked with responding to, planning for, recovering from and mitigating against disasters. FEMA provides extensive resources to help communities, businesses, and residents prepare for disasters. FEMA is also a major source of funding through grants for hazard mitigation and hazard preparedness.

Federal Emergency Management Agency (FEMA), Region 9 Mitigation Division

Level: Federal and State	Hazard: Multi	http://www.fema.gov/fema-region-ix-mitigation-division	
1111 Broadway		Suite 1200	
Oakland, CA 94607-4052		Ph: 510-627-7162	Fax:

Notes: The Mitigation Division manages the National Flood Insurance Program and oversees FEMA's mitigation programs. It has a number of programs and activities that provide for citizens' Protection, with flood insurance; Prevention, with mitigation measures, and Partnerships, with communities throughout the country. The Region 9 Mitigation Division oversees the Risk Analysis Branch, Hazard Mitigation Assistance Branch, and Floodplain Management and Insurance Branch.

Floodplain Management Association

Level: Federal	Hazard: Flood	www.floodplain.org	
P.O. Box 712080			
Santee, CA 92072		Ph: 916-231-2134	Fax:

Notes: The Floodplain Management Association is a non-profit educational association established in 1990 to promote the reduction of flood losses and to encourage the protection and enhancement of natural floodplain values. Members include representatives from Federal, State and local government agencies, as well as private firms. The association serves as an unbiased forum for legislature, government, industry and science to advance best practices, technologies, policies, regulations, and legal strategies, with a focus on California, Nevada and Hawaii.

Governor's Office of Emergency Services (Cal OES)

Level: State	Hazard: Multi	www.oes.ca.gov; www.calema.ca.gov/	
3650 Schriever Avenue			
Mather, CA 95655		Ph: 916 845- 8510	Fax: 916 845- 8511

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, man-made, and war-caused emergencies, and for assisting local governments in their emergency preparedness, response and recovery efforts.

National Resources Conservation Service

Level: Federal	Hazard: Multi	http://www.nrcs.usda.gov/	
1400 Independence Avenue, SW		Room 5105-A	
Washington, DC 20250		Ph: 202-720-7246	Fax: 202-720-7690

Notes: NRCS assists private property owners to conserve 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.

National Fire Protection Association (NFPA)

Level: National	Hazard: Wildfire	http://www.nfpa.org/	
1 Batterymarch Park			
Quincy, MA 02169-7471		Ph: 617-770-3000	Fax: 617-770-0700

Notes: The mission of the international, non-profit 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.

National Floodplain Insurance Program (NFIP)			
Level: Federal	Hazard: Flood	http://www.fema.gov/national-flood-insurance-program	
500 C Street, S.W.			
Washington, D.C. 20472		Ph: 202-646-2500	Fax:
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, including flood insurance for private property owners, mitigation measures to encourage prevention of flood disasters, and partnerships with communities throughout the country.			

National Oceanic and Atmospheric Administration (NOAA)			
Level: Federal	Hazard: Multi	www.noaa.gov	
1401 Constitution Avenue, NW		Room 5128	
Washington, DC 20230		Ph: 202-482-6090	Fax: 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. Some services provided by NOAA include daily weather forecasts, severe storm warnings and climate monitoring, fisheries management, coastal restoration, and marine commerce support.			

National Weather Service, Office of Hydrologic Development			
Level: Federal	Hazard: Flood	http://www.nws.noaa.gov/oh/	
1325 East West Highway			
Silver Spring, MD 20910		Ph: 301-713-1658	Fax: 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 offices, and providing advanced hydrologic products to meet needs identified by NWS customers. Their products and services improve flood warnings and water resource forecasts.			

National Weather Service (NWS)			
Level: Federal	Hazard: Multi	http://www.wrh.noaa.gov/lox/	
1325 East West Highway			
Silver Spring, MD 20910		Ph:	Fax:

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. The Western Region Headquarters office is located at 125 South State Street, Salt Lake City, UT 84138-1102.

Sanitation Districts of Los Angeles County			
Level: County	Hazard: Multi	http://www.lacsd.com	
1955 Workman Mills Road, P.O. Box 4998			
Whittier, CA 90607-4998		Ph: 562-908-4288	Fax:
Notes: The Districts protect public health and the environment through innovative and cost-effective wastewater and solid waste management. They do this in part by converting waste into resources such as recycled water, energy and recycled materials.			

Los Angeles County Certified Unified Program Agency (CUPA)			
Level: County	Hazard: Multi	http://dpw.lacounty.gov/epd/ust/cupa.cfm	
County of Los Angeles Department of Public Works, Environmental Programs Division		900 S. Fremont Avenue, Annex Building, 3rd Floor	
Alhambra, CA 91803-1331		Ph: 1-888-CLEAN-LA	Fax:
Notes: The CUPA is the local administrative agency that coordinates programs regulating hazardous materials and hazardous wastes in all unincorporated and most incorporated areas in Los Angeles County. Programs that they administer include: 1) hazardous materials disclosure, 2) business emergency plans, 3) hazardous waste, 4) underground storage tanks, 5) aboveground petroleum storage tanks, and 6) California accidental release prevention.			

American Red Cross Los Angeles Region			
Level: County	Hazard: Multi	http://www.redcross.org/ca/los-angeles	
11355 Ohio Avenue			
Los Angeles, CA 90025		Ph: 310-445-9900	Fax:
Notes: The American Red Cross Los Angeles Region serves nearly 10 million people in 88 cities within Los Angeles County. They also serve Inyo and Mono Counties and the eastern third of Kern County. They are dedicated to helping victims of disaster and providing programs and services that help the community prevent, prepare for, and respond to emergencies. The Los Angeles Region chapter is comprised of the following six Red Cross chapters: Antelope Valley, Glendale-Crescenta Valley, Greater Long Beach, Los Angeles, San Gabriel Pomona Valley and Santa Monica. Programs and services that they provide include: response with relief when disaster strikes, help keep the community safe and healthy through CPT, First Aid and other courses; serve military members and their families, teach people how to prepare for and respond to a disaster, and connect families around the world. They also work to ensure that there is a safe and adequate blood supply in the area.			

Los Angeles County Sheriff's Department			
Level: County	Hazard: Multi	http://sheriff.lacounty.gov/wps/portal/lasd	
4700 Ramona Boulevard			
Monterey Park, CA 91754		Ph: 323-267-4800	Fax:
Notes: In communities in Los Angeles County that have not incorporated into cities, the Los Angeles County Sheriff's Department provides law enforcement and operates the county jails and courts. In addition, dozens of cities in the Los Angeles County, including Cudahy, contract with the Los Angeles County Sheriff's Department to provide law enforcement services in their City. This contract provides all services of a normal police department (including extra services such as SWAT teams, specialized detective units, air support and emergency services) at a substantial savings to the City.			

South Coast Air Quality Management District (AQMD)			
Level: Regional	Hazard: Multi	http://www.aqmd.gov/	
21865 Copley Drive			
Diamond Bar, CA 91765 Branch Office: 1500 W. Carson, Suite, 115 Long Beach, CA 90810		Ph: 800-CUT-SMOG (for air quality complaints) 909-396-2000 310-233-7000	Fax: 909-326-2000
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.			

Southern California Earthquake Center (SCEC)			
Level: Regional	Hazard: Earthquake	http://www.scec.org/	
3651 Trousdale Parkway		Suite 169	
Los Angeles, CA 90089-0742		Ph: 213-740-5843	Fax: 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.			

Southern California Association of Governments (SCAG)			
Level: Regional	Hazard: Multi	http://www.scag.ca.gov/	
818 W. 7th Street		12th Floor	
Los Angeles, CA 90017		Ph: 213-236-1800	Fax: 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.			

State Fire Marshal (SFM)			
Level: State	Hazard: Wildfire	http://osfm.fire.ca.gov	
1131 "S" Street			
Sacramento, CA 95811		Ph: 916-445-8200	Fax: 916-445-8509
Notes: The Office of the State Fire Marshal (SFM) supports the mission of the California Department of Forestry and Fire Protection (CalFire) 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.			

United States Geological Survey (USGS)			
Level: Federal	Hazard: Multi	http://www.usgs.gov/	
345 Middlefield Road			
Menlo Park, CA 94025		Ph: 650-853-8300 1-800-ASK-USGS	Fax:
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. The Pasadena Field Office is located at 525 South Wilson Avenue, Pasadena, CA 91106-3212, Ph: 626-583-7811.			

US Army Corps of Engineers (USACE), Los Angeles District			
Level: Federal	Hazard: Multi	http://www.spl.usace.army.mil/	
915 Wilshire Boulevard		Suite 1101	
Los Angeles, CA 90017		Ph: 213-452- 3333	Fax: 213-452-4209
Notes: The United States Army Corps of Engineers works in engineering and environmental matters. A workforce of biologists, engineers, geologists, hydrologists, natural resource managers and other professionals provides engineering services to the nation including planning, designing, building and operating water resources and other civil works projects.			

US Department of Agriculture (USDA) Forest Service			
Level: Federal	Hazard: Wildfire	http://www.fs.fed.us	
1400 Independence Ave. SW			
Washington, D.C. 20250-1111		Ph: 202-205-8333 1-800-832-1355	Fax:
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.			

US Geological Survey (USGS) Water Resources			
Level: Federal	Hazard: Multi	http://ca.water.usgs.gov/	
6000 J Street		Placer Hall	
Sacramento, CA 95819-6129		Ph: 916-278-3000	Fax: 916-278-3070
Notes: The USGS Water Resources' mission is to provide water information that benefits the Nation's citizens; this information is presented in the form of publications, data, maps, and applications software. The USGS Water aims to minimize loss of life and property as a result of water-related natural hazards such as floods, drought, and landslides; effectively manage groundwater and surface-water resources for domestic, agricultural, recreational, and ecological uses; protect and enhance water resources for human health, aquatic health, and environmental quality; and contribute to the wise physical and economic development of our resources for the benefit of present and future generations.			

Western States Seismic Policy Council (WSSPC)			
Level: Regional	Hazard: Earthquake	www.wsspc.org/	
801 K Street		Suite 1236	
Sacramento, CA 95814		Ph: 916-444-6816	Fax: 916-444-8077
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. The WSSPC develops seismic policies and shares information to promote programs aimed at reducing earthquake-related losses.			

U.S. Department of Homeland Security (DHS)			
Level: Federal	Hazard: Multi	http://www.dhs.gov/dhspublic/index.jsp	
Department of Homeland Security			
Washington, D.C. 20528		Ph: 202-282-8000	Fax:

Notes: In the event of a terrorist attack, natural disaster or other large-scale emergency, the DHS assumes primary responsibility for ensuring that emergency response professionals are prepared for any situation. This entails providing a coordinated, comprehensive federal response to any large-scale crisis and mounting a swift and effective recovery effort. DHS also prioritizes the important issue of citizen preparedness. Educating America's families on how best to prepare their homes for a disaster and tips for citizens on how to respond in a crisis will be given special attention at DHS.			

U.S. Census Bureau			
Level: Federal	Hazard: Multi	http://www.census.gov/	
4600 Silver Hill Road			
Washington, DC 20233		Ph: 800-992-3530 818-267-1700	Fax: 818-267-1711
Notes: Offers many statistics, some of which are available by metropolitan statistical area or by county. The Census Bureau publications collection also includes many current and historical censuses on population and housing. Older census data, which present data describing the people and the economy of each state and county from 1790 to 1960, are also available. The Los Angeles Regional Office is located at 15350 Sherman Way, Suite 400, Van Nuys, CA 91406-4224.			

APPENDIX B: PUBLIC PARTICIPATION PROCESS and MEETING MATERIALS

The Federal Emergency Management Agency (FEMA) requires that public input be considered during the development of mitigation plans. Essentially, public participation is a key component to any strategic planning process; broad-reaching plans such as this one should not be written in isolation. Agency participation offers an opportunity for impacted departments and organizations to provide expertise and insight into the planning process, whereas public participation offers residents the chance to voice their ideas, interests, and opinions. To that end, Cudahy's Local Natural Hazards Mitigation Plan (the Plan) is the result of a collaborative effort between various City departments and their consultant, local citizens, and regional and state organizations.

To obtain input from a broad cross-section of the community, the Cudahy Hazard Mitigation Advisory Committee engaged in a wide-reaching public participation process. This process included several components, as follows: 1) assembling and involving a Steering Committee comprised of knowledgeable individuals from various City departments that are already tasked with natural hazard reduction programs and are knowledgeable of the community; 2) hosting public workshops and manning a booth at the community's Night-Out where the draft of the Plan was presented, and where feedback on the Plan and the process were received; and 3) providing opportunities for the public and regional agencies to review the Draft Natural Hazards Mitigation Plan. This last component included publishing the Draft Plan on the City's website with a link that allowed for public comment and input regarding the document. Additional details of these activities are described in the sections below.

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 that were incorporated in the Plan's action items.

Steering and Advisory Committees

Hazard mitigation in the City of Cudahy is overseen by the Hazard Mitigation Advisory Committee, which consists of representatives from various city departments. A smaller group of members from the Advisory Committee form the Steering Committee. These committee 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 Advisory Committee 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 Steering Committee provided the resources necessary to prepare the Plan. Many of these same individuals will be part of the City's Hazard Mitigation Working Group, who will be responsible for implementation of the Plan and review of its effectiveness.

The Steering Committee was comprised of representatives from:

- ✓ City of Cudahy Community Development Department, Planning Division
- ✓ City of Cudahy Community Development Department, Building and Safety Division, and
- ✓ City of Cudahy Community Development Department, Engineering Division.

The Advisory Committee included members from the departments listed above, plus representatives from these other City departments and regional organizations:

- ✓ City of Cudahy Community Development Department, Code Enforcement Division
- ✓ City of Cudahy Community Services Department, Maintenance Division
- ✓ Los Angeles County Sheriff Department, and
- ✓ City of Cudahy Finance Department, Grants Coordinator.

The Final Document was presented to the Mayor and City Council Members for review prior to adoption of the document.

Process Followed

The City of Cudahy's efforts to complete and submit a Natural Hazards Mitigation Plan for approval to FEMA and Cal-OES began in 2005, when Cudahy participated in a multijurisdictional effort to prepare such a document together with the City of Maywood. The consultant for the 2005 project was Emergency Planning Consultants (EPC), under the direction of Carolyn J. Harshman. The 2005 document was never completed, but the meetings and workshops held at that time are summarized below to demonstrate that Cudahy has been working towards the goal of having an approved Natural Hazards Mitigation Plan for over a decade.

In 2012, the City of Cudahy applied for and received funding from the Governor's Office of Emergency Services to complete the Plan they had started in 2005. This document is the product of that effort, with substantial modifications and additions to the original, basic report. The additions made reflect City's staff increased understanding of the hazards that the City is susceptible to, increased scientific knowledge of several of these hazards, such as the buried thrust faults underlying the metropolitan Los Angeles area, and a desire to be as comprehensive as possible within the limitations of the budget and timing set aside for this project.

The meetings in 2005 were facilitated by the City's consultant at that time, Carolyn J. Harshman of Emergency Planning Consultants. Meetings starting in 2013 were facilitated by the City's new consultant, Tania Gonzalez of Earth Consultants International.

Meeting #1: Pre-Training March 9, 2005

The meeting was hosted by the City of Maywood. EPC delivered pre-training to the Planning Team. 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 March 9, 2005

EPC facilitated the 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 3 hours.

Meeting #3: Pre-Training Mitigation Workshop August 11, 2005

The meeting was hosted by the City of Cudahy. 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 Workshop August 11, 2005

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 Cudahy, as well as identifying future mitigation actions.

A brainstorming process was then conducted to develop draft goals for the Plan, with sample goal language provided for the committee's consideration. The Team agreed to cluster the categories of the Mitigation Actions by type of actions as follows: #1 Multi-Hazard and #2 Earthquakes. The Team was unanimous in its belief that the "Multi-Hazard" actions would yield the greatest benefit to the jurisdiction. The next task was to examine a FEMA-approved Mitigation Plan to get an idea of how mitigation actions are written. The Planning Tools, developed by EPC, consisted of nearly 300 mitigation actions gathered from dozens of Mitigation Plans across the country.

2015 Plan, Meeting #1: Kickoff Meeting August 23, 2012

The consultant assumed that the committee members were new to the process of preparing a Local Hazards Mitigation Plan and discussed the intent and requirements of the 2000 Disaster Mitigation Act. The attendants were given a spreadsheet identifying several natural hazards, and asked to provide input on which of those hazards are more likely to impact the city of Cudahy. They were asked to consider the probability of occurrence, the potential impact to the city, and whether or not these hazards have historically impacted the city. A copy of the spreadsheet is provided in the following page. For a list of participants, refer to the attendance roster below. The PowerPoint presentation is provided at the end of this document.

Attendance Roster – August 23, 2012 Kick-off Meeting, 11:30 AM – 12:30 PM

Name – Organization or Position	Contact Information
Greg Castanon – Maintenance Supervisor	323-773-5143 x 237
Aaron Hernandez-Torres – Assistant City Engineer	323-773-5143 ahernandez@cityofcudahyca.gov
Michael Allen, Associate Planner	323-773-5143 mallen@cityofcudahyca.gov
Jennifer Hernandez – Assistant Grants Coordinator	323-773-5143 jhernandez@cityofcudahyca.gov
Javier Valencia – LA County Sheriff	323-816-7251 jvalenc@lasd.org
Saul Bolivar – Director Community Development	323-895-0405 sbolivar@cityofcudahyca.gov
Vince Altuna – Building Inspector	323-773-5143 x. 222 valtuna@cityofcudahyca.gov
Raul Mazariegos – Code Enforcement	323-773-5143 rmazariegos@cityofcudahyca.gov
Tania Gonzalez – Consultant	714-412-2654 tgonzalez@earthconsultants.com
Location:	City Council Chambers

Committee members provided significant input regarding the hazards that they perceive as most significant in the city. Most of these are man-made, as opposed to natural hazards. Both the 1987 and 1994 earthquakes caused cosmetic damage to City buildings and infrastructure. Participants expressed concern regarding the use of hazardous materials and the structure fire hazards. Mobile homes are often tightly packed in trailer parks, and the city was designed with very deep lots that have since been redeveloped with multi-housing, typically two-stories units. The Fire Department often has difficulty reaching the housing units in the back of the lots. Given that 94% of the population in the City consists of renters, there is little incentive for them to improve their houses. The property owners who rent are generally not interested in improving their structures either. The City finds that most improvements are made as a result of code violations that their code enforcement department requires, typically in building construction and fire standards.

The dense population is viewed as a significant issue if the City were to be evacuated. There are simply not enough evacuation routes to get everybody out in a timely manner. Potential evacuation shelters are few, including a few parks, the three community centers, school playgrounds, and churches with parking lots. The City had one CERT team graduating class. They plan to continue offering the classes.

Qualitative Ranking of the Natural Hazards with the Potential to Impact the City of Cudahy

Hazard	Rank (# of Points)	Geographic Extent			Historical Occurrence in Cudahy	Probability of Occurrence			Potential Risk		
		Widespread	Mod.	Small		High	Med.	Low	High	Med.	Low
Earthquake											
Strong Ground Motion											
Surface Fault Rupture											
Liquefaction											
Flooding											
Flash flooding due to storm bursts											
Coastal flooding											
Dam inundation											
Tsunami											
Sea-level rise											
Wildfires											
Landslides											
Erosion											
Windstorms											
Santa Ana winds											
Tornados											
Hurricanes											
Drought											
Volcanic Eruptions											

# of Points based on the sum of geographic extent, probability of occurrence and potential risk as follows: Widespread or high = 3 points, moderate or medium = 2 points, and small or low = 1 point. **Rank** (1 = highest; 6 = lowest) assigned based on the number of points earned, with higher number of points equal to a higher rank.

2015 Plan Meeting #2, Monday June 24, 2013, Submittal of Draft Report and Progress Update

Attendance Roster – June 24, 2013, 10:00 AM - 11:00 AM

Name – Organization or Position	**Contact Information**
Saul Bolivar – Director Community Development	323-895-0405 sbolivar@cityofcudahyca.gov
Jennifer Hernandez – Assistant Grants Coordinator	323-773-5143 jhernandez@cityofcudahyca.gov
Victor Ferrer -	323-773-5143 x. 222 valtuna@cityofcudahyca.gov
Tania Gonzalez – Consultant	714-412-2654 tgonzalez@earthconsultants.com
Location:	City Hall, Mr. Bolivar's office

At this meeting the Consultant delivered hardcopies of several draft sections of the report (Earthquakes, Floods, Severe Weather, Plan Maintenance, in addition to several appendices), for review by the Advisory Committee members. Responsibilities and future actions by both the consultant and the City were discussed and agreed on. Specifically, the consultant was to:

1) Submit digital copies of the sections that were hand-delivered that day, in Word format, for City staff to red-line during their review, using the Track Changes Tool. This was done that afternoon, after the meeting.
2) Submit additional chapters of the draft report for City review as they are completed.
3) Prepare a table-formatted document that includes existing (from the City's General Plan) and proposed mitigation actions for City staff to comment on during the action items identification phase. This table was submitted for review by the Advisory Committee on July 12, 2013.
4) Prepare a PowerPoint presentation and print hazard maps to be used for the public workshop meetings in July and August (summarized below).
5) Make a 15-minute presentation, with additional time for questions and answers, on July 24th, at 7PM, during the regularly scheduled Town Hall meeting.
6) Make the same 15-minute presentation at the August 6th City Council meeting, and be prepared to lay out poster-sized images of the graphics at the Night-Out Town meeting on the same day.

City responsibilities identified include:

1) Victor Ferrer to set up a gmail account for the project and will provide committee members and the consultant with the specifics of how to use it.
2) Will review and provide feedback on the various sections of the report.
3) Will announce the public workshops in the venues that you deem most appropriate and will provide documentation to that effect so that consultant can include it in the appropriate sections of the report.
4) Will participate in the regional meeting on flood hazards being presented by the Army Corps of Engineers on July 17th, and will provide the consultant with City-

specific information pertinent to the flood hazards section.

5) Will provide consultant with copies of relevant reports that discuss flood hazards, fire after earthquakes, and other items that are relevant to the document.
6) Will provide consultant with a revised list of individuals on the Advisory Committee.

2015 Plan Public Workshop, Wednesday July 24, 2013, 7:00 PM to 8:30 PM
Location: Community Center

This was an oral, PowerPoint presentation made to the public. The slides were in English, but the presentation was given primarily in Spanish in consideration of the attendees, who were mostly Hispanic. The PowerPoint presentation is included at the end of this document. Over 200 people attended the meeting, with nearly 90 of them filling in the sign-in sheets provided by the City.

The presentation included time for questions and answers. Many people commented on the enhanced earthquake hazards in the city as a result of the underlying buried thrusts, which they did not know about. This prompted discussions about being better prepared and having earthquake-preparedness kits. A lady in attendance asked whether there was a FEMA program available to upgrade mobile/manufactured homes. She mentioned that there used to be such a program, but due to budget cuts, had been discontinued. She hoped that if FEMA funding could not be obtained, that the City could somehow find funds to continue this program.

2015 Plan Public Workshop, Tuesday August 6, 2013, 5:00 PM to 8:00 PM
Location: Community Center

This was a one-on-one meeting with residents and City staff that attended the City's Night-Out Fair. The consultant placed oversized copies of the hazards maps on a table that was set-aside for that purpose (see photos next page). More than 20 separate groups of residents and interested parties stopped by and reviewed the maps and asked questions. The consultant was available to answer questions as needed.

U.S. Congresswoman Lucille Roybal-Allard and her staff stopped by the booth and reviewed the materials with great interest. Rep. Roybal-Allard expressed great interest in the implementation of this document as a means to make the community more disaster-resistant.

Photos of the booth set up during Cudahy's Night-Out, August 6, 2013. The photos were taken at the beginning of the evening, before participants started to stop by and peruse the maps.

2015 Plan Meeting #3 with Advisory Committee: July 8, 2015

This was a working meeting with the Plan's Advisory Committee. The consultant provided the participants with a list of proposed action items that had been culled from the City's 2010 Safety Element of the General Plan, the 2005 Plan effort, and action items developed in response to the specific hazards identified as significant in the City, with emphasis on earthquakes, severe weather, and concerns expressed by the public during the public workshops and meetings.

Each committee member was asked to review the list and provide input regarding which City department(s) and other agencies would be responsible for the action items. Furthermore, each committee member went through the list and ranked the action items as to priority, timeline for implementation, and constraints to implementation. As described in Section 4, the consultant compiled these answers to develop the final, prioritized list of Action Items presented in Section 4.

Attendance Roster –July 8, 2015 Meeting, 1:30 – 2:30 PM

Name – Organization or Position	Contact Information
Greg Castanon – Maintenance Supervisor	323-773-5143 x 237 gcastanon@cityofcudahyca.gov
Didier Murillo – Planning	323-773-5143 x 255 plan@cityofcudahyca.gov
Vince Altuna – Building Inspector	323-773-5143 x. 222 valtuna@cityofcudahyca.gov
Michael Allen, Associate Planner	323-773-5143 mallen@cityofcudahyca.gov
Raul Mazariegos	323-773-5143 x 247 rmazariegos@cityofcudahyca.gov
Aaron Hernandez-Torres – Assistant City Engineer	323-773-5143 ahernandez@cityofcudahyca.gov
Tania Gonzalez – Consultant	714-412-2654 tgonzalez@earthconsultants.com
Location:	City Council Chambers

Web-Posting of the Draft Local Natural Hazards Mitigation Plan for Public Review and Feedback

City staff posted the Draft Plan to the City's website for public review and input on June 25, 2015. The plan was posted on two separate locations on the website, as follows:

http://www.cityofcudahy.com/bids-and-proposals.html and
http://www.cityofcudahy.com/city-documents.html

As of August 15, 2015, the City had not received any specific feedback from visitors to these websites.

PowerPoint Presentations and Sign-In Sheets for Public Workshop

Preparing the Local Hazard Mitigation Plan for the City of Cudahy

Kick-off Meeting

August 23, 2012

11:30 to 12:30 AM

Local Hazard Mitigation Plans mandated by the

- **Disaster Mitigation Act of 2000**
  (Public Law 106-390)
- Revision of the Robert T. Stafford Disaster Relief and Emergency Assistance Act - funding for disaster relief, recovery and some hazard mitigation planning
- Interim final rule: Federal Register, 2/16/02, 44 CFR Part 201 and 206 - establishes planning and funding criteria
- Required LHMPs to be submitted for approval to the local FEMA office by Nov. 1, 2004

Disaster Mitigation Act of 2000 (DMA 2000)

1. Emphasizes planning for disasters before they occur
2. Encourages and rewards local and state pre-disaster planning - funds used for planning activities
3. Provides requirements for the national post-disaster Hazard Mitigation Grant Program - must have approved plan in place before receiving funds

Hazard Mitigation Planning Process:

1. Organize resources
2. Assess risks
3. Develop the mitigation plan
4. Implement the plan and monitor progress

Phase 1: Organize Resources

- Coordinate among City agencies
- Integrate with other planning efforts
- Involve the public
- Coordinate with State agencies

Phase 2: Assess Risks

1. Identify hazards
2. Profile hazard events
3. Assess vulnerability
4. Estimate potential losses

Phase 3: Develop Mitigation Plan

- Develop mitigation goals and objectives
- Identify and prioritize mitigation actions
- Prepare an implementation strategy
- Document the mitigation planning process
- Find funding sources

Phase 4: Implement the Plan and Monitor Progress

- Adopt the plan
- Implement mitigation measures
- Monitor, evaluate and update plan
- Continue public involvement

Glendale - Already Ahead

Award-winning Safety Element and Technical Background Report (2003)

Phase 1: Integrating other planning efforts; but otherwise, still needs to be done

Phase 2: Identified hazards, profiled losses, assessed vulnerability, and estimated future losses from earthquakes; need to estimate losses from other hazards

Phase 3: Developed goals and objectives, developed mitigation measures, prepared an implementation strategy; need to prioritize

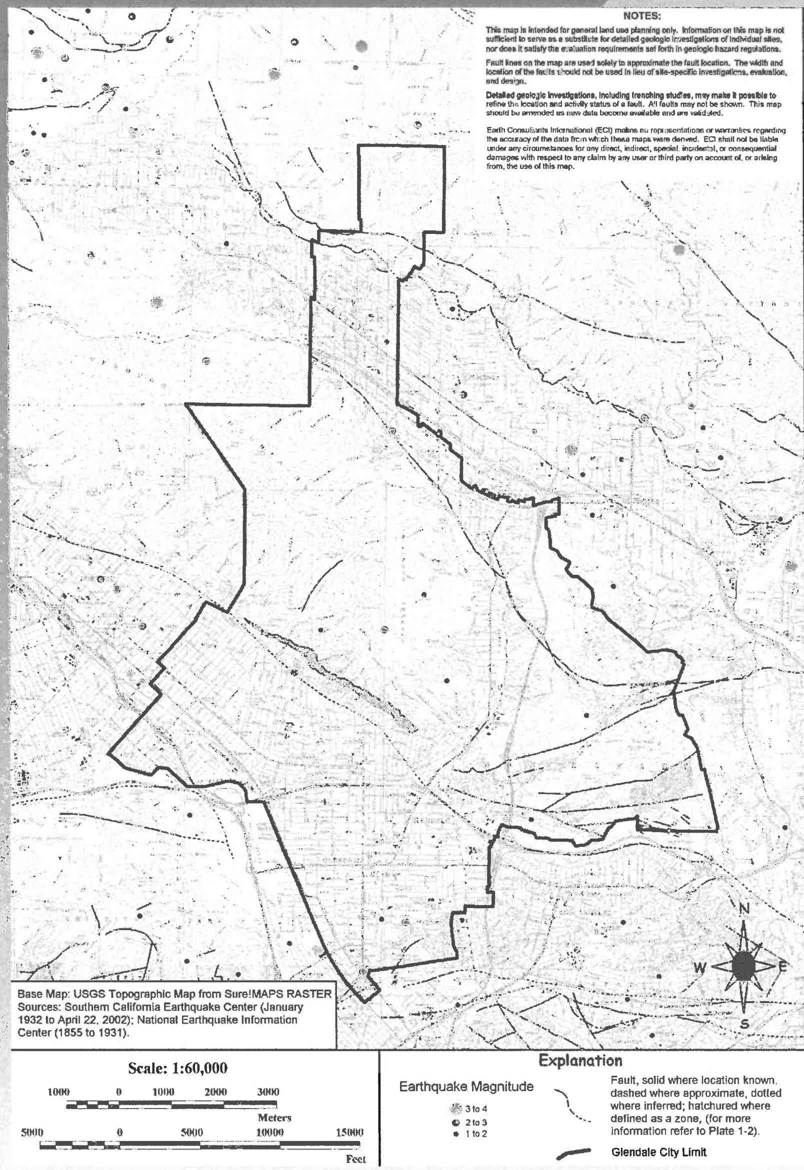
Phase 4: To be done . . . Ongoing by the City

Technical Background Report to Safety Element

- Seismic Hazards
- Geologic Hazards
- Flooding Hazards
- Fire Hazards
- Hazardous Materials Management
- Other Hazards

Seismic Hazards

- Past earthquakes and regional seismicity
- Active and potentially active faults
- Liquefaction susceptibility
- Earthquake vulnerability and loss estimates



Geologic Hazards

Slope instability

- earthquake-induced
- storm-induced

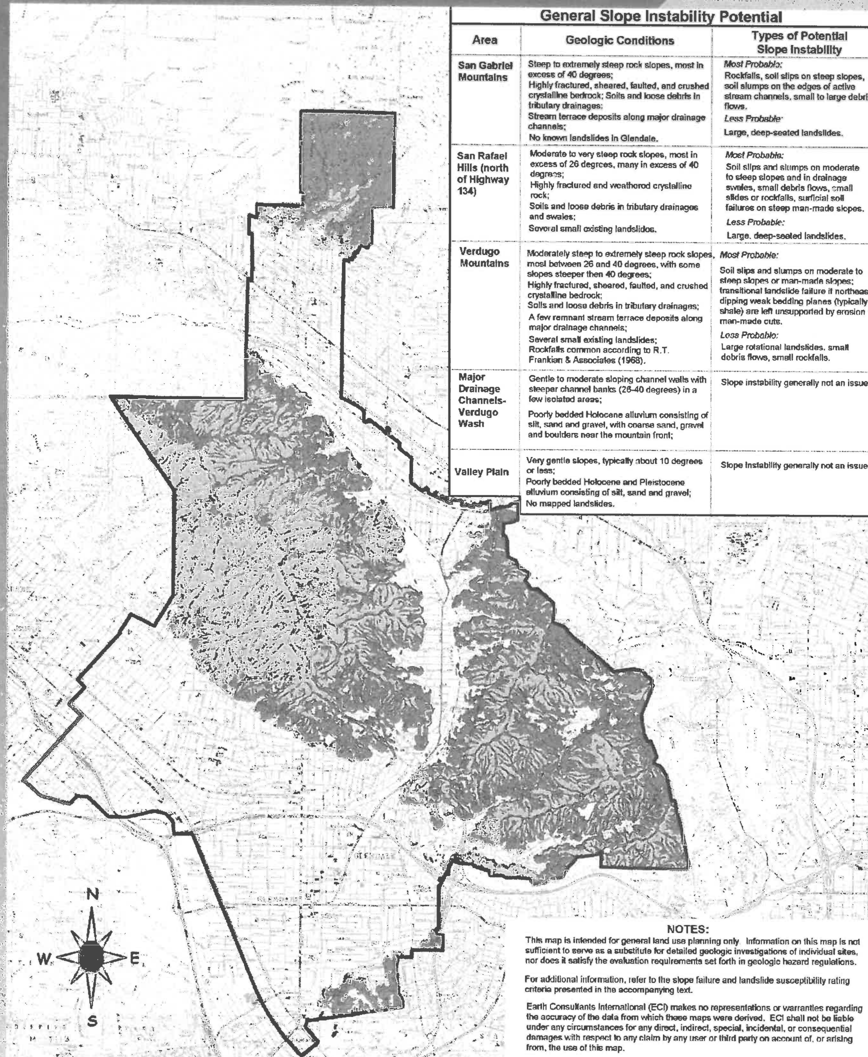
Geotechnical issues

- collapsible soils
- expansive soils
- corrosive soils

Radon Gas

General Slope Instability Potential

Area	Geologic Conditions	Types of Potential Slope Instability
San Gabriel Mountains	Steep to extremely steep rock slopes, most in excess of 40 degrees; Highly fractured, sheared, faulted, and crushed crystalline bedrock; Soils and loose debris in tributary drainages; Stream terrace deposits along major drainage channels; No known landslides in Glendale.	*Most Probable:* Rockfalls, soil slips on steep slopes, soil slumps on the edges of active stream channels, small to large debris flows. *Less Probable:* Large, deep-seated landslides.
San Rafael Hills (north of Highway 134)	Moderate to very steep rock slopes, most in excess of 26 degrees, many in excess of 40 degrees; Highly fractured and weathered crystalline rock; Soils and loose debris in tributary drainages and swales; Several small existing landslides.	*Most Probable:* Soil slips and slumps on moderate to steep slopes and in drainage swales, small debris flows, small slides or rockfalls, surficial soil failures on steep man-made slopes. *Less Probable:* Large, deep-seated landslides.
Verdugo Mountains	Moderately steep to extremely steep rock slopes, most between 26 and 40 degrees, with some slopes steeper then 40 degrees; Highly fractured, sheared, faulted, and crushed crystalline bedrock; Soils and loose debris in tributary drainages; A few remnant stream terrace deposits along major drainage channels; Several small existing landslides; Rockfalls common according to R.T. Frankian & Associates (1968).	*Most Probable:* Soil slips and slumps on moderate to steep slopes or man-made slopes; transitional landslide failure if northeast dipping weak bedding planes (typically shale) are left unsupported by erosion or man-made cuts. *Less Probable:* Large rotational landslides, small debris flows, small rockfalls.
Major Drainage Channels-Verdugo Wash	Gentle to moderate sloping channel walls with steeper channel banks (26-40 degrees) in a few isolated areas; Poorly bedded Holocene alluvium consisting of silt, sand and gravel, with coarse sand, gravel and boulders near the mountain front;	Slope instability generally not an issue.
Valley Plain	Very gentle slopes, typically about 10 degrees or less; Poorly bedded Holocene and Pleistocene alluvium consisting of silt, sand and gravel; No mapped landslides.	Slope instability generally not an issue.



NOTES:

This map is intended for general land use planning only. Information on this map is not sufficient to serve as a substitute for detailed geologic investigations of individual sites, nor does it satisfy the evaluation requirements set forth in geologic hazard regulations.

For additional information, refer to the slope failure and landslide susceptibility rating criteria presented in the accompanying text.

Earth Consultants International (ECI) makes no representations or warranties regarding the accuracy of the data from which these maps were derived. ECI shall not be liable under any circumstances for any direct, indirect, special, incidental, or consequential damages with respect to any claim by any user or third party on account of, or arising from, the use of this map.

Base Map: USGS Topographic Map from Sure!MAPS RASTER Sources: Derived from Dibblee, 1989a, 1989b, 1991a, 1991b, 2002; Byer, 1968 and United States Geological Survey 10-meter **Digital Elevation Model.**

Scale: 1:64,000

1 0 1 2 3 Kilometers

0.5 0 0.5 1 1.5 Miles

EXPLANATION

Mapped Landslides (small isolated areas in the Verdugo Mountains and the San Rafael Hills.)

Glendale City Boundary

Slope Instability Rating

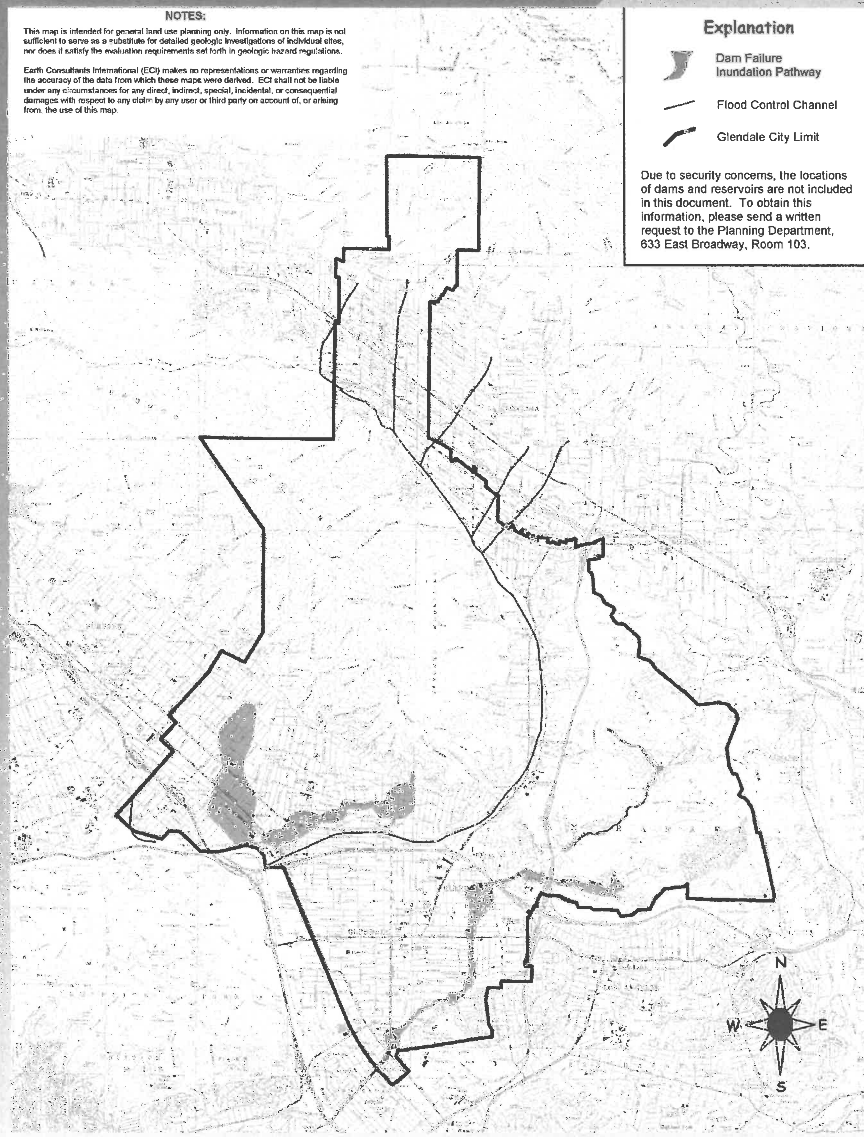
- Very High
- High
- Moderate
- Low

Flooding Hazards

Storm Flooding

Dam Failure

Above-Ground Reservoir Failure

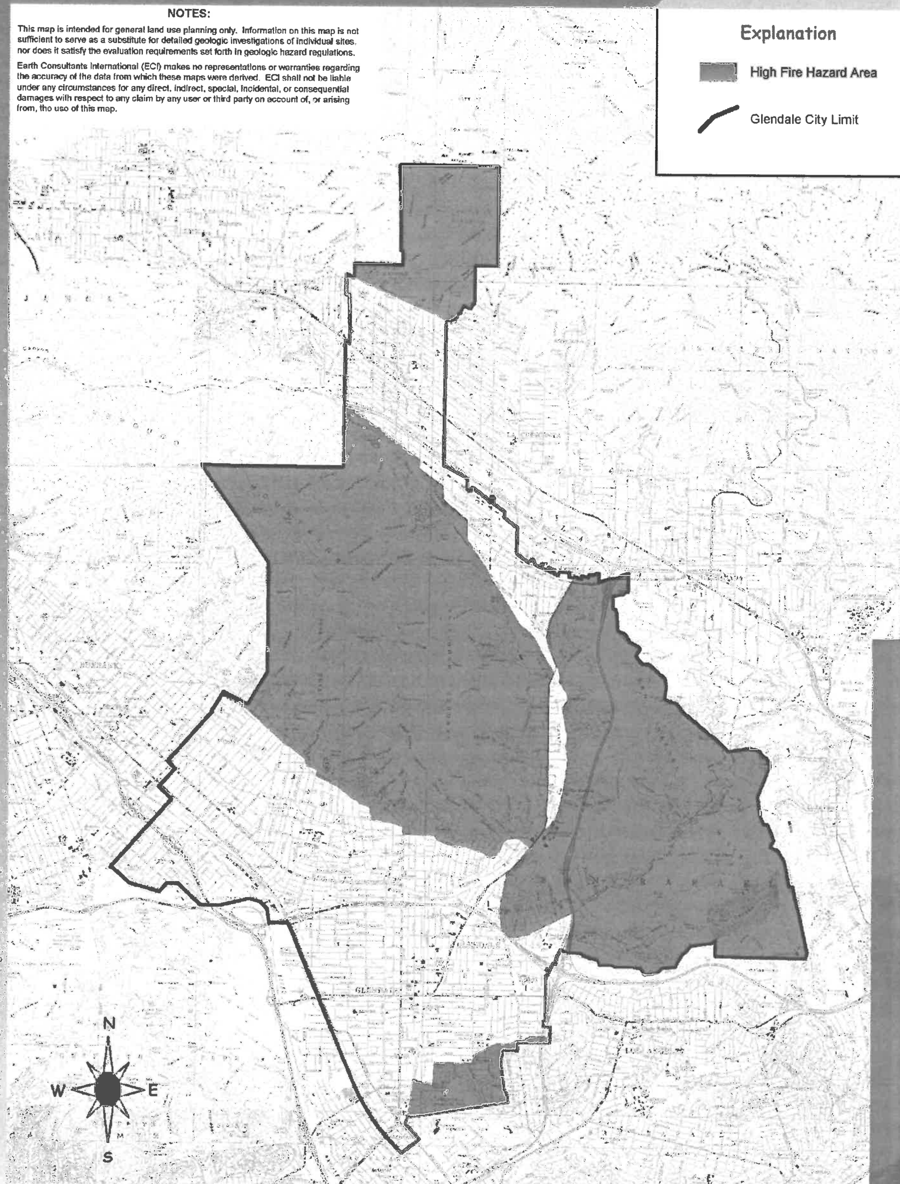


Fire Hazards

Wildland Fires

Urban Interface (UWI)

Urban Fires



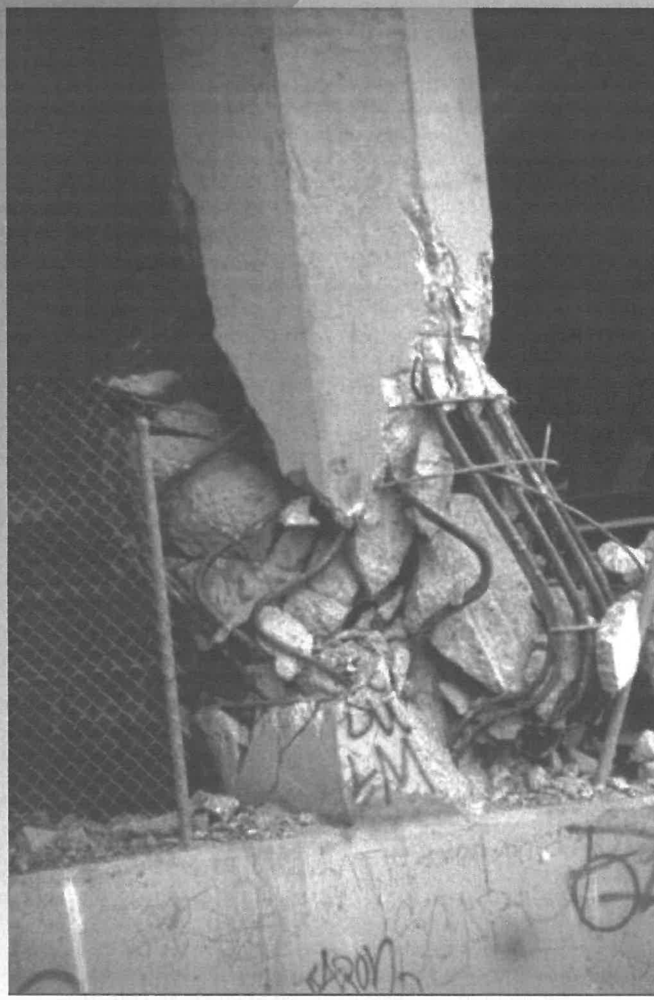
Phase 2: Assess Risks

1. Identify hazards
2. Profile hazard events
3. Assess vulnerability
4. Estimate potential losses

Safety Element - Policies Report

- **Goals**
- **Policies**
- **Programs**
  - Responsible Division or Agency
  - Priority
  - Time Frame
- **Potential Shelter Locations**

Example - Goal



Reduce the loss of life, injury, private property damage, infrastructure damage, economic losses and social dislocation and other impacts resulting from seismic hazards.

Example - Policies and Programs

- **Policy**: The City will ensure that new buildings are designed to address earthquake hazards and shall promote the improvement of existing structures to enhance their safety in the event of an earthquake.
  - **Program**: The City shall adopt and enforce the latest version of Title 24 of the California Code of Regulations with local amendments, including near-source seismic conditions. [Responsible Division: Public Works/Building and Safety; Priority: High; Timing: On-going].

Phase 3: Develop Mitigation Plan

- Develop mitigation goals and objectives
- Identify and prioritize mitigation actions
- Prepare an implementation strategy
- Document the mitigation planning process
- Find funding sources

Where do we go from here?

- Need to involve the public (critical component of Phase 1).
  In 2003, the City invited several public and private agencies to review and comment on the Draft Safety Element. No one attended.
- How can we improve this?

Need your assistance

- Provide data we can use to estimate losses due to hazards other than seismic; i.e., recent floods and fires
- Review the existing Safety Element
- Help prioritize the programs from the Safety Element and develop new programs as necessary for the LHMP

Together we can comply with Phase 1 and the first part of Phase 4.

Phase 4: Implement the Plan and Monitor Progress

- Adopt the plan
- Implement mitigation measures
- Monitor, evaluate and update plan
- Continue public involvement

THANK YOU!!

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Earth Consultants International

Preparing the Disaster Mitigation Plan

for

CITY OF CUDAHY • CALIFORNIA
INCORPORATED NOV. 10, 1960

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Community Services Department
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DATE: July 24, 2013

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APPENDIX C: ECONOMIC ANALYSIS OF NATURAL HAZARD MITIGATION PROJECTS

Benefit/cost analysis is a key mechanism used by the State Office of Emergency Services (CalOES), 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: The Interagency Hazards Mitigation Team, State Hazard Mitigation Plan, (Oregon State Police – Office of Emergency Management, 2000), and Federal Emergency Management Agency Publication 331, Report on Costs and Benefits of Natural Hazard Mitigation. There are several useful publications that describe the process of conducting a benefit/cost analysis, including equations, developed by and for FEMA. Several of these publications are listed at the end of this section, in the Resources section. FEMA has also developed a software package, or toolkit, for a variety of natural hazards. For additional information and the most up-to-date software, refer to https://www.fema.gov/benefit-cost-analysis, or do a search for FEMA BCA software.

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. Mitigation activities also reduce 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, which could potentially be a large number of people and economic entities. Furthermore, 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.

Estimating the costs and benefits of a hazard mitigation plan strategy can be a complex process. Employing the services of a specialist can assist in this process.

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.

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 projects can assist in minimizing the risk to natural hazards, but do so at varying economic costs.

2. **Calculate the Costs and Benefits:** Choosing economic criteria is essential to systematically calculate the costs and benefits of mitigation projects and select 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, such as retained earnings, bond and stock issues, and commercial loans, must be researched.

- **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 refer only to the risk-free cost of capital, but it may also include the decision maker's time preference and also a risk premium. Inflation should also be considered.

3. **Analyze and Rank the Alternatives:** Once costs and benefits have been quantified, economic analysis tools can be used to 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 return on an investment minus the value of expected future cost expressed in today's dollars. If the net present value is greater than the project's costs, the project may be deemed feasible for implementation.

- **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 the Benefits of Mitigation Calculated?

Economic Returns of Natural Hazard Mitigation

The estimation of economic returns, which accrue to a building or landowner 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 (see list below) are available to help 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
ARC	American Red Cross
ATC	Applied Technology Council
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
DFE	Design Flood Elevation
EDA	Economic Development Administration
EPA	Environmental Protection Agency
ER	Emergency Relief
EWP	Emergency Watershed Protection (NRCS Program)
FAS	Federal Aid System
FAY	Federal Award Year
FDAA	Federal Disaster Assistance Administration
FEMA	Federal Emergency Management Agency
FIA	Federal Insurance Administration
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
FMA	Flood Mitigation Assistance (FEMA Program)
GSA	General Services Administration
HAZUS	Hazards United States (an earthquake damage assessment prediction tool)
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
IHMT	Interagency Hazard Mitigation Team
MHFP	Multi-Hazard Functional Plan
NCDC	National Climate Data Center
NEMA	National Emergency Management Agency
NEMIS	National Emergency Management Information System
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
NIMS	National Incident Management System
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NRCS	Natural Resources Conservation Service

NSF	National Science Foundation
NWS	National Weather Service
OCC	Operations Coordination Center
OCD	Office of Civil Defense
OEP	Office of Emergency Planning
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
RTPA	Regional Transportation Planning Agency
SBA	Small Business Administration
SFHA	Special Flood Hazard Area
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 and Local Acronyms

ADDI	American Dream Downpayment Initiative
APEFZ	Alquist-Priolo Earthquake Fault Zone
ARP	Accidental Risk Prevention
ATC20	Applied Technology Council20
ATC21	Applied Technology Council21
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
CalFire	California Department of Forestry and Fire Prevention
CALSTARS	California State Accounting Reporting System
CalTRANS	California Department of Transportation
CBO	Community Based Organization
CD	Civil Defense
CDBG	Community Development Block Grant
CDF	California Department of Forestry and Fire Protection
CDMG	California Division of Mines and Geology (now CGS)
CEC	California Energy Commission
CEPEC	California Earthquake Prediction Evaluation Council

CESRS	California Emergency Services Radio System
CGS	California Geological Survey
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 (of the state Office of Emergency Services)
DASH	Downtown Area Short Hop (mini-bus service in Los Angeles)
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
FEAT	Governor's Flood Emergency Action Team
FIR	Final Inspection Reports
FIRESCOPE	Firefighting Resources of So. Calif Organized for Potential Emergencies
FMA	Flood Management Assistance
HAZMAT	Hazardous Materials
HAZMIT	Hazardous Mitigation
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
HOME	Home Investment Partnership 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)
LADOT	City of Los Angeles Department of Transportation
LAMSA	Los Angeles Metropolitan Statistical Area
LEMMA	Law Enforcement Master Mutual Aid
LEPC	Local Emergency Planning Committee
MARAC	Mutual Aid Regional Advisory Council
METRO	Los Angeles County Metropolitan Transit Authority brand
MHID	Multi-Hazard Identification
MTA	Metropolitan Transportation Authority (also known as LACMTA)
NPP	Nuclear Power Plant
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 (also Cal OES)
OSHPD	Office of Statewide Health Planning and Development
OSPR	Oil Spill Prevention and Response
PTAB	Planning and Technological Assistance Branch
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
SCEC	Southern California Earthquake Center
SCO	California State Controller's Office
SEMS	Standardized Emergency Management System
SEPIC	State Emergency Public Information Committee
SHMO	State Hazard Mitigation Officer
SLA	State and Local Assistance

SOP	Standard Operating Procedure
SWEPC	Statewide Emergency Planning Committee
TTT	Train the Trainer
UPA	Unified Program Account
USAR	Urban Search and Rescue
WC	California State Warning Center

Industry and Other Acronyms

A&W	Alert and Warning
AA	Administering Areas
AAR	After Action Report
B/CA	Benefit/Cost Analysis
BCP	Budget Change Proposal
CADD	Computer-Aided Design and Drafting
CMU	Concrete Masonry Unit
FSR	Feasibility Study Report
FTE	Full Time Equivalent
FY	Fiscal Year
GIS	Geographic Information System
IA	Individual Assistance
ICC	Increased Cost of Compliance
LAG	Lowest Adjacent Grade
LAN	Local Area Network
Mmax	Maximum magnitude earthquake
MOU	Memorandum of Understanding
MPE	Maximum Probable Earthquake
MSL	Mean Sea Level
NBC	Nuclear, Biological, Chemical
NGVD	National Geodetic Vertical Datum of 1929
OA	Operational Area
OASIS	Operational Satellite Information System
OSB	Oriented Strand Board
PA	Public Assistance
PC	Personal Computer
PGA	Peak Ground Acceleration
PSA	Public Service Announcement
PTR	Project Time Report
TEC	Travel Expense Claim
UPS	Uninterrupted Power Source
WAN	Wide Area Network

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.
Active fault	For implementation of Alquist-Priolo Earthquake Fault Zoning Act (APEFZA) requirements, an active fault is one that shows evidence of, or is suspected of having experienced surface displacement within the past 11,000 years. APEFZA classification is designed for land use management of surface rupture hazards. A more general definition (National Academy of Science, 1988), states "a fault that on the basis of historical, seismological, or geological evidence has the finite probability of producing an earthquake" (see potentially active fault).
Acute	Quick, one-time exposure to a chemical.
Adjacent grade	Elevation of the natural or graded ground surface, or structural fill, abutting the walls of a building. See *highest adjacent grade* and *lowest adjacent grade*.
Aftershocks	Minor earthquakes following a greater one and originating at or near the same place.
Aggradation	The building up of earth's surface by deposition of sediment.
Alluvial	Pertaining to, or composed of alluvium, or deposited by a stream or running water.
Alluvial fan	A low, outspread, relatively flat to gently sloping surface consisting of loose sediment that is shaped like an open fan, deposited by a stream at the place where the stream comes out of a narrow canyon onto a broad valley or plain. Alluvial fans are steepest at the mouth of the canyon, and spread out, gradually decreasing in gradient, away from the stream source.
Alluvium	Surficial sediments of poorly consolidated gravels, sand, silts, and clays deposited by flowing water.
Anchor	To secure a structure to its footings or foundation wall in such a way that a continuous load transfer path is created and so that it will not be displaced by flood, wind, or seismic forces.
Apparatus	Fire fighting vehicles of various types.
Appurtenant structure	Under the *National Flood Insurance Program*, a structure which is on the same parcel of property as the principal *structure* to be insured and the use of which is incidental.
Aquifer	A body of rock or sediment that contains sufficient saturated permeable material to allow the flow of groundwater and to yield economically significant quantities of groundwater to wells and springs.
Argillic	Alteration in which certain minerals of a rock or sediments are converted to clay.
Armor	To protect slopes from *erosion* and *scour* by *flood* waters. Techniques of armoring include the use of riprap, gabions, or concrete.

Arsenic	A naturally occurring, toxic element that occurs in rocks, soils and groundwater. Above certain concentrations, it can cause skin, bladder and other cancers.
Artesian	An adjective referring to ground water confined under hydrostatic pressure. The water level in wells drilled into an *artesian* aquifer (also called a confined aquifer) will stand at some height above the top of the aquifer. If the water reaches the ground surface the well is a "flowing" *artesian* well.
Aspect	The direction a slope faces.
Asset	Any man-made or natural feature that has value, including, but not limited to people, buildings, infrastructure like bridges, roads, and sewer and water systems; lifelines like electricity and communication resources; or environmental, cultural, or recreational features like parks, dunes, wetlands, or landmarks.
Atmospheric river	Narrow streams of water vapor transported in the lower atmosphere that are thought responsible for most of the storms on the west coast of the United States.
Attenuation	The reduction in amplitude of a wave with time or distance traveled.
Automatic aid agreement	An agreement between two or more agencies whereby such agencies are automatically dispatched simultaneously to pre-determined types of emergencies in pre-determined areas.
A zone	Under the *National Flood Insurance Program*, area subject to inundation by the *100-year flood* where wave action does not occur or where waves are less than 3 feet high, designated Zone A, AE, A1-A30, A0, AH, or AR on a *Flood Insurance Rate Map* (FIRM).
Base flood	Flood that has a 1 percent probability of being equaled or exceeded in any given year. Also known as the 100-year flood.
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.
Basement	Under the *National Flood Insurance Program*, any area of a building having its floor subgrade on all sides. (Note: What is typically referred to as a "walkout basement," which has a floor that is at or above grade on at least one side, is not considered a basement under the *National Flood Insurance Program*.)
Beaufort scale	A scale devised in 1805 by Admiral Francis Beaufort of the British Navy to classify wind speed based on the wind's effect on the seas and vegetation. The scale ranges from 0 (calm) to 12 (hurricane).
Bedding	The arrangement of a sedimentary rock in beds or layers of varying thickness and character.
Bedrock	The solid rock that underlies loose material, such as soil, sand, clay, or gravel.
Bench	A grading term that refers to a relatively level step excavated into earth material on which fill is to be placed.
Berm	Horizontal portion of the backshore beach formed by sediments deposited by waves.
Blind thrust fault	A thrust fault is a low-angle reverse fault (top block pushed over bottom block). A "blind" thrust fault refers to one that does not reach the surface.

Braided stream	A stream that divides into or follows an interlacing or tangled network of several small, branching and reuniting shallow channels separated from each other by channel bars. Also referred to as an anastomosing stream.
Breakaway wall	Under the *National Flood Insurance Program*, a wall that is not part of the structural support of the building and is intended through its design and construction to collapse under specific lateral loading forces, without causing damage to the elevated portion of the building or supporting foundation system. Breakaway walls are required by the *National Flood Insurance Program* regulations for any enclosures constructed below the *Base Flood Elevation* beneath elevated buildings in *Coastal High Hazard Areas* (also referred to as *V zones*). In addition, breakaway walls are recommended in areas where *flood* waters flow at high velocities or contain ice or other debris.
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.
Building code	Regulations adopted by local governments that establish standards for construction, modification, and repair of buildings and other structures.
Built-up roof covering	Two or more layers of felt cemented together and surfaced with a cap sheet, mineral aggregate, smooth coating, or similar surfacing material.
Bulkhead	Wall or other structure, often of wood, steel, stone, or concrete, designed to retain or prevent sliding or *erosion* of the land. Occasionally, bulkheads are use to protect against wave action.
Carcinogen	Material capable of causing cancer in humans.
Cast-in-place concrete	Concrete that is poured and formed at the construction site.
CEQA	The California Environmental Quality Act (Chapters 1 through 6 of Division 13 of the Public Resources Code). A state statute that requires state and local agencies to identify the significant environmental impacts of their actions and to avoid or mitigate those impacts, if feasible.
Chronic	Continual or repeated exposure to a hazardous material.
Cladding	Exterior surface of the building envelope that is directly loaded by the wind.
Clay	A rock or mineral fragment having a diameter less than 1/256 mm (4 microns, or 0.00016 in.). Commonly applied to any soft, adhesive, fine-grained deposit.
Claystone	An indurated clay having the texture and composition of shale, but lacking its fine lamination. A massive mudstone in which clay predominates over silt.
Climate	The average condition of weather over time in a given region.
Code official	Officer or other designated authority charged with the administration and enforcement of the code, or a duly authorized representative, such as a building, zoning, planning, or *floodplain management* official.

Coliform	A group of rod-shaped bacteria that are found in water, soil, and on vegetation, and are present in large numbers in the feces of warm-blooded animals. The coliform count is used as an indicator of the sanitary conditions of foods and water. Most genera of coliform are not harmful to humans, but a few kinds, including some strains of Escherichia coli (E. coli) can be debilitating to sensitive individuals, including children, seniors, and those with compromised immune systems.
Collapse	A relatively sudden change in the volume of a soil mass resulting in the local settlement of the ground surface, with the potential to cause significant damage to overlying structures. If due to strong ground shaking, the soil grains in the soil column are re-arranged by the shaking so that the pore space between grains is reduced and the grains become more tightly packed, resulting in the overall reduction of the thickness of the soil column. This is referred to as earthquake-induced subsidence. Collapse can also occur in certain types of sediments, where with the introduction of water (due to an increase in irrigation, for example), the cement between soil grains dissolves, allowing the soil particles to become more tightly packed, again resulting in the local settlement of the ground surface. This process is also referred to as hydro-collapse or hydroconsolidation.
Column foundation	Foundation consisting of vertical support members with a height-to-least-lateral-dimension ratio greater than three. Columns are set in holes and backfilled with compacted material. They are usually made of concrete or masonry and often must be braced. Columns are sometimes known as posts, particularly if the column is made of wood.
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.
Compressible soil	Geologically young unconsolidated sediment of low density that may compress under the weight of a proposed fill embankment or structure.
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.
Concrete Masonry Unit (CMU)	Building unit or block larger than 12 inches by 4 inches by 4 inches made of cement and suitable aggregates.
Conglomerate	A coarse-grained sedimentary rock composed of rounded to subangular fragments larger than 2 mm in diameter set in a fine-grained matrix of sand or silt, and commonly cemented by calcium carbonate, iron oxide, silica or hardened clay. The consolidated equivalent of gravel.
Connector	Mechanical device for securing two or more pieces, parts, or members together, including anchors, wall ties, and fasteners.
Consolidation	Any process whereby loosely aggregated, soft earth materials become firm and cohesive rock. Also the gradual reduction in volume and increase in density of a soil mass in response to increased load or effective compressive stress, such as the squeezing of fluids from pore spaces.
Contour	A line of equal ground elevation on a topographic (contour) map.

Contraction joint	Groove that is formed, sawed, or tooled in a concrete structure to create a weakened plane and regulate the location of cracking resulting from the dimensional change of different parts of the structure. See *Isolation joint*.
Corrosion-resistant metal	Any nonferrous metal or any metal having an unbroken surfacing of nonferrous metal, or steel with not less than 10 percent chromium or with not less than 0.20 percent copper.
Coseismic rupture	Ground rupture occurring during an earthquake but not necessarily on the causative fault.
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.
Dead load	Weight of all materials of construction incorporated into the building, including but not limited to walls, floors, roofs, ceilings, stairways, built-in partitions, finishes, *cladding*, and other similarly incorporated architectural and structural items and fixed service equipment. See *Loads*.
Debris	(Seismic) The scattered remains of something broken or destroyed; ruins; rubble; fragments. (Flooding, Coastal) Solid objects or masses carried by or floating on the surface of moving water.
Debris impact loads	Loads imposed on a structure by the impact of floodborne debris. These loads are often sudden and large. Though difficult to predict, debris impact loads must be considered when structures are designed and constructed. See *Loads*.
Debris flow	A saturated, rapidly moving saturated earth flow with 50 percent rock fragments coarser than 2 mm in size which can occur on natural and graded slopes.
Debris line	Line left on a structure or on the ground by the deposition of debris. A debris line often indicates the height or inland extent reached by *flood* waters.
Deck	Exterior floor supported on at least two opposing sides by an adjacent structure and/or posts, piers, or other independent supports.
Deflected canyons	A diversion in the trend of a stream or canyon caused by any number of processes, including folding and faulting.
Deformation	A general term for the process of folding, faulting, shearing, compression, or extension of rocks.
Design flood	The greater of either (1) the *base flood* or (2) the *flood* associated with the *flood hazard area* depicted on a community's flood hazard map, or otherwise legally designated.
Design Flood Elevation (DFE)	Elevation of the *design flood*, or the flood protection elevation required by a community, including wave effects, relative to the *National Geodetic Vertical Datum*, *North American Vertical Datum*, or other datum.
Design flood protection depth	Vertical distance between the eroded ground elevation and the *Design Flood Elevation*.
Design stillwater flood depth	Vertical distance between the eroded ground elevation and the *design stillwater flood elevation*.

Design stillwater flood elevation	Stillwater elevation associated with the *design flood*, excluding wave effects, relative to the *National Geodetic Vertical Datum*, *North American Vertical Datum*, or other datum.
Development	Under the *National Flood Insurance Program*, 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 or storage of equipment or materials
Differential settlement	Non-uniform settlement; the uneven lowering of different parts of an engineered structure, often resulting in damage to the structure. Sometimes included with liquefaction as ground failure phenomenon.
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.
Dike	A tabular shaped, igneous intrusion that cuts across bedding of the surrounding rock. An embankment to confine or control water, often built along the banks of a river to prevent overflow of lowlands. A levee.
Dispatch	The implementation of a command decision to move a resource or resources from one place to another.
Displacement	The length, measured in kilometers, of the total movement that has occurred along a fault over as long a time as the geologic record reveals.
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.
DMA 2000	Disaster Mitigation Act of 2000. Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended by Public Law 106-390, October 30, 2000. DMA 2000 is intended to establish a continuing means of assistance by the Federal Government to State and local governments in carrying out their responsibilities to alleviate the suffering and damage which result from disasters by (1) revising and broadening the scope of existing disaster relief programs; (2) encouraging the development of comprehensive disaster preparedness and assistance plans, programs, capabilities, and organizations by the States and by local governments; (3) achieving greater coordination and responsiveness of disaster preparedness and relief programs; (4) encouraging individuals, States, and local governments to protect themselves by obtaining insurance coverage to supplement or replace governmental assistance; (5) encouraging hazard mitigation measures to reduce losses from disasters, including development of land use and construction regulations; and (6) providing Federal assistance programs for both public and private losses sustained in disasters .
Duration	How long a hazard event lasts.
Dust storm	High wind event common in arid and semi-arid regions. Strong winds pick up sand and other particulates and transport them by saltation and suspension to another location.

Dynamic analysis	A complex earthquake-resistant engineering design technique (UBC - used for critical facilities) capable of modeling the entire frequency spectra, or composition, of ground motion. The method is used to evaluate the stability of a site or structure by considering the motion from any source or mass, such as that dynamic motion produced by machinery or a seismic event.
Earth flow	Imperceptibly slow-moving surficial material in which 80 percent or more of the fragments are smaller than 2 mm, including a range of rock and mineral fragments.
Earthquake	Vibratory motion propagating within the Earth or along its surface caused by the abrupt release of strain from elastically deformed rock by displacement along a fault.
Earth's crust	The outermost layer or shell of the Earth.
Effective Flood Insurance Rate Map (FIRM)	See *Flood Insurance Rate Map*.
El Niño	Phenomenon that originates, every few years, typically in December or early January, in the southern Pacific Ocean, off of the western coast of South America, characterized by warmer than usual water. This warmer water is statistically linked with increased rainfall in both the southeastern and southwestern United States, droughts in Australia, western Africa and Indonesia, reduced number of earthquakes in the Atlantic Ocean, and increased number of hurricanes in the Eastern Pacific.
Enclosure	That portion of an elevated building below the *Design Flood Elevation (DFE)* that is partially or fully surrounded by solid (including breakaway) walls.
Encroachment	Any physical object placed in a floodplain that hinders the passage of water or otherwise affects the flood flows.
Engineering geologist	A geologist who is certified by the State as qualified to apply geologic data, principles, and interpretation to naturally occurring earth materials so that geologic factors affecting planning, design, construction, and maintenance of civil engineering works are properly recognized and used. An engineering geologist is particularly needed to conduct investigations, often with geotechnical engineers, of sites with potential ground failure hazards.
Environmental Protection Agency (EPA)	Federal agency tasked with ensuring the protection of the environment and the nation's citizens.
Ephemeral stream	A stream or reach of a stream that flows only briefly in direct response to precipitation.
Epicenter	The point at the Earth's surface directly above where an earthquake originated.
Episodic erosion	Erosion induced by a single storm event. Episodic erosion considers the vertical component of two factors: general beach profile lowering and localized conical scour around foundation supports. Episodic erosion is relevant to foundation embedment depth and potential undermining. See *Erosion*.

Erodible soil	Soil subject to wearing away and movement due to the effects of wind, water, or other geological processes during a flood or storm or over a period of years.
Erosion	Under the *National Flood Insurance Program*, the process of the gradual wearing away of landmasses. In general, erosion involves the detachment and movement of soil and rock fragments, during a flood or storm or over a period of years, through the action of wind, water, or other geologic processes.
Erosion analysis	Analysis of the short- and long-term *erosion* potential of soil or strata, including the effects of wind action, *flooding* or *storm surge*, moving water, wave action, and the interaction of water and structural components.
Erosion hazard area	Area anticipated to be lost to shoreline retreat over a given period of time. The projected inland extent of the area is measured by multiplying the average annual long-term recession rate by the number of years desired.
Essential facility	Elements that are important to ensure a full recovery of a community or state following a hazard event. These would include: government functions, major employers, banks, schools, and certain commercial establishments, such as grocery stores, hardware stores, and gas stations.
Evacuation	Movement of people from an area, typically their homes, to another area considered to be safe, typically in response to a natural or man-made disaster that makes an area unsafe.
Expansive soil	A soil that contains clay minerals that take in water and expand. If a soil contains sufficient amount of these clay minerals, the volume of the soil can change significantly with changes in moisture, with resultant structural damage to structures founded on these materials.
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.
Extremely hazardous substance	A substance that shows high acute or chronic toxicity, carcinogenity, bioaccumulative properties, is persistent in the environment, or is water reactive (California Code of Regulations, Title 22).
Fault	A fracture in the continuity of a rock formation caused by a shifting or dislodging of the earth's crust, in which adjacent surfaces are differentially displaced parallel to the plane of fracture.
Fault segment	A continuous portion of a fault zone that is likely to rupture along its entire length during an earthquake.
Fault slip rate	The average long-term movement of a fault (measured in cm/year or mm/year) as determined from geologic evidence.
Federal Emergency Management Agency (FEMA)	Independent agency created in 1978 to provide a single point of accountability for all Federal activities related to disaster mitigation and emergency preparedness, response and recovery.

Federal Insurance Administration (FIA)	The component of the *Federal Emergency Management Agency* directly responsible for administering the flood insurance aspects of the *National Flood Insurance Program*.
Fill	Material such as soil, gravel, or crushed stone placed in an area to increase ground elevations or change soil properties.
Fire resistant	A characteristic of a plant species that allows individuals to resist damage or mortality during a fire. Also used to describe construction materials that resist damage to fire.
First responders	A group designated by the community as those who may be first to arrive at the scene of a fire, accident or chemical release.
Fire weather	The weather conditions that influence fire behavior, including air temperature, atmospheric moisture, atmospheric stability, clouds and precipitation.
Five hundred (500)-year flood	*Flood* that has as 0.2-percent probability of being equaled or exceeded in any given year.
Flash flood	A flood event occurring with little or no warning where water levels rise at an extremely fast rate.
Flood	A rising body of water, as in a stream or lake, which overtops its natural and artificial confines and covers land not normally under water. Under the *National Flood Insurance Program*, either (a) a general and temporary condition or 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) mudslides (i.e., mudflows) which are proximately caused by flooding as defined in (2) and are akin to a river of liquid and flowing mud on the surfaces of normally dry land areas, as when the earth is carried by a current of water and deposited along the path of the current, or (b) the collapse or subsidence of land along the shore of a lake or other body of water as a result of erosion or undermining caused by waves or currents of water exceeding anticipated cyclical levels or suddenly caused by an unusually high water level in a natural body of water, accompanied by a severe storm, or by an unanticipated force of nature, such as flash flood or abnormal tidal surge, or by some similarly unusual and unforeseeable event which results in flooding as defined in (1), above.
Flood-damage-resistant material	Any construction material capable of withstanding direct and prolonged contact (i.e., at least 72 hours) with floodwaters without suffering significant damage (i.e., damage that requires more than cleanup or low-cost cosmetic repair, such as painting).
Flood depth	Height of the flood-water surface above the ground surface.
Flood elevation	Height of the water surface above an established elevation datum such as the *National Geodetic Vertical Datum*, *North American Vertical Datum*, or *mean sea level*.

Flood hazard area	The greater of the following: (1) the area of special flood hazard, as defined under the *National Flood Insurance Program*, or (2) the area designated as a flood hazard area on a community's legally adopted flood hazard map, or otherwise legally designated.
Flood insurance	Insurance coverage provided under the National Flood Insurance Program.
Flood Insurance Rate Map (FIRM)	Under the *National Flood Insurance Program*, an official map of a community, on which the *Federal Emergency Management Agency* has delineated both the special hazard areas and the risk premium zones applicable to the community. (Note: The latest FIRM issued for a community is referred to as the *effective FIRM* for that community.)
Flood Insurance Study (FIS)	Under the *National Flood Insurance Program*, an examination, evaluation, and determination of *flood* hazards and, if appropriate, corresponding *water surface elevations*, or an examination, evaluation, and determination of mudslide (i.e., mudflow) and/or flood-related erosion hazards in a community or communities. (Note: The *National Flood Insurance Program* regulations refer to Flood Insurance Studies as "flood elevation studies.")
Floodplain	Any land area, including watercourse, susceptible to partial or complete inundation by water from any source.
Floodplain management	Operation of an overall program of corrective and preventive measures for reducing *flood* damage, including but not limited to emergency preparedness plans, flood control works, and *floodplain management regulations*.
Floodplain management regulations	Under the *National Flood Insurance Program*, zoning ordinances, subdivision regulations, building codes, health regulations, special purpose ordinances (such as floodplain ordinance, grading ordinance, and erosion control ordinance), and other applications of police power. The term describes such state or local regulations, in any combination thereof, which provide standards for the purpose of *flood* damage prevention and reduction.
Flood-related erosion area or flood-related erosion prone area	A land area adjoining the shore of a lake or other body of water, which due to the composition of the shoreline or bank and high water levels or wind-driven currents, is likely to suffer *flood*-related *erosion* damage.
Floodway	The channel of a river or other watercourse, and the adjacent land areas that must be kept free of encroachment in order to discharge the base flood without cumulatively increasing the water surface elevation more than a certain height.
Flow failure	A type of liquefaction-induced failure that generally occurs in slopes greater than 3 degrees, and that is characterized by the displacement, over tens to hundreds of feet, of blocks of soil riding on top of the liquefied substrate.
Footing	Enlarged base of a foundation wall, pier, post, or column designed to spread the load of the structure so that it does not exceed the soil bearing capacity.
Footprint	Land area occupied by a structure.

Freeboard	Under the *National Flood Insurance Program*, a factor of safety, usually expressed in feet above a *flood* level, for the purposes of *floodplain management*. Freeboard tends to compensate for the many unknown factors that could contribute to flood heights greater than the heights calculated for a selected size flood and floodway conditions, such as the hydrological effect of urbanization of the watershed.
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.
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.
Funnel clouds	Cone-shaped or needle-like clouds that extend down from the main cloud base but do not extend to the ground surface. If a funnel cloud touches the ground, it becomes a tornado.
Gabion	Rock-filled cage made of wire or metal that is placed on slopes or embankments to protect them from *erosion* caused by flowing or fast-moving water.
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.
Geomorphology	The science that treats the general configuration of the Earth's surface. The study of the classification, description, nature, origin and development of landforms, and the history of geologic changes as recorded by these surface features.
Geotechnical engineer	A licensed civil engineer who is also certified by the State as qualified for the investigation and engineering evaluation of earth materials and their interaction with earth retention systems, structural foundations, and other civil engineering works.
Grade beam	Section of a concrete slab that is thicker than the slab and acts as a footing to provide stability, often under load-bearing or critical structural walls. Grade beams are occasionally installed to provide lateral support for vertical foundation members where they enter the ground.
Grading	Any excavating or filling or combination thereof. Generally refers to the modification of the natural landscape into pads suitable as foundations for structures.
Granite	Broadly applied, any completely crystalline, quartz-bearing, plutonic rock.
Ground failure	Permanent ground displacement produced by fault rupture, differential settlement, liquefaction, or slope failure.
Ground lurching	A form of earthquake-induced ground failure where soft, saturated soils move in a wave-like manner in response to intense seismic ground shaking, forming ridges or cracks at the surface.

Ground motion	The vibration or shaking of the ground during an earthquake. When a fault ruptures, seismic waves radiate, causing the ground to vibrate. The severity of the vibration increases with the amount of energy released and decreases with distance from the causative fault or epicenter, but soft soils can further amplify ground motions
Ground oscillations	A type of liquefaction-induced failure where liquefaction occurs at depth, in an area where the ground surface is too level to permit the lateral displacement of the overlying soil blocks. The blocks instead separate from one another and oscillate above the liquefied layer. This may result in the opening and closing of fissures or cracks, and the formation of sand boils or sand volcanoes.
Ground rupture	Displacement of the earth's surface as a result of fault movement associated with an earthquake.
Hail	Solid precipitation consisting of fragments of ice water called hailstones.
Hazard	A source of potential danger or adverse condition. Hazards in this how to series will include naturally occurring events such as floods, earthquakes, tornadoes, tsunami, coastal storms, landslides, and wildfires that strike populated areas. A natural event is a hazard when it has the potential to harm people or property.
Hazard event	A specific occurrence of a particular type of hazard.
Hazard identification	The process of identifying hazards that threaten an area.
Hazard mitigation	Sustained actions taken to reduce or eliminate long-term risk from hazards and their effects.
Hazardous material (HAZMAT)	Substance that has the ability to harm humans, property or the environment. The United States Environmental Protection Agency defines hazardous waste as substances that: 1) may cause or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible illness; 2) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of or otherwise managed; and 3) whose characteristics can be measured by a standardized test or reasonably detected by generators of solid waste through their knowledge of their waste. Hazardous waste is also ignitable, corrosive, or reactive (explosive) (EPA 40 CFR 260.10). A material may also be classified as hazardous if it contains defined amounts of toxic chemicals.
Hazard profile	A description of the physical characteristics of hazards and a determination of various descriptors including magnitude, duration, frequency, probability, and extent. In most cases, a community can most easily use these descriptors when they are recorded and displayed as maps.
Hazardous Waste Operations and Emergency Response (HAZWOPER)	The Occupational Safety and Health Agency (OSHA) regulations that cover safety and health issues at hazardous waste sites and response to chemical incidents.
Hazard reduction	Any treatment of a hazard that reduces its threat.
HazUS (Hazards U.S.)	A GIS-based nationally standardized earthquake loss estimation tool developed by FEMA.

Heat wave	Periods of excessive heat, typically exceeding 95 degrees Fahrenheit, often with high levels of humidity, and lasting more than three days.
Hexavalent chromium	Compounds that contain the element chromium in its +6 (hexa) oxidation state. These compounds are used extensively in several different industries; however, it is a known human carcinogen and thus its use is now regulated. Groundwater in many parts of the country has been contaminated with varying levels of hexavalent chromium.
High-velocity wave action	Condition in which *wave heights* or *wave runup depths* are greater than or equal to 3.0 feet.
Highest adjacent grade	Elevation of the highest natural or regarded ground surface, or structural fill, that abuts the walls of a building.
Holocene	An epoch of the Quaternary period spanning from the end of the Pleistocene to the present time (the past about 11,000 years).
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.
Hurricane clip or strap	Structural connector, usually metal, used to tie roof, wall, floor, and foundation members together so that they can resist wind forces.
Hydrocompaction	Settlement of loose, granular soils that occurs when the loose, dry structure of the sand grains held together by a clay binder or other cementing agent collapses upon the introduction of water.
Hydrodynamic loads	Loads imposed on an object, such as a building, by water flowing against and around it. Among these loads are positive frontal pressure against the structure, drag effect along the sides, and negative pressure on the downstream side.
Hydrology	The science of dealing with the waters of the earth. A flood discharge is developed by a hydrologic study.
Hydrostatic loads	Loads imposed on a surface, such as a wall or floor slab, by a standing mass of water. The water pressure increases with the square of the water depth.
Hypocenter	The earthquake focus, that is, the place at depth, along the fault plane, where an earthquake rupture started.
Hypothermia	Abnormally low body temperature (typically below 95 degrees Fahrenheit) that is accompanied by any of several signs, including uncontrollable shivering, disorientation, memory loss, slurred speech, drowsiness, and apparent exhaustion.
Igneous	Type of rock or mineral that formed from molten or partially molten magma.
Infiltration	The process by which water seeps into the soil, as influenced by soil texture, soil structure, and vegetation cover.

Infrastructure	Refers to the public services of a community that have a direct impact on the quality of life. Infrastructure includes communication technology such as phone lines or Internet access, vital services such as public water supplies and sewer treatment facilities, and includes an area's transportation system such as airports, heliports; highways, bridges, tunnels, roadbeds, overpasses, railways, bridges, rail yards, depots; and waterways, canals, locks, seaports, ferries, harbors, drydocks, piers and regional dams.
Intensity	A measure of the effects of a hazard event at a particular place.
Invasive plants	Plants that aggressively expand their ranges over the landscape, typically at the expense of native plants that are displaced or destroyed by the newcomers. Invasive species are typically considered a major threat to biological diversity.
Isolation joint	Separation between adjoining parts of a concrete structure, usually a vertical plane, at a designated location such as to interfere least with the performance of the structure, yet such as to allow relative movement in three directions and avoid formation of cracks elsewhere in the concrete and through which all or part of the bonded reinforcement is interrupted. See *Contraction joint*.
Jet stream	A relatively narrow stream of fast-moving air in the middle and upper troposphere. Surface cyclones develop and move along the jet stream.
Jetting (of piles)	Use of a high-pressure stream of water to embed a pile in sandy soil. See *pile foundation*.
Joist	Any of the parallel structural members of a floor system that support, and are usually immediately beneath, the floor.
ka	Thousands of years before present.
Landslide	A general term covering a wide variety of mass-movement landforms and processes involving the downslope transport, under gravitational influence, of soil and rock material en masse.
Lateral force	The force of the horizontal, side-to-side motion on the Earth's surface as measured on a particular mass; either a building or structure.
Lateral spreading	Lateral movements in a fractured mass of rock or soil which result from liquefaction or plastic flow or subjacent materials.
Left-lateral fault	A strike-slip fault across which a viewer would see the block on the opposite side of the fault move to the left.
Level-of-service standard (LOS standard)	Quantifiable measures against which services being delivered by a service provider can be compared. Standards based upon recognized and accepted professional and county standards, while reflecting the local situation within which services are being delivered. Levels-of-service standards for fire protection may include response times, personnel per given population, and emergency water supply. LOS standards can be used to evaluate the way in which fire protection services are being delivered, for use in countywide fire planning efforts.
Lifeline system	Linear conduits or corridors for the delivery of services or movement of people and information (e.g., pipelines, telephones, freeways, railroads).
Lineament	Straight or gently curved, lengthy features of earth's surface, frequently expressed topographically as depressions or lines of depressions, scarps, benches, or change in vegetation.

Liquefaction	Changing of soils (unconsolidated alluvium) from a solid state to weaker state unable to support structures; where the material behaves similar to a liquid as a consequence of earthquake shaking. The transformation of cohesionless soils from a solid or liquid state as a result of increased pore pressure and reduced effective stress.
Live loads	*Loads* produced by the use and occupancy of the building or other structure. Live loads do not include construction or environmental loads such as wind load, snow load, rain load, earthquake load, flood load, or dead load. See *Loads*.
Load-bearing wall	Wall that supports any vertical load in addition to its own weight. See *Non-load-bearing wall*.
Loads	Forces or other actions that result from the weight of all building materials, occupants and their possessions, environmental effects, differential movement, and restrained dimensional changes. Permanent loads are those in which variations over time are rare or of small magnitude. All other loads are variable loads.
Lowest adjacent grade (LAG)	Elevation of the lowest natural or re-graded ground surface, or structural fill, that abuts the walls of a building. See *Highest adjacent grade*.
Lowest floor	Under the NFIP, the lowest floor of the lowest enclosed area (including basement) of a structure.
Lowest horizontal structural member	In an elevated building, the lowest beam, *joist*, or other horizontal member that supports the building. *Grade beams* installed to support vertical foundation members where they enter the ground are not considered lowest horizontal structural members.
Ma	Millions of years before present.
Macroburst	A strong downdraft over 2.5 miles in diameter that can cause damaging winds lasting 5 to 20 minutes. Formed by an area of significantly rain-cooled air that after hitting ground levels spreads out in all directions.
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.
Main shock	The biggest earthquake in a sequence of earthquakes that occur fairly close in time and space. Smaller shocks before the main shock are called foreshocks; smaller shocks that occur after the main shock are called aftershocks.
Major earthquake	Capable of widespread, heavy damage up to 50+ miles from epicenter; generally near Magnitude range 6.5 to 7.0 or greater, but can be less, depending on rupture mechanism, depth of earthquake, location relative to urban centers, etc
Manufactured home	Under the *National Flood Insurance Program*, a *structure*, transportable in one or more sections, which is built on a permanent chassis and is designed for use with or without a permanent foundation when attached to the required utilities. The term "manufactured home" does not include a "recreational vehicle."
Marsh	Wetland dominated by herbaceous or non-woody plants often developing in shallow ponds or depressions, river margins, tidal areas, and estuaries.
Masonry	Built-up construction of combination of building units or materials of clay, shale, concrete, glass, gypsum, stone, or other

Mass casualty	Incident in which the number of victims exceeds the capability of the emergency management system to manage the incident effectively.
Maximum Contaminant Level (MCL)	Federal drinking water standard: "the maximum permissible level of a contaminant in water which is delivered to any user of a public water system (Code of Federal Regulations, Title 40, Part 141.2).
Maximum Magnitude Earthquake (Mmax)	The highest magnitude earthquake a fault is capable of producing based on physical limitations, such as the length of the fault or fault segment.
Maximum Probable Earthquake (MPE)	The design size of the earthquake expected to occur within a time frame of interest, for example within 30 years or 100 years, depending on the purpose, lifetime or importance of the facility. Magnitude/frequency relationships are based on historic seismicity, fault slip rates, or mathematical models. The more critical the facility, the longer the time period considered.
Mean sea level (MSL)	Average height of the sea for all stages of the tide, usually determined from hourly height observations over a 19-year period on an open coast or in adjacent waters having free access to the sea. See *National Geodetic Vertical Datum*.
Mediterranean climate	The climate characteristic of the Mediterranean region and most of California, characterized by hot, dry summers, and cool, wet winters.
Metal roof panel	Interlocking metal sheet having a minimum installed weather exposure of 3 square feet per sheet.
Metal roof shingle	Interlocking metal sheet having an installed weather exposure less than 3 square feet per sheet.
Metamorphic rock	A rock whose original mineralogy, texture, or composition has been changed due to the effects of pressure, temperature, or the gain or loss of chemical components.
Microburst	A very localized zone of sinking air, less than 2.5 miles in diameter, producing damaging, straight-line, divergent winds at or near the ground surface lasting 2 to 5 minutes.
Mitigation	Any action taken to reduce or permanently eliminate the long-term risk to life and property from natural hazards.
Mitigation directorate	Component of *Federal Emergency Management Agency* directly responsible for administering the flood hazard identification and *floodplain management* aspects of the *National Flood Insurance Program*.
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.
Moderate earthquake	Capable of causing considerable to severe damage, generally in the range of Magnitude 5.0 to 6.0 (Modified Mercalli Intensity <VI), but highly dependent on rupture mechanism, depth of earthquake, and location relative to urban center, etc.
Modified Mercalli Intensity	A qualitative measure of the size of an earthquake based on people's description of how strongly the earthquake was felt, and the damage it caused to the built environment. The scale has 12 divisions, ranging from I (felt by only a very few people) to XII (total damage).
Moment magnitude (seismic moment, Mw)	A measure of earthquake size that is based on the amount of energy released when a fault ruptures. Considered the most meaningful and thus preferred measure of earthquake size.

Monsoon	A seasonal reversing wind that is accompanied by precipitation. In North America, the monsoon occurs between late June and early September; starts in Mexico and spreads northward into Arizona, New Mexico, West Texas, Nevada, Utah, Colorado and eastern California.
Mutual Aid Agreement	A reciprocal aid agreement between two or more agencies that defines what resources each will provide to the other in response to certain predetermined types of emergencies. Mutual aid response is provided upon request.
National Flood Insurance Program (NFIP)	Federal program created by Congress in 1968 that makes *flood* insurance available in communities that enact and enforce satisfactory *floodplain management regulations*.
National Geodetic Vertical Datum of 1929 (NGVD)	Datum established in 1929 and used 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 or, more recently, to the *North American Vertical Datum*.
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.
Natural attenuation	Reduction in mass or concentration of a compound in groundwater over time or distance from the source of constituents of concern due to naturally occurring physical, chemical, and biological processes, such as biodegradation, dispersion, dilution, adsorption, and volatilization. (American Society for Testing and Materials, 2003).
Naturally decay-resistant wood	Wood whose composition provides it with some measure of resistance to decay and attack by insects, without preservative treatment (e.g., heartwood of cedar, black locust, black walnut, and redwood).
Near-field earthquake	Used to describe a local earthquake within approximately a few fault zone widths of the causative fault which is characterized by high frequency waveforms that are destructive to above-ground utilities and short period structures (less than about two or three stories).
New construction	For the purpose of determining flood insurance rates under the *National Flood Insurance Program*, *structures* for which the start of construction commenced on or after the effective date of the initial *Flood Insurance Rate Map* or after December 31, 1974, whichever is later, including any subsequent improvements to such structures. (See *Post-FIRM structure*.) For *floodplain management* purposes, new construction means *structures* for which the *start of construction* commenced on or after the effective date of a *floodplain management regulation* adopted by a community and includes any subsequent improvements to such structures.
Non-coastal A zone	The portion of the *Special Flood Hazard Area* in which the principal source of *flooding* is runoff from rainfall, snowmelt, or a combination of both. In non-coastal A zones, *flood* waters may move slowly or rapidly, but waves are usually not a significant threat to buildings. See *A zone* and *coastal A zone*. (Note: the *National Flood Insurance Program* regulations do not differentiate between non-coastal A zones and *coastal A zones*.)
Non-load-bearing wall	Wall that does not support vertical loads other than its own weight. See *Load-bearing wall*.

Nor'easter	An extra-tropical cyclone producing gale-force winds and precipitation in the form of heavy snow or rain.
North American Vertical Datum (NAVD)	Datum used as a basis for measuring flood, ground, and structural elevations. NAVD is used in many recent *Flood Insurance Studies* rather than the *National Geodetic Vertical Datum*.
Oblique – reverse fault	A fault that combines some strike-slip motion with some dip-slip motion in which the upper block, above the fault plane, moves up over the lower block.
Offset ridge	A ridge that is discontinuous on account of faulting.
Offset stream	A stream displaced laterally or vertically by faulting
One hundred (100)-year flood	See *Base flood*.
Oriented strand board (OSB)	Mat-formed wood structural panel product composed of thin rectangular wood strands or wafers arranged in oriented layers and bonded with waterproof adhesive.
Outflow	Follows water inundation creating strong currents that rip at structures and pound them with debris, and erode beaches and coastal structures.
Paleoseismic	Pertaining to an earthquake or earth vibration that happened decades, centuries, or millennia ago.
Peak Ground Acceleration (PGA)	The greatest amplitude of acceleration measured for a single frequency on an earthquake accelerogram. The maximum horizontal ground motion generated by an earthquake. The measure of this motion is the acceleration of gravity (equal to 32 feet per second squared, or 980 centimeter per second squared), and generally expressed as a percentage of gravity.
Peak flood	The highest discharge or stage value of a flood.
Pedogenic	Pertaining to soil formation.
Perched groundwater	Unconfined groundwater separated from an underlying main body of ground water by an unsaturated zone.
Peak flood	The highest discharge or stage value of a flood.
Perchlorates	Negatively charged molecules highly persistent in the environment that can displace the iodide molecule in the thyroid gland, leaving to hypothyroidism in adults, and impaired development in infants.
Perennial stream	A stream that flows continuously throughout the year.
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.
Plutonic	Pertaining to igneous rocks formed at great depth.
Plywood	Wood structural panel composed of plies of wood veneer arranged in cross-aligned layers. The plies are bonded with an adhesive that cures on application of heat and pressure.
Pore pressure	The stress transmitted by the fluid that fills the voids between particles of a soil or rock mass.

Post foundation	Foundation consisting of vertical support members set in holes and backfilled with compacted material. Posts are usually made of wood and usually must be braced. Posts are also known as columns, but columns are usually made of concrete or masonry.
Post-FIRM structure	For purposes of determining insurance rates under the *National Flood Insurance Program*, structures for which the *start of construction* commenced on or after the effective date of an initial *Flood Insurance Rate Map* or after December 31, 1974, whichever is later, including any subsequent improvements to such structures. This term should not be confused with the term *new construction* as it is used in *floodplain management*.
Potentially active fault	A fault showing evidence of movement within the past 1.6 million years (750,000 years according to the U.S. Geological Survey) but before about 11,000 years ago, and that is capable of generating damaging earthquakes.
Precast concrete	Structural concrete element cast elsewhere than its final position in the structure. See *Cast-in-place concrete*.
Pressure-treated wood	Wood impregnated under pressure with compounds that reduce the susceptibility of the wood to flame spread or to deterioration caused by fungi, insects, or marine borers.
Primary fault rupture	Fissuring and displacement of the ground surface along a fault that breaks in an earthquake.
Probability	A statistical measure of the likelihood that a hazard event will occur.
Project	A development application involving zone changes, variances, conditional use permits, tentative parcel maps, tentative tract maps, and plan amendments.
Quaternary	The second period of the Cenozoic era, consisting of the Pleistocene and Holocene epochs; covers the last approximately two million years.
Rain shadow	A reduction in precipitation in an area on the leeward side of a mountain or range of mountains, caused by the release of moisture on the windward side.
Recurrence interval	The time between earthquakes of a given magnitude, or within a given magnitude range, on a specific fault or within a specific area.
Reinforced concrete	Structural concrete reinforced with steel bars.
Remote shutoff	Valve that can be used to shut off the flow of a substance or chemical from a location away from the spill or break.
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.
Resonance	Amplification of ground motion frequencies within bands matching the natural frequency of a structure and often causing partial or complete structural collapse; effects may demonstrate minor damage to single-story residential structures while adjacent 3- or 4-story buildings may collapse because of corresponding frequencies, or vice versa.

Response spectra	The range of potentially damaging frequencies of a given earthquake applied to a specific site and for a particular building or structure.
Response time	The time that elapses between the moment a 911 call is placed to the emergency dispatch center and the time that a first-responder arrives on scene. Response time includes dispatch time, turnout time (the time it takes firefighters to travel to the fire station, don their personal protection equipment, and prepare the apparatus), and travel time.
Retrofit	Any change made to an existing structure to reduce or eliminate damage to that structure from flooding, *erosion*, high winds, earthquakes, or other hazards
Revetment	Facing of stone, cement, sandbags, or other materials placed on an earthen wall or embankment to protect it from *erosion* or *scour* caused by *flood* waters or wave action.
Richter scale	A numerical scale of earthquake magnitude devised by seismologist C.F. Richter in 1935. Seismologists no longer use this magnitude scale because of limitations in how it measures large earthquakes, and prefer instead to use moment magnitude as a measure of the energy released during an earthquake.
Right-lateral fault	A strike-slip fault across which a viewer would see the block on the opposite side of the fault move to the right.
Riprap	Broken stone, cut stone blocks, or rubble that is placed on slopes to protect them from *erosion* or *scour* caused by *flood* waters or wave action.
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.
Rockfall	Free-falling to tumbling mass of bedrock that has broken off steep canyon walls or cliffs.
Roof deck	Flat or sloped roof surface not including its supporting members or vertical supports.
Sand boil	An accumulation of sand resembling a miniature volcano or low volcanic mound produced by the expulsion of liquefied sand to the sediment surface. Also called sand blows, and sand volcanoes.
Sandstone	A medium-grained, clastic sedimentary rock composed of abundant rounded or angular fragments of sand size set in a fine-grained matrix and more or less firmly united by a cementing material.
Santa Ana (or Santana) wind	Strong, typically extremely dry offshore winds that characteristically blow through southern California and northern Baja California in late fall and winter. They typically originate in the Great Basin or upper Mojave Desert, and can be either hot or cold. The winds tend to funnel down the valleys and canyons, where gusts can attain speeds of 60 to 90 miles per hour (mph). Several devastating wildfires in southern California have been associated with Santa Ana winds.

Saturated	Said of the condition in which the interstices of a material are filled with a liquid, usually water.
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. A line of cliffs produced by faulting or by erosion. The term is an abbreviated form of escarpment.
Scour	Removal of soil or fill material by the flow of floodwaters. The term is frequently used to describe storm-induced, localized conical erosion around pilings and other foundation supports where the obstruction of flow increases turbulence.
Secondary fault rupture	Ground surface displacements along faults other than the main traces of active regional faults.
Sediment	Solid fragmental material that originates from weathering of rocks and is transported or deposited by air, water, ice, or that accumulates by other natural agents, such as chemical precipitation from solution, and that forms in layers on the Earth's surface in a loose, unconsolidated form.
Sedimentary rock	Type of rock composed of material deposited at the Earth's surface or at the bottom of bodies of water by the actions of water, wind, gravity, or ice. Sedimentary rocks generally differ from sediment in that the individual particles have been partially or fully cemented together by clay, silica, calcium carbonate or some other material, giving the rock strength.
Seiche	A free or standing-wave oscillation of the surface of water in an enclosed or semi-enclosed basin (such as a lake, bay, or harbor), that is initiated chiefly by local changes in atmospheric pressure, aided by winds, tidal currents, and earthquakes, and that continues, pendulum-fashion, for a time after cessation of the originating force.
Seismic moment	A measure of the size of an earthquake that is associated with the amount of energy released (the force that was necessary to overcome the friction along the fault plane), the area of the fault rupture, and the average amount of slip.
Seismicity	Describes the likelihood of an area being subject to earthquakes.
Seismogenic	Capable of producing earthquake activity.
Seismograph	An instrument that detects, magnifies, and records vibrations of the Earth, especially earthquakes. The resulting record is a seismogram.
Shear wall	*Load-bearing wall* or *non-load-bearing wall* that transfers in-plane lateral forces from lateral *loads* acting on a structure to its foundation.
Sheet flow	An overland flow or downslope movement of water taking the form of a thin, continuous film over relatively smooth soil or rock surfaces, and not concentrated into channels larger than rills.
Shutter ridge	That portion of an offset ridge that blocks or "shutters" the adjacent canyon.
Silt	A rock fragment or detrital particle smaller than a very fine sand grain and larger than coarse clay, having a diameter in the range of 1/256 to 1/16 mm (4-62 microns, or 0.00016-0.0025 in.). An indurated silt having the texture and composition of shale but lacking its fine lamination is called a siltstone.

Single-ply membrane	Roofing membrane that is field-applied with one layer of membrane material (either homogeneous or composite) rather than multiple layers.
Slip rate	The speed at which a fault is moving, typically expressed in millimeters per year (mm/yr), and generally estimated by measuring the amount of offset that has occurred in a given, known amount of time.
Slope creep	Deformation and movement of the outer soil or rock that covers a slope due to the forces of gravity overcoming the shear strength of the material.
Slope ratio	Refers to the angle or gradient of a slope as the ratio of horizontal units to vertical units. For example, in a 2:1 slope, for every two horizontal units, there is a vertical rise of one unit (equal to a slope angle, from the horizontal, of 26.6 degrees).
Slump	A landslide characterized by a shearing and rotary movement of a generally independent mass of rock or earth along a curved slip surface.
Soft-story building	Building with a story, generally the ground or first floor, lacking adequate strength or toughness due to too few shear walls. Examples of this type of structure include apartments above glass-fronted stores, and buildings perched atop parking garages.
Soil horizon	A layer of soil that is distinguishable from adjacent layers by characteristic physical properties such as structure, color, or texture.
Special Flood Hazard Area (SFHA)	Under the *National Flood Insurance Program*, an area having special *flood*, mudslide (i.e., mudflow) and/or flood-related erosion hazards, and shown on a Flood Hazard Boundary Map or *Flood Insurance Rate Map* as Zone A, AO, A1-A30, AE, A99, AH, V, V1-V30, VE, M or E.
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.
Standardized Emergency Management System (SEMS)	(Government Code § 8607). The group of principles developed for coordinating state and local emergency response in California. SEMS provides for organization of a multiple-level emergency response, and is intended to structure and facilitate the flow of emergency information and resources within and between the organizational levels--the field response, local government, operational areas, regions and the state management level. SEMS incorporates by reference: the Incident Command System (ICS); multi-agency or inter-agency coordination; the State's Mutual Aid Program; and Operational Areas.

Start of construction	Under the *National Flood Insurance Program*, date the building permit was issued, provided the actual start of construction, repair, reconstruction, rehabilitation, addition placement, or other improvement was within 180 days of the permit date. The actual start means either the first placement of permanent construction of a structure on a site, such as the pouring of slab or footings, the installation of piles, the construction of columns, or any work beyond the stage of excavation; or the placement of a manufactured home on a foundation. Permanent construction does not include land preparation, such as clearing, grading, and filling; nor does it include the installation of streets and/or walkways; nor does it include excavation for a basement, footings, piers, or foundations or the erection of temporary forms; nor does it include the installation on the property of accessory buildings, such as garages or sheds not occupied as dwelling units or not part of the main structure. For a *substantial improvement*, the actual start of construction means the first alteration of any wall, ceiling, floor, or other structural part of a building, whether or not that alteration affects the external dimensions of the building.
State Coordinating Agency	Under the *National Flood Insurance Program*, the agency of the state government, or other office designated by the Governor of the state or by state statute to assist in the implementation of the *National Flood Insurance Program* in that state.
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 postdisaster mitigation activities.
Stillwater elevation	Projected elevation that flood waters would assume, referenced to the *National Geodetic Vertical Datum*, *North American Vertical Datum*, or other datum, in the absence of waves resulting from wind or seismic effects.
Storage capacity	Dam storage measured in acre-feet or decameters, including dead storage.
Strike-slip fault	A fault with a vertical to sub-vertical fault surface that displays evidence of horizontal and opposite displacement.
Structural concrete	All concrete used for structural purposes, including *plain concrete* and *reinforced concrete*.
Structural engineer	A licensed civil engineer certified by the State as qualified to design and supervise the construction of engineered structures.
Structural fill	Fill compacted to a specified density to provide structural support or protection to a *structure*. See *Fill*.

Structure	Something constructed, such as a building, or part of one. For *floodplain management* purposes under the *National flood Insurance Program*, a walled and roofed building, including a gas or liquid storage tank, that is principally above ground, as well as a manufactured home. For insurance coverage purposes under the NFIP, structure means a walled and roofed building, other than a gas or liquid storage tank, that is principally above ground and affixed to a permanent site, as well as a *manufactured home* on a permanent foundation. For the latter purpose, the term includes a building while in the course of construction, alteration, or repair, but does not include building materials or supplies intended for use in such construction, alteration, or repair, unless such materials or supplies are within an enclosed building on the premises.
Subsidence	The sudden sinking or gradual downward settling of the Earth's surface with little or no horizontal motion.
Substantial damage	Damage of any origin sustained by a structure in a Special Flood Hazard Area whereby the cost of restoring the structure to its before-damaged condition would equal or exceed 50 percent of the market value of the structure before the damage.
Substantial improvement	Under the *National Flood Insurance Program*, any reconstruction, rehabilitation, addition, or other improvement of a *structure*, the cost of which equals or exceeds 50 percent of the market value of the structure before the *start of construction* of the improvement. This term includes structures, which have incurred *substantial damage*, regardless of the actual repair work performed. The term does not, however, include either (1) any project for improvement of a structure to correct existing violations of state or local health, sanitary, or safety code specifications which have been identified by the local code enforcement official and which are the minimum necessary to assure safe living conditions, or (2) any alteration of a "historic structure," provided that the alteration will not preclude the structure's continued designation as a "historic structure."
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.
Surficial failure	Type of slope failure that impacts the near-surface soil and weathered rock face, typically in response to the effects of gravity and precipitation.
Surge	See *Storm surge*.
Swale	In hillside terrace, a shallow drainage channel, typically with a rounded depression or "hollow" at the head.
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.
Thirty (30)-year erosion setback	A state or local requirement that prohibits new construction and certain improvements and repairs to existing coastal buildings located in an area expected to be lost to *shoreline retreat* over a 30-year period. The inland extent of the area is equal to 30 times the average annual long-term recession rate at a site, measured from a reference feature.

Thrust fault	A fault, with a relatively shallow dip, in which the upper block, above the fault plane, moves up over the lower block.
Thunderstorm	A weather condition that develops when warm, moist air meets a cold front, producing strong winds, and sometimes tornadoes and hail.
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.
Transform system	A system in which faults of plate-boundary dimensions transform into another plate-boundary structure when it ends.
Transpression	In crustal deformation, an intermediate stage between compression and strike-slip motion; it occurs in zones with oblique compression.
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 disturbance	Tropical cyclone that maintains its identity for at least 24 hours and is marked by moving thunderstorms and with slight or no rotary circulation at the water surface. Winds are not strong. It is a common phenomenon in the tropics and is the first discernable stage in the development of a *hurricane*.
Tropical storm	A tropical cyclone with maximum sustained winds greater than 39 mph and less than 74 mph.
Tsunami	Great sea wave produced by a submarine earthquake, landslide, 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.
Unconfined aquifer	Aquifer in which the upper surface of the saturated zone is free to rise and fall.
Unconsolidated sediments	A deposit that is loosely arranged or unstratified, or whose particles are not cemented together, occurring either at the surface or at depth.
Undermining	Process whereby the vertical component of erosion or scour exceeds the depth of the base of a building foundation or the level below which the bearing strength of at the foundation is compromised.
Unreinforced Masonry (URM) Structure	Structures in which there is no steel reinforcement within the masonry walls. The definition of an unreinforced masonry building can vary among jurisdictions. Some cities classify unreinforced infill walls within a reinforced frame as a URM while others classify unreinforced exterior veneers on to a wood frame as URMs.
Uplift	Hydrostatic pressure caused by water under a building. It can be strong enough lift a building off its foundation, especially when the building is not properly anchored to its foundation.
Upper bound earthquake	The ground motion with a 10% chance of exceedance in 100 years, with a statistical return period of 949 years.

Variance	Under the *National Flood Insurance Program*, grant of relief by a community from the terms of a *floodplain management regulation*.
Violation	Under the *National Flood Insurance Program*, the failure of a structure or other development to be fully compliant with the community's *floodplain management regulations*. A *structure* or other *development* without the elevation certificate, other certifications, or other evidence of compliance required in Sections 60.3(b)(5), (c)(4), (c)(10), (d)(3), (e)(2), (e)(4), or (e)(5) of the NFIP regulations is presumed to be in violation until such time as that documentation is provided.
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.
Watershed	A topographically defined region draining into a particular water course.
Waterspout	Tornado that forms over water.
Water surface elevation	Under the *National Flood Insurance Program*, the height, in relation to the *National Geodetic Vertical Datum* of 1929 (or other datum, where specified), of *floods* of various magnitudes and frequencies in the *floodplains* of coastal or riverine areas.
Water table	The upper surface of groundwater saturation of pores and fractures in rock or surficial earth materials.
Water year	The 12-month period from October 1 through September 30 of the following year.
Wave	Ridge, deformation, or undulation of the water surface.
Wave crest elevation	Elevation of the crest of a wave.
Wave height	Vertical distance between the wave crest and wave trough.
Wave runup	Rush of wave water up a slope or structure.
Wave runup depth	Vertical distance between the maximum wave runup elevation and the eroded ground elevation.
Wave runup elevation	Elevation, referenced to the *National Geodetic Vertical Datum* or other datum, reached by *wave runup*.
Weather	The short-term state of the air or atmosphere with respect to heat or cold, wetness or dryness, calm or storm, clearness or cloudiness, or any other meteorological phenomena.
Wildfire	An uncontrolled fire spreading through vegetative fuels, exposing and possibly consuming structures.

X zone	Under the *National Flood Insurance Program,* areas where the *flood* hazard is less than that in the *Special Flood Hazard Area*. Shaded X zones shown on recent *Flood Insurance Rate Maps* (B zones on older maps) designate areas subject to inundation by the *500-year flood*. Un-shaded X zones (C zones on older *Flood Insurance Rate Maps*) designate areas where the annual probability of flooding is less than 0.2 percent.
Zone	A geographical area shown on a Flood Insurance Rate Map (FIRM) that reflects the severity or type of flooding in the area.

APPENDIX F: CALIFORNIA DISASTERS SINCE 1950

Disaster Name	Disaster #	Year	Counties and Cities Declared	State Declaration	# of Deaths	# of Injuries	Cost of Damage
Floods	OCD 50-01	1950	Statewide	11/21/50	9		$32,183,000
Fire, Flood, and Erosion	DR-28	1954	Los Angeles, San Bernardino	2/5/54			Not Avail
Floods	DR-47	1955	Statewide	12/22/55	74		$200,000,000
Fires	DR-65	1956	Los Angeles (Malibu area), Ventura		1	Several hundred	$70,000,000
Unseasonal and Heavy Rainfall		1957	Cherry producing areas of Northern California	5/20/57		2	$6,000,000
Fires	CDO 58-01	1958	Los Angeles	1/3/58	1	23	Not available
High Tides	CDO 58-02	1958	City of Imperial Beach, San Diego County	1/31/58			Not available
Storm & Flood Damage	CDO 58-03	1958	Northern California (Southern boundaries of Santa Cruz, Santa Clara, Stanislaus, Tuolumne, Alpine counties to the Oregon border)	2/26/58			Not available
Storm & Flood Damage	N/A	1958	Statewide	4/2/58	13		$24,000,000
Potential Flood Damage and Landsides as a Result of Fires	CDO 59-01	1959	Los Angeles	1/8/59			Not applicable
Unseasonal and Heavy Rainfall	N/A	1959	Tokay grape producing areas of Northern California	9/17/59	2		$100,000
Major and Widespread Fires	N/A	1960	Los Angeles, San Bernardino	7/21-22/60		12	$10,000,000
Major and Widespread Fires	N/A	1960	Lassen Plumas, Shasta, Sierra, Tehama	8/16/60			$3,075,000
Bel Air Fires	DR-119	1961	Los Angeles			103	Between $50,000,000 - $100,000,000
Widespread Fires	N/A	1961	Amador, Butte, El Dorado, Napa, Nevada, Placer, San Diego, Sonoma, Tehama	9/8/61			$5,696,813
High Tides and Waves Caused By Storms At Sea	N/A	1961	Ventura	1/16/61			Not available
Flood and Rainstorm	DR-122	1962	Los Angeles, Ventura	2/16/62 & 2/23/62			Not available
Fires and Explosions	N/A	1962	Alameda	9/14/62	1	12	$500,000
Flood and Rainstorm		1962	Alameda, Butte, Contra Costa, Modoc, Napa San Mateo, Sierra, Sutter, Yuba, Placer, Trinity, Lassen	10/17/62, 10/25/62, 10/30,62, & 11/4/62			$4,000,000
Baldwin Hills Dam Failure	DR-161	1963	Los Angeles	12/16/63			$5,233,203
High Tides and Heavy Surf	N/A	1963	Orange, City of Redondo Beach		5		$500,000
Abnormally Heavy and Continuous Rainfall	N/A	1963	Northern California (boundaries of San Luis Obispo, Ventura, Los Angeles, and San Bernardino counties to the Oregon State Line	2/14/64			Not Available
Flood and Rainstorm	Unknown	1963	Alpine, Nevada, Placer, Plumas, Sierra, Amador, Colusa, El Dorado, Glenn, Lake, Lassen, Tehama, Santa Clara, Santa Cruz, Siskiyou, Yolo, Tulare, Mono, Trinity, Yuba	2/7/63, 2/26/63, 2/29/63, & 4/22/63			Not available
Major Widespread Fires	N/A	1964	Los Angeles	3/16/64			$2,000,000

Disaster Name	Disaster #	Year	Counties and Cities Declared	State Declaration	# of Deaths	# of Injuries	Cost of Damage
(Weldon Fire)							
Major and Widespread Fires and Excessively High Winds	N/A	1964	Napa, Sonoma, Santa Barbara	9/22/64, 9/23/64, & 9/25/64			$16,500,000
Storms	N/A	1964	Los Angeles	4/3/64			1,610,300
Abnormally Heavy and Continuous Rainfall	N/A	1964	Humboldt	2/10/64			$1,407,000
Tsunami Caused by 1964 Earthquake in Alaska	N/A	1964	Marin	9/15/64			Not applicable
1964 Late Winter Storms	Unknown	1964	Del Norte, Humboldt, Shasta, Mendocino, Colusa, Glenn, Lassen, Plumas, Sierra, Siskiyou, Sonoma, Sutter, Tehama, Trinity, Amador, Butte, El Dorado, Modoc, Nevada, Placer, Yuba, Alpine, Lake, Sacramento, Yolo, Marin	12/22/64, 12/23/64, 12/28/64, 1/5/65, & 1/1/65			$213,149,000
Tsunami Caused by Alaska Earthquake	Unknown	1964	Del Norte	3/28/64	12		$10,000,000
Riots	N/A	1965	Los Angeles	8/14/65	32	874	$44,991,000
Major and Widespread Fires	N/A	1965	Marin, Napa, Placer, Solano, Sonoma	9/18/65			Not available
Flooding and Hill Slides Caused by Heavy Rains	N/A	1965	City of Burbank, Los Angeles	1/5/65			Not Available
Slide Damage	N/A	1965	City of Los Angeles	6/21/65			$6,488,600
1965 Heavy Rainfall		1965	Riverside, San Bernardino, Ventura, San Diego	11/24/65, 11/26/65, 12/23/65			$21,843,739
Continuous Rainfall	DR-211	1966	Humboldt	1/14/66			$6,918,000.00
Riots	N/A	1966	San Francisco	9/27/66		42	Not available
Earth slides	N/A	1966	Redwood City	12/16/66			$100,000
1966 Winter Storms	Unknown	1966	Kern, Riverside, Tulare, San Bernardino, San Luis Obispo, Monterey, City of Escondido, Inyo	12/9/66, 12/13/66, 12/16/66, 12/16/66, & 12/23/66			$28,761,041.00
Major and Widespread Fires	N/A	1967	Los Angeles, Orange, San Diego, Ventura	1/7/67			$11,345,000
Riots and Other Conditions	N/A	1968	City of Richmond	8/2/68			Not applicable
Riots	N/A	1969	City of Berkeley	2/5/69	0	20	Not available
Extremely Severe Weather; Freezing	N/A	1969	San Diego	2/5/69			$10,000,000
Major Oil Spill	N/A	1969	Coastal Areas of Southern California				Not available
1969 Storms	Unknown	1969	Los Angeles, San Luis Obispo, Fresno, Inyo, Riverside, San Bernardino, Santa Barbara, Tulare, Ventura, Amador, El Dorado, Kern, Kings, Madera, Modoc, Mono, Monterey, Orange, Placer, Sacramento, San Joaquin, Shasta, Solano, Stanislaus, Tuolumne, Mariposa, Merced, Calaveras, San Benito, Sierra, Contra Costa, Humboldt, Mendocino, Sonoma, Plumas, Tehama, Yuba, Butte, Marin, Yolo	1/23/69, 1/25,69, 1/28/69, 1/29/69, 2/8/69, 2/10/69, 2/16/69, 3/12/69	47	161	$300,000,000
Heavy Snow Runoff		1969	Kings	1/28/96			$2,812,500.00
Riots and	N/A	1970	Santa Barbara	2/26/70		12+	$300,000

Disaster Name	Disaster #	Year	Counties and Cities Declared	State Declaration	# of Deaths	# of Injuries	Cost of Damage
Disorders							
Large Fire	N/A	1970	City of Sonora, Tuolumne	2/26/70			$2,300,000
Widespread Fires	N/A	1970	Riverside	12/22/70			$3,200,000
Storms and Floods	N/A	1970	Contra Costa	4/10/70			Not available
Freezing Conditions	N/A	1970	Napa, Sonoma, Mendocino, San Joaquin, Lake	5/1/70, 5/19/70, 6/8/70, 6/10/70, 7/24/70			$19,749,200
Slide Damage Caused by Heavy Rains and Storms	N/A	1970	City of Oakland	2/10/70			$11,500,000
Slide Damage Caused by Heavy Rains and Storms	N/A	1970	City of Los Angeles	3/10/70			$8,500,000
Northern California Flooding	Unknown	1970	Butte, Colusa, Glenn, Lake, Lassen, Marin, Modoc, Plumas, Shasta, Siskiyou, Tehama, Trinity, Sutter, Yuba, Del Norte, Alameda, El Dorado, Mendocino	1/26/60, 2/3/60, 2/10/60, 3/2/60			$27,657,478
Statewide Fires		1970	City of Oakland, Los Angeles, Ventura, San Diego, Kern, San Bernardino, Monterey, Riverside	9/24/70, 9/28/70, 10/1/70, 10/2/70, 10/20/70, 11/14/70	19		$223,611,000
San Fernando Earthquake	DR-299	1971	Los Angeles	2/9/71	58	2,000	$483,957,000
Widespread Fires	N/A	1971	Santa Barbara	10/13/71	4		$9,000,000
High Ocean Tides and Wind-driven Waves	N/A	1971	Ventura	5/19/71			$250,000
1972 Storms	DR-316	1972	Santa Barbara	1/3/72			$2,660,000
Andrus island Levee Break	DR-342	1972	Sacramento	6/21/72			$23,681,630
Exotic Newcastle Disease Epidemic	N/A	1972	Los Angeles, Orange, Riverside, San Bernardino, San Diego, Ventura, Santa Barbara	4/10/72, 5/22/72			$10,000,000
Drought Conditions	N/A	1972	Glenn, San Benito, Santa Clara	7//73			$8,000,000
Heavy Rains and Mud Slides	N/A	1972	Monterey	10/24/72			$720,000
Severe Weather Conditions	N/A	1972	Sutter	9/3/72			$2,004,300
Freeze and Severe Weather Conditions	N/A	1972	Fresno, Kings, Tulare, Merced, Kern, Madera, San Benito, Stanislaus, El Dorado, Tehama, Placer, Nevada, San Joaquin, Colusa, Siskiyou, Modoc, Santa Clara	4/17/72, 5/22/72, 5/22/72, 5/31/72			$111,517,260
1972 Continuing Storms		1972	Del Norte, Humboldt	2/28/72			$6,817,618
Coastal Flooding	DR-364	1973	Marin, San Luis Obispo, City of South San Francisco, Santa Barbara, Solano, Ventura	1/23/73, 1/30/73, 2/8/73, 2/28/73			$17,998,250
Southern Pacific Railroad Fires and Explosions (Roseville)	N/A	1973	Sacramento, placer	4/30/73	0	37	$2,925,000
Boulder Fire	N/A	1973	San Diego	12/12/73	0		$215,700
High Ocean Tides and Wind-driven Waves	N/A	1973	Ventura	2/1/73			$1,027,000
Storms and Floods	N/A	1973	Colusa, Glenn, Napa, Placer, Sutter, Yuba	2/28/73			$1,864,000
Storms and Floods	N/A	1973	Mendocino	3/15/73			$1,523,200
Storms and Floods	N/A	1973	City of Pacifica	4/11/73			$700,000
Freeze	N/A	1973	Butte	2/28/73			$300,000
Eucalyptus Tree	Unknown	1973	Alameda, Contra Costa	4/4/73			$8,000,000 to $10,000,000

Disaster Name	Disaster #	Year	Counties and Cities Declared	State Declaration	# of Deaths	# of Injuries	Cost of Damage
Freeze							
Fires	N/A	1973	Los Angeles	7/16/73			$1,300,000
Storms	DR-412	1974	Humboldt, Shasta, Siskiyou, Trinity, Glenn, Mendocino, Tehama	1/17/74, 1/18/74			$35,192,500
Storms	DR-432	1974	Mendocino	4/23/74			$4,475,900
Gasoline Purchasing Problems	N/A	1974	Alameda, Contra Costa, Los Angeles, Orange, Riverside, San Mateo, Solano, Santa Clara, Ventura	2/28/74, 3/4/74, 3/10/74			
Storms	N/A	1974	Santa Cruz	2/28/74			$763,267
Fires	N/A	1975	Los Angeles	11/24/75			$19,486,960
Drought	N/A	1976	Alpine, Calaveras, Colusa, Fresno, Glenn, Madera, Merced, San Diego, San Joaquin, Solano, Stanislaus, Sutter, Tuolumne, Alameda, Butte, Contra Costa, Kings, Los Angeles, Riverside, San Luis Obispo, Tulare, Yolo, Amador, Monterey, Napa, Nevada, San Benito, San Bernardino, Tehama, San Mateo, Marin	2/9/76, 2/13,76, 2/24/76, 3/26/76, 7/6/76			$2,664,000,000
1976 High Winds and Flooding	DR-521	1976	Imperial, Riverside, San Bernardino, San Diego	9/13/76, 9/22/76			$120,132,771
Sycamore Fire	N/A	1977	Santa Barbara	7/27/77	0		$25,540,755
Imperial County Flooding	N/A	1977	Imperial	8/23/77			$28,498,469
Threat of Floods/Mud Slides	N/A	1977	Monterey, Riverside	9/8/77			$6,110,000
Storms	N/A	1977	San Diego, Kern, Humboldt, City of Arvin	1/10/78, 12/23/77, 1/22/77, 12/21/77			$38,009,035
Laguna Landslide	DR-566	1978	City of Laguna Beach	10/5/78			$16,595,000
1978 Los Angeles Fire	EM-3067	1978	Los Angeles	10/24/78	1		$61,279,374
Santa Barbara Earthquake	N/A	1978	Santa Barbara	8/15/78	0	65	$12,987,000
PSA Air Crash	N/A	1978	City of San Diego	1/15/79	150		
Storms	N/A	1978	Humboldt, Mendocino, Santa Cruz	1/27/78, 1/20/78			$6,126,409
Storms	Unknown	1978	Inyo, Mono, San Diego, San Luis Obispo, Kings, Monterey, Kern, Los Angeles, Orange, Riverside, San Bernardino, Santa Barbara, Tulare, Ventura	3/9/78, 2/27,78, 2/13/78	14	21	$117,802,785
Severe Storms	DR-594	1979	Riverside	7/26/80			$25,867,100
Imperial Earthquake	DR-609	1979	Imperial	10/16/79	0	91	$21,197,250
Gasoline Shortage Emergency	N/A	1979	Alameda, Contra Costa, Los Angeles, Marin, Monterey, Orange, Riverside, San Francisco, San Diego, Santa Clara, Santa Cruz, San Mateo, Ventura, San Bernardino, Sonoma, Contra Costa, Los Angeles, Orange, Santa Clara	5/8/79 - 11/13/79			
Fires	N/A	1979	Santa Barbara, Ventura, Los Angeles, El Dorado	9/28/79, 9/21/79, 9/20/79			$9,970,119
1980 Winter Storms	DR-615	1980	Santa Barbara, Los Angeles, Orange, Riverside, Ventura, San Bernardino, San Diego	2/21/80, 2/7/80			
Jones Tract Levee Break	DR-633	1980	San Joaquin	9/30/80			$21,510,956
Southern California Fires	DR-635	1980	San Bernardino, Los Angeles, Orange, Riverside	11/18/80			$64,795,200
Delta Levee Break	EM-3078	1980	Contra Costa, Sacramento, San Joaquin	1/23/80			$17,388,013
Owens Valley Earthquake	N/A	1980	Mono	5/28/80	0	9	$2,000,000
Storms	N/A	1980	Stanislaus, Monterey, Solano, Santa Cruz	3/5/80			$316,640,817

Disaster Name	Disaster #	Year	Counties and Cities Declared	State Declaration	# of Deaths	# of Injuries	Cost of Damage
Mediterranean Fruit Fly Infestation	N/A	1981	Contra Costa, Los Angeles, San Benito, Stanislaus, Santa Cruz, San Mateo	8/8/81 - 9/25/81			$22,000,000
Atlas Peak Fire	N/A	1981	Napa	6/24/81	0		$31,000,000
1982 Winter Storms	DR-651	1982	Alameda, Santa Clara, Solano, San Joaquin, Contra Costa, Humboldt, Marin, San Mateo, Santa Cruz, Sonoma	1/5/82 - 1/9/82	33	481	$273,850,000
Orange Fire	DR-657	1982	Orange, City of Redondo Beach	4/21/82			$50,877,040
McDonald Island Levee Break	DR-669	1982	MacDonald Island	8/24/82			$11,561,870
1982-83 Winter Storms	DR-677	1982	Contra Costa, San Joaquin, Sacramento, Marin, San Mateo, Los Angeles, San Diego, Alameda, Orange, San Benito, Santa Barbara, Santa Clara, Santa Cruz, Shasta, Sonoma, Ventura, Trinity, Colusa, Lake, Mendocino, Monterey, San Luis Obispo, Solano, Yolo, Butte, Glenn, Kern, Kings, San Bernardino, Sutter, Tehama, Merced, Del Norte, Fresno, madera, Napa, Placer, Riverside, Stanislaus, Tulare, Humboldt, Mariposa, Nevada, Yuba	1982, 1983	0	0	$523,617,032
Rains Causing Agricultural Losses	N/A	1982	Fresno, Madera, Merced, Monterey, kenr Tulare, Sacramento, San Joaquin, Solano, Stanislaus, Yolo	10/26/82			$345,195,974
Dayton Hills Fire	N/A	1982	Los Angeles, Orange, Ventura	10/10/82	0		$19,277,102
High Tides, Strong Winds, and Rains	N/A	1982	Contra Costa, Sacramento, San Joaquin	12/8/82			$6,964,998
Heavy Rains/ Flooding	N/A	1982	Inyo	9/27/82			$6,161,320
Winter Storms	Unknown	1982	Contra Costa, San Joaquin, Sacramento, Marin, San Mateo, Los Angeles, San Diego, Alameda, orange, San Benito, Santa Barbara, Santa Clara, Santa Cruz, Shasta, Sonoma, Ventura, Trinity, Colusa, Lake Mendocino, Monterey, San Luis Obispo, Solano, Yolo, Butte, Glenn, Kern, Kings, San Bernardino, Sutter, Tehama, Merced, Del Norte, Fresno, Madera, Napa, Placer, Riverside, Stanislaus, Tulare, Humboldt, Mariposa, Nevada, Yuba	12/8/82-3/21/83			$523,617,032
Coalinga Earthquake	DR-682	1983	Fresno	5/2/83	0	47	$31,076,300
Colorado River Flooding	DR-682	1983	Riverside, San Bernardino, Imperial	6/23/83, 6/28/83			$4,640,315
1983 Summer Storms	DR-690	1983	Inyo, Riverside, San Bernardino	8/29/83	3		$34,689,155
Mexican Fruit Fly	N/A	1983	Los Angeles	11/4/83			
Levee Failure, High Winds, High Tides, Floods, Storms, Wind Driven Water	N/A	1983	Contra Costa, Alameda	12/9/83, 1/18/84			$10,909,785
Morgan Hill Earthquake	EM-4043	1984	Santa Clara		0	27	$7,265,000
Storms	N/A	1984	Kern, Riverside, Tulare, San Bernardino, San Luis Obispo, Monterey, City of Escondido, Inyo				$1,600,000
Statewide Fires	DR-739	1985	San Diego, City of Lost Angeles, San Luis Obispo, Monterey, Santa Clara, Santa Cruz, Ventura	7/1/85 - 7/11/85	3	470	$64,845,864

Disaster Name	Disaster #	Year	Counties and Cities Declared	State Declaration	# of Deaths	# of Injuries	Cost of Damage
Wheeler Fire	N/A	1985	Ventura	10/14/85	1	2	
Hydrilla Proliferation	N/A	1985	Shasta	9/13/85			
Storms	DR-758	1986	Humboldt, Napa, Sonoma, Glenn, Lake, Marin, Modoc, Sacramento, Santa Clara, Santa Cruz, Solano, Yuba, Alpine, Amador, Butte, Calaveras, Colusa, El Dorado, Lassen, Mendocino, Nevada, Placer, Plumas, San Joaquin, Sierra, Sutter, Tehama, Tuolumne, Yolo, Fresno, Madera, San Mateo, Alameda, Contra Costa, Del Norte, Trinity, Mono, San Benito, Shasta	2/18-86 - 3/12/86	13		$407,538,904
Heavy Rains	N/A	1986	Monterey, Siskyou	3/26/86			$400,000
Plane Crash	N/A	1986	City of Cerritos	8/31/86	67	2	
Whittier Earthquake	DR-799	1987	Monterey park, City of Whittier, Los Angeles, Orange	10/2/87 - 10/5/87	9	200	$358,052,144
Imperial County Earthquake	N/A	1987	Imperial	11/23/87	0	94	$2,638,833
Mediterranean Fruit Fly	N/A	1987	Los Angeles	8/25/87			
Forest Fire - Del Norte Fire, Pebble Beach	N/A	1987	Monterey		0	8	$15,000,000
Acorn Fire	N/A	1987	Alpine	8/3/87	0	3	$8,500,000
Wildland Fires	N/A	1987	Colusa, Del Norte, Butte, Fresno, Humboldt, Inyo, Kern, Lake, Lassen, Mariposa, Mendocino, Modoc, Mono, Nevada, Placer, Plumas, Riverside, San Bernardino, Shasta, Sierra, Siskiyou, Trinity, Tulare, Tuolumne	9/10/87, 9/3/87	3	76	$18,000,000
Wildfires/ Flooding/ Mud Slides	N/A	1987	San Diego	11/19/87			$5,371,150
Coastal Storms	DR-812	1988	Los Angeles, Orange, San Diego	1/21/88	0		
Fires - 49er, Miller, and Fern	DR-815	1988	Shasta, Solano, Yuba, Nevada	9/11/88-9/20/88	0		$31,247,534
Mediterranean Fruit Fly	N/A	1988	Los Angeles	7/21/88			
Wildland Fires	N/A	1988	Calaveras	7/21/88			
Fire and Wind Driven Waves	N/A	1988	City of Redondo Beach	6/15/88	0		$25,000,000
Fires/ High Winds	N/A	1988	Los Angeles	12/9/88	0	2	$12,400,000
Storms	N/A	1988	Santa Barbara, City of San Buenaventura	1/26/88			$49,416,200
Loma Prieta Earthquake	DR-845	1989	Alameda, Monterey, San Benito, San Mateo, Santa Clara, Santa Cruz, San Francisco, Contra Costa, Marin, City of Isleton, City of Tracy, Solano	10/18/89 - 10/30/89	63	3,757	$5,900,000,000
Mediterranean Fruit Fly	N/A	1989	Los Angeles	8/9/89			
Mediterranean Fruit Fly	N/A	1989	Santa Clara	9/6/89			
Mediterranean Fruit Fly	N/A	1989	San Bernardino	10/3/89			
Mediterranean Fruit Fly	N/A	1989	Orange	11/20/89			
Santa Barbara Fires	DR-872	1990	Los Angeles, Santa Barbara, Riverside, San Bernardino	6/28/90, 6/29/90	3	89	$300,000,000
Freeze	DR-894	1990	Santa Cruz, Fresno, Glenn, imperial, Kern, Mendocino, Monterey, Riverside, San Benito, San Bernardino, San Diego, San Mateo,	12/19/90-1/18/91			$856,329,675

Disaster Name	Disaster #	Year	Counties and Cities Declared	State Declaration	# of Deaths	# of Injuries	Cost of Damage
			Santa Barbara, Santa Clara, Solano, Sonoma, Tulare, Ventura, Alameda, Butte, Colusa, Los Angeles, Madera, Marin, Merced, Napa, San Joaquin, San Luis Obispo, Sutter, Yolo, Yuba, Stanislaus, Tehama				
Drought	N/A	1990	City of Santa Barbara	7/17/90			
Drought	N/A	1990	Santa Barbara	11/13/90			
Upland Earthquake	N/A	1990	Los Angeles, San Bernardino	3/9/90, 3/13/90	0	38	$12,034,150
Mediterranean Fruit Fly	N/A	1990	Riverside	4/18/90			
Mexican Fruit Fly	N/A	1990	Los Angeles, San Diego	5/14/90			
Finley Fire/ Yosemite Fire	N/A	1990	Mariposa, Kern, Tehama	8/13/90, 8/14/90	1	84	$548,000,000
Severe Storms	N/A	1990	Butte, Nevada	2/22/90	1	17	$11,500,000
East Bay Hills Fire	DR-919	1991	Alameda County	10/20/91	25	150	$1,700,000,000
Sweet potato Whitefly	N/A	1991	Imperial, Riverside				$120,567,949
Cantara Spill	N/A	1991	Shasta, Siskyou			300	$38,000,000
1992 Winter Storms	DR-935	1992	Los Angeles, Ventura, City of Los Angeles, kern, orange, San Bernardino	2/12/92, 2/19/92	5		$123,240,531
Los Angeles Civil Disorder	DR-942	1992	Los Angeles	4/29/92	53	2,383	$800,000,000
Cape Mendocino Earthquakes	DR-943	1992	Humboldt	4/25/92	0	356	$48,271,137
Big Bear - Landers Earthquakes	DR-947	1992	Riverside, San Bernardino	6/28/92	1	$402	$91,079,376
Shasta/Calaveras Fire	DR-958	1992	Calaveras, Shasta	8/21/92	0	$8	$54,108,500
1992 Late Winter Storms	DR-979	1992	Alpine, Los Angeles, Humboldt, Napa, Santa Barbara, Culver City, City of Los Angeles, Contra Costa, Mendocino, Sonoma, Fresno, imperial, Madera, Monterey, San Bernardino, Sierra, Tehama, Trinity, Tulare, Modoc, Orange, Riverside, Lassen, Siskiyou, Plumas, San Diego	1/7/93 - 2/19/93	20	10	$600,000,000
Sewage Spill	N/A	1992	San Diego, City of Chula Vista, City of Coronado, San Diego	2/6/92, 2/7/92			
Southern California Firestorms	DR-1005	1993	Los Angeles, Ventura, San Diego, Orange, Riverside, San Bernardino	10/27/93, 10/28/93	4	162	$1,000,000,000
Mediterranean Fruit Fly	N/A	1993	Riverside	5/21/94			
Tijuana River Pollution	N/A	1993	San Diego	9/10/93			
New River Pollution	N/A	1993	Imperial	10/6/93			
Northridge Earthquake	DR-1008	1994	Los Angeles, Ventura, Orange	1/17/94, 1/24/94	57	11,846	$40,000,000,000
Salmon fisheries	DR-1038	1994	Del Norte, Humboldt, Mendocino, Sonoma	5/20/94			$28,300,000
Humboldt Earthquake	N/A	1994	Humboldt	12/29/94			$1,300,000
Mediterranean Fruit Fly	N/A	1994	Ventura	10/7/94			
San Luis Obispo Fire - Hwy 41	N/A	1994	San Luis Obispo	8/24/94		12	$6,382,235
Severe Winter Storms	DR-1044	1995	Los Angeles, Orange, Humboldt, Lake , Sonoma, Butte, Colusa, Contra Costa, Del Norte, Glenn, Kern, Lassen, Mendocino, Modoc, Monterey, Napa, placer, Plumas, San Luis Obispo, Santa Barbara,	1/6/95 - 3/14/95	11		$741,400,000

Disaster Name	Disaster #	Year	Counties and Cities Declared	State Declaration	# of Deaths	# of Injuries	Cost of Damage
			Santa Clara, Santa Cruz, Tehama, Ventura, Yolo, Yuba, Alpine, Amador, Nevada, Riverside, Sacramento, San Bernardino, San Mateo, Shasta, Sutter, Trinity, San Diego, Alameda, Marin, Fresno, Kings, El Dorado, Madera, Solano, Siskiyou				
Late Winter Storms	DR-1046	1995	All counties except Del Norte		17		$1,100,000,000
Southern California Firestorms	EM-3120	1996	Los Angeles, Orange, San Diego	10/1/96		5	$40,000,000
January 1997 Floods		1997	Alpine, Amador, Butte, Colusa, Del Norte, El Dorado, Glenn, Humboldt, Lake, Lassen, Modoc, Napa, Nevada, Plumas, Sacrament, San Joaquin, Sierra, Siskiyou, Solano, Sonoma, Sutter, Tehama, Trinity, Yuba, Calaveras, Madera, Mono, Monterey, Placer, San Benito, San Luis Obispo, San Mateo, Santa Cruz, Shasta, Stanislaus, Tuolumne, Yolo, Contra Costa, Fresno, Marin, Tulare, Mariposa, Merced, Santa Clara, Alameda, San Francisco, Kings,	1/2/97 - 1/31/97	8		$1,800,000,000
El Nino		1998	Alameda, Amador, Butte, Calaveras, Colusa, Contra Costa, Fresno, Glenn Humboldt, Kern, Kings, Lake, Los Angeles, Marin, Mendocino, Merced, Monterey, Napa, Orange, Riverside, Sacramento, San Benito, San Bernardino, San Diego, San Francisco, San Joaquin, San Luis Obispo, San Mateo, Santa Barbara, Santa Clara, Santa Cruz, Siskiyou, Solano, Sonoma, Stanislaus, Sutter, Tehama, Trinity, Tulare, Ventura, Yolo, Yuba		17		$550,000,000
Freeze		1998	Fresno, Kern, Kings, Madera, Merced, Monterey, Tulare, Ventura	2/9/99			
Fire		1999	Various Counties	8/26/99			
Road Damage		1999	Sonoma	3/29/99			
Earthquake		2000	Napa	9/6/00			
Water Shortage		2001	City of Rio Dell	3/16/01			
Sierra Madre Earthquake	N/A	2003	Los Angeles	7/5/91	1	30	$33,500,000
Widespread Fires	N/A	2003	Madera		2		Not available
Freeze and Snow Conditions	N/A	2003	Lake	7/13/72			$357,000
Drought		2003	Modoc, Siskiyou	5/4/01			
Exotic Newcastle Disease Epidemic		2003	15 Northern Counties	2/21/03			
Bark Beetle Infestation		2003	San Bernardino, San Diego, Riverside	3/7/03			
Wildfire		2003	Calaveras	9/10/01			
Southern California Wildfires	DR-1498	2003	Ventura, Los Angeles, San Bernardino, Riverside, San Diego	10/24-26/03			$317,000,000
San Simeon Earthquake	DR-1505	2003	San Luis Obispo, Santa Barbara	12/23/03			$21,100,000
Levee Break	DR-1529	2004	San Joaquin	6/4/04			$53,000,000
La Conchita Mudslide		2005	La Conchita, Ventura County	1/12/05	10	22	
Southern	DR-1577	2005	Kern, Los Angeles, Orange,	1/6/05,	28	8	$200,000,000

Disaster Name	Disaster #	Year	Counties and Cities Declared	State Declaration	# of Deaths	# of Injuries	Cost of Damage
California Severe Storm			Riverside, San Bernardino, San Diego, Santa Barbara, Ventura	1/15/05			
Southern California Severe Storm	DR-1585	2005	Kern, San Bernardino and San Diego	1/15/05			
Flood		2005	Los Angeles Region		9		$250,000,000
California Severe Storms, Flooding, Mudslides and Landslides	DR-1628	2006	Alpine, Amador, Butte, Colusa, Contra Costa, Del Norte, El Dorado, Humboldt, Lake, Lassen, Marin, Mendocino, Napa, Nevada, Placer, Plumas, Sacramento, San Joaquin, San Luis Obispo, San Mateo, Santa Cruz, Sierra, Siskiyou, Solano, Sonoma, Sutter, Trinity, Yolo, and Yuba		3		$245,000,000
California Severe Storms, Flooding, Landslides	DR-1646	2006	Alameda, Amador, Calaveras, El Dorado, Lake, Madera, Marin, Merced, Napa, Nevada, Placer, San Joaquin, San Mateo, Santa Cruz, Sonoma, Stanislaus, and Tuolumne		1		$259,000,000
		2006	Throughout California	7/9-7/14/06	1	17	$16,000,000
		2006	Riverside County	10/26-27/06	4	1	
		2006	Ventura County	12/3-6/06			
Freeze	DR-1689	2007	Fresno, Imperial, Kern, Los Angeles, Monterey, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara, Tulare, and Ventura	1/11-11/17/07	65 (US)	220 (US)	$23,000,000
Island Fire	FM-2694	2007	Santa Catalina	5/10/07 - 5/15/07			
Forest Fires		2007	Lake Tahoe Region, Nevada	6/25/07			
Forest Fires	DR-1731	2007	Los Angeles, Orange, Riverside, San Bernardino, San Diego, Santa Barbara and Ventura counties	10/21/07-03/31/08	10		$114,000,000
Santa Anita Fire	FM-2763	2008	Los Angeles County	4/26/08 – 5/2/08			
Summit Fire	FM-2766	2008	Santa Clara and Santa Cruz Counties	5/22/08 – 5/28/08		16	$16,100,000
Ophir Fire	FM-2770	2008	Butte County	6/10/08 – 6/13/08		1	
Humboldt Fire	FM-2771	2008	Butte County	6/11/08 – 6/18/08		10	$20,500,000
Martin Fire	FM-2772	2008	Santa Cruz County	6/11/08 – 6/17/08		4	$5,400,000
Wildfires	EM-3287	2008	Butte, Mendocino, Monterey, Santa Clara, Santa Cruz, Shasta, and Trinity counties	6/20/08			
Sayre Fire	DR-1810	2008	Los Angeles County	11/13/08 – 11/14/08			
Jesusita Fire	FM-2817	2009	Santa Barbara County	5/5/09 – 5/18/09			$20,000,000
Lockheed Fire	FM-2824	2009	Santa Cruz County	8/12/09 - 8/23/09		10	$26,600,000
Yuba Fire	FM-2825	2009	Yuba County	8/14/09 – 8/23/09		41	$12,100,000
PV Fire	FM-2828	2009					
Station Fire	FM-2830	2009	Los Angeles County	8/26/09 – 10/16/09			
49er Fire	FM-2832	2009	Placer County	8/30/09 – 9/2/09			$1,000,000
Oak Glen Fire	FM-2833	2009	San Bernardino County	8/30/09 – 9/8/09		4	$6,900,000
Pendleton Fire	FM-2836	2009	San Bernardino County	8/31/09 – 9/4/09		1	$1,490,000
Guiberson Fire	FM-2839	2009	Ventura County	9/22/09 – 9/27/09		10	$9,800,000
Sheep Fire	FM-2841	2009	San Bernardino County	10/3/09 – 10/10/09			
Bull Fire	FM-2849	2010					
West Fire	FM-2850	2010	Fresno County				
Crown Fire	FM-2851	2010	Los Angeles County				
Post Fire	FM-2852	2010	Kern County				
Glenview Fire	FM-2856	2010	San Mateo County				
Canyon Fire	FM-2858	2010	Kern County				
Flooding	DR-1884	2010	Imperial, Siskiyou, Los Angeles, Riverside, San Bernardino and Calaveras counties				$50,000,000

Disaster Name	Disaster #	Year	Counties and Cities Declared	State Declaration	# of Deaths	# of Injuries	Cost of Damage
Easter Sunday EQ	DR-1911	2010	Imperial County				$90,000,000
Flooding	DR-1952	2011	Inyo, Kern, Kings, Madera, Mariposa, Orange, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara, and Tulare counties	12/10/10 to 01/04/2011; declared 01/26/2011			163 residences impacted; 2 destroyed. Total individual assistance cost estimate of nearly $2 million, and total public assistance cost estimate exceeding $75.4 million
Tsunami	DR-1968	2011	Tsunami wave surge as result of earthquake in Japan on 3/11/11. Del Norte and Santa Cruz counties.	3/12/2011	1		$70 million in damages in California. Minor to major damage to harbors from Crescent City to San Diego.
Hill Fire	FM-2955	2011	San Bernardino County	9/2/2014;			Burned 1,158 acres; threatened more than 1,000 structures; approximately 1,000 people were evacuated.
Canyon Fire	FM-2961	2011	Kern County – due to plane crash	9/4/2011;		7	Burned 14,585 acres; destroyed 32 residences and 30 outbuildings. >$10.3 million in costs.
Keene Fire Complex	FM-2970	2011	Southeastern Kern County near Tehachapi	9/10/2011		4	$ 7.2 million in costs; burned 10,470 acres
Comanche Fire Complex	FM-2971	2011	Kern County, 5 miles south east of Arvin	9/10/2011		6	Burned 29,338 acres; complex consisted of 4 fires.
Wye Fire	FM-5004	2012	Lake and Colusa Counties, East of Clearlake Oaks	8/12/2012		3	Burned 7,934 acres; destroyed 2 structures and 1 outbuilding, and damaged 2 structures.
Ponderosa Fire	FM-5007	2012	Tehama & Shasta Counties, Southeast of Manton	8/18/2012		7	27,676 acres burned; 52 residences and 81 outbuildings destroyed; 1 residence and 5 outbuildings damaged.
Shockey Fire	FM-5021	2012	San Diego County, East of Campo	9/23/2012	1	3	2,556 acres burned; 11 residences, 14 outbuildings and 11 vehicles destroyed; 2 residences damaged.
Summit Fire	FM-5023	2013	Riverside County, Banning and Beaumont	5/1/2013		2	3,166 acres burned; 1 structure destroyed.
Springs Fire	FM-5024	2013	Ventura County; southbound Highway 101 at Camarillo Springs Road in Camarillo	5/2/2013		10	24,251 acres burned; 10 outbuildings destroyed; 6 commercial properties and 6 outbuildings damaged.
Powerhouse Fire	FM-5025	2013	North Los Angeles County, within the Angeles National Forest	6/2/13			30,274 acres burned
Falls Fire	FM-5040	2013	Riverside County; within the Cleveland National Forest; off Ortega Highway, west of Lake Elsinore	8/6/2013			1,383 acres burned
Silver Fire	FM-5041	2013	Riverside County, Poppet Flats Rd. near Hwy. 243, south of Banning	8/8/2013		13	20,292 acres burned; 48 structures destroyed; 8 structures damaged. Estimated cost about $10 million,
Rim Fire	DR-4158 FM-5049	2013	Tuolemne County; 3 miles east of Groveland, along Highway 20, within the Stanislaus National Forest / Yosemite National Park Administrative area.	8/17/2013 to 10/25/2013; declared 12/13/13			257,314 acres burned
Clover Fire	FM-5050		Shasta County; about 10 miles SW of Redding	9/10/2013		6	8,073 acres burned; 68 residences and 128 outbuildings destroyed; 5 residences and 10 outbuildings damaged.
Colby Fire	FM-5051	2014	Los Angeles County; near Morris Reservoir north of Glendora, within the Angeles National Forest	1/16/2014			1,952 acres burned; 7 residences damaged, 5 destroyed. 1 outbuilding damaged, 10 destroyed.
Poinsettia Fire	FM-5054	2014	San Diego County; off Poinsettia Land and Alicante Road in Carlsbad	5/14/2014	1		600 acres burned; 5 homes destroyed; 18 apartment units

Disaster Name	Disaster #	Year	Counties and Cities Declared	State Declaration	# of Deaths	# of Injuries	Cost of Damage
							and 1 commercial unit destroyed; 4 homes, 1 commercial building damaged; 22 homes with minor damage. Cost to structures: $12 million; costs to fight fire: $12 million.
Cocos Fire	FM-5055	2014	San Diego County; at Village Drive and Twin Oaks Road, San Marcos	5/14/2014		3	1,995 acres burned; 40 structures destroyed.
Butts Fire	FM-5057	2014	Napa and Lake Counties; NW of lake Berryessa	7/2/2014		4	4,300 acres burned; 2 residences and 7 outbuildings destroyed.
Eiler Fire	FM-5067	2014	Shasta County; 12 miles SE of Burney, near Old Station	8/2/2014		11	32,416 acres burned; 7 residences, 2 commercial and 12 outbuildings destroyed
Oregon Gulch Fire	FM-5068	2014	Siskiyou County (Jackson and Klamath Counties in Oregon); part of the Beaver Fire Complex; in the community of Copco south of Oregon border	8/2/2014			35,302 acres burned; 9,464 in California. Total costs to fight fire estimated at greater than $22 million.
Bald Fire	FM-5069	2014	Shasta County; 8 miles SE of Fall River Mills	8/3/2014			39,736 acres burned
Day Fire	FM-5070	2014	Modoc County; north of the community of Day	8/3/2014		7	13,153 acres burned; 6 structures destroyed.
Junction Fire	FM-5074	2014	Madera County; off Road 425A, near the junction of Hwys. 41 and 49 at Oakhurst	8/19/2014		3	612 acres burned; 47 structures destroyed.
Way Fire	FM-5075	2014	Kern County; north of Hwy 55, NW of Wofford Heights	8/19/2014			4,045 acres burned
Napa Earthquake	DR-4193	2014	Napa and Solana Counties	8/24/2014; declared 9/11/2014			>$2.4 million in Federal assistance
Oregon Fire	FM-5076	2014	Trinity County; off Hwy 299 at Oregon Mountain Summit, near Weaverville	8/25/2014		2	580 acres burned; 1 structure destroyed.
Bridge Fire	FM-5077	2014	Mariposa County; Highway 49 at Harris Road, 10 miles E of Mariposa	9/5/2014		3	300 acres burned.
Courtney Fire	FM-5078	2014	Madera County; on Courtney Lane and 7 Hills Road, at Oakhurst	9/14/2014		4	320 acres burned; 30 residences, 19 outbuildings and 17 vehicles destroyed; 4 homes, 3 outbuildings and 2 vehicles damaged.
Boles Fire	FM-5079	2014	Siskiyou County; in the city of Weed	9/15/2014		1	516 acres burned; 157 residences and 8 commercial properties destroyed; 4 homes and 3 commercial structures damaged. 1,000 homes and 100 commercial structures threatened.
King Fire	FM-5081	2014	El Dorado County; near Pollock Pines	Started 9/13/14; declared 9/17/2014		12	97,717 acres burned; 12 residences and 68 other minor structures destroyed.
Applegate Fire	FM-5082	2014	Placer County; on the east side of I-80, near the Applegate area	10/8/2014		2	459 acres burned; 6 homes and 4 outbuildings destroyed.

Sources: California Governor's Office of Emergency Services (http://www.oes.ca.gov); FEMA (http://www.fema.gov/news/disasters.fema); EM-DAT: The OFDA/CRED International Disaster Database - www.em-dat.net - Université Catholique de Louvain - Brussels – Belgium.

APPENDIX G: MAJOR DAMS IN LOS ANGELES COUNTY

Dam No.	National ID. No.	Name	Owner	Stream	Year Built	Capacity (Ac-ft)	Res. Area (acres)	Drainage Area (sq. miles)	Crest Elev. (ft)	Height (Ft)	Length (Ft)	Type
1049-000	CA00881	10 MG Walteria	City of Torrance	Offstream	1953	31	1		282	40	1022	RECT
5-004	CA00062	10th and Western	City of Glendale	Offstream	1924	46	3	1.03	725	28	725	ERTH
1049-002	CA01193	18MG Walteria	City of Torrance	Offstream	1987	58	2	0.08	281.3	31	1287	RECT
789-000	CA01406	Amargosa Creek	City of Palmdale	Amargosa Creek	1998	1187	93	23.6	3026.3	65	480	ERTH
32-034	CA01150	Bailey Debris Basin	Los Angeles Co. Dept. of Public Works	Bailey Canyon Wash	1954	49	2.5	0.58	1167.6	43	585	ERTH
32-000	CA00187	Big Dalton	Los Angeles Co. Dept. of Public Works	Big Dalton Wash	1929	1290	26	4.3	1718	153	480	MULA
32-030	CA01156	Big Dalton Debris Basin	Los Angeles Co. Dept. of Public Works	Big Dalton Wash	1960	208	10	7.33	1148	59	840	ERTH
32-002	CA00188	Big Santa Anita	Los Angeles Co. Dept. of Public Works	Tributary Rio Hondo	1927	858	17	10.8	1328	225	612	VARA
32-006	CA00191	Big Tujunga No. 1	Los Angeles Co. Dept. of Public Works	Big Tujunga Creek	1931	5750	83	81.7	2320	220	505	VARA
32-025	CA0151	Blanchard Debris Basin	Los Angeles Co. Dept. of Public Works	Blanchard Canyon	1966	26	1	0.5	2065	35	925	ERTH
6-031	CA00088	Bouquet Canyon (Bouquet Reservoir)	City of Los Angeles	Bouquet Creek	1934	36505	628	13.6	3008	190	1180	ERTH
32-026	CA01152	Brand Debris Basin	Los Angeles Co. Dept. of Public Works	Brand Debris Basin	1965	42	3	1.03	903	45	400	ERTH
5-000	CA00061	Brand Park	City of Glendale	Offstream	1930	32	1	0	970.6	99	230	ERTH
1-058	CA00044	Castaic	California Dept. of Water Resources	Castaic Creek	1973	323700	2235	153.7	1535	340	5200	ERTH

Dam No.	National ID. No.	Name	Owner	Stream	Year Built	Capacity (Ac-ft)	Res. Area (acres)	Drainage Area (sq. miles)	Crest Elev. (ft)	Height (Ft)	Length (Ft)	Type
1-071	CA00740	Century	California Dept. of Parks and Recreation	Malibu Creek	1913	70	7	68.1	661	44	149	CORA
6-039	CA00093	Channel Diversion Dike	City of Los Angeles	Storm Drain Channel	1940	437	28	6.3	1193	42	390	ERTH
6-004	CA00067	Chatsworth	City of Los Angeles	Tributary to Los Angeles River	1918	9886	607	5.4	900	45	2700	HYDF
5-008	CA01078	Chevy Chase 1290	City of Glendale	Tributary to Sycamore Canyon	1940	17	1	0.01	1292	90	300	ERTH
32-005	CA00190	Cogswell	Los Angeles Co. Dept. of Public Works	Wfk San Gabriel River	1935	8969	146	38.4	2412	266	585	ROCK
32-003	CA00189	Devils Gate	Los Angeles Co. Dept. of Public Works	Arroyo Seco	1920	2600	110	29.7	1075	108	252	GRAV
5-006	CA00064	Diederich Reservoir	City of Glendale	Offstream	1950	174	7	0	728	60	100	ERTH
6-016	CA00077	Drinkwater	City of Los Angeles	Offstream	1923	92	4	0.03	2060	105	448	ERTH

Dam No.	National ID. No.	Name	Owner	Stream	Year Built	Capacity (Ac-ft)	Res. Area (acres)	Drainage Area (sq. miles)	Crest Elev. (ft)	Height (Ft)	Length (Ft)	Type
6-005	CA00068	Dry Canyon	City of Los Angeles	Dry Canyon Creek	1912	1140	58	4.5	1520	66	780	HYDF
6-041	CA00094	Eagle Rock	City of Los Angeles	Offstream	1953	254	7	0	963.5	113	495	ERTH
5-009	CA01079	East Glorietta	City of Glendale	Tributary to Verdugo Canyon	1932	71	4		970	22	1730	RECT
32-020	CA00201	Eaton Wash Debris Basin	Los Angeles Co. Dept. of Public Works	Eaton Wash	1936	721	54	9.47	902	63	1545	ERTH
6-049	CA01080	Elderberry Forebay	City of Los Angeles	Castaic Creek	1974	28400	450	81.6	1550	179	1935	ERTH
6-006	CA00069	Elysian	City of Los Angeles	Tributary to Los Angeles River	1943	167	6	0.08	466	71	480	ERTH
6-007	CA00070	Encino	City of Los Angeles	Encino Creek	1924	9789	158	1.4	1088	168	1850	ERTH
6-008	CA00071	Fairmont	City of Los Angeles	Antelope Valley Creek	1912	7507	172	2.64	3043	121	4300	HYDF
6-053	CA1295	Fairmont #2	City of Los Angeles	Tributary to Antelope Valley Creek	1982	493	28	0.08	3040	24	4437	ERTH
35-006	CA00217	Garvey Reservoir	Metropolitan Water District	Tributary to Rio Hondo	1954	1610	38	0	580	160	5164	ERTH
5-007	CA00065	Glenoaks 968 Reservoir	City of Glendale	Offstream	1949	28	1	0	972	62	220	ERTH
6-043	CA00096	Green Verdugo	City of Los Angeles	Tributary to Tujunga Wash	1953	99	3	0.04	1406	118	452	ERTH
1061-000	CA00893	Greystone Reservoir	City of Beverly Hills	Offstream	1970	60	2		628	75	1140	RECT
		Hansen Dam	U.S. Army Corps of Engineers	Tujunga Wash	1940	51000	372	147.4	1060	97	10475	ERTH
6-054	CA01448	Hansen Recreational Lake	City of Los Angeles	Offstream	1999	85	11	0.01	1060	50	3600	ERTH
57-002	CA00238	Harold Reservoir (Palmdale Lake)	Palmdale Water District	Tributary to Antelope Valley Creek	1891	3870	218	4.63	2824	30	2800	ERTH
1-067	CA00053	JW Wisda	California Dept. of Parks and Recreation	Tributary to Topanga Canyon	1958	45	4	0.22	1140	50	350	ERTH

Dam No.	National ID. No.	Name	Owner	Stream	Year Built	Capacity (Ac-ft)	Res. Area (acres)	Drainage Area (sq. miles)	Crest Elev. (ft)	Height (Ft)	Length (Ft)	Type
32-027	CA01153	La Tuna Debris Basin	Los Angeles Co. Dept. of Public Works	La Tuna Canyon	1960	207	11	5.3	1157	47	654	ERTH
32-022	CA00203	Laguna Regulating Basin	Los Angeles Co. Dept. of Public Works	Laguna Wash	1970	310	12	5.55	380	43	380	ERTH
785-000	CA00742	Lindero	Private Entity – Lake Lindero HOA	Lindero Creek	1966	90	12	5	935	19	170	ERTH
32-028	CA01154	Little Dalton Debris Basin	Los Angeles Co. Dept. of Public Works	Little Dalton Canyon	1960	234	8	3.3	1200	71	543	ERTH
57-000	CA00237	Littlerock	Little Rock Creek Id	Littlerock Creek	1924	4600	126	63.7	3286	124	576	GRAV
32-007	CA00192	Live Oak	Los Angeles Co. Dept. of Public Works	Live Oak Creek	1922	239	12	2.3	1506	76	303	GRAV
35-013	CA01084	Live Oak Reservoir	Metropolitan Water District	Tributary to Marshall Creek	1975	2500	77	0.17	1574	105	3000	ERTH
6-050	CA01081	Los Angeles Reservoir	City of Los Angeles	San Fernando Creek	1977	10000	175	9	1185	130	3415	ERTH
		Lopez Dam	U.S. Army Corps of Engineers	Pacoima Wash	1954	1248	63	34	1272.9	50	1330	ERTH
6-014	CA00075	Lower Franklin	City of Los Angeles	Franklin Canyon	1922	920	22	1.12	590.4	103	500	HYDF
6-052	CA01188	Lower Franklin No. 2	City of Los Angeles	Franklin Canyon	1982	206	10	1.12	590	49	410	ERTH
6-015	CA00076	Lower San Fernando (Lower Van Norman Lake)	City of Los Angeles	San Fernando Creek	1918	10000	220	13.3	1115	125	1840	HYDF
32-034	CA01161	Lower Sunset Debris Basin	Los Angeles Co. Dept. of Public Works	Sunset Canyon	1963	37	2	1.1	1056	86	379	ERTH
6-048	CA00101	Lower Van Norman Bypass	City of Los Angeles	Offstream	1970	240	12	0.03	1166.2	78	600	ERTH
771-000	CA00739	Malibu Lake Club	Private Entity	Malibu Creek	1923	500	55	64	727	44	190	CORA
32-039	CA01385	Morgan Debris	Los Angeles Co.	Morgan Canyon	1962	21	2	0.6	1169.9	37	380	ERTH

Dam No.	National ID. No.	Name	Owner	Stream	Year Built	Capacity (Ac-ft)	Res. Area (acres)	Drainage Area (sq. miles)	Crest Elev. (ft)	Height (Ft)	Length (Ft)	Type
		Basin	Dept. of Public Works	Creek								
32-040	CA00216	Morris	Los Angeles Co. Dept. of Public Works	San Gabriel River	1935	27500	420	210	1175	245	750	GRAV
19-003	CA00154	Morris S. Jones	Pasadena City Dept. of Water & Power		1952	153.3	6.3		948	49	1470	ERTH
7000-124		Mountain Brook Ranch	Private Entity		Unknown	15				25		ERTH
6-017	CA00078	Mullholand (Hollywood Reservoir)	City of Los Angeles	Weid Canyon	1924	4036	82	1	756	195	933	GRAV
32-008	CA00193	Pacoima	Los Angeles Co. Dept. of Public Works	Pacoima Creek	1929	3777	68	27.8	2015.8	365	640	VARA
35-004	CA00215	Palos Verdes Reservoir	Metropolitan Water District	Tributary to Los Angeles Harbor	1939	1100	27	1	330	82	2150	ERTH
775-000	CA00741	Porter Estate	Porter Ranch Development Co.	Tributary to Los Angeles River	1888	135	16	0.86	1067.7	46	310	ERTH
786-000	CA00743	Potrero	Private Entity – Westlake Lake Management Assn.	Triunfo Canyon Creek	1967	791	95	28.9	880	40	730	GRAV
32-009	CA00194	Puddingstone	Los Angeles Co. Dept. of Public Works	Walnut Creek	1928	16342	490	33.1	982	147	2698	ERTH
32-016	CA00199	Puddingstone Diversion	Los Angeles Co. Dept. of Public Works	San Dimas Wash	1928	150	16	19.8	1168	34	825	ERTH
1-066	CA00052	Pyramid	California Dept. of Water Resources	Piru Creek	1973	178700	1291	295	2606	386	1080	ERRK
4-006	CA00059	Reservoir No. 4	City of Burbank	Offstream	1955	34	1	0	908	38	210	RECT
4-007	CA00060	Reservoir No. 5	City of Burbank	Offstream	1949	77	3	0	906	36	870	RECT
1043-000	CA00876	Riviera Reservoir	City of Santa Monica Dept. of Public Works	Offstream	1962	76	2		349	40	1280	RECT
32-021	CA00202	Rubio Debris	Los Angeles Co.	Rubio Creek	1944	44	3	1.71	1624.5	64	780	ERTH

Dam No.	National ID. No.	Name	Owner	Stream	Year Built	Capacity (Ac-ft)	Res. Area (acres)	Drainage Area (sq. miles)	Crest Elev. (ft)	Height (Ft)	Length (Ft)	Type
		Basin	Dept. of Public Works									
32-010	CA00195	San Dimas	Los Angeles Co. Dept. of Public Works	San Dimas Creek	1922	1534	36	15.9	1481	131	340	GRAV
32-019	CA00200	San Gabriel No. 1	Los Angeles Co. Dept. of Public Works	San Gabriel River	1938	44183	560	205	1481	320	1520	ERRK
32-029	CA01155	Santa Anita Debris Basin	Los Angeles Co. Dept. of Public Works	Santa Anita Wash	1960	116	9	12.5	796	56	955	ERTH
		Santa Fe (Santa Fe Reservoir)	U.S. Army Corps of Engineers	San Gabriel River	1941-49	32109	1256	236	496	92	23800	ERTH
6-047	CA00100	Santa Ynez Canyon	City of Los Angeles	Tributary to Santa Ynez Canyon	1968	356	9	0.23	727	157	544	ERTH
32-012	CA00196	Sawpit	Los Angeles Co. Dept. of Public Works	Sawpit Creek	1927	406	9	3.27	1378	150	527	CORA
32-031	CA01157	Sawpit Debris Basin	Los Angeles Co. Dept. of Public Works	Sawpit Wash	1955	152	6	2.87	1000	82	520	ERTH
32-036	CA01172	Schoolhouse Debris Basin	Los Angeles Co. Dept. of Public Works	Mansfield Channel	1962	19	1	0.28	1491.3	38	265	ERTH
		Sepulveda (Sepulveda Flood Control Basin)	U.S. Army Corps of Engineers	Los Angeles River	1941	17425	46764	152	710	57	15444	ERTH
32-013	CA00197	Sierra Madre	Los Angeles Co. Dept. of Public Works	Lower Santa Anita Creek	1928	51	1	0.77	1179	69	200	CORA
32-032	CA01158	Sierra Madre Villa	Los Angeles Co. Dept. of Public Works	Sierra Madre Canyon	1958	109	8	1.5	1102.5	50	906	ERTH

Dam No.	National ID. No.	Name	Owner	Stream	Year Built	Capacity (Ac-ft)	Res. Area (acres)	Drainage Area (sq. miles)	Crest Elev. (ft)	Height (Ft)	Length (Ft)	Type
6-051	CA00081	Silver Lake	City of Los Angeles	Tributary to Ballona Creek	1976	2020	77	0.12	463	43	760	ERTH
32-041	CA01469	Stevenson Ranch	Los Angeles Co. Dept. of Public Works	Pico Canyon Creek	2004	105	4.75	5.1	1386.5	54	280	ERTH
6-025	CA00083	Stone Canyon	City of Los Angeles	Stone Canyon Creek	1924	10372	138	1.4	878	188	1150	ERTH
32-033	CA01160	Stough Debris Basin	Los Angeles Co. Dept. of Public Works	Stough Canyon	1961	6	3	1.7	1044	46	567	ERTH
104-027	CA00445	Thompson (Middle Ranch Reservoir)	Southern California Edison Co.	Middle Canyon	1925	1010	54	8.6	677	114	445	ERTH
32-015	CA00198	Thompson Creek	Los Angeles Co. Dept. of Public Works	Thompson Creek	1928	543	345	3.46	1648	66	1500	ERTH
6-029	CA00087	Upper Hollywood	City of Los Angeles	Weid Canyon	1933	196	8	0.37	763	87	368	ERTH
6-028	CA00086	Upper San Fernando	City of Los Angeles	San Fernando Creek	1921	1848	78	0.53	1219	82	1740	HYDF
6-044	CA00097	Upper Stone Canyon	City of Los Angeles	Stone Canyon Creek	1954	425	14	0.66	936.5	111	740	ERTH
1073-000	CA00904	Westlake Reservoir	Las Virgenes Municipal Water District	Three Springs Creek	1972	9200	156	0.9	1056	158	1400	ERTH
35-011	CA00222	Weymouth Memorial Reservoir	Metropolitan Water District	Offstream	1966	151	8	0	1080	18	2400	RECT
		Whittier Narrows	U.S. Army Corps of Engineers	San Gabriel River	1957	49143	63512	554	239	56	16960	ERTH
18-002	CA00153	Whittier Reservoir No. 4	City of Whittier Water District	Tributary to San Gabriel River	1931	32	1	0.08	464	55	190	ERTH
32-035	CA01162	Wilson Debris Basin	Los Angeles Co. Dept. of Public Works	Wilson Canyon	1961	84	5	2.6	1543	50	666	ERTH
104-026	CA00444	Wrigley Reservoir	Southern California Edison Co.	Hapress Creek	1930	62	2	0	1426	42	190	ERTH

Dam No.	National ID. No.	Name	Owner	Stream	Year Built	Capacity (Ac-ft)	Res. Area (acres)	Drainage Area (sq. miles)	Crest Elev. (ft)	Height (Ft)	Length (Ft)	Type
6-046	CA00099	Yarnell Debris Basin	City of Los Angeles	Tributary to Bull Canyon	1963	105	10	1.87	1220	42	1290	ERTH

Sources: California Division of Safety of Dams, Listing of California Jurisdictional Dams, from http://www.water.ca.gov/damsafety/damlisting/

Wikipedia, List of dams and reservoirs in California, from http://en.wikipedia.org/wiki/List_of_dams_and_reservoirs_in_California

U.S. Army Corps of Engineers, Los Angeles District web page, information on the Los Angeles County Drainage Area project, including http://198.17.86.43/resreg/htdocs/hnsn_2.html, http://198.17.86.43/resreg/htdocs/lopz_2.html, http://198.17.86.43/resreg/htdocs/snfe_2.html, http://198.17.86.43/resreg/htdocs/wnrh_2.htmlhttp://198.17.86.43/resreg/htdocs/spda_2.html

APPENDIX H: PLATES

Table of Contents

N
W E
S

4 0 4 8
Miles

6 0 6 12
Kilometers

Scale: 1:300,000

Explanation

0 1000 2000 3000 4000 5000

Elevation (in Feet)

Cudahy City Limit

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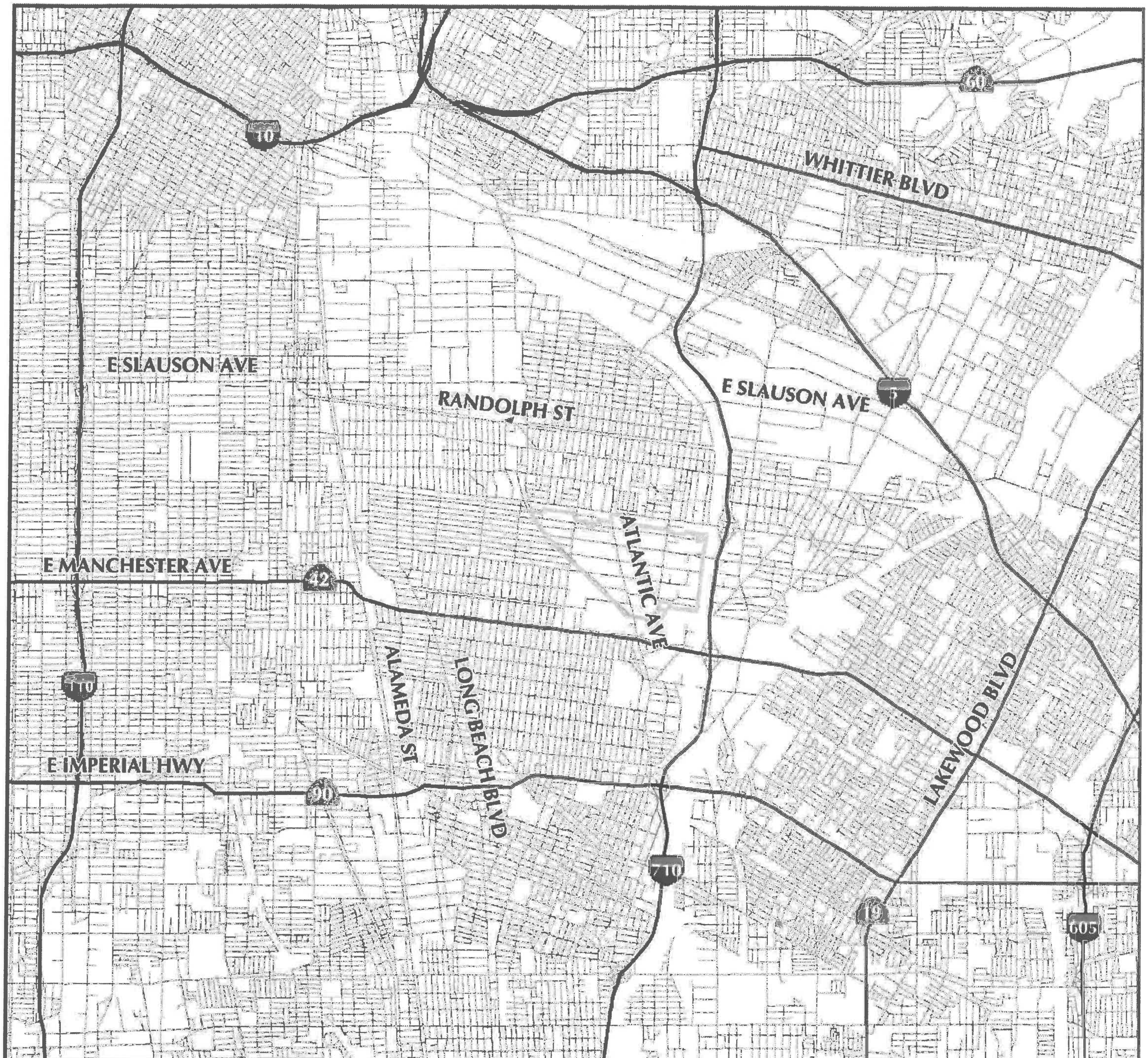
Project Number: 3209
Date: 2014

Physiographic Map of Cudahy, California and Surrounding Areas

Plate H-1



Base Map: Streetworks, 1998

N W E S

7500 0 7500 15000
Feet

1800 0 1800 3600
Meters

Scale: 1:90,000

Explanation

Cudahy City Limit

Earth Consultants International

Project Number: 3209
Date: 2014

Major Roads
near
Cudahy, California and Surrounding Areas

Plate H-2

NOTES:

This map is intended for general land use planning only. Information on this map is not sufficient to serve as a substitute for detailed geologic investigations of individual sites, nor does it satisfy the evaluation requirements set forth in geologic hazard regulations.

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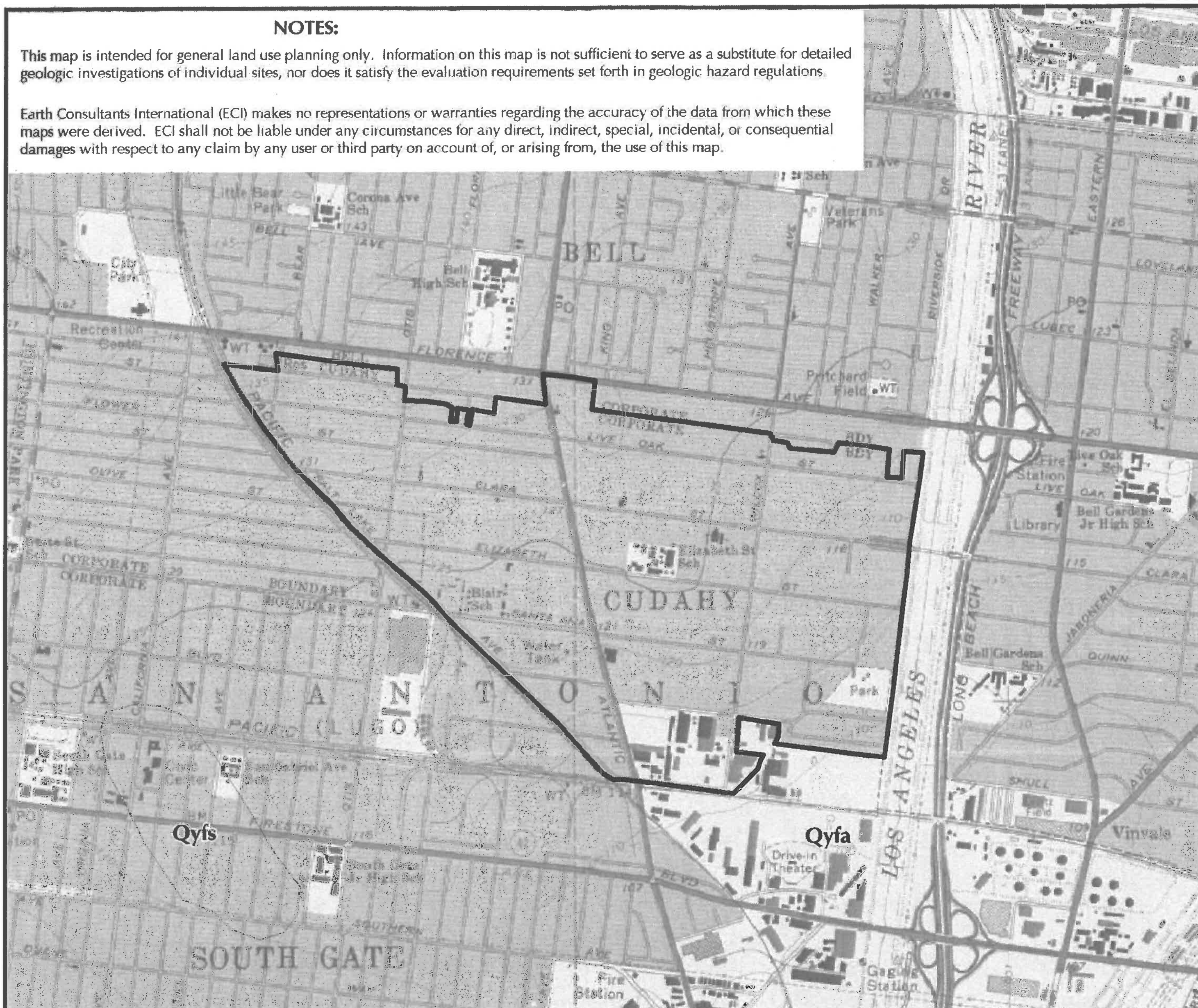

N
W E
S

2000 0 2000 4000
Feet

500 0 500 1000
Meters

Scale: 1:24,000

Explanation

Qyf	Young alluvial fan and valley deposits, undivided (Holocene and late Pleistocene) - Mostly poorly consolidated and poorly sorted clay, sand, gravel and cobble alluvial fan and valley deposits. a = sand, s = silt, c = clay
——	Cudahy City Limit

Base Map: USGS Topographic Map from Sure!MAPS RASTER, 1997.
Sources: California Geological Survey, 2003

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Project Number: 3209
Date: 2014

Geologic Map
Cudahy, California

Plate H-3

NOTES:

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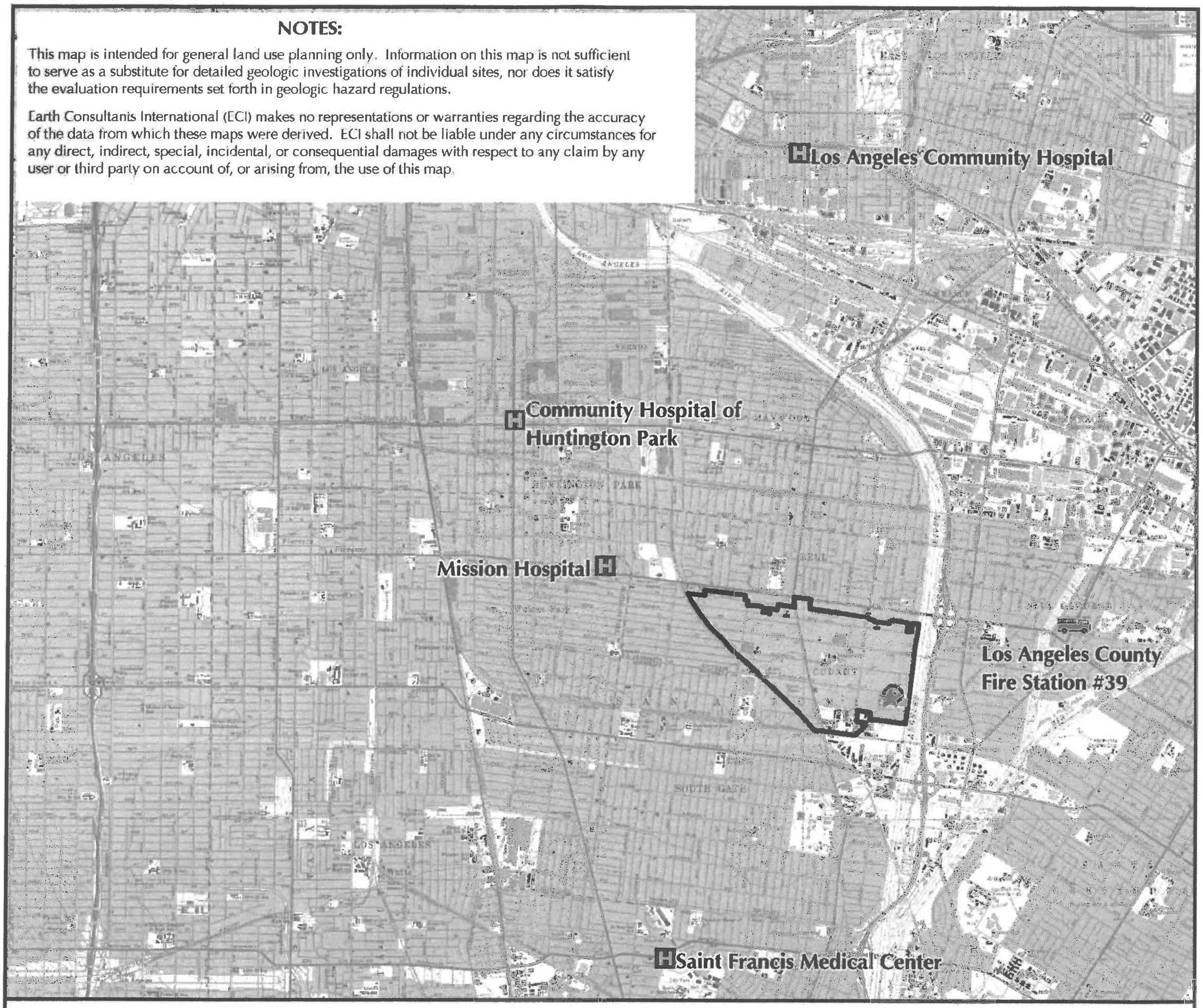

N W E S

6000 0 6000 12000

Feet

1 0 1 2

Kilomètres

Scale: 1:72,000

Explanation

- City Hall
- Emergency Operations Center
- Hospital
- School
- Park (Potential Shelter Location)
- Cudahy City Limit

Base Map: USGS Topographic Map from Sure!MAPS RASTER, 1997.
Sources: City of Cudahy, Google.com, and Bing

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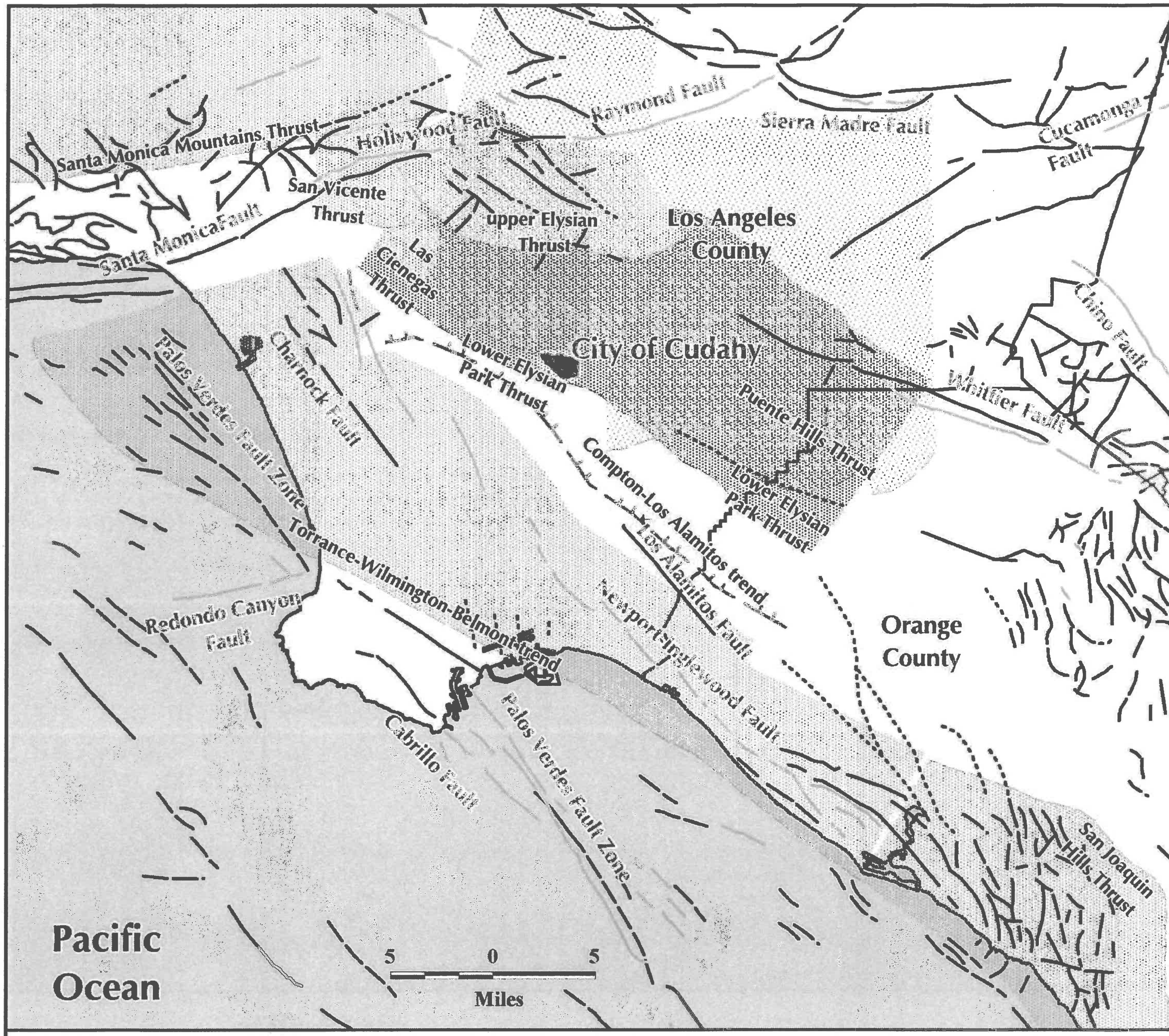
Project Number: 3209
Date: 2014

Critical Facilities In and Near Cudahy
That Provide Critical/Essential Services to Cudahy Residents

Plate H-4



Modified from: Dolan, Shaw, and Pratt, 2002; Grant et al., 1999; and Jennings, 1994.

Map Explanation

Blind thrust fault ramp; red hachures show the surface projection of the locus of active folding along the tip of the thrust ramp. The thrust fault ramps are shown from deepest to shallowest by gray, green, and blue shading, respectively.

Fault Showing Evidence of Historic Rupture (Active).

Fault Showing Evidence of Holocene Rupture (Active).

Fault Showing Evidence of Quaternary and Late Quaternary Rupture (Potentially Active).

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Local Active and Potentially Active Faults

Plate H-5

NOTES:

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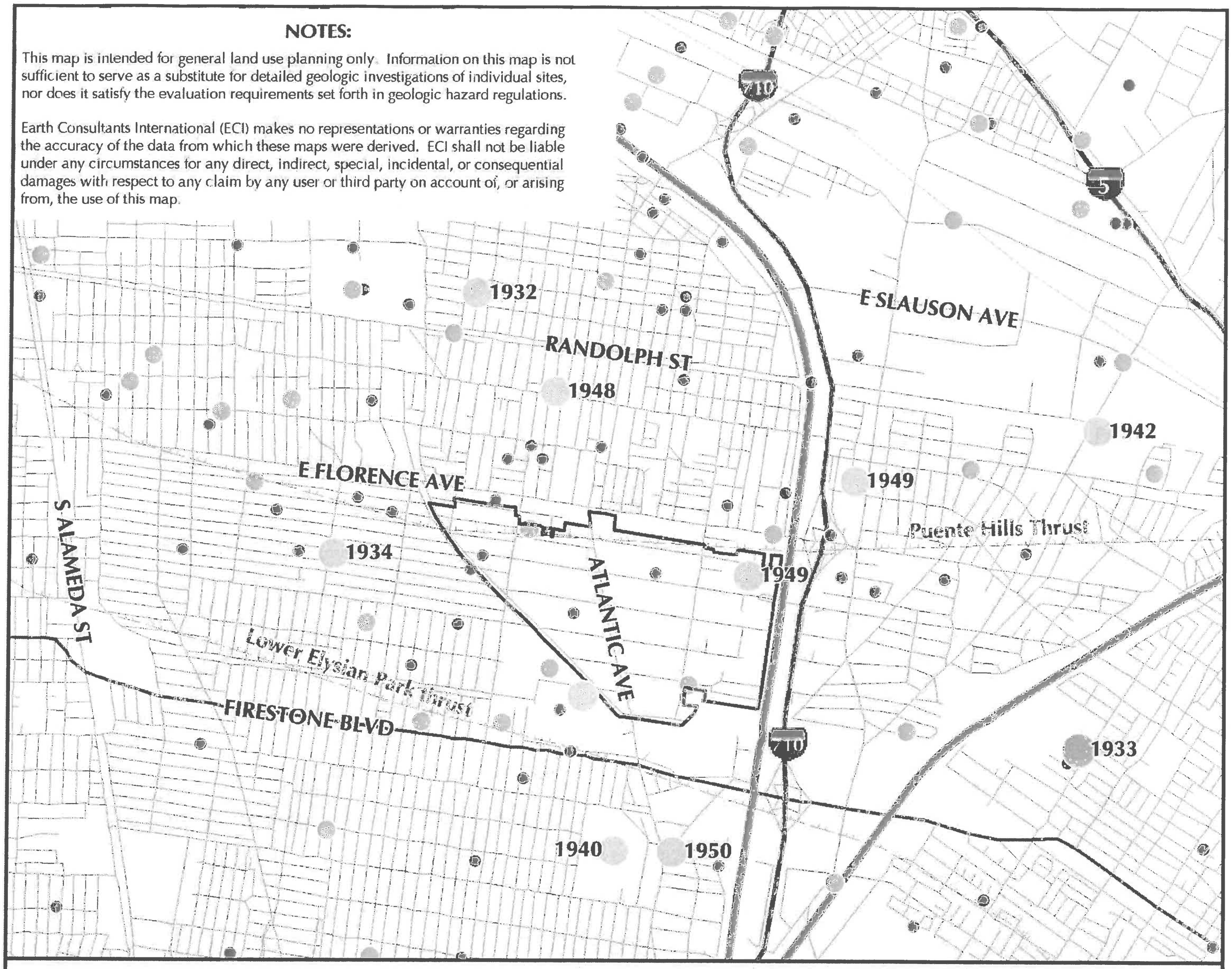

4000 0 4000 8000

Feet

1000 0 1000 2000

Meters

Scale: 1:48,000

Base Map: Streetworks, 1998

Sources: Southern California Earthquake Center (January 1932 to November 2014); National Earthquake Information Center (1800 to 1931)

Explanation

Earthquake Magnitude

- 4 to 5
- 2 to 3
- 3 to 4
- <2

Surface projection of the locus of active folding along the tip of the thrust ramp.

River

Cudahy City Boundary

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CITY OF CUDAHY CALIFORNIA

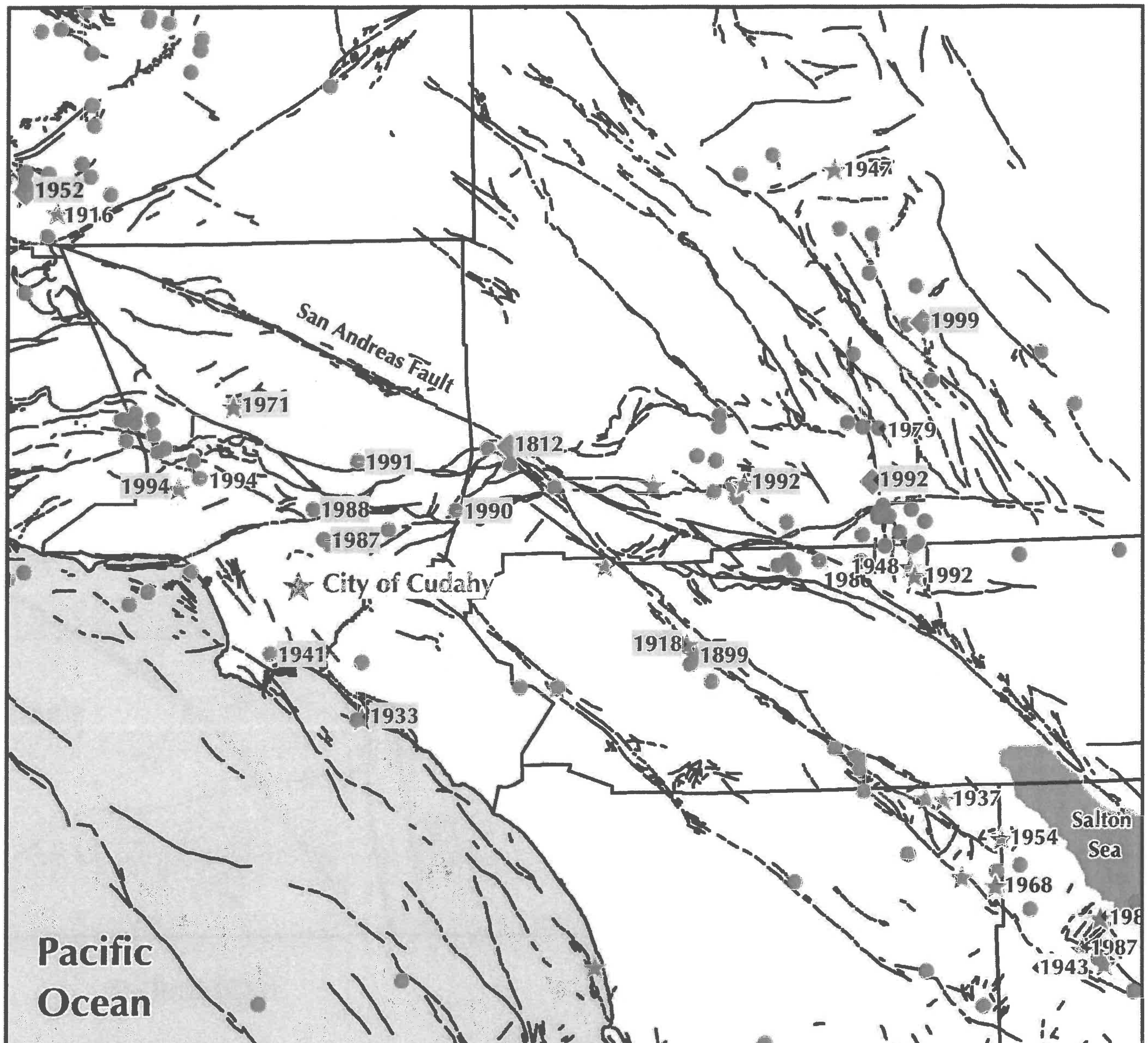
Project Number: 3209

Date: 2014

Faults and Historical (1800-2014) Seismicity Map

Cudahy, California

Plate H-6



Source: Jennings, 1994; SCEC earthquake catalog; NEIC earthquake catalog

N W E S

0 20
Miles

Explanation

- ◆ Magnitude 7+
- ★ Magnitude 6 - 7
- ● Magnitude 5 - 6
- —— Quaternary faults
- **1899** Earthquakes discussed further in the text

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Date: 2014

City of Cudahy California

Notable Regional Earthquakes

Plate H-7

NOTES:

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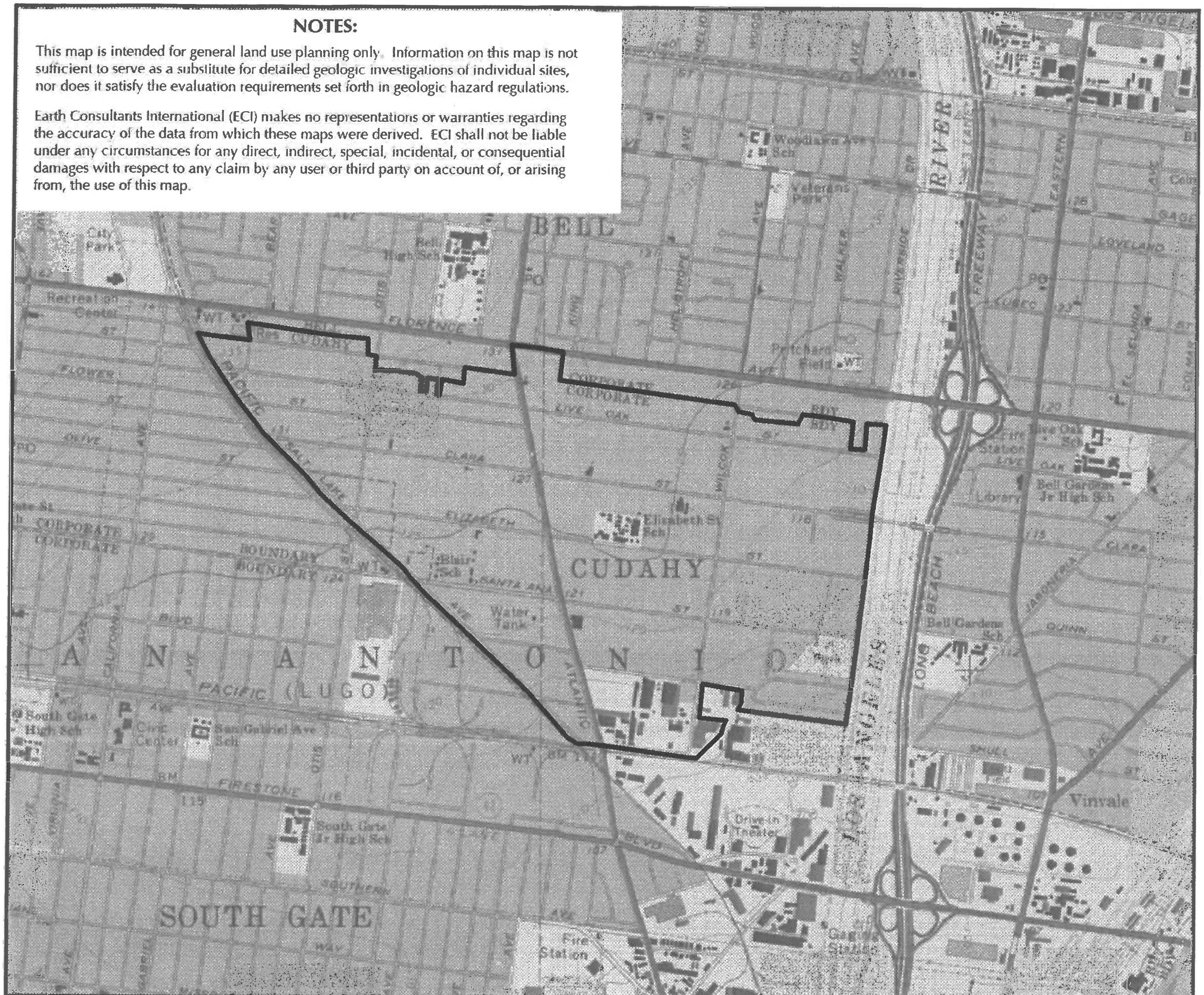

N
W E
S

2000 0 2000 4000
Feet

500 0 500 1000
Meters

Scale: 1:24,000

Explanation

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 2693c would be required.

Cudahy City Limit

Base Map: USGS Topographic Map from Sure!MAPS RASTER, 1997.
Sources: California Division of Mines and Geology, 1999, (South Gate Quadrangle)

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Project Number: 3209
Date: 2014

Seismic Hazards Map

Cudahy, California

Plate H-8

2000 0 2000 4000

Feet

500 0 500 1000

Meters

N W E S

Scale: 1:24,000

Explanation

06037534406 — Census Tract Boundaries with Census Tract Number

Cudahy City Boundary

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Date: 2014

CITY OF CUDAHY CALIFORNIA

Census Tracts Used in the HazUS Analyses

Plate H-9

NOTES:

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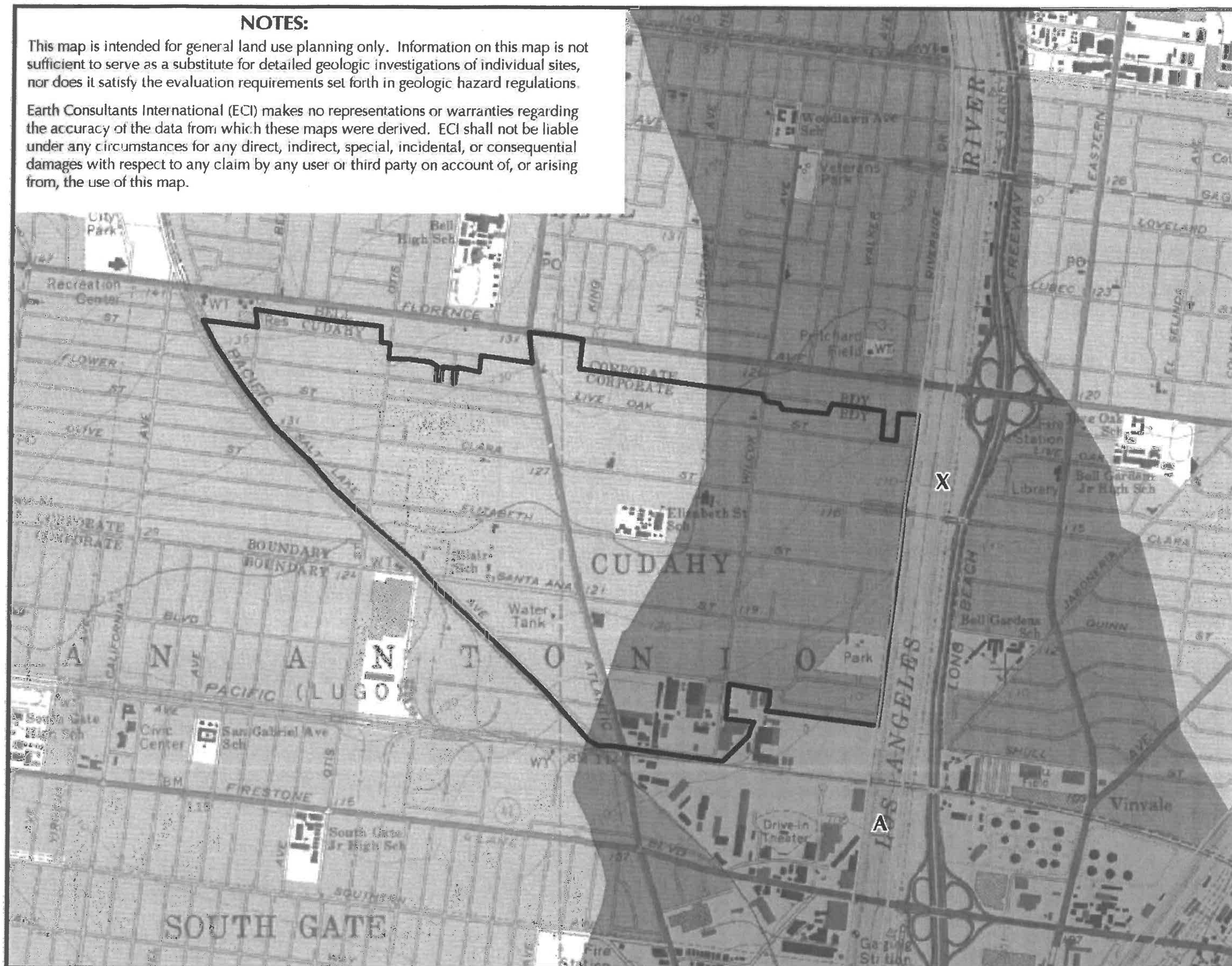

Scale: 1:24,000

2000 0 2000 4000

Feet

500 0 500 1000

Meters

N W E S

Base Map: USGS Topographic Map from Sure!MAPS RASTER, 1997.
Sources: Federal Emergency Management Agency, Flood Insurance Rate Maps
(Panel Numbers: 06037C1805F & 06037C1810F).

* For elevations or depths see original FEMA Flood Insurance Rate Maps available at the City, County, or www.fema.gov.

Explanation

FEMA Flood Insurance Rate Zones

High Risk Areas

A — Zone that corresponds to the 100-year flood areas, as determined by approximate methods. Because detailed hydraulic analyses were not performed, no base flood elevations or depths are shown. Flood insurance is mandatory.

Moderate and Low Risk Areas

X — Zone that corresponds to areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood. No base flood elevations or depths are shown. Flood insurance is available but not required.

X — Zone that corresponds to areas outside of the 500-year flood. No base flood elevations or depths are shown. Flood insurance is available but not required.

Levee

Cudahy City Limit

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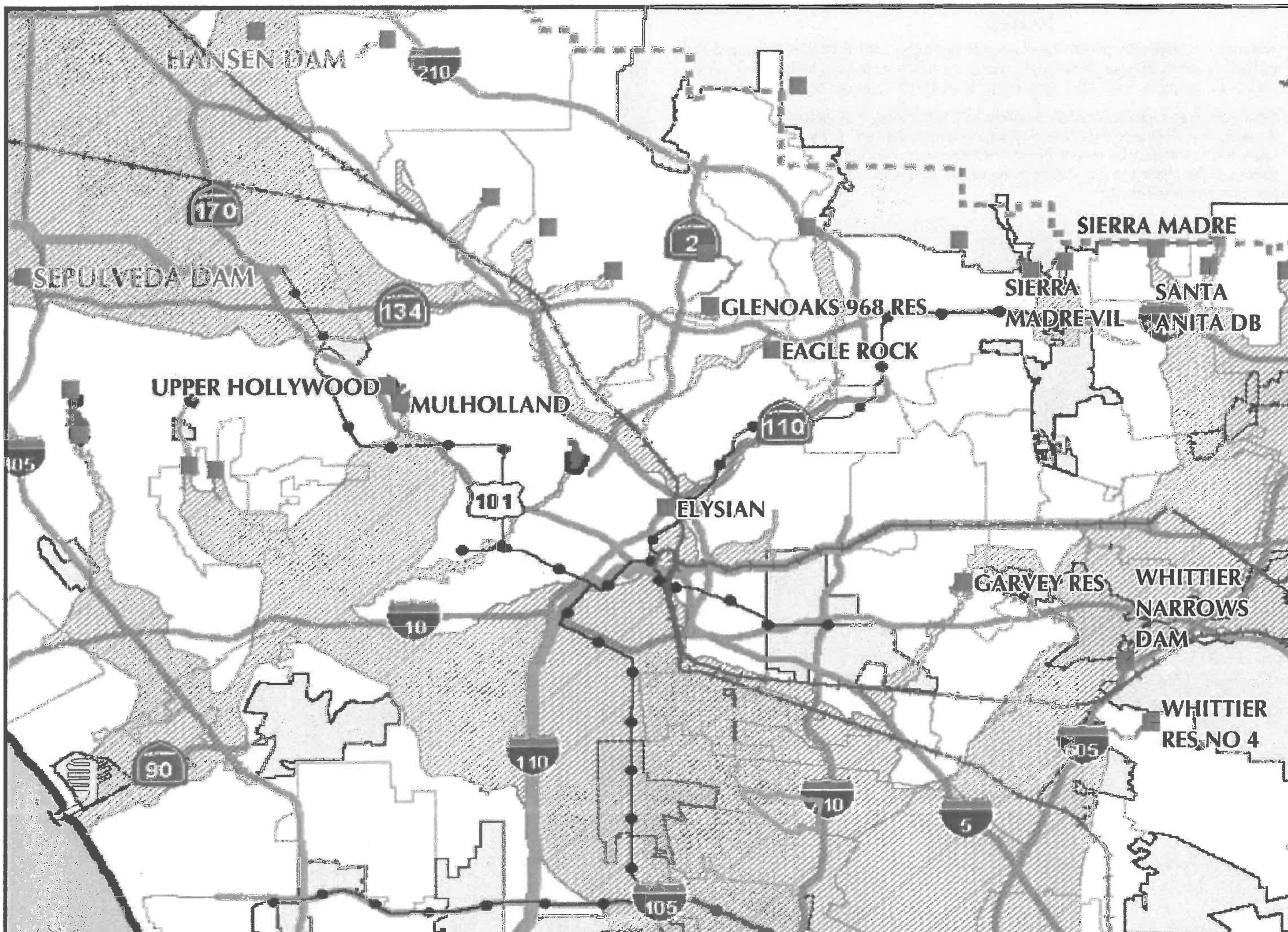
Date: 2014

CITY OF CUDAHY CALIFORNIA

Flood Hazard Map

Cudahy, California

Plate H-10



NOTES:

This map is a component of the Los Angeles County General Plan Update Program. It is a working draft subject to revision. This map will not be official until adopted by the Board of Supervisors. Informatiopn within cities is for reference only.

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N
W E
S

2 0 2 4
Miles

4 0 4 8
Kilometers

Scale: 1:224,000

Explanation

Potential Dam Inundation Areas from California Office of Emergency Services. Dams and Reservoirs from SCAG's 2005 Existing Land Use dataset.

Approximate Dam Location from "Major Dams of the United States" U.S. Geological Survey, 1999

Cudahy City Limit

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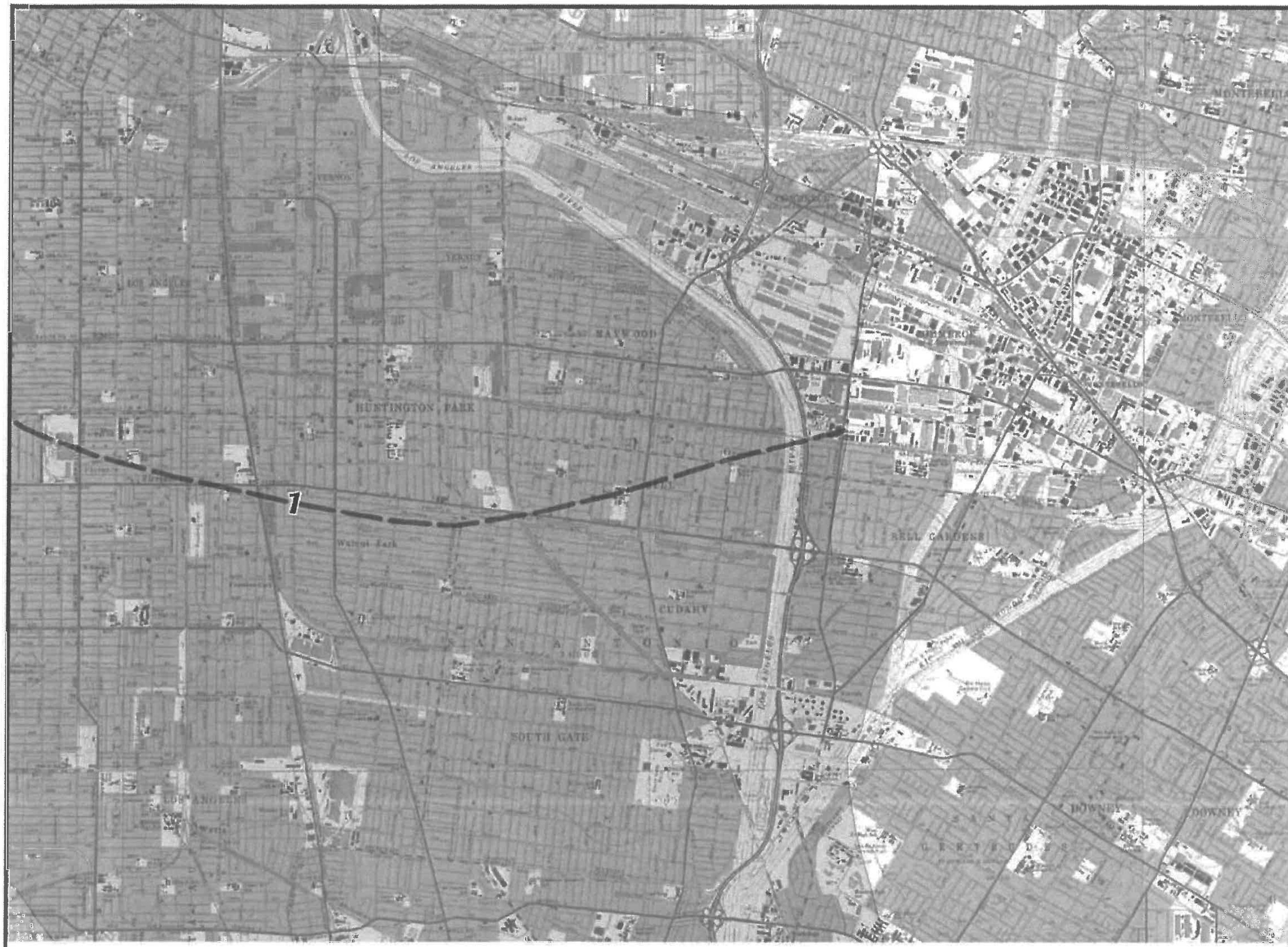
Dam Inundation Map

Cudahy, California

Plate H-11



NOTES:

Sources: Leighton and Associates, 1990 and David Evans and Associates, 19

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N
W E
S

6000 0 6000

Feet

Scale: 1:72,000

Explanation

Dam Failure Inundation Area

1 — Average Overbank Depth (in feet) at Crss Section

Cross Section where flood data was measured

Cudahy City Limit

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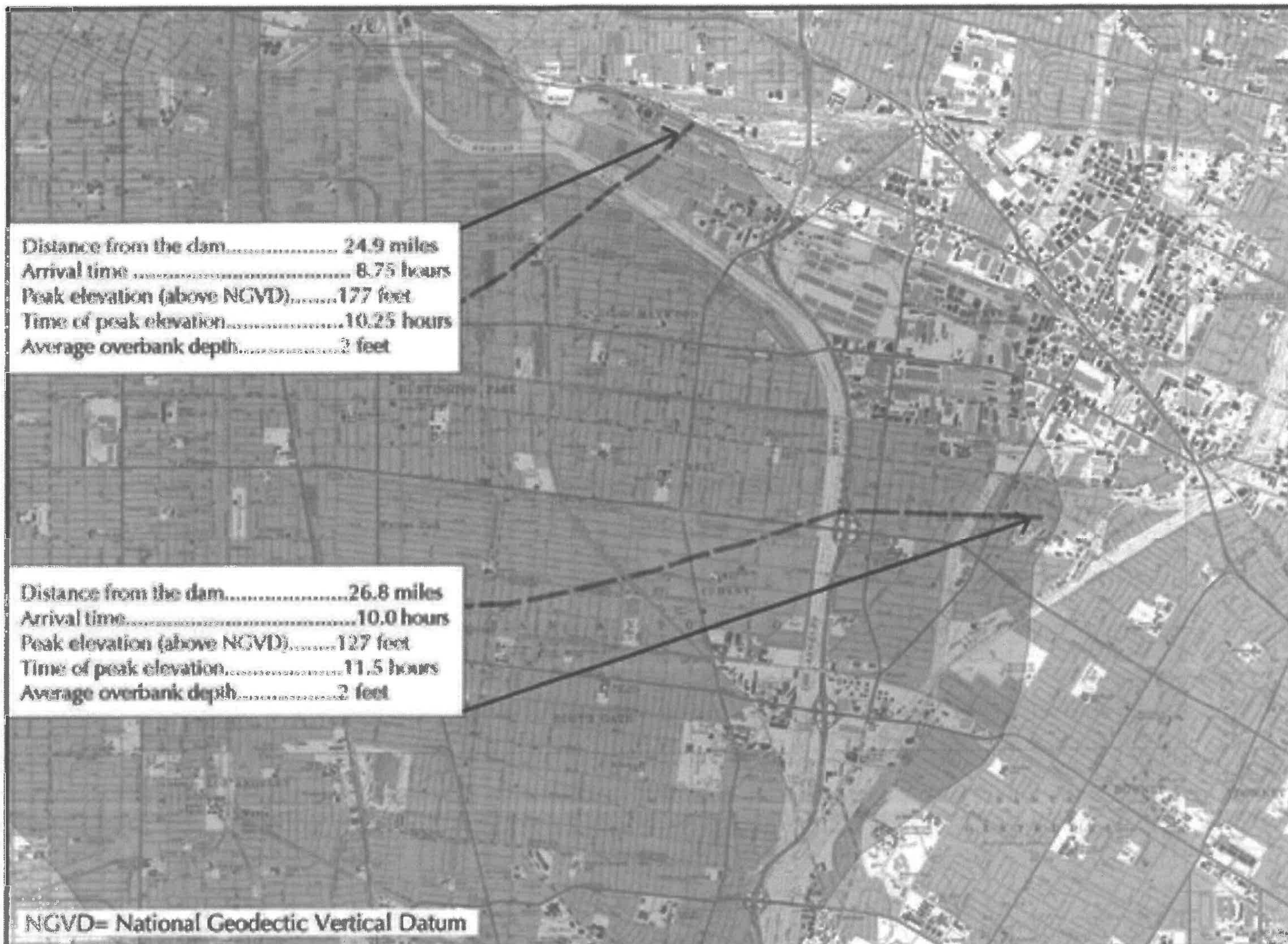
Date: 2013

Hansen Dam Inundation Map

Cudahy, California

Plate H-12



NOTES:

Sources: US Army Corps of Engineers, 1988 and Michael Brandman Associates, 19

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N
W E
S

6000 0 6000
Feet

Scale: 1:72,000

Explanation

Dam Failure Inundation Area

Cross Section where flood data was measured

Cudahy City Limit

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Project Number: 3209
Date: 2014

Sepulveda Dam Inundation Map

Cudahy, California

Plate H-13

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Helpful Websites:

General

http://www.consrv.ca.gov/cgs/
California Geological Survey

http://www.cpuc.ca.gov
California Public Utilities Commission

http://www.oes.ca.gov
California Office of Emergency Services

http:// www.bsc.ca.gov
Site of the California Building Standards Commission. Provides information regarding the status of the building codes being considered for future approval in California.

http://www.gps.caltech.edu
California Institute of Technology, GPS Division

http://www.oes.ca.gov
California Office of Emergency Services

http://www.seismic.ca.gov
California Seismic Safety Commission

http://www.sce.com
Southern California Edison

http://www.data.scec.org
Southern California Earthquake Center

http://www.census.gov
U.S. Census Bureau

http://www.fema.gov
FEMA

http://www.fema.gov/hazus
FEMA's HAZUS website

http://www.usgs.gov
U.S. Geological Survey

Geologic Hazards in General

http://geohazards.cr.usgs.gov/
USGS Hazard Team website. Hazard information on commonly recognized hazards such as earthquakes, landslides, and volcanoes. Contains maps and slide shows.

http://www.usgs.gov/themes/hazard.html
A webpage by the USGS on hazards such as hurricanes, floods, wildland fire, wildlife disease, coastal storms and tsunamis, and earthquakes. Also has information on their Hazard Reduction Program.

http://www.consrv.ca.gov/cgs/index.htm
Homepage for the California Geologic Survey (formerly the Division of Mines and Geology). Information on their publications (geologic reports and maps), programs (seismic hazard mapping, Alquist-Priolo Earthquake Fault Study Zone maps); and other brochures (asbestos, natural hazard disclosure). For California Geological Survey Notes – informational brochures covering a variety of subjects refer to http://www.consrv.ca.gov/cgs/information/publications/cgs_notes/index.htm

www.oes.ca.gov/
California Governor's Office of Emergency Services website. Contains information on response plans regarding natural disasters (earthquakes), terrorist attacks, and electrical outages, and information on past emergencies.

Geologic Maps

http://wrgis.wr.usgs.gov/wgmt/scamp/scamp.html

Homepage for the Southern California Aerial Mapping Project (SCAMP), which is the USGS' program to update geologic maps of Southern California at a 1:100,000 scale and release these in a digital GIS format.

Seismic Hazards, Faults, and Earthquakes

http://gmw.consrv.ca.gov/shmp/
Shows the current list of seismic hazard maps available from the California Geologic Survey. These can be downloaded in Adobe Acrobat (pdf) format.

www.scecdc.scec.org.
Southern California Earthquake data center (hosted by SCEC, USGS, and Caltech. Shows maps and data for recent earthquakes in Southern California and worldwide. Catalogs of historic earthquakes.

http://www.consrv.ca.gov/cgs/rghm/quakes/index.htm
List of California earthquakes (date, magnitude, latitude longitude, description of damage).

http://geohazards.cr.usgs.gov/eq/html/canvmap.html
Website at the USGS Earthquake Hazard's Program that lists seismic acceleration maps available for downloading.

www.seismic.ca.gov/
Homepage of the California Seismic Safety Commission. Contains information on California earthquake legislation, safety plans, and programs designed to reduce the hazards from earthquakes. Includes several publications of interest, including "The Homeowner's Guide to Earthquake Safety." Also contains a catalog of recent California earthquakes.

http://neic.usgs.gov/
Homepage of the National Earthquake Information Center. Maintains an extensive global seismic database on earthquake parameters. Its mission is to rapidly determine the location and size of all destructive earthquakes worldwide, and disseminate that information as quickly as possible to concerned national and international agencies, scientists, and the public in general.

http://www.scsn.org/
Site where Shakemaps for actual and scenario earthquakes can be obtained.

Flooding, Dam Inundation, and Erosion (Note: the information on some of these websites has been removed due to safety concerns; but may be posted again in the future in limited form).

http://www.usace.army.mil/public.html#Regulatory
US Army Corps of Engineers website regarding waterway regulations.

http://www.fema.gov/fima/

FEMA website about the National Flood Insurance Program.

http://www.worldclimate.com/
Precipitation rates at different rain stations in the world measured over time.

http://waterdata.usgs.gov
Stream gage measurements for rivers throughout the US.

http://www.usatoday.com/weather/whhcalif.htm
Article on historical storms that have impacted the southern California area

http://ceres.ca.gov/planning/nhd/dam_inundation.html

http://hurricanes.noaa.gov
The National Oceanic and Atmospheric Administration web page on hurricanes and other coastal processes.

Others

http://www.oes.ca.gov/
California Office of Emergency Services

http://www.noaa.gov/
National Oceanic and Atmospheric Administration website. Provides information on weather updates, hurricanes, tornadoes, and severe weather events, drought, etc.

http://www.tornadoproject.com
The Tornado Project website. List of tornadoes spawned by hurricanes and tropical storms. Last updated in 2000, but provides a good list of historical events.

http://www.cpuc.ca.gov/puc/
California Public Utilities Commission website. State entity that regulates privately owned electric, natural gas, telecommunications, water, railroad, rail transit, and passenger transportation.

APPENDIX J: ADOPTION

City of Cudahy, California
2015 Local Natural Hazards Mitigation Plan
City Council Adoption Resolution

Advertising Order Confirmation

Ad Order Number	Customer	Payor Customer	PO Number
0010720772	CITY OF CUDAHY	CITY OF CUDAHY	
Sales Rep.	**Customer Account**	**Payor Account**	**Ordered By**
tbutikofer	5007693	5007693	Michael Allen
Order Taker	**Customer Address**	**Payor Address**	**Customer Fax**
tbutikofer	5220 SANTA ANA STREET CUDAHY CA 90201 USA	5220 SANTA ANA STREET CUDAHY CA 90201 USA	
Order Source	**Customer Phone**	**Payor Phone**	**Customer EMail**
Select Source	323-773-5143	323-773-5143	

Current Queue	Invoice Text	Ad Order Notes
Ready		

Tear Sheets	Affidavits	Blind Box	Materials	Promo Type	Special Pricing
0	0				None

Ad Number	Ad Size	Color	Production Color	Ad Attributes	Production Method	Production Notes
0010720772-01	3.0 X 56 Li				AdBooker	
External Ad Number		**Pick Up**	**Ad Type**			
			Legal Liner			

NOTICE OF PUBLIC HEARING

Natural Hazards Mitigation Plan

NOTICE IS HEREBY GIVEN that the City Council of the City of Cudahy will hold a public hearing to consider approval of the City of Cudahy Natural Hazards Mitigation Plan. The Natural Hazards Mitigation Plan is available for review under Public Notices on the City's website, or at City Hall at 5220 Santa Ana Street, Cudahy, CA.
Any person interested in expressing an opinion on the proposed project is invited to attend the public hearing and offer testimony in support of, or in the opposition to, the project. Written testimony may be forwarded to the Development Services Department, Planning Division, 5220 Santa Ana Street, Cudahy, CA 90201, or call (323) 773-5143. The files are public information available during counter hours Monday through Friday, 8:00 am to 10:00 am.

A REGUALR MEETING OF THE CUDAHY CITY COUNCIL TO BE HELD ON: October 12, 2015, 6:30 P.M., or as soon thereafter as the matter can be heard, City Hall Council Chambers, 5240 Santa Ana Street

Published and Posted: October 2, 2015
By: Michael Allen, Acting Community Development Director

Pub Oct 2, 2015(1t) PT(720772)

Product	Requested Placement	Requested Position	Run Dates	# Inserts

Advertising Order Confirmation

Ad Order Number	*Customer*			
0010720772	CITY OF CUDAHY			
Press Telegram	Legals CLS	General-1076~	10/02/15	1

Order Charges:

Net Amount	*Tax Amount*	*Total Amount*	*Payment Method*	*Payment Amount*	***Amount Due***
$345.01	$0.00	$345.01		$0.00	**$345.01**

If this confirmation includes an advertising proof, please check your proof carefully for errors, spelling, and/or typos. Errors not marked on the returned proof are not subject to credit or refunds.

Please note: To meet our printer's deadline, we must have your proof returned by the published deadline, and as indicated by your sales rep. If we have not heard from you by that time, we will assume that your ad is correct, and it will run as is.

I hereby authorize publication of the above described advertising.

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Please note: If you pay by bank card, your card statement will show the merchant as "LA NEWSPAPER GROUP".

Item Number
12A

STAFF REPORT

Date: October 12, 2015

To: Honorable Mayor/Chair and City Council/Agency Members

From: Jose E. Pulido, City Manager/Executive Director
By: Laura Valdivia, Interim City Clerk

Subject: **Consideration to Approve the Ad-Hoc Committee Recommendations to fill City Commission Vacancies**

RECOMMENDATION

The City Council is requested to approve the Ad Hoc Committee's recommendations to fill City Commission vacancies for the Parks and Recreation Commission, Aging and Senior Citizens Commission, Public Safety Commission and Planning Commission.

BACKGROUND

1. On May 5, 2015, City Council provided direction to the City Clerk's Office to give notice to all City Commissioners that all Commission seats were to be open for reappointment.

2. On May 27, 2015, the City Clerk distributed notice to all City Commissioners that all Commission seats were to be open for reappointment, effective June 21, 2015.

3. On May 28, 2015, the City Clerk published a Notice of Commission Vacancies (Attachment A) and posted it at the following City facilities: City Hall; Clara Park; Lugo Park; and on the City's website.

4. On June 26, 2015, applications for all City Commissions were due to the City Clerk's Office. Due to lack of response, the due date was extended to July 10, 2015.

5. On July 10, 2015, applications for all City Commissions were due to the City Clerk's Office.

6. On August 24, 2015, the City Council received and filed the applications for appointments to the various commissions; appointed a City Council Ad-Hoc Committee (i.e., Vice Mayor Hernandez and Council Member Sanchez) to interview and recommend candidates for appointments to the various City Commissions; and provided direction to the City Clerk to publish a notice and accept applications for the Economic Development Commission.

7. At the September 14, 2015, City Council meeting, Council Member Sanchez provided the City Council with the Ad-Hoc Committee's recommendations (Attachment B) for appointments to the various City Commissions and requested that the item be brought back for formal action.

ANALYSIS

Direction was given to staff at the May 5, 2015 City Council meeting, to notify the current City Commissioners that all Commission seats were to be open for reappointment and that staff would begin advertising for those open Commission seats.

A Notice of City Commission Positions Open was posted at City Hall, Clara Park, Lugo Park, and on the City's website for the following Commission vacancies:

- Parks and Recreation Commission: Five Vacancies (one and two-year terms)

  This Commission serves in advisory capacity to the City Council on the acquisition, use, maintenance, and operation of parks, playgrounds and other public recreational facilities, and to the maintenance of a planned program of public recreation for the citizens of Cudahy. This Commission meets on the fourth Monday each month at 6:00 p.m.;

- Aging and Senior Citizens Commission: Five Vacancies (one and two-year terms)

  This Commission serves in an advisory capacity to the City Council on matters and means to enhance the health and quality of seniors in the community; provide advice based on input received to improve the programs, policies and services. This Commission meets on the second Monday each month at 2:00 p.m.;

- Public Safety Commission: Five Vacancies (one and two-year terms)

  This Commission serves in an advisory capacity to the City Council on planning and preparation for a program of civil defense and disaster; problems of traffic safety as related to traffic and pedestrian control; and adequacy police, fire and health services. This Commission meets on the second Tuesday of each month at 5:00 p.m.; and

- Planning Commission: Five Vacancies (one and two-year terms)

  This Commission serves in advisory capacity to the City Council on land-use policy planning matters which guide the future growth, development, and beautification of the City, including public and private buildings and works, subdivisions, streets, parks and playgrounds and unimproved real property. This Commission meets on the third Monday of each month at 6:00 p.m.

In response to the advertised vacancies, the City Clerk's Office received a total of 19 applications.

At their August 24, 2015 regular meeting, the City Council received and filed the 19 applications and formed an Ad-Hoc Committee (i.e., Vice Mayor Hernandez and Council Member Sanchez) to interview and recommend potential candidates for appointment to the various City Commissions. The City Council also directed the City Clerk to publish a notice and accept applications for the Economic Development Commission vacancies. A notice advertising the vacancies was posted at City Hall, Clara Park, Lugo Park, and on the City's website. To date, the City Clerk's Office has not received any applications for this Commission.

During the September 14, 2015 regular meeting, Council Member Sanchez distributed to the City Council, the Ad-Hoc Committee's list of recommended appointments to the various City Commission vacancies. After a brief discussion, the City Council modified the list and directed staff to bring the item back for formal action.

CONCLUSION

Currently the City has vacancies on the Planning Commission, Aging and Senior Citizens Commission, Parks and Recreation Commission, and Public Safety Commission. At the direction of the City Council, the Ad-Hoc Committee interviewed and selected qualified candidates for appointment to these Commission vacancies. It is therefore requested that the City Council approve the recommendations submitted by the Ad-Hoc Committee (Attachment C).

FINANCIAL IMPACT

There is no fiscal impact in the review and selection of commission appointees.

ATTACHMENT

A. Notice of Vacancy – Commission Applicants Sought
B. Initial Ad-Hoc Committee Recommendations
C. Final Ad-Hoc Committee Recommendations

NOTICE OF VACANCY

COMMISSION APPLICANTS SOUGHT

NOTICE IS HEREBY GIVEN that the City of Cudahy invites interested persons of the City of Cudahy to submit applications to serve on the following City Commission **(OPEN until filled)**.

Parks and Recreation Commission: 5 Vacancies (2-year term). This Commission serves in advisory capacity to the City Council on the acquisition, use, maintenance, and operation of parks, playgrounds and other public recreational facilities, and to the maintenance of a planned program of public recreation for the citizens of Cudahy. This Commission meets on the fourth Monday each month at 6:00 p.m.

Aging and Senior Citizens Commission: 5 Vacancies (2-year term). This Commission serves in an advisory capacity to the City Council on matters and means to enhance the health and quality of seniors in the community; provide advice based on input received to improve the programs, policies and services. This Commission meets on the second Monday each month at 2:00 p.m.

Public Safety Commission: 5 Vacancies (2-year term). This Commission serves in an advisory capacity to the City Council on planning and preparation for a program of civil defense and disaster; problems of traffic safety as related to traffic and pedestrian control; and adequacy police, fire and health services. This Commission meets on the second Tuesday of each month at 5:00 p.m.

Planning Commission: 5 Vacancies (2-year term). Current term expires on April 30, 2014. This Commission serves in advisory capacity to the City Council on land-use policy planning matters which guide the future growth, development, and beautification of the City, including public and private buildings and works, subdivisions, streets, parks and playgrounds and unimproved real property. This Commission meets on the third Monday of each month at 6:00 p.m.

Applications are available at City Hall in the Office of the City Clerk, 5220 Santa Ana Street, California, Monday through Thursday, between the hours of 7:00 a.m. and 5:00 p.m., Friday, between the hours of 7:00 p.m. and 4:00 p.m. except holidays. The application will be available online as well and can be downloaded from www.cityofcudahy.com Completed application forms must be filed with the City Clerk in order to be considered for appointment to this position. The appointment for this position will be made during a Regular City Council Meeting.

Note: According to the Cudahy Municipal Code, Chapter 2.32.010 to be qualified as a City Commissioner one must be an owner of real property located within the city; reside within the city; or employed within the city.

/s/Victor H. Ferrer
Deputy City Clerk
Office of the City Clerk
City of Cudahy

Posted on May 28, 2015 at the following locations:

1. City Hall
2. Clara Park
3. Lugo Park
4. City's Website

12C.

Parks and Recs		Seniors		Public Safety		Planning Commission
1 **Martin Aguilera**	1	**Guadalupe Martinez**	1	**Emanuel Cruz**	1	**Susie De Santiago**
2 **Kimberly Ortega**	2	**Isaias Cornejo**	2	**Joaquin Carrera**	2	**Martin Fuentes**
3 **Jessica Chavez**	3	**Michele Gessner**	3	**Diana Vera**	3	**Gilbert Cuevas**
4 Ildefonso Magallon	4	. Valenzuela Gonzalo Jr	4	**Enrique Cardonne**	4	**Richard Corvera Hernandez**
5 **Cesar Cruz**	5		5		5	

Attachment C

Ad-Hoc Committee Recommendation to fill City Commission Vacancies

Parks and Recreation Commission

		2-year term* (select three)	1-year term** (select two)
1.	Martin Aguilera		X
2.	Kimberly Ortega	X	
3.	Jessica Chavez		X
4.	Gilbert Cuevas	X	
5.	Cesar Cruz	X	

Aging and Senior Citizens Commission (one unfilled vacancy)

		2-year term* (select three)	1-year term** (select two)
1.	Guadalupe Martinez	X	
2.	Isaias Cornejo	X	
3.	Michele Gessner	X	
4.	Valenzuela Gonzalo Jr.		X
5.	Vacant		X

Public Safety Commission (one unfilled vacancy)

		2-year term* (select three)	1-year term** (select two)
1.	Emanuel Cruz	X	
2.	Joaquin Carrera	X	
3.	Diana Vera	X	
4.	Enrique Cardonne		X
5.	Vacant		X

Planning Commission

		2-year term* (select three)	1-year term** (select two)
1.	Susie De Santiago	X	
2.	Martin Fuentes		X
3.	Elizabeth Alcantar	X	
4.	Richard Corvera Hernandez	X	
5.	Leslie Mendoza		X

*2-year term expires 4/30/17

**1-year term expires 4/30/16

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Item Number
12B

STAFF REPORT

Date: October 12, 2015

To: Honorable Mayor/Chair and City Council/Agency Members

From: Jose E. Pulido, City Manager/Executive Director
By: Michael Allen, Acting Community Development Director
By: Didier Murillo, Planning Technician

Subject: **Consideration to Introduce Ordinance No. 653 by First Reading, Amending Cudahy Municipal Code (CMC) Chapter 20.28 Development Agreements of Title 20 Zoning**

RECOMMENDATION

The City Council is requested to introduce Ordinance No. 653 by first reading, amending Cudahy Municipal Code (CMC) Chapter 20.28 Development Agreements of Title 20 Zoning.

BACKGROUND

1. In 1979, State Development Agreement Law (California Government Code Section 65864 et seq.) Article 2.5 Development Agreements [65864-68869.5] was added by California Statutes Ch. 934.

2. On March 4, 1991, City Council adopted Ordinance No. 431 amending Chapter 20 of the Cudahy Municipal Code to establish procedures for the approval and adoption of Development Agreements.

3. On October 7, 2003, City Council adopted Ordinance No. 587 adopting and amending a comprehensive city-wide Cudahy Zoning Ordinance.

4. On August 17, 2015, Planning Commission approved Resolution No. PC 15-10 recommending that the City Council adopt Ordinance No. 653 amending Cudahy Municipal Code (CMC) Chapter 20.28 Development Agreements of Title 20 Zoning.

ANALYSIS

The City has prepared an inventory of underdeveloped land which has been identified with having the potential for future economic development opportunities. There are a total of seven sites identified in the inventory. Strengthening and clarifying the language in the current CMC in regards to development agreements would be mutually beneficial to both developers and the City as a whole. The City is currently in the process of updating the General Plan. The Cudahy General Plan is the umbrella document that allows the City to plan for future development. The General Plan update will attract development into the City with increased density and contemporary concepts such as mixed used development. Therefore, having strong and concise development agreements in place will help facilitate and shape the future of potential projects sites.

Under California Law, cities can establish a development agreement which is essentially a contract between the City and a person (i.e., developer) who owns or controls property within the jurisdiction. The purpose of the agreement is for the City to specify the standards and conditions that will govern development of a property. The development agreement provides assurances to the developer that the development regulations that apply to the project will not change during the term of the agreement. The City may require that conditions of approval be included in the agreement to mitigate project impacts, including project phasing and timing of public improvements. The agreement can also facilitate enforcement of requirements, since it is a contract that details the obligations of the developer and the City.

To address State Development Agreement Law Government Code Section 65864 et seq (a-c) listed below, the City will amend Chapter 20.28 Development Agreements to strengthen and clarify the language of the current CMC.

(a) *The lack of certainty in the approval of development projects can result in a waste of resources, escalate the cost of housing and other development to the consumer, and discourage investment in and commitment to comprehensive planning which would make maximum efficient utilization of resources at the least economic cost to the public.*

(b) *Assurance to the applicant for a development project that upon approval of the project, the applicant may proceed with the project in accordance with existing policies, rules and regulations, and subject to conditions of approval, will strengthen the public planning process, encourage private participation in comprehensive planning, and reduce the economic costs of development.*

(c) *The lack of public facilities, including, but not limited to, streets, sewerage, transportation, drinking water, school, and utility facilities, is a serious impediment to the development of new housing. Whenever possible, applicants and local governments may include provisions in agreements* *whereby applicants are reimbursed over time for financing public facilities.*

In order to strengthen and clarify the language of the current CMC that provides certain assurances to development project applicants that projects may rely on existing policies, rules and regulations, the City desires to propose modifications to include the provisions that development agreements shall be processed concurrently with all other project-related applications and outline the approval process of a development agreement. Provisions include the ability for the Community Development Director to sign off on minor modifications of a project and any other terms that may arise. Lastly, provisions will include conditions and requirements that the City Council deems proper.

The amendments to Chapter 20.28 Development Agreements can be found on pages 1-3 of Attachment B (strikethrough denotes deletions; underlining denotes additions).

CEQA (CALIFORNIA ENVIRONMENTAL QUALITY ACT):

The California Environmental Quality Act (CEQA) is a statute that requires state and local agencies to identify the significant environmental impacts of their actions and to avoid or mitigate those impacts, if feasible.

CEQA applies to certain activities that affect the environment of state and local public agencies. A public agency must comply with CEQA when it undertakes an activity defined by CEQA as a "project." A project is an activity undertaken by a public agency or a private activity which must receive some discretionary approval (meaning that the agency has the authority to deny the requested permit or approval) from a government agency which may cause either a direct physical change or a reasonably foreseeable indirect change in the environment.

Adoption and implementation of this ordinance is exempt from the California Environmental Quality Act (CEQA) pursuant to CEQA Guidelines (Cal. Code Regs. title 14) section 15061(b)(3) (certain to have no significant effect on the environment), because the ordinance implements State law and policy, and there can be no meaningful analysis of environmental impacts because it is not reasonably foreseeable what projects might be proposed. (Id. § 15064(d).) Specific development agreements will each be subject to CEQA.

CONCLUSION

If the City Council adopts Ordinance No. 653, amending Cudahy Municipal Code (CMC) Chapter 20.28 Development Agreements of Title 20 Zoning, the City will strengthen and clarify the language found in the current code, which provides certain assurances to development project applicants that projects may rely on existing policies, rules and regulations.

FINANCIAL IMPACT

There is no fiscal impact associated with adoption of Ordinance No. 653.

ATTACHMENTS

A. Resolution PC 15-09
B. Amendments of Chapter 20.28 Development Agreements
C. Current CMC Chapter 20.28 Development Agreements
D. Draft CMC Chapter 20.28 Development Agreements
E. Draft Ordinance No. 653

RESOLUTION NO. PC 15-09

A RESOLUTION OF THE PLANNING COMMISSION OF THE CITY OF CUDAHY RECOMMENDING APPROVAL AND ADOPTION OF ORDINANCE NO 653 BY THE CITY OF CUDAHY CITY COUNCIL AMENDING CUDAHY MUNICIPAL CODE CHAPTER 20.28 (DEVELOPMENT AGREEMENTS) OF TITLE 20 (ZONING) REGARDING DEVELOPMENT AGREEMENTS

WHEREAS: the State Development Agreement Law (California Government Code section 65864 et seq.) provides that a city may enter into an agreement with any person having a legal or equitable interest in real property for the development of the property; and

WHEREAS: California Government Code section 65867.5 states that a development agreement is a legislative act that shall be approved by ordinance; and

WHEREAS: the State Development Agreement Law authorizes cities to establish procedures and requirements for application, review, and approval of development agreements; and

WHEREAS: the City's Development Agreement Ordinance is set forth in Chapter 20.28 of the Cudahy zoning ordinance; and

WHEREAS: in furtherance of the planning process that provides certain assurances to development project applicants that projects may rely on existing policies, rules and regulations, the City desires to strengthen and clarify its Development Agreement Ordinance; and

WHEREAS: the Cudahy Planning Commission has carefully considered all oral and written testimony offered at the duly noticed public hearing.

NOW, THEREFORE, THE PLANNING COMMISSION OF THE CITY OF CUDAHY, CALIFORNIA DOES RECOMMEND THAT CITY COUNCIL ORDAIN AS FOLLOWS:

SECTION 1: Subpart (2) of Cudahy Municipal Code Section 20.28.030 (Initiation of and requirement of hearing) is amended as follows (underlining denotes additions):

(2) Upon the filing of a completed application, the community development director shall set a date for a noticed public hearing before the planning commission and shall give notice as required by CMC 20.48.020. <u>The application for a development agreement shall be processed and scheduled for public hearing concurrently with all project-related applications.</u>

<u>SECTION 2</u>: Subpart (2) of Cudahy Municipal Code Section 20.28.050 (Contents) is amended as follows (underlining denotes additions):

(2) In addition to the required terms, a development agreement may include any of the following provisions:

(a) The specified time for construction to commence.

(b) The specified time for the project, or any phase of the project, to be completed.

(c) Terms and conditions relating to applicant financing of necessary public facilities, and subsequent reimbursement, if any.

(d) Conditions, terms, restrictions, and requirements for subsequent discretionary actions by the city, provided these shall not prevent development of the land for the uses and to the density or intensity set forth in the agreement.

<u>(e) Director sign-off for minor modifications to the development project, with criteria to determine a minor modification.</u>

<u>(g) Any other terms, conditions and requirements the city council deems proper.</u>

<u>SECTION 3</u>: Cudahy Municipal Code Section 20.28.060 (Approval of development agreement) is amended as follows (strikethrough denotes deletions; underlining denotes additions):

~~A development agreement shall be approved by resolution. The city council shall not approve a development agreement unless it finds that its provisions are consistent with the general plan and applicable specific plans.~~

<u>(1) Following a public hearing, the city council shall approve, conditionally approve, or deny the development agreement and associated applications. If the city council proposes substantial modification to the development agreement that was not considered by the planning commission, the modification shall be referred back to the planning commission for its recommendation. Failure of the planning commission to report back to the city council within forty days after the referral, or a longer time set by the city council, shall be deemed a recommendation for approval of the proposed modification.</u>

(2) If the city council approves or conditionally approves the application, it shall direct the preparation of a development agreement that reflects the conditions and terms as approved, and an ordinance authorizing execution of the development agreement by the city council. The ordinance shall contain the following findings:

(a) The development agreement is in the best interests of the city and promotes the public interest and welfare.

(b) The development agreement is consistent with the General Plan, any applicable specific plan, and the city zoning code.

SECTION 4: In accordance with Municipal Code section 20.16.100, the City Council finds that the amendment is consistent with the objectives of the zoning code and the City of Cudahy General Plan. The amendment implements state law governing development agreements, which allows cities and developers to enter into contracts to lock in regulations and policies governing the property. The amendment requires that the proposed development agreement is consistent with the General Plan and the zoning code. Development agreements benefit the city and its residents by specifying the developer's responsibilities, such as public improvements and payment of fees, while providing assurance to the applicant regarding the applicable rules. The amendment is consistent with the objective of the General Plan to promote opportunities for growth and development, and the policy to "encourage development that complements and enhances the community." (Land Use Element Policy 1.2.)

SECTION 5: Adoption and implementation of this ordinance is exempt from the California Environmental Quality Act (CEQA) pursuant to CEQA Guidelines (Cal. Code Regs. title 14) section 15061(b)(3) (certain to have no significant effect on the environment), because the ordinance implements State law and policy, and there can be no meaningful analysis of environmental impacts because it is not reasonably foreseeable what projects might be proposed. (Id. § 15064(d).) Specific development agreements will each be subject to CEQA.

SECTION 6: This ordinance shall supersede any inconsistent provision of the Municipal Code to the extent of such inconsistency and no further.

SECTION 7: Should any provision of this ordinance be determined to be invalid or unconstitutional, all other provisions shall remain in full force and effect as approved.

SECTION 8: Based on the aforementioned, the City of Cudahy Planning Commission hereby recommends approval of Ordinance No. 653 by Resolution PC 15-09.

<u>SECTION 9</u>: The Planning Commission Secretary shall certify to the adoption of this Resolution and forward a copy to the City council and City Clerk.

PASSED AND APPROVED this 17th day of August, 2015 by the following vote:

AYES: Commissioner Alcantar, Commissioner de Santiago, & Chairman Cuevas
NOES: None
ABSENT: Vice Chairman Fuentes
ABSTAIN: None

APPROVED:

Chairman

ATTEST:

Secretary,

20.28.030 Initiation of and requirement of hearing.

(2) Upon the filing of a completed application, the community development director shall set a date for a noticed public hearing before the planning commission and shall give notice as required by CMC 20.48.020. The application for a development agreement shall be processed and scheduled for public hearing concurrently with all project-related applications.

20.28.050 Contents.

(e) Director sign-off for minor modifications to the development project, with criteria to determine a minor modification.

(g) Any other terms, conditions and requirements the city council deems proper.

20.28.060 Approval of development agreement.

~~A development agreement shall be approved by resolution. The city council shall not approve a development agreement unless it finds that its provisions are consistent with the general plan and applicable specific plans.~~ (Ord. 587 § 20-1.0725).

(1) Following a public hearing, the city council shall approve, conditionally approve, or deny the development agreement and associated applications. If the city council proposes substantial modification to the development agreement that was not considered by the planning commission, the modification shall be referred back to the planning commission for its recommendation. Failure of the planning commission to report back to the city council within forty days after the referral, or a longer time set by the city council, shall be deemed a recommendation for approval of the proposed modification.

(2) If the city council approves or conditionally approves the application, it shall direct the preparation of a development agreement that reflects the conditions and terms as approved, and an ordinance authorizing execution of the development agreement by the city council. The ordinance shall contain the following findings:

> (a) The development agreement is in the best interests of the city and promotes the public interest and welfare.
>
> (b) The development agreement is consistent with the General Plan, any applicable specific plan, and the city zoning code.

To see the full *draft* of Chapter 20.28 Development Agreements please reference Attachment C.

shall be governed by the provisions of this section which control new applications for extensions of time. (Ord. 587 § 20-1.0605).

20.24.030 Continuation of existing nonconforming uses.

Any use established or conducted, or any building or improvement existing in violation of Los Angeles County Ordinance No. 1494 (as amended) upon the effective date of the ordinance codified in this zoning code shall not be deemed to have acquired a legal nonconforming status by reason of the adoption of this zoning code. To the extent that such use, building, or improvement was a violation of Los Angeles County Ordinance No. 1494 (as amended) or any other ordinance, statute, or law, or is a violation of this zoning code, it shall be deemed a continuing violation. (Ord. 587 § 20-1.0610).

Chapter 20.28

DEVELOPMENT AGREEMENTS

Sections:

20.28.010 Authorization/purpose.

The purpose of this chapter is to establish procedures and requirements for the approval and adoption of development agreements. These procedures and requirements are established pursuant to, and are consistent with, Government Code Sections 65864 through 65869.5. The planning commission may recommend, and the city council may enter into a development agreement with, any person having a legal or equitable interest in real property. (Ord. 587 § 20-1.0700).

20.28.020 Application.

Any person desiring a development agreement may file an application with the community development director. An applicant shall be required to pay a fee as provided in CMC 20.12.080. (Ord. 587 § 20-1.0705).

20.28.030 Initiation of and requirement of hearing.

(1) A hearing on a development agreement may be initiated in any of the following manners:

(a) Upon the initiative of the city council;

(b) Upon the recommendation of the planning commission and the concurrence of the city council; or

(c) Upon the filing of a completed application and the payment of fees as provided for by CMC 20.12.080.

(2) Upon the filing of a completed application, the community development director shall set a date for a noticed public hearing before the planning commission and shall give notice as required by CMC 20.48.020.

(3) The planning commission and the city council shall hold noticed public hearings on every completed application for a development agreement. (Ord. 587 § 20-1.0710).

20.28.040 Reserved.

(Ord. 587 § 20-1.0715).

20.28.050 Contents.

(1) This section establishes the scope and content of development agreements. A development agreement shall include the following:

(a) The duration of the agreement;

(b) The permitted uses of the property;

(c) The density or intensity of use;

(d) The maximum height and size of proposed buildings;

(e) Any provisions for the reservation or dedication of land for public purposes; and

(f) Provision for a periodic review of the applicant's compliance with the terms of the agreement under CMC 20.28.080.

(2) In addition to the required terms, a development agreement may include any of the following provisions:

(a) The specified time for construction to commence.

(b) The specified time for the project, or any phase of the project, to be completed.

(c) Terms and conditions relating to applicant financing of necessary public facilities, and subsequent reimbursement, if any.

(d) Conditions, terms, restrictions, and requirements for subsequent discretionary actions by the city, provided these shall not prevent development of the land for the uses and to the density or intensity set forth in the agreement. (Ord. 587 § 20-1.0720).

20.28.060 Approval of development agreement.

A development agreement shall be approved by resolution. The city council shall not approve a development agreement unless it finds that its provisions are consistent with the general plan and applicable specific plans. (Ord. 587 § 20-1.0725).

20.28.070 Recording of development agreement.

The city clerk shall record a copy of the approved development agreement with the Los Angeles County recorder's office within 10 days after the city council approves the agreement. Amendments to, or modifications of, an approved development agreement shall be recorded with the Los Angeles County recorder's office within 10 days after the city council approves such amendments or modifications. (Ord. 587 § 20-1.0730).

20.28.080 Periodic review of development agreement.

The planning commission shall conduct a periodic review of an applicant's compliance with the terms of the development agreement at least every 12 months. During this review the applicant, or the applicant's successor in interest, shall be required to demonstrate good faith compliance with the terms of the development agreement. If the planning commission finds and determines on the basis of substantial evidence that the initial applicant, or the applicant's successor in interest, has not complied in good faith with the terms or conditions of the agreement, the planning commission may recommend and the city council may terminate or modify the agreement. (Ord. 587 § 20-1.0735).

20.28.090 Amendment or cancellation.

The applicant and the city council may, by mutual consent, amend a development agreement, in whole or in part. Notice of intention to amend shall be given pursuant to CMC 20.28.040. The city council may in its discretion hold a hearing on the proposed amendment. An amendment to a development agreement shall be approved by ordinance. An amendment shall not be approved unless the city council finds it to be consistent with the general plan and applicable specific plans.

The applicant and the city council may also, by mutual consent, cancel a development agreement, in whole or part. Notice of intention to cancel shall be given pursuant to Section 20-1.0715. (Ord. 587 § 20-1.0740).

20.28.100 Modification or suspension.

Provisions of a development agreement which do not comply with state or federal laws or regulations enacted after the city council's approval of the development agreement shall be modified or suspended as necessary to comply with such laws or regulations. (Ord. 587 § 20-1.0745).

20.28.110 Application of rules, regulations and policies.

All rules, regulations, and official policies governing permitted uses of land, density, and design, improvement and construction standards and specifications, in force at the time the development agreement is approved, will continue to be applicable, unless the development agreement provides otherwise. (Ord. 587 § 20-1.0750).

20.28.120 Enforcement.

Unless and until amended or canceled as provided in CMC 20.28.090, or modified or suspended as provided in CMC 20.28.100, a development agreement shall be enforceable by any party to the agreement, notwithstanding any change in any applicable general plan, specific plan, zoning, subdivision, or building regulation which alters or amends the rules, regulations, or policies specified in CMC 20.28.110.

The burdens of a development agreement shall be binding upon, and the benefits of the agreement shall inure to, all successors in interest to the parties to the development agreement. (Ord. 587 § 20-1.0755).

Chapter 20.32

TEMPORARY USE PERMITS

Sections:

20.32.010 Uses and developments permitted upon review and approval by the community development director.

The following temporary uses and developments may be initiated, altered or maintained upon approval pursuant to this section:

(1) Temporary uses of land, including temporary outdoor sales, and the erection of booths, tents, or parking of trailers for temporary activities conducted either outdoors or within temporary structures, when such uses are allowed in the applicable zone with the approval of the community development director. Not more than 26 outdoor sales events shall occur within any 12-month period at any one location. Each sales event shall be limited in duration to not more than two consecutive calendar days. A third day is allowed if the event occurs on a holiday weekend. The location of an outdoor sales event shall not interfere with automobile circulation, and shall be designed in a manner to allow free pedestrian movement within and around the vicinity. For purposes of this subsection, the term "location" shall include a parcel or combination of parcels that are owned or occupied by the same owner or business entity. No outdoor sales activity shall occur on a public sidewalk or on other portions of the public right-of-way along a street. The location of an outdoor sales event shall not interfere with public fire and police protection services. Outdoor sales activities within or beneath a tent are not permitted.

(2) Outdoor sales of flowers and gifts are prohibited, except for a business licensed to sell flowers that has been licensed to sell flowers for more than one year. Flower shops may obtain a temporary use permit provided the applicant submits financial statements showing sales of flowers

Attachment D

The amendments to Chapter 20.28 Development Agreements are found below (**strikethrough denotes deletions; underlining denotes additions**):

20.28.010 Authorization/purpose.
The purpose of this chapter is to establish procedures and requirements for the approval and adoption of development agreements. These procedures and requirements are established pursuant to, and are consistent with, Government Code Sections 65864 through 65869.5. The planning commission may recommend, and the city council may enter into a development agreement with, any person having a legal or equitable interest in real property. (Ord. 587 § 20-1.0700).

20.28.020 Application.
Any person desiring a development agreement may file an application with the community development director. An applicant shall be required to pay a fee as provided in CMC 20.12.080. (Ord. 587 § 20-1.0705).

20.28.030 Initiation of and requirement of hearing.
(1) A hearing on a development agreement may be initiated in any of the following manners:

(a) Upon the initiative of the city council;

(b) Upon the recommendation of the planning commission and the concurrence of the city council; or

(c) Upon the filing of a completed application and the payment of fees as provided for by CMC 20.12.080.

(2) Upon the filing of a completed application, the community development director shall set a date for a noticed public hearing before the planning commission and shall give notice as required by CMC 20.48.020. The application for a development agreement shall be processed and scheduled for public hearing concurrently with all project-related applications.

(3) The planning commission and the city council shall hold noticed public hearings on every completed application for a development agreement. (Ord. 587 § 20-1.0710).

20.28.040 Reserved. (Ord. 587 § 20-1.0715).

20.28.050 Contents.
(1) This section establishes the scope and content of development agreements. A development agreement shall include the following:

(a) The duration of the agreement;

(b) The permitted uses of the property;

(c) The density or intensity of use;

(d) The maximum height and size of proposed buildings;

(e) Any provisions for the reservation or dedication of land for public purposes; and

(f) Provision for a periodic review of the applicant's compliance with the terms of the agreement under CMC 20.28.080.

(2) In addition to the required terms, a development agreement may include any of the following provisions:

(a) The specified time for construction to commence.

(b) The specified time for the project, or any phase of the project, to be completed.

(c) Terms and conditions relating to applicant financing of necessary public facilities, and subsequent reimbursement, if any.

(d) Conditions, terms, restrictions, and requirements for subsequent discretionary actions by the city, provided these shall not prevent development of the land for the uses and to the density or intensity set forth in the agreement. (Ord. 587 § 20-1.0720).

(e) Director sign-off for minor modifications to the development project, with criteria to determine a minor modification.

(g) Any other terms, conditions and requirements the city council deems proper.

20.28.060 Approval of development agreement.

~~A development agreement shall be approved by resolution. The city council shall not approve a development agreement unless it finds that its provisions are consistent with the general plan and applicable specific plans.~~ (Ord. 587 § 20-1.0725).

(1) Following a public hearing, the city council shall approve, conditionally approve, or deny the development agreement and associated applications. If the city council proposes substantial modification to the development agreement that was not considered by the planning commission, the modification shall be referred back to the planning commission for its recommendation. Failure of the planning commission to report back to the city council within forty days after the referral, or a longer time set by the city council, shall be deemed a recommendation for approval of the proposed modification.

(2) If the city council approves or conditionally approves the application, it shall direct the preparation of a development agreement that reflects the conditions and terms as approved, and an ordinance authorizing execution of the development agreement by the city council. The ordinance shall contain the following findings:

(a) The development agreement is in the best interests of the city and promotes the public interest and welfare.

(b) The development agreement is consistent with the General Plan, any applicable specific plan, and the city zoning code.

20.28.070 Recording of development agreement.

The city clerk shall record a copy of the approved development agreement with the Los Angeles County recorder's office within 10 days after the city council approves the agreement. Amendments to, or modifications of, an approved development agreement shall be recorded with the Los Angeles County recorder's office within 10 days after the city council approves such amendments or modifications. (Ord. 587 § 20-1.0730).

20.28.080 Periodic review of development agreement.

The planning commission shall conduct a periodic review of an applicant's compliance with the terms of the development agreement at least every 12 months. During this review the applicant, or the applicant's successor in interest, shall be required to demonstrate good faith compliance with the terms of the development agreement. If the planning commission finds and determines on the basis of substantial evidence that the initial applicant, or the applicant's successor in interest, has not complied in good faith with the terms or conditions of the agreement, the planning commission may recommend and the city council may terminate or modify the agreement. (Ord. 587 § 20-1.0735).

20.28.090 Amendment or cancellation.
The applicant and the city council may, by mutual consent, amend a development agreement, in whole or in part. Notice of intention to amend shall be given pursuant to CMC 20.28.040. The city council may in its discretion hold a hearing on the proposed amendment. An amendment to a development agreement shall be approved by ordinance. An amendment shall not be approved unless the city council finds it to be consistent with the general plan and applicable specific plans. The applicant and the city council may also, by mutual consent, cancel a development agreement, in whole or part. Notice of intention to cancel shall be given pursuant to Section 20-1.0715. (Ord. 587 § 20-1.0740).

20.28.100 Modification or suspension.
Provisions of a development agreement which do not comply with state or federal laws or regulations enacted after the city council's approval of the development agreement shall be modified or suspended as necessary to comply with such laws or regulations. (Ord. 587 § 20-1.0745).

20.28.110 Application of rules, regulations and policies.
All rules, regulations, and official policies governing permitted uses of land, density, and design, improvement and construction standards and specifications, in force at the time the development agreement is approved, will continue to be applicable, unless the development agreement provides otherwise. (Ord. 587 § 20-1.0750).

20.28.120 Enforcement.
Unless and until amended or canceled as provided in CMC 20.28.090, or modified or suspended as provided in CMC 20.28.100, a development agreement shall be enforceable by any party to the agreement, notwithstanding any change in any applicable general plan, specific plan, zoning, subdivision, or building regulation which alters or amends the rules, regulations, or policies specified in CMC 20.28.110. The burdens of a development agreement shall be binding upon, and the benefits of the agreement shall inure to, all successors in interest to the parties to the development agreement. (Ord. 587 § 20-1.0755).

Attachment E

ORDINANCE NO. 653

AN ORDINANCE OF THE CITY COUNCIL OF THE CITY OF CUDAHY, CALIFORNIA, AMENDING CUDAHY MUNICIPAL CODE CHAPTER 20.28 (DEVELOPMENT AGREEMENTS) OF TITLE 20 (ZONING) REGARDING DEVELOPMENT AGREEMENTS

WHEREAS: the State Development Agreement Law (California Government Code section 65864 et seq.) provides that a city may enter into an agreement with any person having a legal or equitable interest in real property for the development of the property; and

WHEREAS: California Government Code section 65867.5 states that a development agreement is a legislative act that shall be approved by ordinance; and

WHEREAS: the State Development Agreement Law authorizes cities to establish procedures and requirements for application, review, and approval of development agreements; and

WHEREAS: the City's Development Agreement Ordinance is set forth in Chapter 20.28 of the Cudahy zoning ordinance; and

WHEREAS: in furtherance of the planning process that provides certain assurances to development project applicants that projects may rely on existing policies, rules and regulations, the City desires to strengthen and clarify its Development Agreement Ordinance; and

WHEREAS: on August 17, 2015, following proper notice and public hearing, the City Planning Commission adopted Resolution No. 653, recommending that the City Council adopt an ordinance amending Cudahy Municipal Code Chapter 20.28 regarding development agreements; and

WHEREAS, the City Council has considered evidence presented by the Planning Commission, City Staff and the public at a duly noticed public hearing.

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF CUDAHY, CALIFORNIA DOES ORDAIN AS FOLLOWS:

SECTION 1: Subpart (2) of Cudahy Municipal Code Section 20.28.030 (Initiation of and requirement of hearing) is amended as follows (underlining denotes additions):

(2) Upon the filing of a completed application, the community development director shall set a date for a noticed public hearing before the planning commission and shall give notice as required by CMC 20.48.020. The application for a development agreement shall be processed and scheduled for public hearing concurrently with all project-related applications.

SECTION 2: Subpart (2) of Cudahy Municipal Code Section 20.28.050 (Contents) is amended as follows (underlining denotes additions):

(2) In addition to the required terms, a development agreement may include any of the following provisions:

(a) The specified time for construction to commence.

(b) The specified time for the project, or any phase of the project, to be completed.

(c) Terms and conditions relating to applicant financing of necessary public facilities, and subsequent reimbursement, if any.

(d) Conditions, terms, restrictions, and requirements for subsequent discretionary actions by the city, provided these shall not prevent development of the land for the uses and to the density or intensity set forth in the agreement.

(e) Director sign-off for minor modifications to the development project, with criteria to determine a minor modification.

(g) Any other terms, conditions and requirements the city council deems proper.

SECTION 3: Cudahy Municipal Code Section 20.28.060 (Approval of development agreement) is amended as follows (strikethrough denotes deletions; underlining denotes additions):

~~A development agreement shall be approved by resolution. The city council shall not approve a development agreement unless it finds that its provisions are consistent with the general plan and applicable specific plans.~~

(1) Following a public hearing, the city council shall approve, conditionally approve, or deny the development agreement and associated applications. If the city council proposes substantial modification to the development agreement that was not considered by the planning commission, the modification shall be referred back to the planning commission for its recommendation. Failure of the planning commission to report back to the city council within forty days after the referral, or a longer time

set by the city council, shall be deemed a recommendation for approval of the proposed modification.

(2) If the city council approves or conditionally approves the application, it shall direct the preparation of a development agreement that reflects the conditions and terms as approved, and an ordinance authorizing execution of the development agreement by the city council. The ordinance shall contain the following findings:

(a) The development agreement is in the best interests of the city and promotes the public interest and welfare.

(b) The development agreement is consistent with the General Plan, any applicable specific plan, and the city zoning code.

SECTION 4: In accordance with Municipal Code section 20.16.100, the City Council finds that the amendment is consistent with the objectives of the zoning code and the City of Cudahy General Plan. The amendment implements state law governing development agreements, which allows cities and developers to enter into contracts to lock in regulations and policies governing the property. The amendment requires that the proposed development agreement is consistent with the General Plan and the zoning code. Development agreements benefit the city and its residents by specifying the developer's responsibilities, such as public improvements and payment of fees, while providing assurance to the applicant regarding the applicable rules. The amendment is consistent with the objective of the General Plan to promote opportunities for growth and development, and the policy to "encourage development that complements and enhances the community." (Land Use Element Policy 1.2.)

SECTION 5: Adoption and implementation of this ordinance is exempt from the California Environmental Quality Act (CEQA) pursuant to CEQA Guidelines (Cal. Code Regs. title 14) section 15061(b)(3) (certain to have no significant effect on the environment), because the ordinance implements State law and policy, and there can be no meaningful analysis of environmental impacts because it is not reasonably foreseeable what projects might be proposed. (Id. § 15064(d).) Specific development agreements will each be subject to CEQA.

SECTION 6: This ordinance shall supersede any inconsistent provision of the Municipal Code to the extent of such inconsistency and no further.

SECTION 7: Should any provision of this ordinance be determined to be invalid or unconstitutional, all other provisions shall remain in full force and effect as approved.

SECTION 8: This ordinance shall take effect 30 days after its passage pursuant to California Government Code section 36937.

SECTION 9: The City Clerk shall attest to the adoption of this ordinance and shall cause the same to be published in the manner prescribed by law.

PASSED, APPROVED AND ADOPTED this ______ day of ______________, 2015.

____

Cristian Markovich, Mayor

ATTEST:

____

Deputy City Clerk

APPROVED AS TO FORM:

____

Isabel Birrueta
Assistant City Attorney

CERTIFICATION

STATE OF CALIFORNIA)
COUNTY OF LOS ANGELES) SS
CITY OF CUDAHY)

I, Victor H. Ferrer, Acting Deputy City Clerk of the City of Cudahy, hereby certify that the foregoing Ordinance No.________ was passed and adopted by the City Council of the City of Cudahy, signed by the Mayor and attested by the City Clerk at a regular meeting of said Council held on the ________ day of ______________________, 2015, and that said Ordinance was adopted by the following vote, to-wit:

AYES:

NOES:

ABSTAIN:

ABSENT:

____

Deputy City Clerk

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Item Number

12C

STAFF REPORT

Date: October 12, 2015

To: Honorable Mayor/Chair and City Council/Agency Members

From: Jose E. Pulido, City Manager/Executive Director
By: Michael Allen, Acting Community Development Director

Subject: **Discussion of City Council Appointments to the General Plan Advisory Committee (GPAC)**

RECOMMENDATION

The City Council is requested to consider the appointment of up to three candidates each to the General Plan Advisory Committee (GPAC) per Council Member.

BACKGROUND

1. On October 17, 2014, the City Council approved the Fiscal Year (FY) 2014 - 2015 Budget which included a total of $150,000 to commence the General Plan Update.

2. On June 29, 2015, the City Council approved the FY 2015 - 2016 City Budget which included a total of $400,000 to commence the General Plan Update.

3. On August 10, 2015, the City Council awarded a Professional Services Agreement to MIG in an amount not to exceed $488,088 ($379,368 for the preparation of the Cudahy General Plan Update and $108,720 for the preparation of the optional Development Code Update).

4. On September 23, 2015, City staff and the MIG project team met for the General Plan Update kick-off meeting, and identified next steps, which includes the Council appointment of a GPAC.

ANALYSIS

As part of the City's 2015 - 2016 Cudahy General Plan Update, City staff and the MIG project team met to kick-off the project, exchange data and information, finalize protocols and communications, discuss the stakeholder process, and outline overall expectations and desired project outcomes. Additionally, the project team toured the City highlighting individual neighborhoods and community areas, key issues and opportunity sites as well as where land use changes may be considered in the near future. The focus of the tour was to view and understand the neighborhoods, districts, and opportunity areas. Following the meeting, the project team will prepare a detailed project schedule, identify stakeholders to be interviewed, and solidify the GPAC.

Central to the community engagement program of the General Plan Update will be the GPAC. The GPAC can be made up of 10 – 15 community stakeholders, including residents, business owners, and representatives from community organizations including student representatives.

CONCLUSION

City Council members are requested to consider up to three appointments per member to the GPAC, to be made at the next regularly scheduled City Council meeting on October 12, 2015.

FINANCIAL IMPACT

None.

ATTACHMENTS

None.