



Appendix C. MITIGATION CATEGORIES, ALTERNATIVES, SELECTION CRITERIA

C.1 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

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- Channel modifications
 - Culvert resizing/replacement/maintenance
 - Floodwalls

Public Information

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

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

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- 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

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- 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
- 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

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- 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

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- 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

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

City of Fullerton Local Hazard Mitigation Project

Initial Prioritization Process

HMPC Meeting #4

December 16, 2009

Mitigation Action Title	Hazards Addressed	Points/ Worksheet Status
Integrate Local Hazard Mitigation Plan into Safety Element of General Plan	Multi-Hazard	
Tree Master Plan Update	Multi-hazard	9/Complete
Community Forest Master Plan Update	Multi-hazard	NEW/Complete
Develop and Conduct a Multi-Hazard Seasonal Public Awareness Program	Multi-hazard	12/Complete
Hazardous Materials GIS improvements	Multi-hazard	5/Complete
Acacia Grade Separation	Multi-hazard	NEW/Complete
State College Grade Separation	Multi-hazard	NEW/Complete
Raymond Grade Separation	Multi-hazard	NEW/Complete
Data Gathering and GIS Tracking of Police and Fire Calls for Service in Response to Natural Hazard Events	Multi-hazard	NEW/Complete
GIS Integration	Multi-hazard	NEW/Complete
GIS tracking of Historic, Cultural, and Natural Resources	Multi-hazard	NEW/Complete
Structure Buy Out Program and Conversion (Southwest Fullerton) to open space	Multi-hazard: flood, liquefaction	0/Complete
Brea Dam Safety and Maintenance Plan	Dam	2/Complete
Convert Lions Field/Richmond Park to Artificial Turf	Drought	0/Complete
Reservoir Rehabilitation	Drought & Earthquake	NEW/Complete
Water Main Replacement	Drought	NEW/Complete
Water Allocation Study	Drought	NEW/Complete
Water Meter Replacement	Drought	NEW/Complete
Park and Recreation Master Plan	Drought	0/Complete
Seismic Compliance/Retro Fit for Existing Structures – Public and Critical Facilities	Earthquake	5/Complete
Seismic Compliance/Retro Fit for Existing Structures – Private	Earthquake	14/Complete
Bastanchury Storm Drain Improvements	Flood/Erosion	9/Complete
Olive Street Storm Drain Improvements	Flood	NEW/Complete

Mitigation Action Title	Hazards Addressed	Points/ Worksheet Status
Harbor Slope Stabilization	Flood/Erosion/ Earthquake	8/Complete
Evaluate status of floodplain management program	Flood	8/Complete
Consider joining CRS	Flood	5/Complete
Modifying/Enforcing Fuels Modification Plans and Weed Abatement on Public Lands	Wildfire	0/Complete
Study for Protection of Existing EOC	Wildfire	1/Complete
Purchase Type 3 Engine	Wildfire	0/Complete

23 overall points for earthquake; 3 for multi-hazard; 20 for wildfire