HYDROLOGY

Baldwin Hills Project

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by

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INTRODUCTION

The information contained in this section was drawn directly from the "Hydrology Report for Baldwin Hills Regional Park" prepared by the Design Division of the Los Angeles County Department of County Engineer. The maps and data presented in the report were compiled from the Division's monitoring systems and collaboration with the Los Angeles County Flood Control District.

The Baldwin Hills area is located within the boundaries of the Los Angeles County Flood Control District. A 50-year recurrence interval was adopted by the Flood Control District for design purposes as an economic limit giving considerations to needs and time required to provide reasonably adequate protection. Major channels and storm drains constructed to Flood Control District standards are capable of accepting continually increasing contributions from additional drains constructed to relieve localized flooding conditions as development demands.

Past studies show that runoff concentrates rapidly from the steep slopes in hillside areas, and that runoff from watersheds recently denuded by fire greatly exceeds runoff from a watershed in its natural state. This increase is due to greater direct runoff resulting from loss of vegetative cover, and from reduced infiltration rates associated with hydrophobic soil conditions after a fire. There is also a greatly increased quantity of inorganic debris present in flows from burned watersheds.

Runoff volumes and rates from hillside areas developed for residential use are increased due to higher imperviousness and decreased concentration times due to drainage improvements. The debris content is almost totally eliminated by erosion control devices or through the loss of debris producing areas due to development itself.

Runoff volumes in the highly developed valley areas have also increased as the soil surface has become covered by impervious materials. Peak runoff rates for these areas have increased due to the elimination of natural ponding areas and to the greater hydraulic efficiency of drainage devices such as streets and storm drain systems.

The hydrology as applied to determine design quantities for major channel systems and flood regulating or retention structures is patterned after rainfall events commonly observed during major extra-tropical storms in the Los Angeles region. Frequency analysis rainfall amounts from about 280 standard gauge rainfall station records of up to 67 years length were made by the Flood Control District to establish the 50-year frequency design rainfall values (see graph IV-1 for a typical rainfall record).

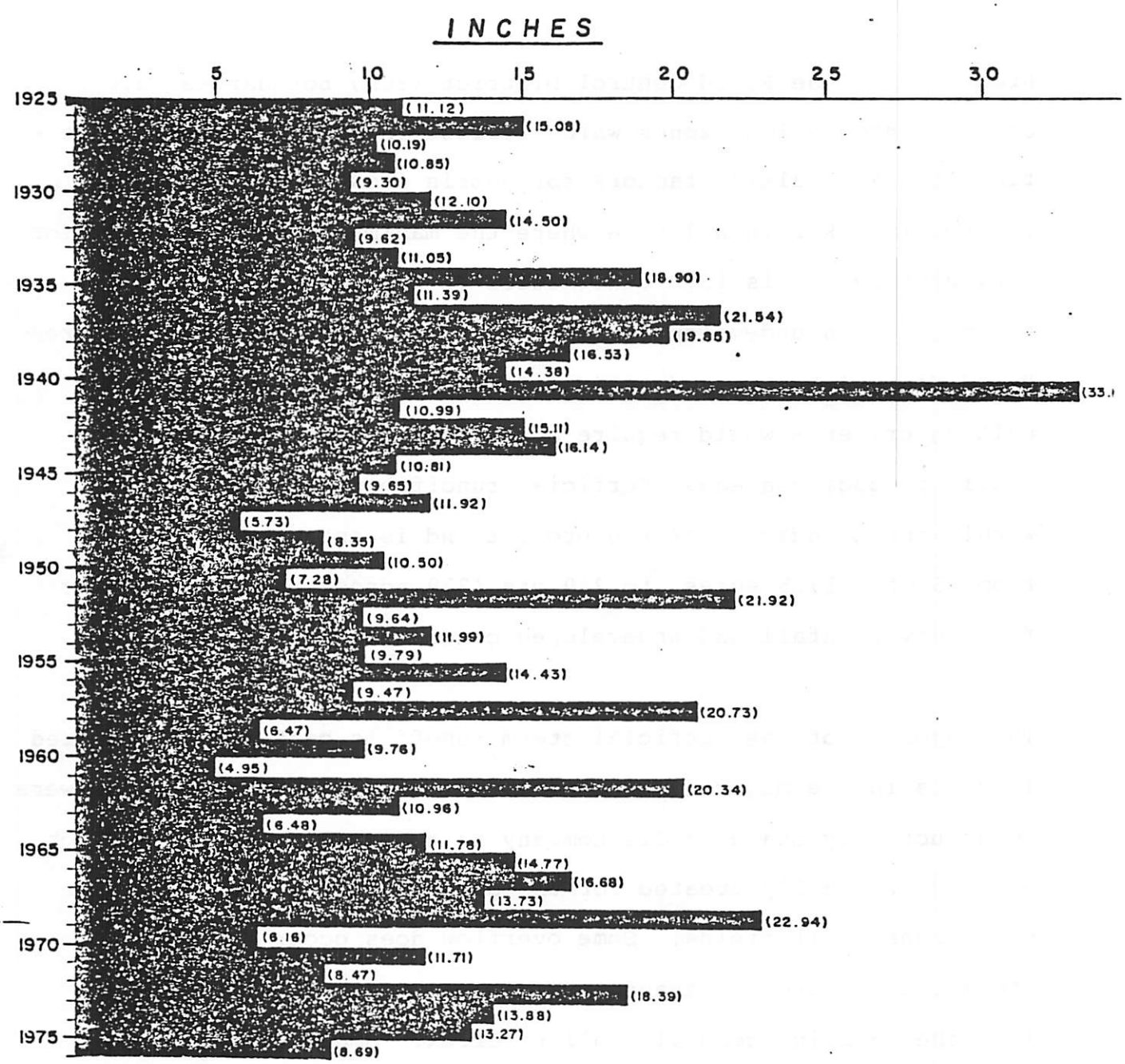
WATERSHED DESCRIPTIONS

Watersheds

The Baldwin Hills area contains numerous hillside watersheds which drain into the highly developed valley areas which surround the project. These watersheds range in size from 7 to 92.7 hectares

GRAPH IV - 1

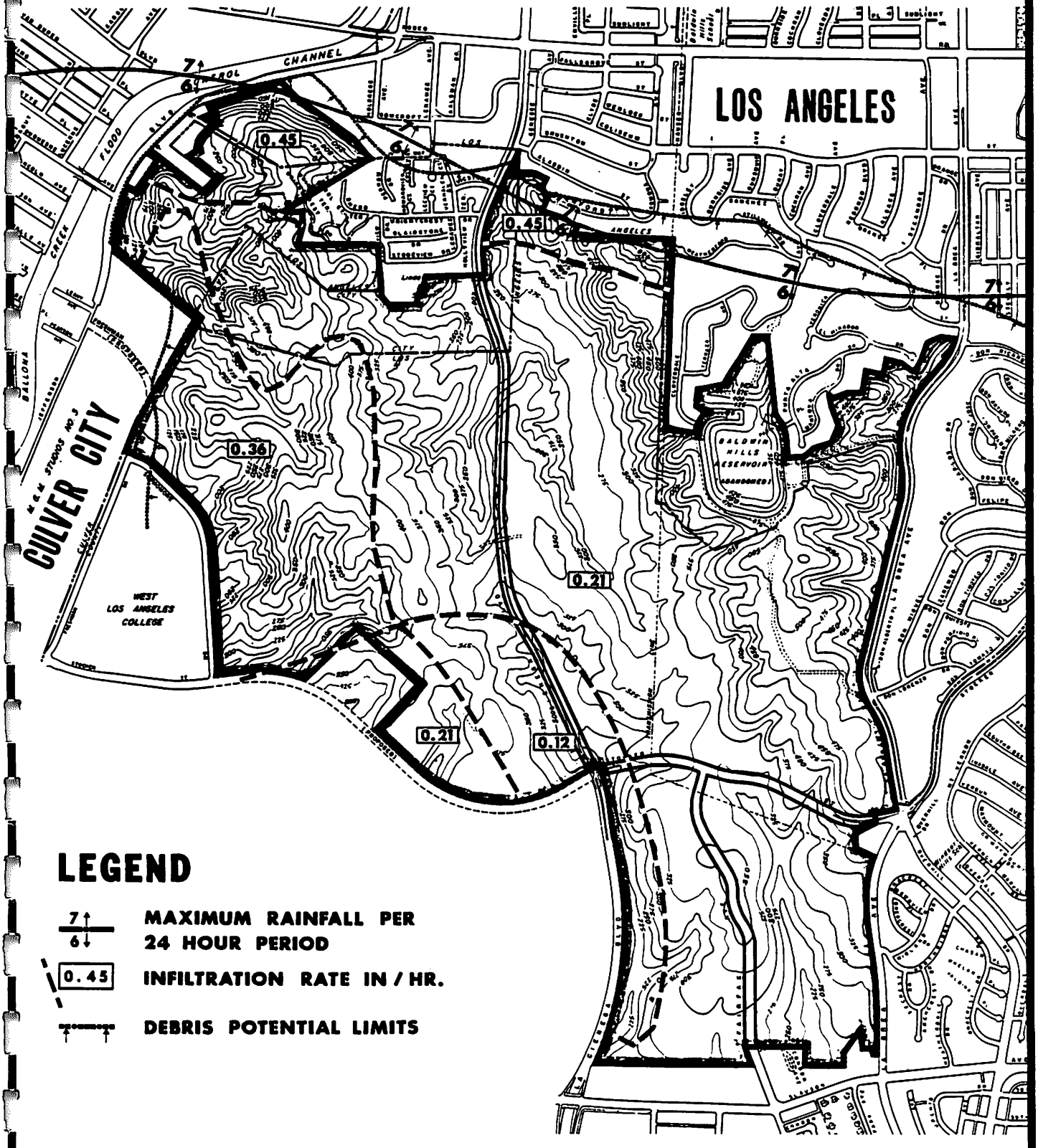
RAINFALL — TOTAL INCHES / SEASON



(17.5 to 229 acres), and contain intermittent streams which range from approximately 305 to 2,134 meters (1,000 to 7,000 feet) in length (map IV-2).

Areas within the Flood Control District (FCD) boundaries have been divided into various zones which reflect intensities, runoff coefficients, and bulking factors for debris flows. The project is located in a K rainfall zone where the maximum rainfall amount for a 24 hour period is 15.2 centimeters (6 inches). Infiltration rates based on undeveloped soil condition have been tabulated from Flood Control District data (map IV-1). Flood Control District bulking criteria would require a 60% increase for runoff from debris producing areas. Surficial runoff has been investigated within the boundaries of the project and is estimated to range from 35 cfs (17.5 acres) to 340 cfs (229 acres) based on 50-year frequency rainfall and undeveloped conditions.

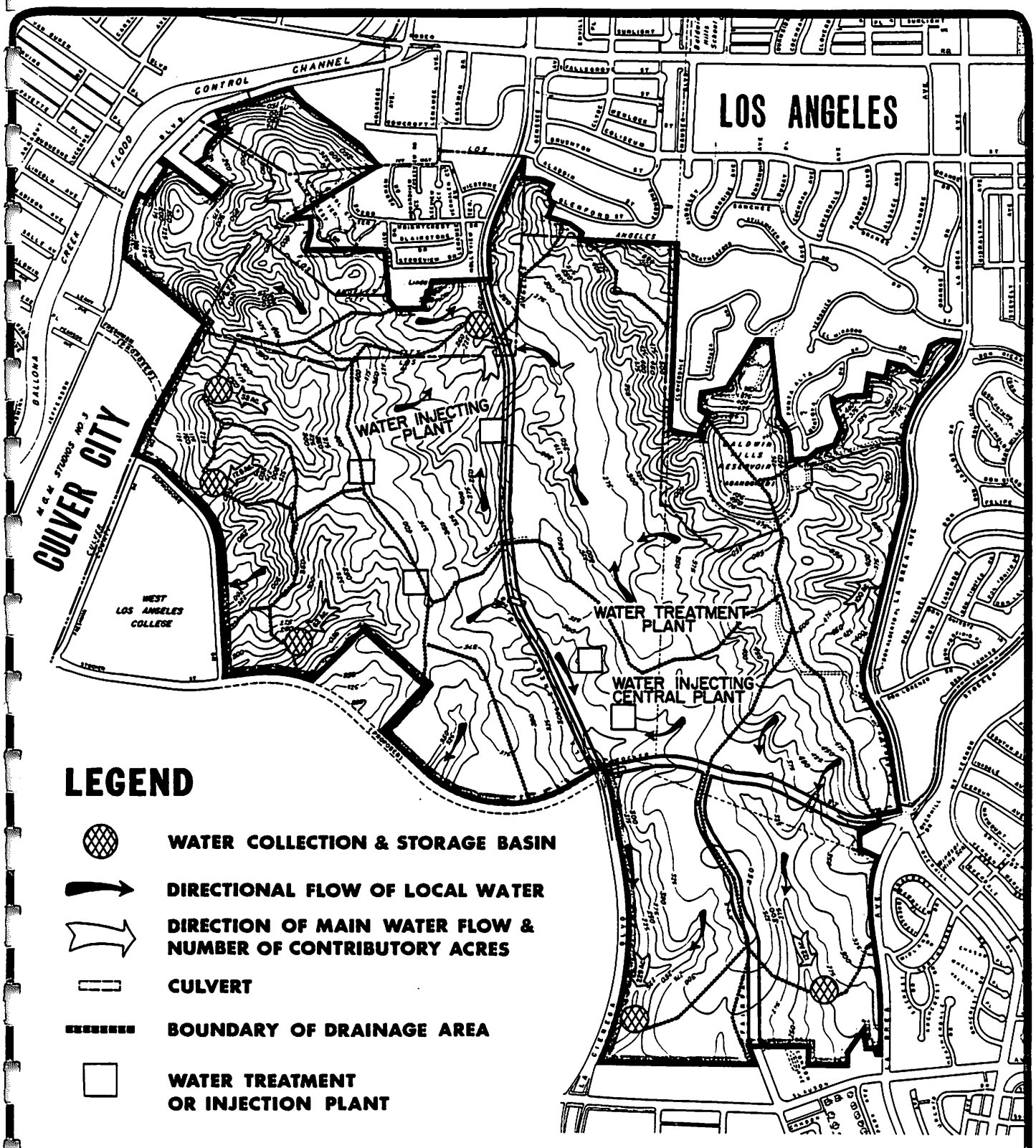
The majority of the surficial storm runoff is contained and stored in sumps in the major areas as shown on map IV-2. These sumps were constructed by Standard Oil Company in order to store water which will be eventually treated for the purpose of injection into the subterranean oil fields. Some overflow does occur during major storms. This water is transported through existing storm drains into the Pacific Ocean via Ballona Creek. Small waterbeds that produce low amounts of runoff that are not practical to intercept are allowed to exit the site via existing ditches and storm drain systems.



50 YEAR ISOHYET - HYDROLOGY

BALDWIN HILLS PROJECT

MAP IV-1



SURFICIAL HYDROLOGY

BALDWIN HILLS PROJECT

MAP IV-2

Ground Water

The Baldwin Hills represent the junction of the three major ground water basins; the Santa Monica Basin, the West Coast Basin, and the Central Basin Pressure Area. Major waterbearing zones in these basins surround the Baldwin Hills on all sides. The Baldwin Hills themselves are essentially non-waterbearing.

The Baldwin Hills are a topographic highland, thus probably a minor ground water recharge area. The strata which are waterbearing in adjacent basin lowlands are non-waterbearing in the Baldwin Hills, because they are elevated above the surrounding water table. Rainfall soaked up by these permeable sediments migrates down through the gently dipping strata to the water table outside the Baldwin Hills. Some of the rainfall leaves this highland area as runoff via the many natural drainage courses which dissect the hills.

CONSTRAINTS

Flood Prone Areas

Los Angeles County entered into the Regular Program of the Federal Insurance Administration on December 2, 1980. Flood Insurance Rate Maps published for the Baldwin Hills indicate flood hazard areas only in the vicinity of the two Standard Oil retention basins located at the southeasterly corner of the project. 100-year flood plains were not delineated in the remaining areas, because of the relatively small watershed areas. Runoff from these watersheds is naturally confined in the immediate vicinity of the natural watercourses due to the steep terrain.

The collapse of the Baldwin Hills Dam in December of 1963 caused major flooding northerly of the project in Los Angeles. The sudden release of water from the reservoir produced flow rates which greatly exceeded the capacity of the existing storm drain system. The reservoir was abandoned soon after the dam failure, and due to its location at the top of a hill, potential runoff is minor as it is produced only by rain which falls directly into the reservoir area.

Water Quality

Investigation of the project site showed that the only source of surface water is runoff of rain water from the project site. Sub-surface information with regard to potable water was obtained from interviews with companies that had an interest in water located below ground level. All information indicated the same situation exists not only within the boundaries of the project, but also in the areas adjacent to the site. Comments regarding subterranean water sources are as follows:

1. There is no ground water of any nature above an elevation of 152.4 meters (500 feet) below sea level.

2. Water encountered below 152.4 meters (500 feet) below sea level is of a brackish saline nature.

3. If it was economically feasible to pump this water, it would have no value as its nature would be detrimental to any plant life. Conclusion: Because of the expense to lift and treat this substandard water source, it is not feasible to consider the above as a practical source of water for any use within the proposed scope of operations.

Water Quantity

The California-American Water Company buys the major portion of its

water from the Metropolitan Water District. They have some wells in the vicinity of Crenshaw Boulevard to the east of the project. The depth of these wells varies between 122 to 305 meters (400 to 1,000 feet); the pumping capacity of these wells varies between 2,650 to 3,785 liters (700 to 1,000 gallons) per minute. They are a retailer and sell water to anyone located within limits of the water company boundary. The Los Angeles City Department of Water and Power draws its water for this area from three sources: the Owens Valley, the Metropolitan Water District, and wells in the San Fernando Valley. The Department of Water and Power usually sells water only to customers within the boundary of the City of Los Angeles unless they have an excess of water. (Presently there is no excess water). There is a possibility that some type of agreement between the County of Los Angeles and the Department of Water and Power can be reached to allow the Department to furnish the County of Los Angeles the water demands of the project.

RECOMMENDATIONS

It is recommended that detailed study of the water demands be made prior to the start of any negotiations for the supply of water.

REFERENCES

California Department of Water Resources, 1961.

Planned Utilization of Ground Water Basins of the Coastal Plan of Los Angeles County; Ground Water Geology: Bulletin 104. 181pp.