

Section 9: Flood

The Los Angeles River Watershed (see map 9) covers a land area of over 834 square miles from the eastern portions of Santa Monica Mountains, and Simi Hills, and Santa Susana Mountains to the western portions of the San Gabriel Mountains. The watershed encompasses and is shaped by the path of the Los Angeles River, which flows from its headwaters in the mountains eastward to the northern corner of Griffith Park, where the channel turns southward through the Glendale Narrows before flowing across the coastal plain and into San Pedro Bay near Long Beach. The Los Angeles River Watershed has diverse patterns of land use. The upper portion of the watershed, which is approximately 360 square miles, consists of forest or open space, while the remaining watershed, approximately 474 square miles, is highly developed with commercial, industrial, or residential uses.

There are eight major tributaries to the Los Angeles River as it flows from its headwaters to the Pacific Ocean. The major tributaries of the Los Angeles River include Burbank Western Channel, Pacoima Wash, Tujunga Wash, and Verdugo Wash in the San Fernando Valley; and the Arroyo Seco, Compton Creek, and Rio Hondo south of the Glendale Narrows. The Los Angeles River Watershed has 22 lakes within its boundaries including Devil Gates Dam, Hansen Basin, Lopez Dam, Pacoima Dam, and Sepulveda Basin.

In addition, there are a number of spreading grounds in the watershed including sites at Dominguez Gap, the Headworks, Hansen Dam, Lopez Dam, and Pacoima Dam. The Los Angeles River is connected hydraulically to the San Gabriel River through the Whittier Narrows Reservoir, although this occurs primarily during large storm events.

The Los Angeles River, which once flowed freely over the coastal plain, was channeled between 1914 and 1970 in order to control the runoff and reduce the impacts of major flood events in the region. Today, the Los Angeles River is 51 miles in length, however, only 47.9 miles of it is lined. There are three stretches where the channel is not lined with reinforced concrete, and they are:

- Within the Sepulveda Flood Control Basin
- Through the Glendale Narrows
- South of Willow Street in Long Beach

The Los Angeles River had irregular flow throughout the year prior to it being channeled. In addition, many of its tributaries did not reach the river except during storm events. The current flow in the river is effluent dominated with approximately 80 percent of its flow originating at dischargers and the remaining flow coming from storm drain runoff and groundwater reaching the surface.

The Los Angeles River Watershed has impaired water quality in the middle and lower portions of the basin due to runoff from dense clusters of commercial, industrial, residential, and other urban activities. The 1998, 303d list impairments in a majority of

the watershed, are due to point and non-point sources. These impairments include the following: pH, ammonia, a number of metals, coliform, trash, scum, algae, oil, chorpnyrifos as well as other pesticides, and volatile organics.

The San Gabriel River Watershed (see map 10) is located in the eastern portion of Los Angeles County. It is bound by the San Gabriel Mountains to the north, most of San Bernardino/Orange County to the east, the division of the Los Angeles River from the San Gabriel River to the west, and the Pacific Ocean to the south. The watershed is composed of approximately 640 square miles of land with 26% of its total area developed. The watershed drains into the San Gabriel River from the San Gabriel Mountains to the Pacific Ocean. The major tributaries to the San Gabriel River include Walnut Creek, San Jose Creek, Coyote Creek, and numerous storm drains.

100 Year Flood Plain

Rio Hondo and San Gabriel River Basin

The National Flood Insurance Program does not designate the City as being in a 100-year flood plain area (see map 11). However, the City recognizes the potential for unexpected events at the Santa Anita Dam, which is located north of Arcadia and Monrovia, in the Angeles National Forest. The Santa Anita Wash (see map 12), which runs north/south along the eastern edge of the City, begins at the Santa Anita Dam and eventually directs water to the Rio Hondo Channel (see map 13). In addition, the Eaton Wash is located along the western and southern portion of the City. The Eaton Wash begins several miles north of Pasadena, and has a directional flow starting from the northwest to southeast.

In the mid 1990's the U.S. Army Corps of Engineers conducted a comprehensive review and determined the existing system, specifically the Rio Hondo Channel from the Whittier Narrows' Reservoir (south of El Monte) to the confluence with the Los Angeles River (11.9 miles), and the lower Los Angeles River from the confluence with the Rio Hondo Channel to its mouth in Long Beach (11.7 miles) no longer provides adequate flood protection. Since this evaluation the Los Angeles County Flood Control District has taken steps to mitigate the threat, which includes the addition and enlargement of spreading grounds. For the purposes of the 100-year floodplain threat, it is not expected nor anticipated this type of flood incident would threaten or endanger the safety or well being of persons in the City.

It is understood, however, that an unexpected catastrophic events can occur without warning. There is a potential for a catastrophic event to occur and water flow could exceed the limits of the flood control channels. There are two conditions: the first is referred to as "overflow", which means the water flow is greater than the channel capacity but the water outside the channel is contiguous with the channel due to the topography. The second is "breakout", which is a flow greater than the channel capacity but follows an alternate path through a community.

The criteria for levee failure are based upon the duration and magnitude of floodwaters overtopping the channel wall or levee. If the flow reaches 7,500 gallons per second above the channels capacity for at least one hour, levee failure is assumed to result. The locations where levee failures are assumed to occur are at four different locations along the Los Angeles River and the Rio Hondo Channel, none of which would impact the City.

Any potential flood incident could impact the City. Heavy, prolonged rainfall in the San Gabriel Mountains could result in debris flowing into the channels, which would raise the water levee. To reach a level of flow that would represent a threat to the Santa Anita Dam, Santa Fe Dam and/or reservoir systems would have to be at capacity with an overtopping result.

Urban Flooding

Southern California has experienced very heavy rains during an El Nino condition. The part of an El Nino condition that impacted southern California is referred to as the Southern Oscillation that is an irregular “see-saw”, in which atmospheric pressure and wind patterns shift across the Pacific. Usually when high pressure in the eastern Pacific decreases and low pressure over Australia and northern Indonesia rises, conditions are right for an El Nino event to develop.

As warm water shifts eastward, so do the convection and heavy rains caused by the increased buoyancy of air warmed by the underlying water. As warm water piles up in the east, upwelling of cold, nutrient-rich water is inhibited. Latent heat of condensation further warms the air, further decreases atmospheric pressure in the east. The thunderstorms that have shifted from the western to the central and eastern Pacific disrupt high-level jet stream circulation by pumping warm air and moisture high into the atmosphere.

California is impacted as the El Nino storm track affects the location of jet streams, which are a major factor in producing winter weather patterns at mid-latitudes. Instead of coming ashore in the Pacific Northwest as usual, the southern jet stream hits California, carrying moisture and storms. In general, the effect of El Nino on Southern California is increased rainfall with accompanying floods, landslides, and coastal erosion.

The City is dependent on the Los Angeles County’s storm drain system and pumping stations. Although some of the County’s storm drains and stations may need updating, the City has reviewed all City facilities, agency facilities, and critical facilities for flooding problems. The Capital Improvement Plan has identified these sites requiring additional and/or updated drainage systems. The implementation plan has prioritized the work based on need and work is currently in progress.

The City is aware of potential health risks posed to the general area, due to contamination caused by flooded sewage systems.

Dam and Reservoir Failure

Dam inundation is defined as the flooding that occurs as the result of structural failure of a dam. Structural failure may be caused by seismic activity. Seismic activity may also cause inundation by the action of a seismically induced wave, which overtops the dam without causing structural failure; this action is referred to as a seiche. Landslides flowing into a reservoir are also a source of potential dam failure or overtopping.

Map 14 (Appendix E) contains a flood inundation map, which is outlined in blue and shows the area affected by a flood, should the Santa Fe Dam fail. However, the risk of such a failure is slim and the affect on the City would be minimal due to the distance from the dam. Of lesser impact would be the failure of the San Gabriel Dam, Morris Dam, Santa Anita Dam, Santa Anita Debris Basin, Garvey Reservoir, and the Cogswell Dam (see map 15 and 16). None of these dams, nor their reservoirs are located in the City.

Failure of these dams during a catastrophic event, such as a severe earthquake, is considered very unlikely event. Due to the method of construction, these dams have performed well in earthquakes, and failure is not expected. In the case of failure at the Cogswell and San Gabriel Dams, located north of the City, overflowing waters would be contained by the Morris Dam and the San Gabriel River Basin. In the event of failure to the Morris Dam, the height and velocity would rapidly diminish at the mouth of the San Gabriel Canyon and spread out laterally, leaving the City unaffected.

Santa Anita Dam

In terms of the City being affected by a flood, the most rational situation would be the result of a complete collapse of the Santa Anita Dam. A fairly large portion of Arcadia and Monrovia would be affected. A rather small portion of the City would be affected, in particular, a small segment east of the Arcadia Wash. In the event of overflow or failure, the Santa Anita Debris Basin would proceed south into the Santa Anita Wash and be contained, leaving the City unaffected. However, the failure of the Santa Anita Dam is considered unlikely.

Santa Fe Dam

For the purpose of hazard analysis, the most extreme flood risk to the City would be from an uncontrolled release of the Santa Fe Dam. The Dam is an earth filled dam that was completed in 1949 and is owned by the Army Corps of Engineers. The dam is located in the northwest area of the City of Irwindale, north of Arrow Highway, between Buena Vista Drive (west) and Irwindale Avenue (east). The dam is 16,960 feet long and contains reservoir space for approximately 250,000 acre-feet of water.

Failure of the dam is considered highly unlikely, since water is stored only temporarily in the Santa Fe Reservoir and is rapidly released into downstream spreading grounds and channel to prepare for storm inflow. It is extremely unlikely that a dam-destroying event,

which itself is unlikely, would occur at a time when there was a sufficient volume of water in the reservoir to inundate the downstream area.

Inundation Area

In the event of dam failure, inundation would impact a portion of the City, as well as areas in the following communities:

1. City of Arcadia
2. City of Baldwin Park
3. City of El Monte
4. City of Industry
5. City of Irwindale
6. City of Monrovia
7. City of Rosemead
8. City of South El Monte
9. City of West Covina
10. Unincorporated County areas to the east and west.

There are potential locations in the Santa Fe Dam for a failure:

1. East of the 605 Freeway and north of Arrow Highway, near the gauging station.
2. North of Arrow Highway near Azusa Canyon Road in the City of Irwindale, west of the Union Pacific railroad tracks.

Inundation Path

In the event a failure at the Santa Fe Dam, the water will flow south, bounded on the east by Irwindale Avenue, and on the west it will expand out to Santa Anita Avenue and continue in a southwesterly direction to Baldwin Avenue at Lower Azusa Road, and will continue southwesterly to the boundary of the Whittier Narrows golf course where it starts flowing back and into the Whittier Narrows Flood Control Basin.

On the east portion of the dam, the boundary is along Irwindale Avenue, but at Puente Avenue the boundary starts southwesterly across the San Bernardino (I-10) freeway, where it angles over to Francisquito Road and Puente Avenue, then continuing southwesterly to Vineland Avenue and the Union Pacific railroad tracks. From there, it would continue southwesterly towards the intersection of the 605 Freeway and 60 Freeway (see map 14).

There are several natural dams within the inundation area. These include the San Bernardino (I-10) freeway, the Pomona (60) freeway and miscellaneous railroad tracks. Within these natural dams drainage will occur at underpasses, however, there is a potential for water build up to the height of the natural dam until sufficient drainage takes place.

MITIGATION STRATEGIES:

OBJECTIVE

- (1) Ensure that areas susceptible to flooding within the City are addressed to reduce or eliminate the hazard that exists.

Actions for Implementation

- a) Inspect and clean all ground and roof drains, gutters, scuppers, down-pipes, roof surfaces and runoff areas.
- b) Move all water sensitive materials and equipment to the highest practical level available.
- c) Continue to obtain knowledge and information about the areas of our City sites that may have experienced water damage or flooding in the past and which could suffer damage in the future without adequate preparation.

Coordinating Organization: Public Works
Timeline: Ongoing
Constraints: Limited time available to City Staff.