APPENDIX C: MITIGATION STRATEGY

Categories of Mitigation Measures Considered

The following categories are based on the Community Rating System. To accommodate other hazards, multi-hazard examples were added:

Prevention

- Planning and zoning
- Open space preservation
- Land development regulations
- Stormwater management
- Fuels management

Property Protection

- Firewise construction
- Defensible space/fuels modification
- Water supply
- Flood protection

Natural Resource Protection

- Erosion and sediment control
- Wetlands protection
- Threatened and endangered species protection
- Fuels management

Emergency Services

- Warning and evacuation
- Communications
- Critical facilities protection
- Lifeline utilities protection
- Health and safety maintenance

Structural Projects

- Detention/retention structures
- Sediment basins/low-head weirs
- Channel modifications
- Culvert resizing/replacement/maintenance
- Floodwalls

Public Information

- Hazard maps
- Outreach programs (mailings, media, web, speakers bureau)
- Education program (children/adults)

Alternative Mitigation Measures per Category

Prevention

Preventive measures are designed to keep the problem from occurring or getting worse. Their objective is to ensure that future development is not exposed to damage and does not increase damage to other properties.

- Planning
- Zoning
- Open space preservation
- Land development regulations
  - Subdivision regulations
  - Floodplain development regulations
- Stormwater management
- Fuels management, fire breaks
- Building codes
  - Firewise construction
- (also see Property Protection)

Emergency Services

Emergency services protect people during and after a disaster. A good emergency services program addresses all hazards. Measures include:

- Warning (floods, tornadoes, ice storms, hail storms, dam failures)
  - NOAA weather radio all hazards
  - Sirens
  - Reverse 911

- Evacuation and sheltering
- Communications
- Emergency planning
  - Activating the emergency operations room (emergency management)
  - Closing streets or bridges (police or public works)
  - Shutting off power to threatened areas (utility company)
  - Holding children at school/releasing children from school (school district)
  - Passing out sand and sandbags (public works)
  - Ordering an evacuation (mayor)
  - Opening evacuation shelters (red cross)
  - Monitoring water levels (engineering)
  - Security and other protection measures (police)
- Monitoring of conditions (dams)
- Critical facilities protection (buildings or locations vital to the response and recovery effort, such as police/fire stations, hospitals, sewage treatment plants/lift stations, power substations)
  - Buildings or locations that, if damaged, would create secondary disasters, such as hazardous materials facilities and nursing homes
  - Lifeline utilities protection
  - Health and safety maintenance

Property Protection

Property protection measures are used to modify buildings subject to damage rather than to keep the hazard away. A community may find these to be inexpensive measures because often they are implemented by or cost-shared with property owners. Many of the measures do not affect the appearance or use of a building, which makes them particularly appropriate for historical sites and landmarks.

- Retrofitting/disaster proofing
  - Floods
    - Wet/dry floodproofing (barriers, shields, backflow valves)
    - Relocation
    - Acquisition
  - Tornadoes
    - Safe rooms
    - Securing roofs and foundations with fasteners and tie-downs
    - Strengthening garage doors and other large openings
  - Drought
    - Improve water supply (transport/storage/conservation)
    - Remove moisture competitive plants (tamarisk/salt cedar)
    - Water restrictions/water saver sprinklers/appliances

    - Grazing on CRP lands (no overgrazing—see noxious weeds)
    - Create incentives to consolidate/connect water services
    - Recycled wastewater on golf courses
  - Earthquakes
    - Removing masonry overhangs, bracing other parts
    - Tying down appliances, water heaters, bookcases and fragile furniture so they will not fall over during a quake.
    - Installing flexible utility connections that will not break during shaking (pipelines, too)
  - Wildland fire
    - Replacing building components with fireproof materials (roofing, screening)
    - Creating "defensible space"
    - Installing spark arrestors
    - Fuels modification
  - Noxious weeds/insects
    - Mowing
    - Spraying
    - Replacement planting
    - Stop overgrazing
    - Introduce natural predators
- Insurance

Natural Resource Protection

Natural resource protection activities are generally aimed at preserving (or in some cases restoring) natural areas. In so doing, these activities enable the naturally beneficial functions of floodplains and watersheds to be better realized. These natural and beneficial floodplain functions include the following:

- Storage of floodwaters
- Absorption of flood energy
- Reduction in flood scour
- Infiltration that absorbs overland flood flow
- Groundwater recharge
- Removal/filtering of excess nutrients, pollutants, and sediments from floodwaters
- Habitat for flora and fauna
- Recreational and aesthetic opportunities

Methods of protecting natural resources include:

- Erosion and sediment control
- Wetlands protection
- Riparian area/habitat protection

- Threatened and endangered species protection
- Fuels management
- Set-back regulations/buffers
- Best management practices—Best management practices ("BMPs") are measures that reduce nonpoint source pollutants that enter the waterways. Nonpoint source pollutants come from non-specific locations. Examples of nonpoint source pollutants are lawn fertilizers, pesticides, and other farm chemicals, animal wastes, oils from street surfaces and industrial areas and sediment from agriculture, construction, mining and forestry. These pollutants are washed off the ground's surface by stormwater and flushed into receiving storm sewers, ditches and streams. BMPs can be implemented during construction and as part of a project's design to permanently address nonpoint source pollutants. There are three general categories of BMPs:
  - Avoidance—Setting construction projects back from the stream.
  - Reduction—Preventing runoff that conveys sediment and other water-borne pollutants, such as planting proper vegetation and conservation tillage.
  - Cleanse—Stopping pollutants after they are en route to a stream, such as using grass drainageways that filter the water and retention and detention basins that let pollutants settle to the bottom before they are drained
- Dumping regulations
- Water use restrictions
- Weather modification
- Landscape management

Structural Projects

Structural projects have traditionally been used by communities to control flows and water surface elevations. Structural projects keep flood waters away from an area. They are usually designed by engineers and managed or maintained by public works staff. These measures are popular with many because they "stop" flooding problems. However, structural projects have several important shortcomings that need to be kept in mind when considering them for flood hazard mitigation:

- They are expensive, sometimes requiring capital bond issues and/or cost sharing with Federal agencies, such as the U.S. Army Corps of Engineers or the Natural Resources Conservation Service.
- They disturb the land and disrupt natural water flows, often destroying habitats.
- They are built to a certain flood protection level that can be exceeded by a larger flood, causing extensive damage.
- They can create a false sense of security when people protected by a structure believe that no flood can ever reach them.
- They require regular maintenance to ensure that they continue to provide their design protection level.

Structural measures include:

- Detention/retention structures
- Erosion and sediment control
- Basins/low-head weirs
- Channel modifications
- Culvert resizing/replacement/maintenance
- Levees and floodwalls
- Fencing (for snow, sand, wind)
- Drainage system maintenance
- Reservoirs (for flood control, water storage, recreation, agriculture)
- Diversions
- Storm sewers

Public Information

A successful hazard mitigation program involves both the public and private sectors. Public information activities advise property owners, renters, businesses, and local officials about hazards and ways to protect people and property from these hazards. These activities can motivate people to take protection

- Hazard maps and data
- Outreach projects (mailings, media, web, speakers bureau)
- Library resources
- Real estate disclosure
- Environmental education
- Technical assistance

Mitigation Alternative Selection Criteria

The following criteria were used to select and prioritize proposed mitigation measures:

STAPLE/E

- **Social**—Does the measure treat people fairly? (different groups, different generations)
- **Technical**—Will it work? (Does it solve the problem? Is it feasible?)
- **Administrative**—Do you have the capacity to implement and manage project?
- **Political**—Who are the stakeholders? Did they get to participate? Is there public support? Is political leadership willing to support?
- **Legal**—Does your organization have the authority to implement? Is it legal? Are there liability implications?

- **Economic**—Is it cost-beneficial? Is there funding? Does it contribute to the local economy or economic development?
- **Environmental**—Does it comply with environmental regulations?

Sustainable Disaster Recovery

- Quality of life
- Social equity
- Hazard mitigation
- Economic development
- Environmental protection/enhancement
- Community participation

Smart Growth Principles

- Infill versus sprawl
- Efficient use of land resources
- Full use of urban resources
- Mixed uses of land
- Transportation options
- Detailed, human-scale design

Other

- Does measure address area with highest risk?
- Does measure protect …
  - The largest # of people exposed to risk?
  - The largest # of buildings?
  - The largest # of jobs?
  - The largest tax income?
  - The largest average annual loss potential?
  - The area impacted most frequently?
  - Critical infrastructure (access, power, water, gas, telecommunications)?
- What is timing of available funding?
- What is visibility of project?
- Community credibility

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Placer County Local Hazard Mitigation Plan

Mitigation Actions List

Initial Prioritization Process

HMPC #5

10/3/08

Jurisdiction/ Responsible Party	Mitigation Action Title	Hazards Addressed	Points/ Worksheet Status
North Tahoe Fire Protection District			
	Community Wildfire Protection Plan (CWPP) Projects	Wildfire	32/Complete
	Defensible Space Inspection, Free Chipping Program and Public Education	Wildfire	29/Complete
	Hazardous Wood Roof Replacement Program	Wildfire	1/Complete
	Regional Water System Fire Protection Upgrades and Interoperability	Wildfire	6/Complete
	North Tahoe Fire Protection District Critical Facility Infrastructure Improvements	Earthquake Seiche	3/Complete
	North Tahoe Fire Protection District Headquarters Station Relocation and EOC Development	Earthquake Multi-Hazard	0/Complete
	FCC P-25 Interoperability Radio Systems	Multi-Hazard	27/Complete
	Skid Steer Loader with Transport Trailer, Fuels Reduction Masticator Attachment and Snow Blower Attachment	Multi-Hazard	0/Complete
	District GIS Technology, Equipment, Database and Mapping Improvements	Multi-Hazard	21/Complete
	Emergency Radio Transmitters and Information Systems	Multi-Hazard	12/Complete
	Hydrant Risers, Replacements and Markers	Multi-Hazard	3/Complete
	Sieche Wave Warning Systems, Signs and Public Education	Earthquake Seiche	0/Complete
	Evacuation Shelter Improvements	Multi-Hazard	0/Complete
City of Colfax			
	Identify Un-Reinforced Masonry Buildings in the City.	Earthquake	0/Complete
	Funding for Residential Fire Protection	Wildfire	0/Complete
Town of Loomis			

Jurisdiction/ Responsible Party	Mitigation Action Title	Hazards Addressed	Points/ Worksheet Status
	Delmar Avenue Headwall Reconstruction	Multi-Hazard	5/Complete
	Creek Maintenance Secret Ravine & Antelope Creek	Flood	8/Complete
	Reconstruction of Brace Bridge @ Secret Ravine	Multi-Hazard	0/Complete
Sierra Community College District			
	Fire Prevention at SC-Nevada County Campus	Wildfire	0/Complete
Tahoe Truckee Unified School District			
	School Site and Community Education of Procedures Related to Safety and Emergency Situations. Improvements of District-Wide Emergency Communication and Alert Systems.	Multi-Hazard	0/Complete
	Structural Upgrades of Roofs at School Sites to Support Higher Snow Loads.	Winter Storm	6/Complete
	Forest Thinning Around Lake Area Schools	Wildfire	0/Complete
	HVAC Control Upgrades	Severe Weather	0/Complete
	Flood Control	Flood	3/Complete
Squaw Valley Public Service District			
	East Booster Emergency Power	Multi-Hazard	0/Complete
	Water & Sewer System CPS Project	Drought	22/Complete
	SVPSD/Mutual Water Company Inter-Tie	Drought	0/Complete
	Easement Abatement/Maintenance of Emergency Access	Multi-Hazard	0/Complete
	Water Tank Earthquake Retrofit Project	Earthquake	7/Complete
	Portable Generator Projects	Multi-Hazard	0/
	Squaw Creek Restoration & Drainage Enhancement Project	Flood	8/Complete
ForestHill Fire Protection District			
	Completion of Fuels Management Projects within the Foresthill / Iowa Hill Fire Safe Council, Greater Auburn Area Fire Safe Council and Placer Sierra Fire Safe Council Areas of the Western Slope of Placer County	Wildfire	27/Complete
	Develop Ordinance for Defensible Space with Maintenance Component and Built-in Funding Mechanism	Wildfire	11/
Nevada Irrigation District			
	Portable Generator Project	Multi-Hazard	0/Complete

Jurisdiction/ Responsible Party	Mitigation Action Title	Hazards Addressed	Points/ Worksheet Status
	Canal Culvert Replacement Program	Flood	3/Complete
	Reservoir Cleaning	Multi-Hazard	0/Complete
Alpine Springs County Water District			
	Alpine Meadows Consolidated Defensible Space Project		0/Complete
City of Auburn			
	Lincoln Basin (Downtown) Drainage Infrastructure	Flood	16/Complete
	GIS enhancement of floodplains	Flood	8/Complete
	Creek and Stream Cleaning & Maintenance Program	Flood	New/Complete
	GAAFSC Public Education	Multi-Hazard	New/Complete
	GIS Citywide	Multi-Hazard	New/Complete
	Residential Inspections	Wildfire	New/Complete
	Shaded Fuel Break Shaded Fuel Break	Wildfire	New/Complete
	Shaded Fuel Break Maintenance	Wildfire	New/Complete
Placer County			
	Continuation of Chipper Program (CAL FIRE)	Wildfire	37/
	Continuation of Biomass Program	Wildfire	5/
	Improve access issues (Ingress/Egress) on county property	Multi-Hazard	16/
	Improve access issues (Ingress/Egress) on private property – Hwy. 89 Bridges.		0/
Open Space	Maintenance of shaded fuel breaks and access corridors	Wildfire	11/Complete
OEM	Sheltering in Place (facilities/generators)	Multi-Hazard/ EM	8/Complete
OEM	NIMs Compliance	Multi-Hazard/ EM	18/Complete
OEM/ Planning	Adoption of LHMP into Safety Element	Multi-Hazard/ EM	0/
	Web EOC Upgrades	Multi-Hazard/ EM	18/Complete
Public Works	Ophir Road	Landslide	5/
Public Works	Yankee Jim/Iowa Hill/Foresthill Roads	Landslide	0/
Public Works	Highway 89	Landslide	0/
Public Works	Update Landslide maps	Landslide	0/

Jurisdiction/ Responsible Party	Mitigation Action Title	Hazards Addressed	Points/ Worksheet Status
Public Works/ Planning	Cottonwood Dam Removal	Dam Failure	0/
PCFCWCD? BOR	Raising Dikes and improving to 200+ level	Dam Failure	0/
	Multi-Hazard Outreach Program	Multi-Hazard	11/
City of Lincoln			
	Fuels Management Program	Wildfire	4/
	Establish and Maintain Access (Ingress/Egress) on city property	Multi-Hazard	10/
	Weed Abatement Program	Wildfire	2/
	Public works to provide projects		1/
	Creek Maintenance	Flood	4/
South Placer Fire Protection District			
	Maintenance of shaded fuel breaks and access corridors	Wildfire	6/
Tahoe City Public Utility District			
	Floodproofing critical facilities	Flood	11/
TCPUD/ TCFPD	Fuels management (and maintenance) projects: Highlands area and others	Wildfire	14/
Placer County Flood Control and Water Conservation District			
	Salachi Farms Easement	Flood	3/
	Dry Creek Projects	Flood	17/

* indicates that mitigation action identified was addressed to some extent in the final Mitigation Action Strategy portion of the LHMP.