



Appendix C MITIGATION STRATEGY

Appendix C: Mitigation Strategy contains the following documents in this order:

- Mitigation Strategy Guidance Criteria
- 2018 Mitigation Action Worksheet
- Typical Mitigation Actions by Community Rating System Categories

C.1 Categories of Mitigation Measures Considered

The following categories are based on the Community Rating System.

- Prevention
- Emergency Services
- Property Protection
- Natural Resource Protection
- Structural Projects
- Public Information

C.2 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

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- 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, and 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

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- 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, speaker's bureau)
- Library resources
- Real estate disclosure
- Environmental education
- Technical assistance

C.3 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

Table C.1. CCWD initial Prioritization Process

Action	Points	Old Action or New Action?	Worksheet Status
Multi-Hazard			
Work with Calaveras County on County General Plan update to integrate natural hazards mitigation measures in new development planning		#12	
Create a disaster recovery plan		#16	
Evaluate the need for improved redundancy at critical facilities		#17	
Develop mutual aid agreements with other water providers and county agencies for support during emergencies		#21	
Dam Failure			
Dam Failure Emergency Planning		#1	
Drought & Water Shortage			
Review and Update Drought Plan		#2	
Review and update a tiered rate structure to encourage responsible water use		#18	
Identify and incorporate strategies for increasing water storage capacity to mitigate impacts of drought and other emergencies in an updated CCWD County Water Master Plan		#20	
Flood			
Implement Other Facility Flood Mitigation Projects		#3	
Retrofit Manhole Covers		#4	
Improve grading and drainage of Wastewater Effluent Storage Ponds		#5	
Jenny Lind Water Treatment Plant Flood Protection (was Provide flood protection for Jenny Lind water treatment plant and La Contenta main sewage lift station)		#10	
Implement recommendations in service area master plans related to critical sewer facilities		#13	

Action	Points	Old Action or New Action?	Worksheet Status
Update the National Pollutant Discharge Elimination System (NPDES) permits for wastewater facilities as required		#19	
Wildfire			
Enhance On-Site Coordination with Cal-Fire during Fire Events		#6	
Construct Fire Resistant Electrical Control Panels		#7	
Remaining Redwood Storage Tanks		#9	
Big Trees South Zone, Redwood Potable Water Storage Tanks, Wildfire Hazard Mitigation Project (was titled Replace redwood water storage tanks with steel tanks in 2006)		#11	
Implement pipeline improvements identified in water master plans to provide adequate fire flows		#14	
Create and maintain wildfire defensible spaces around facilities identified as in high fire hazard areas		#15	
Severe Weather: Winter Storms and Extreme Cold			
Increase District Owned Snow Removal Equipment and/or Snow Plows that can be attached to the District's Truck Fleet.		#9	
Severe Weather: Extreme Temperature (New Hazard)			
Soil Hazards: Landslide/Debris Flows (New Hazard)			



Mitigation Action Worksheet: 2018 LHMP Actions

Instructions: Use this guide to record potential mitigation projects (1 page per project).

Mitigation Project Title:

Hazards Addressed:

Issue/Background:

Other Alternatives:

Existing Planning Mechanism(s) through which Action Will Be Implemented:

Responsible Office:

Priority (H, M, L):

Cost Estimate:

Benefits (Losses Avoided):

Potential Funding:

Schedule:

Example Mitigation Action Items by Community Rating System Mitigation Category and Hazard

Alternative Mitigation Actions	Human Health hazards (Pan flu, West Nile)	Dam Failure	Floods	Land slides/ Land Subsidence /Soil hazards	Weather Extremes (hail, lightning, wind, temps, fog, drought, tornadoes)	Earthquake	Wildfires	Winter Weather
PREVENTION								
Building codes and enforcement			■	■	■	■	■	■
Comprehensive Watershed Tax			■					
Density controls		■	■	■			■	
Design review standards			■	■		■	■	
Easements			■	■			■	
Environmental review standards			■	■		■	■	
Floodplain development regulations		■	■					
Hazard mapping		■	■	■			■	
Floodplain zoning		■	■					
Forest fire fuel reduction							■	
Housing/landlord codes					■			
Slide-prone area/grading/hillside development regulations				■			■	
Manufactured home guidelines/regulations		■	■		■	■		
Multi-Jurisdiction Cooperation within watershed		■	■					
Open space preservation		■	■	■			■	
Performance standards		■	■	■	■	■	■	■
Special use permits		■	■	■			■	
Stormwater management regulations			■					
Subdivision and development regulations		■	■	■		■	■	

Alternative Mitigation Actions	Human Health hazards (Pan flu, West Nile)	Dam Failure	Floods	Land slides/ Land Subsidence /Soil hazards	Weather Extremes (hail, lightning, wind, temps, fog, drought, tornadoes)	Earthquake	Wildfires	Winter Weather
Surge protectors and lightning protection					■			
Tree Management					■		■	■
Transfer of development rights			■	■			■	
Utility location				■	■			■
PROPERTY PROTECTION								
Acquisition of hazard prone structures		■	■	■			■	
Construction of barriers around structures		■	■					
Elevation of structures		■	■					
Relocation out of hazard areas		■	■	■			■	
Non structural improvements (safety film on windows, bookshelf anchoring, critical equipment bracing etc.)					■	■		
Structural retrofits (e.g., reinforcement, floodproofing, bracing, etc.)			■		■	■	■	■
PUBLIC EDUCATION AND AWARENESS								
Debris Control			■					
Flood Insurance		■	■					
Hazard information centers	■	■	■	■	■	■	■	■
Public education and outreach programs	■	■	■	■	■	■	■	■
Real estate disclosure		■	■	■	■	■	■	■
Crop Insurance					■	■		
NATURAL RESOURCE PROTECTION								
Best Management Practices (BMPs)	■		■	■	■		■	
Forest and vegetation management	■	■	■	■	■		■	■

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Hydrological Monitoring	■	■	■	■	■			
Sediment and erosion control regulations		■	■	■				
Stream corridor restoration			■	■				
Stream dumping regulations			■					
Urban forestry and landscape management		■	■	■	■		■	■
Wetlands development regulations			■	■			■	
EMERGENCY SERVICES								
Critical facilities protection		■	■	■	■	■	■	■
Emergency response services		■	■	■	■	■	■	■
Hazard threat recognition	■	■	■	■	■	■	■	■
Hazard warning systems (community sirens, NOAA weather radio)		■	■	■	■	■	■	■
Health and safety maintenance	■	■	■	■	■	■	■	■
Evacuation planning	■	■	■	■			■	
STRUCTURAL PROJECTS								
Channel maintenance			■					
Dams/reservoirs (including maintenance)		■	■					
Levees and floodwalls (including maintenance)			■					
Safe room/shelter					■	■		■
Snow fences								■
Water supply augmentation					■			
Post-disaster mitigation	■	■	■	■	■	■	■	■