



ATTACHMENT 8:  
**Benefits and Cost Analysis**

SANTA CLARA VALLEY WATER DISTRICT

**Proposition 1E Round 2  
Stormwater Flood Management Grant Program  
Permanente Creek Flood Protection Proposal**

In accordance with PSP requirements, **Attachment 8** consists of the following items:

- ✓ Documentation of the monetized and non-monetized benefits based on the physical benefit descriptions discussed in Attachment 7
- ✓ **Appendices** that include copies of the referenced technical documents that support the physical benefit claims.

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## Flood Damage Reduction Benefit Analysis (D1)

The DWR Method was used to estimate the flood damage reduction benefits provided by the Permanente Creek Flood Protection Project.

### Selected Flood Events

For the purposes of determining flood damage benefits, three separate flood events were selected for analysis:

- **25-year Event.** Historic observations and modeling performed using Hazus suggest that this flooding event would cause flood damage without the proposed project.
- **50-year Event.** Historic observations and modeling performed using Hazus suggest that this flooding event would cause relatively major flood damage without the proposed project.
- **100-year Event.** Historic observations and modeling performed using Hazus suggest that this flooding event would cause major flood damage without the proposed project. The project is designed to provide flood protection from the 100-year flood.

### Without-Project Conditions

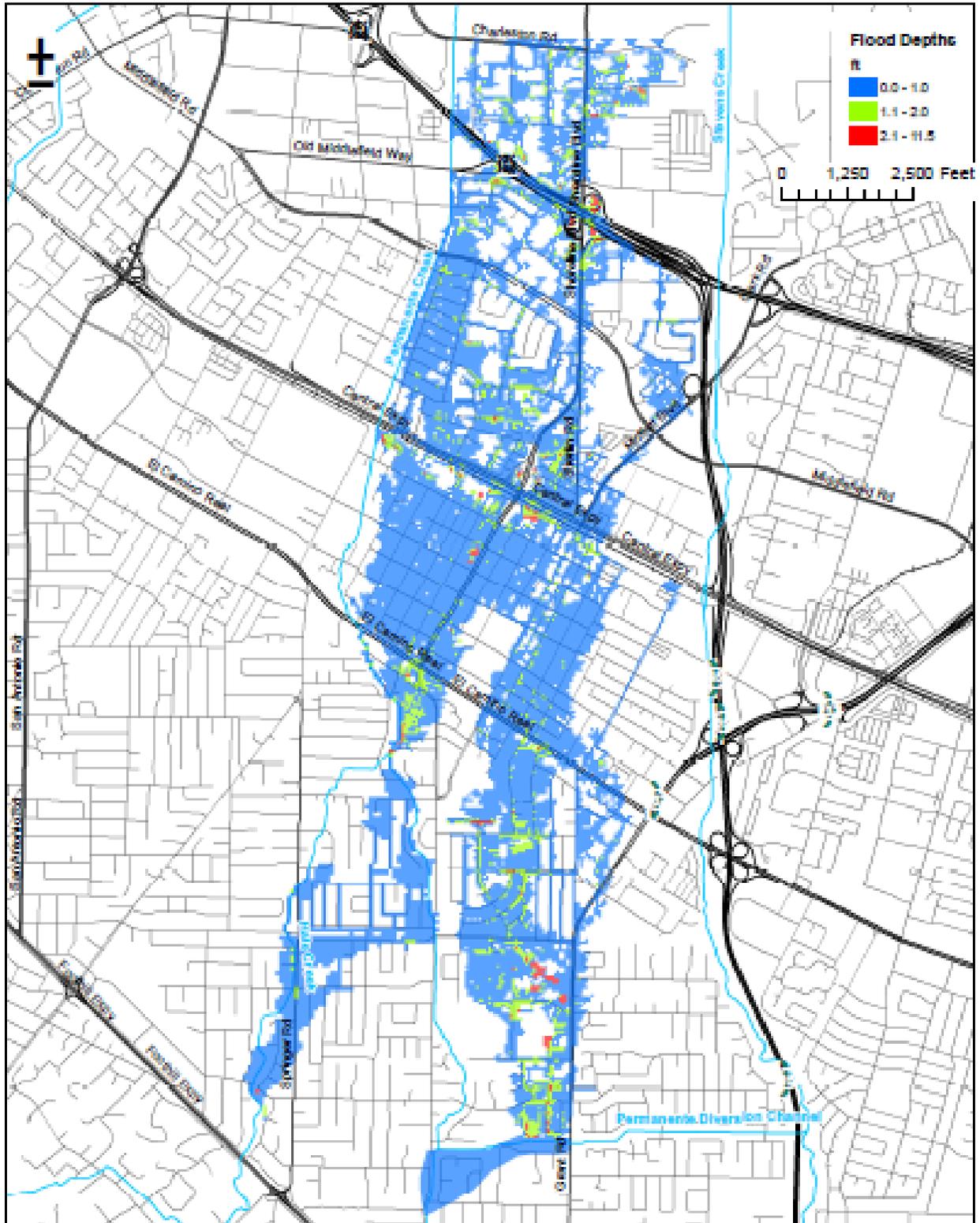
Table 8-1 summarizes without project conditions for the selected hydrologic events. The estimated damages are based on FLO-2D flood modeling, used in conjunction with Hazus, as described in Attachment 7. Hazus output files are provided as Appendix 8-1 to this attachment.

**Table 8-1. Without-Project Conditions**

Without Project Conditions	Hydrologic Event		
	25-Year	50-Year	100-Year
Area Flooded (acres)	204	610	950
# of Structures in Floodplain	985	2,301	3,074
# of Structures Affected	3	34	104
Value of Structures Affected (\$Million)	\$2.86	\$17.55	\$50.70
Lost Business Net Income (\$Million)	\$0.14	\$0.52	\$0.75
Lost Rental Income (\$Million)	\$0.01	\$0.09	\$0.14
Loss of Wages (\$Million)	\$0.33	\$1.70	\$2.0
Loss of Transportation/ Utility Services (\$Million)	\$0.001	\$0.002	\$0.005
Displacement costs (\$Million)	\$0.08	\$0.27	\$0.39
Clean-up Costs (\$Million)	\$0.0096	\$0.053	\$0.14
Vehicle Damage (\$Million)	\$0.41	\$1.89	\$4.05
<b>Estimate of Flood Damage (\$M)</b>	<b>\$3.84</b>	<b>\$22.08</b>	<b>\$58.18</b>



Figure 8-2: Extent of Flooding for 100-Year Flood Event, Without Project Condition



## **Area Flooded**

Without the Project, a significant portion of the Cities of Mountain View, Los Altos, and Cupertino will flood in storm events greater than approximately a 10-year event. Based on FLO-2D modeling performed (described in Attachment 7), in a 25-year event, approximately 204 acres would flood. This increases to 610 acres in a 50-year event, and 950 acres in a 100-year event. Figures 8-1 and 8-2 present the extent of flooding in the 50-year and 100-year events, respectively, for the without Project condition.

## **Physical Damages**

Extensive physical flood-related damages are expected to continue in the without-Project condition. As discussed in Attachment 7, FLO-2D and Hazus were used to estimate physical and economic damages from the 25-year, 50-year, and 100-year flood events. Projected damages, and estimated economic value of these damages, are summarized below.

### **Structures Affected and Value**

Based on FLO-2D simulations, the estimated inundation area for the 25-year, 50-year, and 100-year flood events without the Project are 204, 610, and 950 acres, respectively. A total of 985 structures are currently located within the 25-year floodplain, 2,301 structures are located within the 50-year floodplain, and 3,074 structures are located within the 100-year floodplain. Procedures for estimating structural inventory and losses within Hazus are described in the Hazus MR4 Technical Manual, provided as Appendix 8-2.

Of the structures located within the 25-year, 50-year, and 100-year floodplains, the following structural damages are expected to accrue in the without-Project condition for each hydrologic event simulated.

- 25-Year Event: Three schools or institutions are expected to incur damages. Structure and content damages are estimated to total \$2.86 million.
- 50-Year Event: Thirty-four structures, including seven schools or institutions and five fire stations, are expected to incur damage. Structure and content damages are estimated to total \$17.55 million.
- 100-Year Event: One hundred and four structures, including 12 schools or institutions and five fire stations, are expected to incur damage. Structure and content damages are estimated to total \$50.70 million.

These physical benefits are supported by the Hazus model output files provide in Appendix 8-1.

### **Infrastructure Affected and Value**

In addition to the structures affected and value, Hazus simulations project the following economic impacts to infrastructure. Procedures for estimating direct losses to infrastructure within Hazus are described in the Hazus MR4 Technical Manual, provided as Appendix 8-2.

- 25-Year Event: Direct economic losses to bridges are estimated to be \$0.001 million. No losses are projected associated with damage to utilities (pipelines and facilities).
- 50-Year Event: Direct economic losses to bridges are estimated to be \$0.002 million. No losses are projected associated with damage to utilities (pipelines and facilities).
- 100-Year Event: Direct economic losses to bridges are estimated to be \$0.005 million. No losses are projected associated with damage to utilities (pipelines and facilities).

### **Vehicles Affected and Value**

Hazus simulations project the following impacts to vehicles for the without-Project condition. Procedures for estimating vehicle inventory and losses within Hazus are described in the Hazus MR4 Technical Manual, provided as Appendix 8-2.

- 25-Year Event: Total damages to vehicles are expected to total approximately \$0.41 million.
- 50-Year Event: Total damages to vehicles are expected to total approximately \$1.89 million.
- 100-Year Event: Total damages to vehicles are expected to total approximately \$4.05 million.

## **Loss of Function**

Hazus was used to estimate loss of function for the 25-year, 50-year, and 100-year flood event. Lost business net income, lost rental income, lost wages, and transportation and utility impacts are summarized below. Procedures for estimating loss of function related losses within Hazus are described in the Hazus MR4 Technical Manual, provided as Appendix 8-2.

- 25-Year Event: Loss of business net income is estimated to be approximately \$0.14 million. Lost rental income is projected to be approximately \$0.01 million, and loss of wages is estimated to be approximately \$0.33 million. Direct economic losses to bridges are estimated to be \$0.001 million. No losses are projected associated with damage to utilities (pipelines and facilities). In total, loss of function impacts are estimated to be approximately \$0.48 million.
- 50-Year Event: Loss of business net income is estimated to be approximately \$0.52 million. Lost rental income is projected to be approximately \$0.09 million, and loss of wages is estimated to be approximately \$1.70 million. Direct economic losses to bridges are estimated to be \$0.002 million. No losses are projected associated with damage to utilities (pipelines and facilities). In total, loss of function impacts are estimated to be approximately \$2.31 million.
- 100-Year Event: Loss of business net income is estimated to be approximately \$0.75 million. Lost rental income is projected to be approximately \$0.14 million, and loss of wages is estimated to be approximately \$2.04 million. Direct economic losses to bridges are estimated to be \$0.005 million. No losses are projected associated with damage to utilities (pipelines and facilities). In total, loss of function impacts are estimated to be approximately \$2.94 million.

## **Emergency Response and Clean-up**

Hazus was used to estimate costs associated with displacement, temporary shelter, and relocation. These costs are summarized below. In addition, cleanup costs for a similar system are summarized. Procedures for estimating debris generation within Hazus are described in the Hazus MR4 Technical Manual, provided as Appendix 8-2.

### **Displacement / Relocation Costs**

- 25-Year Event: The 25-year event is expected to displace approximately 4,285 people, with approximately 3,622 people requiring short-term shelter. This is expected to cost approximately \$0.08 million.
- 50-Year Event: The 50-year event is expected to displace approximately 10,197 people, with approximately 9,074 people requiring short-term shelter. This is expected to cost approximately \$0.27 million.
- 100-Year Event: The 100-year event is expected to displace approximately 13,717 people, with approximately 12,535 people requiring short-term shelter. This is expected to cost approximately \$0.39 million.

### **Clean-up Costs**

Sediment deposition would occur on many of the roadways, necessitating lengthy and expensive cleanup activities. In some areas, this sedimentation would be only minor at the 100-year event. However, in ponded areas where sediment would have the opportunity to deposit, sediment depths could be significantly greater. Hazus estimates the following debris generation for the 25-year, 50-year, and 100-year events:

- 25-Year Event: Approximately 160 tons, or 6 truckloads, of debris would be generated.
- 50-Year Event: Approximately 868 tons (35 truckloads) of debris would be generated.
- 100-Year Event: Approximately 2,263 tons (91 truckloads) of debris would be generated.

Assuming a conservative disposal cost in the San Jose area of \$45/ton (refer to local disposal rates, provided in Appendix 8-3), tipping fees for debris removal would be expected to total \$7,200 for the 25-year event (160 tons \* \$45 / ton), \$39,060 for the 50-year event (868 tons \* \$45/ton), and \$101,835 for the 100-year event (2,263 tons \* \$45/ton). In addition, assuming one truckload requires approximately two employees for eight hours, at an hourly rate of \$25 / hr, cleanup labor would be expected to total \$2,400

for the 25-year event (2 employees \* 8 hours / truckload \* \$25/hr \* 6 truckloads), \$14,000 for the 50-year event (2 employees \* 8 hours / truckload \* \$25/hr \* 35 truckloads), and \$36,400 for the 100-year event (2 employees \* 8 hours / truckload \* \$25/hr \* 91 truckloads). Total estimated cleanup costs for each event are summarized below.

- 25-Year Event: Cleanup costs are estimated to be approximately \$9,600 (\$7,200 in fees + \$2,400 in labor).
- 50-Year Event: Cleanup costs are estimated to be approximately \$53,060 (\$39,060 in fees + \$14,000 in labor).
- 100-Year Event: Cleanup costs are estimated to be approximately \$138,235 (\$101,835 in fees + \$36,400 in labor).

### **Probability of Flood Structure Failure**

Without the project, the probability of structural failure for an event greater than a 10-year event is considered to be 100% based on past experience.

### **Estimate of Total Flood Damages**

Based on the analyses performed using FLO-2D and Hazus, the following damages are estimated from the 25-year, 50-year, and 100-year event without the Project.

- 25-Year Event: As shown in Table 8-1, the total expected damage in a 25-Year event for the without-Project condition, including lost business net income, lost rental income, loss of wages, loss of transportation/utility services, displacement costs, clean-up costs, and vehicle damage is estimated to be \$3.84 million.
- 50-Year Event: As shown in Table 8-1, the total expected damage in a 50-Year event for the without-Project condition, including lost business net income, lost rental income, loss of wages, loss of transportation/utility services, displacement costs, clean-up costs, and vehicle damage is estimated to be \$22.08 million
- 100-Year Event: As shown in Table 8-1, the total expected damage in a 100-Year event for the without-Project condition, including lost business net income, lost rental income, loss of wages, loss of transportation/utility services, displacement costs, clean-up costs, and vehicle damage is estimated to be \$58.18 million

## With-Project Conditions

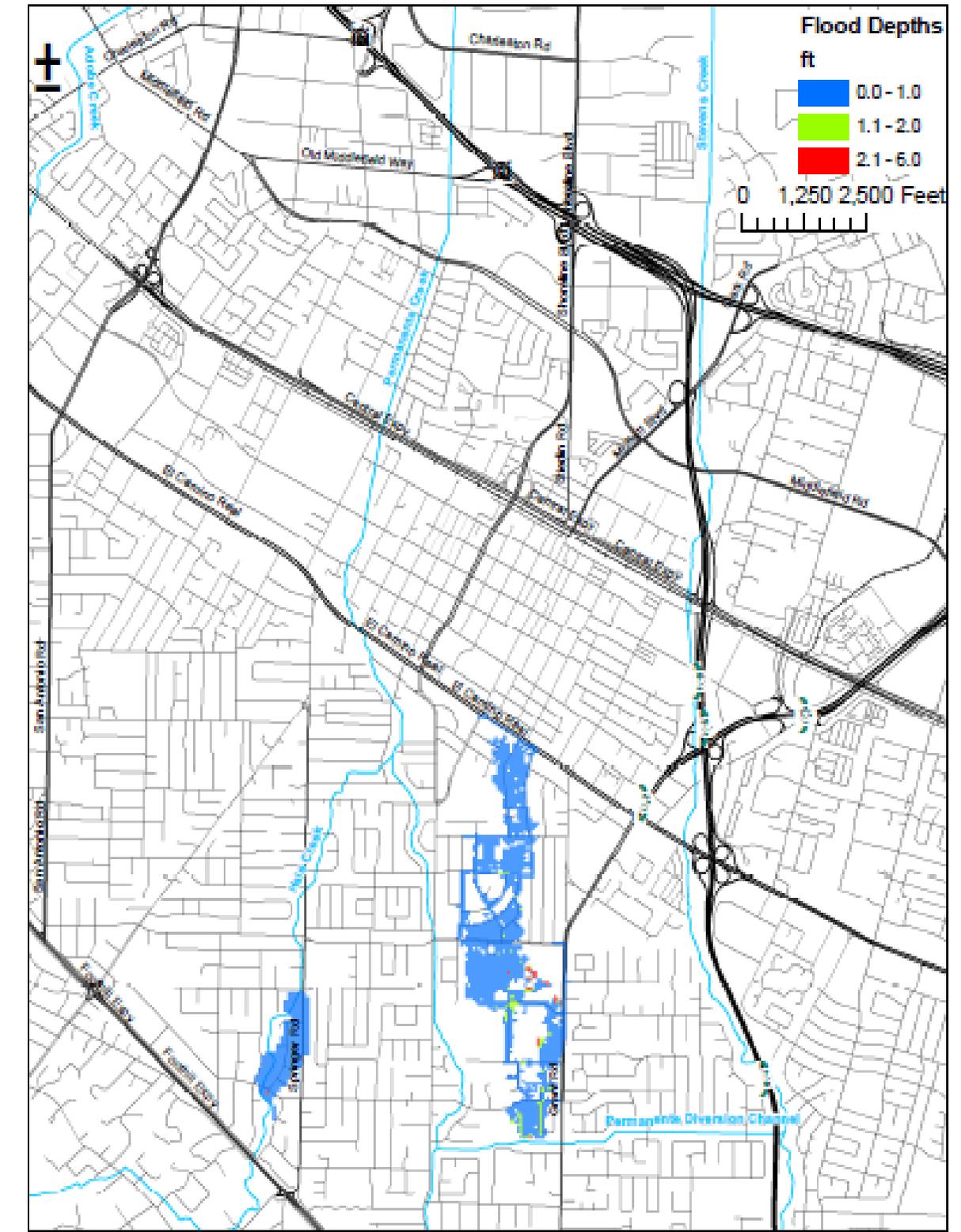
Table 8-2 summarizes without project conditions for the selected hydrologic events. The estimated damages are based on FLO-2D flood modeling, used in conjunction with Hazus, as described in Attachment 7. Hazus output files are provided as Appendix 8-1 to this attachment.

**Table 8-2. With-Project Conditions**

With Project Conditions	Hydrologic Event		
	25-Year	50-Year	100-Year
Area Flooded (acres)	11	14	115
# of Structures in Floodplain	48	61	379
# of Structures Affected	0	0	0
Value of Structures Affected (\$Million)	\$0.02	\$0.02	\$2.70
Lost Business Net Income (\$Million)	\$0	\$0	\$0.07
Lost Rental Income (\$Million)	\$0	\$0	\$0.01
Loss of Wages (\$Million)	\$0	\$0	\$0.17
Loss of Transportation/ Utility Services (\$Million)	\$0	\$0	\$0.005
Displacement costs (\$Million)	\$0.004	\$0.004	\$0.05
Clean-up Costs (\$Million)	\$0.0004	\$0.0004	\$0.0006
Vehicle Damage (\$Million)	\$0.006	\$0.01	\$0.23
<b>Estimate of Flood Damage (\$M)</b>	<b>\$0.03</b>	<b>\$0.03</b>	<b>\$3.24</b>



Figure 8-4: Extent of Flooding for 100-Year Flood Event, With Project Condition



## **Area Flooded**

With the Project, the Cities of Mountain View, Los Altos, and Cupertino will be protected from flooding in storm events up to the 100-year event. Based on FLO-2D modeling performed (described in Attachment 7), in a 25-year event, approximately 11 acres would flood (compared to 204 acres for the without-Project condition). This increases to 14 acres in a 50-year event (compared to 610 acres for the without-Project condition), and 115 acres in a 100-year event (compared to 950 acres for the without-Project condition). Figures 8-3 and 8-4 present the extent of flooding in the 50-year and 100-year events, respectively, for the with-Project condition.

## **Physical Damages**

Extensive physical flood-related damages are expected to be prevented in the with-Project condition. As discussed in Attachment 7, FLO-2D and Hazus were used to estimate physical and economic damages from the 25-year, 50-year, and 100-year flood events with the Project in place. Projected damages, and estimated economic value of these damages, are summarized below.

### **Structures Affected and Value**

Based on FLO-2D simulations, the estimated inundation area for the 25-year, 50-year, and 100-year flood events with the Project in place are 11, 14, and 115 acres, respectively. The number of structures in the 25-year, 50-year, and 100-year floodplains would be 48, 61, and 379, respectively, compared to the without-Project condition, in which 985 structures are currently located within the 25-year floodplain, 2,301 structures are located within the 50-year floodplain, and 3,074 structures are located within the 100-year floodplain. Procedures for estimating structural inventory and losses within Hazus are described in the Hazus MR4 Technical Manual, provided as Appendix 8-2.

Of the structures located within the 25-year, 50-year, and 100-year floodplains for the with-Project condition, the following structural damages are expected to accrue in the with-Project condition for each hydrologic event simulated.

- 25-Year Event: No structures are expected to incur significant damage under the with-Project condition (three schools or institutions would be expected to incur damages in the without-Project condition). Structure and content damages are estimated to total \$0.02 million (compared to \$2.86 million for the without-Project condition).
- 50-Year Event: No structures are expected to incur significant damage under the with-Project condition (thirty-four structures, including seven schools or institutions and five fire stations, are expected to incur damage for the without-Project condition). Structure and content damages are estimated to total \$0.02 million for the with-Project condition (compared to \$17.55 million for the without-Project condition).
- 100-Year Event: No structures are expected to incur significant damage under the with-Project condition (one hundred and four structures, including 12 schools or institutions and five fire stations, are expected to incur damage under the without-Project condition). Structure and content damages are estimated to total \$2.70 million (compared to \$50.70 million for the without-Project condition).

These physical benefits are supported by the Hazus model output files provided in Appendix 8-1.

### **Infrastructure Affected and Value**

In addition to the structures affected and value, Hazus simulations project the following economic impacts to infrastructure. Procedures for estimating direct losses to infrastructure within Hazus are described in the Hazus MR4 Technical Manual, provided as Appendix 8-2.

- 25-Year Event: Direct economic losses to bridges are estimated to be \$0 (compared to \$0.001 million for the without-Project condition). No losses are projected associated with damage to utilities (pipelines and facilities) for either the with- or without-Project condition.

- 50-Year Event: Direct economic losses to bridges are estimated to be \$0 (compared to \$0.002 million for the without-Project condition). No losses are projected associated with damage to utilities (pipelines and facilities) for either the with- or without-Project condition.
- 100-Year Event: Direct economic losses to bridges are estimated to be \$0.005 million (compared to \$0.005 million for the without-Project condition). No losses are projected associated with damage to utilities (pipelines and facilities) for either the with- or without-Project condition.

### **Vehicles Affected and Value**

Hazus simulations project the following impacts to vehicles for the with-Project condition. Procedures for estimating vehicle inventory and losses within Hazus are described in the Hazus MR4 Technical Manual, provided as Appendix 8-2.

- 25-Year Event: Total damages to vehicles are expected to total approximately \$0.006 million (compared to \$0.41 million for the without-Project condition).
- 50-Year Event: Total damages to vehicles are expected to total approximately \$0.01 million (compared to \$1.89 million for the without-Project condition).
- 100-Year Event: Total damages to vehicles are expected to total approximately \$0.23 million (compared to \$4.05 million for the without-Project condition).

### **Loss of Function**

Hazus was used to estimate loss of function for the 25-year, 50-year, and 100-year flood event with the Project. Lost business net income, lost rental income, lost wages, and transportation and utility impacts are summarized below. Procedures for estimating loss of function related losses within Hazus are described in the Hazus MR4 Technical Manual, provided as Appendix 8-2.

- 25-Year Event: Loss of business net income is estimated to be \$0 (compared to \$0.14 million for the without-Project condition). Lost rental income is projected to be \$0 (compared to \$0.01 million for the without-Project condition), and loss of wages is estimated to be \$0 (compared to \$0.33 million for the without-Project condition). Direct economic losses to bridges are estimated to be \$0 (compared to \$0.001 million for the without-Project condition). No losses are projected associated with damage to utilities (pipelines and facilities). In total, loss of function impacts are estimated to be \$0 (compared to \$0.48 million for the without-Project condition).
- 50-Year Event: Loss of business net income is estimated to be \$0 (compared to \$0.52 million for the without-Project condition). Lost rental income is projected to be \$0 (compared to \$0.09 million for the without-Project condition), and loss of wages is estimated to be \$0 (compared to \$1.70 million for the without-Project condition). Direct economic losses to bridges are estimated to be \$0 (compared to \$0.002 million for the without-Project condition). No losses are projected associated with damage to utilities (pipelines and facilities). In total, loss of function impacts are estimated to be \$0 (compared to \$2.31 million for the without-Project condition).
- 100-Year Event: Loss of business net income is estimated to be approximately \$0.07 million (compared to \$0.75 million for the without-Project condition). Lost rental income is projected to be approximately \$0.01 million (compared to \$0.14 million for the without-Project condition), and loss of wages is estimated to be approximately \$0.17 million (compared to \$2.04 million for the without-Project condition). Direct economic losses to bridges are estimated to be \$0.005 million (compared to \$0.005 million for the without-Project condition). No losses are projected associated with damage to utilities (pipelines and facilities). In total, loss of function impacts are estimated to be approximately \$0.25 million (compared to \$2.94 million for the without-Project condition).

### **Emergency Response and Clean-up**

Hazus was used to estimate costs associated with displacement, temporary shelter, and relocation. These costs are summarized below. In addition, cleanup costs for a similar system are summarized. Procedures for estimating debris generation within Hazus are described in the Hazus MR4 Technical Manual, provided as Appendix 8-2.

### **Displacement / Relocation Costs**

- 25-Year Event: With the Project, the 25-year event is expected to displace approximately 147 people (compared to 4,285 people without the Project), with approximately 111 people requiring short-term shelter (compared to approximately 3,622 people without the Project). This is expected to cost approximately \$0.004 million (compared to \$0.08 million without the Project).
- 50-Year Event: With the Project, the 50-year event is expected to displace approximately 183 people (compared to 10,197 people without the Project), with approximately 136 people requiring short-term shelter (compared to approximately 9,074 people without the Project). This is expected to cost approximately \$0.004 million (compared to \$0.27 million without the Project).
- 100-Year Event: With the Project, the 100-year event is expected to displace approximately 1,246 people (compared to 13,717 people without the Project), with approximately 1,043 people requiring short-term shelter (compared to 12,535 people requiring short-term shelter without the Project). This is expected to cost approximately \$0.05 million (compared to \$0.39 million without the Project).

### **Clean-up Costs**

With the Project, sediment deposition on roadways would be significantly reduced. Hazus estimates the following debris generation for the 25-year, 50-year, and 100-year events with the Project:

- 25-Year Event: Approximately 1 ton, or 1 truckload, of debris would be generated with the Project (compared to 160 tons, or 6 truckloads, of debris generated without the Project).
- 50-Year Event: Approximately 1 ton, or 1 truckload, of debris would be generated with the Project (compared to 868 tons, or 35 truckloads, of debris generated without the Project).
- 100-Year Event: Approximately 95 tons, or 4 truckloads, of debris would be generated with the Project (compared to 2,263 tons, or 91 truckloads, of debris generated without the Project).

Assuming a conservative disposal cost in the San Jose area of \$45/ton (refer to Appendix 8-3), tipping fees for debris removal would be expected to total \$45 for the 25-year event (1 ton \* \$45 / ton), \$45 for the 50-year event (1 ton \* \$45/ton), and \$4,275 for the 100-year event (95 tons \* \$45/ton). In addition, assuming one truckload requires approximately two employees for eight hours, at an hourly rate of \$25 / hr, cleanup labor would be \$400 for the 25-year event (2 employees \* 8 hours / truckload \* \$25/hr \* 1 truckload), \$400 for the 50-year event (2 employees \* 8 hours / truckload \* \$25/hr \* 1 truckload), and \$1,600 for the 100-year event (2 employees \* 8 hours / truckload \* \$25/hr \* 4 truckloads). Total estimated cleanup costs for each event are summarized below.

- 25-Year Event: Cleanup costs are estimated to be approximately \$445 (\$45 in fees + \$400 in labor), compared to \$9,600 without the Project.
- 50-Year Event: Cleanup costs are estimated to be approximately \$445 (\$45 in fees + \$400 in labor), compared to \$53,060 without the Project.
- 100-Year Event: Cleanup costs are estimated to be approximately \$5,875 (\$4,275 in fees + \$1,600 in labor), compared to \$138,235 without the Project.

### **Probability of Flood Structure Failure**

The Project will be designed to accommodate the 100-year event. As such, the probability of structural failure with the Project is minimal, and was estimated to be 0.5% for all hydrologic events analyzed.

### **Estimate of Total Flood Damages**

Based on the analyses performed using FLO-2D and Hazus, the following damages are estimated from the 25-year, 50-year, and 100-year event with the Project.

- 25-Year Event: As shown in Table 8-2, the total expected damage in a 25-Year event for the with-Project condition, including lost business net income, lost rental income, loss of wages, loss of transportation/utility services, displacement costs, clean-up costs, and vehicle damage is estimated to be \$0.03 million.

- 50-Year Event: As shown in Table 8-2, the total expected damage in a 50-Year event for the with-Project condition, including lost business net income, lost rental income, loss of wages, loss of transportation/utility services, displacement costs, clean-up costs, and vehicle damage is estimated to be \$0.03 million
- 100-Year Event: As shown in Table 8-2, the total expected damage in a 100-Year event for the with-Project condition, including lost business net income, lost rental income, loss of wages, loss of transportation/utility services, displacement costs, clean-up costs, and vehicle damage is estimated to be \$3.24 million

## **With- and Without-Project Comparison**

The economic analysis provides the cost and benefits for the with- and without-project conditions for the 50-year project life. Table 8-3 (PSP Table 11) provides a comparison of Expected Annual Damages under with- and without-project conditions.

**Table 8-3. Expected Annual Damage**

Table 11 – Example Calculation of Expected Annual Damage											
Event	Event Exceedance Prob.	Event Damage if Flood Structures Fail	Probability Structural Failure		Expected Event Damage		Interval Probability	Average Damage in Interval		Average Damage in Interval times Interval Probability	
			Without Project	With Project	Without Project	With Project		Without Project	With Project	Without Project	With Project
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(i)	(j)	(k)	(l)	(m)
					(c) x (d)	(c) x (e)	from (b)	from (f)	from (g)	(i) x (j)	(i) x (k)
10-Year	0.1	\$0	0	0	\$0	\$0					
25-Year	0.04	\$3,840,600	1	0.005	\$3,840,600	\$30,400	0.06	\$1,920,300	\$15,200	\$115,218	\$912
50-Year	0.02	\$22,075,000	1	0.005	\$22,075,000	\$34,400	0.02	\$12,957,800	\$32,400	\$259,156	\$648
100-Year	0.01	\$58,175,000	1	0.005	\$58,175,000	\$3,235,600	0.01	\$40,125,000	\$1,635,000	\$401,250	\$16,350
Expected Annual Damages, Without and With Project										\$775,624	\$17,910

Table 8-4 (PSP Table 12) shows the monetary benefits associated with the Flood Damage Reduction Project over the next 50 years in present value terms. The Expected Annual Damage Without-project in row (a) takes into consideration the annual impact and costs associated with flood waters on buildings, vehicles, transportation disruptions, emergency services and overbank deposition totaling an annual cost of \$775,624 without the Project. Upon the completion of the project row (b) shows how the annual cost associated with flooding would be greatly reduced to a value of \$17,910. The difference between the value in row (a) and row (b) is the expected annual benefit of the project which is seen in row (c) as \$757,714. The expected annual benefit over a 50-year period is discounted at a 6% discount rate, which is represented in row (d) as a present value coefficient of 15.76. Row (e) shows multiplications of the Expected Annual Damage Benefit (c) by the Present Value Coefficient (d) equating the Present Value of Future Benefits to \$11,941,572.

**Table 8-4. Present Value of Expected Annual Damage Benefits (2012 dollars)**

Table 12 – Present Value of Expected Annual Damage Benefits			
Project: Permanente Creek Flood Protection Project			
(a)	Expected Annual Damage Without Project <sup>(1)</sup>		<b>\$775,624.00</b>
(b)	Expected Annual Damage With Project <sup>(1)</sup>		<b>\$17,910.00</b>
(c)	Expected Annual Benefit	(a) – (b)	<b>\$757,714.00</b>
(d)	Present Value Coefficient <sup>(2)</sup>		<b>15.76</b>
(e)	<b>Present Value of Future Benefits Transfer to Table 17, column (d).</b>	<b>(c) x (d)</b>	<b>\$11,941,572.64</b>

1. *This program assumes no land use changes in the floodplain. So, EAD will be constant over analysis period.*
2. *6% discount rate; 50-year analysis period (could vary depending upon lifecycle of project).*

## Non-Monetized Benefits Analysis (D2)

This section describes other physical benefits provided by the Permanente Creek Flood Protection Project that are not easily monetized. Table 8-5 (PSP Table 13) provides a checklist of non-monetized benefits, and the sections that follow provide an expanded discussion of the applicable benefits to the Permanente Creek Flood Protection Project.

**Table 8-5. Non-Monetized Benefits Checklist**

Table 13 – Non-monetized Benefits Checklist		
No.	Question	Enter “Yes”, “No” or “Neg”
	<b>Community/Social Benefits</b> <b>Will the proposal</b>	
<b>1</b>	<b>Provide education or technology benefits?</b>	<b>Yes</b>
	Examples are not limited to, but may include: <ul style="list-style-type: none"> <li>- Include educational features that should result in water supply, water quality, or flood damage reduction benefits?</li> <li>- Develop, test or document a new technology for water supply, water quality, or flood damage reduction management?</li> <li>- Provide some other education or technological benefit?</li> </ul>	
<b>2</b>	<b>Provide social recreation or access benefits?</b>	<b>Yes</b>
	Examples are not limited to, but may include: <ul style="list-style-type: none"> <li>- Provide new or improved outdoor recreation opportunities?</li> <li>- Provide more access to open space?</li> <li>- Provide some other recreation or public access benefit?</li> </ul>	
<b>3</b>	<b>Help avoid, reduce or resolve various public water resources conflicts?</b>	<b>Yes</b>
	Examples are not limited to, but may include: <ul style="list-style-type: none"> <li>- Provide more opportunities for public involvement in water management?</li> <li>- Help avoid or resolve an existing conflict as evidenced by recurring fines or litigation?</li> <li>- Help meet an existing state mandate (e.g., water quality, water conservation, flood control)?</li> </ul>	
<b>4</b>	<b>Promote social health and safety?</b>	<b>Yes</b>
	Examples are not limited to, but may include: <ul style="list-style-type: none"> <li>- Increase urban water supply reliability for fire-fighting and critical services following seismic events?</li> <li>- Reduce risk to life from dam failure or flooding?</li> <li>- Reduce exposure to water-related hazards?</li> </ul>	
<b>5</b>	<b>Have other social benefits?</b>	<b>No</b>
	Examples are not limited to, but may include: <ul style="list-style-type: none"> <li>- Redress or increase inequitable distribution of environmental burdens?</li> <li>- Have disproportionate beneficial or adverse effects on disadvantaged communities, Native Americans, or other distinct cultural groups?</li> </ul>	

Table 13 – Non-monetized Benefits Checklist		
No.	Question	Enter “Yes”, “No” or “Neg”
	<b>Environmental Stewardship Benefits:</b> <b>Will the proposal</b>	
<b>6</b>	<b>Benefit wildlife or habitat in ways that were not quantified in Attachment 7?</b>	<b>No</b>
	Examples are not limited to, but may include: <ul style="list-style-type: none"> <li>- Cause an increase in the amount or quality of terrestrial, aquatic, riparian or wetland habitat?</li> <li>- Contribute to an existing biological opinion or recovery plan for a listed special status species?</li> <li>- Preserve or restore designated critical habitat of a listed species?</li> <li>- Enhance wildlife protection or habitat?</li> </ul>	
<b>7</b>	<b>Improve water quality in ways that were not quantified in Attachment 7?</b>	<b>Yes</b>
	Examples are not limited to, but may include: <ul style="list-style-type: none"> <li>- Cause an improvement in water quality in an impaired water body or sensitive habitat?</li> <li>- Prevent water quality degradation?</li> <li>- Cause some other improvement in water quality?</li> </ul>	
<b>8</b>	<b>Reduce net emissions in ways that were not quantified in Attachment 7?</b>	<b>No</b>
	Examples are not limited to, but may include: <ul style="list-style-type: none"> <li>- Reduce net production of greenhouse gasses?</li> <li>- Reduce net emissions of other harmful chemicals into the air or water?</li> </ul>	
<b>9</b>	<b>Provide other environmental stewardship benefits, other than those claimed in Sections D1, D3 or D4?</b>	<b>No</b>
	<b>Sustainability Benefits:</b> <b>Will the proposal</b>	
<b>10</b>	<b>Improve the overall, long-term management of California groundwater resources?</b>	<b>Yes</b>
	Examples are not limited to, but may include: <ul style="list-style-type: none"> <li>- Reduce extraction of non-renewable groundwater?</li> <li>- Promote aquifer storage or recharge?</li> </ul>	
<b>11</b>	<b>Reduce demand for net diversions for the regions from the Delta?</b>	<b>Yes</b>
<b>12</b>	<b>Provide a long-term solution in place of a short-term one?</b>	<b>No</b>
	Examples are not limited to, but may include: <ul style="list-style-type: none"> <li>- Replace a temporary water supply with a more permanent supply?</li> <li>- Replace a temporary water quality solution with a more permanent solution?</li> <li>- Replace temporary flood control management with a more permanent solution?</li> <li>- Replace temporary habitat with a more permanent solution?</li> </ul>	
<b>13</b>	<b>Reduce water consumption on a permanent basis?</b>	<b>No</b>

Table 13 – Non-monetized Benefits Checklist		
No.	Question	Enter “Yes”, “No” or “Neg”
<b>14</b>	<b>Promote energy savings or replace fossil fuel based energy sources with renewable energy and resources?</b>	<b>No</b>
	Examples are not limited to, but may include: <ul style="list-style-type: none"> <li>- Reduce net energy use on a permanent basis?</li> <li>- Increase renewable energy production?</li> <li>- Include new buildings or modify buildings to include certified LEED features?</li> <li>- Provide a net increase in recycling or reuse of materials?</li> <li>- Replace unsustainable land or water management practices with recognized sustainable practices?</li> </ul>	
<b>15</b>	<b>Improve water supply reliability in ways not quantified in Attachment 7?</b>	<b>No</b>
	Examples are not limited to, but may include: <ul style="list-style-type: none"> <li>- Provide a more flexible mix of water sources?</li> <li>- Reduce likelihood of catastrophic supply outages?</li> <li>- Reduce supply uncertainty?</li> <li>- Reduce supply variability?</li> </ul>	
<b>16</b>	<b>Other (If the above listed categories do not apply, provide non-monetized benefit description)?</b>	<b>Yes</b>

The project will achieve the following non-monetizable benefits.

**1. Education or Technology Benefits**

As part of Mitigation Measure BIO2.3 (refer to SEIR page 5-18), the project will include providing construction worker awareness training for special status frogs. Specifically, the District will provide, or require contractors to provide, worker awareness training for construction personnel to enable them to recognize special-status frogs and other aquatic and riparian wildlife. Trained construction personnel will also understand where sensitive resource areas are within the construction zone so they can minimize their impact on upland (dispersal and aestivation) habitat. Training will be presented by a qualified wildlife biologist experienced in training nonspecialists. The training program will include at least the following: a description of the special-status species likely to use the site, and their habitat needs; photographs of these species; an explanation of the legal status of these species and their protection under the ESA and other regulations; a list of measures being taken to reduce effects to these species during project construction; and distribution of a fact sheet summarizing training content. The District will also distribute, or require contractors to distribute, the training summary fact sheet to anyone else who may enter the project site. Upon completion of training, employees will sign a form stating they attended the training and understand all the conservation and protection measures.

Consistent with Mitigation Measure Mitigation Measure PALEO1.1 (refer to SEIR, page 6-15), the District will also provide preconstruction worker awareness training for paleontological resources. This training will include information on the possibility of encountering fossils during construction; the types of fossils likely to be seen, based on finds in the site vicinity; and proper procedures in the event fossils are encountered. Worker training will be prepared and presented by a qualified paleontologist as defined by the SVP (Society of Vertebrate Paleontology Conformable Impact Mitigation Guidelines Committee 1995) or other appropriate personnel (e.g., California licensed professional geologist with appropriate

experience and expertise) experienced in teaching nonspecialists. It may be delivered at the same time as other preplanned construction worker education or it may be presented separately.

## **2. Social Recreation or Access Benefits**

As described on pages 12-4 and 12-5 of the SEIR, the Project would provide additional recreation features at Rancho San Antonio County Park and McKelvey Park. As discussed in Attachment 7, a new restroom and a new trail spur would be installed at Rancho San Antonio County Park, running from the Hammond Snyder Loop Trail along Cristo Rey Drive, down the slope between the Gate of Heaven Cemetery and the new basin, connecting back to the Hammond Snyder Loop Trail adjacent to the creek, for a total of 1,200 feet of new trails. The Project would also establish a new 0.7-acre mini-park at McKelvey Park.

In addition, the restored fields and other amenities at the park will be developed cooperatively with park users and the City of Mountain View to ensure that the new facility offers a community benefit and provides needed flood protection. Therefore, the Project could alleviate pressure to expand or improve other facilities in the project area, potentially representing a beneficial impact.

## **3. Avoid, Reduce or Resolve Various Public Water Resources Conflicts**

The District operates an integrated water supply system to meet demands in Santa Clara County. Local surface water and water imported from the Sacramento-San Joaquin River Delta (Delta):

- replenish the local groundwater subbasins, which are pumped for use by individual well owners and retail water suppliers,
- supply the District's drinking water treatment plants for purification,
- are delivered directly to agricultural water users, and
- help meet environmental needs.

The District manages groundwater supplies in conjunction with surface water supplies. In wet years, excess supplies are stored in the local groundwater basin or in a groundwater bank in Kern County for use in dry years. This helps the District manage the natural variations in rainfall and the associated variations in water supply availability.

The cost of imported water has increased significantly and is expected to continue to increase into the future. Environmental stressors, such as ongoing drought in the Colorado River Basin, reduced snowpack and runoff in Northern California, and court-ordered pumping restrictions necessary to protect endangered species, have decreased the reliability of imported water supplies. As such, competing demands for Delta supplies continue to increase. This project, by providing for enhanced groundwater recharge, would reduce demands on the Delta, resulting in reduced conflicts associated with limited Delta supplies.

## **4. Promote Social Health and Safety**

According to the National Oceanic and Atmospheric Administration (NOAA), flash and river floods claimed 113 lives nationwide in 2011, up from 103 in 2010 (refer to Appendix 8-4). Flooding represents a major hazard that threatens the health and safety of those affected. As discussed in Attachment 7, this project will protect 1,664 parcels from the 100-year flood, decreasing the number of displaced households in that event from 4,572 to 415. This represents a significant improvement in public health and safety.

## **7. Improve Water Quality in Ways Not Quantified in Attachment 7**

The banks of Permanente Creek and its tributaries are currently subject to varying degrees of erosion and sedimentation, which degrades the overall water quality of the creeks. Implementation of this Project will result in reduced sedimentation and erosion and will therefore improve water quality.

## **10. Improve the Overall, Long-Term Management of Groundwater Resources**

Currently, floodwaters are unable to be captured and managed, and cause destruction. This project will allow the District, which operates a robust and sophisticated conjunctive use system, to recharge a portion of these floodwaters and ultimately put this supply to beneficial use. This is an important component of effectively maximizing all available water supplies.

## **11. Reduce Demand for net Diversions from the Delta**

As described on page 4-8 of Volume I of the Final Supplemental EIR, groundwater supply and recharge would increase at McKelvey Park, and Rancho San Antonio County Park. Inundation within each detention facility would vary based on type of rain event (i.e., 10-year or 50-year storm event). Construction of the flood detention facilities would vary in size from approximately 5 to 15 acres and in depth from approximately 8 to 15 feet. The McKelvey Park Flood Detention Facility would be inundated during a 50-year storm event; the Rancho San Antonio County Park Flood Detention Facilities would be inundated during a 10-year storm event. The detention basins would typically empty within 1 to 4 days, depending on the facility and magnitude of the flood event. Larger storm events would result in longer retention times and increased percolation into the groundwater.

Floodwater would be recharged during the 10-year event and the 50-year event, supplementing groundwater supplies and reducing reliance on water imported from the Delta via State Water Project and Central Valley Project, as well as local surface water supplies.

## **16. Other: Reduced Maintenance Requirements**

Inadequate access makes maintenance of Permanente Creek and its tributaries more difficult, costly and time-consuming. Additionally, these creeks frequently require sediment removal from the channel bottoms to maintain flow capacity, but this process is currently burdened by a lack of suitable access for equipment.

Implementation of this Project will provide improved access and a continuous maintenance road that will facilitate maintenance of the Creek. A properly-sized bankfull channel with a depressed benches constructed in the proper elevation will reduce maintenance activities in the channel in the long-term. In addition, the project will reduce maintenance requirements such as sediment removal and erosion repair work caused by bank failures, and trash and graffiti removal caused by existing blight conditions.

## Other Monetized Benefits (D3)

This section describes other benefits (not including the flood reduction benefits described above) that can be monetized for the Permanente Creek Flood Protection Project. These benefits include:

- 5-cfs increase in flows in the Permanente mainstem downstream of the diversion structure, enhancing cold water habitat
- 9 additional passenger car parking spaces at Rancho San Antonio County Park
- 20 acres of undeveloped wetlands protected in perpetuity<sup>1</sup>

### Description of Benefits

#### Enhanced Cold Freshwater Habitat

As described on page 4-16 of the SEIR, the Project would slightly modify the flow split between the Permanente Creek Diversion Channel and Permanente Creek in floods smaller than the 10-year event because a small percentage of incoming floodflow would be allowed to continue down the Permanente mainstem. For example, at an incoming flow of 1,000 cubic feet per second (cfs) (approximately equal to the 5-year floodflow in Permanente Creek immediately upstream of the diversion structure), the new diversion structure would pass approximately 50 cfs to downstream Permanente Creek but would still divert the majority of the flow (approximately 950 cfs) to Stevens Creek. At very low flows, the post-project flow split would change substantially from existing conditions because the Project would be specifically designed to route summer low flows into the downstream Permanente mainstem. This is expected to result in about a 5-cfs increase in flows in the Permanente mainstem downstream of the diversion structure, which could enhance Cold Freshwater Habitat, as summer low flows from the Permanente Diversion Channel consist largely of nuisance flows from adjacent developed areas warmed by their passage along the unshaded concrete channel. Assuming summer low flows occur for approximately 10 days per year, a 5 cfs average increase in flow would equate to approximately 99 AFY of additional flow in the Permanente mainstem to provide Cold Water Habitat enhancements.

The monetary value of increased summertime flows in Permanente Creek in summer months was developed by using the cost to supplement Permanente Creek flows by 99 AFY using other untreated District supplies. Based on personal communications with District staff, current untreated water costs, excluding costs to convey water to Permanente Creek, are approximately \$622/ AF (refer to 2012 water charges, provided as Appendix 8-6). Assuming an average annual benefit of 99 AFY beginning in 2017 and continuing over the 50-year project lifetime, the value of this benefit is approximately \$768,793 as shown in Table 8-6.

#### Additional Passenger Car Parking Spaces

As described on pages 12-4 and 12-5 of the SEIR, the Project would provide additional recreation features at Rancho San Antonio County Park and McKelvey Park. At Rancho San Antonio County Park, the existing parking lot would be expanded into the existing gravel equestrian parking area to provide nine additional passenger car parking spaces, in addition to the existing 50 spaces.

Income from Rancho San Antonio County Park is estimated as approximately \$295,000 over five years, or \$59,000 per year, based on current costs paid to the Mid-Peninsula Parks District for maintenance of the developed portion of the park (see the Mid-Peninsula Parks District newsletter, provided as Appendix 8-5, for additional information). The nine new parking spaces represent an 18% increase in available parking. As such, we have assumed an increase in revenue of \$10,620 per year beginning in 2017 as a result of the new parking spaces. Using a 6 percent discount rate, this equates to a present value of approximately \$1,193,304 over the 50-year life of the Project.

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<sup>1</sup> It should be noted that, while an attempt was made to monetize this benefit, it has NOT been included in the monetized benefits analysis due to significant uncertainty associated with wetland values.

### Protection of 20 Acres of Undeveloped Wetlands

The Project would establish a 15-acre detention basin at Rancho San Antonio Park and a 5-acre detention basin at McKelvey Park in locations that are currently subject to periodic flooding. By doing so, the Project will effectively protect 20 acres of perennial wetlands in perpetuity.

A 1992 case study performed at the University of California Berkeley Graduate School of Public Policy reviewed the wetlands literature and estimated that California's wetlands provide between \$6.9 and \$22.9 billion (\$10.8 billion and \$36 billion in 2012 dollars) in flood control, water supply, water quality, recreation, commercial fisheries and habitat benefits to the state annually, not including the incalculable value to wildlife (Allen et.al. 1992). Although the literature review found no studies conducted for California it is reasonable to assume the value of wetlands in the Greater San Francisco Bay Area are roughly comparable to those found in other regions of the country.

Although the study looked at values to the state as a whole, and was not designed to look at the value of any one individual acre, the study found that the average acre of wetland provides benefits equal to \$5,636 per year, in 2012 dollars. Assuming the wetlands being protected have value equal to or greater than the average California wetland acre, this project represents an annual value of roughly \$112,720 per year (20 acres x \$5,636/year), with a present value to the State of California, discounted at 6% over the life of the project, of about \$28 million. Although this figure is considered a rough estimate due to the number of assumptions and unknowns (e.g. are values linear and/or transferable?), it does provide an empirical insight into the potential magnitude of the benefits associated with this project.

It should be noted that, while an attempt was made to monetize this benefit, it has NOT been included in the monetized benefits analysis due to significant uncertainty associated with wetland values.

## Summary of Other Monetized Benefits

Table 8-6 (PSP Table 14) summarizes the other monetized benefits expected to accrue from Project implementation. Over the 50-year project life, other monetized benefits are projected to total \$1,962,097.

**Table 8-6. Annual Benefit (2012 dollars)**

Table 14 – Annual Benefit (All benefits are in 2012 dollars)									
Project: Permanente Creek Flood Protection Project									
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
Year	Type of Benefit	Measure of Benefit (Units)	W/o Project	W/ Project	Change from Project (e) – (d)	Unit \$ Value <sup>(1)</sup>	Ann. \$ Val. <sup>(1)</sup> (f) x (g)	Disc. Factor <sup>(1)</sup>	Disc. Benefits <sup>(1)</sup> (h) x (i)
<b>2012</b>								1.000	
<b>2013</b>								0.943	
<b>2014</b>								0.890	
<b>2015</b>								0.840	
<b>2016</b>								0.792	
<b>2017</b>	Increased flow	AFY	0	99	99	\$622	\$61,578	0.747	<b>\$46,015</b>
	Recreation Access / Parking	Parking Spaces	50	59	9	\$10,620	\$95,580	0.747	<b>\$71,423</b>
<b>2018</b>	Increased flow	AFY	0	99	99	\$622	\$61,578	0.705	<b>\$43,410</b>
	Recreation Access / Parking	Parking Spaces	50	59	9	\$10,620	\$95,580	0.705	<b>\$67,380</b>
<b>2019</b>	Increased flow	AFY	0	99	99	\$622	\$61,578	0.665	<b>\$40,953</b>
	Recreation Access / Parking	Parking Spaces	50	59	9	\$10,620	\$95,580	0.665	<b>\$63,566</b>
<b>2020</b>	Increased flow	AFY	0	99	99	\$622	\$61,578	0.627	<b>\$38,635</b>
	Recreation Access / Parking	Parking Spaces	50	59	9	\$10,620	\$95,580	0.627	<b>\$59,968</b>
<b>2021</b>	Increased flow	AFY	0	99	99	\$622	\$61,578	0.592	<b>\$36,448</b>
	Recreation Access / Parking	Parking Spaces	50	59	9	\$10,620	\$95,580	0.592	<b>\$56,574</b>
<b>2022</b>	Increased flow	AFY	0	99	99	\$622	\$61,578	0.558	<b>\$34,385</b>
	Recreation Access / Parking	Parking Spaces	50	59	9	\$10,620	\$95,580	0.558	<b>\$53,371</b>
<b>2023</b>	Increased flow	AFY	0	99	99	\$622	\$61,578	0.527	<b>\$32,439</b>
	Recreation Access / Parking	Parking Spaces	50	59	9	\$10,620	\$95,580	0.527	<b>\$50,350</b>
<b>2024</b>	Increased flow	AFY	0	99	99	\$622	\$61,578	0.497	<b>\$30,602</b>
	Recreation Access / Parking	Parking Spaces	50	59	9	\$10,620	\$95,580	0.497	<b>\$47,500</b>
<b>2025</b>	Increased flow	AFY	0	99	99	\$622	\$61,578	0.469	<b>\$28,870</b>
	Recreation Access / Parking	Parking Spaces	50	59	9	\$10,620	\$95,580	0.469	<b>\$44,812</b>

Table 14 – Annual Benefit									
(All benefits are in 2012 dollars)									
Project: Permanente Creek Flood Protection Project									
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
Year	Type of Benefit	Measure of Benefit (Units)	W/o Project	W/ Project	Change from Project (e) – (d)	Unit \$ Value <sup>(1)</sup>	Ann. \$ Val. <sup>(1)</sup> (f) x (g)	Disc. Factor <sup>(1)</sup>	Disc. Benefits <sup>(1)</sup> (h) x (i)
<b>2026</b>	Increased flow	AFY	0	99	99	\$622	\$61,578	0.442	<b>\$27,236</b>
	Recreation Access / Parking	Parking Spaces	50	59	9	\$10,620	\$95,580	0.442	<b>\$42,275</b>
<b>2027</b>	Increased flow	AFY	0	99	99	\$622	\$61,578	0.417	<b>\$25,694</b>
	Recreation Access / Parking	Parking Spaces	50	59	9	\$10,620	\$95,580	0.417	<b>\$39,882</b>
<b>2028</b>	Increased flow	AFY	0	99	99	\$622	\$61,578	0.394	<b>\$24,240</b>
	Recreation Access / Parking	Parking Spaces	50	59	9	\$10,620	\$95,580	0.394	<b>\$37,625</b>
<b>2029</b>	Increased flow	AFY	0	99	99	\$622	\$61,578	0.371	<b>\$22,868</b>
	Recreation Access / Parking	Parking Spaces	50	59	9	\$10,620	\$95,580	0.371	<b>\$35,495</b>
<b>2030</b>	Increased flow	AFY	0	99	99	\$622	\$61,578	0.350	<b>\$21,573</b>
	Recreation Access / Parking	Parking Spaces	50	59	9	\$10,620	\$95,580	0.350	<b>\$33,486</b>
<b>2031</b>	Increased flow	AFY	0	99	99	\$622	\$61,578	0.331	<b>\$20,352</b>
	Recreation Access / Parking	Parking Spaces	50	59	9	\$10,620	\$95,580	0.331	<b>\$31,590</b>
<b>2032</b>	Increased flow	AFY	0	99	99	\$622	\$61,578	0.312	<b>\$19,200</b>
	Recreation Access / Parking	Parking Spaces	50	59	9	\$10,620	\$95,580	0.312	<b>\$29,802</b>
<b>2033</b>	Increased flow	AFY	0	99	99	\$622	\$61,578	0.294	<b>\$18,114</b>
	Recreation Access / Parking	Parking Spaces	50	59	9	\$10,620	\$95,580	0.294	<b>\$28,115</b>
<b>2034</b>	Increased flow	AFY	0	99	99	\$622	\$61,578	0.278	<b>\$17,088</b>
	Recreation Access / Parking	Parking Spaces	50	59	9	\$10,620	\$95,580	0.278	<b>\$26,524</b>
<b>2035</b>	Increased flow	AFY	0	99	99	\$622	\$61,578	0.262	<b>\$16,121</b>
	Recreation Access / Parking	Parking Spaces	50	59	9	\$10,620	\$95,580	0.262	<b>\$25,023</b>
<b>2036</b>	Increased flow	AFY	0	99	99	\$622	\$61,578	0.247	<b>\$15,208</b>
	Recreation Access / Parking	Parking Spaces	50	59	9	\$10,620	\$95,580	0.247	<b>\$23,606</b>
<b>2037</b>	Increased flow	AFY	0	99	99	\$622	\$61,578	0.233	<b>\$14,348</b>
	Recreation Access / Parking	Parking Spaces	50	59	9	\$10,620	\$95,580	0.233	<b>\$22,270</b>
<b>2038</b>	Increased flow	AFY	0	99	99	\$622	\$61,578	0.220	<b>\$13,535</b>
	Recreation Access / Parking	Parking Spaces	50	59	9	\$10,620	\$95,580	0.220	<b>\$21,009</b>

<b>Table 14 – Annual Benefit</b>									
(All benefits are in 2012 dollars)									
Project: Permanente Creek Flood Protection Project									
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
Year	Type of Benefit	Measure of Benefit (Units)	W/o Project	W/ Project	Change from Project (e) – (d)	Unit \$ Value <sup>(1)</sup>	Ann. \$ Val. <sup>(1)</sup> (f) x (g)	Disc. Factor <sup>(1)</sup>	Disc. Benefits <sup>(1)</sup> (h) x (i)
<b>2039</b>	Increased flow	AFY	0	99	99	\$622	\$61,578	0.207	<b>\$12,769</b>
	Recreation Access / Parking	Parking Spaces	50	59	9	\$10,620	\$95,580	0.207	<b>\$19,820</b>
<b>2040</b>	Increased flow	AFY	0	99	99	\$622	\$61,578	0.196	<b>\$12,047</b>
	Recreation Access / Parking	Parking Spaces	50	59	9	\$10,620	\$95,580	0.196	<b>\$18,698</b>
<b>2041</b>	Increased flow	AFY	0	99	99	\$622	\$61,578	0.185	<b>\$11,365</b>
	Recreation Access / Parking	Parking Spaces	50	59	9	\$10,620	\$95,580	0.185	<b>\$17,640</b>
<b>2042</b>	Increased flow	AFY	0	99	99	\$622	\$61,578	0.174	<b>\$10,721</b>
	Recreation Access / Parking	Parking Spaces	50	59	9	\$10,620	\$95,580	0.174	<b>\$16,641</b>
<b>2043</b>	Increased flow	AFY	0	99	99	\$622	\$61,578	0.164	<b>\$10,114</b>
	Recreation Access / Parking	Parking Spaces	50	59	9	\$10,620	\$95,580	0.164	<b>\$15,699</b>
<b>2044</b>	Increased flow	AFY	0	99	99	\$622	\$61,578	0.155	<b>\$9,542</b>
	Recreation Access / Parking	Parking Spaces	50	59	9	\$10,620	\$95,580	0.155	<b>\$14,811</b>
<b>2045</b>	Increased flow	AFY	0	99	99	\$622	\$61,578	0.146	<b>\$9,002</b>
	Recreation Access / Parking	Parking Spaces	50	59	9	\$10,620	\$95,580	0.146	<b>\$13,972</b>
<b>2046</b>	Increased flow	AFY	0	99	99	\$622	\$61,578	0.138	<b>\$8,492</b>
	Recreation Access / Parking	Parking Spaces	50	59	9	\$10,620	\$95,580	0.138	<b>\$13,182</b>
<b>2047</b>	Increased flow	AFY	0	99	99	\$622	\$61,578	0.130	<b>\$8,012</b>
	Recreation Access / Parking	Parking Spaces	50	59	9	\$10,620	\$95,580	0.130	<b>\$12,435</b>
<b>2048</b>	Increased flow	AFY	0	99	99	\$622	\$61,578	0.123	<b>\$7,558</b>
	Recreation Access / Parking	Parking Spaces	50	59	9	\$10,620	\$95,580	0.123	<b>\$11,732</b>
<b>2049</b>	Increased flow	AFY	0	99	99	\$622	\$61,578	0.116	<b>\$7,130</b>
	Recreation Access / Parking	Parking Spaces	50	59	9	\$10,620	\$95,580	0.116	<b>\$11,068</b>
<b>2050</b>	Increased flow	AFY	0	99	99	\$622	\$61,578	0.109	<b>\$6,727</b>
	Recreation Access / Parking	Parking Spaces	50	59	9	\$10,620	\$95,580	0.109	<b>\$10,441</b>
<b>2051</b>	Increased flow	AFY	0	99	99	\$622	\$61,578	0.103	<b>\$6,346</b>
	Recreation Access / Parking	Parking Spaces	50	59	9	\$10,620	\$95,580	0.103	<b>\$9,850</b>

Table 14 – Annual Benefit									
(All benefits are in 2012 dollars)									
Project: Permanente Creek Flood Protection Project									
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
Year	Type of Benefit	Measure of Benefit (Units)	W/o Project	W/ Project	Change from Project (e) – (d)	Unit \$ Value <sup>(1)</sup>	Ann. \$ Val. <sup>(1)</sup> (f) x (g)	Disc. Factor <sup>(1)</sup>	Disc. Benefits <sup>(1)</sup> (h) x (i)
<b>2052</b>	Increased flow	AFY	0	99	99	\$622	\$61,578	0.097	<b>\$5,987</b>
	Recreation Access / Parking	Parking Spaces	50	59	9	\$10,620	\$95,580	0.097	<b>\$9,292</b>
<b>2053</b>	Increased flow	AFY	0	99	99	\$622	\$61,578	0.092	<b>\$5,648</b>
	Recreation Access / Parking	Parking Spaces	50	59	9	\$10,620	\$95,580	0.092	<b>\$8,767</b>
<b>2054</b>	Increased flow	AFY	0	99	99	\$622	\$61,578	0.087	<b>\$5,328</b>
	Recreation Access / Parking	Parking Spaces	50	59	9	\$10,620	\$95,580	0.087	<b>\$8,270</b>
<b>2055</b>	Increased flow	AFY	0	99	99	\$622	\$61,578	0.082	<b>\$5,027</b>
	Recreation Access / Parking	Parking Spaces	50	59	9	\$10,620	\$95,580	0.082	<b>\$7,802</b>
<b>2056</b>	Increased flow	AFY	0	99	99	\$622	\$61,578	0.077	<b>\$4,742</b>
	Recreation Access / Parking	Parking Spaces	50	59	9	\$10,620	\$95,580	0.077	<b>\$7,361</b>
<b>2057</b>	Increased flow	AFY	0	99	99	\$622	\$61,578	0.073	<b>\$4,474</b>
	Recreation Access / Parking	Parking Spaces	50	59	9	\$10,620	\$95,580	0.073	<b>\$6,944</b>
<b>2058</b>	Increased flow	AFY	0	99	99	\$622	\$61,578	0.069	<b>\$4,220</b>
	Recreation Access / Parking	Parking Spaces	50	59	9	\$10,620	\$95,580	0.069	<b>\$6,551</b>
<b>2059</b>	Increased flow	AFY	0	99	99	\$622	\$61,578	0.065	<b>\$3,982</b>
	Recreation Access / Parking	Parking Spaces	50	59	9	\$10,620	\$95,580	0.065	<b>\$6,180</b>
<b>2060</b>	Increased flow	AFY	0	99	99	\$622	\$61,578	0.061	<b>\$3,756</b>
	Recreation Access / Parking	Parking Spaces	50	59	9	\$10,620	\$95,580	0.061	<b>\$5,830</b>
<b>2061</b>	Increased flow	AFY	0	99	99	\$622	\$61,578	0.058	<b>\$3,544</b>
	Recreation Access / Parking	Parking Spaces	50	59	9	\$10,620	\$95,580	0.058	<b>\$5,500</b>
<b>2062</b>	Increased flow	AFY	0	99	99	\$622	\$61,578	0.054	<b>\$3,343</b>
	Recreation Access / Parking	Parking Spaces	50	59	9	\$10,620	\$95,580	0.054	<b>\$5,189</b>
<b>2063</b>	Increased flow	AFY	0	99	99	\$622	\$61,578	0.051	<b>\$3,154</b>
	Recreation Access / Parking	Parking Spaces	50	59	9	\$10,620	\$95,580	0.051	<b>\$4,895</b>
<b>2064</b>	Increased flow	AFY	0	99	99	\$622	\$61,578	0.048	<b>\$2,975</b>
	Recreation Access / Parking	Parking Spaces	50	59	9	\$10,620	\$95,580	0.048	<b>\$4,618</b>

Table 14 – Annual Benefit (All benefits are in 2012 dollars)									
Project: Permanente Creek Flood Protection Project									
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
Year	Type of Benefit	Measure of Benefit (Units)	W/o Project	W/ Project	Change from Project (e) – (d)	Unit \$ Value <sup>(1)</sup>	Ann. \$ Val. <sup>(1)</sup> (f) x (g)	Disc. Factor <sup>(1)</sup>	Disc. Benefits <sup>(1)</sup> (h) x (i)
<b>2065</b>	Increased flow	AFY	0	99	99	\$622	\$61,578	0.046	<b>\$2,807</b>
	Recreation Access / Parking	Parking Spaces	50	59	9	\$10,620	\$95,580	0.046	<b>\$4,357</b>
<b>2066</b>	Increased flow	AFY	0	99	99	\$622	\$61,578	0.043	<b>\$2,648</b>
	Recreation Access / Parking	Parking Spaces	50	59	9	\$10,620	\$95,580	0.043	<b>\$4,110</b>
<b>2067</b>								0.041	
...	..							...	
<b>Last Year of Project Life</b>								...	
Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table):									<b>\$1,962,097</b>
Comments:									

(1) Complete these columns if dollar value is being claimed for the benefit.

### Annual Cost of Avoided Projects

Implementation of this project would not cause an alternate project or projects to be avoided. As such, PSP Table 15 has not been completed.

## Project Benefit and Cost Summary (D4)

This section highlights the overall costs and benefits of the Permanente Creek Flood Protection Project. Present value costs are projected to equal approximately \$44.1 million, and benefits are projected to equal approximately \$13.9 million. In addition to monetized benefits, the following key unmonetizable benefits will be achieved by the proposal:

- Training and education related to special status frogs and paleontological resources.
- Additional recreation features at Rancho San Antonio County Park and McKelvey Park, including a new restroom and a new trail spur at Rancho San Antonio County Park, for a total of 1,200 feet of new trails, and a new 0.7-acre mini-park at McKelvey Park.
- Enhanced groundwater recharge, which would reduce demands on the Delta.
- A significant improvement in public health and safety.
- Reduced sedimentation and erosion and improved water quality in Permanente and Hale Creeks.
- Improved access and a continuous maintenance road that will facilitate maintenance of the Creek and reduced maintenance requirements.

## Project Costs

### Initial and Annual Costs

As shown in Table 8-7 (PSP Table 16) below, the present value of Project costs is estimated to be \$39.8 million. This estimate includes all costs associated with construction, administration, operation and maintenance of the project and reflects all the costs required for the Project to achieve its stated benefits. Costs funded by local, State, federal agencies and non-profits are included. The following assumptions were made related to project costs.

#### **Assumptions: Initial Costs**

- 2009: \$1,819,301 was spent on planning/design/environmental work (considered a sunk cost)
- 2010: \$2,742,161 was spent on planning/design/environmental work (considered a sunk cost) and \$8,668 was spent on land acquisition (considered an opportunity cost)
- 2011: \$2,634,829 was spent on planning/design/environmental work (considered a sunk cost) and \$380,000 was spent on preliminary construction activities (considered a sunk cost)
- 2012: \$2,218,472 was spent on planning/design/environmental work (considered a sunk cost) and \$185,300 was spent on land acquisition/easements (considered an opportunity cost and retained)
- 2013: \$532,300 will be spent on project administration, \$571,309 will be spent on land purchase/easements, \$3,183,000 will be spent on planning/design/environmental work, \$4,000,000 will be spent on construction activities (Permanente Creek Improvements), \$400,000 will be spent on construction administration, and \$400,000 will be spent in contingency. It was assumed that 62.5% of all costs (7.5/12) except land purchase / easement costs are sunk costs incurred prior to the assumed date of grant award. The full \$621,309 in land purchase / easements is considered an opportunity cost and the full cost was retained.
- 2014: It was assumed that \$532,300 will be spent on project administration, \$2,405,000 will be spent on planning/design/environmental work, \$12,641,087 will be spent on construction (all elements begin construction), \$1,000,000 will be spent on construction administration, and \$1,264,108 will be spent in contingency.
- 2015: It was assumed that \$532,300 will be spent on project administration, \$12,641,087 will be spent on construction (all elements but Hale Creek finish construction), \$213,000 will be spent on environmental mitigation, \$1,000,000 will be spent on construction administration, and \$1,264,109 will be spent on contingency.
- 2016: It was assumed that \$532,300 will be spent on project administration, \$600,000 will be spent on construction (Hale Creek only), \$260,000 will be spent on construction administration, and \$60,000 will be spent on contingency.

- 2017: It was assumed that \$532,300 will be spent on project administration, \$654,439 will be spent on construction (Hale Creek only), \$331,474 will be spent on construction administration, and \$65,444 will be spent on contingency.

**Assumptions: Annual Costs**

- The 2008 Permanente Creek Flood Protection Project Planning Study Report (Appendix 8-7, page 143) estimated approximately \$255,000 in annual operations and maintenance costs. However, the Project has been modified since completion of the Planning Study Report. The following operations and maintenance costs have been assumed for the Project, based on the preliminary costs developed on the 2008 Planning Study and District experience completing similar projects:
  - Admin: \$25,000
  - Operation: \$40,000
  - Maintenance: \$130,000
  - Replacement: \$60,000

**Table 8-7. Annual Costs of Project (2012 Dollars)**

Table 16 – Annual Costs of Project (All costs should be in 2012 Dollars) Project: Permanente Creek Flood Protection Project										
	Initial Costs	Adjusted Grant Total Cost <sup>(1)</sup>	Annual Costs <sup>(2)</sup>					Discounting Calculations		
			Admin	Ops.	Maint.	Repl.	Other	Total Costs	Disc. Factor	Discounted Costs (h) x (i)
Year	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
2009	\$1,819,301	0						\$0	1.191	\$0
2010	\$2,750,829	\$8,668						\$8,668	1.124	\$9,739
2011	\$3,014,829	0						\$0	1.060	\$0
2012	\$2,403,772	\$185,300						\$185,300	1.000	\$185,300
2013	\$9,134,237	\$5,941,889						\$5,941,889	0.943	\$5,605,556
2014	\$17,840,123	\$17,840,123						\$17,840,123	0.890	\$15,877,646
2015	\$15,648,124	\$15,648,124						\$15,648,124	0.840	\$13,138,466
2016	\$1,449,928	\$1,449,928						\$1,449,928	0.792	\$1,148,479
2017	\$1,581,285	\$1,581,285						\$1,581,285	0.747	\$1,181,628
2018			\$25,000	\$40,000	\$130,000	\$60,000		\$230,000	0.705	\$162,141
2019			\$25,000	\$40,000	\$130,000	\$60,000		\$230,000	0.665	\$152,963
2020			\$25,000	\$40,000	\$130,000	\$60,000		\$230,000	0.627	\$144,305
2021			\$25,000	\$40,000	\$130,000	\$60,000		\$230,000	0.592	\$136,137
2022			\$25,000	\$40,000	\$130,000	\$60,000		\$230,000	0.558	\$128,431
2023			\$25,000	\$40,000	\$130,000	\$60,000		\$230,000	0.527	\$121,161
2024			\$25,000	\$40,000	\$130,000	\$60,000		\$230,000	0.497	\$114,303
2025			\$25,000	\$40,000	\$130,000	\$60,000		\$230,000	0.469	\$107,833
2026			\$25,000	\$40,000	\$130,000	\$60,000		\$230,000	0.442	\$101,729

<b>Table 16 – Annual Costs of Project</b> (All costs should be in 2012 Dollars) Project: Permanente Creek Flood Protection Project										
	Initial Costs	Adjusted Grant Total Cost <sup>(1)</sup>	Annual Costs <sup>(2)</sup>						Discounting Calculations	
			Admin	Ops.	Maint.	Repl.	Other	Total Costs	Disc. Factor	Discounted Costs (h) x (i)
Year	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
2027			\$25,000	\$40,000	\$130,000	\$60,000		\$230,000	0.417	\$95,971
2028			\$25,000	\$40,000	\$130,000	\$60,000		\$230,000	0.394	\$90,539
2029			\$25,000	\$40,000	\$130,000	\$60,000		\$230,000	0.371	\$85,414
2030			\$25,000	\$40,000	\$130,000	\$60,000		\$230,000	0.350	\$80,579
2031			\$25,000	\$40,000	\$130,000	\$60,000		\$230,000	0.331	\$76,018
2032			\$25,000	\$40,000	\$130,000	\$60,000		\$230,000	0.312	\$71,715
2033			\$25,000	\$40,000	\$130,000	\$60,000		\$230,000	0.294	\$67,656
2034			\$25,000	\$40,000	\$130,000	\$60,000		\$230,000	0.278	\$63,826
2035			\$25,000	\$40,000	\$130,000	\$60,000		\$230,000	0.262	\$60,213
2036			\$25,000	\$40,000	\$130,000	\$60,000		\$230,000	0.247	\$56,805
2037			\$25,000	\$40,000	\$130,000	\$60,000		\$230,000	0.233	\$53,590
2038			\$25,000	\$40,000	\$130,000	\$60,000		\$230,000	0.220	\$50,556
2039			\$25,000	\$40,000	\$130,000	\$60,000		\$230,000	0.207	\$47,695
2040			\$25,000	\$40,000	\$130,000	\$60,000		\$230,000	0.196	\$44,995
2041			\$25,000	\$40,000	\$130,000	\$60,000		\$230,000	0.185	\$42,448
2042			\$25,000	\$40,000	\$130,000	\$60,000		\$230,000	0.174	\$40,045
2043			\$25,000	\$40,000	\$130,000	\$60,000		\$230,000	0.164	\$37,779
2044			\$25,000	\$40,000	\$130,000	\$60,000		\$230,000	0.155	\$35,640
2045			\$25,000	\$40,000	\$130,000	\$60,000		\$230,000	0.146	\$33,623
2046			\$25,000	\$40,000	\$130,000	\$60,000		\$230,000	0.138	\$31,720
2047			\$25,000	\$40,000	\$130,000	\$60,000		\$230,000	0.130	\$29,924
2048			\$25,000	\$40,000	\$130,000	\$60,000		\$230,000	0.123	\$28,230
2049			\$25,000	\$40,000	\$130,000	\$60,000		\$230,000	0.116	\$26,632
2050			\$25,000	\$40,000	\$130,000	\$60,000		\$230,000	0.109	\$25,125
2051			\$25,000	\$40,000	\$130,000	\$60,000		\$230,000	0.103	\$23,703
2052			\$25,000	\$40,000	\$130,000	\$60,000		\$230,000	0.097	\$22,361
2053			\$25,000	\$40,000	\$130,000	\$60,000		\$230,000	0.092	\$21,095
2054			\$25,000	\$40,000	\$130,000	\$60,000		\$230,000	0.087	\$19,901
2055			\$25,000	\$40,000	\$130,000	\$60,000		\$230,000	0.082	\$18,775
2056			\$25,000	\$40,000	\$130,000	\$60,000		\$230,000	0.077	\$17,712
2057			\$25,000	\$40,000	\$130,000	\$60,000		\$230,000	0.073	\$16,710

Table 16 – Annual Costs of Project (All costs should be in 2012 Dollars) Project: Permanente Creek Flood Protection Project										
	Initial Costs	Adjusted Grant Total Cost <sup>(1)</sup>	Annual Costs <sup>(2)</sup>						Discounting Calculations	
			Admin	Ops.	Maint.	Repl.	Other	Total Costs	Disc. Factor	Discounted Costs (h) x (i)
Year	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
2058			\$25,000	\$40,000	\$130,000	\$60,000		\$230,000	0.069	\$15,764
2059			\$25,000	\$40,000	\$130,000	\$60,000		\$230,000	0.065	\$14,871
2060			\$25,000	\$40,000	\$130,000	\$60,000		\$230,000	0.061	\$14,030
2061			\$25,000	\$40,000	\$130,000	\$60,000		\$230,000	0.058	\$13,236
2062			\$25,000	\$40,000	\$130,000	\$60,000		\$230,000	0.054	\$12,486
2063			\$25,000	\$40,000	\$130,000	\$60,000		\$230,000	0.051	\$11,780
2064			\$25,000	\$40,000	\$130,000	\$60,000		\$230,000	0.048	\$11,113
2065			\$25,000	\$40,000	\$130,000	\$60,000		\$230,000	0.046	\$10,484
2066			\$25,000	\$40,000	\$130,000	\$60,000		\$230,000	0.043	\$9,890
2067			\$25,000	\$40,000	\$130,000	\$60,000		\$230,000	0.041	\$9,331
Total Present Value of Discounted Costs (Sum of Column (j)) Transfer to Table 17, column (c), Proposal Benefits and Costs Summaries										\$39,846,056
Comments: \$12,987,110 in costs incurred for planning, design, and construction prior to the assumed grant award date of August 15, 2013 are considered sunk costs, and have been omitted from this estimate. Land acquisition costs incurred prior to 2012 have been retained. All costs are in 2012 dollars.										

### Cost Guidelines and Assumptions

The aforementioned costs were developed in accordance with PSP requirements:

- **Consistency:** The economic analysis is consistent with the grant requirements, uses the total project costs as provided in Attachment 4, and is based on the flood protection benefits as described in the 2012 SEIR for the Permanente Flood Protection Project.
- **Period of Analysis.** The initial costs presented in Table 8-7 (PSP Table 16) are consistent with the projected construction schedule for the Permanente Creek Flood Protection Project (shown in Attachment 5), and reflect start of construction activities in 2013 and the completion of construction activities in 2017. The operational life of the Project is assumed to be 50 years, which is consistent with most flood protection projects.
- **Economic Cost.** The economic cost of the total Project as presented in Attachment 4 considers all reasonably foreseeable costs including opportunity costs.
- **Sunk Costs.** Sunk costs considered as part of the economic analysis but not factored into the total Project costs include costs incurred for planning, design, and preliminary construction activities prior to the assumed award date of August 15, 2013 (as described above).
- **Opportunity Costs.** All opportunity costs are accounted for including previous construction costs incurred since October 2008.
- **Discount Rate.** In accordance with PSP requirements, a 6% discount rate was applied.
- **Dollar Value.** In accordance with PSP requirements, all costs are presented in 2012 dollars.

## Project Benefit and Cost Summary

Table 8-8 (PSP Table 17) presents a summary of the Proposal Benefits and Costs. A more detailed discussion of these costs and benefits is provided in the previous sections.

**Table 8-7. Proposal Benefits and Costs Summary**

Table 17 – Proposal Benefits and Costs Summary						
Proposal: Permanente Creek Flood Protection Proposal						
Agency: Santa Clara Valley Water District						
Project	Project Proponent	Total Present Value Project Costs <sup>(1)</sup>	Total Present Value Project Benefits			From Section D2 – Briefly describe the main Non-monetized benefits
			From Scn D2 – Flood Damage Reduction <sup>(2)</sup>	From Scn D3 – Monetized <sup>(3)</sup>	Total	
(a)	(b)	(c)	(d)	(e)	(f) = (d) + (e)	(g)
<b>Permanente Creek Flood Protection Project</b>	Santa Clara Valley Water District	\$39,846,056	\$11,941,573	\$1,962,097	\$13,903,670	<ul style="list-style-type: none"> <li>• Training and education</li> <li>• Additional recreation features</li> <li>• Enhanced groundwater recharge</li> <li>• Significant improvements to public health and safety</li> <li>• Improved water quality</li> <li>• Improved access and reduced maintenance requirements</li> </ul>
<b>TOTAL</b>		\$39,846,056	\$11,941,573	\$1,962,097	\$13,903,670	

(1) From Table 16 or RWMG method

(2) From Table 12 or RWMG method

(3) From Table 14 or RWMG method

## **APPENDIX 8-1: HAZUS Modeling Output**

**Overview of Hazus Output Data: Existing conditions (Without Project) - 25 year**

		<u>HAZUS value</u>	<u>Hazus output summary file</u>
<b>Area Flooded (acres)</b>		204	no file (calculated in FLO2D)
<b>Physical Damage</b>			
# of structures affected (Hazus damaged)		3	structcount
# of structures in floodplain		985	structcount
value of structures affected(\$M)	\$	2.86	directloss (cap stock losses)
<b>Loss of Function</b>			
Lost business net income(\$M)	\$	0.14	directloss (cap related loss)
Lost Rental Income (\$M)	\$	0.01	directloss
Loss of Wages (\$M)	\$	0.33	directloss
Loss of Transportation/Utility Services (\$M)	\$	0.001	transportation, utilities
<b>Emergency Response/Clean-Up Costs</b>			
Displacement/relocation costs (\$M)	\$	0.08	directloss
<b>Clean-Up</b>			
debris (tons)		160	debris
truckloads (@25tons/truck)		6	debris
<b>Displacement/Shelter</b>			
# of displaced people		4285	displace_shelt
# of people needing short term shelter		3622	displace_shelt
<b>Vehicles affected and value (day)</b>			
car (\$)	\$	249,074.00	vehicleday
light truck (\$)	\$	145,980.00	vehicleday
heavy truck(\$)	\$	16,497.00	vehicleday
total loss (\$)	\$	411,551.00	vehicleday

**Overview of Hazus Output Data: Existing conditions (Without Project) - 50**

<b>HAZUS value</b>	
<b>Area Flooded (acres)</b>	610
<b>Physical Damage</b>	
# of structures affected (Hazus damaged)	34
# of structures in floodplain	2301
value of structures affected(\$M)	\$ 17.55
<b>Loss of Function</b>	
Lost business net income(\$M)	\$ 0.52
Lost Rental Income (\$M)	\$ 0.09
Loss of Wages (\$M)	\$ 1.70
Loss of Transportation/Utility Services (\$M)	\$ 0.002
<b>Emergency Response/Clean-Up Costs</b>	
Displacement costs (\$M)	\$ 0.27
<b>Clean-Up</b>	
debris (tons)	868
truckloads (@25tons/truck)	35
<b>Displacement/Shelter</b>	
# of displaced people	10197
# of people needing short term shelter	9074
<b>Vehicles affected and value (day)</b>	
car (\$)	\$ 1,155,402.00
light truck (\$)	\$ 674,286.00
heavy truck(\$)	\$ 64,455.00
total loss (\$)	\$ 1,894,143.00

year

<b>Hazus output summary file</b>
no file (calculated in ArcMap)
structcount
structcount
directloss (cap stock loss)
directloss (cap related loss)
directloss
directloss
transportation, utilities
displace_shelt
debris
debris
displace_shelt
displace_shelt
vehicleday
vehicleday
vehicleday
vehicleday

**Overview of Hazus Output Data: Existing conditions (Without Project) - 100 year**

		<u>HAZUS value</u>	<u>Hazus output summary file</u>
<b>Area Flooded (acres)</b>		950	no file (calculated in ArcMap)
<b>Physical Damage</b>			
# of structures affected (Hazus damaged)		104	structcount
# of structures in floodplain		3074	structcount
value of structures affected(\$M)	\$	50.70	directloss (cap stock losses)
<b>Loss of Function</b>			
Lost business net income(\$M)	\$	0.75	directloss (cap related loss)
Lost Rental Income (\$M)	\$	0.14	directloss
Loss of Wages (\$M)	\$	2.04	directloss
Loss of Transportation/Utility Services (\$M)	\$	0.005	transportation, utilities
<b>Emergency Response/Clean-Up Costs</b>			
Displacement/relocation costs (\$M)	\$	0.39	directloss
<b>Clean-Up</b>			
debris (tons)		2263	debris
truckloads (@25tons/truck)		91	debris
<b>Displacement/Shelter</b>			
# of displaced people		13717	displace_shelt
# of people needing short term shelter		12535	displace_shelt
<b>Vehicles affected and value (day)</b>			
car (\$)	\$	2,479,398.00	vehicleday
light truck (\$)	\$	1,416,639.00	vehicleday
heavy truck(\$)	\$	150,092.00	vehicleday
total loss (\$)	\$	4,046,129.00	vehicleday

**Overview of Hazus Output Data: Design Conditions (With Project) - 25 year**

		<u>HAZUS value</u>	<u>Hazus output summary file</u>
<b>Area Flooded (acres)</b>		11	no file (calculated in ArcMap)
<b>Physical Damage</b>			
# of structures affected (Hazus damaged)		0	structcount
# of structures in floodplain		48	structcount
value of structures affected(\$M)	\$	0.02	directloss (cap stock losses)
<b>Loss of Function</b>			
Lost business net income(\$M)	\$	-	directloss (cap related loss)
Lost Rental Income (\$M)	\$	-	directloss
Loss of Wages (\$M)	\$	-	directloss
Loss of Transportation/Utility Services (\$M)	\$	-	transportation, utilities
<b>Emergency Response/Clean-Up Costs</b>			
Displacement/relocation costs (\$M)	\$	0.004	directloss
<b>Clean-Up</b>			
debris (tons)		1	debris
truckloads (@25tons/truck)		1	debris
<b>Displacement/Shelter</b>			
# of displaced people		147	displace_shelt
# of people needing short term shelter		111	displace_shelt
<b>Vehicles affected and value (day)</b>			
car (\$)	\$	3,922.00	vehicleday
light truck (\$)	\$	2,092.00	vehicleday
heavy truck(\$)	\$	173.00	vehicleday
total loss (\$)	\$	6,187.00	vehicleday

**Overview of Hazus Output Data: Design Conditions (With Project) - 50 year**

		<u>HAZUS value</u>	<u>Hazus output summary file</u>
<b>Area Flooded (acres)</b>		14	no file (calculated in ArcMap)
<b>Physical Damage</b>			
# of structures affected (Hazus damaged)		0	structcount
# of structures in floodplain		61	structcount
value of structures affected(\$M)	\$	0.02	directloss (cap stock losses)
<b>Loss of Function</b>			
Lost business net income(\$M)	\$	-	directloss (cap related loss)
Lost Rental Income (\$M)	\$	-	directloss
Loss of Wages (\$M)	\$	-	directloss
Loss of Transportation/Utility Services (\$M)	\$	-	transportation, utilities
<b>Emergency Response/Clean-Up Costs</b>			
Displacement/relocation costs (\$M)	\$	0.004	directloss
<b>Clean-Up</b>			
debris (tons)		1	debris
truckloads (@25tons/truck)		1	debris
<b>Displacement/Shelter</b>			
# of displaced people		183	displace_shelt
# of people needing short term shelter		136	displace_shelt
<b>Vehicles affected and value (day)</b>			
car (\$)	\$	6,257.00	vehicleday
light truck (\$)	\$	3,430.00	vehicleday
heavy truck(\$)	\$	384.00	vehicleday
total loss (\$)	\$	10,071.00	vehicleday

# HAZUS-MH: Flood Event Report

**Region Name:** PermanentePDHale

**Flood Scenario:** exist25yr2

**Print Date:** Thursday, December 20, 2012

***Disclaimer:***

*Totals only reflect data for those census tracts/blocks included in the user's study region.*

*The estimates of social and economic impacts contained in this report were produced using HAZUS loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social*

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## General Description of the Region

HAZUS is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of HAZUS is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- California

Note:

Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 16 square miles and contains 691 census blocks. The region contains over 22 thousand households and has a total population of 51,912 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 17,241 buildings in the region with a total building replacement value (excluding contents) of 6,611 million dollars (2006 dollars). Approximately 89.58% of the buildings (and 74.63% of the building value) are associated with residential housing.

### General Building Stock

HAZUS estimates that there are 17,241 buildings in the region which have an aggregate total replacement value of 6,611 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

**Table 1**  
**Building Exposure by Occupancy Type for the Study Region**

<b>Occupancy</b>	<b>Exposure (\$1000)</b>	<b>Percent of Total</b>
Residential	4,934,180	74.6%
Commercial	1,222,007	18.5%
Industrial	256,760	3.9%
Agricultural	66,649	1.0%
Religion	63,762	1.0%
Government	11,916	0.2%
Education	55,859	0.8%
<b>Total</b>	<b>6,611,133</b>	<b>100.00%</b>

**Table 2**  
**Building Exposure by Occupancy Type for the Scenario**

<b>Occupancy</b>	<b>Exposure (\$1000)</b>	<b>Percent of Total</b>
Residential	1,246,093	84.0%
Commercial	136,557	9.2%
Industrial	22,958	1.5%
Agricultural	57,624	3.9%
Religion	10,540	0.7%
Government	1,000	0.1%
Education	8,758	0.6%
<b>Total</b>	<b>1,483,530</b>	<b>100.00%</b>

### Essential Facility Inventory

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 286 beds. There are 23 schools, 5 fire stations, 1 police station and no emergency operation centers.

## Flood Scenario Parameters

HAZUS used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

<b>Study Region Name:</b>	PermanentePDHale
<b>Scenario Name:</b>	exist25yr2
<b>Return Period Analyzed:</b>	25
<b>Analysis Options Analyzed:</b>	No What-ifs

## General Building Stock Damage

HAZUS estimates that about 3 buildings will be at least moderately damaged. This is over 0% of the total number of buildings in the scenario. There are an estimated 0 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the HAZUS Flood technical manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

**Table 3: Expected Building Damage by Occupancy**

Occupancy	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	0	0.00	3	100.00	0	0.00	0	0.00	0	0.00
<b>Total</b>	<b>0</b>		<b>0</b>		<b>3</b>		<b>0</b>		<b>0</b>		<b>0</b>	

**Table 4: Expected Building Damage by Building Type**

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Masonry	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	0	0.00	0	0.00	3	100.00	0	0.00	0	0.00	0	0.00

## Essential Facility Damage

Before the flood analyzed in this scenario, the region had 286 hospital beds available for use. On the day of the scenario flood event, the model estimates that 286 hospital beds are available in the region.

**Table 5: Expected Damage to Essential Facilities**

Classification	Total	# Facilities		
		At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	5	0	0	0
Hospitals	1	0	0	0
Police Stations	1	0	0	0
Schools	23	3	0	0

If this report displays all zeros or is blank, two possibilities can explain this.

- (1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.
- (2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

## Induced Flood Damage

### **Debris Generation**

HAZUS estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 160 tons of debris will be generated. Of the total amount, Finishes comprises 100% of the total, Structure comprises 0% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 6 truckloads (@25 tons/truck) to remove the debris generated by the flood.

## Social Impact

### **Shelter Requirements**

HAZUS estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. HAZUS also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 1,428 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 3,622 people (out of a total population of 51,912) will seek temporary shelter in public shelters.

## Economic Loss

The total economic loss estimated for the flood is 13.70 million dollars, which represents 0.15 % of the total replacement value of the scenario buildings.

### **Building-Related Losses**

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 2.86 million dollars. 17% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 54.19% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

**Table 6: Building-Related Economic Loss Estimates**

(Millions of dollars)

<b>Category</b>	<b>Area</b>	<b>Residential</b>	<b>Commercial</b>	<b>Industrial</b>	<b>Others</b>	<b>Total</b>
<b><u>Building Loss</u></b>						
	Building	1.10	0.25	0.04	0.00	1.39
	Content	0.67	0.72	0.07	0.00	1.46
	Inventory	0.00	0.00	0.01	0.00	0.01
	<b>Subtotal</b>	<b>1.77</b>	<b>0.97</b>	<b>0.12</b>	<b>0.00</b>	<b>2.86</b>
<b><u>Business Interruption</u></b>						
	Income	0.00	0.06	0.00	0.08	0.14
	Relocation	0.07	0.01	0.00	0.00	0.08
	Rental Income	0.01	0.00	0.00	0.00	0.01
	Wage	0.00	0.09	0.00	0.24	0.33
	<b>Subtotal</b>	<b>0.09</b>	<b>0.16</b>	<b>0.00</b>	<b>0.32</b>	<b>0.57</b>
<b>ALL</b>	<b>Total</b>	<b>1.86</b>	<b>1.13</b>	<b>0.12</b>	<b>0.32</b>	<b>3.43</b>

## **Appendix A: County Listing for the Region**

California

- Santa Clara

**Appendix B: Regional Population and Building Value Data**

	Building Value (thousands of dollars)			Total
	Population	Residential	Non-Residential	
<b>California</b>				
Santa Clara	51,912	4,934,180	1,676,953	6,611,133
<b>Total</b>	<b>51,912</b>	<b>4,934,180</b>	<b>1,676,953</b>	<b>6,611,133</b>
<b>Total Study Region</b>	<b>51,912</b>	<b>4,934,180</b>	<b>1,676,953</b>	<b>6,611,133</b>

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## Debris Summary Report

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January 10, 2013

All values are in tons.

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	Finishes	Structures	Foundations	Total
<b>California</b>				
Santa Clara	160	0	0	160
<b>Total</b>	<b>160</b>	<b>0</b>	<b>0</b>	<b>160</b>
<b>Scenario Total</b>	<b>160</b>	<b>0</b>	<b>0</b>	<b>160</b>

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Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

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**Study Region:** PermanentePDHale  
**Scenario:** exist25yr2  
**Return Period:** 25

## Direct Economic Losses for Buildings

January 10, 2013

All values are in thousands of dollars

	Capital Stock Losses			Building Loss Ratio %	Income Losses				Total Loss
	Cost Building Damage	Cost Contents Damage	Inventory Loss		Relocation Loss	Capital Related Loss	Wages Losses	Rental Income Loss	
<b>California</b>									
Santa Clara	1,387	1,460	11	0.1	80	141	334	12	3,425
<b>Total</b>	<b>1,387</b>	<b>1,460</b>	<b>11</b>	<b>0.10</b>	<b>80</b>	<b>141</b>	<b>334</b>	<b>12</b>	<b>3,425</b>
<b>Scenario Total</b>	<b>1,387</b>	<b>1,460</b>	<b>11</b>	<b>0.10</b>	<b>80</b>	<b>141</b>	<b>334</b>	<b>12</b>	<b>3,425</b>

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

Study Region: PermanentePDHale  
 Scenario: exist25yr2  
 Return Period: 25

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## Shelter Summary Report

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January 10, 2013

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	# of Displaced People	# of People Needing Short Term Shelter
<b>California</b>		
Santa Clara	4,285	3,622
<b>Total</b>	<b>4,285</b>	<b>3,622</b>
<b>Scenario Total</b>	<b>4,285</b>	<b>3,622</b>

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*Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.*

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**Study Region:** PermanentePDHale  
**Scenario:** exist25yr2  
**Return Period:** 25

Page : 1 of 1

## Income and Employment Impact (with outside aid)

January 10, 2013

Income impact in millions of dollars  
Employment impact in number of employees  
Positive values denote a gain, negative values denote a loss

	Mining		Manufacturing		Trade		Services		Miscellaneous		
	Agriculture	Construction	Transportation		Finance	Government					Total
<b>First Year</b>											
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	0.019	0.002	0.000	0.000	-0.001	-0.001	-0.001	0.000	0.018
<b>Second Year</b>											
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	0.012	0.001	-0.001	-0.001	-0.002	-0.004	-0.002	0.000	0.002
<b>Third Year</b>											
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	-0.001	0.002	-0.001	0.004	-0.003	-0.006	-0.002	0.000	-0.007
<b>Fourth Year</b>											
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	-0.001	0.002	-0.001	0.004	-0.003	-0.006	-0.002	0.000	-0.007

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## Income and Employment Impact (with outside aid)

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	Mining		Manufacturing		Trade		Services		Miscellaneous		
	Agriculture	Construction	Transportation		Finance	Government					Total
<b>Fifth Year</b>											
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	-0.001	0.002	-0.001	0.004	-0.003	-0.006	-0.002	0.000	-0.007

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*Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.*

**Study Region:** PermanentePDHale  
**Scenario:** exist25yr2  
**Return Period:** 25

## Income and Employment Impact (without outside aid)

January 10, 2013

Income impact in millions of dollars  
Employment impact in number of employees  
Positive values denote a gain, negative values denote a loss

	Agriculture	Mining	Construction	Manufacturing	Transportation	Trade	Finance	Services	Government	Miscellaneous	Total
<b>First Year</b>											
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	0.290	0.056	0.000	0.017	0.000	-0.001	0.000	0.000	0.363
<b>Second Year</b>											
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	0.130	0.027	0.000	0.008	0.000	0.000	0.000	0.000	0.165
<b>Third Year</b>											
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	0.000	0.003	0.000	0.007	0.000	0.000	0.000	0.000	0.010
<b>Fourth Year</b>											
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	0.000	0.003	0.000	0.007	0.000	0.000	0.000	0.000	0.010
<b>Fifth Year</b>											
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	0.000	0.003	0.000	0.007	0.000	0.000	0.000	0.000	0.010

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

Study Region: PermanentePDHale  
Scenario: exist25yr2  
Return Period: 25

## Building Damage Count by General Building Type

January 10, 2013

	Count of Buildings (#) by Range of Damage (%)							Total
	None	1-10	11-20	21-30	31-40	41-50	Substantial	
<b>California</b>								
<b>Santa Clara</b>								
Concrete	1	0	0	0	0	0	0	1
ManufHousing	1	0	0	0	0	0	0	1
Masonry	3	0	0	0	0	0	0	3
Steel	1	0	0	0	0	0	0	1
Wood	976	0	0	3	0	0	0	979
<b>Total</b>	<b>982</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>985</b>
<b>Total</b>	<b>982</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>985</b>
<b>Scenario Total</b>	<b>982</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>985</b>

### Special Notice Regarding Building Count:

Unlike the earthquake and hurricane models, the flood model performs its analysis at the census block level. This means that the analysis starts with a small number of buildings within each census block and applies a series of distributions necessary for analyzing the potential damage. The application of these distributions and the small number of buildings make the flood model more sensitive to rounding errors that introduces uncertainty into the building count results. Please use these results with suitable caution.

*Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.*

**Study Region:** PermanentePDHale  
**Scenario:** exist25yr2  
**Return Period:** 25

## Direct Economic Loss For Transportation

January 10, 2013

All values are in thousands of dollars

	Highway	Railway	Light Rail	Bus Facility	Ports	Ferries	Airport	Total
<b>California</b>								
<b>Santa Clara</b>								
Segments	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Bridges	\$1.15	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$1.15
Tunnels	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Facilities	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
<b>Total</b>	<b>\$1.15</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$1.15</b>
<b>Total</b>	<b>\$1.15</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$1.15</b>
<b>Scenario Total</b>	<b>\$1.15</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$1.15</b>

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

Study Region: PermanentePDHale  
 Scenario: exist25yr2  
 Return Period: 25

## Direct Economic Losses for Utilities

January 10, 2013

All values are in thousands of dollars.

	Potable Water	Waste Water	Oil Systems	Natural Gas	Electric Power	Communication	Total
<b>California</b>							
<b>Santa Clara</b>							
Facilities	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Pipelines	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
<b>Total</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>
<b>Total</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>
<b>Scenario Total</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

Study Region: PermanentePDHale  
 Scenario: exist25yr2  
 Return Period: 25

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## Direct Economic Losses For Vehicles (Day)

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January 10, 2013

All values are in dollars.

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	Car	Light Truck	Heavy Truck	Total Loss
<b>California</b>				
Santa Clara	249,074	145,980	16,497	411,551
<b>Total</b>	<b>249,074</b>	<b>145,980</b>	<b>16,497</b>	<b>411,551</b>
<b>Scenario Total</b>	<b>249,074</b>	<b>145,980</b>	<b>16,497</b>	<b>411,551</b>

---

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

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**Study Region:** PermanentePDHale  
**Scenario:** exist25yr2  
**Return Period:** 25

---

## Direct Economic Losses For Vehicles (Night)

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January 10, 2013

All values are in dollars.

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	Car	Light Truck	Heavy Truck	Total Loss
<b>California</b>				
Santa Clara	270,765	152,344	17,325	440,434
<b>Total</b>	<b>270,765</b>	<b>152,344</b>	<b>17,325</b>	<b>440,434</b>
<b>Scenario Total</b>	<b>270,765</b>	<b>152,344</b>	<b>17,325</b>	<b>440,434</b>

---

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

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**Study Region:** PermanentePDHale  
**Scenario:** exist25yr2  
**Return Period:** 25

# HAZUS-MH: Flood Event Report

**Region Name:** PermHalePD  
**Flood Scenario:** Exist50yr  
**Print Date:** Thursday, December 20, 2012

***Disclaimer:***

*Totals only reflect data for those census tracts/blocks included in the user's study region.*

*The estimates of social and economic impacts contained in this report were produced using HAZUS loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social*

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## General Description of the Region

HAZUS is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of HAZUS is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- California

**Note:**

Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 16 square miles and contains 691 census blocks. The region contains over 22 thousand households and has a total population of 51,912 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 17,241 buildings in the region with a total building replacement value (excluding contents) of 6,611 million dollars (2006 dollars). Approximately 89.58% of the buildings (and 74.63% of the building value) are associated with residential housing.

## Building Inventory

### General Building Stock

HAZUS estimates that there are 17,241 buildings in the region which have an aggregate total replacement value of 6,611 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

**Table 1**  
**Building Exposure by Occupancy Type for the Study Region**

<b>Occupancy</b>	<b>Exposure (\$1000)</b>	<b>Percent of Total</b>
Residential	4,934,180	74.6%
Commercial	1,222,007	18.5%
Industrial	256,760	3.9%
Agricultural	66,649	1.0%
Religion	63,762	1.0%
Government	11,916	0.2%
Education	55,859	0.8%
<b>Total</b>	<b>6,611,133</b>	<b>100.00%</b>

**Table 2**  
**Building Exposure by Occupancy Type for the Scenario**

<b>Occupancy</b>	<b>Exposure (\$1000)</b>	<b>Percent of Total</b>
Residential	2,441,567	79.4%
Commercial	458,015	14.9%
Industrial	61,754	2.0%
Agricultural	58,467	1.9%
Religion	29,600	1.0%
Government	9,975	0.3%
Education	16,183	0.5%
<b>Total</b>	<b>3,075,561</b>	<b>100.00%</b>

### Essential Facility Inventory

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 286 beds. There are 23 schools, 5 fire stations, 1 police station and no emergency operation centers.

## Flood Scenario Parameters

HAZUS used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

<b>Study Region Name:</b>	PermHalePD
<b>Scenario Name:</b>	Exist50yr
<b>Return Period Analyzed:</b>	50
<b>Analysis Options Analyzed:</b>	No What-Ifs

## General Building Stock Damage

HAZUS estimates that about 36 buildings will be at least moderately damaged. This is over 2% of the total number of buildings in the scenario. There are an estimated 0 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the HAZUS Flood technical manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

**Table 3: Expected Building Damage by Occupancy**

Occupancy	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	3	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	5	15.15	28	84.85	0	0.00	0	0.00	0	0.00
<b>Total</b>	<b>0</b>		<b>8</b>		<b>28</b>		<b>0</b>		<b>0</b>		<b>0</b>	

**Table 4: Expected Building Damage by Building Type**

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Masonry	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	0	0.00	6	17.65	28	82.35	0	0.00	0	0.00	0	0.00

## Essential Facility Damage

Before the flood analyzed in this scenario, the region had 286 hospital beds available for use. On the day of the scenario flood event, the model estimates that 286 hospital beds are available in the region.

**Table 5: Expected Damage to Essential Facilities**

Classification	Total	# Facilities		
		At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	5	5	0	0
Hospitals	1	0	0	0
Police Stations	1	0	0	0
Schools	23	7	0	2

If this report displays all zeros or is blank, two possibilities can explain this.

- (1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.
- (2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

## Induced Flood Damage

### **Debris Generation**

HAZUS estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 868 tons of debris will be generated. Of the total amount, Finishes comprises 99% of the total, Structure comprises 0% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 35 truckloads (@25 tons/truck) to remove the debris generated by the flood.

## Social Impact

### **Shelter Requirements**

HAZUS estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. HAZUS also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 3,399 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 9,074 people (out of a total population of 51,912) will seek temporary shelter in public shelters.

## Economic Loss

The total economic loss estimated for the flood is 60.38 million dollars, which represents 1.88 % of the total replacement value of the scenario buildings.

### **Building-Related Losses**

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 17.55 million dollars. 13% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 49.72% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

**Table 6: Building-Related Economic Loss Estimates**

(Millions of dollars)

<b>Category</b>	<b>Area</b>	<b>Residential</b>	<b>Commercial</b>	<b>Industrial</b>	<b>Others</b>	<b>Total</b>
<b><u>Building Loss</u></b>						
	Building	5.79	1.53	0.20	0.02	7.53
	Content	3.95	5.47	0.37	0.13	9.93
	Inventory	0.00	0.03	0.06	0.00	0.09
	<b>Subtotal</b>	<b>9.74</b>	<b>7.03</b>	<b>0.63</b>	<b>0.16</b>	<b>17.55</b>
<b><u>Business Interruption</u></b>						
	Income	0.01	0.40	0.00	0.11	0.52
	Relocation	0.18	0.08	0.00	0.00	0.27
	Rental Income	0.04	0.05	0.00	0.00	0.09
	Wage	0.04	0.46	0.00	1.21	1.70
	<b>Subtotal</b>	<b>0.27</b>	<b>0.99</b>	<b>0.00</b>	<b>1.32</b>	<b>2.58</b>
<b>ALL</b>	<b>Total</b>	<b>10.01</b>	<b>8.02</b>	<b>0.63</b>	<b>1.48</b>	<b>20.13</b>

## **Appendix A: County Listing for the Region**

California

- Santa Clara

**Appendix B: Regional Population and Building Value Data**

	Building Value (thousands of dollars)			Total
	Population	Residential	Non-Residential	
<b>California</b>				
Santa Clara	51,912	4,934,180	1,676,953	6,611,133
<b>Total</b>	<b>51,912</b>	<b>4,934,180</b>	<b>1,676,953</b>	<b>6,611,133</b>
<b>Total Study Region</b>	<b>51,912</b>	<b>4,934,180</b>	<b>1,676,953</b>	<b>6,611,133</b>

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## Debris Summary Report

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January 08, 2013

All values are in tons.

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	Finishes	Structures	Foundations	Total
<b>California</b>				
Santa Clara	861	3	4	868
<b>Total</b>	<b>861</b>	<b>3</b>	<b>4</b>	<b>868</b>
<b>Scenario Total</b>	<b>861</b>	<b>3</b>	<b>4</b>	<b>868</b>

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Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

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**Study Region:** PermHalePD  
**Scenario:** Exist50yr  
**Return Period:** 50

## Direct Economic Losses for Buildings

January 08, 2013

All values are in thousands of dollars

	Capital Stock Losses			Building Loss Ratio %	Income Losses				Total Loss
	Cost Building Damage	Cost Contents Damage	Inventory Loss		Relocation Loss	Capital Related Loss	Wages Losses	Rental Income Loss	
<b>California</b>									
Santa Clara	7,534	9,925	91	0.2	267	522	1,702	85	20,126
<b>Total</b>	<b>7,534</b>	<b>9,925</b>	<b>91</b>	<b>0.20</b>	<b>267</b>	<b>522</b>	<b>1,702</b>	<b>85</b>	<b>20,126</b>
<b>Scenario Total</b>	<b>7,534</b>	<b>9,925</b>	<b>91</b>	<b>0.20</b>	<b>267</b>	<b>522</b>	<b>1,702</b>	<b>85</b>	<b>20,126</b>

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

Study Region: PermHalePD  
 Scenario: Exist50yr  
 Return Period: 50

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## Shelter Summary Report

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January 08, 2013

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	# of Displaced People	# of People Needing Short Term Shelter
<b>California</b>		
Santa Clara	10,197	9,074
<b>Total</b>	<b>10,197</b>	<b>9,074</b>
<b>Scenario Total</b>	<b>10,197</b>	<b>9,074</b>

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*Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.*

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**Study Region:** PermHalePD  
**Scenario:** Exist50yr  
**Return Period:** 50

## Income and Employment Impact (with outside aid)

January 08, 2013

Income impact in millions of dollars  
Employment impact in number of employees  
Positive values denote a gain, negative values denote a loss

	Mining		Manufacturing		Trade		Services		Miscellaneous		Total
	Agriculture	Construction	Transportation		Finance	Government					
<b>First Year</b>											
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	0.040	0.005	-0.001	0.001	-0.002	-0.003	-0.001	0.000	0.039
<b>Second Year</b>											
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	0.025	0.003	-0.002	-0.002	-0.005	-0.010	-0.004	0.000	0.005
<b>Third Year</b>											
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	-0.001	0.004	-0.003	0.008	-0.006	-0.012	-0.005	0.000	-0.015
<b>Fourth Year</b>											
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	-0.001	0.004	-0.003	0.008	-0.006	-0.012	-0.005	0.000	-0.015

Study Region: PermHalePD  
Scenario: Exist50yr  
Return Period: 50

**Income and Employment Impact (with outside aid)**

	Mining		Manufacturing		Trade		Services		Miscellaneous		
	Agriculture	Construction	Transportation		Finance	Government					Total
<b>Fifth Year</b>											
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	-0.001	0.004	-0.003	0.008	-0.006	-0.012	-0.005	0.000	-0.015

*Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.*

**Study Region:** PermHalePD  
**Scenario:** Exist50yr  
**Return Period:** 50

## Income and Employment Impact (without outside aid)

January 08, 2013

Income impact in millions of dollars  
Employment impact in number of employees  
Positive values denote a gain, negative values denote a loss

	Agriculture	Mining	Construction	Manufacturing	Transportation	Trade	Finance	Services	Government	Miscellaneous	Total
<b>First Year</b>											
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	0.625	0.121	-0.001	0.038	0.000	-0.001	0.000	0.000	0.781
<b>Second Year</b>											
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	0.280	0.059	0.000	0.017	0.000	0.000	0.000	0.000	0.356
<b>Third Year</b>											
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	0.000	0.007	0.000	0.015	0.000	0.000	0.000	0.000	0.022
<b>Fourth Year</b>											
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	0.000	0.007	0.000	0.015	0.000	0.000	0.000	0.000	0.022
<b>Fifth Year</b>											
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	0.000	0.007	0.000	0.015	0.000	0.000	0.000	0.000	0.022

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

Study Region: PermHalePD  
Scenario: Exist50yr  
Return Period: 50

## Building Damage Count by General Building Type

January 08, 2013

	Count of Buildings (#) by Range of Damage (%)							Total
	None	1-10	11-20	21-30	31-40	41-50	Substantial	
<b>California</b>								
<b>Santa Clara</b>								
Steel	6	0	0	0	0	0	0	6
Wood	2,218	0	6	28	0	0	0	2,252
Masonry	13	0	0	0	0	0	0	13
Concrete	5	0	0	0	0	0	0	5
ManufHousing	25	0	0	0	0	0	0	25
<b>Total</b>	<b>2,267</b>	<b>0</b>	<b>6</b>	<b>28</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2,301</b>
<b>Total</b>	<b>2,267</b>	<b>0</b>	<b>6</b>	<b>28</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2,301</b>
<b>Scenario Total</b>	<b>2,267</b>	<b>0</b>	<b>6</b>	<b>28</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2,301</b>

### Special Notice Regarding Building Count:

Unlike the earthquake and hurricane models, the flood model performs its analysis at the census block level. This means that the analysis starts with a small number of buildings within each census block and applies a series of distributions necessary for analyzing the potential damage. The application of these distributions and the small number of buildings make the flood model more sensitive to rounding errors that introduces uncertainty into the building count results. Please use these results with suitable caution.

*Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.*

**Study Region:** PermHalePD  
**Scenario:** Exist50yr  
**Return Period:** 50

## Direct Economic Loss For Transportation

January 08, 2013

All values are in thousands of dollars

	Highway	Railway	Light Rail	Bus Facility	Ports	Ferries	Airport	Total
<b>California</b>								
<b>Santa Clara</b>								
Segments	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Bridges	\$2.29	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$2.29
Tunnels	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Facilities	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
<b>Total</b>	<b>\$2.29</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$2.29</b>
<b>Total</b>	<b>\$2.29</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$2.29</b>
<b>Scenario Total</b>	<b>\$2.29</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$2.29</b>

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

Study Region: PermHalePD  
 Scenario: Exist50yr  
 Return Period: 50

## Direct Economic Losses for Utilities

January 08, 2013

All values are in thousands of dollars.

	Potable Water	Waste Water	Oil Systems	Natural Gas	Electric Power	Communication	Total
<b>California</b>							
<b>Santa Clara</b>							
Facilities	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Pipelines	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
<b>Total</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>
<b>Total</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>
<b>Scenario Total</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

Study Region: PermHalePD  
 Scenario: Exist50yr  
 Return Period: 50

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## Direct Economic Losses For Vehicles (Day)

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January 08, 2013

All values are in dollars.

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	Car	Light Truck	Heavy Truck	Total Loss
<b>California</b>				
Santa Clara	1,155,402	674,286	64,455	1,894,143
<b>Total</b>	<b>1,155,402</b>	<b>674,286</b>	<b>64,455</b>	<b>1,894,143</b>
<b>Scenario Total</b>	<b>1,155,402</b>	<b>674,286</b>	<b>64,455</b>	<b>1,894,143</b>

---

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

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**Study Region:** PermHalePD  
**Scenario:** Exist50yr  
**Return Period:** 50

---

## Direct Economic Losses For Vehicles (Night)

---

---

January 08, 2013

All values are in dollars.

---

	Car	Light Truck	Heavy Truck	Total Loss
<b>California</b>				
Santa Clara	1,112,974	623,967	68,683	1,805,624
<b>Total</b>	<b>1,112,974</b>	<b>623,967</b>	<b>68,683</b>	<b>1,805,624</b>
<b>Scenario Total</b>	<b>1,112,974</b>	<b>623,967</b>	<b>68,683</b>	<b>1,805,624</b>

---

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

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**Study Region:** PermHalePD  
**Scenario:** Exist50yr  
**Return Period:** 50

# HAZUS-MH: Flood Event Report

**Region Name:** PermanentePDHale  
**Flood Scenario:** PDHale100Exist  
**Print Date:** Thursday, December 20, 2012

***Disclaimer:***

*Totals only reflect data for those census tracts/blocks included in the user's study region.*

*The estimates of social and economic impacts contained in this report were produced using HAZUS loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social*

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## General Description of the Region

HAZUS is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of HAZUS is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- California

Note:

Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 16 square miles and contains 691 census blocks. The region contains over 22 thousand households and has a total population of 51,912 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 17,241 buildings in the region with a total building replacement value (excluding contents) of 6,611 million dollars (2006 dollars). Approximately 89.58% of the buildings (and 74.63% of the building value) are associated with residential housing.

### General Building Stock

HAZUS estimates that there are 17,241 buildings in the region which have an aggregate total replacement value of 6,611 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

**Table 1**  
**Building Exposure by Occupancy Type for the Study Region**

<b>Occupancy</b>	<b>Exposure (\$1000)</b>	<b>Percent of Total</b>
Residential	4,934,180	74.6%
Commercial	1,222,007	18.5%
Industrial	256,760	3.9%
Agricultural	66,649	1.0%
Religion	63,762	1.0%
Government	11,916	0.2%
Education	55,859	0.8%
<b>Total</b>	<b>6,611,133</b>	<b>100.00%</b>

**Table 2**  
**Building Exposure by Occupancy Type for the Scenario**

<b>Occupancy</b>	<b>Exposure (\$1000)</b>	<b>Percent of Total</b>
Residential	2,781,420	77.1%
Commercial	587,459	16.3%
Industrial	119,112	3.3%
Agricultural	59,306	1.6%
Religion	32,841	0.9%
Government	10,972	0.3%
Education	17,505	0.5%
<b>Total</b>	<b>3,608,615</b>	<b>100.00%</b>

### Essential Facility Inventory

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 286 beds. There are 23 schools, 5 fire stations, 1 police station and no emergency operation centers.

## Flood Scenario Parameters

HAZUS used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

<b>Study Region Name:</b>	PermanentePDHale
<b>Scenario Name:</b>	PDHale100Exist
<b>Return Period Analyzed:</b>	100
<b>Analysis Options Analyzed:</b>	No What-Ifs

## General Building Stock Damage

HAZUS estimates that about 105 buildings will be at least moderately damaged. This is over 3% of the total number of buildings in the scenario. There are an estimated 0 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the HAZUS Flood technical manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

**Table 3: Expected Building Damage by Occupancy**

Occupancy	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	5	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	17	17.00	82	82.00	0	0.00	1	1.00	0	0.00
<b>Total</b>	<b>0</b>		<b>22</b>		<b>82</b>		<b>0</b>		<b>1</b>		<b>0</b>	

**Table 4: Expected Building Damage by Building Type**

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	1	100.00	0	0.00
Masonry	0	0.00	1	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	0	0.00	1	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	0	0.00	19	18.81	82	81.19	0	0.00	0	0.00	0	0.00

## Essential Facility Damage

Before the flood analyzed in this scenario, the region had 286 hospital beds available for use. On the day of the scenario flood event, the model estimates that 286 hospital beds are available in the region.

**Table 5: Expected Damage to Essential Facilities**

Classification	Total	# Facilities		
		At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	5	5	0	0
Hospitals	1	0	0	0
Police Stations	1	0	0	0
Schools	23	9	0	3

If this report displays all zeros or is blank, two possibilities can explain this.

- (1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.
- (2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

## Induced Flood Damage

### **Debris Generation**

HAZUS estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 2,263 tons of debris will be generated. Of the total amount, Finishes comprises 98% of the total, Structure comprises 1% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 91 truckloads (@25 tons/truck) to remove the debris generated by the flood.

## Social Impact

### **Shelter Requirements**

HAZUS estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. HAZUS also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 4,572 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 12,535 people (out of a total population of 51,912) will seek temporary shelter in public shelters.

## Economic Loss

The total economic loss estimated for the flood is 108.02 million dollars, which represents 2.53 % of the total replacement value of the scenario buildings.

### **Building-Related Losses**

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 50.69 million dollars. 6% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 46.08% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

**Table 6: Building-Related Economic Loss Estimates**

(Millions of dollars)

<b>Category</b>	<b>Area</b>	<b>Residential</b>	<b>Commercial</b>	<b>Industrial</b>	<b>Others</b>	<b>Total</b>
<b><u>Building Loss</u></b>						
	Building	14.84	5.10	1.47	0.04	21.44
	Content	9.68	15.54	3.26	0.25	28.73
	Inventory	0.00	0.14	0.35	0.04	0.52
	<b>Subtotal</b>	<b>24.52</b>	<b>20.77</b>	<b>5.08</b>	<b>0.33</b>	<b>50.69</b>
<b><u>Business Interruption</u></b>						
	Income	0.01	0.60	0.00	0.13	0.75
	Relocation	0.25	0.13	0.00	0.00	0.39
	Rental Income	0.06	0.08	0.00	0.00	0.14
	Wage	0.04	0.65	0.01	1.35	2.04
	<b>Subtotal</b>	<b>0.37</b>	<b>1.46</b>	<b>0.01</b>	<b>1.48</b>	<b>3.32</b>
<b>ALL</b>	<b>Total</b>	<b>24.89</b>	<b>22.22</b>	<b>5.09</b>	<b>1.81</b>	<b>54.01</b>

## **Appendix A: County Listing for the Region**

California

- Santa Clara

**Appendix B: Regional Population and Building Value Data**

	Building Value (thousands of dollars)			Total
	Population	Residential	Non-Residential	
<b>California</b>				
Santa Clara	51,912	4,934,180	1,676,953	6,611,133
<b>Total</b>	<b>51,912</b>	<b>4,934,180</b>	<b>1,676,953</b>	<b>6,611,133</b>
<b>Total Study Region</b>	<b>51,912</b>	<b>4,934,180</b>	<b>1,676,953</b>	<b>6,611,133</b>

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## Debris Summary Report

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January 10, 2013

All values are in tons.

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	Finishes	Structures	Foundations	Total
<b>California</b>				
Santa Clara	2,217	14	33	2,263
<b>Total</b>	<b>2,217</b>	<b>14</b>	<b>33</b>	<b>2,263</b>
<b>Scenario Total</b>	<b>2,217</b>	<b>14</b>	<b>33</b>	<b>2,263</b>

---

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

---

**Study Region:** PermanentePDHale  
**Scenario:** PDHale100Exist  
**Return Period:** 100

## Direct Economic Losses for Buildings

January 10, 2013

All values are in thousands of dollars

	Capital Stock Losses			Building Loss Ratio %	Income Losses				Total Loss
	Cost Building Damage	Cost Contents Damage	Inventory Loss		Relocation Loss	Capital Related Loss	Wages Losses	Rental Income Loss	
<b>California</b>									
Santa Clara	21,442	28,730	522	0.6	386	749	2,039	141	54,009
<b>Total</b>	<b>21,442</b>	<b>28,730</b>	<b>522</b>	<b>0.60</b>	<b>386</b>	<b>749</b>	<b>2,039</b>	<b>141</b>	<b>54,009</b>
<b>Scenario Total</b>	<b>21,442</b>	<b>28,730</b>	<b>522</b>	<b>0.60</b>	<b>386</b>	<b>749</b>	<b>2,039</b>	<b>141</b>	<b>54,009</b>

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

Study Region: PermanentePDHale  
 Scenario: PDHale100Exist  
 Return Period: 100

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## Shelter Summary Report

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January 10, 2013

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	# of Displaced People	# of People Needing Short Term Shelter
<b>California</b>		
Santa Clara	13,717	12,535
<b>Total</b>	<b>13,717</b>	<b>12,535</b>
<b>Scenario Total</b>	<b>13,717</b>	<b>12,535</b>

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*Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.*

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**Study Region:** PermanentePDHale  
**Scenario:** PDHale100Exist  
**Return Period:** 100

Page : 1 of 1

## Income and Employment Impact (with outside aid)

January 10, 2013

Income impact in millions of dollars  
Employment impact in number of employees  
Positive values denote a gain, negative values denote a loss

	Mining		Manufacturing		Trade		Services		Miscellaneous		Total
	Agriculture	Construction	Transportation		Finance	Government					
<b>First Year</b>											
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	0.050	0.006	-0.001	0.001	-0.002	-0.004	-0.002	0.000	0.049
<b>Second Year</b>											
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	0.031	0.003	-0.002	-0.003	-0.006	-0.012	-0.005	0.000	0.007
<b>Third Year</b>											
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	-0.002	0.005	-0.003	0.010	-0.007	-0.015	-0.006	0.000	-0.019
<b>Fourth Year</b>											
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	-0.002	0.005	-0.003	0.010	-0.007	-0.015	-0.006	0.000	-0.019

Study Region: PermanentePDHale  
Scenario: PDHale100Exist  
Return Period: 100

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**Income and Employment Impact (with outside aid)**

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	Mining		Manufacturing		Trade	Services		Miscellaneous			
	Agriculture	Construction	Transportation		Finance	Government				Total	
<b>Fifth Year</b>											
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Income Impact	0.000	0.000	-0.002	0.005	-0.003	0.010	-0.007	-0.015	-0.006	0.000	-0.019

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*Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.*

**Study Region:** PermanentePDHale  
**Scenario:** PDHale100Exist  
**Return Period:** 100

## Income and Employment Impact (without outside aid)

January 10, 2013

Income impact in millions of dollars  
Employment impact in number of employees  
Positive values denote a gain, negative values denote a loss

	Agriculture	Mining	Construction	Manufacturing	Transportation	Trade	Finance	Services	Government	Miscellaneous	Total
<b>First Year</b>											
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	0.787	0.152	-0.001	0.047	0.000	-0.002	0.000	0.000	0.984
<b>Second Year</b>											
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	0.353	0.074	0.000	0.021	0.000	0.000	0.000	0.000	0.448
<b>Third Year</b>											
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	0.000	0.008	0.000	0.019	0.000	0.000	0.000	0.000	0.028
<b>Fourth Year</b>											
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	0.000	0.008	0.000	0.019	0.000	0.000	0.000	0.000	0.028
<b>Fifth Year</b>											
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	0.000	0.008	0.000	0.019	0.000	0.000	0.000	0.000	0.028

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

Study Region: PermanentePDHale  
Scenario: PDHale100Exist  
Return Period: 100

## Building Damage Count by General Building Type

January 10, 2013

	Count of Buildings (#) by Range of Damage (%)							Total
	None	1-10	11-20	21-30	31-40	41-50	Substantial	
<b>California</b>								
<b>Santa Clara</b>								
ManufHousing	74	0	0	0	0	1	0	75
Concrete	8	0	0	0	0	0	0	8
Wood	2,863	0	19	82	0	0	0	2,964
Masonry	18	0	1	0	0	0	0	19
Steel	7	0	1	0	0	0	0	8
<b>Total</b>	<b>2,970</b>	<b>0</b>	<b>21</b>	<b>82</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>3,074</b>
<b>Total</b>	<b>2,970</b>	<b>0</b>	<b>21</b>	<b>82</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>3,074</b>
<b>Scenario Total</b>	<b>2,970</b>	<b>0</b>	<b>21</b>	<b>82</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>3,074</b>

### Special Notice Regarding Building Count:

Unlike the earthquake and hurricane models, the flood model performs its analysis at the census block level. This means that the analysis starts with a small number of buildings within each census block and applies a series of distributions necessary for analyzing the potential damage. The application of these distributions and the small number of buildings make the flood model more sensitive to rounding errors that introduces uncertainty into the building count results. Please use these results with suitable caution.

*Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.*

**Study Region:** PermanentePDHale  
**Scenario:** PDHale100Exist  
**Return Period:** 100

## Direct Economic Loss For Transportation

January 10, 2013

All values are in thousands of dollars

	Highway	Railway	Light Rail	Bus Facility	Ports	Ferries	Airport	Total
<b>California</b>								
<b>Santa Clara</b>								
Segments	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Bridges	\$4.59	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$4.59
Tunnels	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Facilities	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
<b>Total</b>	<b>\$4.59</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$4.59</b>
<b>Total</b>	<b>\$4.59</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$4.59</b>
<b>Scenario Total</b>	<b>\$4.59</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$4.59</b>

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

Study Region: PermanentePDHale  
 Scenario: PDHale100Exist  
 Return Period: 100

## Direct Economic Losses for Utilities

January 10, 2013

All values are in thousands of dollars.

	Potable Water	Waste Water	Oil Systems	Natural Gas	Electric Power	Communication	Total
<b>California</b>							
<b>Santa Clara</b>							
Facilities	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Pipelines	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
<b>Total</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>
<b>Total</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>
<b>Scenario Total</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

Study Region: PermanentePDHale  
 Scenario: PDHale100Exist  
 Return Period: 100

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## Direct Economic Losses For Vehicles (Day)

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January 10, 2013

All values are in dollars.

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	Car	Light Truck	Heavy Truck	Total Loss
<b>California</b>				
Santa Clara	2,479,398	1,416,639	150,092	4,046,129
<b>Total</b>	<b>2,479,398</b>	<b>1,416,639</b>	<b>150,092</b>	<b>4,046,129</b>
<b>Scenario Total</b>	<b>2,479,398</b>	<b>1,416,639</b>	<b>150,092</b>	<b>4,046,129</b>

---

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

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**Study Region:** PermanentePDHale  
**Scenario:** PDHale100Exist  
**Return Period:** 100

## Direct Economic Losses For Vehicles (Night)

January 10, 2013

All values are in dollars.

	Car	Light Truck	Heavy Truck	Total Loss
<b>California</b>				
Santa Clara	2,184,921	1,221,338	159,801	3,566,060
<b>Total</b>	<b>2,184,921</b>	<b>1,221,338</b>	<b>159,801</b>	<b>3,566,060</b>
<b>Scenario Total</b>	<b>2,184,921</b>	<b>1,221,338</b>	<b>159,801</b>	<b>3,566,060</b>

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

Study Region: PermanentePDHale  
 Scenario: PDHale100Exist  
 Return Period: 100

# HAZUS-MH: Flood Event Report

**Region Name:** PermHalePD  
**Flood Scenario:** Design25yr  
**Print Date:** Thursday, December 20, 2012

***Disclaimer:***

*Totals only reflect data for those census tracts/blocks included in the user's study region.*

*The estimates of social and economic impacts contained in this report were produced using HAZUS loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social*

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## General Description of the Region

HAZUS is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of HAZUS is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- California

**Note:**

Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 16 square miles and contains 691 census blocks. The region contains over 22 thousand households and has a total population of 51,912 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 17,241 buildings in the region with a total building replacement value (excluding contents) of 6,611 million dollars (2006 dollars). Approximately 89.58% of the buildings (and 74.63% of the building value) are associated with residential housing.

### General Building Stock

HAZUS estimates that there are 17,241 buildings in the region which have an aggregate total replacement value of 6,611 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

**Table 1**  
**Building Exposure by Occupancy Type for the Study Region**

<b>Occupancy</b>	<b>Exposure (\$1000)</b>	<b>Percent of Total</b>
Residential	4,934,180	74.6%
Commercial	1,222,007	18.5%
Industrial	256,760	3.9%
Agricultural	66,649	1.0%
Religion	63,762	1.0%
Government	11,916	0.2%
Education	55,859	0.8%
<b>Total</b>	<b>6,611,133</b>	<b>100.00%</b>

**Table 2**  
**Building Exposure by Occupancy Type for the Scenario**

<b>Occupancy</b>	<b>Exposure (\$1000)</b>	<b>Percent of Total</b>
Residential	59,497	95.7%
Commercial	1,929	3.1%
Industrial	754	1.2%
Agricultural	0	0.0%
Religion	0	0.0%
Government	0	0.0%
Education	0	0.0%
<b>Total</b>	<b>62,180</b>	<b>100.00%</b>

### Essential Facility Inventory

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 286 beds. There are 23 schools, 5 fire stations, 1 police station and no emergency operation centers.

## Flood Scenario Parameters

HAZUS used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

<b>Study Region Name:</b>	PermHalePD
<b>Scenario Name:</b>	Design25yr
<b>Return Period Analyzed:</b>	25
<b>Analysis Options Analyzed:</b>	No What-Ifs

## General Building Stock Damage

HAZUS estimates that about 0 buildings will be at least moderately damaged. This is over 0% of the total number of buildings in the scenario. There are an estimated 0 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the HAZUS Flood technical manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

**Table 3: Expected Building Damage by Occupancy**

Occupancy	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)								
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
<b>Total</b>	<b>0</b>		<b>0</b>									

**Table 4: Expected Building Damage by Building Type**

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)								
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Masonry	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

## Essential Facility Damage

Before the flood analyzed in this scenario, the region had 286 hospital beds available for use. On the day of the scenario flood event, the model estimates that 286 hospital beds are available in the region.

**Table 5: Expected Damage to Essential Facilities**

Classification	Total	# Facilities		
		At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	5	0	0	0
Hospitals	1	0	0	0
Police Stations	1	0	0	0
Schools	23	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.

- (1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.
- (2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

## Induced Flood Damage

### **Debris Generation**

HAZUS estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 1 tons of debris will be generated. Of the total amount, Finishes comprises 100% of the total, Structure comprises 0% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 0 truckloads (@25 tons/truck) to remove the debris generated by the flood.

## Social Impact

### **Shelter Requirements**

HAZUS estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. HAZUS also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 49 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 111 people (out of a total population of 51,912) will seek temporary shelter in public shelters.

## Economic Loss

The total economic loss estimated for the flood is 0.02 million dollars, which represents 0.03 % of the total replacement value of the scenario buildings.

### **Building-Related Losses**

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 0.02 million dollars. 20% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 70.00% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

**Table 6: Building-Related Economic Loss Estimates**

(Millions of dollars)

<b>Category</b>	<b>Area</b>	<b>Residential</b>	<b>Commercial</b>	<b>Industrial</b>	<b>Others</b>	<b>Total</b>
<b><u>Building Loss</u></b>						
	Building	0.01	0.00	0.00	0.00	0.01
	Content	0.00	0.01	0.00	0.00	0.01
	Inventory	0.00	0.00	0.00	0.00	0.00
	<b>Subtotal</b>	<b>0.01</b>	<b>0.01</b>	<b>0.00</b>	<b>0.00</b>	<b>0.02</b>
<b><u>Business Interruption</u></b>						
	Income	0.00	0.00	0.00	0.00	0.00
	Relocation	0.00	0.00	0.00	0.00	0.00
	Rental Income	0.00	0.00	0.00	0.00	0.00
	Wage	0.00	0.00	0.00	0.00	0.00
	<b>Subtotal</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
<b>ALL</b>	<b>Total</b>	<b>0.01</b>	<b>0.01</b>	<b>0.00</b>	<b>0.00</b>	<b>0.02</b>

## **Appendix A: County Listing for the Region**

California

- Santa Clara

**Appendix B: Regional Population and Building Value Data**

	Building Value (thousands of dollars)			Total
	Population	Residential	Non-Residential	
<b>California</b>				
Santa Clara	51,912	4,934,180	1,676,953	6,611,133
<b>Total</b>	<b>51,912</b>	<b>4,934,180</b>	<b>1,676,953</b>	<b>6,611,133</b>
<b>Total Study Region</b>	<b>51,912</b>	<b>4,934,180</b>	<b>1,676,953</b>	<b>6,611,133</b>

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## Debris Summary Report

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January 10, 2013

All values are in tons.

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	Finishes	Structures	Foundations	Total
<b>California</b>				
Santa Clara	1	0	0	1
<b>Total</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>1</b>
<b>Scenario Total</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>1</b>

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Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

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**Study Region:** PermHalePD  
**Scenario:** Design25yr  
**Return Period:** 25

## Direct Economic Losses for Buildings

January 10, 2013

All values are in thousands of dollars

	Capital Stock Losses			Building Loss Ratio %	Income Losses				Total Loss
	Cost Building Damage	Cost Contents Damage	Inventory Loss		Relocation Loss	Capital Related Loss	Wages Losses	Rental Income Loss	
<b>California</b>									
Santa Clara	7	9	0	0.0	4	0	0	0	20
<b>Total</b>	<b>7</b>	<b>9</b>	<b>0</b>	<b>0.00</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>20</b>
<b>Scenario Total</b>	<b>7</b>	<b>9</b>	<b>0</b>	<b>0.00</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>20</b>

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

Study Region: PermHalePD  
 Scenario: Design25yr  
 Return Period: 25

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## Shelter Summary Report

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January 10, 2013

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	# of Displaced People	# of People Needing Short Term Shelter
<b>California</b>		
Santa Clara	147	111
<b>Total</b>	<b>147</b>	<b>111</b>
<b>Scenario Total</b>	<b>147</b>	<b>111</b>

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*Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.*

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**Study Region:** PermHalePD  
**Scenario:** Design25yr  
**Return Period:** 25

## Income and Employment Impact (with outside aid)

January 10, 2013

Income impact in millions of dollars  
 Employment impact in number of employees  
 Positive values denote a gain, negative values denote a loss

	Mining		Manufacturing		Trade		Services		Miscellaneous			
	Agriculture	Construction	Transportation		Finance	Government					Total	
<b>First Year</b>												
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<b>Second Year</b>												
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<b>Third Year</b>												
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<b>Fourth Year</b>												
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

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## Income and Employment Impact (with outside aid)

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	Mining		Manufacturing		Trade		Services		Miscellaneous		
	Agriculture	Construction	Transportation		Finance	Government					Total
<b>Fifth Year</b>											
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

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*Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.*

**Study Region:** PermHalePD  
**Scenario:** Design25yr  
**Return Period:** 25

## Income and Employment Impact (without outside aid)

January 10, 2013

Income impact in millions of dollars  
Employment impact in number of employees  
Positive values denote a gain, negative values denote a loss

	Agriculture	Mining	Construction	Manufacturing	Transportation	Trade	Finance	Services	Government	Miscellaneous	Total
<b>First Year</b>											
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<b>Second Year</b>											
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<b>Third Year</b>											
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<b>Fourth Year</b>											
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<b>Fifth Year</b>											
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

Study Region: PermHalePD  
Scenario: Design25yr  
Return Period: 25

## Building Damage Count by General Building Type

January 10, 2013

	Count of Buildings (#) by Range of Damage (%)							Total
	None	1-10	11-20	21-30	31-40	41-50	Substantial	
<b>California</b>								
<b>Santa Clara</b>								
Concrete	0	0	0	0	0	0	0	0
ManufHousing	0	0	0	0	0	0	0	0
Masonry	0	0	0	0	0	0	0	0
Steel	0	0	0	0	0	0	0	0
Wood	48	0	0	0	0	0	0	48
<b>Total</b>	<b>48</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>48</b>
<b>Total</b>	<b>48</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>48</b>
<b>Scenario Total</b>	<b>48</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>48</b>

### Special Notice Regarding Building Count:

Unlike the earthquake and hurricane models, the flood model performs its analysis at the census block level. This means that the analysis starts with a small number of buildings within each census block and applies a series of distributions necessary for analyzing the potential damage. The application of these distributions and the small number of buildings make the flood model more sensitive to rounding errors that introduces uncertainty into the building count results. Please use these results with suitable caution.

*Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.*

**Study Region:** PermHalePD  
**Scenario:** Design25yr  
**Return Period:** 25

## Direct Economic Loss For Transportation

January 10, 2013

All values are in thousands of dollars

	Highway	Railway	Light Rail	Bus Facility	Ports	Ferries	Airport	Total
<b>California</b>								
<b>Santa Clara</b>								
Segments	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Bridges	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Tunnels	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Facilities	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
<b>Total</b>	<b>\$0.00</b>							
<b>Total</b>	<b>\$0.00</b>							
<b>Scenario Total</b>	<b>\$0.00</b>							

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

Study Region: PermHalePD  
 Scenario: Design25yr  
 Return Period: 25

## Direct Economic Losses for Utilities

January 10, 2013

All values are in thousands of dollars.

	Potable Water	Waste Water	Oil Systems	Natural Gas	Electric Power	Communication	Total
<b>California</b>							
<b>Santa Clara</b>							
Facilities	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Pipelines	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
<b>Total</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>
<b>Total</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>
<b>Scenario Total</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

Study Region: PermHalePD  
 Scenario: Design25yr  
 Return Period: 25

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## Direct Economic Losses For Vehicles (Day)

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January 10, 2013

All values are in dollars.

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	Car	Light Truck	Heavy Truck	Total Loss
<b>California</b>				
Santa Clara	3,922	2,092	173	6,187
<b>Total</b>	<b>3,922</b>	<b>2,092</b>	<b>173</b>	<b>6,187</b>
<b>Scenario Total</b>	<b>3,922</b>	<b>2,092</b>	<b>173</b>	<b>6,187</b>

---

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

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**Study Region:** PermHalePD  
**Scenario:** Design25yr  
**Return Period:** 25

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## Direct Economic Losses For Vehicles (Night)

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January 10, 2013

All values are in dollars.

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	Car	Light Truck	Heavy Truck	Total Loss
<b>California</b>				
Santa Clara	7,250	3,915	196	11,361
<b>Total</b>	<b>7,250</b>	<b>3,915</b>	<b>196</b>	<b>11,361</b>
<b>Scenario Total</b>	<b>7,250</b>	<b>3,915</b>	<b>196</b>	<b>11,361</b>

---

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

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**Study Region:** PermHalePD  
**Scenario:** Design25yr  
**Return Period:** 25

# HAZUS-MH: Flood Event Report

**Region Name:** PermHalePD  
**Flood Scenario:** Design50yr  
**Print Date:** Thursday, December 20, 2012

***Disclaimer:***

*Totals only reflect data for those census tracts/blocks included in the user's study region.*

*The estimates of social and economic impacts contained in this report were produced using HAZUS loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social*

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## General Description of the Region

HAZUS is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of HAZUS is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- California

**Note:**

Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 16 square miles and contains 691 census blocks. The region contains over 22 thousand households and has a total population of 51,912 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 17,241 buildings in the region with a total building replacement value (excluding contents) of 6,611 million dollars (2006 dollars). Approximately 89.58% of the buildings (and 74.63% of the building value) are associated with residential housing.

## General Building Stock

HAZUS estimates that there are 17,241 buildings in the region which have an aggregate total replacement value of 6,611 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

**Table 1  
Building Exposure by Occupancy Type for the Study Region**

<b>Occupancy</b>	<b>Exposure (\$1000)</b>	<b>Percent of Total</b>
Residential	4,934,180	74.6%
Commercial	1,222,007	18.5%
Industrial	256,760	3.9%
Agricultural	66,649	1.0%
Religion	63,762	1.0%
Government	11,916	0.2%
Education	55,859	0.8%
<b>Total</b>	<b>6,611,133</b>	<b>100.00%</b>

**Table 2  
Building Exposure by Occupancy Type for the Scenario**

<b>Occupancy</b>	<b>Exposure (\$1000)</b>	<b>Percent of Total</b>
Residential	67,313	95.8%
Commercial	2,169	3.1%
Industrial	754	1.1%
Agricultural	0	0.0%
Religion	0	0.0%
Government	0	0.0%
Education	0	0.0%
<b>Total</b>	<b>70,236</b>	<b>100.00%</b>

## Essential Facility Inventory

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 286 beds. There are 23 schools, 5 fire stations, 1 police station and no emergency operation centers.

## Flood Scenario Parameters

HAZUS used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

<b>Study Region Name:</b>	PermHalePD
<b>Scenario Name:</b>	Design50yr
<b>Return Period Analyzed:</b>	50
<b>Analysis Options Analyzed:</b>	No What-Ifs

## General Building Stock Damage

HAZUS estimates that about 0 buildings will be at least moderately damaged. This is over 0% of the total number of buildings in the scenario. There are an estimated 0 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the HAZUS Flood technical manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

**Table 3: Expected Building Damage by Occupancy**

Occupancy	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)								
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
<b>Total</b>	<b>0</b>		<b>0</b>									

**Table 4: Expected Building Damage by Building Type**

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)								
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Masonry	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

## Essential Facility Damage

Before the flood analyzed in this scenario, the region had 286 hospital beds available for use. On the day of the scenario flood event, the model estimates that 286 hospital beds are available in the region.

**Table 5: Expected Damage to Essential Facilities**

Classification	Total	# Facilities		
		At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	5	0	0	0
Hospitals	1	0	0	0
Police Stations	1	0	0	0
Schools	23	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.

- (1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.
- (2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

## Induced Flood Damage

### **Debris Generation**

HAZUS estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 1 tons of debris will be generated. Of the total amount, Finishes comprises 100% of the total, Structure comprises 0% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 0 truckloads (@25 tons/truck) to remove the debris generated by the flood.

## Social Impact

### **Shelter Requirements**

HAZUS estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. HAZUS also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 61 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 136 people (out of a total population of 51,912) will seek temporary shelter in public shelters.

## Economic Loss

The total economic loss estimated for the flood is 0.04 million dollars, which represents 0.03 % of the total replacement value of the scenario buildings.

### **Building-Related Losses**

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 0.02 million dollars. 20% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 70.00% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

**Table 6: Building-Related Economic Loss Estimates**

(Millions of dollars)

<b>Category</b>	<b>Area</b>	<b>Residential</b>	<b>Commercial</b>	<b>Industrial</b>	<b>Others</b>	<b>Total</b>
<b><u>Building Loss</u></b>						
	Building	0.01	0.00	0.00	0.00	0.01
	Content	0.00	0.01	0.00	0.00	0.01
	Inventory	0.00	0.00	0.00	0.00	0.00
	<b>Subtotal</b>	<b>0.01</b>	<b>0.01</b>	<b>0.00</b>	<b>0.00</b>	<b>0.02</b>
<b><u>Business Interruption</u></b>						
	Income	0.00	0.00	0.00	0.00	0.00
	Relocation	0.00	0.00	0.00	0.00	0.00
	Rental Income	0.00	0.00	0.00	0.00	0.00
	Wage	0.00	0.00	0.00	0.00	0.00
	<b>Subtotal</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
<b>ALL</b>	<b>Total</b>	<b>0.01</b>	<b>0.01</b>	<b>0.00</b>	<b>0.00</b>	<b>0.02</b>

## **Appendix A: County Listing for the Region**

California

- Santa Clara

**Appendix B: Regional Population and Building Value Data**

	Building Value (thousands of dollars)			Total
	Population	Residential	Non-Residential	
<b>California</b>				
Santa Clara	51,912	4,934,180	1,676,953	6,611,133
<b>Total</b>	<b>51,912</b>	<b>4,934,180</b>	<b>1,676,953</b>	<b>6,611,133</b>
<b>Total Study Region</b>	<b>51,912</b>	<b>4,934,180</b>	<b>1,676,953</b>	<b>6,611,133</b>

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## Debris Summary Report

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January 10, 2013

All values are in tons.

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	Finishes	Structures	Foundations	Total
<b>California</b>				
Santa Clara	1	0	0	1
<b>Total</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>1</b>
<b>Scenario Total</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>1</b>

---

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

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**Study Region:** PermHalePD  
**Scenario:** Design50yr  
**Return Period:** 50

## Direct Economic Losses for Buildings

January 10, 2013

All values are in thousands of dollars

	Capital Stock Losses			Building Loss Ratio %	Income Losses				Total Loss
	Cost Building Damage	Cost Contents Damage	Inventory Loss		Relocation Loss	Capital Related Loss	Wages Losses	Rental Income Loss	
<b>California</b>									
Santa Clara	7	9	0	0.0	4	0	0	0	20
<b>Total</b>	<b>7</b>	<b>9</b>	<b>0</b>	<b>0.00</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>20</b>
<b>Scenario Total</b>	<b>7</b>	<b>9</b>	<b>0</b>	<b>0.00</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>20</b>

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

Study Region: PermHalePD  
 Scenario: Design50yr  
 Return Period: 50

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## Shelter Summary Report

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January 10, 2013

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	# of Displaced People	# of People Needing Short Term Shelter
<b>California</b>		
Santa Clara	183	136
<b>Total</b>	<b>183</b>	<b>136</b>
<b>Scenario Total</b>	<b>183</b>	<b>136</b>

---

*Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.*

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**Study Region:** PermHalePD  
**Scenario:** Design50yr  
**Return Period:** 50

## Income and Employment Impact (with outside aid)

January 10, 2013

Income impact in millions of dollars  
 Employment impact in number of employees  
 Positive values denote a gain, negative values denote a loss

	Mining		Manufacturing		Trade		Services		Miscellaneous			
	Agriculture	Construction	Transportation		Finance	Government					Total	
<b>First Year</b>												
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<b>Second Year</b>												
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<b>Third Year</b>												
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<b>Fourth Year</b>												
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

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**Income and Employment Impact (with outside aid)**

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	Mining		Manufacturing		Trade		Services		Miscellaneous		
	Agriculture	Construction	Transportation		Finance	Government					Total
<b>Fifth Year</b>											
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

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*Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.*

**Study Region:** PermHalePD  
**Scenario:** Design50yr  
**Return Period:** 50

## Income and Employment Impact (without outside aid)

January 10, 2013

Income impact in millions of dollars  
Employment impact in number of employees  
Positive values denote a gain, negative values denote a loss

	Agriculture	Mining	Construction	Manufacturing	Transportation	Trade	Finance	Services	Government	Miscellaneous	Total
<b>First Year</b>											
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<b>Second Year</b>											
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<b>Third Year</b>											
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<b>Fourth Year</b>											
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<b>Fifth Year</b>											
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

Study Region: PermHalePD  
Scenario: Design50yr  
Return Period: 50

## Building Damage Count by General Building Type

January 10, 2013

	Count of Buildings (#) by Range of Damage (%)							Total
	None	1-10	11-20	21-30	31-40	41-50	Substantial	
<b>California</b>								
<b>Santa Clara</b>								
Concrete	0	0	0	0	0	0	0	0
ManufHousing	0	0	0	0	0	0	0	0
Masonry	0	0	0	0	0	0	0	0
Steel	0	0	0	0	0	0	0	0
Wood	61	0	0	0	0	0	0	61
<b>Total</b>	<b>61</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>61</b>
<b>Total</b>	<b>61</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>61</b>
<b>Scenario Total</b>	<b>61</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>61</b>

### Special Notice Regarding Building Count:

Unlike the earthquake and hurricane models, the flood model performs its analysis at the census block level. This means that the analysis starts with a small number of buildings within each census block and applies a series of distributions necessary for analyzing the potential damage. The application of these distributions and the small number of buildings make the flood model more sensitive to rounding errors that introduces uncertainty into the building count results. Please use these results with suitable caution.

*Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.*

**Study Region:** PermHalePD  
**Scenario:** Design50yr  
**Return Period:** 50

## Direct Economic Loss For Transportation

January 10, 2013

All values are in thousands of dollars

	Highway	Railway	Light Rail	Bus Facility	Ports	Ferries	Airport	Total
<b>California</b>								
<b>Santa Clara</b>								
Segments	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Bridges	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Tunnels	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Facilities	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
<b>Total</b>	<b>\$0.00</b>							
<b>Total</b>	<b>\$0.00</b>							
<b>Scenario Total</b>	<b>\$0.00</b>							

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

Study Region: PermHalePD  
 Scenario: Design50yr  
 Return Period: 50

## Direct Economic Losses for Utilities

January 10, 2013

All values are in thousands of dollars.

	Potable Water	Waste Water	Oil Systems	Natural Gas	Electric Power	Communication	Total
<b>California</b>							
<b>Santa Clara</b>							
Facilities	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Pipelines	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
<b>Total</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>
<b>Total</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>
<b>Scenario Total</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

Study Region: PermHalePD  
 Scenario: Design50yr  
 Return Period: 50

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## Direct Economic Losses For Vehicles (Day)

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January 10, 2013

All values are in dollars.

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	Car	Light Truck	Heavy Truck	Total Loss
<b>California</b>				
Santa Clara	6,257	3,430	384	10,071
<b>Total</b>	<b>6,257</b>	<b>3,430</b>	<b>384</b>	<b>10,071</b>
<b>Scenario Total</b>	<b>6,257</b>	<b>3,430</b>	<b>384</b>	<b>10,071</b>

---

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

---

**Study Region:** PermHalePD  
**Scenario:** Design50yr  
**Return Period:** 50

---

## Direct Economic Losses For Vehicles (Night)

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January 10, 2013

All values are in dollars.

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	Car	Light Truck	Heavy Truck	Total Loss
<b>California</b>				
Santa Clara	10,373	5,680	461	16,514
<b>Total</b>	<b>10,373</b>	<b>5,680</b>	<b>461</b>	<b>16,514</b>
<b>Scenario Total</b>	<b>10,373</b>	<b>5,680</b>	<b>461</b>	<b>16,514</b>

---

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

---

**Study Region:** PermHalePD  
**Scenario:** Design50yr  
**Return Period:** 50

# HAZUS-MH: Flood Event Report

**Region Name:** PermanentePDHale

**Flood Scenario:** PDHale100design

**Print Date:** Tuesday, December 18, 2012

***Disclaimer:***

*Totals only reflect data for those census tracts/blocks included in the user's study region.*

*The estimates of social and economic impacts contained in this report were produced using HAZUS loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social*

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## General Description of the Region

HAZUS is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of HAZUS is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- California

Note:

Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 16 square miles and contains 691 census blocks. The region contains over 22 thousand households and has a total population of 51,912 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 17,241 buildings in the region with a total building replacement value (excluding contents) of 6,611 million dollars (2006 dollars). Approximately 89.58% of the buildings (and 74.63% of the building value) are associated with residential housing.

### General Building Stock

HAZUS estimates that there are 17,241 buildings in the region which have an aggregate total replacement value of 6,611 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

**Table 1**  
**Building Exposure by Occupancy Type for the Study Region**

<b>Occupancy</b>	<b>Exposure (\$1000)</b>	<b>Percent of Total</b>
Residential	4,934,180	74.6%
Commercial	1,222,007	18.5%
Industrial	256,760	3.9%
Agricultural	66,649	1.0%
Religion	63,762	1.0%
Government	11,916	0.2%
Education	55,859	0.8%
<b>Total</b>	<b>6,611,133</b>	<b>100.00%</b>

**Table 2**  
**Building Exposure by Occupancy Type for the Scenario**

<b>Occupancy</b>	<b>Exposure (\$1000)</b>	<b>Percent of Total</b>
Residential	562,965	84.2%
Commercial	92,203	13.8%
Industrial	4,078	0.6%
Agricultural	469	0.1%
Religion	4,373	0.7%
Government	62	0.0%
Education	4,540	0.7%
<b>Total</b>	<b>668,690</b>	<b>100.00%</b>

### Essential Facility Inventory

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 286 beds. There are 23 schools, 5 fire stations, 1 police station and no emergency operation centers.

## Flood Scenario Parameters

HAZUS used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

<b>Study Region Name:</b>	PermanentePDHale
<b>Scenario Name:</b>	PDHale100design
<b>Return Period Analyzed:</b>	100
<b>Analysis Options Analyzed:</b>	No What-ifs

## General Building Stock Damage

HAZUS estimates that about 0 buildings will be at least moderately damaged. This is over 0% of the total number of buildings in the scenario. There are an estimated 0 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the HAZUS Flood technical manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

**Table 3: Expected Building Damage by Occupancy**

Occupancy	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)								
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
<b>Total</b>	<b>0</b>		<b>0</b>									

**Table 4: Expected Building Damage by Building Type**

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)								
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Masonry	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

## Essential Facility Damage

Before the flood analyzed in this scenario, the region had 286 hospital beds available for use. On the day of the scenario flood event, the model estimates that 286 hospital beds are available in the region.

**Table 5: Expected Damage to Essential Facilities**

Classification	Total	# Facilities		
		At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	5	0	0	0
Hospitals	1	0	0	0
Police Stations	1	0	0	0
Schools	23	3	0	0

If this report displays all zeros or is blank, two possibilities can explain this.

- (1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.
- (2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

## Induced Flood Damage

### **Debris Generation**

HAZUS estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 95 tons of debris will be generated. Of the total amount, Finishes comprises 100% of the total, Structure comprises 0% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 4 truckloads (@25 tons/truck) to remove the debris generated by the flood.

## Social Impact

### **Shelter Requirements**

HAZUS estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. HAZUS also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 415 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 1,043 people (out of a total population of 51,912) will seek temporary shelter in public shelters.

## Economic Loss

The total economic loss estimated for the flood is 2.98 million dollars, which represents 0.45 % of the total replacement value of the scenario buildings.

### **Building-Related Losses**

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 2.69 million dollars. 10% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 35.86% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

**Table 6: Building-Related Economic Loss Estimates**

(Millions of dollars)

<b>Category</b>	<b>Area</b>	<b>Residential</b>	<b>Commercial</b>	<b>Industrial</b>	<b>Others</b>	<b>Total</b>
<b><u>Building Loss</u></b>						
	Building	0.52	0.31	0.00	0.00	0.83
	Content	0.50	1.35	0.00	0.00	1.86
	Inventory	0.00	0.00	0.00	0.00	0.00
	<b>Subtotal</b>	<b>1.02</b>	<b>1.67</b>	<b>0.00</b>	<b>0.00</b>	<b>2.69</b>
<b><u>Business Interruption</u></b>						
	Income	0.00	0.06	0.00	0.01	0.07
	Relocation	0.03	0.01	0.00	0.00	0.05
	Rental Income	0.01	0.01	0.00	0.00	0.01
	Wage	0.01	0.13	0.00	0.03	0.17
	<b>Subtotal</b>	<b>0.05</b>	<b>0.21</b>	<b>0.00</b>	<b>0.04</b>	<b>0.29</b>
<b>ALL</b>	<b>Total</b>	<b>1.07</b>	<b>1.87</b>	<b>0.00</b>	<b>0.04</b>	<b>2.98</b>

## **Appendix A: County Listing for the Region**

California

- Santa Clara

**Appendix B: Regional Population and Building Value Data**

	Building Value (thousands of dollars)			Total
	Population	Residential	Non-Residential	
<b>California</b>				
Santa Clara	51,912	4,934,180	1,676,953	6,611,133
<b>Total</b>	<b>51,912</b>	<b>4,934,180</b>	<b>1,676,953</b>	<b>6,611,133</b>
<b>Total Study Region</b>	<b>51,912</b>	<b>4,934,180</b>	<b>1,676,953</b>	<b>6,611,133</b>

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## Debris Summary Report

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January 10, 2013

All values are in tons.

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	Finishes	Structures	Foundations	Total
<b>California</b>				
Santa Clara	95	0	0	95
<b>Total</b>	<b>95</b>	<b>0</b>	<b>0</b>	<b>95</b>
<b>Scenario Total</b>	<b>95</b>	<b>0</b>	<b>0</b>	<b>95</b>

---

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

---

**Study Region:** PermanentePDHale  
**Scenario:** PDHale100design  
**Return Period:** 100

## Direct Economic Losses for Buildings

January 10, 2013

All values are in thousands of dollars

	Capital Stock Losses			Building Loss Ratio %	Income Losses				Total Loss
	Cost Building Damage	Cost Contents Damage	Inventory Loss		Relocation Loss	Capital Related Loss	Wages Losses	Rental Income Loss	
<b>California</b>									
Santa Clara	830	1,858	1	0.1	45	66	166	12	2,978
<b>Total</b>	<b>830</b>	<b>1,858</b>	<b>1</b>	<b>0.10</b>	<b>45</b>	<b>66</b>	<b>166</b>	<b>12</b>	<b>2,978</b>
<b>Scenario Total</b>	<b>830</b>	<b>1,858</b>	<b>1</b>	<b>0.10</b>	<b>45</b>	<b>66</b>	<b>166</b>	<b>12</b>	<b>2,978</b>

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

Study Region: PermanentePDHale  
 Scenario: PDHale100design  
 Return Period: 100

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## Shelter Summary Report

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January 10, 2013

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	# of Displaced People	# of People Needing Short Term Shelter
<b>California</b>		
Santa Clara	1,246	1,043
<b>Total</b>	<b>1,246</b>	<b>1,043</b>
<b>Scenario Total</b>	<b>1,246</b>	<b>1,043</b>

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*Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.*

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**Study Region:** PermanentePDHale  
**Scenario:** PDHale100design  
**Return Period:** 100

Page : 1 of 1

## Income and Employment Impact (with outside aid)

January 10, 2013

Income impact in millions of dollars  
Employment impact in number of employees  
Positive values denote a gain, negative values denote a loss

	Mining		Manufacturing		Trade		Services		Miscellaneous		Total
	Agriculture	Construction	Transportation		Finance	Government					
<b>First Year</b>											
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	0.006	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.005
<b>Second Year</b>											
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	0.003	0.000	0.000	0.000	-0.001	-0.001	-0.001	0.000	0.001
<b>Third Year</b>											
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	0.000	0.001	0.000	0.001	-0.001	-0.002	-0.001	0.000	-0.002
<b>Fourth Year</b>											
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	0.000	0.001	0.000	0.001	-0.001	-0.002	-0.001	0.000	-0.002

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## Income and Employment Impact (with outside aid)

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	Mining		Manufacturing		Trade		Services		Miscellaneous		
	Agriculture	Construction	Transportation		Finance	Government					Total
<b>Fifth Year</b>											
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	0.000	0.001	0.000	0.001	-0.001	-0.002	-0.001	0.000	-0.002

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*Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.*

**Study Region:** PermanentePDHale  
**Scenario:** PDHale100design  
**Return Period:** 100

## Income and Employment Impact (without outside aid)

January 10, 2013

Income impact in millions of dollars  
Employment impact in number of employees  
Positive values denote a gain, negative values denote a loss

	Agriculture	Mining	Construction	Manufacturing	Transportation	Trade	Finance	Services	Government	Miscellaneous	Total
<b>First Year</b>											
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	0.087	0.017	0.000	0.005	0.000	0.000	0.000	0.000	0.109
<b>Second Year</b>											
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	0.039	0.008	0.000	0.002	0.000	0.000	0.000	0.000	0.050
<b>Third Year</b>											
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	0.000	0.001	0.000	0.002	0.000	0.000	0.000	0.000	0.003
<b>Fourth Year</b>											
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	0.000	0.001	0.000	0.002	0.000	0.000	0.000	0.000	0.003
<b>Fifth Year</b>											
Employment Impact	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Income Impact	0.000	0.000	0.000	0.001	0.000	0.002	0.000	0.000	0.000	0.000	0.003

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

Study Region: PermanentePDHale  
Scenario: PDHale100design  
Return Period: 100

## Building Damage Count by General Building Type

January 10, 2013

	Count of Buildings (#) by Range of Damage (%)							Total
	None	1-10	11-20	21-30	31-40	41-50	Substantial	
<b>California</b>								
<b>Santa Clara</b>								
Concrete	2	0	0	0	0	0	0	2
ManufHousing	0	0	0	0	0	0	0	0
Masonry	3	0	0	0	0	0	0	3
Steel	2	0	0	0	0	0	0	2
Wood	372	0	0	0	0	0	0	372
<b>Total</b>	<b>379</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>379</b>
<b>Total</b>	<b>379</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>379</b>
<b>Scenario Total</b>	<b>379</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>379</b>

### Special Notice Regarding Building Count:

Unlike the earthquake and hurricane models, the flood model performs its analysis at the census block level. This means that the analysis starts with a small number of buildings within each census block and applies a series of distributions necessary for analyzing the potential damage. The application of these distributions and the small number of buildings make the flood model more sensitive to rounding errors that introduces uncertainty into the building count results. Please use these results with suitable caution.

*Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.*

**Study Region:** PermanentePDHale  
**Scenario:** PDHale100design  
**Return Period:** 100

## Direct Economic Loss For Transportation

January 10, 2013

All values are in thousands of dollars

	Highway	Railway	Light Rail	Bus Facility	Ports	Ferries	Airport	Total
<b>California</b>								
<b>Santa Clara</b>								
Segments	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Bridges	\$4.59	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$4.59
Tunnels	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Facilities	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
<b>Total</b>	<b>\$4.59</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$4.59</b>
<b>Total</b>	<b>\$4.59</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$4.59</b>
<b>Scenario Total</b>	<b>\$4.59</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$4.59</b>

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

Study Region: PermanentePDHale  
 Scenario: PDHale100design  
 Return Period: 100

## Direct Economic Losses for Utilities

January 10, 2013

All values are in thousands of dollars.

	Potable Water	Waste Water	Oil Systems	Natural Gas	Electric Power	Communication	Total
<b>California</b>							
<b>Santa Clara</b>							
Facilities	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Pipelines	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
<b>Total</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>
<b>Total</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>
<b>Scenario Total</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

Study Region: PermanentePDHale  
 Scenario: PDHale100design  
 Return Period: 100

---

## Direct Economic Losses For Vehicles (Day)

---

---

January 10, 2013

All values are in dollars.

---

	Car	Light Truck	Heavy Truck	Total Loss
<b>California</b>				
Santa Clara	143,421	83,464	3,395	230,280
<b>Total</b>	<b>143,421</b>	<b>83,464</b>	<b>3,395</b>	<b>230,280</b>
<b>Scenario Total</b>	<b>143,421</b>	<b>83,464</b>	<b>3,395</b>	<b>230,280</b>

---

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

---

**Study Region:** PermanentePDHale  
**Scenario:** PDHale100design  
**Return Period:** 100

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## Direct Economic Losses For Vehicles (Night)

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January 10, 2013

All values are in dollars.

---

	Car	Light Truck	Heavy Truck	Total Loss
<b>California</b>				
Santa Clara	93,100	52,119	3,712	148,931
<b>Total</b>	<b>93,100</b>	<b>52,119</b>	<b>3,712</b>	<b>148,931</b>
<b>Scenario Total</b>	<b>93,100</b>	<b>52,119</b>	<b>3,712</b>	<b>148,931</b>

---

Totals only reflect data for those census tracts/blocks included in the user's study region and will reflect the entire county/state only if all of the census blocks for that county/state were selected at the time of study region creation.

---

**Study Region:** PermanentePDHale  
**Scenario:** PDHale100design  
**Return Period:** 100

## **APPENDIX 8-2: HAZUS MR4 Technical Manual**

*(Provided on Attached CD as file Att3\_SWF\_WorkPlan\_3of4)*

## **APPENDIX 8-3: Local Disposal Rate Sheet**



Materials Recovery & Landfill

## INBOUND RECYCLING & DISPOSAL FEES

MATERIAL	PRICE PER CUBIC YARD
<b>Construction Waste</b> (ie wood, sheetrock, cardboard, stucco, metals)	\$25.00
<b>Demolition Debris</b> (ie wood demolition, mechanically processed materials)	\$25.00
<b>Sheetrock</b>	\$25.00
<b>Mixed Debris</b> (ie metals, cardboard, appliances, tv monitors, etc.)	\$25.00
<b>Trash</b> (ie insulation, vinyl flooring, furniture, mattresses, plastics, textiles)	\$25.00
<b>Wood Shingles with Tar Paper</b>	\$25.00
<b>Composite Asphalt Roofing</b>	\$25.00
<b>Concrete 1</b> (NO dirt, wire, rebar or wood - 3' minus)	\$12.00
<b>Concrete 2</b> (MINIMAL dirt, 3' minus with rebar & wire)	\$22.00
<b>Concrete 3</b> (MIXED w/ brick, not to exceed 50% soil, asphalt w/ petromat) [LOADS OVER 8 CUBIC YARDS @ \$45/ton]	\$45.00
<b>Concrete Oversized</b>	ON INSPECTION
<b>Dirt / Sod</b> [LOADS OVER 8 CUBIC YARDS @ \$45/ton]	\$45.00
<b>Yard Waste</b> (Lawn clippings / leaves)	\$12.00
<b>Brush / Tree Trimmings</b> (including wood chips, small tree rounds no palm, ivy or fibrous materials)	\$12.00
<b>Wood / Lumber</b> (unpainted & untreated, nails OK)	\$8.00
<b>Stumps / Trees</b>	ON INSPECTION
<b>Palm, Ivy &amp; Fibrous Materials</b>	\$25.00
<b>Carpet / Carpet Padding</b>	\$25.00
<b>Cable / Cyclone Fencing</b>	\$25.00
<b>Tires - Passenger Car / Truck</b>	\$10.00 (car) / \$22.00 (truck) <b>each</b>
<b>Tractor Push-off</b>	\$30.00 minimum

**THERE IS A \$30.00 MINIMUM CHARGE ON ALL ITEMS PER VEHICLE**

### PRICES EFFECTIVE JANUARY 1, 2013

Measurement of load is by volume with no allowance for air space. No hazardous wastes will be accepted. No wet garbage or food waste will be accepted. A load checking program is in effect. Prices subject to change without notice.



#### Hours of Operation

##### Zanker Road Landfill

6:00 am - 5:45 pm Monday - Friday  
8:00 am - 3:45 pm Saturday & Sunday

##### Zanker Materials Processing Facility

6:00 am - 5:45 pm Monday - Friday  
8:00 am - 3:45 pm Saturday (closed Sunday)

#### Payment Types Accepted

- CASH
- CHECK



- CHARGE ACCOUNTS AVAILABLE

#### Locations

675 & 705 Los Esteros Rd.  
San Jose, CA 95134  
Phone: 408-263-2384  
Fax: 408-263-2393

**CALGreen**  
Compliant



LEED & CDDD  
APPROVED

**FOR MORE INFORMATION VISIT US ON THE WEB @ [WWW.ZANKERRECYCLING.COM](http://WWW.ZANKERRECYCLING.COM)**

## **APPENDIX 8-4: National Flood Statistics**

## 2011 Flash Flood / River Flood Fatalities

In 2011, flash and river floods claimed 113 lives, up slightly from 103 in 2010. The 2011 flood casualty total is well above the 10-year average of 78 deaths and the 30-year average of 93 fatalities. Of the 113 deaths, 68 (60%), were caught in a vehicle other than a boat, and 26 (23%) died while in water. Pennsylvania tragically numbered 16 victims, most from unusual tropical storms that resulted in record or near record flooding. Flash floods caused 69 deaths, up slightly from 67 in 2010; river floods, 44, up from 36 in 2010. Flood deaths were heaviest in the 50-59 age range with 20 (19%). Males accounted for 69 deaths (61%) and females, 43 (38%).

### 2011 Flood Fatalities by State and Location

State	BO	BU	CA	IW	MH	OT	PH	VE	Total
AR (Arkansas)	0	0	0	3	0	0	0	15	18
AZ (Arizona)	0	0	0	0	0	1	0	0	1
CA (California)	0	0	0	1	0	0	0	0	1
CT (Connecticut)	0	0	0	1	0	0	0	0	1
DE (Delaware)	0	0	0	2	0	0	0	0	2
HI (Hawaii)	0	0	0	1	0	0	0	0	1
IL (Illinois)	0	0	0	0	0	0	1	3	4
KY (Kentucky)	0	0	0	0	1	0	0	6	7
LA (Louisiana)	0	0	0	0	0	0	0	2	2
MD (Maryland)	0	0	0	0	0	1	0	0	1
MN (Minnesota)	0	0	0	0	0	1	0	0	1
MO (Missouri)	0	0	0	0	0	0	0	3	3
MS (Mississippi)	0	0	0	0	0	0	0	2	2
MT (Montana)	0	0	0	1	0	2	0	0	3
NC (North Carolina)	0	0	0	2	0	0	0	0	2
NJ (New Jersey)	0	0	0	4	0	0	0	2	6
NY (New York)	1	0	0	1	0	3	1	4	10
OH (Ohio)	0	0	0	1	0	0	0	1	2
PA (Pennsylvania)	0	0	0	5	0	0	2	9	16
PR (Puerto Rico)	0	0	0	0	0	0	0	9	9
SD (South Dakota)	0	0	0	0	0	0	0	2	2
TN (Tennessee)	0	0	0	2	0	0	0	0	2
UT (Utah)	0	0	0	0	0	0	0	1	1
VA (Virginia)	0	0	0	2	0	1	0	3	6
VT (Vermont)	0	0	0	0	0	3	0	1	4
WI (Wisconsin)	0	0	0	0	0	1	0	0	1
WV (West Virginia)	0	0	0	0	0	0	0	1	1
WY (Wyoming)	0	0	0	0	0	0	0	4	4
<b>Total</b>	1	0	0	26	1	13	4	68	113
<b>Percent</b>	0.88	0.00	0.00	23.01	0.88	11.50	3.54	60.18	

### 2011 Flood Fatalities by Age and Gender

	Female	Male	Unknown	Total	Percent
0 to 9	8	3	0	11	9.73
10 to 19	4	1	0	5	4.42
20 to 29	4	9	0	13	11.50
30 to 39	4	5	0	9	7.96
40 to 49	4	9	0	13	11.50
50 to 59	4	16	0	20	17.70
60 to 69	5	6	0	11	9.73
70 to 79	5	10	0	15	13.27
80 to 89	2	2	0	4	3.54
90 to --	1	1	0	2	1.77
Unknown	2	7	1	10	8.85
<b>Total</b>	43	69	1	113	
<b>Percent</b>	38.05	61.06	0.88		

### Legend

BO -	Boating
BU -	Business
CA -	Camping
IW -	In Water
MH -	Mobile/Trailer Home
OT -	Other
PH -	Permanent Home
VE -	Vehicle/Towed Trailer

## **APPENDIX 8-5: Mid-Peninsula Parks District Newsletter**



MIDPENINSULA REGIONAL OPEN SPACE DISTRICT  
Celebrating 40 Years of Open Space Preservation: 1972 – 2012

# ANNUAL REPORT 2011-2012

QUARTERLY NEWS ON OPEN SPACE PRESERVATION AND PROGRAMS • FALL 2012

ANNUAL MESSAGE FROM THE  
GENERAL MANAGER, STEVE ABBORS

## Towards a Shared Vision

During the long days of late summer, autumn's approach brings to mind a time when we harvest the fruits of our labor. Two of the District's recent purchases, the October Farm and the Madonna Creek Ranch, represent the region's agricultural past, and also offer opportunities to pursue sustainable farming practices that are taking root as part of land management operations. Although our region is no longer based on ranching and agriculture, we continue to recognize and celebrate our heritage in local farms, farmers' markets, and many of the area festivals.

A good harvest requires much work. Not only do we plant the seeds and cultivate them, but we provide stewardship of the land. The District has long been planting seeds and providing stewardship with a grand harvest in mind. With its mission to acquire and preserve a regional greenbelt of open space land in perpetuity, the District has permanently preserved nearly 61,000 acres of mountainous, foothill, and bayland open space, creating 26 open space preserves. The acreage, valued at over \$394 million, has been acquired for approximately \$243 million of public property tax dollars.

(continued on page 3)



PRESERVATION  
IN PROGRESS

## Habitat Restoration is a Long-Term Commitment

Four years ago, on St. Joseph's Hill Open Space Preserve, the rare most beautiful jewel flower plant (*Streptanthus glandulosus*) was identified alongside the Manzanita Trail. These charismatic purple balloon-like blooms are endemic to California. At St. Joseph's Hill the plant was being crowded out by the invasive non-native yellow starthistle, and their sensitive habitat was vulnerable to visitors veering off trails. It was clear to the District's Open Space Technician, Amanda Mills, that a conservation project to save this population of the delicate and threatened plant needed to be initiated. "It is so important to preserve the rare plants we have in our District preserves," says Amanda, "not only to protect the biodiversity of our environment but to ensure future generations will be able to enjoy them as well."

(continued on page 17)



Russian Ridge Open Space Preserve

## 2011-2012 FINANCIAL PROFILE

Continuing its history of excellent financial management, the District's fiscal year 2011-2012 expenditures were 14% below budgeted levels while property tax revenues (the District's primary source of funding) came in 4% higher than projected.

As we celebrate both our 40th anniversary and a new milestone of owning and managing nearly 61,000 acres of land on behalf of the public, we are excited to continue our mission of protecting the environment through land preservation, restoration, and by providing for public use and enjoyment of open space lands. Below are the details on lands purchased in fiscal year 2011-2012\*.



Jennifer Frazer

Windy Hill Open Space Preserve

### Land Added to the Preserves in 2011-2012

By the end of the fiscal year (March 31, 2012), the District added and helped to protect 1,531 acres of new open space land, valued at \$24.0 million. The additions were funded from the following sources:

The District's General Fund	\$9.1 million
Gifts	\$13.9 million
Grants	<u>\$1.0 million</u>
<b>Total</b>	<b>\$24.0 million</b>

#### ■ Miramontes Ridge Open Space Preserve:

The District added the 564-acre Madonna Creek Ranch, valued at \$3.6 million. Due to a \$500,000 Habitat Conservation Fund grant, and a \$3.0 million gift from Peninsula Open Space Trust (POST), the District's net expense for this property was only \$100,000.

#### ■ Purisima Creek Open Space Preserve:

The District added 279 acres to this Preserve at a total value of \$3.7 million, which includes:

- The 270-acre October Farm property for \$3.6 million;
- The 4.5-acre Peninsula Volunteers properties in the Lobitos watershed for \$110,000; cost partially offset by a \$63,000 gift.

#### ■ Rancho San Antonio Open Space Preserve:

The District continues its management agreement with Santa Clara County Parks for approximately 127.85 acres.

#### ■ Russian Ridge Open Space Preserve:

Initially a management agreement, the 97.5-acre Silva property owned by POST was purchased by the District

for \$3.1 million, which was partially offset by a \$500,000 grant from the Coastal Conservancy.

#### ■ Saratoga Gap Open Space Preserve:

The District purchased 66 acres from the City of Saratoga, for \$250,000.

#### ■ Sierra Azul Open Space Preserve:

Six properties totaling 544 acres were added to this Preserve at a total purchase cost of \$2.5 million and include the following:

1. 175.87-acre former Stanton Trust (Crites) property, for \$1.4 million;
2. 158.51-acre former POST Property (Barrett Creek Uplands), for \$250,000;
3. 83.4-acre former Balaban property, for \$800,000;
4. 39.14-acre, former Hendrys Creek I property for which the District has entered into a management agreement with POST;
5. 78.01-acre, former Hendrys Creek II property for which the District has entered into a management agreement with POST;
6. 9.21-acre former U.S. Bureau of Land Management, for \$41,000;

#### ■ Windy Hill Open Space Preserve:

The largest acquisition this year was the 79-acre gift from the owner of the Hawthorns Property in Portola Valley, valued at \$10.9 million with an additional \$2.0 million endowment to manage the property.

### District Revenues

Total District revenues for fiscal year 2011-2012 were \$32.1 million, an increase of \$1.7 million over the prior fiscal year, due primarily to higher property tax revenues. This does not include the receipt of \$13.9 million in land and property gifts. Revenues consist of program revenue which includes rental income, grants and donations, and general revenue primarily from property tax and investment income. The District receives approximately two-thirds of its tax revenue from Santa Clara County, and one-third from San Mateo County.

Tax revenue was \$28.7 million in fiscal year 2011-2012, an increase of 5.4% over the previous fiscal year, reflecting increased property values and the resumption of supplemental (SB813) revenue in Santa Clara County.

The District received \$293,000 under its five-year agreement with Santa Clara County to manage the developed portion of Rancho San Antonio County Park. In addition, the District succeeded in obtaining a \$500,000 Habitat Conservation Fund grant and a \$500,000 Coastal Conservancy grant to cover a portion of the land acquisition costs for the Miramontes Ridge and Russian Ridge Open Space Preserves.

### District Expenditures

Consistent with prior years, District expenditures remained within the budget approved by the District Board of Directors. Fiscal year 2011-2012 operating and capital expenditures totaled \$17.2 million, which is 9.4% below budget and is primarily due to deferring the next phase of the Mount Umunhum project into the next fiscal year. Expenditures for land and debt service (used for payment of long-term debt principal and interest)

\*numbers are rounded

(continued on page 3)

## **APPENDIX 8-6: Santa Clara Valley Water District 2012 Water Charges**

**CLEAN RELIABLE WATER**

- Where Does Your Water Come From?
- Water Charges
- 2012/2013 Groundwater Production Charge-Setting Process
- 2012/2013 Surface Water Production Charge-Setting Process
- 2012/2013 Water Charges & Retailers**
- 2011/2012 Water Charges & Retailers
- Resolution No. 91-53: Requirements For Metering Of Well Production
- Drinking Water Quality
- Water Supply Planning
- Projects

**FLOOD PROTECTION**

**HEALTHY CREEKS AND ECOSYSTEMS PROGRAMS**

**TECHNICAL INFORMATION**

Home > Services > Clean Reliable Water > Water Charges > 2012-2013 Water Charges & Retailers

## 2012-2013 Water Charges & Retailers

The Santa Clara Valley Water District is a water wholesaler. The following charges reflect what water retailers and agricultural users pay for wholesale or well water.

The 2012 Water Utility Enterprise Report: Protection and Augmentation of Water Supplies or PAWS 2012 Report, listed on the right, presents the financial and water supply information that forms the basis for the fiscal year 2012-2013 wholesale water charges.

Questions about retail water charges should be addressed to the appropriate [retail water agency](#).

Water charges for Fiscal Year 2012 - 2013 (effective July 1, 2012)

Type of Charge	Agricultural Water (AF)	Non-Agricultural Water (AF)
<b>Groundwater</b>		
Zone W-2	\$17.70	\$622.00
Zone W-5	\$17.70	\$295.00
(See a <a href="#">zone map</a> )		
<b>Surface Water <sup>1</sup></b>		
Zone W-2 Deliveries <sup>2</sup>	\$30.30	\$634.60
Zone W-5 Deliveries <sup>3</sup>	\$30.30	\$307.60
Minimum Charge--Zone W-2 <sup>4</sup>	\$13.28	\$466.50
Minimum Charge--Zone W-5 <sup>5</sup>	\$13.28	\$221.25
<b>Treated Water</b>		
Contract <sup>6</sup>	N/A	\$722.00
Non-contract <sup>7</sup>	N/A	\$672.00
<b>Recycled water</b>		
Gilroy	\$41.50	\$275.00

**Notes**

- <sup>1</sup> Surface water charge is the sum of the basic user charge plus the water master charge.
- <sup>2</sup> Other Zone W-5 Deliveries = Basic User (AG or M&I @ \$17.70/AF or \$295/AF) + Water Master (\$12.60/AF).
- <sup>3</sup> Other Zone W-2 Deliveries = Basic User (AG or M&I @ \$17.70/AF or \$622/AF) + Water Master (\$12.60/AF).
- <sup>4</sup> Minimum Charge W-5 = 0.75 X Basic User W-5 (M&I @ \$295/AF, Ag @ 17.70/AF).
- <sup>5</sup> Minimum Charge W-2 = 0.75 X Basic User W-2 (M&I @ \$622/AF, Ag @ 17.70/AF).
- <sup>6</sup> Treated Water Charge is the sum of Basic User (\$622/AF) and Treated Water Surcharge (\$100/AF).
- <sup>7</sup> The charge for non-contract deliveries is the sum of the basic user charge (\$622/AF) and the treated water surcharge for non-contract water (\$50/AF).

**AF** = acre feet  
**Ag** = agricultural  
**Non-Ag** = municipal and industrial

## **APPENDIX 8-7: Permanente Creek Flood Protection Project Planning Study Report**

*(Provided on Attached CD as file Att8\_SWF\_BenCost\_3of3)*