Flood & Inundation Hazards

Riverside County has experienced severe flooding many times throughout its history, resulting in the loss of lives and millions of dollars in property damage. Floods are caused by rivers and creeks overrunning their banks, and most property damage has occurred where development has been allowed without regard for flood hazard. If urban development continues to encroach onto the floodplains without major structural improvements, Riverside County will face an ever-increasing flood hazard, and potential losses will escalate.

The tremendous capital investments made in dikes, channels, levees, and dams over the last half century have not eliminated all flood hazards, and in some instances, the protective facilities may be unable to accommodate the 100-year flood. In recent years, the idea has become increasingly accepted that, while it is essential to protect existing development, the provision of massive flood control facilities merely to permit new development over major floodplains may be unwise. It is often more effective and less costly to locate development outside of hazard areas than to attempt to control the hazard itself.

Furthermore, consistent with the intent and policies of the Multipurpose Open Space Element, the Safety Element recognizes the need to protect watercourses in their natural state. Flood and inundation policies limit the alteration of floodways and channelization when alternative methods of flood control are not technically feasible. The intent is to balance the need for protection with prudent land use solutions, recreation needs, and habitat requirements; and, as applicable, to provide incentives for natural watercourse preservation, including density transfer programs.

One-hundred- and five-hundred-year flood hazard zones are identified in Figure S-9, while dam inundation zones are identified in Figure S-10.

The intent of these policies is to eliminate the need for state or federal flood disaster declarations through aggressive flood mitigation activities.

Flood and Inundation Hazard Abatement

While local agencies operate and maintain many flood control facilities, funding for the construction of such facilities often is shared with federal and state agencies. Nevertheless, local agencies independently fund many local projects without financial assistance from the federal or state governments.

Flooding susceptibility in Riverside County is primarily associated with several major stream drainages, including but not limited to the Santa Ana, San Jacinto and Whitewater Rivers, as well as smaller scale and flash flood events on many of the alluvial fans that flank the County's hillsides. Large-scale developments have utilized golf courses and greenbelts as part of a network of channels that collect flood flows on the upstream side of a project, carry it safely through the project, and disperse it on the downstream side. However, given the low permeabilities of the underlying bedrock, heavy runoff from the surrounding hills and mountains during strong storms cannot be prevented.

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Since 1965, eleven Gubernatorial and Presidential flood disaster declarations have been declared for Riverside County. State law generally makes local government agencies responsible for flood control in California.

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Flood Facts:

- *Most lives are lost when people are swept away by flood currents.*
- *Most flood-related deaths are due to flash floods.*
- *Fifty percent of all flash flood fatalities are vehicle-related.*
- *Most property damage results from inundation by sediment-laden water.*
- *Most homeowners' insurance policies do not cover flood water damage.*
- *Individuals and business owners can protect themselves from property losses by purchasing flood insurance through FEMA's National Flood Insurance Program.*

***Floodplains** are comprised of the floodway and the floodway fringe. They are the low, flat, periodically flooded lands adjacent to rivers, lakes and oceans inundated by 100-year flood.*

***Floodway:** The channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the 100-year flood without cumulatively increasing the water surface elevation more than one foot.*

***Floodway Fringe:** That portion of the floodplain between the floodway and the limits of the existing 100-year floodplain.*

***100-Year Floodplain:** Land bordering a river or channel that can expect to be flooded in a storm that has a one-percent chance of occurring each year. Federal legislation requires that the County have a flood management program for areas that are within the 100-Year Floodplain.*

The nation has seen several catastrophic collapses of highway and railroad bridges, due to scouring and a subsequent loss of support of foundations. Major bridge crossings that are vital to the County of Riverside should be designed and built to withstand scouring. Scour at highway bridges involves flood water sediment-transport and erosion processes that cause streambed material to be removed from the bridge vicinity. The State of California participates in the bridge scour inventory and evaluation program. In addition, California's seismic retrofit program of bridges includes underpinning of foundations. In western Riverside County, this is expected to help reduce the vulnerability of foundations to be undermined by scour. However, since the eastern portion of the County has only a moderate seismic risk, bridges in these areas are of lower priority for seismic underpinning.

A review of records maintained at the California Office of Emergency Services provided potential failure inundation maps for 23 dams affecting Riverside County. These maps were compiled into the geographic information system digital coverage of potential dam inundation zones for Riverside County. These maps are intended to be used by state and local officials for the development and approval of dam failure emergency procedures as described in Section 8589.5 of the California Government code. The maps are also used to provide information needed to make natural hazard disclosure statements required under recent legislation (AB 1195 Chapter 65, June 9, 1998; Natural Hazard Disclosure Statement).

Seismically-induced inundation refers to flooding that occurs when water retention structures fail during an earthquake. Often, inundation is triggered by damage from a seiche. A seiche is a wave that reverberates on the surface of water in an enclosed or semi-enclosed basin, such as a reservoir, lake, bay or harbor, in response to ground shaking during an earthquake. Seismically-induced inundation can also occur if strong ground shaking causes structural damage to above-ground water tanks. In response to this hazard, a new tank design includes flexible joints that can accommodate movement in any direction.

Policies:

S 4.1 For new construction and proposals for substantial improvements to residential and nonresidential development in 100- and 500-year floodplains and dam inundation areas, the County shall apply a minimum level of acceptable risk; and disapprove projects that cannot mitigate the hazard to the satisfaction of the Building Official or other responsible agency. (AI 25)

S 4.2 Enforce provisions of the Building Code in conjunction with the following guidelines: (AI 25)

a. The ground floor of any development proposed for human occupancy within any area determined to be a flood hazard shall, at a minimum, be constructed one foot above the projected inundation depth. Critical facilities should be constructed above grade to the satisfaction of the Building Official, based on federal, state, or other reliable hydrologic studies.

b. Critical facilities shall not be permitted in floodplains unless the project design ensures that there are two routes for emergency egress and regress, and minimizes the potential for debris or flooding to block emergency routes, either through the construction of dikes, bridges, or large-diameter storm drains under roads used for primary access.

c. Facilities using, storing, or otherwise involved with substantial quantities of onsite hazardous materials shall not be permitted, unless all standards for elevation, anchoring, and flood-proofing have been satisfied; and hazardous materials are stored in watertight containers, not capable of floating.

d. Specific flood-proofing measures should include permanent sealing of grade-level openings; use of paints, membranes, or mortar to reduce water seepage through walls; installation of water tight doors, bulkheads, and shutters; installation of flood water pumps in structures; and proper modification and protection of all electrical equipment, circuits, and appliances so that the risk of electrocution or fire is eliminated.

S 4.3 Prohibit construction of permanent structures for human housing or employment to convey floodwaters without property damage or risk to public safety. Agricultural, recreational, or other low intensity uses are allowable, if floodplain functions are maintained and groundwater recharge protected. (AI 25)

Alteration of Watercourses: *For more detailed policies regarding the alteration of natural watercourses, please refer to the Watershed Management Section of the Multipurpose Open Space Element.*

S 4.4 Prohibit alteration of floodways and channelization unless alternative methods of flood control are not technically feasible. The intent is to balance the need for protection with prudent land use solutions, recreation needs, and habitat requirements, and as applicable to provide incentives for natural watercourse preservation, including density transfer programs as may be adopted. (AI 25, 60)

a. Prohibit the construction, location, or substantial improvement of structures in areas designated as floodways, except upon approval of a plan which provides that the proposed development will not result in any increase in flood levels during the occurrence of a 100-year flood discharge.

b. Prohibit the filling or grading of land for nonagricultural purposes and for non-authorized flood control purposes in areas designated as floodways, except upon approval of a plan which provides that the proposed development will not result in any increase in flood levels during the occurrence of a 100-year flood discharge.

S 4.5 Prohibit substantial modification to water courses, unless modification does not increase erosion or adjacent sedimentation, or increase water velocities, so as to be detrimental to adjacent property, nor adversely affect adjacent wetlands or riparian habitat. (AI 60, 61)

S 4.6 Direct flood control improvement measures toward the protection of existing and planned development. (AI 25)

S 4.7 Require that any substantial modification to a water course be done in the least environmentally damaging manner possible in order to maintain adequate wildlife corridors and linkages and maximize groundwater recharge. Refer to the County of Riverside Multiple Species Habitat Conservation Plans (MSHCP) for additional policies related to wildlife corridors and linkages. (AI 25, 60)

S 4.8 Require development in the floodway fringe, following a site-specific hydrology study, to implement measures that avoid erosion or sedimentation on adjacent land, or water flows or velocities, that would be detrimental to the health and safety of persons or adjacent property, or adversely affect adjacent wetlands or riparian habitat. (AI 25, 60, 61)

S 4.9 Minimize encroachment of development into the floodway fringe to convey floodwater without property damage and risk to public safety. (AI 25, 60)

S 4.10 Require all uses within the floodway fringe to be capable of withstanding flooding and to minimize use of fill. (AI 60)

S 4.11 Require new projects anywhere in the County to mitigate any impacts that it may have on the carrying capacity of the local storm drain system.

S 4.12 Encourage neighboring jurisdictions to require development occurring adjacent to the County to consider impact on inundation protection in the County of Riverside. (AI 25)

High-Risk Facilities

Many essential public and quasi-public facilities and hazardous materials sites are located within the 100- or 500-year flood zones of Riverside County, including: 14 of the County's 39 airports; 4 of 18 hospitals; 47 of 109 police stations, fire stations and emergency operation centers; 92 of 380 schools; 446 of 1,306 highway bridges; and 695 of 1,978 hazardous materials sites.

Policies:

S 4.13 Require certain existing essential, dependent care, and high-risk facilities that are not in conformance with provisions of County zoning to upgrade or modify building use to a level of safety consistent with the inundation risk. (AI 25, 101)

S 4.14 Require that facilities storing substantial quantities of hazardous materials within inundation zones shall be adequately flood-proofed and hazardous materials containers shall be anchored and secured to prevent flotation and contamination (AI 25)

S 4.15 Require that dependent care facilities have all flood-vulnerable electrical circuitry flood-proofed. (AI 101)

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Environmental legislation that protects rare and endangered species will continue to make construction of flood control structures difficult. In arid environments, twice as many species and about 250 percent more plant cover are associated with natural wash areas, compared with surrounding land. The County should consider a "Flood-prone Land Acquisition Program" that will reduce the losses associated with flooding, as well as the costs associated with mitigation. Developers can still profit from leaving wash corridors untouched, as home buyers will pay premiums to live by open space.