Appendix C Mitigation Strategy

Sacramento County
Local Hazard Mitigation Plan Update
HMPC Meetings #3 & 4 - Mitigation Strategy Meetings
March 24 & 30, 2021

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Jeanine Foster (jeanine.foster@fostermorrison.com)
Foster Morrison Consulting, Ltd.
(303) 717-7171

AGENDA

Sacramento County
Local Hazard Mitigation Plan (LHMP) Update
HMPC Meetings #3 & #4 - Mitigation Strategy Meetings
March 24 & 30, 2021

HMPC Meeting #3: (2 hours)

1. Introductions
2. LHMP Project Status and Next Steps/Timeline
3. Priority Hazards Review
4. Develop Plan Goals and Objectives
5. Introduction to HMPC Meeting #4: Mitigation Alternatives/Actions/Projects

HMPC Meeting #4: (2 to 2.5 hours)

1. Introductions
2. Review Mitigation Categories and Selection Criteria
3. Brainstorming of Mitigation Alternatives/Actions/Projects by Hazard
4. Review of Voting Process for Prioritization of Mitigation Actions/Projects
5. Questions

Mitigation Strategy Meetings
March 24 & 30, 2021
Day 1

Status of the 2021 Sacramento County LHMP Update Project/Next Steps

FEMA's 4-Phase-10 Step DMA/CRS Planning Process

Phase I: Organize Resources

1) Get organized

2) Plan for public involvement

3) Coordinate with other departments and agencies

Phase II: Risk Assessment

4) Identify the hazard(s)

5) Assess the risks

Capability Assessment

Phase III: Mitigation Strategy

6) Set planning goals

7) Review mitigation alternatives

8) Draft and action plan

Phase IV: Adoption and Implementation

9) Adopt the plan

10) Implement the plan, evaluate its worth, and revise as needed

LHMP Update Project Schedule/Key Dates

2021 LHMP Update Meetings

- **March 24** (Wednesday) HMPC Meeting #3 (Mitigation Strategy: Goals Development) (1:30-3:30 pm)
- **March 30** (Tuesday) HMPC Meeting #4 (Mitigation Strategy: Actions and Projects) (1:30-4:00 pm)
- **August 3** (Tuesday) Public Meeting #2 (5:30-7:00 pm)
- **August 4** (Wednesday) HMPC Meeting #5 (1:30-4:00 pm)

Mitigation Strategy Meetings - Follow up

- **April 2 (**Friday**)** Mitigation Strategy Actions and Projects processed and voting site launched
- **April 9** (Friday) Voting ends
- **April 13** (Tuesday) Foster Morrison to send Mitigation Action prioritization follow up to HMPC
- **May 7 (**Friday) Planning Team Mitigation Action (Project) Worksheets due to Foster Morrison

LHMP Document Drafts

- **March 15** – **April 1**: Foster Morrison to send out Jurisdictional Annexes for input
- **May 7**: Jurisdictions to return updated Annexes to Foster Morrison
- **May 21** (Friday): HMPC (First) Draft LHMP to County
- **June 18** (Friday): HMPC comments due on Draft Plan
- **July 2** (Friday): Comments incorporated into Public Review (Second) Draft to County
- **July 12** (Monday): Public Review Draft on County website
- **August 13** (Friday**):** all Planning Team and Public input to Foster Morrison
- **September:** Public and HMPC comments incorporated and LHMP submittal to Cal OES – September 2021

Sacramento County Hazard Identification & Profiles

Hazard	Geographic Extent	Likelihood of Future Occurrences	Magnitude/ Severity	Significance	Climate Change Influence
Climate Change	Extensive	Likely	Limited	Medium	–
Dam Failure	Significant	Occasional	Catastrophic	High	Medium
Drought & Water Shortage	Extensive	Likely	Limited	Medium	High
Earthquake	Extensive	Occasional	Catastrophic	Medium	Low
Earthquake Liquefaction	Limited	Occasional	Critical	Medium	Low
Floods: 1%/0.2% annual chance	Significant	Likely	Catastrophic	High	Medium
Floods: Localized Stormwater	Extensive	Highly Likely	Limited	Medium	Medium
Landslides, Mudslides, and Debris Flow	Limited	Occasional	Limited	Low	Medium
Levee Failure	Extensive	Occasional	Critical	High	Medium
Pandemic	Extensive	Likely	Catastrophic	Medium	Medium
Severe Weather: Extreme Cold and Freeze	Extensive	Highly Likely	Limited	Medium	Medium
Severe Weather: Extreme Heat	Extensive	Highly Likely	Limited	Medium	High
Severe Weather: Heavy Rains and Storms	Extensive	Highly Likely	Limited	Medium	Medium
Severe Weather: Wind and Tornado	Extensive	Highly Likely	Limited	Medium	Low
Subsidence	Significant	Highly Likely	Limited	Medium	Medium
Volcano	Extensive	Unlikely	Negligible	Low	Low
Wildfire	Significant	Highly Likely	Critical	High	High

Geographic Extent
Limited: Less than 10% of planning area
Significant: 10-50% of planning area
Extensive: 50-100% of planning area

Likelihood of Future Occurrences
Highly Likely: Near 100% chance of occurrence in next year, or happens every year.
Likely: Between 10 and 100% chance of occurrence in next year, or has a recurrence interval of 10 years or less.
Occasional: Between 1 and 10% chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years.
Unlikely: Less than 1% chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years.

Magnitude/Severity
Catastrophic—More than 50 percent of property severely damaged; shutdown of facilities for more than 30 days; and/or multiple deaths
Critical—25-50 percent of property severely damaged; shutdown of facilities for at least two weeks; and/or injuries and/or illnesses result in permanent disability
Limited—10-25 percent of property severely damaged; shutdown of facilities for more than a week; and/or injuries/illnesses treatable do not result in permanent disability
Negligible—Less than 10 percent of property severely damaged, shutdown of facilities and services for less than 24 hours; and/or injuries/illnesses treatable with first aid

Significance
Low: minimal potential impact
Medium: moderate potential impact
High: widespread potential impact

Climate Change Influence
Low: minimal potential impact
Medium: moderate potential impact
High: widespread potential impact

Risk Assessment Methodology

Calculating Likelihood of Future Occurrence

The frequency of past events is used in this section to gauge the likelihood of future occurrences. Based on historical data, the likelihood of future occurrence is categorized into one of the following classifications:

- **Highly Likely**: Near 100% chance of occurrence in next year, or happens every year.
- **Likely**: Between 10 and 90% chance of occurrence in next year, or has a recurrence interval of 10 years or less.
- **Occasional**: Between 1 and 10% chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years.
- **Unlikely**: Less than 1% chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years.

Calculating Vulnerability

Vulnerability is measured in general, qualitative terms, and is a summary of the potential impact based on past occurrences, spatial extent, and damage and casualty potential:

- **Extremely Low**: The occurrence and potential cost of damage to life and property is very minimal to non-existent.
- **Low**: Minimal potential impact. The occurrence and potential cost of damage to life and property is minimal.
- **Medium**: Moderate potential impact. This ranking carries a moderate threat level to the general population and/or built environment. Here the potential damage is more isolated and less costly than a more widespread disaster.
- **High**: Widespread potential impact. This ranking carries a high threat to the general population and/or built environment. The potential for damage is widespread. Hazards in this category may have already occurred in the past.
- **Extremely High**: Very widespread and catastrophic impact.

Defining Significance (Priority) of a Hazard

Defining the significance or priority of a hazard to a community is based on a subjective analysis of several factors. This analysis is used to focus and prioritize hazards and associated mitigation measures for the plan. These factors include the following:

- **Past Occurrences**: Frequency, extent, and magnitude of historic hazard events.
- **Likelihood of Future Occurrences**: Based on past hazard events.
- **Ability to Reduce Losses through Implementation of Mitigation Measures**: This looks at both the ability to mitigate the risk of future occurrences as well as the ability to mitigate the vulnerability of a community to a given hazard event.

Sacramento County Priority Hazards

- Climate Change
- Dam Failure
- Drought & Water Shortage
- Earthquake
- Earthquake Liquefaction
- Flood: 1%/0.2% annual chance
- Flood: Localized/Stormwater
- Levee Failure
- Pandemic
- Severe Weather: Extreme Cold and Freeze
- Severe Weather: Extreme Heat
- Severe Weather: Heavy Rains and Storms (hail, lightning)
- Severe Weather: High Winds and Tornadoes
- Subsidence
- Wildfire

Non-Priority Hazards:

- Landslide, Mudslide, Debris Flow
- Volcano

Jurisdiction: _____

Priority Hazards???

- Climate Change
- Dam Failure
- Drought & Water Shortage
- Earthquake
- Earthquake Liquefaction
- Flood: 1%/0.2% annual chance
- Flood: Localized/Stormwater
- Landslide, Mudslide, Debris Flow
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- Severe Weather: Extreme Cold and Freez
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- Severe Weather: High Winds and Tornadoes
- Subsidence
- Volcano
- Wildfire

Participating Jurisdictions

- County
- All 7 incorporated communities
- 14 Flood Control/ Reclamation District Annexes
- 8 other Districts
- **30 Total Participating Jurisdictions**

Data Needs

Review of Key Items to Date

- Hazard-specific data
  - ✓ Hazard ID tables
  - ✓ Historic Hazard Worksheets or list of past hazard occurrences and impacts to each jurisdiction
    - Old participating jurisdictions – need past occurrences/hazard history since 2016
    - New participating jurisdictions –significant hazard occurrences - back 50 years or so
- Risk Assessment Worksheet (County)
  - ✓ Data on future development areas (County/Cities)
- Status updates to 2016 Mitigation Actions/Projects

Other Data Items

- Photos, Photos, Photos
- Updated Goals Statements **by April 2**
- New/Carry over Mitigation Action Worksheets due **by May 7h**
- Jurisdictions to return updated Annexes to Foster Morrison **by May 7th**

Mitigation Strategy: Goals

The most important element of the LHMP is the resulting mitigation strategy which serves as the long-term blueprint for reducing the potential losses identified in the risk assessment. The mitigation strategy is comprised of three components:

6. Mitigation Goals
7. Mitigation Actions
8. Mitigation Action (Implementation) Plan

Mitigation Goals

Up to now, the HMPC has been involved in collecting and providing data for the Sacramento County Local Hazard Mitigation Plan Update. From this information, a Risk Assessment has been developed that describes the risk and vulnerability of the Sacramento County Planning Area to identified hazards and includes an assessment of the area's current capabilities for countering these threats through existing policies, regulations, programs, and projects.

This analysis identifies areas where improvements could or should be made. Formulating Goals will lead to incorporating these improvements into the Mitigation Strategy portion of the LHMP. Our planning goals should provide direction for what loss reduction activities can be undertaken to make the Planning Area and Participating Jurisdictions more disaster resistant.

Mitigation Goals are general guidelines that represent the community's vision for reducing or avoiding losses from identified hazards. Goals are stated without regard for achievement, that is, implementation, cost, schedule, and means are not considered. ***Goals are public policy statements that:***

- **Represent basic desires of the jurisdiction;**
- **Encompass all aspects of planning area, public and private;**
- **Are nonspecific, in that they refer to the quality (not the quantity) of the outcome;**
- **Are future-oriented, in that they are achievable in the future; and**
- **Are time-independent, in that they are not scheduled events.**

  - ***While goals are not specific (quantitative), they should not be so general as to be meaningless or unachievable.***

  - ***Goals statements will form the basis for objectives. They should be stated in such a way as to develop one or more objectives related to each goal.***

  - ***The key point in writing goals is to remember that they must deal with results, not the activities that produce those results.***

  - ***Consider other planning area goals from other regional/county/city programs, plans and priorities.***

Types/Sources of other area mitigation plans/ programs include:

- General Plans
- Stormwater Program and Plans
- Flood/Watershed Management Plans and Studies
- Drought Plans, Urban/Integrated Regional Water Management Plan
- Community Wildfire Protection Plans
- Strategic Fire Plans
- Dam Emergency Action Plans
- Emergency Operations Plans
- Climate Adaptation Plans
- Others?

2018 State Plan/2016 Sacramento County LHMP Goals

Goals from the 2018 California State Hazard Mitigation Plan

1. Significantly reduce life loss and injuries.

2. Minimize damage to structures and property, as well as minimizing interruption of essential services and activities.

3. Protect the environment.

4. Promote community resilience through integration of hazard mitigation with public policy and standard business practices.

Sacramento County 2016 LHMP Update (This is what we are updating)

Mission Statement: This Local Hazard Mitigation Plan assesses natural hazards of concern to the Sacramento community; evaluates risk to life safety, public health, property, and the environment; and evaluates mitigation measures to reduce these risks and vulnerabilities, minimize losses, and increases community resilience.

GOAL 1: Minimize risk and vulnerability of the Sacramento County community to the impacts of natural hazards and protect lives and reduce damages and losses to property, public health, economy, and the environment.

Objectives:

- Protect, preserve, and promote public health and safety, livability, and the environment
- Assure long term protection and resiliency of existing and future development (including infill areas) from natural hazards
- Protect critical facilities from natural hazards and minimize interruption of essential infrastructure, utilities, and services
- Protect natural resources; Protect and enhance water quality and supply, critical aquatic resources and habitat for beneficial uses.
- Maintain/enhance the flood mitigation program to provide 100/200/500-year flood protection
- Minimize risk of levee breach, overtopping or other failures

- Mitigate Repetitive Loss Properties
- Continued enhancement of CRS programs
- Address localized drainage issues
- Reduce the potential of wildfire in Sacramento County and protect the community from adverse effects of wildfire, including secondary impacts such as air quality
- Protect vulnerable populations from the threat of natural hazards
- Address climate change influence in project design and development
- Promote hazard mitigation as an integrated public policy and as a standard business practice

GOAL 2: Improve public outreach, awareness, education, and preparedness for all hazards to minimize hazard related losses

Objectives:

- Increase outreach, communication and awareness of natural hazards and reduce exposure to all hazard related losses, including climate change
- Improve the communities' understanding of natural hazards and how to effectively be prepared and take action to mitigate the impacts of hazard events
- Develop and target outreach and education for each hazard type and risk area
- Increase access to natural hazard information via enhanced web and mobile applications before, during, and after a disaster
- Enhance public outreach programs to target all vulnerable populations, including multi-language communications and multi-mode delivery
- Continued promotion of flood insurance

GOAL 3: Improve the capabilities of the community to mitigate losses and to be prepared for, respond to, and recover from a disaster event

Objectives:

- Promote interagency coordination of mitigation planning and implementation efforts
- Minimize hazard-related damage in order to maintain current service levels
- Continued enhancements to emergency services capabilities, integrating new technologies to reduce losses and save lives
- Promote intergovernmental and interagency coordination, planning, training, exercising and communication to ensure effective community preparedness, response, and recovery
- Increase the use of coordinated, shared resources between agencies
- Promote public/private partnerships in hazard mitigation and preparedness programs
- Identify, coordinate, and implement countywide evacuation and shelter in place planning for all populations and increase community awareness of these activities

GOAL 4: Assure conformance to Federal and State Hazard Mitigation Initiatives and Maximize Potential for Mitigation Implementation

Objectives:

- Maintain FEMA Eligibility/Position Jurisdictions for Grant Funding
- Maintain good standing with FEMA and State hazard mitigation programs, regulations and requirements

- Develop an overall mitigation funding strategy to prioritize and pursue mitigation projects in an equitable manner to benefit all populations
- Maximize funding opportunities through identification and tracking of all types of Federal and state grant programs to implement identified mitigation projects

Other Example Goal Statements

- Minimize risk and vulnerability from natural hazards
- Increase communities' awareness of vulnerability to hazards
- Increase the use of shared resources
- Improve communities' capabilities to mitigate losses
- Maintain coordination of disaster plans with changing DHS/FEMA needs
- Maintain FEMA eligibility/position jurisdictions for grant funding
- Maintain/enhance the flood mitigation program to provide 200/500-year flood protection
- Maintain current service levels
- Provide protection for existing buildings from hazards
- Provide protection for future development from hazards
- Provide protection for natural and cultural resources from hazard impacts
- Provide protection for people's lives from hazards
- Provide protection for public health
- Provide protection for critical services (fire, police, etc.) from hazard impacts
- Provide protection for critical lifeline utilities from hazard impacts
- Reduce exposure to hazard related losses
- Reduce the number of emergency incidents
- Make better use of technology

General Recommendation for Categories of Goals

- Reduce Losses/Protection of Life, Property, Public Health, and the Environment from all Hazards
- Reduce Losses/Protection of Critical Facilities and Infrastructure from all Hazards
- Public Education
- Increase County Capabilities to all Hazards
- Any Hazard-specific goals

Goals Development

The purpose of goal's development is to reach a consensus on updated goals for the Sacramento County 2021 LHMP Update. Provided above are example goals for this LHMP and goals from the previous 2016 Sacramento County LHMP. ***You may reword those above or develop your own updated goals.***

Each person should provide either via chat (on this zoom call) or email to Jeanine.foster@fostermorrison.com: Two (2) goals they would like to see included for this 2021 Sacramento County LHMP Update. (Please submit by Friday, April 2)

When collated, we will combine and rework them into 4-6 goals for this LHMP Update and send them out to the HMPC for further review and refinement.

Mitigation Strategy Meetings
March 24 & 30, 2021
Day 2

Mitigation Strategy Action Development: Ground Rules

Rule 1: All Participating Jurisdictions MUST have a Mitigation Action/Project to address each of their Priority Hazards (those rated as a high or medium significance in their respective Hazard Identification table).

Rule 2: Every Mitigation Action/Project MUST be supported by Risk Assessment Data contained within Chap 4 of the Base Plan and/or within each Participating Jurisdictions' Annexes. Note: this might necessitate backfilling the hazard risk assessment data.

Rule 3: The Mitigation Actions/Projects for this 2021 LHMP Update should reflect each Participating Jurisdictions' WISH LIST for mitigation, regardless of funding source.

Rule 4: Any Mitigation Action/Project that might be considered for FEMA mitigation grant funding over the next 5-years covered by this LHMP MUST be included in this 2021 LHMP Update.

Rule 5: While the updated Mitigation Strategy should include all potential Mitigation Actions/Projects for each Participating Jurisdiction (regardless of funding source), keep in mind that no one is obligated to implement ANY of the identified Mitigation Actions/Projects – all are always subject to funding and changing priorities.

Rule 6: Each Mitigation Action/Project to be included in this LHMP Update MUST have a Mitigation Action Worksheet completed by each Participating Jurisdiction. This applies to Mitigation Actions/Projects being carried forward from the 2016 LHMP.

Rule 7: Participating Jurisdictions CAN include Mitigation Actions/Projects that might not get identified during this Mitigation Action/Project Prioritization process – the key is to complete a Mitigation Action Worksheet for any project to be included in the updated LHMP prior to submittal to Cal OES/FEMA.

REMEMBER: Having a FEMA approved LHMP for your Jurisdiction is a prerequisite for being eligible to apply for FEMA pre and post mitigation funding.

Mitigation Strategy: Actions

Mitigation Actions are specific projects and activities that help achieve the goals and accomplish risk reduction in the community.

Categories of Mitigation Measures

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
  - ✓ Building Codes
    - Fire-Wise Construction
  - ✓ Floodplain development regulations
  - ✓ Geologic Hazard Areas development regulations (for roads too!)
- Storm Water Management
- Fuels Management, Fire-Breaks

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

- Warning (flooding, tornadoes, winter storms, geologic hazards, fire)
  - ✓ NOAA Weather Radio
  - ✓ Sirens
  - ✓ "Reverse 911" (Emergency Notification System)
- Emergency Response
  - ✓ Evacuation & Sheltering
  - ✓ Communications
  - ✓ Backup power supply/generators
  - ✓ Emergency Planning
    - Activating the EOC (emergency management)
    - Closing streets or bridges (police or public works)
    - Shutting off power to threatened areas (utility company)
    - Holding/releasing children at school (school district)
    - Ordering an evacuation (mayor)
    - Opening emergency shelters (Red Cross)
    - Monitoring water levels (engineering)
    - Security and other protection measures (police)
- 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

➢ Post-Disaster Mitigation

➢ Building Inspections
- ✓ ID mitigation opportunities & funding before reconstruction

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/Elevation
  - Acquisition
  - Retrofitting
- ✓ High Winds/Tornadoes
  - Safe Rooms
  - Securing roofs and foundations with fasteners and tie-downs
  - Strengthening garage doors and other large openings
- ✓ Winter Storms
  - Immediate snow/ice removal from roofs, tree limbs
  - "Living" snow fences
- ✓ Geologic Hazards (Landslides, earthquakes, sinkholes)
  - Anchoring, bracing, shear walls
  - Dewatering sites, agricultural practices
  - Catch basins
- ✓ 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
- ✓ Wildfire, Grassfires
  - Replacing building components with fireproof materials
  - Roofing, screening
  - Create "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:

- Wetlands Protection
- Riparian Area/Habitat Protection/Threatened-Endangered Species
- Erosion & Sediment Control
- 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:

9. Avoidance: setting construction projects back from the stream.
10. Reduction: Preventing runoff that conveys sediment and other water-borne pollutants, such as planting proper vegetation and conservation tillage.
11. 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
- Set-back regulations/buffers
- Fuels Management
- Water Use Restrictions

- Landscape Management
- Weather Modification

STRUCTURAL: Projects that 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 or requiring Environmental Assessments.
- 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
- Anchoring, grading, debris basins (for landslides)
- 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, displays)
- Library Resources
- Real Estate Disclosure
- Environmental Education

Mitigation Measures from 2016 Sacramento County LHMP (This is what we are updating)

Action Title	Complete	Ongoing	Not Started	Project in Plan Update
Sacramento County				
Multi-Hazard Actions				
Integrate Local Hazard Mitigation Plan into Safety Element of General Plan				
Enhance Public Education and Awareness of Natural Hazards and Public Understanding of Disaster Preparedness				
Increase pedestrian and bicycle evacuation routes by constructing regional bike/pedestrian trail infrastructure, and expanding connection to neighborhoods (particularly in vulnerable areas)				
Community Rating System (CRS) Program for Public Information (PPI)				
Flood Insurance Assessment, Awareness, and Promotion				
Public Outreach Mailers				
Toxic Substance Release				
Climate Change Actions				
Increase average fuel efficiency and reduce GHG emissions from the County Fleet and Fuels				
Reduce Sacramento County's vulnerability to Climate Change by reducing GHG emissions in the commercial and residential sectors by making energy efficiency a priority through building code improvements				
Mitigate Climate Change impacts by integrating climate change research and adaptation planning into County operations and services				
Reduce Sacramento County's vulnerability to extreme heat events and associated hazards by Increase tree planting/canopy preservation/enhancement				
Drought Actions				
Implement Water Supply CIP				
Flood, Levee Failure, and Localized Flood Actions				
Keep the PPI current				
Alder Creek flood control				
Alder Creek flood mitigation (dam)				
Alder Creek miners reservoir, property owned by the City of Folsom				
Delta Small Communities flood protection - structural and nonstructural mitigation				
Gum Ranch flood control - joint use basin				
Implement Storm Drain CIP				

Action Title	Complete	Ongoing	Not Started	Project in Plan Update
Laguna Creek at Triangle Aggregate flood control -joint use basins				
Laguna Creek mitigate flood hazard south of Jackson Highway				
Model Sacramento River levee breach (LAMP) south of Freeport				
Morrison Creek Miners Reach Flood Insurance Study				
Morrison Creek Miners Reach levee improvements				
Outreach stormwatch guide (ALERT, Stormready, weather radio)				
Peak flow floodplain mitigation Arcade Creek near Auburn Blvd				
Risk Map (flood frequency, depth, velocity)				
Elevation & Acquisition Projects (to Mitigate Flood Risk)				
Repetitive Loss Properties (to Mitigate Flood Risk)				
Five-Year Capital Improvement Plan – Drainage Projects				
Arcade Creek Corridor Plan				
Elevate Homes on Long Island (Grand Island Road, Sacramento River)				
Repetitive Loss Church Building on Dry Creek				
South Branch Arcade Creek – Gum Ranch Basin (with Fair Oaks Park District) and Kenneth Avenue Bridge Improvements (with Sacramento County Department of Transportation)				
Dry Creek Flood Hazard Mitigation Acquisitions with County Regional Park Department				
Arcade Creek at Evergreen Estates Floodwall Improvements				
Linda Creek Peak Flow Mitigation				
Flood Preparation in the American River Parkway				
Improve County ALERT (Automated Local Evaluation in Real Time) System of Stream and Rain Gauges				
Update County Hydrology Standards				
Woodside Condominiums Repetitive Flood Loss Property				
Bridge Replacement on Elk Grove Florin Road at Elder Creek				
Michigan Bar Bridge Replacement at the Cosumnes River				
El Camino Avenue Phase 2 Road Improvements				
Improve Flood Protection and/or Evacuation Planning for Mobile Home/RV Park at Manzanita/Auburn. Alternatively, the Park Should Establish Flood Warning and evacuation procedures.				
Hydromodification and Stormwater Quality Countywide				
Evacuation Mapping				
Regional Flood Management Plan Projects				
River/Stream/Creek Bank Erosion				
Erosion Site Repairs				

Action Title	Complete	Ongoing	Not Started	Project in Plan Update
Wildfire Actions				
Wildfire Suppression				
Wildfire Fighting - Support				
Wildfire Suppression – Regional Parks and Open Space (urban interface)				
City of Citrus Heights				
Integrate Local Hazard Mitigation Plan into Safety Element of General Plan, as well as other Local Planning Efforts				
Rinconada Flood Wall				
Drainage Project Implementation				
City of Elk Grove				
Integrate Local Hazard Mitigation Plan into Safety Element of General Plan, as well as other Local Planning Efforts				
Mutual Aid Agreements				
Elk Grove Green Street Project: Repurposing Urban Runoff with Green Instructure Technologies				
Hazard Education and Risk Awareness				
City of Elk Grove's Storm Drainage Master Plan (SDMP)				
City of Folsom				
Integrate Local Hazard Mitigation Plan into Safety Element of General Plan, as well as other Local Planning Efforts				
Stormwater Basin Maintenance and Operation Project				
Alder Creek Watershed Council				
Drainage System Maintenance Tax Assessment				
Floodplain Mapping				
Redevelopment Area Drainage Improvements				
Stormwater Basin Maintenance and Operation Project				
Heating and Cooling Centers				
Public Education/Outreach Extreme Weather				
Weed Abatement Program				
Arson Prevention and Control Outreach				
Wildfire Hazard Identification				
Ignition Resistant Building Construction Upgrades				
Wildfire Prevention Outreach				
City of Galt				
Integrate Local Hazard Mitigation Plan into Safety Element of General Plan, as well as other Local Planning Efforts				
Increase Redundancy/Functionality of Water Wells and Sewer Lift Stations				

Action Title	Complete	Ongoing	Not Started	Project in Plan Update
Drain Inlet Retrofit Capital Improvement Plan (CIP)				
Creek/Streams Vegetation Management Plan				
Increase Data Capacity of Emergency Frequencies				
City of Isleton*				
Integrate Local Hazard Mitigation Plan into Safety Element of General Plan				
Storm Water Runoff Rehabilitation Project				
Wastewater Treatment Plant Pond Levee Elevation Raise to 200-year Flood Standard				
City of Rancho Cordova				
Integrate Local Hazard Mitigation Plan into Safety Element of General Plan				
Sunrise Boulevard Widening Kiefer to Jackson				
City of Rancho Cordova Disaster Debris Management Plan				
Transportation Interconnectivity				
Intergovernmental Agreement between the County of Sacramento and the City of Rancho Cordova				
Land Use (Long range)				
Post disaster training for staff				
Update/Maintain Emergency Operation Plans (EOPs)				
Increase Everbridge Enrollment				
Developing and maintaining a database to track community vulnerability.				
City Website HMP and City Website, Press Notification, and Social Media Emergency Information				
Building & Safety Division Disaster Inspector Training				
Landscape and Irrigation Requirements/Retro				
Landscape Ordinance				
Impervious surface				
Porous pavement and vegetative buffers				
Storm Water Pump Station Infrastructure Upgrades				
SB-5 Urban Level of Flood Protection				
Channel Vegetation Management and Erosion Control				
Adoption of Hydromodification and Low Impact Development (LID) Standards				
Stormwater Capital Improvement Program Master Plan				
Sunrise Blvd. & Monier Circle Drainage Improvements				
Roundabouts				

Action Title	Complete	Ongoing	Not Started	Project in Plan Update
City of Sacramento				
Multi-Hazard Actions				
Integrate Local Hazard Mitigation Plan into Safety Element of General Plan				
Coordination with Relevant Organizations and Agencies to Consider the Impacts of Urbanization and Climate Change on Long-Term Natural Hazard Safety				
Maintain and Identify Changes in Critical Facilities GIS Layer to Support Emergency Management Efforts				
Community Outreach on Multi-Hazard Preparation & Pre-mitigation				
Evaluation and Mitigation of Critical Facilities in Identified Hazard Areas				
Retrofit of Repetitive Loss Properties				
Safeguard Essential Communication Services				
Multi-lingual Disaster Education				
Cal OES Safety Assessment Program Evaluators				
National Flood Insurance Program & Community Rating System Continuation				
Coordinate with Sacramento Area Flood Control Agency on Completion of South Sacramento Streams Group Projects				
Develop a Master Generation Plan for Pump Stations				
Develop a Disaster Housing Plan				
Disaster Resistant Business Program				
Develop Enhanced Emergency Planning for Special Needs Populations in the City of Sacramento Emergency Operations Plan and Other Planning Documents				
Establish a Post-Disaster Action Plan				
Flood Recovery Plan				
Public Information Flood Response Plan				
Construction of a new Emergency Operation Center (EOC)				
Emergency Operation Center (EOC) Expansion and Information Technology Upgrade				
Protection of Transportation Infrastructure				
Public Education Campaign for Everbridge System				
Regional Emergency and Disaster Preparedness Exercises to Test Operational & Emergency Plans				
Special Needs and Critical Facilities Database and Advanced Warning System				
Assets Inventory				
Protection of City Assets from Cyber Terrorism				

Action Title	Complete	Ongoing	Not Started	Project in Plan Update
Protection of City Information Technology Infrastructure				
Cell Booster				
Travel Time Model for Lower American and Sacramento Rivers and their Major Tributaries				
Watershed Spill Contamination to Drinking Water Quality: Preparedness for Events and Recovery				
Purchase Drones for Use in Disaster Preparedness, Mitigation, and Response				
Climate Change Actions				
Map and Assess Vulnerability to Sea Level Rise				
Emission Study of City Sump and Pump Stations				
Climate Change Mitigation Actions/Climate Change Adaptation Plan for Drinking Water Quality				
Harmful Algal Bloom (HAB) Surveillance and Response Planning				
Drought and Water Shortage Actions				
Aquifer Storage				
Perform a Groundwater Recharge Feasibility Study				
Earthquake Actions				
Map and Assess Community Vulnerability to Earthquakes				
Seismic Vulnerability Assessment on Sacramento Levees, Infrastructure & Buildings				
Retrofit Historical Buildings				
Extreme Cold and Heat Actions				
Heating Centers in High Priority Locations				
Cooling Centers in High Priority Locations				
Extreme Weather Outreach Strategy				
Severe Weather Action Plan				
Flood, Localized Flood, and Levee Failure Actions				
Coordinate with Stakeholder on Proposed Flood Control Project on Magpie Creek				
Adopt Additional Floodplain Development Standards				
Drainage Projects for Repetitive Loss Properties				
Emergency Notification and Evacuation Planning				
Historic Magpie Creek				
Natomas Internal Drainage Canals/Levees				
Drainage Projects from the City's Priority Drainage Project List				
Projects Identified in the Combined Sewer System Improvement Plan Update				
Easements for Open Land Along Levees				

Action Title	Complete	Ongoing	Not Started	Project in Plan Update
Emergency Management Planning and Levee Security				
Flood Fighting Equipment				
Flood Management Land Use Planning and Development				
Florin Creek Pump at Pomegranate Avenue				
Internal Drainage System Improvements				
Levee and Structural Flood Management Improvements				
Master planning to identify facilities needed to prevent 10-year event street flooding and 100-year event structure flooding				
Retrofit Pumping Plants with Discharge Monitoring Devices				
Risk Communication and NFIP/CRS Projects				
Steamers and Rio City Café Floodwalls				
Trash Racks and Debris Cages				
Multi-Jurisdictional Modeling for Drainage Watersheds Greater Than 10 Square Miles				
Post-Flood Water Treatment Facility Recovery				
Wind and Tornado Actions				
Tree Trimming & Debris Removal				
Upgrading Overhead Utility Lines & Burying Critical Power Lines				
Install Redundancies and Loop Feeds for Power Lines & Infrastructure				
Erosion Actions				
Stabilization of Erosion Hazard Areas				
Wildfire Actions				
Implement a Fire Education and Information Program				
Fuels Reduction on the American River Parkway				
Outreach on the Effects of Smoke on Air Quality				
Cosumnes Community Services District				
Flood Response Equipment				
Flood Response Training				
Los Rios Community College				
District Wide Roofing Renovations				
ARC Drainage at Arcade Creek				
Protect District Property				
Metro Fire District				
Relocate the essential facilities in the 200-year flood plain				
Perform seismic study of all district facilities and identify those facilities at greatest risk for earthquake damage.				
Implement a Wildland Urban Interface (WUI) Building/Fire Code				

Action Title	Complete	Ongoing	Not Started	Project in Plan Update
Develop and Implement a comprehensive WUI fuels management program.				
Deploy 2 remote automated weather stations (RAWS) in Metro Fire jurisdiction				
Defensible space ordinance				
Brannan Andrus Levee Maintenance District				
Implement Bioengineered Bank Stabilization techniques				
Development of Dredge Stockpile Site				
Georgiana Slough Waterside Erosion Repair				
Hydrographic surveys and data collection				
Mokelumne River Crown Raising				
San Joaquin River Waterside Erosion Repair				
Sevenmile Slough French Drain and Seepage Berm				
Reclamation District #3*				
Levee Improvements				
Reclamation District #341*				
San Joaquin River Setback Levee/Habitat Bench Multi-Benefit Project, Phase 1				
Complete Projects from Regional Flood Management Plan				
Reclamation District #369				
Pump Station Upgrades and Backup Generators				
Levee Maintenance Program Improvements				
RD 551*				
Levee Improvements				
Reclamation District #554*				
Apply for a Letter of Map Revision (LOMR) to bring the District back into Zone X. (outside of the 100-year flood zone)				
Fill Abandoned Slough				
Geotechnical Investigation				
Snodgrass Slough Levee Improvements				
Reclamation District #556*				
Flood Response Activities, Georgiana Slough Weir				
Georgiana Slough Vegetation Management				
Georgiana Slough Waterside Erosion Repair				
Topographic and Hydrographic Surveys and Data Collection				
Reclamation District #563*				
Rock Slope Protection Project				
HMP and PL-8499 Levee Improvement Projects				

Action Title	Complete	Ongoing	Not Started	Project in Plan Update
Reclamation District #800				
Erosion Repair				
Emergency Supplies				
Reclamation District #1000				
River Berm and Levee Erosion				
Erosion Protection Canal Banks				
Implement Security Measures at Key Facilities				
2014 Capital Improvement Plan				
Implement Supervisory Control and Acquisition Data system (SCADA) on District canals and pump stations				
Public Outreach and Education				
Stockpile and pre-stage flood emergency response materials				
Emergency response improvements including radios for communications				
Emergency Back-up Generator for pump stations				
Reclamation District #1002*				
Geotechnical Investigation				
Snodgrass Slough Levee Improvements				
Snodgrass Slough Vegetation Management				
Reclamation District #1601*				
Levee Improvement Project				
Reclamation District #2111*				
Rock Slope Protection Project				
HMP and PL-8499 Levee Improvement Projects				
Sacramento Regional County Sanitation District				
South River Pump Station Flood Protection Project				
Reduction of Fire Hazard SRCSD Bufferlands				
Sacramento Area Sewer District				
MOU for Dedicated Cell Phone Tower and Cell Phone Pack				
Southgate Recreation and Park District				
Drought Mitigation Actions/Drought Contingency Plan				
Flood Mitigation Actions/Land Acquisition				
Conservation Easements				
Multi-jurisdictional Cooperation within Watersheds				
Storm Water Management Practices – Implement Storm Water Management Practices as identified in Stormwater Quality Design Manual				

Action Title	Complete	Ongoing	Not Started	Project in Plan Update
Severe Weather: Heavy Rains and Storms Mitigation Actions/Tree Management				
Twin Rivers School District				
New drainage plans to sites within the flood areas including, site drainage, storm drain upgrades and re-grading fields to shed water (on-site) away from buildings				
Work with City/County/Water departments to create defensible spaces at sites where nearby creeks are prone to flooding. Build-up earthen berms (off-site) to shed water away from critically located schools.				
Working with the Department of the State Architect (DSA) on Earthquake Retrofit Plan on all sites.				
Revise and update district-wide Storm Water Prevention Plan				
Create defensible perimeter space – for fire areas. Trees trimmed and vegetation removed to minimize impact during fire season.				

Mitigation Strategy: Action (Implementation) Plan

The mitigation action plan describes how the mitigation actions will be implemented, including how those actions will be prioritized, administered, and incorporated into the community's existing planning mechanism. Each participating jurisdiction must have a mitigation action(s) and an action plan specific to that jurisdiction and its priority hazards and vulnerabilities.

Mitigation Criteria

For use in selecting and prioritizing Proposed Mitigation Measures

1. STAPLEE

Social: Does the measure treat people fairly? (different groups, different generations)

- Community Acceptance
- Effect on Segment of Population
- Social Benefits

Technical: Will it work? (Does it solve the problem? Is it feasible?)

- Technical Feasibility
- Reduce Community Risk
- Long Term Solution/Sustainable
- Secondary Impacts

Administrative: Do you have the capacity to implement & manage project?

- Staffing
- Funding Allocated
- Maintenance/Operations

Political: Who are the stakeholders? Did they get to participate? Is there public support? Is political leadership willing to support?

- Political Support
- Local Champion
- Public Support
- Achieves Multiple Objectives
- Supported by a broad array of Stakeholders

Legal: Does your organization have the authority to implement? Is it legal? Are there liability implications?

- Existing Local Authority
- State Authority
- Potential Legal Challenges

Economic: Is it cost-beneficial? Is there funding? Does it contribute to the local economy or economic development?

- Benefit of Action
- Cost of Action
- Cost Effective/Economic Benefits
- Economically Viable
- Outside Funding Required

Environmental: Does it comply with Environmental regulations?

- Effect on Land/Water
- Effect on Endangered Species
- Effect on Cultural Resources
- Effect on Hazmat sites
- Consistent with Community Environmental Goals
- Consistent with Environmental Laws
- Environmental Benefits

2. SUSTAINABLE DISASTER RECOVERY

- Quality of Life
- Social Equity
- Hazard Mitigation
- Economic Development
- Environmental Protection/Enhancement
- Community Participation

3. 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

4. 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)
- Timing of Available funding
- Visibility of Project
- Community Credibility

Mitigation Action Prioritization (Voting) Instructions

The mitigation actions and projects will be further collated by hazard and will be presented back to the HMPC for prioritization. **An email link to the voting site will be launched Friday April 2nd; voting will be open for a week and will close Friday April 9th.** The voting website location is https://fostermorrison.aweeba.com/.

Each person will have 9 votes total to vote for their preferred mitigation actions/projects:

- ***3 high priority votes (5 points each)***
- ***3 medium priority votes (3 points each)***
- ***3 low priority votes (1 point each)***

Your votes will indicate the consensus of the team.

Use the list of mitigation selection criteria (above) to help you make your determinations.

After the votes are tabulated, we will send out an email detailing mitigation action prioritization results and next steps.

Sacramento County
Mitigation Action Worksheet

Jurisdiction:	
Mitigation Action/Project Title:	
Hazards Addressed:	
Issue/Background:	
Project Description:	
Other Alternatives:	
Existing Planning Mechanism(s) through which Action Will Be Implemented:	
Responsible Office/Partners:	
Cost Estimate:	
Benefits (Losses Avoided):	
Potential Funding:	
Timeline:	
Project Priority (H, M, L):	

Worksheet completed by:	
Name and Title:	
Phone:	

Sacramento County 2021 LHMP Update

Mitigation Strategy Meetings – Action Prioritization

56 Voting Members

Actions sorted by Vote Totals

Mitigation Action Title	Hazards Addressed	Points/ Worksheet Status
Evacuation planning - countywide	Multi-Hazard	60
Drainage improvement projects to address localized flooding and runoff, permeable and impermeable surfaces	Flood	43
Implement the actions contained within the Sac County/Cities Climate Adaptation/Action Plans	Climate Change	43
Flood Master Planning – understanding flood impacts and recommendations to mitigate floods through master planning	Flood	39
Integrate Local Hazard Mitigation Plan into Safety Element of General Plan	Multi-Hazard	38
Establish an Operational Area level public education and outreach to provide consistent messaging, coordinating resource delivery, etc.	Multi-Hazard	37
ALL HAZARDS: Enhance public education and awareness of natural hazards and public understanding of disaster preparedness	Multi-Hazard	34
Stream and creek channel and drainageway invasives/overgrowth clearing and maintenance projects	Flood	30
Critical facilities and infrastructure – flood protection projects	Flood	29
Backup power supply for critical facilities and infrastructure/Generator projects	Multi-Hazard	28
Levee improvement projects	Levee Failure	27
Develop/update/implement stormwater master plans	Flood	26
Elevation projects to reduce flood risk	Flood	25
Fuel reduction projects	Wildfire	23
Develop and conduct countywide (operational area) exercises for priority hazards	Multi-Hazard	19
USACE efforts for erosion, seepage, and stability improvements to the American River and Sacramento River levees (2020-2025)	Levee Failure	19
Increase tree plantings around buildings to shade parking lots and along public rights-of-way	Severe Weather: Heat	18
Defensible space and vegetation management projects	Wildfire	16
Flood fighting for Delta legacy communities: Hood, Courtland, Locke, Walnut Grove	Flood	16
Increase use of permeable surfaces and rainwater catchment/retention systems in developed areas to enhance groundwater recharge	Drought & Water Shortage	16
Develop/implement water shortage contingency plan	Drought & Water Shortage	16
Expand broadband/wifi access	Multi-Hazard	15

Mitigation Action Title	Hazards Addressed	Points/ Worksheet Status
Telecommute implementation to reduce emissions/isolate	Climate Change/Pandemic	15
Development of a Climate Adaptation/Action Plan	Climate Change	15
Carbon Farming Plans, incentives, pilot programs	Climate Change	15
Add more purple air monitors around county for additional localized information on air quality/smoke	Wildfire	15
Completion of Folsom Dam improvements	Dam Failure	14
Mitigation of repetitive loss flood areas and properties	Flood	14
Flood insurance studies (modeling and mapping the special flood hazard area)	Flood	14
Operational protocol updates for American River pump stations that are affected by the reoperation of Folsom Dam to include analysis, modeling and mapping	Flood	13
Develop Urban Forestry Fire Management Plan	Wildfire	13
Fleet electrification charging infrastructure and back up power for fleet resiliency to avoid disruption for providing essential services dependent on e mobility	Climate Change	13
Bridge and road improvement projects	Flood	12
Critical Facilities and other structure hardening projects	Wildfire	12
Maintain and improve Sacramento River levee from south of Freeport to south of Hood, a reach owned and operated by CA DWR Maintenance Area 9	Levee Failure	11
Implement Delta Small Communities (flood risk reduction plan for the communities of Hood, Courtland, Locke, Walnut Grove East, and Walnut Grove West/Ryde)	Flood	11
Water conservation and green infrastructure implementation	Drought & Water Shortage	11
Maintain and improve railroad embankment levee from south of Freeport to south of Hood, a reach owned by CA Parks Department (Railroad Museum)	Levee Failure	11
Delta area jurisdictions – drainage improvement projects to address sea level rise	Climate Change	10
EOP, mass care and shelter plan, logistics support Annex	Multi-Hazard	10
Using cool roofing products that reflect sunlight and heat away from buildings	Severe Weather: Heat	9
Backup power sources	Severe Weather/ Multi-hazard	9
Beach Stone Lakes area flood risk reduction program (reduce flood frequency, increase flood protection, flood insurance)	Flood	9
Building electrification subsidies, battery storage, and other peak demand projects	Climate Change	9
Utilize parks to serve as water collection/permeable surfaces	Flood	9
Aquifer storage and recovery (ASR) projects	Drought & Water Shortage	9
Improve water systems for suppression and resiliency against wildfires	Wildfire	8

Mitigation Action Title	Hazards Addressed	Points/ Worksheet Status
Cooling centers/Ensure that County facilities used as cooling centers are equipped with backup power supplies, including on-site renewable energy generation and energy storage systems as feasible	Severe Weather: Heat	8
Undergrounding of utilities	Severe Weather/ Multi-hazard	8
Park debris clean up	Pandemic	8
Co generation of electric vehicles in order to maintain service in a dark sky event or in the event of grid disruptions	Climate Change	8
Support water forum and water forum 2.0 successor effort	Drought & Water Shortage	8
Enhance/enforce weed abatement ordinance/hazardous vegetation ordinance	Wildfire	8
Storm Ready Outreach (Weather radio, understanding the hazard and risk, high water notices describing the flood depth, brochures, outreach)	Flood	8
Code enhancement/enforcement	Wildfire	7
Update Pandemic Plan(s)	Pandemic	7
Identification and outreach to critical facilities located in the dam inundation areas	Dam Failure	7
Open Space fire prevention & vegetation management prescribed grazing/goats	Wildfire	7
Erosion repair projects	Levee Failure	6
Microgrid projects	Multi-Hazard	6
Evaluate the need and feasibility of improving fire prevention for the historic business districts	Wildfire	6
Delta RDs – create habitat/wetland areas to assist with flood mitigation	Levee Failure	6
Conduct a Climate Resiliency Study	Climate Change	5
Consider mobile power station rather than generators for essential fleet and facilities	Severe Weather/ Multi-hazard	5
McCormack Williamson flood control weir	Levee Failure	5
Enhanced multi model transportation options	Climate Change	5
HVAC system upgrades	Pandemic/Wildfire (Smoke)	4
Establish warming centers with backup power	Severe Weather: Extreme Cold and Freeze	4
Conduct seismic evaluation and retrofits of public buildings and critical facilities and infrastructure	Earthquake	4
Add more cameras to public property/infrastructure to the Alert Wildfire project to allow better real-time monitoring	Wildfire	4
Additional funding for Everbridge enhancements	Multi-Hazard	4
Update Hydrology Standards (Analyze historic rainfall records, update the statistical analysis/ DDF, consider climate change)	Flood	3
Traffic light replacement to round abouts – they work during power outages	Severe Weather/ Multi-hazard	3

Mitigation Action Title	Hazards Addressed	Points/ Worksheet Status
Mesh Networks/redundancy	Pandemic	3
Update County GIS aerial photography and LiDAR topography	Flood	3
Community Mobility Resilience Plan, to include projected climate impacts and resilience strategies (air quality benefits)	Climate Change	3
Water bank projects	Drought & Water Shortage	3
Establish system requirements/capabilities to work from home- conferencing capabilities, VPN, etc.	Climate Change/Pandemic	2
Bottle filler stations for public buildings/areas	Pandemic	2
Air filtration system enhancements/ filter replacements	Pandemic/Wildfire (Smoke)	1
Water system intertie projects	Drought & Water Shortage	1
Delta RDs – address internal drainage issues	Levee Failure	1
Floodproofing of nonresidential structures	Flood	1
Acquisition projects of flood prone structures	Flood	1
Dam Safety (Activity 630) - Develop an emergency management and public outreach effort using the Community Rating System Activity 630 as our guide	Dam Failure	1
Additional disinfection/ thermometer stations	Climate Change/Pandemic	0
Severe Weather Annex update and revision	Severe Weather/ Multi-hazard	0
Signal changing technology enhancements	Severe Weather/ Multi-hazard	0
Develop climate change annex to EOP	Climate Change	0
Increase broadband systems and access	Pandemic	0
Hillside Slope Stabilization	Flood/Landslide	0
Flood risk mitigation for mobile home and recreational vehicle parks/ Flood risk reduction, flood warning systems, evacuation procedures	Levee Failure	0
Model Water Efficient Landscape Ordinance (MWELO) implementation	Drought & Water Shortage	0
Add pumping plants	Levee Failure	0
Laguna Creek basin flood control, modeling, and mapping	Flood	0
Water source redundancy and reliability projects	Drought & Water Shortage	0
Arcade Creek flood control implementation (Gum Ranch basin, floodwalls and levees, pump station(s), public information)	Flood	0
Alder Creek flood hazard mitigation	Flood	0
Plan for Public Information (PPI)/CRS program implementation	Flood	0

Mitigation Action Title	Hazards Addressed	Points/ Worksheet Status
Flood Risk Mapping enhancements to include the frequency, depth, and velocity of the water	Flood	0

C.1 Categories of Mitigation Measures Considered

The following categories of mitigation measures are based on the Community Rating System.

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

C.2 Sacramento County Analysis of Alternative Mitigation Measures per Category

Note: This review of mitigation measures is in compliance with the FEMA's nationally accepted six mitigation categories and FEMA's CRS Program requirement to provide a comprehensive evaluation of the six mitigation categories with a specific requirement that Preventative Measures be thoroughly reviewed. This review leads to the projects incorporated into the mitigation strategy action plan. This Section specifically focuses on the mitigation measures and potential mitigation strategies specific to Sacramento County and City of Sacramento, the two CRS communities to this plan.

C.2.1. Preventive Measures

Preventive measures are designed to keep a problem - such as flooding - from occurring or from getting worse. The objective of preventive measures is to ensure that future development is not exposed to damage and does not cause an increase in damages to other properties. Building, zoning, planning and code enforcement offices usually administer preventive measures. Some examples of types of preventive measures include:

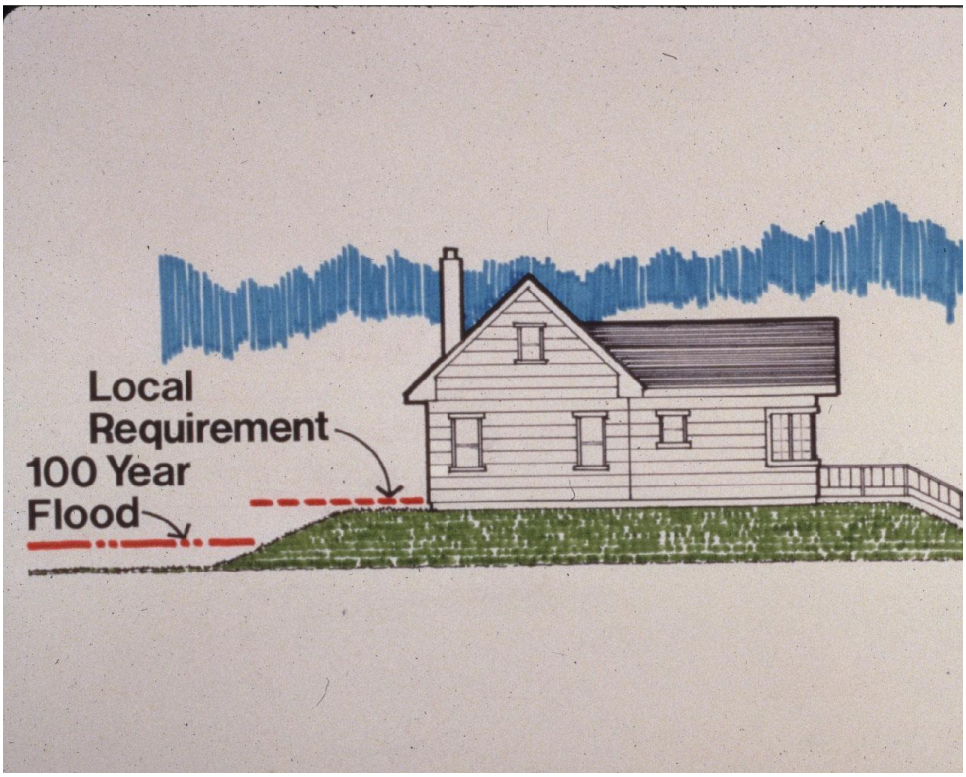
- Building codes and floodplain regulations
- Comprehensive land use planning, zoning, and open space preservation
- Stormwater management and subdivision regulations

Building Codes

Building codes provide one of the best methods of addressing natural hazards. When properly designed and constructed according to code, the average building can withstand many of the impacts of natural hazards. Hazard protection standards for all new and improved or repaired buildings can be incorporated into the local building code. Building codes can ensure that the first floors of new buildings are constructed to be

higher than the elevation of the 100-year flood (the flood that is expected to have a one percent chance of occurring in any given year). This is shown in Figure C-1.

Figure C-1 Building Codes and Flood Elevations



Floodplain Regulations

Most communities with a flood problem participate in the National Flood Insurance Program (NFIP). The NFIP sets minimum requirements for the participating communities' standards for development, subdivision of land, construction of buildings, installation of mobile homes, and improvements and repairs to buildings. These are usually spelled out in a separate ordinance.

The NFIP minimum requirements are summarized below. It should be stressed that these are minimum requirements. Local conditions, such as high velocity flooding or the presence of a potential dam failure, may warrant higher local standards.

Enforcement

To ensure that communities are meeting the NFIP standards, FEMA periodically conducts a Community Assessment Visit. During this visit, the maps and ordinances are reviewed, permits are checked, and issues are discussed with staff. Failure to meet all of the requirements can result in one or more consequences:

- Reclassification under the Community Rating System to a higher class
- Probation, which entails a $50 surcharge on every flood insurance policy in the community, or

- Suspension from the NFIP.

Suspension is the most serious. It means that the community is out of the NFIP and the following sanctions are imposed:

- Flood insurance will not be available. No resident will be able to purchase a flood insurance policy.
- Existing flood insurance policies will not be renewed.
- No direct federal grants or loans for development may be made in identified flood hazard areas under programs administered by federal agencies, such as HUD, EPA, and the Small Business Administration.
- Federal disaster assistance will not be provided to repair insurable buildings located in identified flood hazard areas for damage caused by a flood.
- No federal mortgage insurance or loan guarantees may be provided in identified flood hazard areas. This includes policies written by FHA, VA, and others.
- Federally insured or regulated lending institutions, such as banks and credit unions, must notify applicants seeking loans for insurable buildings in flood hazard areas that there is a flood hazard and the property is not eligible for federal disaster relief.

These sanctions can be severe for any community with a substantial number of buildings in the floodplain. Most communities with a flood problem have joined the NFIP and are in full compliance with their regulatory obligations.

One way to assure good administration and enforcement is to have Certified Floodplain Managers on staff. The Association of State Floodplain Managers administers the national Certified Floodplain Manager (CFM®) program.

Minimum National Flood Insurance Program Regulatory Requirements

The National Flood Insurance Program (NFIP) is administered by the Federal Emergency Management Agency (FEMA). As a condition of making flood insurance available for their residents, communities that participate in the NFIP agree to regulate new construction in the area subject to inundation by the 100-year (base) flood. The floodplain subject to these requirements is shown as an A or V Zone on the Flood Insurance Rate Map (FIRM).

There are five major floodplain regulatory requirements. Additional floodplain regulatory requirements may be set by state and local laws.

1. All development in the 100-year floodplain must have a permit from the community. The NFIP regulations define "development" as any manmade change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations or storage of equipment or materials.
2. Development along a river or other channel cannot obstruct flows so as to cause an increase in flooding on other properties. An analysis must be conducted to demonstrate that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point within the community.

3. New buildings may be built in the floodplain, but they must be protected from damage from the base flood. In riverine floodplains, the lowest floor of residential buildings must be elevated to be at or above the base flood elevation (BFE). Nonresidential buildings must be either elevated or floodproofed.
4. Under the NFIP, a "substantially improved" building is treated as a new building. The NFIP regulations define "substantial improvement" as any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds 50% of the market value of the structure before the start of construction of the improvement. This requirement also applies to buildings that are substantially damaged.
5. Communities are encouraged to adopt local ordinances that are more comprehensive or provide more protection than the federal criteria. The NFIP's Community Rating System provides insurance premium credits to recognize the additional flood protection benefit of higher regulatory standards.

Local Implementation: Sacramento County and the City of Sacramento

Sacramento County and the City of Sacramento have adopted the 2019 California Building Code based on the 2018 International Building Code. Sacramento County has a Floodplain Management Ordinance (2017) that exceeds minimum NFIP standards and includes some higher regulatory standards. This most recent update incorporated additional SB 5 standards addressing the 200-year flood standard of protection in urban or urbanizing areas (i.e., ULOP). The City of Sacramento also has a Floodplain Management Ordinance (2016) that exceeds minimum NFIP standards and includes some higher regulatory standards. The City's ordinance was recently updated in March 2016 to incorporate the ULOP requirements of SB 5.

Just as important as having code standards is the enforcement of the code. Adequate inspections are needed during the course of construction to ensure that the builder understands the requirements and is following them. Making sure a structure is properly elevated and anchored requires site inspections at each step. Both Sacramento County and the City of Sacramento indicate that their Floodplain Management Ordinances are adequately enforced.

Reduce Future Flood Losses

Future flood losses should be reduced by enforcement of current floodplain regulations:

Sacramento County. For new residential construction or substantial improvements, Sacramento County requires that either the lowest finished floor be elevated at least 1.5 feet above the base flood elevation. For nonresidential construction or substantial improvements, Sacramento County requires that either the lowest finished floor be elevated at least 1.5 feet above the base flood elevation or that below the base flood level the structure is dry flood-proofed and watertight, with walls substantially impermeable to the passage of water and with structural components having the capability of resisting hydrostatic and hydrodynamic loads and effects of buoyancy.

City of Sacramento. For new residential construction or substantial improvements in Zones A, AH and AE, the City of Sacramento requires that either the lowest floor, including basement, be elevated at least 1 foot above the base flood elevation. For new residential construction, or substantial improvements in Zone AO, the City of Sacramento requires that either the lowest floor, including basement, be elevated above the highest grade to the depth number specified in feet on the FIRM or 2 feet above the highest adjacent grade

if no depth number is specified. For nonresidential construction or substantial improvements, the City of Sacramento requires that either the lowest floor, including basement be elevated in conformance with the residential standards described above, together with attendant utility and sanitary facilities or be dry floodproofed below the elevation required for the lowest floor so that the structure is watertight, with walls substantially impermeable to the passage of water and with structural components having the capability of resisting hydrostatic and hydrodynamic loads and effects of buoyancy.

Enacting and enforcing the current standards and/or adopting higher regulatory standards reduces future flood losses by regulating development within flood hazard areas.

Current Standards

As described above, Sacramento County and the City of Sacramento have Floodplain Management Ordinances that meet all of the NFIP's minimum floodplain regulatory requirements and exceed some of them such as establishing additional freeboard. Their regulations are designed to:

- Protect human life and health;
- Minimize expenditure of public money for costly flood control projects;
- Minimize the need for rescue and relief efforts associated with flooding;
- Minimize business interruptions;
- Minimize damage to public facilities, including streets, sewers, bridges, and utilities;

The County and City's regulations include methods and provisions for:

- Restricting or prohibiting development which are dangerous to health, safety, and property due to flood hazards, or which result in damaging increase in flood heights or velocities;
- Requiring that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction;
- Controlling the alteration of natural floodplains, stream channels, and natural protective barriers, which help accommodate or channel floodwaters;
- Controlling fill, grading, dredging, and other development which may increase flood damage; and
- Preventing or regulating the construction of flood barriers which will unnaturally divert floodwaters or which may increase flood hazards in other areas.

In addition, all new construction or substantial improvements shall be:

- Designed or modified and adequately anchored to prevent flotation, collapse or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy
- Constructed in ways that minimize flood damage
- Constructed with materials resistant to flood damage
- Constructed with electrical, heating, ventilation, plumbing, and air conditioning equipment and other service facilities designed or located so as to prevent water from entering or accumulating within components during flooding

Sacramento County and the City of Sacramento also have regulations that exceed minimum NFIP standards. These include:

- Floodways are delineated and certain requirements apply to construction within these floodways so as to not result in any increase in flood levels during the occurrence of the base flood discharge.
- Requiring new construction and substantial improvements to have the lowest flood, including basement, elevated a minimum of 1.5 feet (Sacramento County) above the base flood elevation.
- For the City, base flood elevations for new construction are required to be 1 foot above the FIRM flood depth for zones A, AH, and AE. In zones AO, the lowest floor will be elevated to one foot above the FIRM flood depth, or two feet above the highest adjacent grade if not depth number is specified.
- Restrictions and standards are included on the use of enclosures below elevated buildings.

In addition, Sacramento County's and the City of Sacramento's floodplain management programs are implemented by Certified Floodplain Managers on staff.

Manufactured Homes

Manufactured or mobile homes are usually not regulated by local building codes. They are built in a factory in another state and are shipped to a site. They do have to meet construction standards set by the U.S. Department of Housing and Urban Development. All mobile homes constructed after 1976 must comply with HUD's National Manufactured Home Construction and Safety Standards. These standards apply uniformly across the country and it is illegal for a local unit of government to require additional construction requirements. Local jurisdictions may regulate the location of these structures and their on-site installation.

Local Implementation

Both the Sacramento County and the City of Sacramento Floodplain Management Ordinances include specific requirements for the placement, installation, elevation, and anchoring of manufactured homes

CRS Credit

Building Codes: The CRS encourages strong building codes. It provides credit in two ways: points are awarded based on the community's BCEGS classification and points are awarded for adopting the International Code series. The CRS also has a prerequisite for a community to attain a Class 6 or better within the CRS program, the community must have a BCEGS class of 5/5 or better. To attain a Class 4 or better in the CRS program, the community must have a BCEGS class of 4/4 or better.

Sacramento County has a BCEGS classification of 3/3. Sacramento County has adopted the 2019 California Building Code which includes the International Code series with State enhancements.

The City of Sacramento's BCEGS classification is a 2/2. The City of Sacramento has also adopted the 2019 California Building Code which includes the International Code series with State enhancements.

The National Flood Insurance Program's (NFIP) Community Rating System (CRS) was implemented in 1990 as a program for recognizing and encouraging community floodplain management activities that exceed the minimum NFIP standards. The National Flood Insurance Reform Act of 1994 codified the Community Rating System in the NFIP.

- The CRS recognizes 18 creditable activities, organized under four categories numbered 300 through 600:
  - ✓ Public Information
  - ✓ Mapping and Regulations

- ✓ Flood Damage Reduction
- ✓ Flood Preparedness

- Sacramento County and the City of Sacramento participate in the Community Rating System (CRS) of the National Flood Insurance Program.
- By implementing these floodplain management activities, the residents of Sacramento County and the City of Sacramento qualify for flood insurance premium rate reductions. When communities go beyond the minimum standards for floodplain management, the CRS can provide discounts up to 45% off flood insurance premiums.

Sacramento County is currently a Class 2 community, which provides a 40% discount on flood insurance to properties located in the Special Flood Hazard Area and up to a 10% discount for those properties located outside the special flood hazard zone.

The City of Sacramento is also currently a Class 3 community, which provides a 35% discount on flood insurance to properties located in the Special Flood Hazard Area and up to a 10% discount for those properties located outside the special flood hazard zone.

Floodplain Management – Higher Regulatory Standards: There are many higher regulatory standards that warrant CRS credit. These standards include:

- Delineating a floodway, the area of higher hazard near the channel. This would allow development outside the floodway (called the "floodplain fringe") without engineering studies to determine their impact on others.
- Requiring all new construction to be elevated one or two feet above the base flood elevation to provide an extra level of protection from waves and higher floods. This extra protection is reflected in a distinct reduction in flood insurance rates.
- Having all developers (not just the larger ones) provide flood data where none are available.
- Specifications to protect foundations from erosion, scour and settling.
- Prohibiting critical facilities from all or parts of the floodplain.
- Prohibiting hazardous materials.
- Requiring buffers adjacent to streams or natural areas.
- Restrictions on use of enclosures below elevated buildings.
- Flood storage lost due to filling and construction must be compensated for by removal of an equal volume of storage.
- The CRS also provides credit for having trained staff and a higher credit if the staff members are Certified Floodplain Managers.

It should be noted that one of the prerequisites for participation in the CRS is that the community be in full compliance with the minimum requirements of the NFIP. A community with a number of "potential violations" risks being removed from the CRS entirely.

Manufactured homes: The NFIP allows communities to exempt mobile homes in existing mobile home parks from some of the flood protection requirements. The CRS provides up to 50 points if the community does not use this exemption.

Comprehensive Land Use Planning, Zoning, and Open Space Preservation

Building codes provide guidance on how to build in hazardous areas. Planning and zoning activities direct development away from these areas, particularly floodplains and wetlands. They do this by designating land uses that are compatible with the natural conditions of land that is prone to flooding, such as open space or recreation. Planning and zoning activities can also provide benefits by simply allowing developers more flexibility in arranging improvements on a parcel of land through the planned development approach.

General and Comprehensive Plans

These plans are the primary tools used by communities to address future development. They can reduce future flood-related damages by indicating open space or low density development within floodplains and other hazardous areas. Unfortunately, natural hazards are not always emphasized or considered in the specific land use recommendations.

Generally, a plan has limited authority. It reflects what the community would like to see happen. Its utility is that it guides other local measures, such as capital improvement programs, zoning ordinances, and subdivision regulations.

Capital Improvement Plans

A capital improvement plan can guide a community's major public expenditures for a 5- to 20-year period. Capital expenditures may include acquisition of open space within the hazardous areas, extension of public services into hazardous areas, or retrofitting existing public structures to withstand a hazard.

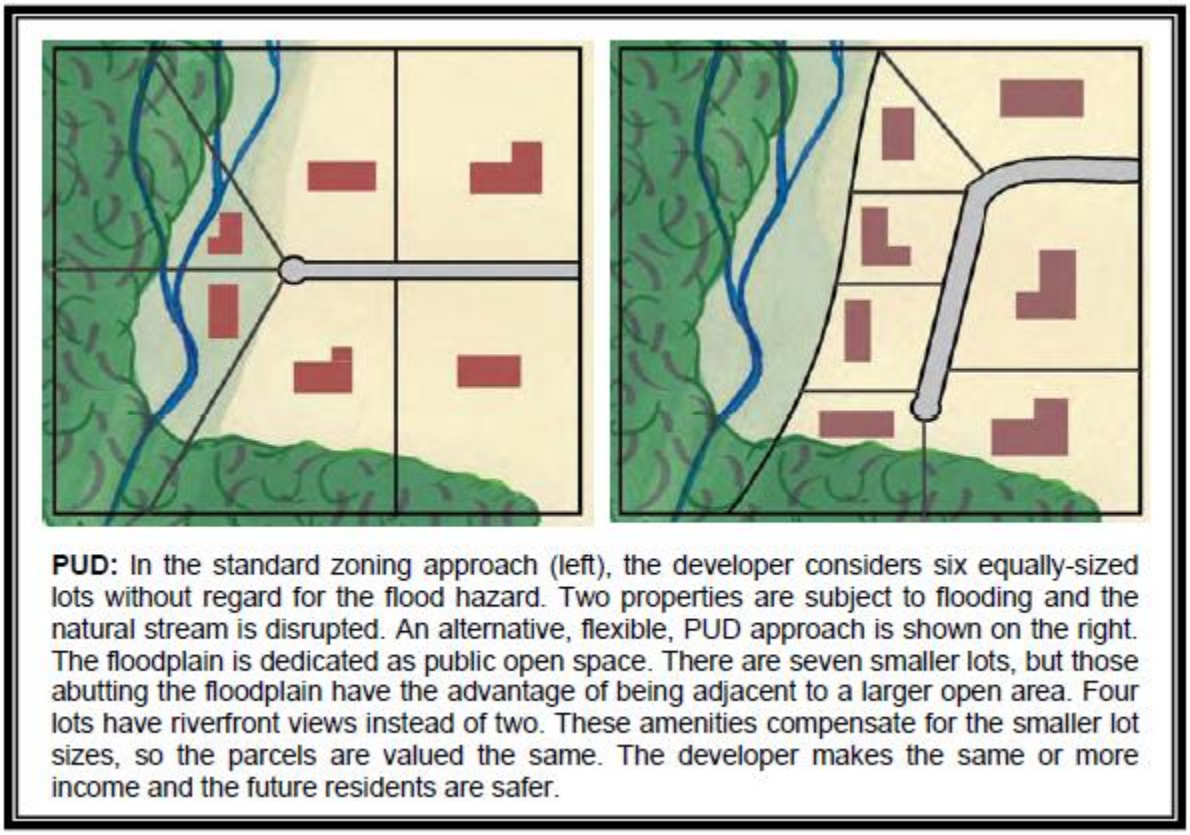
Zoning

A zoning ordinance regulates development by dividing a community into zones or districts and setting development criteria for each of those zones or districts. Zoning codes are considered the primary tool to implement a general/comprehensive plan's guidelines for how land should be developed.

Zoning ordinances can limit development in hazardous areas, such as reserving floodplain zones for agricultural uses. Often, developers will produce a standard grid layout. The ordinance and the community can allow flexibility in lot sizes and location so developers can avoid hazardous areas.

One way to encourage such flexibility is to use the planned unit development (PUD) approach or cluster development. The PUD and cluster approaches allow the developer to easily incorporate flood hazard mitigation measures into the project. Open space or floodplain preservation can be facilitated as site design standards and land use densities can be adjusted to fit the property's specific characteristics, as shown in Figure C-2.

Figure C-2 Zoning for Development in the Floodzone



PUD: In the standard zoning approach (left), the developer considers six equally-sized lots without regard for the flood hazard. Two properties are subject to flooding and the natural stream is disrupted. An alternative, flexible, PUD approach is shown on the right. The floodplain is dedicated as public open space. There are seven smaller lots, but those abutting the floodplain have the advantage of being adjacent to a larger open area. Four lots have riverfront views instead of two. These amenities compensate for the smaller lot sizes, so the parcels are valued the same. The developer makes the same or more income and the future residents are safer.

Open Space Preservation

Keeping the floodplain and other hazardous areas open and free from development is the best approach to preventing damage to new developments. Open space can be maintained in agricultural use or can serve as parks, greenway corridors and golf courses.

Comprehensive and capital improvement plans should identify areas to be preserved by acquisition and other means, such as purchasing an easement. With an easement, the owner is free to develop and use private property, but property taxes are reduced or a payment is made to the owner if the owner agrees to not build on the part set aside in the easement.

Although there are some federal programs that can help acquire or reserve open lands, open space lands and easements do not always have to be purchased. Developers can be encouraged to dedicate park land and required to dedicate easements for drainage and maintenance purposes. These are usually linear areas along property lines or channels. Maintenance easements also can be donated by streamside property owners in return for a community maintenance program.

Local Implementation

General Plan: Sacramento County's current General Plan was last adopted in 2017. This 2017 General Plan Update included provisions to address new flood protections requirements that establish a 200-year state requirement for the ULOP. This is the primary policy change that will affect construction in urban or urbanizing areas that are in a SFHA or a Moderate Flood Zone. Areas not considered to be urbanizing will remain subject to the FEMA 0.1% standard of flood protection. General Plan amendments addressed: agency coordination, setbacks along levees, elevation and construction standards, flood map data, flood emergency response, floodway management, building design standards, and the process for making legal determinations and project approvals for development in flood hazard zones.

The City of Sacramento recently updated its General Plan in 2015 to include requirements for establishing 200-year state requirements for the ULOP to comply with Senate Bill (SB) 5 regarding floodplain management.

Zoning and Open Space Preservation: Sacramento County's General Plan, in coordination with the local Codes, protects current open space. As described above, the County recently finalized updates to the general plan which also included updates to the County's Zoning Code.

The City of Sacramento's local codes in combination with the 2015 General Plan provides protection for and encourages open space preservation. The City's 2015 Floodplain Management Ordinance includes requirements for establishing 200-year state requirements for the ULOP to comply with Senate Bill (SB) 5 regarding floodplain management.

Reduce Future Flood Losses

Enacting the General Plans and the comprehensive zoning and future land uses contained in the County and City's General Plans will help to reduce future flood losses by managing development in hazardous areas and known floodplains.

Current Standards

Generally, Sacramento County's zoning ordinance separates hazardous land uses from sensitive land uses and addresses risks e.g. flood, erosion and traffic. The zoning ordinance contains a Flood (F) Combining Zoning District and Tributary Standards, and Natural Streams (NS) Combining Zoning District to reduce the impacts of flood hazards. Additionally, the ordinance contains a Parkway Corridor (PC) Combining Zoning District to ensure that bluff development does not create erosion or geologic instability.

Likewise, the City of Sacramento's zoning ordinance is an effective measure for reducing hazard impacts and is adequately administered and enforced. The City's ordinance includes a Flood Zone and an American River Parkway, Floodplain Zone (ARP-F). The Flood Zone is considered an Open Space Zone established to conditionally permit specified uses along the Sacramento and American Rivers and their tributaries. The ARP-F was established to prevent loss of life and property by prohibiting the erection of improvements or structures in a designated floodway, to protect the natural features of the American River floodplain, to prevent erosion and siltation, and to preserve valuable open space.

CRS Credit

The CRS provides flood insurance discounts to those communities that implement various floodplain management activities that meet certain criteria. Comparing local activities to those national criteria helps determine if local activities should be improved.

Credits are provided for regulations that encourage developers to preserve floodplains or other hazardous areas from development. There is no credit for a plan, only for the enforceable regulations that are adopted pursuant to a plan. Credits are also provided for setting aside floodplains for low density zoning, such as five acre lots or conservation

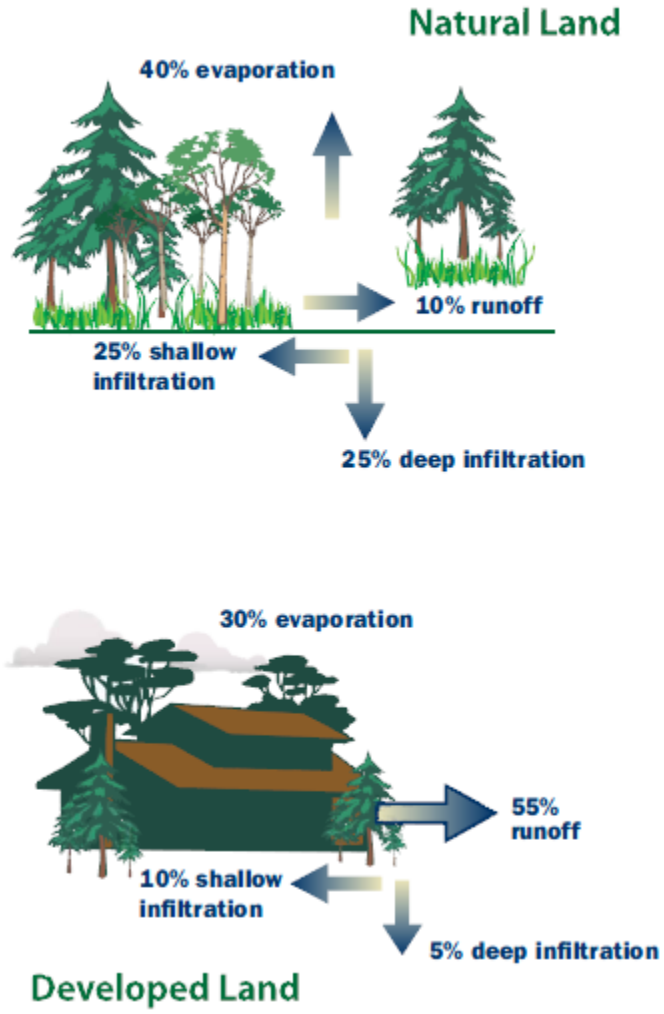
Preserving flood prone areas as open space is one of the highest priorities of the Community Rating System. Up to 1,450 points can be given, based on how much of the floodplain is in community public undeveloped properties, parks, wildlife refuges, golf courses, or other uses that can be depended on to stay open (Activity 420 - Open Space Preservation).

Stormwater Management and Subdivision Ordinance

Development in floodplains is development in harm's way. New construction in the floodplain increases the amount of development exposed to damage and can aggravate flooding on neighboring properties.

Development outside a floodplain can also contribute to flooding problems. Stormwater runoff is increased when natural ground cover is replaced by urban development (see Figure C-3). Development in the watershed that drains to a river can aggravate downstream flooding, overload the community's drainage system, cause erosion, and impair water quality.

Figure C-3 Runoff and Infiltration of Natural and Developed Land



There are three ways to prevent flooding problems caused by stormwater runoff:

- Regulating development in the floodplain to ensure that it will be protected from flooding and that it won't divert floodwaters onto other properties, and
- Regulating all development to ensure that the post-development peak runoff will not be greater than it was under pre-development conditions.
- Set construction standards so buildings are protected from shallow water.

Most communities participate in the NFIP, which sets minimum requirements for regulating development in the floodplain. All new buildings must be protected from the base or 100-year flood and no development can cause an increase in flood heights or velocities.

Stormwater runoff regulations require developers to build retention or detention basins to minimize the increases in the runoff rate caused by impervious surfaces and new drainage systems. Generally, each

development must not let stormwater leave at a rate higher than what existed under pre-development conditions.

Standards for drainage requirements are typical in subdivision regulations. Standards for storm sewers, ditches, culverts, etc., are best set when an area is laid out and developed. Traditionally, the national standard is to require that the local drainage system carry the 10-year storm. Recently, communities are finding that older estimates of the 10-year storm understated the true hazard, so they are addressing larger storms.

One problem with requiring the drainage system to carry water away is that runoff increases with urban development. The runoff equivalent of a 10-year storm occurs more frequently, and from smaller storms. The problem is just sent downstream onto someone else's property.

Accordingly, modern subdivision regulations require new developments to ensure that the post-development peak runoff will not be greater than it was under pre-development conditions. This is usually done by constructing retention or detention basins to hold the runoff for a few hours or days, until flows in the system have subsided and the downstream channels can accept the water without flooding.

If the storm sewers or roadside ditches cannot handle a heavy rain, the standard subdivision design uses the streets to carry excess runoff. If the flows exceed the streets' capacity, adjacent properties will flood. Therefore, the third approach to protecting from stormwater flooding is to make sure new buildings are elevated one or two feet above the street or above adjacent grade.

Local Implementation

Reduce Future Flood Losses

Current practices and tracking mechanisms are seeking to reduce flood risks. Future flood control and stormwater improvements in Sacramento County and the City of Sacramento will help reduce localized flood risks by improving flood control mechanisms and drainage. In order to reduce future flood losses, the County and City may consider revisiting their stormwater management ordinances.

Current Standards

Sacramento County and the City of Sacramento have stormwater management ordinances.

Sacramento County’s Stormwater Management Ordinance authorizes the County to exercise its police power to protect and promote the public health, safety and general welfare. While stormwater runoff is one step in the natural cycle of water, human activities, including, but not limited to, agriculture, construction, manufacturing and the operation of an urban infrastructure, may result in undesirable discharges of pollutants and certain sediments. Such discharges may accumulate in local drainage channels and waterways and eventually may be deposited in the natural surface waters. The purpose of this chapter is to protect and enhance the watercourses within the unincorporated area of the County, by controlling the contribution of urban pollutants to stormwater runoff which enters the County storm drain system in a manner consistent with the Federal Clean Water Act, the Porter-Cologne Water Quality Control Act and Municipal discharge Permit No. CAS082597, and by controlling pollutants that are discharged directly to

natural surface waters. The County's Stormwater Program also uses its Land Grading and Erosion Control Ordinance to minimize damage to surrounding properties and public rights-of-way, the degradation of the water quality of watercourses, and the disruption of natural or County authorized drainage flows caused by the activities of clearing and grubbing, grading, filling and excavating of land, and sediment and pollutant runoff from other construction related activities, and to comply with the provisions of the County's National Pollutant Discharge Elimination System (NPDES) Permit Number, CA0082597, issued by the California Regional Water Quality Control Board (Regional Board). These goals will be achieved by establishing administrative procedures, minimum standards of review, and implementation and enforcement procedures for controlling erosion, sedimentation and other pollutant runoff, including construction debris and hazardous substances used on construction sites, and the disruption of existing drainage and related environmental damage caused by the aforementioned activities.

The City of Sacramento's Stormwater Management Ordinance is designed to protect and promote the health, safety and general welfare of the citizens of the City by controlling non-stormwater discharges to the stormwater conveyance system, by eliminating discharges to the stormwater conveyance system from spills, dumping, or disposal of materials other than stormwater, and by reducing pollutants in urban stormwater discharges to the maximum extent practicable. This chapter is intended to assist in the protection and enhancement of the water quality of watercourses, water bodies, and wetlands in a manner pursuant to and consistent with the Federal Water Pollution Control Act, Porter-Cologne Water Quality Control Act, and National Pollutant Discharge Elimination System (NPDES) Permit No. CAS082597, as such permit is amended and/or renewed.

Subdivision Regulations

In addition to controlling stormwater runoff as described above, subdivision regulations govern how land will be subdivided and they set construction standards. These standards generally address roads, sidewalks, utilities, storm sewers, and drainage ways. They can include the following flood protection standards:

- Requiring that the final plat show all hazardous areas
- Requiring that each lot be provided with a building site above the flood level
- Requiring that all roadways be no more than one foot below the flood elevation

Local Implementation

Sacramento County's subdivision ordinance regulates the design and improvement of land divisions and the dedication of public improvements needed in connection with land divisions. The subdivision ordinance does not address hazards.

The City of Sacramento's Subdivision Ordinance is designed to assist in the systematic implementation of the general plan, specific and community plans, the zoning ordinance, and other land use regulations, and to provide for public needs, health and safety, convenience, and general welfare. The City's subdivision requirements address floodplain management requirements. Specifically, the ordinance requires that the design of all subdivisions shall provide adequate drainage to reduce exposure to flood damage and shall in all respects conform to the requirements of Title 15.104 of this code, Floodplain Management Regulations, and the national flood insurance program regulations, set forth in Subchapter B of Title 44 of the Code of Federal Regulations Parts 59 and 60. All final subdivision improvement plans will provide the elevation of the proposed building site. If the site is filled above the base flood, the final pad elevation shall be

certified by a qualified registered professional engineer or surveyor and provided to the local administrator. All subdivision proposals shall be consistent with the need to minimize flood damage. All subdivision proposals shall have public utilities and facilities such as sewer, gas, electrical and water systems located and constructed to minimize flood damage.

CRS Credit

CRS credit is provided for both higher regulatory standards in the floodplain and stormwater management standards for new developments. Credit is based on how those standards exceed the minimum NFIP requirements.

Conclusions and Recommendations

- Sacramento County and the City of Sacramento have floodplain development ordinances that exceed minimum national and state standards and will be helpful in preventing flood problems from increasing.
- With ongoing improvements to the regions' flood control facilities, requirements mandated by SB 5, and any resulting changes in the FEMA DFIRMs, the floodplain regulations for the County and City should be revisited and revised accordingly.
- Sacramento County and the City of Sacramento should continue to implement CRS activities to align with the recent changes in the 2017 Coordinator's Manual. The County and City should evaluate their floodplain management ordinances for incorporating additional higher standards.
- The County and City should review their zoning and subdivision ordinances for floodplain management and other hazard specific enhancements.
- The County and City should continue to enforce stormwater management best management practices to control post development site runoff. Consideration of a unified countywide stormwater ordinance will provide consistent regulations between all communities within the Sacramento County planning area.
- Standards in subdivision regulations for public facilities should account for the hazards present at the site. New building sites, streets, and water systems should facilitate access and use by fire and emergency equipment.

C.2.2. Property Protection Measures

Property protection measures are used to modify buildings or property subject to damage. Property protection measures fall under three approaches:

- Modify the site to keep the hazard from reaching the building,
- Modify the building so it can withstand the impacts of the hazard, and
- Insure the property to provide financial relief after the damage occurs.

Property protection measures are normally implemented by the property owner, although in many cases technical and financial assistance can be provided by a government agency.

Keeping the Hazard Away

Generally, natural hazards do not damage vacant areas. As noted earlier, the major impact of hazards is to people and improved property. In some cases, properties can be modified so the hazard does not reach the damage-prone improvements. For example, a berm can be built to prevent floodwaters from reaching a house.

Flooding

There are five common methods to keep a flood from reaching and damaging a building:

- Erect a barrier between the building and the source of the flooding.
- Move the building out of the floodprone area.
- Elevate the building above the flood level.
- Demolish the building.
- Replace the building with a new one that is elevated above the flood level.

Barriers

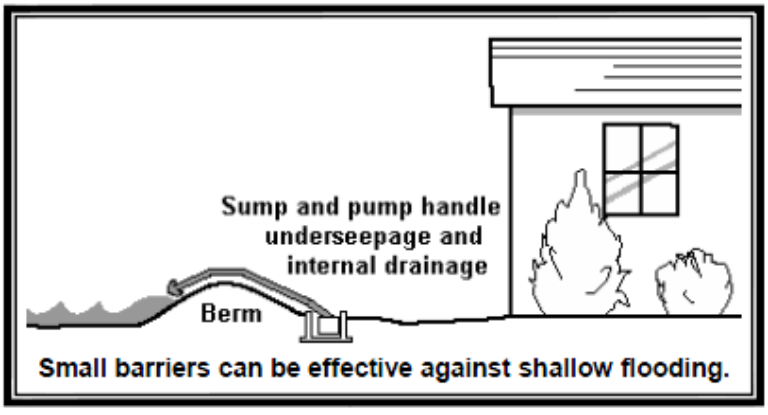
A flood protection barrier can be built of dirt or soil (a "berm") or concrete or steel (a "floodwall"). Careful design is needed so as not to create flooding or drainage problems on neighboring properties. Depending on how porous the ground is, if floodwaters will stay up for more than an hour or two, the design needs to account for leaks, seepage of water underneath, and rainwater that will fall inside the perimeter. This is usually done with a sump or drain to collect the internal groundwater and surface water and a pump and pipe to pump the internal drainage over the barrier.

Figure C-4 Types of Barriers

This low floodwall has landscaping to minimize the adverse impact on the property's appearance.

Small, wood frame buildings are the easiest to relocate

Source: Kennedy House Movers, Huntsville, AL



Small barriers can be effective against shallow flooding.

Barriers can only be built so high. They can be overtopped by a flood higher than expected. Barriers made of earth are susceptible to erosion from rain and floodwaters if not properly sloped, covered with grass, and

properly maintained. A berm can also settle over time, lowering its protection level. A floodwall can crack, weaken, and lose its watertight seal. Therefore, barriers need careful design and maintenance (and insurance on the building, in case of failure).

Relocation

Moving a building to higher ground is the surest and safest way to protect it from flooding. While almost any building can be moved, the cost increases for heavier structures, such as those with exterior brick and stone walls, and for large or irregularly shaped buildings.

In areas subject to flash flooding, deep waters, or other high hazard, relocation is often the only safe approach. Relocation is also preferred for large lots that include buildable areas outside the floodplain or where the owner has a new flood-free lot (or portion of the existing lot) available.

Building Elevation

Raising a building above the flood level can be almost as effective as moving it out of the floodplain. Water flows under the building, causing little or no damage to the structure or its contents. Raising a building above the flood level is cheaper than moving it and can be less disruptive to a neighborhood. Elevation has proven to be an acceptable and reasonable means of complying with floodplain regulations that require new, substantially improved, and substantially damaged buildings to be elevated above the base flood elevation.

One concern with elevation is that it may expose the structure to greater impacts from other hazards such as wind and groundshaking. If not braced and anchored properly, an elevated building may have less resistance to the shaking of an earthquake and the pressures of high winds.

Demolition

Some buildings, especially heavily damaged or repetitively flooded ones, are not worth the expense to protect them from future damages. It is cheaper to demolish them and either replace them with new, flood protected structures ("pilot reconstruction"), or relocate the occupants to a safer site. Demolition is also appropriate for buildings that are difficult to move - such as larger, slab foundation or masonry structures - and for dilapidated structures that are not worth protecting. Generally, demolition projects are undertaken by a government agency, so the cost is not borne by the property owner, and the land is converted to public open space use, like a park.

Figure C-5 Demolition of Flooded Home

Demolishing a repetitively flooded home

One problem that sometimes results from an acquisition and demolition project is a "checkerboard" pattern in which nonadjacent properties are acquired. This can occur when some owners, especially those who have and prefer a waterfront location, are reluctant to leave their homes. Creating such an acquisition pattern in a community simply adds to the maintenance costs that taxpayers must support.

Pilot Reconstruction

If a building is not in good shape, elevating it may not be worthwhile or it may even be dangerous. An alternative is to demolish the structure and build a new one on the site that meets or exceeds all flood and wind protection codes. This was formerly known as "demo/rebuild." FEMA funding programs refer to this approach as "pilot reconstruction." It is still a pilot program, and not a regularly funded option.

Certain rules must be followed to qualify for federal funds for pilot reconstruction:

- Pilot reconstruction is only possible after it has been shown that acquisition or elevation are not feasible, based on the program's criteria.
- Funds are only available to people who owned the property at the time of the event for which funding is authorized.
- It must be demonstrated that the benefits exceed the costs.
- The new building must be elevated to the advisory base flood elevation.
- The new building must not exceed more than 10% of the old building's square footage.
- The new building must meet all flood and wind protection codes.
- There must be a deed restriction that states the owner will buy and keep a flood insurance policy.
- The maximum federal grant is 75% of the cost, up to $150,000. FEMA is developing a detailed list of eligible costs to ensure that disaster funds are not used to upgrade homes.

Local Implementation

Within the Sacramento County planning area, which includes the unincorporated Sacramento County and the City of Sacramento, acquisition and elevation projects have occurred. Historically, Sacramento County has participated in programs to acquire and elevate flooddprone structures within the County. The County is currently pursuing a FEMA HMGP Grant to elevate another approximately 35 structures. The City of Sacramento has also participated in similar programs.

CRS Credit

The CRS provides the most credit points for acquisition and relocation, because this measure permanently removes insurable buildings from the floodplain. The CRS credits barriers and elevating existing buildings (Activity 530 - Flood Protection). Elevating a building above the flood level will also reduce the flood insurance premiums on that individual building. Because barriers are less secure than elevation, not as many points are provided. Higher scores are possible, but they are based on the number of buildings removed compared to the number remaining in the floodplain.

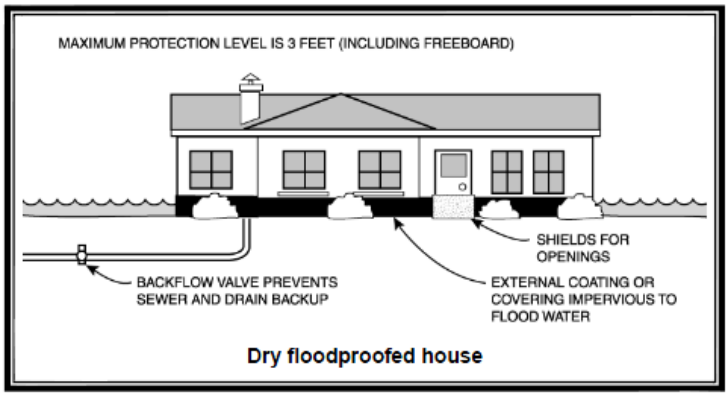
Retrofitting

An alternative to keeping the hazard away from a building is to modify or retrofit the site or building to minimize or prevent damage. There are a variety of techniques to do this, as described below.

Dry Floodproofing

Dry floodproofing means making all areas below the flood protection level watertight. Walls are coated with waterproofing compounds or plastic sheeting. Openings, such as doors, windows and vents, are closed, either permanently, with removable shields, or with sandbags. Dry floodproofing of new and existing nonresidential buildings in the regulatory floodplain is permitted under state, FEMA and local regulations. Dry floodproofing of existing residential buildings in the floodplain is also permitted as long as the building is not substantially damaged or being substantially improved. Owners of buildings located outside the regulatory floodplain can always use dry floodproofing techniques.

Figure C-6 Dry Floodproofing



Dry floodproofing is only effective for shallow flooding, such as repetitive drainage problems. It does not protect from the deep flooding along lakes and larger rivers caused by hurricanes or other storms.

Wet Floodproofing

The alternative to dry floodproofing is wet floodproofing: water is let in and everything that could be damaged by a flood is removed or elevated above the flood level. Structural components below the flood level are replaced with materials that are not subject to water damage. For example, concrete block walls are used instead of wooden studs and gypsum wallboard. The furnace, water heater and laundry facilities are permanently relocated to a higher floor. Where the flooding is not deep, these appliances can be raised on blocks or platforms.

Local Implementation

Area residents have utilized both dry and wet floodproofing techniques for construction of homes in floodprone areas. Floodproofing requirements for new or substantially improved structures are addressed in the communities' Floodplain Management Ordinances.

CRS Credit

Credit for dry and wet floodproofing and sewer backup protection is provided under Activity 530 - Retrofitting. Because these property protection measures are less secure than barriers and elevation, not as many points are provided.

Insurance

Technically, insurance does not mitigate damage caused by a natural hazard. However, it does help the owner repair, rebuild, and hopefully afford to incorporate some of the other property protection measures in the process. Insurance offers the advantage of protecting the property, as long as the policy is in force, without requiring human intervention for the measure to work.

Private Property

Although most homeowner's insurance policies do not cover a property for flood damage, an owner can insure a building for damage by surface flooding through the NFIP. Flood insurance coverage is provided for buildings and their contents damaged by a "general condition of surface flooding" in the area.

Figure C-7 Flood Insurance Coverage

Table 5-1 Example Flood Insurance Premiums	
Building Exposure	**Premium**
In the Special Flood Hazard Area (AE Zone)	
Pre-FIRM ("subsidized") rate	$1,689
Post-FIRM (actuarial) rates	
2 feet above the base flood elevation	$440
1 foot above the base flood elevation	$643
At the base flood elevation	$1,167
1 foot below the base flood elevation	$4,379
Outside the Special Flood Hazard Area	$1,029
Premiums are for $150,000 in building coverage and $75,000 in contents coverage for a one story house with no basement and a $500 deductible, using the October 2008 *Flood Insurance Manual*. Premiums include the 5% Community Rating System discount in unincorporated St. Tammany Parish. Premiums are higher in the municipalities, which are not in the CRS.	

Most people purchase flood insurance because it is required by the bank when they get a mortgage or home improvement loan. Usually these policies just cover the building's structure and not the contents. Contents coverage can be purchased separately. Renters can buy contents coverage, even if the owner does not buy structural coverage on the building. Most people don't realize that there is a 30-day waiting period to purchase a flood insurance policy and there are limits on coverage.

Public Property

Governments can purchase commercial insurance policies. Larger local governments often self-insure and absorb the cost of damage to one facility, but if many properties are exposed to damage, self-insurance can drain the government's budget. Communities cannot expect federal disaster assistance to make up the difference after a flood.

Under Section 406(d) of the Stafford Act:

> *"If an eligible insurable facility damaged by flooding is located in a [mapped floodplain] … and the facility is not covered (or is underinsured) by flood insurance on the date of such flooding, FEMA is required to reduce Federal disaster assistance by the maximum amount of insurance proceeds that would have been received had the buildings and contents been fully covered under a National Flood Insurance Program (NFIP) standard flood insurance policy. [Generally, the maximum amount of proceeds for a non-residential property is $500,000.]*

[Communities] Need to:

- Identify all insurable facilities, and the type and amount of coverage (including deductibles and policy limits) for each. The anticipated insurance proceeds will be deducted from the total eligible damages to the facilities.

- Identify all facilities that have previously received Federal disaster assistance for which insurance was required. Determine if insurance has been maintained. A failure to maintain the required insurance for the hazard that caused the disaster will render ineligible for Public Assistance funding…
- [Communities] must obtain and maintain insurance to cover [their] facility - buildings, equipment, contents and vehicles - for the hazard that caused the damage in order to receive Public Assistance funding. Such coverage must, at a minimum, be in the amount of the eligible project costs. FEMA will not provide assistance for that facility in future disasters if the requirement to purchase insurance is not met. - FEMA Response and Recovery Directorate Policy No. 9580.3, August 23, 2000

In other words, the law expects public agencies to be fully insured as a condition of receiving federal disaster assistance.

Local Implementation

Flood insurance is available in Sacramento County and the City of Sacramento.

NFIP insurance data provided by DWR indicates that as of March 24, 2020, there were 7,497 policies in force in the unincorporated County, resulting in $2,169,765,000 of insurance in force. Of these policies, 6,878 are for residential and 619 are for non-residential properties. There have been 1,747 closed paid losses totaling $24,741,813.70. Of these losses,1,178 were parcels in A zones and 544 parcels were in B, C, or X zone, with 25 claim unknown. Of the 1,747 claims, 1,352 claims were associated with pre-FIRM structures and 370 with post-FIRM structures, with 25 claims unknown. There have been 390 repetitive loss (RL) structures, and 6 severe repetitive loss (SRL) structures in the County with 606 paid losses totaling $14,987,148.49. Of these RL buildings, 187 are in the A zones and 103 are in the B, C, or X zone. There have been 137 substantial damage claims since 1978. Additional information on these policies for Sacramento County are described in Chapter 4 of the Base Plan.

NFIP data indicates that as of March 24, 2020, there were 43,303 flood insurance policies in force in the City with $6,937,000 of coverage. Of the 43,303 policies, 42,269 were residential, while 1,034 were non-residential structures. Of the 43,303 policies, 26,639 were in A zones, while 16,664 were in B, C, and X zones. There has been 1,855 historical claims for flood losses totaling $9,852,037.68. NFIP data further indicates that there are 106 repetitive loss (RL) and no severe repetitive loss (SRL) buildings in Sacramento. There have been 158 RL claims totaling $2,110,551.25. There have been 43 substantial damage claims since 1978. Additional information on these policies for the City of Sacramento are described in the City's Annex.

Both Sacramento County and the City of Sacramento make great efforts on flood insurance promotion. This includes public outreach efforts for flood insurance promotion under both of their CRS PPI programs as well as other outreach efforts as necessary to educate the public on this important mitigation program. More information on flood insurance, the County and City's PPI programs and other public outreach mechanisms regarding flood insurance promotion are included in Chapter 4 of the Base plan and the City's Annex.

CRS Credit

There is no credit for purchasing flood insurance, but the CRS does provide credit for local public information programs that explain flood insurance to property owners. The CRS also reduces the premiums for those people who do buy NFIP coverage.

The Government's Role

Property protection measures are usually considered the responsibility of the property owner. However, local governments should be involved in all strategies that can reduce flood losses, especially acquisition and conversion of a site to public open space. There are various roles a municipality can play in encouraging and supporting implementation of these measures.

One of the first duties of a local government is to protect its own facilities. Fire stations, water treatment plants and other critical facilities should be a high priority for retrofitting projects and insurance coverage. Often public agencies discover after the disaster that their "all-hazard" insurance policies do not cover the property for the type of damage incurred. Flood insurance is even more important as a mitigation measure because of certain Stafford Act provisions.

Providing basic information to property owners is the first step in supporting property protection measures. Owners need general information on what can be done. They need to see examples, preferably from nearby.

Communities can help owners by helping to pay for a retrofitting project. Financial assistance can range from full funding of a project to helping residents find money from other programs. Some communities assume responsibility for sewer backups, street flooding, and other problems that arise from an inadequate public sewer or public drainage system. Less expensive community programs include low interest loans, forgivable low interest loans and rebates. A forgivable loan is one that does not need to be repaid if the owner does not sell the house for a specified period, such as five years. These approaches don't fully fund the project, but they cost the community less and they increase the owner's commitment to the flood protection project. Often, small amounts of money act as a catalyst to pique the owner's interest to get a self-protection project moving.

The more common outside funding sources are listed below. Unfortunately, the last three are only available after a disaster, not before, when damage could be prevented.

Pre-disaster funding sources:

- FEMA's Building Resilient Infrastructure and Communities (BRIC) grants
- FEMA's Flood Mitigation Assistance (FMA) grants

- Community Development Block Grants
- Conservation organizations, although generally these organizations prefer to purchase vacant land in natural areas, not properties with buildings on them.

Post-disaster funding sources:

- Insurance claims
- The NFIP's Increased Cost of Compliance. This provision increases a flood insurance claim payment to help pay for a flood protection project required by code as a condition to rebuild the flooded building. It can also be used to help pay the non-federal cost-share of an elevation project.

Post-disaster funding sources, federal disaster declaration needed:

- FEMA's disaster assistance (for public properties). However, after a flood, the amount of assistance will be reduced by the amount of flood insurance that the public agency should be carrying on the property.
- Small Business Administration disaster loans (for non-governmental properties)
- FEMA's Hazard Mitigation Grant Program

Acquisition Agent

The community can be the focal point in an acquisition project. Most funding programs require a local public agency to sponsor the project. The local government could process the funding application, work with the owners, and provide some, or all, of the local share. In some cases, the local government would be the ultimate owner of the property, but in other cases another public agency could assume ownership and the attendant maintenance responsibilities.

Mandates

Mandates are considered a last resort if information and incentives are insufficient to convince a property owner to take protective actions. An example of a retrofitting mandate is the requirement that communities have to disconnect downspouts from the sanitary sewer line.

There is a mandate for improvements or repairs made to a building in the mapped floodplain. If the project equals or exceeds 50% of the value of the original building, it is considered a "substantial improvement." The building must then be elevated or otherwise brought up to current flood protection codes.

Another possible mandate is to require less expensive hazard protection steps as a condition of a building permit. For example, many communities require upgraded electrical service as a condition of a home improvement project. If a person were to apply for a permit for electrical work, the community could require that the service box be moved above the base flood elevation or the installation of a separate ground fault interrupter circuits in the basement.

Local Implementation

As previously described, both Sacramento County and the City of Sacramento have participated in programs to acquire and/or elevate structures in floodprone areas.

CRS Credit

Except for public information programs, the CRS does not provide credit for efforts to fund, provide incentives, or mandate property protection measures. CRS credits are provided for the actual projects after they are completed. However, to participate in CRS, a community must certify that it has adequate flood insurance on all properties that have been required to be insured. The minimum requirement is to insure those properties in the mapped floodplain that have received federal aid, as specified by the Flood Disaster Protection Act of 1973.

Repetitive Loss Properties and Analysis

Repetitive loss properties deserve special attention because they are more prone to damage by natural hazards than any other properties in the County planning area. Further, protecting repetitive loss buildings is a priority with FEMA mitigation funding programs.

Sacramento County: There have been 390 repetitive loss (RL) structures, and 1 severe repetitive loss (SRL) structure in the County with 606 paid losses totaling $14,987,148.49. Of these RL buildings, 187 are in the A zones and 103 are in the B, C, or X zone. Several more properties within Sacramento County may have reached the damage threshold for Repetitive Loss Properties, but not all properties are covered by flood insurance and flood insurance claims are not submitted for all flood damage sustained. Much more information and analysis of the County's RL properties can be found in Section 4.3.10 of the Base plan and the County's RLAA 2015 Report and 2021Annual Progress Report Update, included as an Appendix to this LHMP.

City of Sacramento: The City has 106 RL structures and no Severe Repetitive Loss structures. There have been 158 RL claims totaling $2,110,551.25. The RL properties are located throughout the city. Repetitive flooding is generally a result of a combination of poor drainage and homes below the street elevation. Drainage improvements in the area have alleviated some of the flooding issues to these RL structures over the years. Citizens are required to have flood insurance in an A zone if they have a federally backed mortgage. Repetitive loss properties are shown in Figure F-39 and detailed in Table F-46 of Annex F of this Plan Update. A more detailed repetitive loss area analyses of the City's repetitive loss properties is located in the City's Annex to this LHMP and in their most recent RLAA Report, also included as an Appendix to this LHMP.

Conclusions and Recommendations

- There are several ways to protect individual properties from damage by natural hazards. The advantages and disadvantages of each should be examined for each situation.
- Property protection measures can protect some of the most damage-prone buildings in the Sacramento County planning area including repetitive loss properties.
- Flood insurance promotion has been effective within both Sacramento County and the City of Sacramento as evidenced by the numbers of flood insurance policies.
- Property owners can implement some property protection measures at little cost, especially for sites in areas of low hazards (e.g., shallow flooding, sewer backup, and thunderstorms). For other measures, such as relocation and elevation, the owners may need financial assistance.
- Local government agencies can promote and support property protection measures through several activities, ranging from public information to financial incentives to full funding.

- Government properties, including critical facilities, should be evaluated to determine the extent to which they are protected from flooding.
- Because properties in floodplains are likely to be damaged at some point, efforts should continue to provide information and advice to floodplain property owners. Special attention should be given to repetitive loss and high hazard areas.
- Public education materials can be developed/enhanced to explain property protection measures that can help owners reduce their exposure to damage by floods and the various types of insurance that are available.
- All property protection projects should be voluntary to be most effective. Other than state and federally mandated regulations, local incentives should be positive as much as possible, such as providing financial assistance.
- A FEMA Hazard Mitigation Assistance (HMA) Grant workshop focused on private firms and citizens could be conducted annually to showcase the assistance that FEMA (HMGP, PDM, FMA, RFC and SRL) provides and to encourage public participation.
- A standard checklist could be developed to evaluate a property's exposure to damage from floods. It should include a review of insurance coverage and identify where more information can be found on appropriate property protection measures. The checklist should be provided to each agency participating in this planning process and made available to the public.
- Sacramento County and the City of Sacramento should evaluate its own properties using the standard checklist. A priority should be placed on determining critical facilities' vulnerability to damage and whether public properties are adequately insured.
- Sacramento County and the City of Sacramento should protect their own publicly owned facilities with appropriate mitigation measures.

C.2.3. Natural Resource Protection

Resource protection activities are generally aimed at preserving (or in some cases restoring) natural areas. These activities enable the naturally beneficial functions of fields, floodplains, wetlands, and other natural lands to operate more effectively. Natural and beneficial functions of watersheds, floodplains and wetlands include:

- Reduction in runoff from rainwater and snow melt in pervious areas
- Infiltration that absorbs overland flood flow
- Removal and filtering of excess nutrients, pollutants and sediments
- Storage of floodwaters
- Absorption of flood energy and reduction in flood scour
- Water quality improvement
- Groundwater recharge
- Habitat for flora and fauna
- Recreational and aesthetic opportunities

As development occurs, many of the above benefits can be achieved through regulatory steps for protecting natural areas or natural functions. The regulatory programs are discussed in Section 4.4, Capability Assessment, of the base plan. This Appendix C covers the resource protection programs and standards that can help mitigate the impact of natural hazards, while they improve the overall environment. Seven areas are reviewed:

- Wetland protection
- Erosion and sedimentation control

- River restoration
- Best management practices
- Dumping regulations
- Urban forestry
- Farmland protection

Wetland Protection

Wetlands are often found in floodplains and depressional areas of a watershed. Many wetlands receive and store floodwaters, thus slowing and reducing downstream flows. They also serve as a natural filter, which helps to improve water quality, and they provide habitat for many species of fish, wildlife and plants.

Wetlands that are determined to be part of the waters of the United States are regulated by the U.S. Army Corps of Engineers and the U.S. Environmental Protection Agency (US EPA) under Section 404 of the Clean Water Act. Before a "404" permit is issued, the plans are reviewed by several agencies, including the Corps and the U.S. Fish and Wildlife Service. Each of these agencies must sign off on individual permits.

There are also nationwide permits that allow small projects that meet certain criteria to proceed without individual permits. Wetlands not included in the Corps' jurisdiction or that are addressed by a nationwide permit may be regulated against by local authorities.

If a permit is issued by the Corps, County, or one of the cities, the impact of the development is typically required to be mitigated. Wetland mitigation can include creation, restoration, enhancement or preservation of wetlands elsewhere. Wetland mitigation is often accomplished within the development site, however, mitigation is allowed off-site and sometimes in another watershed. The appropriate type of mitigation is addressed in each permit.

Some developers and government agencies have accomplished the required mitigation by buying into a wetland bank. Wetland banks are large wetlands created for the purpose of mitigation. The banks accept money to reimburse the owner for setting the land aside from development.

When a wetland is mitigated at a separate site there are drawbacks to consider. First, it takes many years for a new wetland to approach the same quality as an existing one. Second, a new wetland in a different location (especially if it is in a different watershed) will not have the same flood damage reduction benefits as the original one did.

Local Implementation

Sacramento County and the City of Sacramento have ordinances that provide parameters for developing near wetlands. These include requirements for restricting grading and soil disturbances in wetlands, drainage ways, stream environment zones, or water bodies.

CRS Credit

The CRS focuses on activities that directly affect flood damage to insurable buildings. While there is no credit for relying on the Corps of Engineers' 404 regulations, there is credit for preserving open space in its natural condition or restored to a state approximating its natural condition. The credit is based on the

percentage of the floodplain that can be documented as wetlands protected from development by ownership or local regulations. Likewise, there is credit for maintaining water quality buffers that protect streams, rivers, lakes and shorelines in their natural condition or restoring them to an approximate natural state. Credit is also available for an approved habitat conservation plan.

Erosion and Sedimentation Control

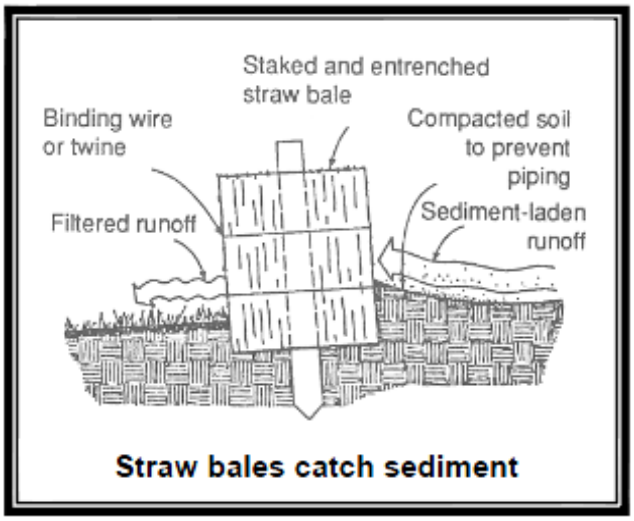
Farmlands and construction sites typically contain large areas of bare exposed soil. Surface water runoff can erode soil from these sites, sending sediment into downstream waterways. Erosion also occurs along stream banks and shorelines as the volume and velocity of flow or wave action destabilize and wash away the soil.

Sediment suspended in the water tends to settle out where flowing water slows down. This can clog storm drains, drain tiles, culverts and ditches and reduce the water transport and storage capacity of river and stream channels, lakes and wetlands. When channels are constricted and flooding cannot deposit sediment in the bottomlands, even more sediment is left in the channels. The result is either clogged streams or increased dredging costs.

Not only are the drainage channels less able to perform their job, but the sediment in the water reduces light, oxygen and water quality, and often carries chemicals, heavy metals and other pollutants. Sediment has been identified by the US EPA as the nation's number one nonpoint source pollutant for aquatic life.

There are two principal strategies to address these problems: minimize erosion and control sedimentation. Techniques to minimize erosion include phased construction, minimal land clearing, and stabilizing bare ground as soon as possible with vegetation and other soil stabilizing practices.

Figure C-8 Erosion Control



If erosion occurs, other measures are used to capture sediment before it leaves the site. Silt fences, sediment traps and vegetated filter strips are commonly used to control sediment transport. Runoff from the site can

be slowed down by terraces, contour strip farming, no-till farm practices, hay or straw bales, constructed wetlands, and impoundments (e.g., sediment basins and farm ponds). Slowing surface water runoff on the way to a drainage channel increases infiltration into the soil and reduces the volume of topsoil eroded from the site.

Erosion and sedimentation control regulations mandate that these types of practices be incorporated into construction plans. The most common approach is to require applicants for permits to submit an erosion and sediment control plan for the construction project. This allows the applicant to determine the best practices for the site.

Local Implementation

Both Sacramento County and the City of Sacramento have comprehensive Stormwater Quality Programs and Erosion and Sediment Control Programs which include ordinances and practices for erosion and sedimentation control. In addition, the South Sacramento Habitat Conservation Plan is a regional approach to addressing issues related to urban development, habitat conservation and agricultural protection. The Plan is still in process with a final draft provided for public review in May 2018.

CRS Credit

Local governments whose ordinances include erosion and sedimentation control provisions can qualify for up to 45 points for this measure.

River Restoration

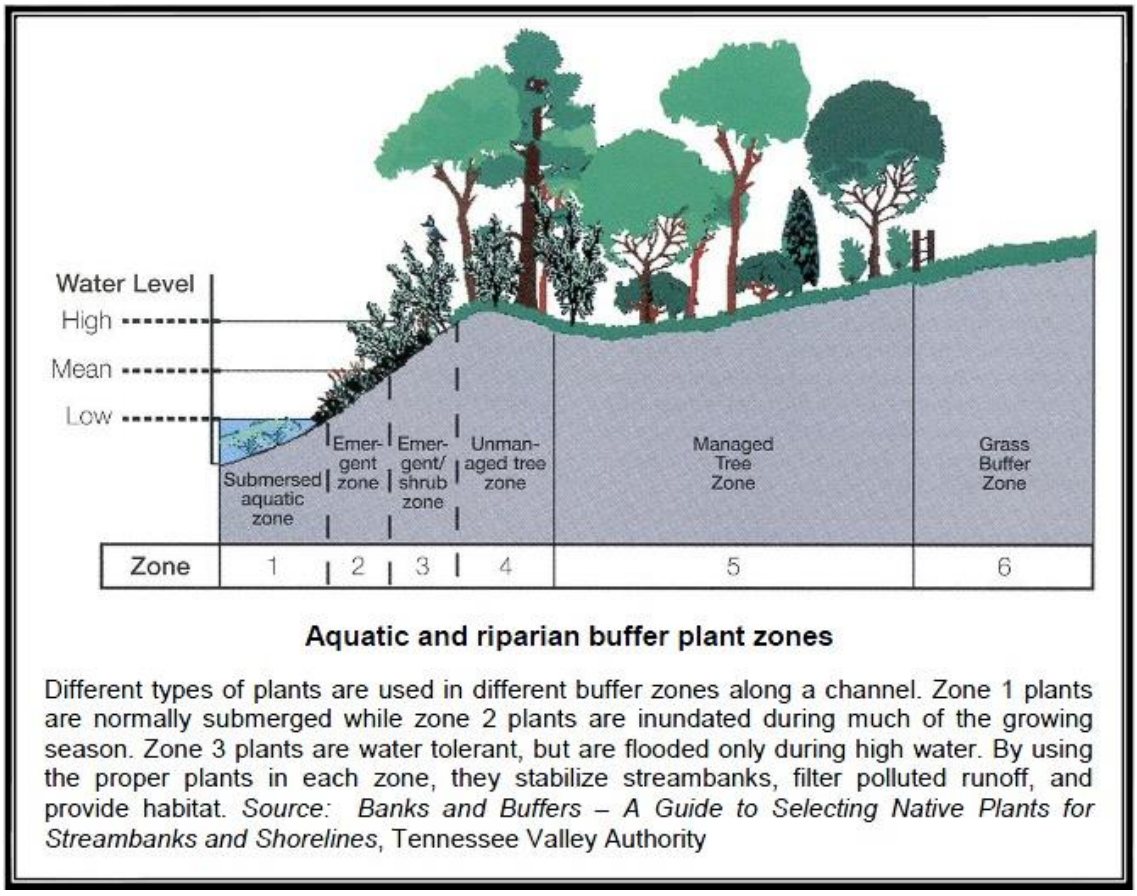
There is a growing movement that has several names, such as "stream conservation," "bioengineering," or "riparian corridor restoration." The objective of these approaches is to return streams, stream banks and adjacent land to a more natural condition, including the natural meanders. Another term is "ecological restoration," which restores native indigenous plants and animals to an area.

A key component of these efforts is to use appropriate native plantings along the banks that resist erosion. This may involve retrofitting the shoreline with willow cuttings, wetland plants, or rolls of landscape material covered with a natural fabric that decomposes after the banks are stabilized with plant roots.

In all, restoring the right vegetation to a stream has the following advantages:

- Reduces the amount of sediment and pollutants entering the water
- Enhances aquatic habitat by cooling water temperature
- Provides food and shelter for both aquatic and terrestrial wildlife
- Can reduce flood damage by slowing the velocity of water
- Increases the beauty of the land and its property value
- Prevents property loss due to erosion
- Provides recreational opportunities, such as hunting, fishing and bird watching
- Reduces long-term maintenance costs

Figure C-9 River Restoration Zones



Aquatic and riparian buffer plant zones

Different types of plants are used in different buffer zones along a channel. Zone 1 plants are normally submerged while zone 2 plants are inundated during much of the growing season. Zone 3 plants are water tolerant, but are flooded only during high water. By using the proper plants in each zone, they stabilize streambanks, filter polluted runoff, and provide habitat. *Source: Banks and Buffers – A Guide to Selecting Native Plants for Streambanks and Shorelines*, Tennessee Valley Authority

Local Implementation

Sacramento County and the City of Sacramento implement a variety of these activities for water quality and floodplain management purposes under many of their existing programs.

CRS Credit

The CRS provides credits for preserving open space in its natural condition or restored to a state approximating its natural condition. There are also credits for channel setbacks, buffers and protecting shorelines. Sacramento County and the City of Sacramento currently receive some credit for open space conservation. Credit is also provided for open space land that is deed restricted

Best Management Practices

Point source pollutants come from pipes such as the outfall of a municipal wastewater treatment plant. They are regulated by the US EPA and the California Department of Water Resources. Nonpoint source pollutants come from non-specific locations and harder to regulate. Examples of nonpoint source pollutants are lawn fertilizers, pesticides, other 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.

The term "best management practices" (BMPs) refers to design, construction and maintenance practices and criteria that minimize the impact of stormwater runoff rates and volumes, prevent erosion, protect natural resources and capture nonpoint source pollutants (including sediment). They can prevent increases in downstream flooding by attenuating runoff and enhancing infiltration of stormwater. They also minimize water quality degradation, preserve beneficial natural features onsite, maintain natural base flows, minimize habitat loss, and provide multiple usages of drainage and storage facilities.

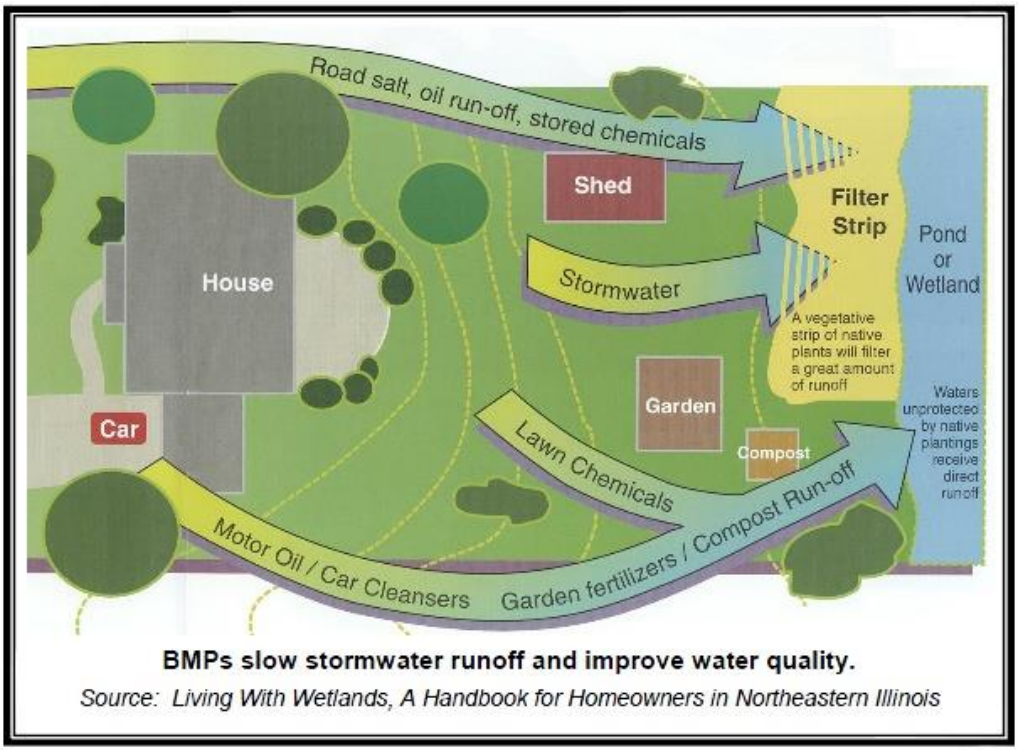
Local Implementation

Sacramento County and the City of Sacramento participate in the National Pollutant Discharge Elimination System permitting program and require BMPs to minimize stormwater impacts.

CRS Credit

A community can receive CRS points if regulations require new developments to include in the design of their permanent stormwater management facilities appropriate BMPs that will improve the quality of surface waters.

Figure C-10 Stormwater Best Management Practices



Dumping Regulations

BMPs usually address pollutants that are liquids or are suspended in water that are washed into a lake or stream. Dumping regulations address solid matter, such as shopping carts, appliances and landscape waste that can be accidentally or intentionally thrown into channels or wetlands. Such materials may not pollute the water, but they can obstruct even low flows and reduce the channels' and wetlands' abilities to convey or clean stormwater.

Many communities have nuisance ordinances that prohibit dumping garbage or other "objectionable waste" on public or private property. Waterway dumping regulations need to also apply to "non-objectionable" materials, such as grass clippings or tree branches, which can kill ground cover or cause obstructions in channels. Regular inspections to catch violations should be scheduled.

Many people do not realize the consequences of their actions. They may, for example, fill in the ditch in their front yard without realizing that is needed to drain street runoff. They may not understand how regarding their yard, filling a wetland, or discarding leaves or branches in a watercourse can cause a problem to themselves and others. Therefore, a dumping enforcement program should include public information materials that explain the reasons for the rules as well as the penalties.

Local Implementation

Sacramento County ordinances makes it unlawful for anyone to deposit waste, trash, or debris into a waterway. Ordinances also prohibits the placing of any obstruction in a floodway, including buildings, fill, or fencing. It is also illegal to dump or discharge hazardous materials, trash, or other pollutants into the storm drains. Even grass, leaves and yard clippings that are repeatedly swept into catch basins can clog the drain, causing flooding and the potential for becoming a breeding ground for rodents and insects. Additionally, when grass and leaves decompose they encourage excessive growth of algae which can deprive fish of adequate oxygen.

The City of Sacramento has regulations that make it illegal for anyone to accumulate, store, keep, throw, place, deposit, or dump refuse in any water or waterway, or upon the levees or banks adjacent thereto. The City also has regulations prohibiting the discharge of trash and pollutants into storm drains.

Both the City and County publicize this information on their local websites and through other outreach mechanisms.

CRS Credit

The CRS provides credit for enforcing and publicizing a regulation that prohibits dumping in the drainage system.

Farmland Protection

Farmland protection is quickly becoming an important piece of comprehensive planning and zoning throughout the United States. The purpose of farmland protection is to provide mechanisms for prime,

unique, or important agricultural land to remain as such, and to be protected from conversion to nonagricultural uses.

Frequently, farm owners sell their land to residential or commercial developers and the property is converted to non-agricultural land uses. With development comes more buildings, roads and other infrastructure. Urban sprawl occurs, which can lead to additional stormwater runoff and emergency management difficulties.

Figure C-11 Floodplain Damages to Farmland

Farms on the edge of cities are often appraised based on the price they could be sold for to urban developers. This may drive farmers to sell to developers because their marginal farm operations cannot afford to be taxed as urban land. The Farmland Protection Program in the United States Department of Agriculture's 2002 Farm Bill (Part 519) allows for funds to go to state, tribal, and local governments as well as nonprofit organizations to help purchase easements on agricultural land to protect against the development of the land. Eligible land includes cropland, rangeland, grassland, pastureland, or forest land that is part of an agricultural operation. Certain lands within historical or archaeological resources are also included.

The hazard mitigation benefits of farmland protection are similar to those of open space preservation:

- Farmland is preserved for future generations,
- Farmland in the floodplain keeps damageable structures out of harm's way,
- Farmland keeps more stormwater on site and lets less stormwater runoff downstream,
- Rural economic stability and development is sustained,
- Ecosystems are maintain, restored or enhanced, and
- The rural character and scenic beauty of the area is maintained.

Local Implementation

Sacramento County currently implements the Williamson Land Conservation Act. This Act was passed by the California legislature to preserve agricultural and other open space lands. It was originally drafted to slow the loss of prime agricultural land, regardless of soil quality. In addition, it now provides protection

for wild life habitats, marshlands, salt flats and certain scenic highways. The Act authorizes local governments and property owners to commit land to specified uses of twenty years or more under a binding contract. Once committed, the land is to be valued as open space land pursuant to open space valuation laws (Revenue & Taxation Code Sections 421, et seq.) enacted pursuant to the Open Space Amendment of the California Constitution.

The City of Sacramento has a similar Urban Agriculture Incentive Zone, intended to promote urban agriculture by providing property tax incentives.

CRS Credit

Credit is given for preserving open space in the floodplain, regardless of why it is being preserved. Credit is also provided for density zoning of floodprone areas.

Conclusions and Recommendations

- A hazard mitigation program can use resource protection programs to support protecting areas and natural features that can mitigate the impacts of natural hazards.
- Sacramento County and the City of Sacramento enforce regulations that prohibit illicit discharges into public sewers or onto public or private property.
- Preserving farmland in the floodplain will maintain open space and prevent damage to homes, businesses, and other development.
- The public and decision makers should be informed about the hazard mitigation benefits of restoring rivers, wetlands and other natural areas. Restoration and protection techniques should be explained.
- Sacramento County and the City of Sacramento may consider publicizing their illicit discharge rules more widely.
- Public outreach activities should include informing the public about the need to protect streams and wetlands from dumping and inappropriate development and the relevant codes and regulations.

C.2.4. Emergency Services Measures

Emergency services measures protect people during and after a disaster. A good emergency management program addresses all hazards, and it involves all local government departments. At the state level, emergency services programs are coordinated by the California Office of Emergency Services (Cal OES). Locally, emergency services are coordinated by the Sacramento County Office of Emergency Services and the City of Sacramento Office of Emergency Services.

This section reviews emergency services measures following a chronological order of responding to an emergency. It starts with identifying an impending problem (threat recognition) and continues through post-disaster activities.

Threat Recognition

The first step in responding to a flood, storm, or other natural hazard is to know when weather conditions are such that an event could occur. With a proper and timely threat recognition system, adequate warnings can be disseminated.

Routine Monitoring for Alerts, Watches and Warnings

Emergency officials constantly monitor events and the environment to identify specific threats that may affect their jurisdiction and increase awareness levels of emergency personnel and the community when a threat is approaching or imminent.

The National Weather Service (NWS) is the prime agency for detecting meteorological threats, such as tornadoes, thunderstorms and winter storms. Severe weather warnings are transmitted through NOAA's Weather Radio System. Federal agencies can only look at the large scale, e.g., whether conditions are appropriate for the formation of a thunderstorm. Local emergency managers can provide more site-specific and timely recognition by sending out NWS trained spotters to watch the skies when the Weather Service issues a watch or a warning. The NWS page for Sacramento County is accessible through the Sacramento County website and at the following: http://forecast.weather.gov/MapClick.php?zoneid=CAZ017.

A flood threat recognition system predicts the time and height of a flood crest. This can be done by measuring rainfall, soil moisture, and stream flows upstream of the community and calculating the subsequent flood levels.

On larger rivers, this measuring and calculating is performed by the NWS, a part of the U.S. Department of Commerce's National Oceanic and Atmospheric Administration (NOAA). Support for NOAA's efforts is provided by cooperating partners from state and local agencies. Forecasts of expected river stages are made through the Advanced Hydrologic Prediction Service (AHPS) of the National Weather Service. Flood threat predictions are disseminated on the NOAA Weather Wire or NOAA Weather Radio. NOAA Weather Radio is considered by the federal government as the official source for weather information.

On smaller rivers, locally established rainfall and river gauges are needed to establish a flood threat recognition system. The NWS may issue a "flash flood watch." This is issued to indicate current or developing hydrologic conditions that are favorable for flash flooding in and close to the watch area, but the occurrence is neither certain nor imminent. These events are so localized and so rapid that a "flash flood warning" may not be issued, especially if no remote threat recognition equipment is available. In the absence of a gauging system on small streams, the best threat recognition system is to have local personnel monitor rainfall and stream conditions. While specific flood crests and times will not be predicted, this approach will provide advance notice of potential local or flash flooding.

Local Implementation

Sacramento County and City of Sacramento Emergency Operations Plan's (EOP), include procedures for threat identification. The City and County work closely with the NWS for issuing an Emergency Alert System (EAS). Additional Sacramento County's threat identification mechanisms include:

California Data Exchange Center (CDEC). The CDEC provides information for flood forecasting information at http://cdec.water.ca.gov/. The CDEC installs, maintains, and operates an extensive hydrologic data collection network including automatic snow reporting gages for the Cooperative Snow Surveys Program and precipitation and river stage sensors for flood forecasting.

Automated Local Evaluation in Real Time (ALERT) System. ALERT was created by the NWS to provide continuous and automatic reports from river levels and rainfall gauges detect impending high water levels. ALERT information includes:

- Rainfall Summary
- Stage Summary
- Storm Ready
- Sandbag Information
- Detailed Forecast
- Quantitative Precipitation Forecasts (QPF)
- NWS River Forecasts

The Sacramento County's ALERT system consists of 2 base stations, and 50 gaging stations. The purpose of the County's ALERT website is to provide real time monitoring information to stage and rainfall information during storm events, which assist in informing the activation of additional warning and potential evacuation of affected areas. This information which can be accessed through the Sacramento County website includes information for: Stream Level Summaries and Maps; and Rainfall Summaries and Maps.

Dam Protocols. Should an event trigger the activation of an Emergency Action Plan (EAP) for a potential dam failure, County OES receives this information via direct phone calls from the originating source/agency or from PCSO Dispatch and/or Cal OES. County OES then follows the notification and evacuation procedures called for in the EAP.

Increased Readiness & Pre-Impact

Early threat identification and sufficient warning provides the opportunity for response agencies to increase readiness, which are actions designed to increase an agency's ability to effectively respond once the emergency occurs. This includes steps to brief key officials, disseminating information to the community, and through activation of EOCs, as necessary.

Community Preparedness and Awareness

Emergency public information is a priority during emergencies and disasters. County and City governments have a primary responsibility to provide accurate and timely information to the public regarding conditions, threats, and protective measures. Emergency information is best communicated when centralized and coordinated among all involved jurisdictions, agencies, and organizations.

The public's response to any emergency is based on an understanding of the nature of the emergency, the potential hazards, the likely response of emergency services, and knowledge of what individuals and groups should do to increase their chances of survival and recovery. Effective public awareness and education prior to an emergency or a disaster will directly affect the Sacramento County/City's emergency operations response and recovery efforts.

CRS Credit

Credit can be received for using river flood stage predictions for the NWS's gages. The actual score is based on how much of the community's floodplain is affected by these systems. Potential CRS credit is possible under Activity 610 - Flood Warning Program and Response.

Notifications and Warning Systems

Once a disaster is imminent, action is taken to control the situation, save lives, protect property, and minimize the effects of the disaster. During this phase, warning systems are activated; resources and first responders notified and mobilized; and evacuations begin.

After a threat recognition system tells the emergency services office that a flood, severe weather or other hazard is coming, the next step is to notify the public and staff of other agencies and critical facilities. Providing adequate and timely notification to the public is the greatest challenge, especially with sudden or no-notice events. The earlier and more specific the warning, the greater the number of people that can implement protection measures.

As previously described, the NWS issues notices to the public using two levels of notification:

- **Watch.** Conditions are right for flooding, thunderstorms, or other hazard event.
- **Warning**. A flood or other event has started or been observed.

A more specific warning may be disseminated by the community in a variety of ways. The following are the more common methods:

- Commercial or public radio or TV stations
- The Weather Channel
- Cable TV emergency news inserts
- Telephone trees/mass telephone notification
- NOAA Weather Radio
- Tone activated receivers in key facilities
- Outdoor warning sirens
- Sirens on public safety vehicles
- Door-to-door contact
- Mobile public address systems
- Email notifications

Multiple or redundant systems are most effective - if people do not hear one warning, they may still get the message from another part of the system. Each has advantages and disadvantages:

- Radio and television provide a lot of information, but people have to know when to turn them on. They are most appropriate for hazards that that develop over more than a day, such as a tropical storm, hurricane, or winter storm.
- NOAA Weather Radio can provide short messages of any impending weather hazard or emergency and advise people to turn on their televisions for more information, but not everyone has a Weather Radio.
- Outdoor warning sirens can reach many people quickly as long as they are outdoors. They do not reach people in tightly-insulated buildings or those around loud noise, such as at a factory, during a

thunderstorm, or in air conditioned homes. They do not explain what hazard is coming, but people should know to turn on a radio or television when they hear the siren.
- Automated telephone notification services are also fast, but can be expensive and do not work when phone lines are down. Nor do they work for unlisted numbers, call screening services, or cellular service, unless people sign up for notifications.
- Where a threat has a longer lead time, going door-to-door and manual telephone trees can be effective.

Just as important as issuing a warning is telling people what to do in case of an emergency. A warning program should have a public information aspect. Citizens should know the difference between a tornado warning (when they should seek shelter in a low spot), a flood warning (when they should stay out of low areas), and other appropriate warnings and responses.

StormReady

The National Weather Service established the StormReady program to help local governments improve the timeliness and effectiveness of hazardous weather related warnings for the public. To be officially StormReady, a community must:

- Establish a 24-hour warning point and emergency operations center,
- Have more than one way to receive severe weather warnings and forecasts and to alert the public,
- Create a system that monitors weather conditions locally,
- Promote the importance of public readiness through community seminars, and
- Develop a formal hazardous weather plan, which includes training severe weather spotters and holding emergency exercises.

Being designated a StormReady community by the National Weather Service is a good measure of a community's emergency warning program for weather hazards. It is also credited by the CRS.

Local Implementation

In coordination with established public safety warning protocols, the activated EOCs for Sacramento County and the City of Sacramento will manage the dissemination of timely and adequate warnings to threatened populations in the most direct and effective means possible. Depending upon the threat and time availability, the County and City EOCs will initiate alerts and warnings utilizing any of the following methods:

- Activation of the Emergency Alert System (EAS)
- Activation of the Telephonic Alert and Warning System (Everbridge and Reverse 911)
- Activation of the Emergency Digital Information System (EDIS)
- Activation of the California Law Enforcement Mutual Aid Radio System (CLEMARS)
- Media broadcast alerts.
- Commercial or public radio or TV stations
  - ✓ Radio: KFBK 1530 am, KSTE 650, KGBY, 92.5 FM
  - ✓ TV: KCRA Channel 3, www.KCRA.com; KXTV Channel 10; KOVR Channel 13; KTXL Channel 40
- NOAA Weather Radio
- www.saccounty.net; SacramentoReady.org websites
- 211/311 Sacramento

- CalTrans 511
- Telephone trees/mass telephone notifications
- Tone activated receivers in key facilities
- Fire and Law enforcement loudspeakers
- Outdoor warning sirens
- Mobile public address sirens/systems
- Door-to-door contact
- Vulnerable population databases
- Email notifications

Sacramento ALERT

The Sacramento County OES, in partnership with Yolo and Placer emergency agencies, use a state-of-the-art emergency alert system known as Sacramento Alert. The system provides information to residents about emergency events quickly and through a variety of communication methods.

The alert system currently includes all listed and unlisted landline telephone numbers in Yolo, Placer, and Sacramento counties that are serviced by AT&T and Verizon.

To ensure emergency notices are received quickly both at work and home, residents are encouraged to log onto the Sacramento Alert Self- Registration Portal and provide phone numbers for both home and work, including land and cell phone numbers, email addresses, TTY device information and instant messaging information.

Residents will only receive alerts that are critical and time-sensitive, including: flooding, levee failures, severe weather, disaster events, unexpected road closures, missing persons, and evacuations of buildings or neighborhoods in specific geographic locations.

The system, which uses Everbridge Alert and Notifications System, was made possible for all three counties by a grant from CAL OES and supported by CA Department of Water Resources, Flood Operations Center through the Sacramento County OES.

In addition, both Sacramento County and the City of Sacramento are StormReady certified.

CRS Credit

Community Rating System points are based on the number and types of warning media that can reach the community's flood prone population. Depending on the location, communities can receive credit for the telephone calling system and more points if there are additional measures, like telephone trees. Being designated as a StormReady community can provide additional points. These credits are in Activity 610 - Flood Warning Program and Response.

Response

The protection of life and property is the most important task of emergency responders. Concurrent with threat recognition and issuing warnings, a community should respond with actions that can prevent or reduce damage and injuries. Typical actions and responding parties include the following:

- Activating the emergency operations center (emergency preparedness),
- Closing streets or bridges (police or public works),
- Shutting off power to threatened areas (utility company),
- Passing out sand and sandbags (public works),
- Holding children at school or releasing children from school (school superintendent),
- Opening evacuation shelters (the American Red Cross),
- Monitoring water levels (public works), and
- Establishing security and other protection measures (police).

An emergency action plan ensures that all bases are covered and that the response activities are appropriate for the expected threat. These plans are developed in coordination with the agencies or offices that are given various responsibilities.

A flood stage forecast map shows areas that will be under water at various flood stages. Different flood levels are shown as color coded areas, so the emergency manager can quickly see what will be affected. Emergency management staff can identify the number of properties flooded, which roads will be under water, which critical facilities will be affected, and who to warn. With this information, an advance plan can be prepared that shows problem sites and determines what resources will be needed to respond to the predicted flood level.

Emergency response plans should be updated annually to keep contact names and telephone numbers current and to ensure that supplies and equipment that will be needed are still available. They should be critiqued and revised after disasters and exercises to take advantage of the lessons learned and of changing conditions. The end result is a coordinated effort implemented by people who have experience working together so that available resources will be used in the most efficient manner possible.

Local Implementation

Sacramento County OES and City of Sacramento OEM have established response protocols to be followed for any given event. Response is provided cooperation with the County Sherriff, city police, and fire departments. The County and City EOPs address the planned response to emergency situations associated with natural disasters and emergencies in or affecting the area. The EOPs are intended to facilitate multi-agency and multi-jurisdictional coordination in emergency operations. They seek to mitigate the effects of hazards, prepare for measures to be taken which will preserve life and minimize damage, enhance response during emergencies and provide necessary assistance, and establish a recovery system to return the County the local jurisdictions to their normal state of affairs.

CRS Credit

The CRS program provides credit under Activity 610- Flood Warning for a warning system that effectively notifies residents of a flood and has procedures for testing and monitoring the system.

Evacuation and Shelter

According to Emergency Management: Principles and Practice, the principle of evacuation is to move citizens from a place of relative danger to a place of relative safety, via a route that does not pose significant danger. There are six key components to a successful evacuation:

- Adequate warning
- Adequate routes
- Proper timing to ensure the routes are clear
- Traffic control
- Knowledgeable travelers
- Care for special populations (e.g., the handicapped, prisoners, hospital patients, and schoolchildren)

Those who cannot get out of harm's way need shelter. Typically, the American Red Cross will staff a shelter and ensure that there is adequate food, bedding, and wash facilities. Shelter management is a specialized skill. Managers must deal with problems like scared children, families that want to bring in their pets, and the potential for an overcrowded facility.

Local Implementation

The County and City both maintain Evacuation Plans that outline strategies and protocols for medium to high-level (catastrophic) evacuation events in the County. These plans also include procedures for sheltering to provide people affected by a disaster with a safe, temporary place to be housed during or immediately after a disaster until they can either return to their homes or be relocated to other housing facilities. Highlights of these County/City plans are detailed below.

Sacramento County

Sacramento County's Evacuation Plan, 2018, is an annex to the County 2017 EOP. The purpose of the Evacuation Plan is to document agreed upon strategy for the County's response to emergencies that involve the evacuation of persons from an impacted area to a safe area. This involves coordination and support for the safe and effective evacuation of the general population and for those who need additional support to evacuate, such as health care facilities and schools. This plan also includes considerations for shelter-in-place options, in circumstances where evacuation may be a higher risk option. The County's Evacuation Plan identifies criteria and triggers for determining what level of evacuation is warranted; information on transportation and evacuation movement control; and roles and responsibilities of agencies/organizations supporting the evacuation.

City of Sacramento

The City EOP identifies roles and responsibilities for coordinating evacuation in the City. Evacuation routes are established for 20 areas within the City. The City Law Enforcement Branch has the responsibility to coordinate area evacuations. Wide-spread evacuations are coordinated with County OES and other local and regional agencies.

Rescue and Evacuation Planning

The City has also established guidelines that focus on public safety during a flood event as an amendment (Appendix K) to its floodplain ordinance. This includes City guidelines for public refuge areas and evacuation locations for rescue areas are based on potential flood depths from the time of levee failure.

Rescue and evacuation planning analysis and maps have been developed based on several levee break scenarios and are being used to support these public safety measures during a levee failure event and include development guidelines to address:

- Refuge and staging locations with exits (e.g., second floor areas with windows or balconies
- Exit locations when the way out is in an extraordinary location for persons with disabilities (e.g., a roof hatch)
- Evacuation points/routes for transport to safety

CRS Credit

Because it is primarily concerned with protecting insurable buildings, the CRS does not provide any special credit for evacuation or sheltering of people (minimal credit is given in Activity 510 - Floodplain Management for evacuation policies and procedures). It is assumed that the emergency response plan would include all necessary actions in response to a flood.

Post-Disaster Recovery and Mitigation

After a disaster, communities should undertake activities to protect public health and safety and facilitate recovery. Appropriate measures include:

- Patrolling evacuated areas to prevent looting,
- Providing safe drinking water,
- Monitoring for diseases,
- Vaccinating residents for tetanus and other diseases,
- Clearing streets, and
- Cleaning up debris and garbage.

Throughout the recovery phase, everyone wants to get "back to normal." The problem is that "normal" means the way they were before the disaster, exposed to repeated damage from future disasters. There should be an effort to help prepare people and property for the next disaster. Such an effort would include:

- Public information activities to advise residents about mitigation measures they can incorporate into their reconstruction work,
- Evaluating damaged public facilities to identify mitigation measures that can be included during repairs,
- Identifying other mitigation measures that can lessen the impact of the next disaster,
- Acquiring substantially or repeatedly damaged properties from willing sellers,
- Planning for long-term mitigation activities, and
- Applying for post-disaster mitigation funds.

Regulating Reconstruction

Requiring permits for building repairs and conducting inspections are vital activities to ensure that damaged structures are safe for people to reenter and repair. There is a special requirement to do this in floodplains, regardless of the type of disaster or the cause of damage. The NFIP requires that local officials enforce the substantial damage regulations. These rules require that if the cost to repair a building in the mapped floodplain equals or exceeds 50% of the building's market value, the building must be retrofitted to meet

the standards of a new building in the floodplain. In most cases, this means that a substantially damaged building must be elevated above the base flood elevation.

This requirement can be very difficult for understaffed and overworked offices following a disaster. However, if these activities are not carried out properly, not only does the community miss a tremendous opportunity to redevelop or clear out a hazardous area, it may be violating its obligations under the NFIP. In some areas, mutual aid agreements have been established so building inspectors from a community not affected by the disaster can work in the communities that were hit the hardest.

Local Implementation

Sacramento County and City of Sacramento EOPs have post-disaster recovery policies in place for the communities. The EOPs are intended to facilitate multi-agency and multi-jurisdictional coordination during emergencies including hazard events. Through it policies and procedures it seeks to mitigate the effects of hazards, prepare for measures to be taken which will preserve life and minimize damage, enhance response during emergencies and provide necessary assistance, and establish a recovery system in order to return the community to their normal state of affairs. The County and City recently updated their EOPs in 2017. Post disaster recovery procedures for all hazards, including flood, are addressed the EOPs and are detailed further in Section 4.4 of the Base Plan and the City's Annex to this LHMP.

CRS Credit

The CRS does credit post-disaster mitigation procedures if the policies and procedures are incorporated into a flood mitigation or multi-hazard plan through Activity 510 - Floodplain Management Planning.

Conclusions and Recommendations

- There are several threat recognitions systems that can provide the County and City with advance notice of an impending emergency.
- Sacramento County and the City of Sacramento depend on local media outlets, sirens, telephones and door-to-door notices to warn residents. These media should reach most people who need to know of a threat. Consideration should be given to reach special populations that may require additional or different methods.
- Emergency management guidance could be very helpful when things happen quickly and for hazards that have predictable impacts, such as flooding.
- Sacramento County and the City of Sacramento should update and exercise their EOPs on a regular basis.
- Sacramento County, the City of Sacramento, and County jurisdictions should continue to work together to protect people before and after a disaster including an outreach program to promote each community's warning system.

C.2.5. Flood Control Measures

Four general types of flood control projects are reviewed here: levees, reservoirs, diversions, and dredging. These projects have three advantages not provided by other mitigation measures:

- They can stop most flooding, protecting streets and landscaping in addition to buildings,

- Many projects can be built without disrupting citizens' homes and businesses, and
- They are constructed and maintained by a government agency, a more dependable long-term management arrangement than depending on many individual private property owners.

However, as shown below, structural measures can have shortcomings. The appropriateness of using flood control depends on individual project area circumstances.

Pros and Cons of Structural Flood Control Projects

- Advantages
  - ✓ They may provide the greatest amount of protection for land area used.
  - ✓ Because of land limitations, they may be the only practical solution in some circumstances.
  - ✓ They can incorporate other benefits into structural project design, such as water supply and recreational uses.
  - ✓ Regional detention may be more cost-efficient and effective than requiring numerous small detention basins.

- Disadvantages
  - ✓ They can disturb the land and disrupt the natural water flows, often destroying wildlife habitat.
  - ✓ They require regular maintenance, which if neglected can have disastrous consequences.
  - ✓ They are built to a certain flood protection level that can be exceeded by larger floods, causing extensive damage.
  - ✓ They can create a false sense of security, as people protected by a project often believe no flood can ever reach them.
  - ✓ Although it may be unintended, in many circumstances they promote more intensive land use and development in the floodplain.

Levees and Floodwalls

Probably the best known flood control measure is a barrier of earth (levee) or concrete (floodwall) erected between the watercourse and the property to be protected. Levees and floodwalls confine water to the stream channel by raising its banks. They must be well designed to account for large floods, underground seepage, pumping of internal drainage, and erosion and scour. Key considerations when evaluating the use of a levee include:

- Design and permitting costs,
- Right of way acquisition,
- Removal of fill to compensate for the floodwater storage that will be displaced by the levee,
- Internal drainage of surface flows from the area inside the levee,
- Cost of construction,
- Cost of maintenance,
- Mitigation of adverse impacts to wetlands and other habitats,
- Loss of river access and views, and
- Creating a false sense of security, because while levees may reduce flood damage for smaller more frequent rain events, they may also overtop or breach in extreme flood events and subsequently create more flood damage than would have occurred without the levee.

Levees placed along the river or stream edge can degrade the aquatic habitat and water quality of the stream. They also are more likely to push floodwater onto other properties upstream or downstream. To reduce environmental impacts and provide multiple use benefits, a setback levee is often the best project design. The area inside a setback levee can provide open space for recreational purposes and provide access sites to the river or stream.

Floodwalls perform like levees except they are vertical-sided structures that require less surface area for construction. Floodwalls are constructed of steel sheet pile or reinforced concrete, which makes the expense of installation cost prohibitive in many circumstances. Floodwalls also can degrade adjacent habitat and can displace erosive energy to unprotected areas of shoreline downstream.

Reservoirs and Detention

Reservoirs reduce flooding by temporarily storing flood waters behind dams or in storage or detention basins. Reservoirs lower flood heights by holding back, or detaining, runoff before it can flow downstream. Flood waters are detained until the flood has subsided, and then the water in the reservoir or detention basin is released or pumped out slowly at a rate that the river can accommodate downstream.

Reservoirs can be dry and remain idle until a large rain event occurs. Or they may be designed so that a lake or pond is created. The lake may provide recreational benefits or water supply (which could also help mitigate a drought).

Flood control reservoirs are most commonly built for one of two purposes. Large reservoirs are constructed to protect property from existing flood problems. Smaller reservoirs, or detention basins, are built to protect property from the stormwater runoff impacts of new development.

Figure C-12 Retention Pond

Retention pond

Regardless of size, reservoirs protect the development that is downstream from the reservoir site. Unlike levees and channel modifications, they do not have to be built close to or disrupt the area to be protected. Reservoirs are most efficient in deeper valleys where there is more room to store water, or on smaller rivers where there is less water to be stored.

In urban areas, some reservoirs are simply manmade holes, excavated to store floodwaters. Reservoirs in urban areas are typically constructed adjacent to streams (though usually outside of the floodplain). When built in the ground, there is no dam for these retention and detention basins and no dam failure hazard. Wet or dry basins can also serve multiple uses by doubling as parks or other open space uses.

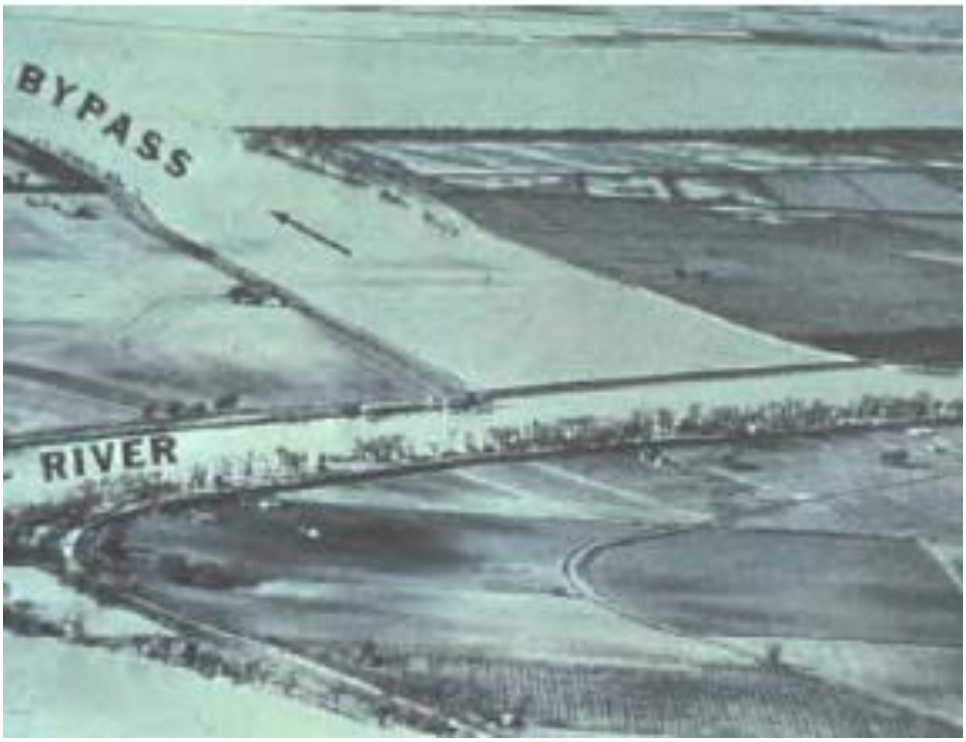
There are several considerations when evaluating the use of reservoirs and detention:

- There is the threat of flooding the protected area should the reservoir's dam fail,
- There is a constant expense for the management and maintenance of the facility,
- They may fail to prevent floods that exceed their design levels,
- Sediment deposition may occur and reduce the storage capacity over time,
- They can impact water quality as they are known to affect temperature, dissolved oxygen and nitrogen, and nutrient levels, and
- If not designed correctly, in-stream reservoirs may cause backwater flooding problems upstream

Diversion

A diversion is a new channel that sends floodwaters to a different location, thereby reducing flooding along an existing watercourse. Diversions can be surface channels, overflow weirs, or tunnels. During normal flows, the water stays in the old channel. During floods, the floodwaters spill over to the diversion channel or tunnel, which carries the excess water to a receiving lake or river.

Figure C-13 Diversion



Diversions are limited by topography; they will not work in some areas. Unless the receiving water body is relatively close to the floodprone stream and the land in between is low and vacant, the cost of creating a diversion can be prohibitive.

Dredging

Dredging is often viewed as a form of conveyance improvement. However, it has the following problems:

- Given the large volume of water that comes downstream during a flood, removing a foot or two from the bottom of the channel will have little effect on flood heights.
- Dredging is often cost prohibitive because the dredged material must be disposed of somewhere.
- Unless in-stream or tributary erosion is corrected upstream, the dredged areas usually fill back in within a few years, and the process and the expense have to be repeated.
- If the channel has not been disturbed for many years, dredging will destroy the habitat that has developed.

Figure C-14 Dredging Activity

To protect the natural values of the stream, federal law requires a U.S. Army Corps of Engineers permit before dredging can proceed. This can be a lengthy process that requires a lot of advance planning and many safeguards to protect habitats, which adds to the cost of the project.

CRS Credit

Structural flood control projects that provide 100-year flood protection and that result in revisions to the Flood Insurance Rate Map are not credited by the CRS in order to avoid duplicating the larger premium reduction provided by removing properties from the mapped floodplain.

The CRS credits smaller flood control projects that meet the following criteria:

- They must provide protection to at least the 25-year flood,
- They must meet certain environmental protection criteria,
- They must meet federal, state and local regulations, such as the Corps of Engineers' 404 permit and California Division of Dam Safety for dam safety rules, and
- They must meet certain maintenance requirements.

These criteria ensure that credited projects are well-planned and permitted. Any of the measures reviewed in this section would be recognized under Activity 530 - Flood Protection, although it would be very hard to qualify a dredging project. Credit points are based on the type of project, how many buildings are protected, and the level of flood protection provided.

Local Implementation

Much of the City of Sacramento and areas of Sacramento County are dependent on levees and other flood control structures to prevent flooding as previously described in this LHMP. In the aftermath of the 1986 floods, several flood control projects were identified to address the flood risks in the Sacramento area. Some of these projects were designed to correct structural deficiencies observed during the flood, while other projects were added once the water had receded and revealed levee conditions. The 1997 flood event also highlighted additional deficiencies that are now being corrected to increase the level of community flood protection. Flood control projects continue in the Planning Area with numerous levee improvement projects underway to provide 100- or 200- year level of protection depending on the requirements.

Conclusions and Recommendations

- In coordination with California Department of Water Resources and the Sacramento Area Flood Control District (SAFCA), flood control and drainage facilities are being brought to current standards of flood protection and prevention.
- Sacramento County, the City of Sacramento, other cities, and special districts should continue to evaluate and implement countywide flood control and drainage improvement projects to reduce the potential from future flooding.

C.2.6. Public Information Measures

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

Information can bring about voluntary mitigation activities at little or no cost to the government. Property owners mitigated their flooding problems long before government funding programs existed. The typical approach to delivering information involves two levels of activity. The first is to broadcast a short and simple version of the message to everyone potentially affected. The second level provides more detailed information to those who respond and want to learn more.

This section starts with activities that reach out to people and tell them to be advised of the hazards and some of the things they can do. It then covers additional sources of information for those who want to learn more. It ends with a general public information strategy.

Outreach Projects

Outreach projects are the first step in the process of orienting property owners to the hazards they face and to the concept of property protection. They are designed to encourage people to seek out more information in order to take steps to protect themselves and their properties.

Research has shown that outreach projects work. However, awareness of the hazard is not enough; people need to be told what they can do about the hazard. Thus, projects should include information on safety, health and property protection measures. Research has also shown that a properly run local information program is more effective than national advertising or publicity campaigns. Therefore, outreach projects should be locally designed and tailored to meet local conditions.

Community newsletters/direct mailings: One of the more effective types of outreach projects include mailings or distributions to everyone in the community. In the case of floods, they may be sent only to floodplain property owners.

News media: Local newspapers can be strong allies in efforts to inform the public. Press releases and story ideas may be all that's needed to gain their interest. After a flood in another community, people and the media become interested in their flood hazard and how to protect themselves and their property. Local radio stations and cable TV channels can also help. These media offer interview formats and cable TV may be willing to broadcast videos on the hazards.

Other approaches: Examples of other outreach projects include:

- Presentations at meetings of neighborhood, civic or business groups,
- Displays in public buildings or shopping malls,
- Signs in parks, along trails and on waterfronts that explain the natural features (such as the river) and their relation to the hazards (such as floods),
- Social Media broadcasts,
- Brochures available in municipal buildings and libraries, and
- Special meetings, workshops and seminars.

Local Implementation

Sacramento County and the City of Sacramento maintain websites that provides in-depth flood protection information. The County and City also provide direct mailings annually to residents, with a focus on repetitive loss areas, which include flyers on flood protection and property protection measures. The County and City also provides direct mailings on flood protection information to insurance brokers and realtors located throughout the community. In addition, the County's water resources and stormwater groups and the City's utility department also conduct and participate in a variety of public community events throughout the year such as community fairs, river cleanups, etc. and provide information to the public on stormwater management and flood protection measures. The County and City also have a variety of flood materials placed in public locations.

In addition, both the County and City have established Programs for Public Information (PPI) that are being implemented and contain a variety of focused flood outreach efforts as described further in Section 4.4 of the Base plan and the City's Annex to this LHMP.

CRS Credit

The Community Rating System provides credit for outreach projects which cover six flood-related topics. Credit is also available for producing flood response materials. Another way to achieve credit for outreach is for producing a PPI. A 40% bonus is applied to outreach credits which are included in a PPI.

Real Estate Disclosure

Many times after a flood or other natural disaster, people say they would have taken steps to protect themselves if they had known they had purchased a property exposed to a hazard. There are some federal and state requirements about such disclosures, but they have their limits.

Federal law: Federally regulated lending institutions must advise applicants for a mortgage or other loan that is to be secured by an insurable building whether the property is in a floodplain as shown on the Flood Insurance Rate Map. If so, flood insurance is required for buildings located within the floodplain if the mortgage or loan is federally insured. However, because this requirement has to be met only 10 days before closing, the applicant is often already committed to purchasing the property when he or she first learns of the flood hazard.

State law: State laws set standards for real estate sales and licensing of agents and brokers.

Local Implementation

Sacramento County and the City of Sacramento receive credit for providing for the local real estate agents disclosure of flood hazards to prospective buyers. Credit is also provided for state and community regulations requiring disclosure of flood hazards.

CRS Credit

Communities in areas that have additional disclosure requirements are eligible for five points under the "Other disclosure requirements" as well as 10 points for the "Disclosure of other hazards."

Libraries and Websites

The two previous activities tell people that they are exposed to a hazard. The next step is to provide information to those who want to know more. The community library and local websites are obvious places for residents to seek information on hazards, hazard protection, and protecting natural resources.

Books and pamphlets on hazard mitigation can be given to libraries, and many of these can be obtained for free from state and federal agencies. Libraries also have their own public information campaigns with displays, lectures and other projects, which can augment the activities of the local government. Today, websites are commonly used as research tools. They provide fast access to a wealth of public and private sites for information. Through links to other websites, there is almost no limit to the amount of up to date information that can be accessed on the Internet.

In addition to online floodplain maps, websites can link to information for homeowners on how to retrofit for tornadoes and floods or a website about floods for children. The "FEMA for Kids" website teaches children how to protect their home and what to have in a family disaster kit.

Local Implementation

Sacramento County and the City of Sacramento provide a variety of flood materials placed in public locations, including public buildings and public libraries. The County also has an extensive flood protection websites at: http://www.waterresources.saccounty.net/stormready/Pages/default.aspx. The City maintains a similar website at: http://www.cityofsacramento.org/Utilities/Education/Flood-Ready/.

CRS Credit

The Community Rating System provides credit for having a variety of flood references in the local public library and additional credits for similar material included on municipal websites (Activity 350 - Flood Protection Information).

Technical Assistance

Hazard Information

Many benefits stem from providing map information to inquirers. Residents and business owners that are aware of the potential hazards can take steps to avoid problems or reduce their exposure to flooding. Real estate agents and house hunters can find out if a property is floodprone and whether flood insurance may be required.

Communities can easily provide map information from FEMA's DFIRMs and Flood Insurance Studies. They may also assist residents in submitting requests for map amendments and revisions when they are needed to show that a building is located outside the mapped floodplain.

Some communities supplement what is shown on the DFIRM with information on additional hazards, flooding outside mapped areas and zoning. When the map information is provided, community staff can explain insurance, property protection measures and mitigation options that are available to property owners. They should also remind inquirers that being outside the mapped floodplain is no guarantee that a property will never get wet.

Property Protection Assistance

While general information provided by outreach projects or the library is beneficial, most property owners do not feel ready to retrofit their buildings without more specific guidance. Local building department staffs are experts in construction. They can provide free advice, not necessarily to design a protection measure, but to steer the owner onto the right track:

- Building or public works department staffs can provide the following types of assistance:
- Visit properties and offer protection suggestions,
- Recommend or identify qualified or licensed contractors,

- Inspect homes for anchoring of roofing and the home to the foundation,
- Provide advice on protecting windows and garage doors from high winds, and
- Explain when building permits are needed for home improvements.

There is a concern that a local official might provide the wrong information and the community would be sued if a project failed. To counter this, there are guidelines for local programs and training on how to identify the right measures. FEMA conducts a free week-long course at its Emergency Management Institute on property protection measures for flooding. FEMA and the Corps of Engineers periodically conduct one- or two-day retrofitting workshops.

Local Implementation

FEMA floodplain maps are available on local websites for both Sacramento County and the City of Sacramento. The County and City also respond to requests on whether a property is located in a Special Flood Hazard Area. The County and City also maintain elevation certificates for many existing home within or near the SFHA.

CRS Credit

The Community Rating System provides points for providing map information to inquirers. Points are available for providing one-on-one flood protection assistance to residents and businesses and for making site visits. Both services must be publicized.

Public Information Program Strategy

A public information program strategy is a document that receives CRS credit. It is a review of local conditions, local public information needs, and a recommended plan of activities. A strategy consists of the following parts, which are incorporated into this plan:

- The local flood hazard (discussed in Chapter 4)
- The property protection measures appropriate for the flood hazard (discussed in Chapters 4 and 5)
- Flood safety measures appropriate for the local situation (discussed in Chapters 4 and 5)
- The public information activities currently being implemented within the community, including those being carried out by non-government agencies (discussed in Chapter 4 and jurisdictional annexes)
- Goals for the community's public information program (discussed in Chapters 4 and 5)
- The outreach projects that will be done each year to reach the goals (discussed in Chapters 4 and 5)
- The process that will be followed to monitor and evaluate the projects (discussed in Chapter 7)

Figure C-15 illustrates several flood safety tips that can be used in an outreach campaign to better inform the public of the hazards associated with flooding.

Figure C-15 Flood Safety Tips for Outreach Campaign

Flood Safety

Pay attention to evacuation orders. Listen to local radio or TV stations for forecasts and emergency warnings. Know about evacuation routes and nearby shelters and have plans for all family members on how to evacuate and where to meet if you're split up during an emergency.

Do not drive through a flooded area. During a flood, more people drown in their cars than anywhere else. Don't drive around road barriers; the road or bridge may be washed out.

Do not walk through flowing water. Flash flooding is the leading cause of weather-related deaths in the U.S. Currents can be deceptive; 6 inches of moving water can knock you off your feet in a strong current. If you walk in standing water, use a stick to help you locate the ground.

Stay away from power lines and electrical wires. Electrical currents can travel through water. Report downed power lines to the police or sheriff by calling 911.

Have the power company turn off your electricity. Some appliances, like TV sets, keep electrical charges even after they've been unplugged. Don't use appliances or motors that have gotten wet unless they have been taken apart, cleaned and dried.

Look before you step. After a flood, the ground and floors are covered with debris like broken bottles and nails. Floors and stairs that are covered with mud can also be slippery.

Be alert for gas leaks. Use a flashlight to inspect damage. Don't smoke or use candles, lanterns, or open flames unless you know the gas has been shut off and the area has been ventilated.

Look out for animals that may have been flooded out of their homes and who may seek shelter in yours. Use a pole or stick to turn things over and scare away small animals.

Look before you step. After a flood, the ground and floors are covered with debris. Floors and stairs that have been covered with mud will be very slippery.

Carbon monoxide exhaust kills. Use a generator or other gasoline-powered machine outdoors. The same goes for camping stoves. Charcoal fumes are especially deadly – cook with charcoal outdoors.

Clean everything that got wet in the flood. Floodwaters have picked up sewage and chemicals from roads, farms, factories, and storage buildings. Spoiled food, and flooded cosmetics and medicines can be health hazards. When in doubt, throw it out.

Take care of yourself. Recovering from a flood is a big job. It is tough on both the body and the spirit and the effects a disaster has on you and your family may last a long time.

CRS Credit

The CRS provides up to 350 points for a Program for Public Information (PPI).

Conclusions and Recommendations

- There are many ways that public information can be used so that people and businesses will be more aware of the hazards they face and how they can protect themselves.
- Libraries and websites are currently being used as public information tools in Sacramento County and the City of Sacramento.
- The most important topics to cover in public information activities are:
  - ✓ Safety precautions for all types of hazards, but especially floods, earthquakes, thunderstorms, winter storms, wildfires, and tornadoes.
  - ✓ Knowing where emergency evacuation shelters are in town.

- ✓ Flood protection measures, including rules for new construction and insurance.
- ✓ Keeping drainage ways clear and protection from local drainage problems.
- ✓ Family and emergency preparedness measures.
- ✓ What the County and cities are doing and sources of assistance.
- ✓ Protecting water quality and wetlands and the benefits of open space.

- The most appropriate ways to spread this information are:
  - ✓ Websites and social media
  - ✓ Mailings to everyone, in utility bills or otherwise
  - ✓ News releases or newspaper articles
  - ✓ Newsletters
  - ✓ Displays, particularly at special events
  - ✓ Handouts, flyers and other materials, which can be distributed at special events and presentations
- County and City staff should continue to reach out to residents, civic organizations and other organizations to help spread the word about flood hazards, flood protection, and safety measures.