



CHAPTER 6

FLOOD PREPAREDNESS ACTIVITIES AND FLOOD HAZARD MITIGATION

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FLOOD HAZARD
MITIGATION



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CHAPTER 6 FLOOD PREPAREDNESS ACTIVITIES AND FLOOD HAZARD MITIGATION

SECTION 1 FLOOD PREPARATIONS ACTIVITIES

3.1 INTRODUCTION

The Colorado Water Conservation Board (CWCB) is the lead state agency for flood mitigation. This office assists other state agencies, local governments, Native American Tribes, and the private sector in addressing flood hazard identification and mitigation actions.

3.2 AUTHORITY & RESPONSIBILITY

3.2.1 FEDERAL

The requirement for state governments to prepare a Flood Hazard Mitigation Plan following a Presidential Disaster Declaration is stated in Section 409 of Public Law 93-288, Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act) as amended by Public Law 100-707, 42 U.S.C. 5121 et seq, Disaster Mitigation Act 2000 and the Hazard Mitigation and Relocation Assistance Act of 1993. It establishes the prerequisites for state receipt of federal disaster assistance.

3.2.2 STATE MITIGATION PLANNING

The first Flood Hazard Mitigation Plan was prepared as a result of the presidential declaration of disaster for Larimer County on July 22, 1982 (FEMA-665-DR-CO). The following are additions and revisions to the original plan:

- Status report No. 1 prepared December 1983.
- Second review prepared January 1985 following declaration of 10 western slope counties as a major disaster area eligible for public assistance on July 27, 1984 (FEMA-719-DR-CO).
- In 1998, the Colorado Flood Hazard Mitigation Plan was updated due to declaration DR-1186-CO.
- In 1999, the Colorado Flood Hazard Mitigation Plan was updated due to declaration DR-1276-CO.
- In 2004, update to the DMA 2000 completed.

3.2.3 LOCAL GOVERNMENT

Local governments play an essential role in implementing effective mitigation, both before and after disaster events. Recommendations on alleviating or eliminating a repetitive problem often focus on local assessment as to the cause of damage and depend on a local applicant for implementation.



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The Colorado Water Conservation Board (CWCB) encourages communities to prepare a flood hazard mitigation plan for their jurisdictions. A carefully drafted plan can be an extremely valuable resource to formulate annual work programs, budgets, and policy positions. Additionally, implementation of an approved local flood hazard mitigation plan makes the community eligible for funding through Federal flood mitigation assistance programs.

3.3 EXISTING MITIGATION PLANS, PROGRAMS, AND STRUCTURES

3.3.1 FEDERAL GOVERNMENT

The federal government operates a number of agencies and programs that work to mitigate damages caused by floods.

3.3.1.1 FEMA AND THE NATIONAL FLOOD INSURANCE PROGRAM (NFIP)

The Federal Emergency Management Agency (FEMA), is an agency under the Department of Homeland Security, reporting to the President. Since its founding in 1979, FEMA's mission has been clear:

“To reduce loss of life and property and protect our nation's critical infrastructure from all types of hazards through a comprehensive, risk-based, emergency management program of mitigation, preparedness, response and recovery.”

FEMA Region 8 in Denver is responsible for administering Hazard Mitigation Programs in Colorado, such as:

- The Hazard Mitigation Grant Program (HMGP)
- Flood Mitigation Assistance Program (FMA)
- Project Impact
- National Flood Insurance Program
- Leadership of Hazard Mitigation Survey Teams and Interagency Hazard Mitigation Teams
- Planning activities conducted under Section 409

In keeping with the National Mitigation Strategy, FEMA identifies mitigation measures and successful mitigation activities, and it reinforces the traditional long-term goal to reduce loss of life and property damage, by eliminating or reducing the impacts of natural or manmade hazards.

The Federal Insurance and Mitigation Administration (FIMA) within FEMA is responsible for administering the National Flood Insurance Program (NFIP) and administering programs that provide assistance for mitigating future damages from natural hazards.

Section 1315 of the 1968 Act prohibits FEMA from providing flood insurance to property owners unless the community adopts and enforces floodplain management criteria established under the



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authority of Section 1361(c) of the Act. These criteria are established in the NFIP regulations at 44 CFR §60.3. The community must adopt a floodplain management ordinance that meets or exceeds the minimum NFIP criteria.

In addition to providing flood insurance and reducing flood damages through floodplain management regulations, the NFIP identifies and maps the nation's floodplains. Mapping flood hazards creates broad-based awareness of the flood hazards and provides the data needed for floodplain management programs and to actuarially rate new construction for flood insurance.

The Colorado Flood Protection Program is directed in Section 37-60-106(1) C.R.S. (1990) to prevent flood damages, review and approve floodplain designations prior to adoption by local government entities, and provide local jurisdictions with technical assistance and floodplain information. In addition, an August 1, 1977 Executive Order requires the CWCB and Land Use Commission to provide assistance to entities in meeting the requirements of the National Flood Insurance Program. The NFIP is also discussed in Chapter 3 Section 1 of this manual.

MAPPING PROGRAMS

The Federal Emergency Management Agency (FEMA) and the National Flood Insurance Program (NFIP) are responsible for creating and distributing Flood Insurance Rate Maps or FIRM'S for every county and community that participates in the NFIP. These maps are used by insurance agents, mortgage companies, property assessors, construction and engineering firms, and federal, state and local governments, to determine if specific areas lie within "designated floodplains." These designated floodplains are those areas determined to be affected by 100 and 500 year floods.

A number of new programs and tools have significantly increased the mapping capabilities of the NFIP. Since 2000, FEMA has been involved in the Map Modernization Program, a nationwide effort to upgrade community FIRM's to digital and GIS format. The resultant Digital Flood Insurance Rate Maps (DFIRM's) are viewable in either digital or paper formats. By Congressional mandate, these DFIRM's are being prepared in the North American Vertical Datum (NAVD) 1988, requiring many FIRM's from previous datums to be converted. The Colorado Water Conservation Board and the Urban Drainage and Flood Control District are assisting the process by serving as federally certified Cooperating Technical Partners (CTP's).

The Colorado Water Conservation Board's Flood Protection Program maintains a library of Colorado's FIRM maps and their accompanying reports. Maps are available for most of Colorado's participating counties, cities, and towns.



TECHNICAL ASSISTANCE

State duties and responsibilities required by FEMA as outlined in 40 CFR §60.25 include the responsibility to establish technical assistance programs to local governments to enable those communities to meet compliance criteria for the NFIP. States are encouraged to maintain the capability to perform the appropriate duties and responsibilities as follows:

- Enact legislation enabling local governments to regulate development within flood-prone areas;
- Encourage and assist communities in qualifying for participation in the NFIP;
- Guide and assist communities in developing, implementing, and maintaining local flood plain management regulations;
- Provide local governments and the general public with NFIP information on the coordination of local activities with Federal and State requirements for managing flood-prone areas;
- Assist communities in disseminating information on minimum elevation requirements for development within flood-prone areas;
- Assist in the delineation of riverine flood-prone areas, whenever possible, and provide all relevant information to the NFIP Administrator;
- Recommend priorities for Federal flood plain management needs of local governments within the State;
- Notify the NFIP Administrator in the event of apparent conflicts between a local flood plain management program and the minimum requirements of the NFIP;
- Establish minimum State flood plain management regulatory standards consistent with those established in 40 CFR §60.25 and in conformance with other Federal and State environmental and water pollution standards for the prevention of pollution during periods of flooding;
- Assure coordination and consistency of flood plain management activities with other State, regional, and local planning and enforcement agencies;
- Assist in the identification and implementation of flood hazard mitigation recommendations which are consistent with the minimum flood plain management criteria for the NFIP;
- Participate in flood plain management training opportunities and other flood hazard preparedness programs whenever practicable.

3.3.1.2 NATIONAL RESOURCES CONSERVATION SERVICE

The Natural Resources Conservation Service (NRCS) can provide technical assistance in the conservation development and productive use of soil and water resources. Its activities in Colorado include watershed protection and flood protection projects, floodplain management studies, resource conservation and development, emergency watershed protection, conservation technical assistance, soil surveys, snow surveys, and water supply forecasting.



3.3.1.3 U.S. ARMY CORPS OF ENGINEERS

The Corps of Engineers is involved in developing and implementing plans for flood control, navigation, hydropower, recreation, and water supply. The corps also has authority for emergency operations, bank protection, permit administration, and technical assistance. Corps programs in Colorado can be lumped into five different authorities: 1) Feasibility Studies and Projects; 2) Continuing Authority Projects; 3) Emergency Operations; 4) Floodplain Management Services; and 5) Permit Issuance.

3.3.1.4 NATIONAL WEATHER SERVICE

The National Weather Service is responsible for 36-48 hour weather forecasting, issuing severe weather warnings and watches, flash flood warnings and watches, and flood warnings.

3.3.1.5 US GEOLOGICAL SURVEY

Congress established the U.S. Geological Survey on March 3, 1879, to classify public lands and examine the geological structure, mineral resources, and products of the country. Over the years, other Congressional acts have enlarged its duties and functions to include making geological and topographic maps, gauging streams, and determining water supplies of the United States. The survey can assist communities and state agencies in collecting, developing, and computing basic data and information for floodplain engineering studies and investigations. Information available from the U.S. Geological Survey includes records of water gauge heights, discharge runoff, times of travel, sediment discharge, historic flood peaks, and inundated areas. Reports of magnitude, frequency, and duration of flood flows are also kept. Flood prone areas subject to inundation by floods of approximately the 100-year frequency have been delineated on topographic maps for selected areas within Colorado and can be obtained through this agency.

3.3.1.6 US BUREAU OF RECLAMATION

The U.S. Bureau of Reclamation administers the federal program in western states for water resource development and use, which provides multiple purpose projects furnishing fish and wildlife protection and recreation opportunities, water for farm irrigation, municipal, and industrial use, hydroelectric power, flood control, and other natural resource conservation benefits.

3.3.1.7 NATIONAL FOREST SERVICE

During emergencies, the Forest Service may install emergency measures on National Forest land for runoff retardation and soil erosion prevention to safeguard life and property on the downstream from watershed lands suddenly damaged by fire, flood, and other natural disasters. Where natural disasters cover National Forest, as



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well as state and/or private lands, the Forest Service works closely with the NRCS, state, and local government entities in coordination of mitigation activities.

The Forest Service is actively involved in wildfire response and the suppression of wildfires. It also plays a key role in the determination of post-fire hydrology and the resulting post-wildfire flood mitigation activities.

3.3.2 STATE GOVERNMENT

3.3.2.1 COLORADO WATER CONSERVATION BOARD

The Colorado Water Conservation Board (CWCB) was created by the Colorado State Legislature in 1937 for the expressed general purpose “. . . **to promote the conservation of the waters of the State of Colorado in order to secure the greatest utilization of such waters and the utmost prevention of floods . . .**”

The Colorado Water Conservation Board provides engineering and technical assistance to local governments in the development of floodplain information studies. The CWCB is the state coordinator of all floodplain management activities within the State of Colorado. The Colorado Water Conservation Board has developed a computerized database showing the availability of floodplain information in Colorado. The database should be available online at the Department of Natural Resources (DNR) homepage. The CWCB also maintains a library of completed floodplain information studies.

Through its designation and approval function, the Colorado Water Conservation Board certifies the technical accuracy and appropriateness of floodplain information to county and municipal governments. It is then up to these local governments to make wise land use decisions based on that information. Since 1967, over 500 studies prepared by various government agencies for a total of approximately 8,000 stream miles have been designated by the CWCB, as of the date of this publication.

The CWCB's flood control and floodplain management programs are listed below:

- a. Prescribe standards for flood hazard, flood control, drainage, flood mitigation, and flood insurance studies.
- b. Assist, review, and perform studies for approval and designation as required by 24-65.1-403(3)(b) and 37-60-106(l)(c), CRS, as amended and to ensure compliance with the board's rules and regulations for delineating 100-year floodplains;
- c. Prepare technical manuals of procedures and engineering methodologies in support of a and b above.
- d. Collect data and documentation of flood events.
- e. Provide coordination on federal studies and flood control projects when seeking Congressional authorization and funding, including



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- study and project reviews, as well as directing study efforts to ensure compliance with state standards and requirements.
- f. Provide general information and coordination to communities concerning participation in the National Flood Insurance Program (NFIP) and the wise use of floodplains, in general. Also, provide assistance to communities to enter the NFIP's Community Rating System and participate in the FEMA-funded and CWCB-administered Flood Mitigation Assistance (FMA) program, which provides annual funding to develop local flood hazard mitigation plans and implement flood mitigation measures.
 - g. Respond to state or federal flood disaster declarations, including preparation of required post-disaster flood hazard mitigation plans, advanced measures, flood fight activities, and post-flood recovery operations. Activities that implement program objectives include: 1) chairing the Colorado Flood Task Force; 2) conducting an annual spring snowmelt review and issuing pre-flood forecasts, as applicable; 3) preparing news releases; and 4) issuing an annual flood report.
 - h. Provide general guidance, including preparation of **"Scopes of Services,"** to communities performing floodplain studies or preparing grant applications for studies.
 - i. Oversee and manage floodplain and major drainage studies, including assistance in negotiation of professional service contracts, study management, engineering work, etc.
 - j. Assist local governments to prepare floodplain regulations or ordinances or amendments to flood insurance rate maps.
 - k. Perform hydrologic and hydraulic investigations.
 - l. Assist (technically and financially) in constructing flood mitigation projects, which will reduce the exposure of Colorado citizens and their property to flood damages.

3.3.2.2 GOVERNOR'S OFFICE

Governor's Office - "Colorado Disaster Emergency Act of 1992" (Part 21 of Article 32, Title 24, Colorado Revised Statute, 1988 as amended) states the governor, as the executive head of state, has the inherent responsibility, constitutional and statutory authority, to commit state and local resources (personnel, equipment, and finances) for the purpose of ***meeting the dangers to the state and its people presented by disasters.*** This responsibility is exercised through the director, Division of Emergency Management (DEM), Department of Local Affairs (DOLA). The Governor's Disaster Emergency Council serves as an advisory council to the governor and the director of Division of Emergency Management on all matters pertaining to Declarations of State Disaster Emergencies, and on the response and recovery activities of state government. The Governor's Office is responsible for making state disaster declarations, usually at the recommendation of the Division of Emergency Management, and for the request to the president for a major disaster declaration, as necessary.



3.3.2.3 COLORADO DIVISION OF EMERGENCY MANAGEMENT

The governor has delegated the Division of Emergency Management, through its director, with the responsibility of managing and coordinating emergency operations that involve state and, when necessary, federal resources. DEM is charged with preparing and maintaining the Colorado State Emergency Operations Plan (The Plan) and for the expeditious and efficient manner in which The Plan is implemented. It is responsible for the organization and operations of the State Emergency Operations Center (SEOC) for both emergency and non-emergency operations. Further, the Division of Emergency Management is responsible for assisting local government emergency management in the development and maintenance of emergency operations plans, procedures, and checklists. In the event of a major emergency or disaster, or the threat thereof, the director of Office of Emergency Management, makes recommendations to the governor and Disaster Emergency Council on matters pertaining to State Declarations of a Disaster Emergency, requests for federal assistance, and ongoing state disaster response and recovery activities.

DEM coordinates the work of other state agencies in these preparedness, response, recovery, and mitigation activities. These authorities have been strengthened in recent years through Executive Orders. DEM has prepared the Colorado State Emergency Operations Plan (mentioned above), which details response activities of state agencies during emergencies. The means by which DEM encourages or requires local governments to improve their floodplain management programs include:

- (1) Federal pass-through funding
- (2) State funding to help local governments recover from a state-declared disaster;
- (3) State statutes that require local emergency preparedness plans Cartography/GIS provides and exchanges cartographic information and a range of cartographic products and geographic information services to local governments, other state agencies, and private firms.

3.3.3 LOCAL GOVERNMENT

Much of the planning and implementation process occurs at the local level. Each applicant for disaster relief assistance is asked to develop a flood hazard mitigation plan tailored specially to the community. A suggested plan outline and a detailed questionnaire were developed by the CWCB to assist in this process.

The purpose of such a plan is to articulate those specific local issues which, if resolved, would help reduce future flood damages which will have an impact on the community. Those local issues, in turn, could also provide the basis for input to the statewide annual mitigation program review. Several local Colorado governments have prepared hazard mitigation plans before and after flood events.



3.4 COLORADO MITIGATION ACCOMPLISHMENTS SINCE 1999

Governor's Conference on Flood and Drought: Conducted on December 2-3, 1999. This conference included local and national experts in drought and flood topics.

Colorado Flood Task Force: Is chaired by the Colorado Water Conservation Board. The task force meets in April and is active through "run off" season. It provides accurate technical information and advance measures to local governments. The task force includes participation by local, state, and federal governments, and the private sector.

Community & Flood Mitigation Assistance Programs: Using FEMA funds, the Colorado Water Conservation Board (CWCB) manages the Community Assistance Program (CAP); statewide National Flood Insurance and Floodplain Management program; and Flood Mitigation Assistance (FMA) funding for projects to reduce losses on insured properties (elevate, buyout, relocate).

CWCB Construction Fund: The fund provides planning, flood response assistance, and construction funds through a low interest loan program and limited grant funds.

Role of Colorado Water Conservation Board (CWCB) in Hazard Mitigation

In addition to the above-mentioned activities of the CWCB, there are several duties and responsibilities of the Board which include:

- Continue to support the statewide association of local floodplain managers, the Colorado Association of Stormwater and Floodplain
- Work with other agencies in approving mitigation activities
- Assist in exploring a state funding pool exclusively for hazard mitigation
- Serve as communication liaison with regional FEMA personnel
- Assist in the implementation of cost-effective and environmentally-acceptable flood mitigation
- Provide technical assistance to county EMCs
- Visit each of the 64 counties on a five-year cycle, monitoring local project progress, as well as monitoring annual maintenance activities
- Develop training materials about mitigation
- Select digital area mapping for recovery operations

Role of Local Government Emergency Managers and Floodplain Administrators

Local government emergency management and floodplain administrators are frequently forced by multiple roles and job demands to deal with mitigation issues and projects. Throughout the mitigation planning process, the county EMCs and floodplain administrators have played an important role. They are the local level contact and the coordinator of mitigation implementation, programs and activities. In that role, the county EMC is the key communication point between the state and local level and between local community agencies and organizations.

Local government emergency management coordinators and floodplain administrators will assist in implementing this plan at the local level. Among their suggested actions are:



- Working closely and communicating with the DEM Regional Coordinator staff and the State Hazard Mitigation Officer (SHMO) to implement mitigation recommendations
- Conducting public awareness and education activities on mitigation, its importance and methods
- Conducting education activities for community organizations
- Developing and implementing the mitigation recommendations appropriate for the county
- Working with other community organizations and agencies on local mitigation projects
- Participating in regional and statewide cooperative mitigation efforts
- Identifying critical facilities and infrastructure at risk from hazards
- Monitoring progress in recommendation implementation through participation on a regional team

3.5 **MITIGATION STRATEGIES**

3.5.1 **BASIC STRATEGIES**

There are basic strategies that may be applied to mitigate flood hazards. Each strategy has different measures that are appropriate for different conditions. In many communities, a different person may be responsible for each strategy. The strategies are described briefly below (see Table CH6-T101).

Prevention:

Through prevention, flood problems are kept from getting worse. The use and development of floodprone areas is limited through planning, land acquisition, or regulation. Building, zoning, planning, and/or code enforcement offices usually administer preventive measures.

Property Protection:

Property owners on a building-by-building or parcel basis usually undertake property protection. Government agencies can provide information and technical or financial assistance to owners who want to elevate, floodproof, insure, or otherwise protect their property.

Emergency Services:

Emergency measures are taken during a flood to minimize its impact. These measures are the responsibility of city or county emergency management staff and the owners or operators of critical facilities.

Flood Protection:

Keeping floodwaters away from an area with a levee, reservoir or other structural project is the goal of flood control. Flood control activities are usually designed by engineers and managed or maintained by public works staff.

3.5.2 **PREVENTION**

Prevention measures are designed to keep the problem from occurring or getting worse. They ensure that future development does not increase flood



damage or they maintain the drainage system's capacity to carry away floodwaters.

Planning:

Comprehensive plans and land use plans identify how a community should be developed. 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 ordinances. The ordinances are covered in later sections.

A community's capital improvement program identifies where major public expenditures will be made over the next 5 to 20 years. Capital expenditures may include acquisition of land for public uses, such as parkland, and extension or improvement of roads and utilities.

If the community's long range plan calls for preserving the floodplain as open space, then the capital improvement program should support the plan by acquiring floodprone areas for parks and by not improving or extending roads into the floodplain. However, plans are only as strong as the local authorities want them to be. To be effective, they must be implemented, which may require additional legal measures, such as a zoning ordinance.

Flood Hazard Mitigation Measures <i>Table CH6-T101</i>	
<i>Prevention</i>	<i>Property Protection</i>
Planning	Building relocation
Zoning	Acquisition
Open space preservation	Building elevation
Floodplain regulations	Barriers
Wetland regulations	Dry floodproofing
Stormwater management	Wet floodproofing
Watershed measures	Sewer backup protection
Soil erosion and sediment control	Insurance
Channel maintenance	Community programs
Drainage protection	
Real estate disclosure	
<i>Emergency Services</i>	<i>Flood Protection</i>
Flood threat recognition	Reservoirs
Flood warning Levees	Levees and floodwalls
Flood response	Diversions
Critical facilities	Conveyance improvements
Health and safety maintenance	Drainage/sewer improvements

Minimum Floodplain Regulation Requirements:

The National Flood Insurance Program (NFIP) is administered by the Federal Emergency Management Agency (FEMA). As a condition of making of flood insurance available for their residents, many Colorado communities agree to regulate



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new construction in the 100-year floodplain. To reduce confusion, the 100-year floodplain is called the “base floodplain” and the elevation of the 100-year flood is known as the base flood elevation.

The base floodplain is shown as the “Special Flood Hazard Area” on the Flood Insurance Rate Map (FIRM) provided by FEMA. The base floodplain is designated as one of many “A” Zones. On older maps the 500-year floodplain is shown as a “B” Zone and areas above the 500-year flood level are shown as “C” Zones. On newer maps, the B and C Zones are called “X” Zones. The designation as B, C, or X Zone does not mean that the area is not subject to local drainage problems or overbank flooding from streams or ditches smaller than the FEMA mapping criteria.

Additional floodplain regulatory requirements are set by state law. These are the minimum floodplain requirements. Cities and counties often have additional or more restrictive regulations.

1. All development must have a permit from the community. Development is defined as any manmade change to the land, including new buildings, improvements to buildings, filing, grading, mining, dredging, etc.
2. Only “appropriate uses” are recommended in the floodway. The floodway is the channel and central portion of floodplain that is needed to convey the base flood. Appropriate uses include flood control structures, recreational facilities, detached garages and accessory structures, floodproofing activities, and other minor alterations. They do not include buildings, building additions, fences, or storage of materials. The result of this is that vacant floodways should essentially remain as open space, free of insurable buildings or other obstructions.
3. New buildings are allowed outside the floodway, but they must be protected from damage by the base flood. Residences must be elevated above the base flood elevation. Nonresidential buildings must be elevated or floodproofed.
4. When an addition, improvement or repair to an existing building is valued at more than 50% of the value of the original building, then it is considered a substantial improvement. A substantial improvement is treated as a new building.
5. Any filling, building or other obstruction placed in the floodplain reduces the amount of floodwater that can be stored. Developers must remove an equal or greater volume of fill to compensate for the loss of storage.