FLOODPLAIN MANAGEMENT IN SOUTHERN CALIFORNIA'S ANTELOPE VALLEY

James L. Easton
Los Angeles County Department of Public Works

Introduction

The Antelope Valley is located in the southwestern portion of the Mojave Desert in northernmost Los Angeles County. It has a population of over 100,000 people and is one of the fastest growing areas in Southern California. It's an area that has long been known for its agriculture, but in recent years two cities (Lancaster and Palmdale) have incorporated and are part of a rapidly expanding urbanized area. The Valley is also a center for several activities important to national defense; e.g., the construction of the B-1B and Stealth Bombers and the Air Force's experimental flight test and space shuttle activities at Edwards Air Force Base.

The Valley has rather unique and severe drainage problems that are not a great threat to agricultural interests but which are a substantial hazard to and are exacerbated by the rapid urbanization in and around the cities. If growth in the Valley is sustained and in order to protect its current residents, the cities and the Los Angeles County Department of Public Works are formulating and intend to implement plans for nearly $1 billion of flood control and water conservation infrastructure that will require the cooperation and participation of many governmental agencies, the public, and private land developers. It will use a combination of structural improvements and nonstructural flood plain management.

Physical Characteristics of the Valley

Climate

The Valley floor is desert with an annual normal rainfall of nine inches in the foothills to five inches at Edwards Air Force Base. In the adjacent San Gabriel and Techachapi Mountains however, rainfall is much greater and often more intense. Summer thunderstorms, although infrequent, can produce very high-intensity, flash flood-producing rainfall in the summer and fall.

Geography and Drainage

The Los Angeles County portion of the Valley has seven major drainage areas. Each begins in the mountains that bound the Valley on the west and south. Storm run-off from the mountain canyons has formed large alluvial fans across which it meanders in ill-defined and often-changing paths.

The Valley is a drainage basin with no natural outlet. The flow that does not percolate into the ground in the upper watersheds finds its way into Rosamond or Rogers Dry Lakes (Edwards Air Force Base) where there is practically no percolation. During rainy years, the lake beds may be flooded for several months.

Population

Much of the Antelope Valley is unimproved desert land. For many years, where water has been available, agriculture has and continues to flourish. The continued agricultural activities in the Valley plus a rapidly expanding population have caused serious overdrafting of the Valley's groundwater resources.

Several factors are causing population growth:

1. The aerospace industry is growing. The B-1B Bomber is being constructed there, and a new plant to build the Stealth Bomber is under construction. The Air Force Flight Test Program at Edwards Air Force Base employs approximately 2,000 people.
2. The on-again, off-again plans for the Palmdale Intercontinental Airport (a proposed supplement to Los Angeles International Airport) may ultimately lead to a substantial increase in commercial activity in the Valley, with attendant population growth.
3. Housing is reasonably priced, which is attracting people who work in the Santa Clarita and San Fernando Valleys, both of which are accessible within minutes via the Antelope Valley Freeway.

The new North County Element of the Los Angeles County General Plan provides for population in the Valley of approximately 218,000 in the year 2000.

Flood Plain Management Crisis

The urbanization of the Valley that has taken place in the past has not

adequately recognized the flood hazard from waters that leave the mountain canyon mouths and traverse the broad alluvial fans and ultimately flow into the dry lakes. Past residential development has been required to provide facilities only for the storm drainage from the site itself. This resulted in construction of storm drains outletting into on-site retention and detention basins. These facilities are not connected to any regional drainage facilities because none currently exist, with the exception of an improved open channel that serves the agricultural community of Littlerock and Amargosa Creek, an earthen channel through the City of Lancaster.

The severe flooding in the Valley that occurred during the storms of 1978, 1980, and 1983 focused the attention of the residents of the Valley and governmental officials on the fact that present and future development could not be adequately protected unless a plan were formulated and implemented to provide regional drainage facilities. A need to maximize conservation of storm runoff to replenish badly overdrafted groundwater supplies is also recognized.

The situation is complicated by the fact that no single public agency is currently responsible for flood control and water conservation in the Los Angeles County portion of the Valley. The Los Angeles County Flood Control District's northernmost boundary line is along the southern portion of the Valley and has prevented the District from extending its service to most of the Valley.

The Evolution of a Master Plan for Storm Drainage and Water Conservation

In late 1984 and early 1985, several things combined contributed to the formation of a master plan for storm drainage and water conservation in the Valley. The Los Angeles County Regional Planning Commission threatened a building moratorium in unincorporated territory unless such a plan were formulated. In the fall of 1984, the Los Angeles County Board of Supervisors consolidated the Flood Control District, County Road Department, and County Engineer into a single Public Works Department. Since the County Engineer is responsible for insuring that land development in the unincorporated area of the Antelope Valley proceeds in a safe manner, the new Department of Public Works was able to utilize the expertise of the Flood Control District in formulating a master plan for storm drainage and water conservation. This move was greeted with enthusiasm and cooperation from the two incorporated cities, the Air Force Base, the City of Los Angeles

Department of Airports, and the development interests. A plan is being developed for each of the seven major drainage areas within the Valley. As of April 1, plans for four of the areas are complete. The other three will be completed by June 30, 1985. In canyon areas, nonstructural solutions such as flood plain management techniques will be used to insure that future development is free of flood hazard. In areas which are or will become urbanized, the plans provide for retention or detention basins near the mouths of canyons and at other locations which will store peak runoff and maximize water conservation. Flows will be safely carried across the Valley floor in channels. Most of these will be earthen channels to maximize water conservation. In areas where flow velocities are slow enough, grassy swales may be utilized. In the two easternmost watersheds, Littlerock and Big Rock Creeks, more traditional methods of flood plain management will be used. A 4,000-foot-wide watercourse with lined levees is being considered for Littlerock Creek. Flood plain mapping and traditional flood plain management methods will probably be used for Big Rock Creek which is sparsely populated and is not used extensively for agriculture.

Funding

Funding the Plan

Total cost of producing the master plan for the seven drainage areas will be approximately $300,000. Funds have been contributed by the Cities of Palmdale and Lancaster, the Los Angeles County Flood Control District, and the County of Los Angeles. Allocation of some Federal block grant funds through the County is expected. Funding contributions are also being sought from the Air Force and the City of Los Angeles Department of Airports.

Funding the Improvements

In late 1984, the Department of Public Works convinced the Los Angeles County Regional Planning Commission to exact development fees for all tract improvements and lot splits in the Antelope Valley. The fees are $2,000 per single-family residence and $1,000 per multiple-family unit in tract developments and $10,000 per commercial-industrial acre. These fees are being required by the Regional Planning Commission as a condition of approval of tentative tract maps or lot splits. Currently, drainage fees are not required for development on previously

subdivided lands.

The developers are putting up bonds or callable letters of credit that will be held by the Department of Public Works until sufficient funds have been accumulated to begin work on specific high-priority elements of the master plan. This approach has been accepted by the development community and the Regional Planning Commission after some spirited discussions with the Department of Public Works.

Federal funding is also being sought. The United States Army Corps of Engineers has been studying the Antelope Valley streams for a number of years. $140,000 is budgeted for Fiscal Year 1985. An identical amount is recommended for Fiscal Year 1986. At that funding level, it is anticipated that the study will be completed in approximately 1990.

The Corps' efforts are being focused on quantifying benefits to the Federal Government attributable to the proposed drainage and water conservation improvements. It is believed that the most significant of these benefits will accrue to Edwards Air Force Base. The lake beds that receive storm runoff from the Valley are a vitally important feature of the Base. The Flight Test Program, the Space Shuttle Recovery Program, and the landing of damaged or disabled aircraft all require dry lake beds. However, during wet years, the lake beds may be flooded for several months. The benefit of having a system of flood control and water conservation facilities that will maximize the utility of the lake beds is very high. For example, the Air Force estimates that it has saved $8 billion worth of aircraft and a substantial number of lives over the past 25 years by being able to divert disabled aircraft to land on the dry lakes. The softer surface of the lake bed, the minimized danger of fire, and the absence of obstructions regardless of the path taken by landing aircraft have minimized damage and loss of life.

The Air Force needs some water in the lakes in order to smooth the ruts generated by wind and landing aircraft. It is believed that the flood control and water conservation system can be designed to provide an optimum amount of water to the lakes even though it will have to be done with some sacrifice of water conservation since water delivered to the lakes will evaporate rather than percolate.

The Department of Public Works will make available to the Corps its master

drainage plans and all of the supporting data as soon as they are complete. It is hoped that this information will be adopted by the Corps and expedite the conclusion of its study. Cooperation of the Air Force is also being sought for possible utilization of military funds for the construction of specific off-base improvements that will provide demonstrable benefits to the Base.

Federal block grant money is being considered for the construction of high-priority regional drainage facilities by both the cities and the County.

The City of Lancaster has also recently enacted development fees similar to those enacted by the County and will use those funds for regional and local drainage facilities within or near the city.

Getting From Here to There--The Interim Program

Because of the unique geography of the area, water will not follow the paths delineated in the master plans until the facilities themselves are built. For this reason, interim measures are being taken to protect future development. Developers will be required to construct streets that will be located so as to serve as temporary watercourses to conduct regional drainage safely through the tract. Lot pads will be elevated sufficiently to prevent flooding of adjacent homes. Facilities will have to be constructed at the upstream side of the tract to safely channelize flow into the streets and at the downstream side of the tract to safely dissipate the energy of water flowing in the street. There will be times when travel is disrupted by reason of the streets being used as occasional watercourses.

Developers are being encouraged to build portions of the regional system. They will receive credit for that construction against the drainage fees being exacted. They are required to dedicate the right of way necessary for the future facilities whether or not they choose to construct the facilities. Again, credit is given for the value of the rights of way.

Legislative action has been introduced to create a new Antelope Valley Flood Control District which, if enacted, will provide a single agency that will be responsible for the implementation of the regional drainage plan. It will also provide a local agency to act as partners with the Federal Government in cooperative local Federal construction.

Summary and Conclusions

Antelope Valley presents some unique challenges because of its climate, geography, and demography. Normal flood plain management approaches are not applicable in most parts of the Antelope Valley (i.e., the Valley floor).

The cooperative action now being taken by a number of governmental agencies and private developers will allow development to continue and provide funds for the construction of the most-needed elements of a regional drainage system. The system will utilize a wide variety of flood plain management techniques ranging from concrete-lined channels to grassy swales. It will protect a large urbanized area, maximize water conservation, and provide more utility of the dry lakes at Edwards Air Force Base.

South of the mountains in the Los Angeles Basin, the flood control and water conservation system was constructed largely after development had taken place. The Antelope Valley provides an opportunity to construct this important infrastructure as development takes place but will require the continued close cooperation of developers, government, and the public. The Department of Public Works intends to meet that challenge.

FLOOD ORDINANCES:
NATIONAL MODELS VS. LOCAL PROBLEMS

Maggy Hurchalla
Martin County, Florida

We are here today from mountains and beaches and swamps and big rivers. We have two things in common back home:

1) It floods.
2) We're growing.

I say the second with some confidence since where water is, people generally want to be. With some mosquito control, air conditioning, and affluence, everyone wants a puddle of their own.

In the fast-growing counties of Florida, our population doubles every ten years. If we figure out what to do right this year, we'll have only half the problem in ten years. If we don't figure it out, we will have three times the problem in 20 years. In figuring out what to do, many of us have been through the process of adopting a FEMA model "under the gun." Given a time deadline and the unthinkable penalty of loss of mortgage money, the process is stilted at best. With time, and the local will to do something, purely local solutions can be hung on the federal model ordinance for the best of both worlds.

While the federal model pays obeisance to the language and thoughts of Congress, it is mostly a hardware solution directed at the specific numbers of a specific study. And what's wrong with that? Surely it is better to base laws on engineering statistics than on undefinable whim. The problem is that the "engineering facts" are hard numbers, but not necessarily facts. There is simply not enough money, historical understanding, or scientific knowledge to do what FEMA tried to do for every square foot of America. For example, consider the following instances:

1) They left out the waves. Until last year the 100- year flood elevations in coastal areas reflected only still-water elevations. Storms don't so limit themselves.

2) They left out erosion. There are areas now in the ocean that were in B and C zones a few years ago.

3) They left out the creeks. Only major rivers were mapped.

4) They left out the swamps except in special cases.

In spite of all these "left outs," I would like to urge on you the conclusion that what is needed is not more money and more studies and more numbers. What is needed is a community perspective. Use the federal club and the FEMA model, but add local knowledge and local values. Community perspective allows you to be concerned with issues that voters and just folks understand. It deals only with the specific circumstances of the community, so mountain towns don't have to deal with beaches and vice versa. It deals with pieces of local geography and history that people know.

Local government is cheaper, faster, and closer than any other. Strange as it may seem, local government, if it chooses to be, is stronger when it comes to regulation than any other level. We tell people what they can do with property on a regular basis through building and zoning permits.

Given all those advantages, how can they best be used? I would suggest that the greatest failure of the federal direction is an unwillingness to use and enforce software solutions. The legislation, the rules, and the model ordinances deal with protection of dunes and mangrove, but not effectively. The whole program is built around water, but it does not deal very well with wetlands. Anyone who has managed flood plains over time knows that dunes and mangrove and wetlands are far more important than numbers. The ground truths of where the water is and where it goes will always be more accurate than computer models. Software solutions are the integration of land use and environmental regulation with flood plain management. They are based on obvious biological or planning principles instead of computer print-outs.

Let me mention one of the drawbacks of purely local action: lack of money. If a community perspective is to work, it must be cheap perspective. That limitation by itself assures that local solutions must look to regulatory standards that are more easily measured. Let's consider some examples.

By now everyone knows that sand dunes are important to prevent coastal flooding. The federal law says so, as well, yet I know of no case in Florida in which FEMA has exercised enforcement against local governments that allow damage to dunes. Except in the cleverer states and localities, almost everyone does some damage to the dunes. Florida is supposed to have a model setback

line, but some of the markers for that line are now out on the beach because of erosion. Florida no longer allows building on the beach itself, but there are still plenty of damaged dunes.

Without federal and state funds and vast and expensive studies, how can local government protect the dunes? It's easier than you think--simply set lines. As long as the choice is rational, it is defensible. A good example would be requiring that all major structures be landward of the landward toe of the dune. There is plenty of information available and plenty of expert testimony that this is a rational choice in terms of flood protection, both for the individual structure and the health of the dune itself.

One of the ironies of the regulations would be that the FEMA V zone would no longer be buildable at all. It is important to remember that the line defining that zone on the official flood maps may be meaningless and even silly. Even with the waves added, our V zone elevation is only 12 feet for the one in 100-year storm. Every other year, however, waves come over the dune at 15 feet in fall northeasters. That being the case, it is rational to set back off the dune and to use a higher elevation. In the wizardry of computers and engineering "proof," we need to remember that the court's standard for upholding legislative decisions is "fairly debatable" not "incomprehensible."

The beauty of using a topographic feature instead of a number is that it's free. The ordinance can set the standard. The developer can be required to do a topographic survey as part of site plan approval in order to set the exact location. The same idea can be used to expand the mangrove protection section of the FEMA model. We set a line that protects all shoreline mangrove plus a 50-foot transition zone. The 50 feet did not come out of a computer, but was rational and defensible from an environmental standpoint as well as for flood protection.

Perhaps the best example of hardware versus software is in wetland protection. The FEMA model takes a purely mechanistic view of floodways that has to do with width and height and cubic feet per second. Anyone with the slightest local knowledge or biological training knows that the best way to stay dry is to stay out of swamps. Soils, vegetation, and other software indicators are good, cheap signs of wetness. Rather than measuring how wet it is, it makes good sense to stay out of wetlands completely.

Besides the environmental benefits, there are indirect benefits for flood control. Wetlands are more than a hydraulic chute for flood-carrying. The peat

soils that hold and store water are part of the natural flood prevention system. The "isolated" wetlands are often important parts of river headwaters that hold and slow peak flows.

If you are in one of those places where a new and growing populace is dashing, lemming-like, towards the wet places, you need to move now. You haven't the time or the money to use the FEMA approach on a detailed local scale. You can use the FEMA framework and FEMA purpose. You can take the federal club and make it into a sharp instrument for doing what you want to locally.