Flood Management and Water Conservation

The goals and objectives developed by the Advisory Committee for flood management and water conservation are:

Ensure that flood control and public safety needs are met.
Consider storm water management alternatives.

- Ensure that public safety is primary.
- Ensure that flood control needs are met.
- Seek consensus on land-use decisions.

A. Existing Conditions

Watershed

The Los Angeles River watershed has a varied terrain consisting of mountains, low lying foothills, valleys and coastal plains. The foothill and mountainous portions of the Los Angeles River watershed comprise 363 square miles or about 43 percent of the 834 square mile watershed, and of this area, 272 square miles are within the boundary of the Angeles National Forest.

Los Angeles and nearby cities are located in a relatively flat alluvial plain, about 30 miles wide, lying on uplift terraces surrounded by mountain ranges. The area is bounded on the north by the Santa Susanna and San Gabriel Mountains whose hillside slopes exceed 68% and stream gradients range up to 3,000 feet per mile (57%). From the outwash fans at the northern edge of this alluvial plain to the tops of the higher peaks there is a difference in elevation of as much as 4,500 feet.

The mountains themselves are formed largely of granitic rock, heavily faulted and deeply weathered, yielding large quantities of rock debris by normal erosional processes. They are among the most erodible mountains in the world. When the characteristic, high intensity local storms occur, the steep canyons of these mountains discharge torrential flows of water and debris upon the suburban and urban areas lying along the mountain front. The intensity of the torrential flows from the mountains, and the damages caused by the debris and boulders which they transport, increase to an astonishing degree whenever the mountain watershed is denuded by forest fires. Damages resulting from these local torrential floods are immence considering the size of the area from which the floods originate.

Prior to development in the valleys and coastal plain, rainfall was readily absorbed by the soil. It collected in existing bodies of water, and debris washed down during storms spread freely across the expansive alluvial plain. The character of the Los Angeles River and Tujunga Wash was like a typical wash of the southwest. Its bottom was wide and rocky and its course, which shifted across the entire plain, changed often. In the early 1900's, development began to encroach into more flood prone areas. Development affects runoff by producing impervious areas, such as parking lots, roads and buildings, which cause increased runoff.

In response to the explosive growth of population and pressure for development, flood protection was demanded by the public. In response, the U.S. Army Corps of Engineers and the county constructed numerous flood control basins, channels and other flood control facilities. Local residents supported this effort through voter approved storm drain bond issue programs in 1952, 1958, 1964, and 1970 for a total of over $900 million. The County Board of Supervisors approved an additional $200 million bond issue in 1993. It has been estimated that this flood control system has prevented nearly $3.6 billion in damages.

The U.S. Army Corps of Engineers operates and maintains five major flood control reservoirs within the Los Angeles River system (Hansen, Lopez, Santa Fe, Sepulveda and Whittier Narrows). The Los Angeles County Department of Public Works operates and maintains 15 dams, about 143 sediment entrapment basins and 29 spreading grounds. Local storm drains and pump stations are maintained by the Department, cities, Caltrans and certain homeowner associations.

Los Angeles River and Tujunga Wash

The Los Angeles River forms in the foothills of the Santa Monica Mountains in the western end of the San Fernando Valley at the confluence of Bell Creek and Arroyo Calabasas (per USGS map). From the confluence, the river flows east through the Sepulveda Basin. Tujunga Wash, Pacoima Wash, Burbank Western System and smaller creeks drain the western San Gabriel Mountains and join with the river as it flows through the San Fernando Valley. The portion of Tujunga Wash included in the Master Plan begins at Hansen Dam in the Lake View Terrace area and continues south nine miles to its confluence with the river. The river turns south around the Hollywood Hills and is joined by the Verdugo Wash. The river continues to flow south through the Glendale Narrows and onto the broad coastal plain. The river continues south and is joined by numerous tributaries, including Sycamore Canyon, Arroyo Seco, Rio Hondo Channel and Compton Creek. The Los Angeles River completes its journey in San Pedro Bay at the Long Beach Harbor. It drains 834 square miles along its 51 mile course.

The Los Angeles River flood control channel was built from the late 1930's through the 1950's in a trapezoidal or rectangular configuration to minimize costly right of way acquisition, and much was lined in

concrete to prevent erosion and scour of the loose native soils. The smooth concrete surface was designed to allow flood waters to move quickly and to provide a durable, low maintenance flood protection system. There are three significant portions of the river, however, that exist in a semi-natural or soft bottom state. Within Sepulveda Basin 2.4 miles of the river is semi-natural, supporting a wide variety of habitat and wildlife. Six miles of the river from Verdugo Wash southerly through the Glendale Narrows to the Golden State Freeway has a soft bottom. Groundwater rises in this area and although the channel sides are concrete, the bottom was lined with boulders and cobble to allow the groundwater to rise and escape. Additionally, the lower 2.6 miles of the river below the Willow Street drop structure is a soft bottom, inter-tidal estuary. The biological resources of these areas contrast sharply with the concrete lined portions.

Tujunga Wash was also constructed during this time as a reinforced concrete, rectangular channel from Hansen Dam to the confluence with the river. The entire length of the Tujunga Wash Channel, below Hansen Dam, is concrete lined.

There is very little natural flow in the Los Angeles River or Tujunga Wash throughout most of the year. The tertiary treated reclaimed waste water that enlivens the "soft bottom" and other reaches of the Los Angeles River is from the Tillman (City of Los Angeles) and Glendale Water Reclamation Plants. These two facilities currently generate a continual flow of 89 million gallons per day. This water is of a very high quality, though not potable, and provides in an average year approximately 77% of the total base flow in the river. The City of Los Angeles has plans to conserve Tillman's tertiary treated water by pumping and diverting it into the county's Hansen Spreading Grounds.

Water Conservation

Since 30 to 40 percent of the water used in the county comes from local supplies, water conservation is one of vital activities performed by the Los Angeles County Department of Public Works. The growth of the county, environmental regulations and periodic droughts have seriously taxed our local water supplies. The county's policy is to conserve the maximum amount of winter storm water runoff possible, considering the runoff quantity and quality, capacities of spreading grounds and geologic and groundwater conditions.

The types of water conserved include: *local water*, which is primarily runoff due to rainfall, dam–releases and rising groundwater; *imported water*, which originates outside the county from either northern California or the Colorado River; and *reclaimed water*, which is tertiary-treated effluent produced by reclamation plants. Depending upon the soils and local geologic conditions, the soft bottom channel areas and the spreading grounds located adjacent to river channels can allow for the percolation of water into groundwater basins for pumping in the future. The spreading grounds are located in areas where the underlying soils are permeable, permitting aquifer recharge.

Across five major geographic areas in the county, the Los Angeles County Department of Public Works operates 2,705 acres of spreading grounds suitable for recharging the various aquifers. During the last recorded water year (1994-95) the County conserved over 401,000 acre-feet of storm water runoff, nearly 43,000 acre-feet of imported water and nearly 33,000 acre-feet of reclaimed water.

Groundwater in Los Angeles County is stored in basins underlying five major geographic areas. The Los Angeles River traverses over two of these major areas, San Fernando Valley and Coastal Plain. These areas contain three groundwater basins which underlie the river for its entire length: **San Fernando Main Basin, Central Basin** and **West Coast Basin.**

The largest basin in the San Fernando Valley is the **San Fernando Main Basin**. One of its characteristics is that the depth to bedrock decreases towards the southeast. The aquifer thickness at the Glendale Narrows, which is the outlet from the San Fernando Basin to the Central Basin and is bordered by Elysian Park, Taylor Yard and the 110 Freeway, varies between 50 to 200 feet. The river was constructed with a "soft bottom" through this reach to preclude uplift of the invert slab due to rising groundwater in the area. The western portion of the basin is comprised of mostly fine material having a low transmissivity, which is a measure of how easily water moves through an aquifer, while the eastern portion of the basin is comprised mostly of sand and gravel having a relatively high transmissivity.

Within the San Fernando Main Basin the Los Angeles County Department of Public Works owns and operates four spreading grounds: Brandford, Hansen, Lopez and Pacoima in the northern San Fernando

Valley where coarse soils exist, while the City of Los Angeles owns Tujunga and Headworks Spreading Grounds near Griffith Park (the Department operates Tujunga Spreading Grounds for the City of Los Angeles). Only the Headworks Spreading Ground is adjacent to the Los Angeles River. Hansen and Tujunga Spreading Grounds are adjacent to Tujunga Wash. Based on the Los Angeles County Department of Public Works Hydrologic Report for 1994-95, the Department recharged nearly 69,000 acre-feet of local water in San Fernando Main Basin. This water is sufficient to meet the needs of 138,000 average families for a year.

The **West Coast and Central Basins**, which are part of the Coastal Plain, underlie the Los Angeles River from the downtown Los Angeles area to its outlet in Long Beach. Four spreading grounds are used for recharging aquifers within both basins: Rio Hondo, Dominguez Gap, San Gabriel Coastal Basin and San Gabriel River, all owned and operated by the Los Angeles County Department of Public Works. Only Dominguez Gap lies adjacent to the Los Angeles River.

Based on the Department of Public Works' Hydrologic Report for 1994-95, over 101,000 acre-feet of local water, over 21,000 acre-feet of imported water and nearly 33,000 acre-feet of reclaimed water were recharged into the Coastal Plain. The vast majority of this recharging occurred through the Rio Hondo and San Gabriel systems. The portion of the river passing over **West Coast Basin** has minimal potential for recharging due to problems related with soils, geology and seawater intrusion. Three seawater barrier projects also lie within the Coastal Plain: West Coast Basin, Dominguez Gap and Alamitos. These barrier projects create large ridges or mounds of fresh water underground along the coastline by injecting fresh water through a series of injection wells, thus protecting groundwater supplies against seawater intrusion. During 1994–95, over 20,000 acre-feet of water was injected into the groundwater basins.

In the **Central Basin** the production aquifers underlying the river behave as an unconfined system throughout the Los Angeles Forebay area. Geologic features throughout the remainder of the area severely limit the potential where recharge could occur; aquifers are separated from the surface by several clay layers eliminating the impact of surface recharge operations on groundwater supplies. Potential projects to use the river's invert for recharging underground basins have been analyzed. Two factors, besides the necessary geological

conditions, prevent an effective recharge of the river's potential soft bottom. Due to its highly urbanized watersheds, the river produces large runoff flows which peak quickly, then decrease quickly. This short runoff period, usually on the order of a few hours, does not allow time for significant recharge. The second factor involves the steep slope of the river. An extensive number of rubber dams would need to be built approximately 500-feet apart in order to produce "step pools" to hold water and optimize recharge through the bottom of the river.

B. Recommendations

- Develop, where feasible and cost effective, multiple use flood control facilities to:
  - Allow for increased storm water detention/retention.
  - Provide additional recreational facilities.
  - Create wildlife and native riparian habitats.
- Develop a means of information exchange, such as a newsletter, to assist in educating other agencies, cities and the general public on river issues and to provide a means of communication with managers of future project developments.
- Coordinate with existing land owners (school districts, public agencies and others to develop multiple-use facilities and offer other amenities or enhancements (park enhancements, landscaping, fencing, lighting, greenbelt creation, etc.) in exchange for the use of their land.

C. Changes in Policy and Practices to Support Flood Management and Water Conservation Goals

- The Los Angeles County Department of Public Works' planning process will ensure that future flood control projects incorporate the recommendations of the Master Plan such as developing multiple-use facilities and enhancing existing rights-of-way, where appropriate and cost effective.
- The Los Angeles County Department of Public Works will coordinate with the U.S. Army Corps of Engineers and other agencies to implement water conservation projects.

REGIONAL CONTEXT MAP

JURISDICTION AND PUBLIC INVOLVEMENT