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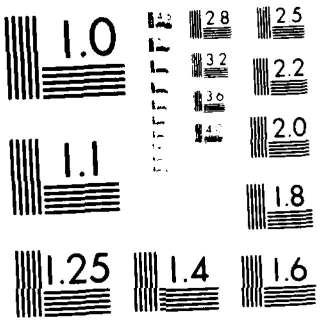

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DRAFT
ENVIRONMENTAL IMPACT
STATEMENT / ENVIRONMENTAL
IMPACT REPORT

NEW SAN CLEMENTE PROJECT

US ARMY CORPS OF ENGINEERS PERMIT APPLICATION NO. 16516 S09

MONTEREY PENINSULA
WATER MANAGEMENT DISTRICT

SEPTEMBER 1987

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, CORPS OF ENGINEERS
211 MAIN STREET
SAN FRANCISCO, CALIFORNIA 94105 - 1905

15 SEP 1987

CESPN-PE-R (1165-2-26a)

MEMORANDUM FOR: Defense Technical Information Center, Cameron Station, Building 5, Alexandria, Virginia 22314

SUBJECT: Draft Environmental Impact Report/Environmental Impact Statement (DEIR/EIS) For The New San Clemente Project, Monterey County, California-Regulatory Permit Application No. 16516S09

In accordance with ER 370-1-1, we are transmitting 12 copies of the subject document for inclusion in the National Technical Information Service System. Also enclosed is one copy of DD Form 1473, Report Documentation Page, for the subject document. Any questions should be referred to Mr. Roger Golden, telephone (415) 974-0444 or FTS 454-0444.

Galen H Yanagihara

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GALEN H. YANAGIHARA
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REPORT DOCUMENTATION PAGE

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- Prepared in cooperation with the Monterey Peninsula Water Management District
- Appendices are bound in a separate volume

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

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Carmel River, CA

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Joint State/Federal environmental impact document, concerning a regulatory permit application by the Monterey Peninsula Water Management District under Section 404 of the Clean Water Act. The proposed project involves construction of a dam across the Carmel River for the purpose of water supply (M&I), drought protection, and restoration of the environmental quality of the river.

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US Army Corps
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Availability of the Draft
Environmental Impact Report/Environmental Impact Statement (EIR/EIS)
For The New San Clemente Project, Monterey County California
Regulatory Permit Application No. 16516S09

The Monterey Peninsula Water Management District (MPWMD) has proposed the construction of a dam on the Carmel River approximately 16 miles southeast of the City of Monterey in Monterey County, California. The dam would: a) provide municipal water supply to meet both short and long term needs of the District; b) afford drought protection in future dry years; and c) restore the environemntal quality of the Carmel River. The proposed project requires authorization by the California State Department of Water Resources, Division of Dam Safety and the State Water Quality Control Board, and authorization by the Department of the Army under Section 404 of the Clean Water Act.

The Draft EIR/EIS has been prepared by the MPWMD and the U.S. Army Engineer District, San Francisco to comply with the environmental impact document requirements of the California Environmental Quality Act and the National Environmental Policy Act. The joint State/Federal environmental document has been prepared so as to minimize the duplication of effort in the State/Federal permit processes.

The MPWMD and the Corps of Engineers are circulating the Draft EIR/EIS to appropriate government agencies, interested organizations, and the public for review. Your written comments are requested so that they may be considered along with other relevant information in preparing the Final EIR/EIS. Please send copies of your comments to the MPWMD or the Corps of Engineers by November 24, 1987.

Copies of the Draft EIR/EIS are available for review at most libraries in Monterey County. Single copies of the Draft EIR/EIS may be obtained by contacting either Ms. Henrietta Stern of the MPWMD at 408-649-4866 or Mr. Roger Golden of the Corps of Engineers at 415-974-0444.

Bruce Buel

Bruce Buel
General Manager
Monterey Peninsula
Water Management District

Galen H Yanagihara

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District Engineer

DRAFT ENVIRONMENTAL IMPACT REPORT/
ENVIRONMENTAL IMPACT STATEMENT
NEW SAN CLEMENTE PROJECT
MONTEREY COUNTY, CALIFORNIA

COVER SHEET

A. ABSTRACT

The Monterey Peninsula Water Management District (MPWMD) has applied to the U.S. Army Engineer District, San Francisco for a permit, under Section 404 of the Clean Water Act (Public Notice No. 16516S09), to construct a dam on the Carmel River approximately 16 miles southeast of the City of Monterey in Monterey County, California. The proposed dam would: a) provide municipal water supply to meet both short- and long-term needs of the MPWMD; b) afford drought protection in future dry years; and c) restore the environmental quality of the Carmel River. The MPWMD and the Corps of Engineers are the designated lead agencies for the preparation of a joint Environmental Impact Report/Environmental Impact Statement (EIR/EIS) to identify the environmental consequences of selected project alternatives.

B. LEAD AGENCY CONTACTS

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C. REVIEW PERIOD

The Draft EIR/EIS has a 60-day period for public review. All written comments must be submitted to either of the designated lead agency contacts by November 24, .987 (or the end of the 60 day public review period either specified by the Notice of Availability published in the Federal Register or specified by the MPWMD's Notice of Completion, whichever date is later). Oral and written comments on this document may also be presented at the MPWMD's public hearing scheduled for November 9, 1987.

This draft report should be processed by DTIC.
Per Mr. Scott Miner, Army Corps of Engineers, San Francisco District

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[1] Throughout this document the term "setting" is used. It is synonymous with "affected environment".

[2] Throughout this document the term "impact" is used. It is synonymous with "environmental consequences".

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SUMMARY

S.1 ENVIRONMENTAL REVIEW

The California Environmental Quality Act (CEQA) requires that an environmental impact report (EIR) be prepared that fully describes the environmental effects of a proposed project before a decision is made to proceed. The National Environmental Policy Act (NEPA) requires that an environmental impact statement (EIS) be prepared on projects that involve federal funds or in some case federal permitting authority. This document is a combined EIR and EIS and is written to fulfill the requirements of both CEQA and NEPA. It is a public document that will be used to examine the environmental effects of the New San Clemente Project alternatives and to explore ways to lessen or avoid adverse environmental effects.

S.2 NEW SAN CLEMENTE PROJECT ALTERNATIVES

The Monterey Peninsula Water Management District plans to build a water supply project that would augment existing supply and provide sufficient water to meet municipal water demand until the year 2020, provide drought protection, and restore and enhance the natural resources of the Carmel River. The District has identified three alternative water supply projects that would meet these goals. They represent the range of reservoir sizes from 16,000 AF to 20,000 AF. They are:

- Alternative A. This alternative consists of a 29,000 acre-foot reservoir on the Carmel River, new wells in Carmel Valley and coastal Seaside and improvements to the Begonia Water Treatment Plant.
- Alternative B. This alternative is similar to Alternative A except that the reservoir on the Carmel River would have a capacity of 20,000 acre-feet.
- Alternative C. This alternative is similar to Alternative A except that the reservoir would have a capacity of 16,000 acre-feet.

The environmental effects of these alternatives together with those of a "No Project Alternative" were examined at an equal level of detail. The No Project Alternative consists of the existing facilities and operating practices, new wells at Seaside and improvements to the Begonia Water Treatment Plant.

S.3 ENVIRONMENTAL IMPACTS OF THE NEW SAN CLEMENTE PROJECT ALTERNATIVES

The impacts of the project alternatives on various elements of the environment are summarized in the following paragraphs together with measures suggested to lessen adverse effects.

S.3.1 WATER SUPPLY

The New San Clemente Project alternatives would increase the amount of water available for municipal supply purposes during dry periods. Because consumers within the District would be less vulnerable to water shortages during droughts, the District would allow water demand to grow beyond the present 20,000 AF/year ceiling to 22,895 AF/year. Under the No Project Alternative the 20,000 AF/year ceiling would remain in effect.

The New San Clemente Project alternatives would allow increased water production. Water production or yield would be similar for most years with the larger project alternatives providing slightly more water overall. The greatest difference in yield would occur in critically dry periods like 1976-1978. Alternative A would product 4,284 AF more water during the dry period than Alternative B and 6,067 AF more than Alternative C. The No Project alternative would produce 13,584 AF less than Alternative A during the same period.

During a 36 month critically dry period similar to that experienced in 1976 to 1978 with Alternative A in place, mandatory water rationing would be necessary for 3% of the time or one month. Under Alternatives B and C, mandatory rationing would be necessary for 12 months or about 33% of the time and 13 months or 36% of the time, respectively. Under the No Project Alternative, rationing would be necessary for 11 months or about 30% of the time. Rationing would be needed less under No Project conditions than for Alternatives B and C because demand would be less due to administrative controls.

S.3.2 GEOLOGY AND SOILS

Alternative A, the 29,000 AF reservoir, would inundate an area of 345 acres. Corresponding inundation areas for Alternatives B and C are 276 and 240 acres, respectively. The geologic resources of the inundation areas are unremarkable and of no special value.

No active faults pass through the existing or proposed dam sites. The risk of damage to the new dam in an earthquake would be small because it would meet California's stringent seismic safety standards.

There are a number of landslide areas around the perimeters of the proposed reservoir. A large landslide into the reservoir could create a wave that would overtop the dam and endanger downstream areas. The possibility of a large landslide into the reservoir cannot be discounted although its probability would be low. Additional studies of the more vulnerable slopes will be undertaken before a dam and reservoir are built.

S.3.3 HYDROLOGY AND WATER QUALITY

One of the purposes of the proposed water supply improvements is to provide more streamflow in the lower reaches of the Carmel River for the benefit of migratory fish and riparian vegetation. The increased storage capacity of the new reservoir alternatives would allow a portion of the winter storm flows to be stored and released to the river during the dry summer months. Once the Carmel Valley Aquifer is filled, conjunctive use of the groundwater basins and reservoir storage would allow much of the water released below the dam to travel the length of the river to the lagoon.

The changes in streamflow that would result from the San Clemente Project alternatives would affect downstream sediment transport and channel geometry. The river channel below the new dam would be expected to narrow from its present 80- to 100- foot width to, perhaps 40 feet. The channel changes would be slightly less extensive with the smaller reservoirs than for the 29,000 AF reservoir. Under the No Project Alternative, channel geometry would not be expected to change because streamflow would not be altered greatly. The present channel instability would be expected to continue or perhaps grow worse.

Reduced channel capacity under Alternatives A, B and C could result in an increase in flood levels compared to the No Project Alternatives. Vegetation clearing and channel deepening are suggested as mitigation measures to reduce flood hazard, if a reduction in channel capacity does, in fact, occur.

Under certain conditions the reduction in winter time storm flow in combination with the increase in summertime flow could lead to increased siltation of the Carmel River Lagoon.

Groundwater levels in the Carmel Valley Aquifer during dry years would be higher with the New San Clemente Project alternatives than with the No Project Alternative. This, in combination with increased streamflow, would reduce the destruction of riparian vegetation and consequent bank erosion during critically dry periods such as 1976-1978.

The New San Clemente Project alternatives would have little effect on water quality other than to reduce summertime water temperatures below the dam. Lowered water temperature would result from the greater mass of water in storage, increased summertime streamflow and increased shading as the river channel narrows and vegetation becomes more abundant. Cooler river water would benefit the steelhead population.

The trihalomethane generation potential of waters from the new reservoir could be increased in the years immediately after the reservoir is filled. This adverse impact can be greatly reduced by clearing vegetation from the inundation area before filling the reservoir.

S.3.4 FISH AND OTHER AQUATIC LIFE

The Carmel River supports the southernmost major steelhead run in North America currently estimated at 1,200 to 1,500 spawning adults. The run has been deteriorating for many years. It is estimated that under the no project condition the run would be reduced to a remnant during the next series of dry years. With Alternative A or B in place the steelhead run could average 4,000 individuals if the fish passage problems at Los Padres Dam are solved and 2,000 individuals if they are not. With Alternative C the number of adults would be less.

With Alternatives A, B or C in place, fair to excellent steelhead runs would originate from habitat upstream of the dam 69%, 62% and 54% of the time, respectively. The corresponding value for the No Project Alternative would be 8% of the time. Fair to excellent steelhead runs from habitat downstream of the dam would occur 65%, 63% and 55% of the time with Alternatives A, B and C, respectively. The corresponding value of the No Project Alternative would be 18% of the time.

The New San Clemente alternatives would inundate or impair potential steelhead spawning habitat. Under Alternative A, 3.5 miles of spawning habitat would be inundated or impaired. Corresponding values for Alternatives B and C would be 3.0 and 2.6 miles, respectively. The No Project Alternative would not inundate any potential spawning habitat.

S.3.5 VEGETATION AND TERRESTRIAL WILDLIFE

The New San Clemente Project alternatives would inundate 240-345 acres of undeveloped land. The most important vegetation community that would be inundated would be riparian forest. Alternatives A, B and C would inundate 31.0, 25.0 and 21.5 acres of riparian forest, respectively. This loss would be partially compensated for by enhancement of downstream riparian areas.

Endangered and threatened species are not expected to be adversely affected by the proposed project alternatives.

S.3.6 CLIMATE AND AIR QUALITY

Operation of the New San Clemente Project alternatives would have no adverse effect on climate or air quality. During construction vehicular emissions would be increased, as would dust generation, but these effects would be localized and insignificant. Mitigation measures are suggested to minimize air pollutant generation, including spraying exposed soil surfaces with water and paving construction haul roads. If brush cleared from the reservoir site is burnt, a short-term adverse effect on air quality can be expected.

S.3.7 TRAFFIC

Operation of the New San Clemente Project alternatives would have no effect on traffic. During the 7-month peak construction period for Alternative A, 460 trips each day would be added to the present traffic volume on Carmel Valley Road. The duration of the peak construction period would be reduced by 1 to 3 months under Alternatives B and C. The increase in traffic would reduce average speeds somewhat but would not cause congestion or delays.

Construction vehicles would use San Clemente Drive to reach the dam site. A number of mitigation measures are suggested that would reduce traffic related impacts on San Clemente Drive and its present users. They include bridge and road improvements, vehicle speed restrictions and vanpooling of workers.

S.3.8 NOISE

Operation of the New San Clemente Project alternatives would have no effect on noise levels. Traffic noise on the section of Carmel Valley Road between Esquiline Road and Cachagua Road and on San Clemente Drive would increase noticeably *during construction*. Noise generated at the construction site would increase noise levels at the nearest sensitive receptor (Lot 1 of Sleepy Hollow) by a maximum of 30-60 dBA. The actual noise level increase would probably be less than the maximum because of shielding by an intervening ridge. The loudest noises could interfere with sleep in rooms facing the construction site if windows are open. The noise of occasional blasting during construction, which would occur only during daylight hours, would be audible in Sleepy Hollow and other nearby areas of Carmel Valley and would be annoying to some. Advance warning of blasting episodes would be provided to area residents.

S.3.9 VISUAL QUALITY

All New San Clemente Project alternatives would produce a permanent change in the appearance of the reservoir area. The new dam and reservoir would be visually more prominent than the existing dam and reservoir by virtue of its greater size. These changes in visual qualities are judged to be insignificant because access to the watershed is limited and few would be aware of them.

S.3.10 HISTORY AND ARCHAEOLOGY

All New San Clemente Project alternatives would inundate two prehistoric and six historic sites. The prehistoric sites consist of poorly developed bedrock mortars that do not appear to be associated with other surface artifacts. The historic sites include the remains of four cabins, the remains of the Carmel Valley Dam and the existing San Clemente Dam. Mitigations include site recording and nomination for inclusion in the National Register of Historic Places.

S.3.11 PUBLIC HEALTH AND SAFETY

Under normal circumstances the New San Clemente Project alternatives would have no effect on public health and safety. During floods, the water surface elevation in the Carmel Valley could be raised above the No Project condition as a result of project-induced changes in river channel geometry and capacity. Any increased flood hazard could be avoided or lessened by selective vegetation clearing and channel deepening.

In the improbable event of a sudden and complete failure of the new dam, a flood wave would descend the Carmel Valley with catastrophic consequences for life and property. The larger the reservoir the more severe would be the consequences. While the risk of any type of dam failure is very low, it is expected that the risk of failure of the proposed mass concrete structure would be less than that of the existing concrete arch dam.

S.3.12 LAND USE

Construction of the New San Clement Project alternatives would result in the conversion of between 345 and 240 acres of undeveloped land to an artificial lake. Approximately 1,450 acres of private lands would be affected by the proposed project, some of which would be purchased and transferred to public ownership.

S.3.13 SOCIOECONOMICS

To finance the project alternatives, average residential water rates would increase by \$3.03 - \$4.08 per month. Average commercial water rates would increase by \$33.71 - \$45.41 per month. Construction of the proposed project would create about 180 two-year construction jobs.

S.3.14 POTENTIAL FOR GROWTH-INDUCEMENT

A project creates potential for growth-inducement when construction or improvement of infrastructure provides capacity for land development and population increases that exceed the planned growth of an area. The proposed water system improvements would have the potential to induce growth if they accommodated significantly more development than allowed by the current general plans of the cities served by the system. In that case, development might occur taking advantage of the excess capacity, despite community goals to the contrary.

The proposed water supply project alternatives are sized to meet municipal water demand in the year 2020. The water demand estimates are based on population and employment projections that are consistent with present land use plans. In addition, the District plans to allocate water from the new reservoir in three phases at a rate consistent with planned growth. Because of the foregoing the proposed project alternatives are judged to be growth accommodating; they would allow presently planned growth to occur without being constrained by a lack of water supply. They would not be growth inducing because they would not allow growth in excess of that already planned.

The New San Clemente Project alternatives would, however, remove an obstacle to growth in that the ability of communities in the District to develop in accordance with their general plans is presently limited by a lack of water.

S.4 SIGNIFICANT ADVERSE EFFECTS THAT CANNOT BE AVOIDED

The California Environmental Quality Act requires that significant adverse environmental effects that cannot be avoided must be identified in an EIR on a proposed project. Sections 15064 and 15065 of the State's guidelines for implementing the California Environmental Quality Act state that "A significant effect on the environment is defined as a substantial or potentially substantial adverse change in the physical conditions which exist in the area affected by the proposed project including land, air, water, minerals, flora and fauna, ambient noise and objects of historic or aesthetic significance." Economic impacts alone are not considered to be significant effects on the environment unless they result in significant physical impacts. While the guidelines provide some elaboration of what is meant by a "significant" impact, it cannot be defined precisely. Ultimately it remains up to the author of the EIR to make some judgment on the matter.

In making the determination of significance it was assumed that to be judged "significant and unavoidable" an adverse impact would have to involve a permanent degradation in the quality of the environment or the destruction of important natural and cultural resources that cannot be eliminated by the incorporation of mitigation measures. Several of the impacts of the New San Clemente Project alternatives are judged to be significant for the following reasons. The loss of steelhead spawning habitat due to inundation behind the dam is a significant loss, although it is made less significant by the elimination of conditions downstream of the dam that would be expected to lead to the demise of the steelhead run in the next series of dry years. Likewise the loss of riparian vegetation due to inundation is significant although partially offset by improved conditions for riparian vegetation downstream of the dam and by the District's proposed mitigation program. Adverse effects of a new dam and reservoir on visual quality were judged to be insignificant because few have access to the altered viewsheds. The impacts of the project alternatives on cultural resources are reduced to insignificance by the mitigation measures. The adverse effects of project construction on traffic, noise and air quality can be lessened by mitigation and would not involve a long-term change in environmental quality.

1 INTRODUCTION

1.1 THE NEW SAN CLEMENTE PROJECT

The Monterey Peninsula Water Management District (MPWMD or "the District") was created by the California legislature in 1978. Its creation was prompted by the severe water shortage on the Monterey Peninsula during the drought of 1976 and 1977. The new agency's principal mission was to develop and implement a plan for expansion of the Peninsula's water supply and to enhance the natural resource values of the Carmel River.

In the early 1980s, District staff and their consultants undertook extensive technical studies designed to improve understanding of the ground and surface water resources available to the District and some of the problems involved in developing them. In 1985 and 1986 the District established criteria that any water supply improvement project would have to meet in order to satisfy the District's needs. A broad range of alternative water supply improvement projects were synthesized and examined in detail. Alternatives not meeting the District's criteria were progressively eliminated from further consideration. By the spring of 1987, the District had identified three alternatives that would meet its needs. All three involve construction of a new dam and reservoir on the Carmel River, known as the New San Clemente Dam and Reservoir, new wells in the coastal Seaside Groundwater Sub-basin and the Carmel Valley Aquifer, and expansion of the Begonia Water Treatment Plant. The alternatives known as the New San Clemente Project Alternatives differ only in regard to reservoir size.

1.2 THE ENVIRONMENTAL REVIEW PROCESS

The California Environmental Quality Act (CEQA) requires that an environmental impact report (EIR) be prepared that fully describes the environmental effects of a proposed project before a decision is made to proceed. The National Environmental Policy Act (NEPA) requires that an environmental impact statement (EIS) be prepared on projects that involve federal funds or in some cases federal permitting authority. This document is a combined EIR and EIS and is written to fulfill the requirements of both CEQA and NEPA. It is a public document that will be used to examine the environmental effects of a proposed project and its alternatives, and to explore ways to lessen or avoid adverse environmental effects.

The District and the U.S. Army Corps of Engineers are lead agencies for the EIR/EIS. The lead agencies are responsible for preparing the environmental document and ensuring that it meets legal requirements. The District is a lead agency because it is the project proponent. The Corps of Engineers is a lead agency because the District must obtain a permit from the Corps of Engineers pursuant to Section 404 of the Clean Water Act.

The first step in the CEQA process is the issuance of a Notice of Preparation informing interested parties that an agency intends to prepare an EIR on a project. The District issued a Notice of Preparation for a 29,000 acre-foot capacity New San Clemente Dam and Reservoir in June 1982. Meetings were held in 1982 and 1983 with government agencies and interested individuals to determine what issues should be addressed in the EIR. In 1986, before the CEQA process could be completed, the Corps of Engineers determined that an EIS was also needed. Accordingly, a Notice of Intent, the federal equivalent of the Notice of Preparation, was published in the Federal Register in August 1986. Two additional public scoping meetings were held in September, 1986.

This Draft EIR/EIS is now available for public review. Written comments on the draft must be received by 24 November 1987. Public workshops on the draft will be held in October, 1987 and a public hearing to accept oral comments will be held on November 9, 1987. Responses to all comments will be prepared and included in the Final EIR/EIS. The Monterey Peninsula Water Management District will then review the Final EIR/EIS, and decide whether the EIR/EIS accurately portrays the environmental consequences of implementing the proposed project, thus fulfilling CEQA requirements. A public hearing to certify the EIR/EIS will be held in early 1988. The Corps of Engineers will make similar determinations with respect to NEPA requirements.

1.3 ORGANIZATION OF THE EIR/EIS

The water supply system improvement alternatives being considered could affect a broad geographical area and many different aspects of the environment. A comprehensive evaluation of the alternatives is necessarily lengthy. The EIR/EIS has been organized to be useful to both the technical reviewer who needs to consider the impacts in detail and the more general reader who wants to understand the main consequences of implementing the alternatives, but does not have time to read the entire report. A summary of the report can be found immediately following the Table of Contents.

Following this introduction, Chapter 2 describes how the three alternatives that best meet the District's goals were selected from a broader range of options. Chapter 3 is a description of the three best alternatives, referred to subsequently as the "feasible alternatives" together with the No Project alternative. Both CEQA and NEPA require that the environmental consequences of a No Project alternative be examined together with other alternatives. The process of determining water demand is discussed in Chapter 4.

The direct effects of the alternatives on various aspects of the environment are described in Chapters 5 through 17. Each chapter is organized in three sections: 1) a description of the environmental setting; 2) an assessment of the environmental impacts of operation of each alternative; and 3) an assessment of the environmental impacts of construction of each alternative. The environmental impacts of system operation would be long-term effects that would continue for the life of the system. The environmental impacts of system construction would only be felt for a relatively short period of time.

Chapter 18 is a discussion of the relationship between the water supply system improvement alternatives and growth on the Monterey Peninsula. Chapter 19 addresses several matters of environmental philosophy, as required by CEQA and NEPA. Public involvement is discussed in Chapter 20. Contributions to the report are listed in Chapter 21.

The District and their consultants have conducted numerous technical studies in support of the environmental process. The studies are too extensive and detailed to be included in the EIR. Instead they are summarized in the text and appropriately referenced. A selected listing of these technical support documents can be found in Appendix B.

The technical studies requiring the greatest level of effort by District staff were those that led to the development of the Carmel Valley Simulation Model (CVSM). The model is a computerized mathematical simulation of surface and groundwater resources that allows the District to determine the effect of various water management strategies on river flow, groundwater levels, municipal yield, reservoir storage and other factors. A summary description of the model is included in Appendix A.

Biological species lists can be found in Appendices C1 through C5. The riparian mitigation plan is contained in Appendix C6. State and Federal Air Quality standards are found in Appendix D. Appendices E and F are population and employment projections and the archaeological report, respectively.

The Appendices are contained in a separately bound companion volume to the EIR/EIS.

2 SELECTION OF FEASIBLE ALTERNATIVES

2.1 INTRODUCTION

A large number of possible alternatives were examined that might, at least conceptually, be able to meet District goals of securing an additional source of water sufficient to meet future demands, provide drought reserve and environmental enhancement. The alternatives that were examined are described in more detail in the following paragraphs. The systematic screening process used to evaluate this large number of alternatives is described later in the chapter, together with the results of this process. Alternatives that met a series of performance standards that reflect the District's goals were deemed "feasible" and are described in detail in Chapter 3.

There are numerous alternatives to construction of New San Clemente Dam and Reservoir. The District could choose not to expand the water supply available for use within its boundaries and could limit water conservation efforts to those already planned. This possibility is referred to as the No Project Alternative, which is fully described in Chapter 3. Alternatives that would produce more water than is currently available include the importation of water from outside the area, dams in different locations on the Carmel River or its tributaries, dredging of existing reservoirs, further development of the Seaside groundwater basin, seawater desalinization and wastewater reclamation and reuse. Alternatives that would compel demand to conform with the available supply include more stringent water conservation than presently practiced and a moratorium on new water connections.

2.2 DESCRIPTION OF ALTERNATIVES CONSIDERED

The following sections describe the various water supply alternatives that were examined by the District. A brief description of each supply source is provided, together with a discussion of the feasibility of the alternative and reasons for the feasibility determination. For more detail, the reader is directed to "Evaluation of Water Supply Alternatives for the Monterey Peninsula" by MPWMD (January 1987).

2.2.1 IMPORTATION FROM DISTANT SOURCES

Water could be imported from outside the District's boundaries. Several projects have been proposed, or at least considered, that would bring water from the Salinas River Basin, the Big and Little Sur Rivers and from San Luis Reservoir in Merced County.[1]

Arroyo Seco River

Since the early part of the century, reservoirs have been intermittently proposed on the Arroyo Seco, a tributary of the Salinas River, as a source of additional water supply for the lower Salinas Valley. A reservoir could be built with sufficient capacity to meet the needs of both the Salinas Valley and the Monterey Peninsula. As part of their studies in the late seventies, the U.S. Army Corps of Engineers concluded that the cost of supplying the Peninsula with water from a reservoir near Greenfield on the Arroyo Seco would be greater than the cost of water from a Carmel River reservoir. Furthermore, the Corps of Engineers concluded that the inter-basin transfer of water would likely be opposed by Salinas Valley interests.[1]

In 1983, CH2M-Hill prepared a report on the feasibility of a dam and reservoir on Arroyo Seco for the Monterey County Flood Control and Water Conservation District. After reviewing the report, the Monterey County Board of Supervisors voted not to proceed with an Arroyo Seco project. While it might have been feasible for the District to participate in an Arroyo Seco project, it would certainly not be feasible for the District to pursue such a project alone due to project costs and inter-basin transfer concerns.

Lower Salinas River

As an alternative to an Arroyo Seco project, Monterey County Flood Control and Water Conservation District developed a project proposal that involved releasing water from the Nacimiento and San Antonio Reservoirs and diverting it from the Salinas River, near Salinas, for agricultural use. In addition a series of wells would be drilled near the upper reaches of the river and water would be pumped and conveyed to Fort Ord and the City of

Marina for municipal supply. The project, known as Lower Salinas Project, was not designed to yield water to the Monterey Peninsula.

Eligibility for this supply source is contingent on having riparian rights along the Salinas River and on being located within the zone that funded Nacimiento and San Antonio. Neither of these criteria is met by the District.

Big and Little Sur Rivers

The Big and Little Sur Rivers have been mentioned as potential water sources for the Monterey Peninsula. Although these small watersheds could theoretically be developed to produce sufficient water to meet the Peninsula's needs, the physical and institutional barriers to construction of a water supply project are formidable. Both rivers are designated under the California Protected Waterways Program as "important waterways." The construction of dams and reservoirs on protected rivers is prohibited and it appears unlikely that a case can be made for lifting the prohibition.

Water stored in reservoirs on either the Big or Little Sur Rivers would have to be conveyed over or through a high mountain ridge to reach the Monterey Peninsula. Although no cost estimates are available, the Corps of Engineers determined that the total cost of storage and conveyance of water from either of these two basins would be high.[2]

San Luis Reservoir (San Felipe Project)

The federal San Felipe Division consists of San Luis Reservoir in Merced County and the Pacheco Tunnel through the Coast Range. Water from the Sacramento Basin is pumped into San Luis Reservoir during high-flow periods, and conveyed to Santa Clara and San Benito Counties, via the Pacheco Tunnel.

Although water is presently only being supplied to Santa Clara and San Benito Counties, the Division's service area also includes the Pajaro River Valley that straddles Santa Cruz and Monterey Counties. The Pajaro Valley Water Management Agency has a contractual option for the use of the water. If the Pajaro Valley agency chooses not to exercise its option and if Monterey County decided that it wanted to use its portion of the water on the Monterey Peninsula, then the other parties to the federal contract would have the first right of refusal for the water allocated to Monterey County. If all these other parties, Santa Clara, San Benito and Santa Cruz Counties, were to refuse Monterey's share, then the Bureau of Reclamation would have to prepare an amended feasibility report expanding the service area to include the Monterey Peninsula and submit it for Congressional approval.[1] However, the Santa Clara Valley Water District has formally requested all water that is available.

While the San Felipe Division could theoretically provide the Monterey Peninsula with water, the institutional barriers to such a project are insurmountable. It would be necessary to construct a pipeline to convey the water to Monterey, and the water would be only off-peak water; thus it would be necessary to build a storage reservoir. The water would, therefore, be expensive.

2.2.2 RESERVOIRS ON THE CARMEL RIVER AND ITS TRIBUTARIES

A large number of different sites for reservoirs in the Carmel River Basin have been considered in the past by the Corps of Engineers, Cal-Am, and the MPWMD. They include both sites on the Carmel River, its tributaries, and off-stream storage sites. An off-stream reservoir would receive pumped water from a stream or tributary; an example is depressions in Fort Ord.

Reservoirs on the Main Stem of the Carmel River

In 1969, Kennedy Engineers, under contract to Cal-Am, studied four possible sites for a new water supply reservoir on the Carmel River. Sites considered included the Klondike site, just upstream of Carmel Valley Village, a site near the Cal-Am filter plant, the New San Clemente site and the Syndicate site near Los Padres Reservoir.[1] Cal-Am concluded that the New San Clemente site, just downstream of the existing dam, was the most favorable but did not proceed with the construction.

In the late 1970s, the U.S. Army Corps of Engineers evaluated the feasibility of constructing a multiple-purpose 154,000 acre-foot (AF) dam and reservoir on the Carmel River.[2] The reservoir would provide water supply, flood control and flat water recreation. Five dam sites were considered: the Los Padres site, the Cachagua Creek site, the Pine Creek site, the New San Clemente site and the Klondike site. The first three sites were rejected because they would result in the inundation of parts of the Ventana Wilderness. A dam at the Klondike site was rejected because it would be vulnerable to earthquakes and would inundate the Cal-Am filter plant, about one mile of Carmel Valley Road and several residential structures. A dam at this site would also block downstream movement of sediment from Tularcitos Creek. The loss of sediment would probably increase the rate of bank erosion downstream of the dam. The New San Clemente site was chosen as the most favorable, but the Corps of Engineers did not proceed with construction because insufficient funds were available for a dam of this magnitude and scope. The projected cost in 1979 was $238 million, of which 86% was to be met by communities within the District. The project did not have adequate local support.

In 1982, Converse Consultants prepared a preliminary design and cost estimate for a rockfill dam and reservoir near the San Clemente site for the District.[3] A subsequent change in the selected construction method from rockfill to roller-compacted concrete (rollcrete) resulted in a dam site location change from 1,200 feet to 3,600 feet below the existing San Clemente Dam.

The relatively minor changes in location of San Clemente Dam appear not to have any significant environmental implications. The change in construction method from rockfill to roller-compacted concrete, made for reasons of economy, has some environmental implications. Because the mass of the dam would be less, the amount of rock that would have to be excavated would also be less. The rollcrete construction period would be 12 months less than with the rockfill method (18 and 30 months, respectively), thus reducing the duration of construction-related impacts to nearby residents. On the other hand, the numbers of trucks traversing Carmel Valley Road will be greater because more materials will have to be brought in from off-site.

Mainstem Reservoirs of Different Sizes

The capacity of the reservoirs considered for the Carmel Valley has varied widely. The 1969 studies for Cal-Am evaluated water supply reservoirs with active storages in the range of 40,000 to 145,000 AF.[1] This was because Cal-Am was projecting, at that time, a much more rapid growth in water demand than has occurred.

In 1981, the U.S. Army Corps of Engineers, selected a reservoir with a total storage of 154,000 AF. It was intended to provide flood control, recreation and water supply.[2]

The District has evaluated reservoirs to serve users within its boundaries with a range of total storage from a few hundred acre-feet to 29,000 AF. Projects were sized based on present water demand projections, drought reserve and the expected fish release requirements. The intent was to provide at least 18,600 AF/year of firm yield in a severe drought, and 22,895 AF firm yield in a normal year to meet the needs of District consumers by the year 2020. The 18,600 AF that would be provided in a severe drought would meet only the rationed demand. The actual unrationed demand would approach 24,600 AF in a critically dry year.

In 1984 another possibility emerged, a 45,000 AF New San Clemente reservoir on the Carmel River that would serve not only the needs of the District but also those of Fort Ord and the Marina County Water District (MCWD).[4] Because over half of the cost ($59 million out of $114 million) of this joint-use project would be for transmission of project water to the Fort Ord/Marina area, this alternative was deemed uneconomical by Fort Ord and MCWD. Thus the Lower Salinas project alternative is being pursued by those agencies.

Tributary and Off-Stream Reservoirs

In 1980, the District conducted an investigation of the possibility of storing surplus Carmel River water in tributary and off-stream reservoirs. Altogether, more than ninety sites were examined.[5] In some cases water would flow into the reservoirs by gravity; in others it would have to be pumped.

Several sites were identified as more favorable including the Chupines Canyon pump storage site. In all cases, however, it was noted that the water developed in this way was several times more expensive than water from a reservoir on the main stem of the river. Furthermore, the Chupines Canyon site would have inundated an important archaeological site as well as prime agricultural land protected by the Williamson Act. It did not pass the screening criteria described later in this chapter and encountered major opposition from local citizens.

In 1982, Converse Consultants examined two tributary reservoir sites, San Clemente Creek and Cachugua Creek, in more detail.[3] They concluded that while it was technically feasible to build reservoirs at these sites, the cost per acre-foot of storage would be about three times greater than for a mainstem reservoir at the New San Clemente site. These alternatives did not pass the screening process described later in this chapter.

Dredging of Existing Reservoirs

The capacity of both Los Padres and San Clemente reservoirs has been reduced by accumulating sediment from the upper watershed. The existing reservoirs are being filled at an average rate of about 20 AF/year through sedimentation.

An estimated 2,500 acre-feet of storage could be restored by dredging both reservoirs. The cost of storage obtained in this way has been estimated to be five to ten times greater than that for development of storage in a new reservoir.[6] Dredging of the reservoirs would re-suspend a great deal of sediment, having a potentially adverse effect on aquatic life. Disposal of the dredged material could also pose a substantial problem as it would have to be trucked to a disposal site away from the river.

2.2.3 GROUNDWATER DEVELOPMENT IN THE SEASIDE BASIN

One of the water sources currently used by the District is the Seaside groundwater basin.[7] The determination of the long-term yield of the basin is important in order to prevent basin overdraft. An overdraft occurs when the average annual withdrawal of water exceed the average annual recharge.

Results of several recent investigations indicate that significant additional water to meet increasing demands on the Monterey Peninsula is probably nct available from the Seaside groundwater basin.[7A,7B] A monitor well drilling program conducted in the inland Fort Ord subbasin revealed that the groundwater production potential in this area of the Seaside basin is poor. An investigation in the coastal Seaside subbasin indicated that although the basin can be utilized to offset short-term increased production demands during dry periods, the long-term yield of this area of the basin is similar to that being produced at present.

As described later in this report, the quality of water from the Seaside groundwater basin is different than that from the Carmel River. In the inland basin, the total dissolved solids, iron and manganese content of the water is higher than desirable. The presence of sulfur has been identified in some areas of the coastal basin. Treatment may be necessary to remove these materials before the water enters the municipal water system.

2.2.4 WASTEWATER RECLAMATION

Unlike the alternatives described above, water reclamation would not increase the amount of water available to the District. Instead it would make better use of the existing supply by using it more than once. At present, water supplied to consumers within the District's boundaries is used once, discharged to the sewer, treated at a municipal treatment plant and discharged as waste to the ocean. The federal and state governments require that the wastewater be treated to a level that protects ocean water quality. With some additional treatment it can be reused.

In many cases, reclaimed water can be used most advantageously to replace uses that do not require the highest quality water. Examples are golf course irrigation and irrigation of crops other than food. Agreements are in progress to substitute reclaimed water for potable water at greenbelt areas and golf courses in Del Monte Forest as part of its existing water conservation program. The proposed facilities could produce up to about 1,500 acre-ft/year of subpotable water, however, a seasonal market of about 800 AF presently exists. Application of reclaimed water would not adversely impact potable water supplies in Del Monte Forest.

2.2.5 GROUNDWATER RECHARGE

The yield of the Seaside aquifer could be increased by artificial recharge; that is, supplementing the natural recharge with additional water from another source. Two sources are available, the Carmel River and reclaimed water.

Recharge with Carmel River Water

In wet years, large volumes of water pass down the Carmel River to the Pacific Ocean. These large flows are too great to be captured and stored in the existing reservoirs and are in excess of the flows needed to meet the fishery requirements. It would be theoretically possible to divert part of this excess flow and convey it to Seaside via a pipeline where it would be injected into the underlying aquifer. The cost of water developed in this way would be relatively inexpensive, but serious questions remain with respect to water availability and the feasibility of recharge by injection. The amount of excess flow that could be delivered to the Seaside basin is limited by filter plant capacity, the number of streamflow events greater than 200 cfs and the turbidity of storm waters.

Recharge with Reclaimed Wastewater

Cal-Am obtains a portion of its water supplies from wells that penetrate the Seaside aquifer. The amount of water that Cal-Am can withdraw from the wells is limited by the rate at which rainwater can recharge the groundwater basin. Reclaimed water could be used to artificially recharge the groundwater basin, then be pumped out for reuse.

The MPWMD has conducted a number of studies designed to determine the feasibility of water reclamation for groundwater recharge. Wastewater would be treated at the existing Monterey or Fort Ord sewage treatment plants and injected in the Seaside aquifer. Systems evaluated include conventional advanced wastewater treatment processes and the culture of water hyacinths as a treatment process. The studies indicate that reclamation and recharge is technically feasible in the Monterey area, although the cost of the water produced would be relatively high.[9] Without carrying the studies further, it is difficult to determine what discharge requirements would have to be met before health authorities would permit such a recharge project. It can be expected that any project that involves the deliberate use of reclaimed water for potable municipal supply will be controversial and difficult to implement.

The State Department of Health Services does not favor projects that introduce wastewater, however well-treated, into drinking water sources because the long-term health effects of chemicals found in wastewater in trace amounts are unknown.

It should be noted that incidental or inadvertent reuse occurs quite commonly, particularly in the arid west. Cities often obtain their water supplies downstream of other cities' water discharges. The effluent from many sewage treatment plants percolates into the ground where it mingles with groundwater used for water supply. In most of these cases, however, it is deemed acceptable because considerable dilution of reclaimed water with natural waters occurs before reuse, and perhaps because no practical alternative exists.

2.2.6 DESALINATION

Water suitable for municipal use can be produced by desalting seawater. Although desalination technology has improved considerably in the last two decades, it remains costly and requires the use of large amounts of energy. Accordingly, desalination of seawater for municipal water supply has only occurred in extreme circumstances; the largest concentration of desalination plants is in the Persian Gulf where energy is inexpensive and no other water sources are available.

No municipalities in the United States are currently desalting seawater. Desalination does not appear to be a practical alternative for the Monterey Peninsula.

2.2.7 EXPANDED WATER CONSERVATION

The District has adopted a water conservation program that is designed to reduce actual demand compared to projected demand without conservation.[10] The plan consists of a number of actions that reduce water use or wastage that are described in Section 3.4.2.

The District's existing water conservation program includes the building-in of conservation devices in all new construction, detection and repair of leaks in the distribution system, and public education and information programs. A more aggressive water conservation program might include compulsory retrofitting of existing homes and businesses with water conserving appliances and restrictions on water use outside the home. It is probable that such an approach could produce about 1,000 to 2,000 AF/yr of water savings. An additional conservation measure would be water pricing to penalize above-average use but implementation of such a measure would be outside the District's legal authority.

An aggressive water conservation program would affect the lives of the District's customers much more noticeably than the existing program. If above average water use attracted a financial penalty it is likely that some customers would have to curtail their use of water outside the home.

One disadvantage of aggressive water conservation is that it reduces the demand without increasing the supply. If a household does not exert much effort during normal times to save water, then when a drought occurs it can relatively easily change a few water-wasting habits and cut its water use. On the other hand, in a household that routinely saves water, there is little more that can be saved during a drought, and its water use remains about the same. If an entire community saves water routinely it is apparent that little more can be done during a drought. Even a small shortfall in water availability could cause some hardship.

Expanded water conservation, as an individual alternative or combined with other non-structural water supply alternatives, would not provide sufficient yield or environmental benefits. It did not pass the screening criteria described later in this chapter and was deemed infeasible.

2.2.8 CISTERNS

The District examined the use of cisterns for residential and institutional use (e.g., schools). Rainwater would be collected and stored in tanks for irrigation of gardens or larger open space, such as school playing fields. Based on a pilot study conducted by the University of California, this concept was considered infeasible due to the low yields it would provide as well as water quality concerns.[11] In addition, rain would not be available in the years when it would be most needed to make cisterns useful.

2.2.9 ALLOCATION REDUCTION

Like most water agencies the District has no direct authority over, or responsibility for, land use planning. Monterey County and the cities that lie within the District's boundaries are responsible for the regulation of land use and development. The District can, however, deny new water meter connections if providing them would adversely affect existing water purveyors' ability to reliably serve their customers or if new connections would lead to further environmental degradation.

The District has established a ceiling of 20,000 AF/year production as the largest amount of water that can be supplied to Cal-Am customers from the existing sources without threatening the reliability of service or further damaging the environment. If it became clear that no new sources of water supply would become available in the foreseeable future, the District could choose to reduce the ceiling to something less than 20,000

AF/year. Such an action would limit growth to levels that could be served by the District water supply. A separate Environmental Impact Report is being prepared on the existing allocation and alternatives ranging from 18,000 AF to 22,895 AF.

2.3 SELECTION PROCESS FOR FEASIBLE ALTERNATIVES

The District examined a number of water supply alternatives that could potentially meet the three project goals: additional municipal water supply, drought reserve and environmental enhancement. The methodology used to select "feasible" alternatives could be compared to a series of successively finer screens in a large funnel. This process is illustrated in Figure 2-1.

Feasible alternatives are those that meet the District's goals, as reflected in a series of performance standards. Any alternative that is deemed feasible is analyzed at a co-equal level of detail throughout this EIR/EIS. The other alternatives that have been considered but deemed as infeasible are described in this chapter only.

A large pool of alternatives, derived from previous studies, was subjected to a series of successively more stringent standards, based on District goals and performance criteria. Each screening removed alternatives that did not meet the criteria until only those that met District goals remained. The complete analysis is available in a District technical report.[12] This methodology, and the alternatives considered, are described briefly below.

2.3.1 ORIGINAL ANALYSIS

The original analysis was conducted during 1986 and completed in January 1987. The screening process involved three steps: primary (qualitative), secondary (quantitative), and tertiary (comparative analysis). Public hearings were held in August, October and December 1986 for the three screenings, respectively. Feasible alternatives were then selected at the completion of the process.

<u>Primary Screening of Candidates</u>

Table 2-1 provides a list of alternatives considered during the primary screening process. A qualitative process was used to remove those alternatives with obvious insurmountable problems in any of four categories: jurisdictional, technical, timing and economic constraints.

SCREENING PROCESS FLOW CHART

FIGURE 2-1

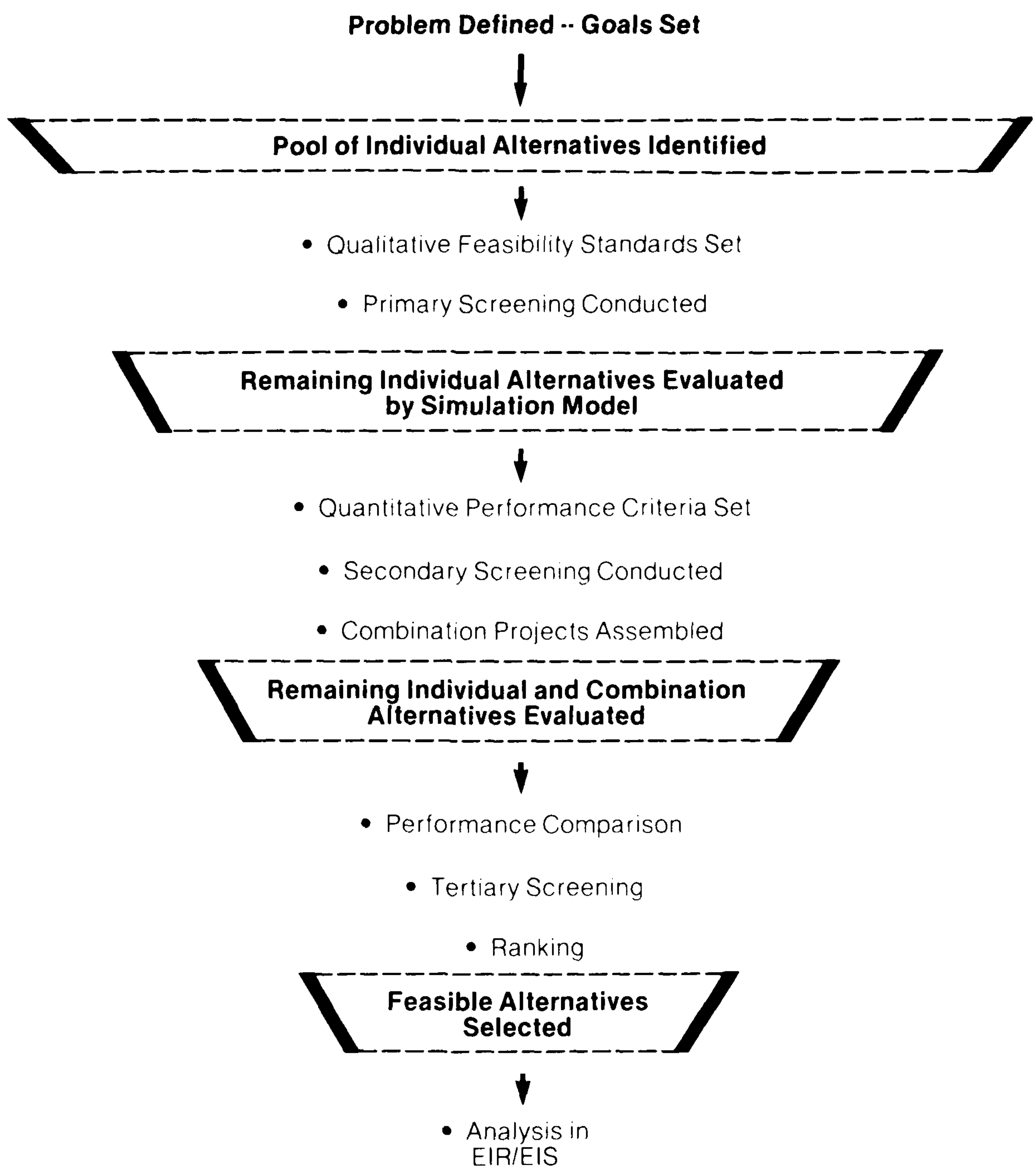


TABLE 2-1

CANDIDATE ALTERNATIVES
SUBJECTED TO PRIMARY SCREENING

I. WATER DEVELOPMENT ALTERNATIVES

A. Mainstream Reservoir
  1. New San Clemente Dam
    o 20,000 acre-feet (rollcrete)
    o 29,000 acre-feet (rollcrete)
    o 45,000 acre-feet (Joint Use, rollcrete)
    o 154,000 acre-feet (Corps Proposal)
    o 1,200 feet below present dam (rockfill)
  2. Los Padres Dam
    o Expansion
    o Replacement
  3. Other Sites on the Carmel River
    o Cachagua
    o Pine Creek
    o Klondike

B. Tributary Reservoirs
  1. San Clemente Creek (Natural Inflow)
  2. Cachagua Creek (Natural Inflow)
  3. Chupines Creek (Pump Storage)
  4. Buckeye Creek (Pump Storage)

C. Off-Channel Reservoirs
  1. Open Pond - Fort Ord Depressions
  2. Seaside Recharge
    o Coastal Barrier
    o Inland Sites

D. Groundwater Development
  1. Carmel Valley Wells (Aquifer Subunit 2)
  2. Seaside Groundwater Basin
    o Coastal Well Redevelopment
    o Inland Well Network

E. Importation From Distant Sources
  1. Arroyo Seco
  2. Lower Salinas
  3. Big/Little Sur Rivers
  4. San Felipe Project

F. Desalinization

Table 2-1 Continued

II. RESOURCE RECOVERY

A. Sediment Removal
   1. Los Padres Reservoir
      o Dredging
      o Excavation
   2. San Clemente Reservoir
      o Dredging
      o Excavation

B. Reclamation
   1. Groundwater Recharge with Reclaimed Water
      o Monterey Plant (Water Factory 21 technology)
      o *Fort Ord Plant (Aquaculture/advanced process)*
   2. Golf Course or Open Space Irrigation
      o CSD Treatment Plant

C. Conservation
   1. On-site Water Collection (Cisterns)
      o Residential
      o Institutional
   2. Additional Conservation (Mandatory Retrofit)

III. NO PROJECT

A. Existing Facilities and Infrastructure with Existing Allocation (Cal-Am Production = 20,000 AF)

Jurisdictional constraints refer to an inability to secure the required permits; political opposition or potential litigation did not eliminate an alternative from consideration. Technical constraints are those that entailed obvious geotechnical, engineering or environmental problems, or the use of unproven technology. Timing constraints refer to the inability of a given alternative to provide service by 1995. Economic constraints refer to those alternatives that would exceed "reasonable" costs as defined by: $100 maximum addition to the cost of an average residential water bill, $90 million maximum capital cost, $11.5 million maximum annual cost, and a maximum cost of incremental firm municipal yield of $2,000/AF.

Secondary Screening of Candidates

Individual alternatives that passed the primary screening were more completely described by the computer model (CVSIM) developed by the District. Table 2-2 lists those alternatives subjected to the secondary screening process. Alternatives that individually did not meet screening standards but could meet standards in combination with other alternatives were also subjected to the secondary screening. The specific criteria used to evaluate these alternatives included: 1) a firm annual yield of at least 18,600 AF, 2) a total annual project cost not to exceed $9.2 million (1986 dollars), and 3) an annual cost of incremental firm yield not to exceed $1,390/AF.[12A,12B] These cost criteria are more refined than those used in the primary screening.

Tertiary Screening of Candidates

All individual or combination alternatives that passed the secondary screening were then subjected to the tertiary screening. Performance was assessed for yield satisfaction, drought reserve, environmental enhancement, economic satisfaction and uncertainty factors. Yield satisfaction was assessed by firm yield and water supply shortfalls; drought reserve was measured by end-of-season storage reserves. Environmental enhancement was assessed by river flow and nine fish-related criteria. Economic factors included annual cost, cost per yield ratios and present worth. Uncertainty factors included cost and time required for additional research.

Those alternatives subject to the tertiary screening are shown in Table 2-3. Note that reclamation was subsequently removed as a distinct alternative as it was already a part of the District's Water Conservation Plan.

TABLE 2-2

CANDIDATE ALTERNATIVES
SUBJECTED TO SECONDARY SCREENING

I. WATER DEVELOPMENT ALTERNATIVES

A. Mainstream Reservoir: New San Clemente Dam

- o 20,000 acre-feet (rollcrete)
- o 29,000 acre-feet (rollcrete)
- o 45,000 acre-feet (Joint Use)

B. Tributary Reservoirs

1. San Clemente Creek (Natural Inflow)
2. Cachagua Creek (Natural Inflow)
3. Chupines Creek (Pump Storage)

C. Groundwater Development

1. Carmel Valley Wells (Aquifer Subunit 2)
2. Seaside Groundwater Basin
   - o Coastal Well Redevelopment
   - o Inland Well Network

II. RESOURCE RECOVERY

A. Sediment Removal

1. Los Padres Reservoir
2. San Clemente Reservoir

B. Reclamation

1. Irrigation - CSD Treatment Plant

C. Additional Conservation (Mandatory Retrofit)

III. NO PROJECT

A. Existing Facilities and Infrastructure with Existing Allocation
(Cal-Am Production = 20,000 AF)

TABLE 2-3

CANDIDATE ALTERNATIVES
SUBJECTED TO TERTIARY SCREENING

I. SINGLES PROJECT:
24,000 AF New San Clemente Dam
25,000 AF New San Clemente Dam
26,000 AF New San Clemente Dam
27,000 AF New San Clemente Dam
28,000 AF New San Clemente Dam
29,000 AF New San Clemente Dam

II. TWO-PROJECT:
10,000 AF New San Clemente Dam + Seaside Inland Wells
8,725 AF San Clemente Creek Dam + Seaside Inland Wells
7,000 AF Cachagua Creek Dam + Seaside Inland Wells

III. THREE-PROJECT:
21,000 AF New San Clemente Dam + Carmel Valley Wells + Seaside Coastal Pumping
10,000 AF Chupines Dam + Seaside Inland Wells + Carmel Valley Wells
29,000 AF New San Clemente Dam + Carmel Valley Wells + Seaside Coastal Pumping

IV. NON-DAM:
Seaside Inland Wells + Seaside Coastal Wells + Carmel Valley Wells + Conservation + Reclamation + Los Padres Excavation

IV. NO PROJECT
Existing Facilities and Infrastructure with Existing Allocation (Cal-AM Production = 20,000 AF)

Determination of Feasible Alternatives

Individual and combination alternatives that passed the tertiary screening were considered feasible for co-equal analysis in this EIR/EIS. The results of this screening process are described below and summarized in Table 2-4. These feasibility determinations were made at a public hearing in December 1986.

The 29,000 AF New San Clemente Dam combined with new Carmel Valley wells and coastal Seaside wells was considered feasible as it passed all criteria tests, providing the best firm yield, best shortfall aversion, best end-of-season storage, lowest cost per acre-foot of average incremental yield and needed a minimum amount of additional research. However, there was some uncertainty regarding fish passage. This project was rated as feasible.

The 29,000 AF New San Clemente Dam alone (no new wells) also passed all criteria tests and provided the second best overall results, with the same disadvantages as the above project. This project was rated as feasible.

The 24,000 AF New San Clemente Dam alone (no new wells) provided the third best rating in shortfall aversion and passed all but one of the criteria. This project had the same disadvantages as the two above projects, but also provided the worst maximum monthly shortfall. The concept of building a smaller New San Clemente project was deemed feasible, but it was recommended that the size of the reservoir be adjusted upwards from 24,000 AF to meet maximum monthly shortfall criteria.

The 21,000 AF New San Clemente Dam combined with new Carmel Valley wells and coastal Seaside wells passed all environmental, economic and other criteria, but provided some uncertainty regarding fish passage and failed both shortfall criteria. The concept of a smaller dam combined with new wells was deemed feasible, but the size of the reservoir was to be adjusted upwards from 21,000 to meet shortfall criteria.

TABLE 2-4
DETERMINATION OF FEASIBLE ALTERNATIVES
FOR ORIGINAL ANALYSIS
December 1986

ALTERNATIVE	DETERMINATION
29,000 AF New San Clemente Dam + Carmel Valley Wells + Seaside Coastal Wells	Feasible
29,000 AF New San Clemente Dam	Feasible
24,000 AF New San Clemente Dam	Feasible
21,000 AF New San Clemente Dam + Carmel Valley Wells + Seaside Coastal Wells	Feasible
10,000 AF New San Clemente Dam + Seaside Inland Wells	Infeasible
10,000 AF Chupines Creek Dam + Seaside Inland Wells	Infeasible
8,725 AF San Clemente Creek Dam + Seaside Inland Wells	Infeasible
7,000 AF Cachagua Creek Dam + Seaside Inland Wells	Infeasible
Non-Dam Combination	Infeasible

The 10,000 AF New San Clemente Dam with Seaside inland wells passed all economic criteria, but posed uncertainty regarding fish passage over the dam, failed both shortfall criteria, provided marginal fish enhancement, provided high uncertainty regarding Seaside inland water rights and required substantial additional research. The project was deemed infeasible.

The 10,000 AF Chupines Creek Dam with Seaside inland wells performed well for the maximum monthly shortfall, but failed frequency shortfall, discharge and economic criteria, had a high uncertainty regarding Seaside inland water rights, provided a conditional fish enhancement rating and required substantial additional research. This alternative was deemed infeasible.

The 8,725 AF San Clemente Creek Dam with Seaside inland wells performed well regarding maximum monthly shortfalls, but had a high uncertainty regarding Seaside inland water rights, failed frequency shortfall criteria, provided conditional fish enhancement and would require a moderate amount of additional research. This project was considered infeasible.

The 7,000 AF Cachagua Creek Dam with Seaside inland wells passed all economic criteria, but again had uncertain water rights and failed both shortfall criteria, provided a conditional fish enhancement rating and required a moderate amount of additional research. This project was considered infeasible.

The Non-Dam project passed all economic criteria and provided the third lowest maximum monthly shortfall, but failed frequency shortfall and environmental criteria, had uncertain water rights and high research cost. It was rejected as infeasible.

It is important to note that the viability of the Seaside inland wells component of the above five alternatives was questionable. Drilling studies subsequent to the original alternatives analysis indicated that the groundwater production potential of this basin is far less than the assumed 4,000 AF/year. This provided further evidence that they should be deemed infeasible.

2.3.2 SUPPLEMENTARY ANALYSIS

The original analysis of alternatives was made with an uncalibrated computer model. In March and April 1987, significant changes were made to the model based on the calibration effort. The simulation period was extended from 15 to 28 years, a new rationing code was developed, and new data on coastal Seaside groundwater supplies was incorporated. Upon presentation of these findings, the Board concluded that any New San Clemente project, regardless of size, should entail additional wells in Carmel Valley and coastal Seaside. Without this additional production capacity, shortfalls would occur despite increased storage capacity. It was also concluded that any New San Clemente project between 20,000 AF and 29,000 AF passed all criteria and that a linear relationship existed between storage and project benefits, that is, the bigger the reservoir, the greater the firm yield and drought reserve, and the smaller the shortfall or rationing. Hence, only the 20,000 AF and 29,000 AF projects were analyzed further as they represent two end-points of a continuum.

Additional computer simulations in April 1987 indicated that projects smaller than 20,000 AF also passed the firm yield requirement. Therefore, a full analysis was also conducted on New San Clemente projects from 9,000 AF to 19,000 AF. In addition, all non-New San Clemente alternatives that met the 18,600 AF minimum firm yield requirement were re-analyzed. Thus, a supplementary study was performed to evaluate candidate alternatives in light of these changes.[13]

The supplementary evaluation of alternatives was a two-phase process similar to the tertiary screening in the original analysis. Candidate alternatives were first screened for eight criteria that reflected firm yield, shortfall, drought reserve, river discharge, cost and rationing. Alternatives that passed this first set of criteria were then subjected to nine fishery enhancement criteria, resulting in an overall fish rating for each alternative.

In order to be considered feasible, an alternative had to clearly pass at least six of eight criteria in the first phase (i.e., two failing or borderline scores allowed) and pass the overall fish rating. To achieve a passing grade for the overall fish rating, a candidate had to pass at least six of the nine fishery criteria.

First Phase

The following alternatives were considered in the first phase of the supplementary analysis:

- New San Clemente Projects from 9,000 AF to 19,000 AF + New Wells in Carmel Valley and Coastal Seaside
- 8,725 AF San Clemente Creek Dam + New Wells in Carmel Valley and Coastal Seaside
- 10,000 AF Chupines Creek Dam + New Wells in Carmel Valley and Coastal Seaside
- 7,000 AF Cachagua Creek Dam + New Wells in Carmel Valley and Coastal Seaside
- Non-Dam Combination (increased conservation savings of 1,000 AF beyond Water Conservation Plan, full dredging of Los Padres and San Clemente Reservoirs, 800 AF of reclamation savings and new wells in Carmel Valley and coastal Seaside).

In addition, the previously selected 20,000 AF and 29,000 AF NSC projects, and the No Project alternatives were analyzed for comparison.

All alternative candidates passed the first phase except for New San Clemente projects 14,000 AF and smaller, Cachagua Creek Dam and the Non-Dam combination. The 7,000 AF Cachagua Creek Dam was dismissed after the first screening phase as it failed the critical firm yield requirement, as well as shortfall, deliverable storage, cost and rationing criteria. This alternative is considered infeasible.

The Non-Dam combination was also dismissed after the first screening phase as it failed the critical firm yield requirement, as well as deliverable storage, river discharge and cost. It also had been rated as unacceptable for fish habitat in the original analysis. Thus, this alternative was rated as infeasible.

Second Phase

The second phase of the supplementary evaluation of alternatives examined the performance of each alternative with regard to the nine fishery criteria. If an alternate passed the second phase it was deemed feasible.

The 16,000 AF New San Clemente project was the smallest reservoir to be deemed feasible as it passed all screening criteria. Thus, this size reservoir was chosen to represent New San Clemente reservoirs in the 16,000 to 19,000 AF size range. Projects 15,000 AF and smaller were rejected as infeasible because they did not pass the overall fish rating.

The 8,725 AF San Clemente Creek Project performed adequately on yield, cost, shortfall and river discharge criteria, but performed poorly during drought periods and provided an unacceptable fish rating. For these reasons, the project was considered infeasible.

The 10,000 AF Chupines Creek Project involved pump-storage facilities and performed well for firm yield, shortfalls, deliverable storage and rationing. However, it performed poorly for river discharge, exceeded cost criteria, and provided an unacceptable fish rating. This project was rejected as infeasible.

Feasible Alternatives

Based on a two-phase screening process that evaluated candidate alternatives' performance in yield, drought reserve, river discharge, economic, rationing and fishery enhancement criteria, the following feasible alternatives were selected for evaluation at an equal level of detail in this EIR/EIS:

- 29,000 AF New San Clemente project + New Wells in Carmel Valley and Coastal Seaside
- 20,000 AF New San Clemente project + New Wells in Carmel Valley and Coastal Seaside
- 16,000 AF New San Clemente project + New Wells in Carmel Valley and Coastal Seaside
- No Project Alternative (mandatory inclusion).

The three project sizes represent the range of feasible alternatives from 16,000 AF to 29,000 AF as a linear relationship exists between project size and benefits. The District could select any intermediate size as the preferred project, based on the analysis in this EIR/EIS.

2.4 FISH PASSAGE AND HATCHERY ALTERNATIVES

Dams can represent a barrier to migratory fish unless special provisions are made to allow them passage. Recognizing that the New San Clemente project alternatives could adversely impact steelhead migration, the District commissioned two studies by D.W. Kelley and Associates (DWK) which evaluated alternatives for fish passage facilities.[14,15] The fish passage facilities would allow steelhead to ascend the river and access spawning habitat above the dam. Their progeny would safely descend the river to the ocean. An alternative concept would be to provide a fish hatchery at the base of the dam. Alternatives for upstream and downstream passage and for a hatchery are discussed in the following paragraphs.

2.4.1 UPSTREAM PASSAGE FACILITIES

A number of alternative methods were examined that would allow upstream migrating adult steelhead to pass the New San Clemente Dam alternatives. The alternatives studied included a fish lock, an elevator and hopper, a fish ladder, a trap and truck operation, and a combination fish ladder/trap and truck operation.

Fish Lock

A fish lock could move fish into the reservoir in a fashion similar to the way in which boats are transported around falls and rapids of a large river. The fish would either swim on their own accord or be encouraged with a mechanical crowder to swim through a tunnel at the base of the dam. Fish would then swim from the tunnel to the bottom of the lock where a gate would close behind them. The lock would then be filled with water to the reservoir level, at which time the fish would be urged out into the reservoir.

This alternative was rejected by DWK because of the mechanical complexity of building and operating this facility on a reservoir with widely fluctuating water levels. It also has high capital and operating costs, and has a higher probability of more frequent and protracted breakdowns than other methods examined.

Elevator and Hopper

For this alternative, the fish would be guided into a short ladder by a low barrier dam. The ladder would lead to a holding pool from which the fish would be crowded into what is basically a large bucket or hopper, and then carried up either the face of the dam or up a shaft inside the dam. The hopper would then be lowered into the reservoir and the fish released.

This alternative was rejected from further consideration by DWK because it does not provide significant reliability, because it can have longer periods of breakdown, and because of high capital and operating costs, with no particular biological advantage.

Fish Ladder and Return Chute to Reservoir

Preliminary designs for a fish ladder that included 320 pools with a 1-foot drop between each pool would allow steelhead to climb to the top of the dam and enter the reservoir when full or nearly full. In dry years when the reservoir was not full, fish at the top of the ladder would enter a chute and slide down into the reservoir. Most fish would need one day to climb the ladder, but some would take as long as one week. A delay of several days to a week when their spawning time is approaching in March could be detrimental. There appears to be some risk of injury to fish when they would slide down the chute into the reservoir, but this is not expected to be significant. Other than delay at the ladder, this alternative appears to be biologically acceptable.

Trap and Truck

This alternative would consist of facilities that would urge fish into a lock arrangement where they would be transferred into a fish planting tank mounted on a truck, and driven to a suitable release site in the reservoir. This alternative is believed to be the most reliable because all of the facilities are located in one relatively small area. The most likely mechanical failure would be in the truck itself, the risk of which could be minimized through a careful maintenance program and, should it happen, repairs would be much easier and faster than repairs to mechanical parts of the other alternatives. The mechanics of designing suitable tank truck equipment is well known, and there should be no mortality or detrimental stress involved in the 2-mile run from the holding pond to the reservoir.

The trap and truck system appears to be biologically acceptable, as long as it is well operated. The US Fish & Wildlife Service has been trapping and transporting salmon at

Keswick Dam since 1943, and has been doing the same for both salmon and steelhead at Red Bluff Diversion Dam since 1966. The operations have proven successful as long as the water temperatures are not allowed to become too warm.

Trap and Truck/Ladder

Operations studies indicate that the reservoir would be below the level where the ladder could operate in about one-third of the months when migration would be expected. Thus as an alternative to the use of the chute, a trap and truck operation could be utilized during these periods when the reservoir level would fall below that necessary for operation of the fish ladder.

This alternative does not appear to present any serious engineering or biological problems. However, capital costs are high.

Conclusion

A fish lock or fish elevator or hopper have inherent mechanical complexities that reduce their reliability. They are also expensive, and provide no biological advantages. Thus, they were deemed infeasible by District fishery consultants.

Construction of a fish ladder provides no significant biological advantages over a well designed trap and truck system, but the costs of the former are about four times that of the latter. Thus the trap and truck system was recommended by DWK as being the best way of moving adult steelhead around the New San Clemente Dam. This conclusion is applicable to each of the three dam sizes being examined in this EIR/EIS.

2.4.2 DOWNSTREAM PASSAGE FACILITIES

A number of methods were examined that would allow downstream migrating adult and juvenile fish to pass the New San Clemente Dam alternatives. Each system consists of a device for attracting fish to a single location and facilities for a safe descent of the dam.

Fish Horn with Trap and Truck Facilities

This system operates by attracting the migrants with the fish horn, separating the adult and juvenile fish into respective hoppers, and hoisting the hoppers onto trucks at the crest of the dam. The fish are then transported below the dam, where they are released into the Carmel River.

Fish Horn with Lock-Conveyance System

This alternative would use similar attraction facilities as described above. Holding tanks would temporarily hold the separated adults and juveniles, from which the fish would be transported at low velocity through the dam by a series of conduits to a holding pond adjacent to the stilling basin.

Fish Horn with Free-Fall Conveyance System

The attraction and separation facilities would be the same as those proposed for the above two alternatives. In this alternative the migrants would drop through a series of weirs, both on the upstream and downstream sides of the dam. They would then be transported to the tailwater area. The free-fall conveyance system would be located between the spillway and the left abutment of the dam.

Fish Horn with Canal Downstream

Again, the attraction and separation facilities would be the same as those proposed for the above alternatives. For this alternative, the fish would be removed from the horn, placed in the canal and transported to the Sleepy Hollow area. The canal or pipe would be approximately 0.6 miles long and would traverse difficult terrain. This alternative was deemed infeasible by DWK because of the extensive work and expense involved in its implementation.

Gulper and Tram System

This conveyance system would consist of a floating intake ("gulper") that would be located in the reservoir, and a tram that would convey the fish over the dam. This system has been installed in several reservoirs in Oregon and Washington state, but was subsequently removed because the system did not collect sufficient numbers of fish. Therefore, this alternative was deemed infeasible by DWK.

Conclusion

None of the alternatives described above would be expected to pose a serious hazard to downstream migrating fish. All were deemed biologically acceptable by DWK. The truck and trap system was selected for downstream conveyance of migrating steelhead because it would be the most economical to implement, in light of the decision to use the same basic system to convey the migrants upstream. It would also involve the least risk of injuring steelhead.

2.4.3 HATCHERY

The feasibility of constructing a hatchery on the Carmel River below the New San Clemente Dam to preserve the steelhead run was examined in reports prepared for the District.[15,16] It was concluded that the following goals would need to be met by a hatchery:

- Maintain a steelhead run of approximately 4,000 adults,
- Maintain a long migration season,
- Maintain a variety of size and age groups in the run including, at least, 20% adults that had previously spawned and had returned to the ocean to grow larger,
- Sustain the opportunity for anglers to catch some "wild steelhead" in the Carmel River,
- Preserve the existing Carmel River gene pool and minimize genotype changes,
- Preserve the historical, cultural and aesthetic values of the run to the extent possible.

The art and science of rearing winter steelhead is well developed, and there is little question that a good hatchery can maintain a steelhead run, providing that downstream environmental conditions are suitable for the migration of adults and juveniles. The most important concern is that of preserving individual genetic strains. Thus, any hatchery built on the Carmel River must be designed and operated with genetic considerations as the major control.

This approach of conserving a specific genetic strain of steelhead run has never been tried, and the hatchery would be, in a large sense, experimental. However, it is believed that the operation could be successful. The operational cost of the hatchery would be higher than average, and no steelhead from outside sources should be brought into the hatchery under any circumstances. The hatchery would need a water supply of 4,500 gallons per minute at temperatures between 50' and 60'F. Should the Carmel River water supply have a temperature in excess of this limit, well water would need to be imported as a supplementary source of supply.

It is important to note that California Department of Fish and Game (CDFG) policy is to preserve any wild steelhead run without a hatchery. The possibility of a hatchery was studied only under the circumstances that preservation of the wild steelhead run would not be feasible. It was therefore recommended that the wild run be preserved if at all possible. In April 1987, the District selected the use of a trap and truck operation, as described in the previous subsections, as the best means to achieve this goal.

2.5 ACCESS ROAD ALTERNATIVES

In 1983 and 1984 the District investigated several potential access routes for construction of the San Clemente Dam as well as public access once the project is completed. In their 1984 report, Converse Consultants developed cost estimates for three alternative routes located on the east side of the Carmel River.[17] As shown in Figure 2-2, all routes extend from Carmel Valley Road and terminate at the existing Cal-Am gate. Access to dam from this point is described in Converse's 1986 Preliminary Design.[18]

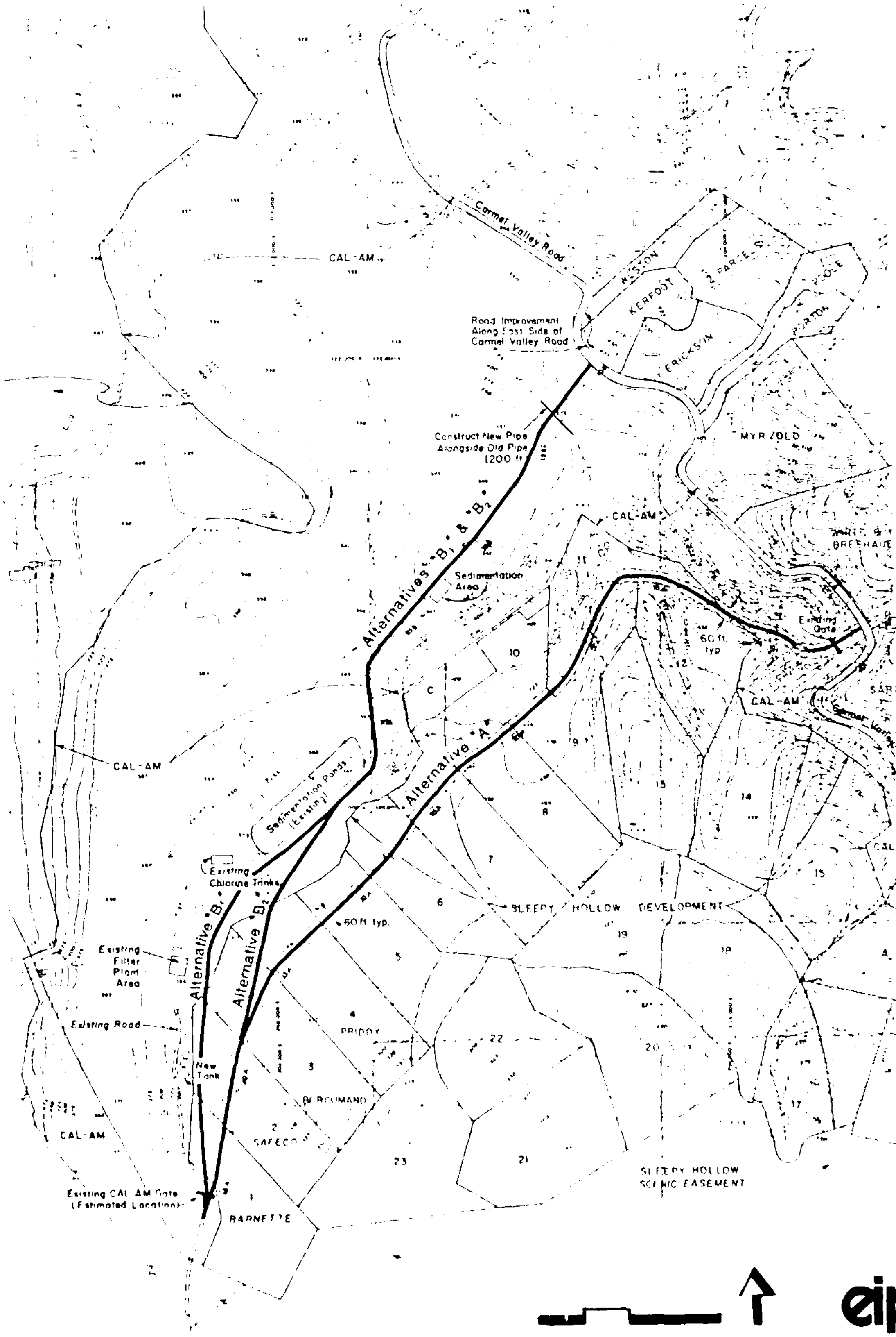
2.5.1 ACCESS ROUTE A

Access Route A is the existing San Clemente Drive, which is a private road guarded by an electronic gate. An existing right-of-way is used by Cal-Am employees and residents of the Sleepy Hollow Subdivision. Public access is presently not allowed on San Clemente Drive.

Construction would entail widening of the existing paved road to accommodate heavy equipment, retention of valuable oak trees, relocation of utilities, a gate, road modification at two critical curves, a new bridge across Tularcitos Creek and safety precautions to protect existing users. Construction cost alone was estimated at $640,000 in 1984, compared to nearly $1.9 million for the Route B variations. No estimate is

ACCESS ROAD ALTERNATIVES

FIGURE 2-2



eip

currently available for the cost of acquiring either right-of-way or costs associated with an assignment of existing easements or a stipulation with property owners. Sleepy Hollow property owners have expressed their opposition to this alternative, particularly for public access.

The District selected Route A as the designated access route for this EIR/EIS at a public hearing on October 8, 1984. It is presently negotiating with Cal-Am and Sleepy Hollow property owners regarding access rights.

2.5.2 ACCESS ROUTES B-1 and B-2

Access Route B would extend from Carmel Valley Road near the Kerboot property, cross Tularcitos Creek and traverse Cal-Am property along the east side of the river. Variation B-1 would run along the east side of the Cal-Am filter plant and sedimentation ponds; variation B-2 would run along the west side of the Cal-Am facilities. Both would extend to the Cal-Am gate.

These alternatives would necessitate construction of new roads. Associated activities would include large culverts for Tularcitos Creek, removal of medium-sized trees in two hillside locations, relocation of a large-diameter water main and construction along a terrace. The estimated construction cost (1984 dollars) of alternatives B-1 and B-2 were $1.88 million and $1.86 million, respectively. Costs for right-of-way acquisition, severance damage and land taken from Cal-am were uncertain at the time of the report. This alternative was considered infeasible due to the significantly higher cost and environmental damage associated with building a new road.

2.5.3 OTHER POTENTIAL ROUTES

Converse considered another alternative route (not shown on the figure) that would begin from Carmel Valley Road near the northern end of the Irwin property, traverse Cal-Am property on the west side of the river and cross Tularcitos Creek via a new bridge to the filter plant. Two variations identical to variations B-1 and B-2 could then extend route C to the existing Cal-Am gate. This alternative was deemed infeasible by Converse due to the high cost and environmental damage associated with road and bridge construction.

The possibility of extending a road from the Cachagua Grade was also considered, but was deemed infeasible by Converse due to steep construction slopes and excessive road lengths.

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[1] Monterey County Flood Control and Water Conservation District, Review of Studies and Reports for Supplemental Water Supply for Zone 11, 1978.

[2] U.S. Army Corps of Engineers, Draft Feasibility Report on Water Resources Development, Carmel River, California, Volume 1, 1981.

[3] Converse Consultants, New San Clemente Project, Preliminary Design and Feasibility Study, 1982.

[4] Converse Consultants, New San Clemente Project, Joint Use Studies, Draft Report, 1985.

[5] John Logan, Reconnaissance Study of Off-Channel Reservoirs, Carmel River Basin, 1980.

[6] Converse Ward Davis Dixon, Inc., Economic Feasibility Analysis and Comprehensive Water Supply Program, 1981.

[7] Monterey Peninsula Water Management District, Carmel Valley and Seaside Groundwater Basins: Description of Basins and Groundwater Storage, 1985.

[7A] Staal, Gardner and Dunne, Fort Ord Groundwater Monitoring Well Project, January 1987.

[7B] Staal, Gardner and Dunne, Seaside Coastal Groundwater Basin Investigation, May 1987.

[8] Converse Consultants, Phase I Final Report, Groundwater Evaluation of Seaside Aquifer System, Monterey County, California, 1985.

[9] Creegan and D'Angelo, Feasibility Analysis of Wastewater Reclamation for Groundwater Recharge, Administrative Draft, 1985.

[10] Monterey Peninsula Water Management District, Water Conservation Plan for Monterey County, Final Draft, 1984. The plan includes measures that will produce a 15% reduction in water demand relative to projected demand without conservation. About 5% of the reduction results from the substitution of reclaimed wastewater for potable water as a source for golf course irrigation. The remaining 10% reduction results from conventional water conservation measures.

[11]Sanitary Engineering Research Laboratory, 1981. Residential and Institutional Rainwater Collection Systems for Irrigation on the Monterey Peninsula; Report No. 80-7, February 1981.

[12]Monterey Peninsula Water Management District, Final Evaluation of Water Supply Alternatives for the Monterey Peninsula, January 1987.

[12A]Firm annual yield is defined as the minimum amount of water expected in a worst case situation (i.e. 1977 simulation). It entails a specific rationing scenario.

[12B]Incremental firm yield is defined as the annual yield that would be available with a project compared to No Project conditions in a worst case situation.

[13]Monterey Peninsula Water Management District, Supplementary Evaluation of Water Supply Alternatives for the Monterey Peninsula, May 1987.

[14]D.W. Kelley & Associates, Evaluation of Alternative Upstream Fish Passage Facilities Over New San Clemente Dam, August 1984.

[15]D.W. Kelley & Associates, Preservation of the Carmel River Steelhead Run with Fish Passage Facilities Over San Clemente Dam or with a Hatchery Near its Base, April 1987.

[16]Converse Consultants, Preliminary Design and Cost Estimate--Fish Conveyance Facilities, May 1987.

[17]Converse Consultants, New San Clemente Project Pre-Appraisal Engineering Studies, July 1984.

[18]Converse Consultants, New San Clemente Project Preliminary Design and Cost Estimate, November 1986.

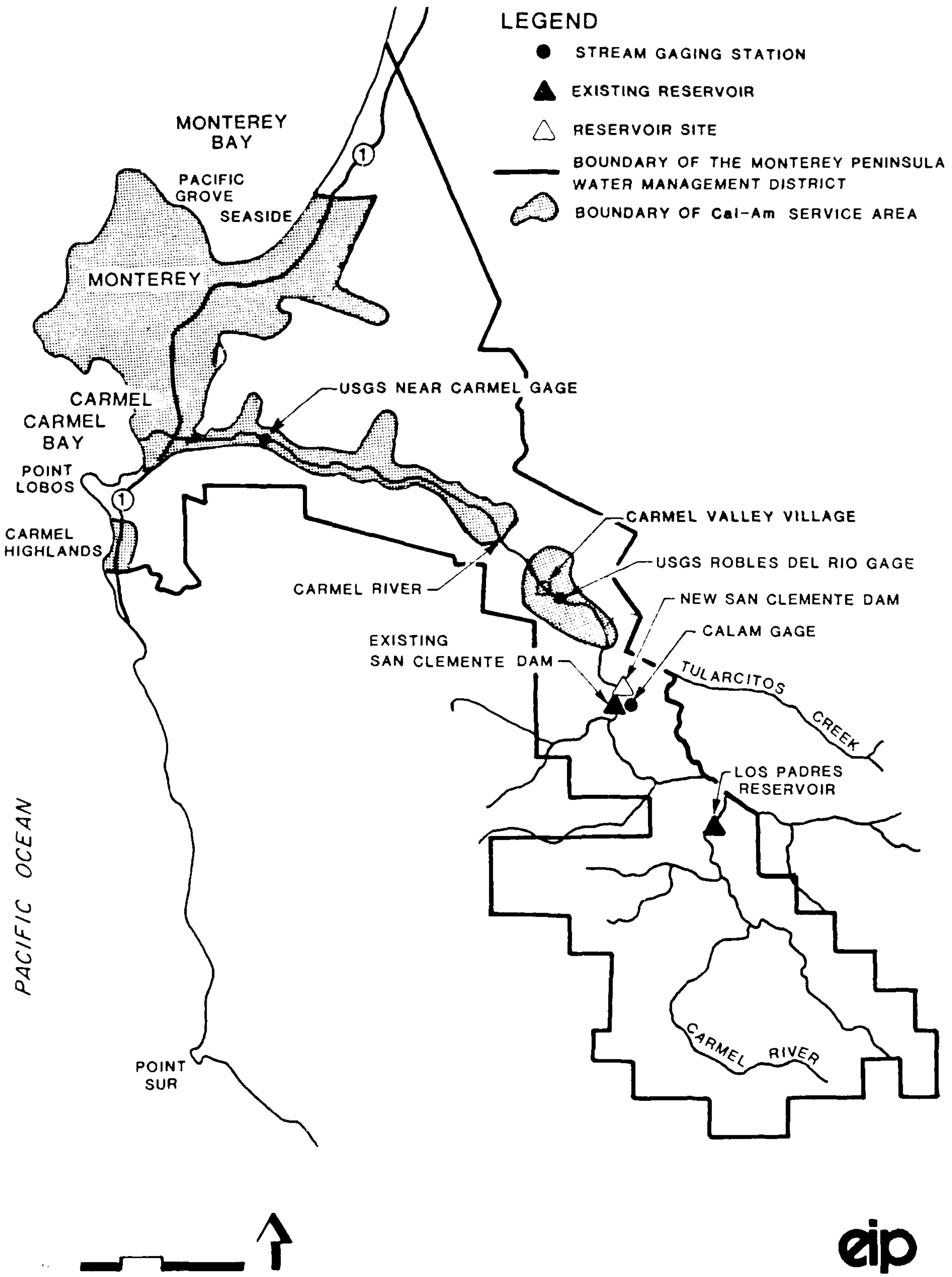
3 DESCRIPTION OF FEASIBLE AND NO PROJECT ALTERNATIVES

3.1 NEED FOR A WATER SUPPLY PROJECT

The Monterey Peninsula Water Management District is responsible for regional water supply planning within a 170-square-mile area consisting primary of the Monterey Peninsula and the Carmel Valley. The District's boundaries and the Cal-Am service area are shown in Figure 3-1. About 95% of the customers within MPWMD's boundaries are supplied with water by the California-American Water Company (Cal-Am). Cal-Am obtains its water by diversion from San Clemente Reservoir and from wells in the Carmel Valley and Seaside. The remaining customers obtain their water from small water systems and private wells. About 82% of the total water produced within the District's boundaries is supplied by Cal-Am.

Improvements to Monterey Peninsula's water supply system are needed for two reasons. First, the demand for water is increasing within the District's boundaries as new homes and businesses are built. Per capita water consumption is also rising because of changing land use and socioeconomic factors. Without an increase in the water supply available to the District, the risk of a water shortage in a dry year will become greater as time passes. Second, present water supply practices are adversely affecting the environmental quality of the Carmel River by providing insufficient water for riparian vegetation and migratory fish.[1] The MPWMD has already taken a number of actions that address these problems. Actions include implementation of a water conservation program to reduce existing future water demand, limitations to total system capacity and improved management of groundwater reservoirs to increase the supply available to the District. In addition, several actions have been taken to improve environmental conditions in the Carmel River. Although beneficial, these actions cannot alone provide sufficient water to meet demand or restore the environmental quality of the Carmel River.

NEW SAN CLEMENTE PROJECT STUDY AREA FIGURE 3-1



Accordingly the District plans to improve the area's water supply system by proposing a new water supply project. The reasons a project is needed and the actions taken already are described in more detail in the following paragraphs.

3.2 DROUGHT VULNERABILITY

The ability of a water agency to reliably supply water to a community depends on maintaining an appropriate balance between supply and demand. If demand increases but supply does not, water shortages in dry years will become more frequent and more severe. Water demand projections are discussed in Chapter 4, while water supply data for the various alternatives is presented in Chapter 5.

Since 1940, water demand in the Monterey area has increased by about 300 acre-feet/year (AF/year) on the average and is expected to increase in the next 35 years as a result of population and economic growth within the MPWMD boundary.[2] As a result of projected growth, total water demand within the Cal-Am service area is expected to increase from 17,937 AF/year in 1985 to 20,825 AF/year in 2000 and to 22,895 AF/year in 2020. This represents an increase of 0.9% per year from 1985 to 2000 and 0.4% per year from 2000 to 2020 and includes conservation savings.

Two dams currently exist on the Carmel River system—San Clemente Dam and Los Padres Dam. The two dams were built in 1921 and 1949, respectively, and provide minimal usable water storage capabilities totaling about 2700 AF at present.

The adequacy of supply to meet demand can be examined in terms of the shortage that would occur during a repeat of the worst drought of record, the 1976-77 drought, and in terms of the frequency that lesser shortages, requiring some form of rationing, might occur.

Just prior to the 1976-1977 drought, water use within the Cal-Am service area was approximately 16,000 AF/year. During 1977, the worst year of the drought, Cal-Am produced only 8,500 AF/year, a shortfall of 47%.[2c] To reduce the risk of another shortage, Cal-Am constructed four new wells in the lower Carmel Valley. The new wells tapped a previously unused portion of the Valley's underground water resources and thus increased the total supply available to the District. Cal-Am also constructed the Canada de la Segunda pipeline which connected Seaside with Carmel Valley.

If a drought equally severe as that experienced in 1977 were to occur today, the Cal-Am system would suffer a water shortage of 12%. Although this is a significant improvement from historical 1977 conditions, the magnitude of the shortage will increase rapidly as water demand increases. By the year 2000, the shortfall in a drought similar to that of 1977 is estimated as 23% even if production capacity is increased and demand is limited to 20,000 AF annual Cal-Am production (assumes no project is built).

Given today's water demand, the expected frequency of some form of rationing in the Cal-Am system would be about 4% of the time, or once every 28 years. By the year 2000, the frequency would increase to 11% of the time, or once in every 9 years, even if production capacity is increased and demand is limited to 20,000 AF annual Cal-Am production. The severity of rationing would also be significantly greater.

The probable severity, frequency and duration of water shortages were determined by District staff using the Carmel Valley Simulation Model. The model is a calibrated computerized mathematical simulation of surface and groundwater resources that allows the District to determine the consequences of various water supply management strategies.[3]

3.3 ENVIRONMENTAL DEGRADATION OF THE CARMEL RIVER

To understand how present water supply practices are harming the Carmel River, it is necessary to understand the hydrology of the Carmel Valley and how water supplies are presently obtained.

The wells in the Carmel Valley pump water from a narrow, shallow and relatively small groundwater body or aquifer that lies below the Carmel River and the valley floor.[4] The groundwater body is recharged primarily by water that percolates into the ground from the Carmel River as it flows downstream. Under natural conditions, groundwater levels in the aquifer would remain high year-round, although they would tend to drop somewhat in the dry season due to evapotranspiration by riparian vegetation. Modest amounts of river water would percolate into the ground from the river to replace the water withdrawn by vegetation. Because water is removed from the aquifer by wells, however, groundwater levels now drop during the dry season. River flows are depleted because much of the streamflow is diverted at San Clemente Dam or percolates into the ground to replace the water withdrawn by the wells.

Both the depleted streamflow and the lowered groundwater levels have adverse environmental consequences. The Carmel River is the southernmost major steelhead run in North America. Steelhead trout are a very popular anadromous sport fish which spawn in freshwater and live in salt water like salmon. Low springtime river flow inhibits juvenile fish from moving downstream to the ocean. In the Carmel River there currently exists a steelhead run of about 1,200 to 1,500 adults, counted at the river mouth, together with a much larger population of juveniles. Only a few hundred adults are estimated past San Clemente Dam. Experts believe that, if past trends continue, the present steelhead run may be reduced to a remnant run during or following the next series of dry years.[5] A remnant run is an intermittent and unstable run.

The lowered groundwater levels reduce the amount of water available to riparian vegetation. The loss of riparian vegetation has contributed to bank erosion and destabilization of the river channel, which has degraded fish spawning habitat, destroyed riverside properties and adversely affected scenic qualities.

Recognizing these problems, the District has already taken action to improve environmental conditions in the Carmel River, but the long-term results of these actions are not yet known.

3.4 ACTIONS ALREADY TAKEN

Actions that have been taken to balance water supply and demand are described below.

3.4.1 WATER ALLOCATION SYSTEM

In order that the seven political jurisdictions (six cities and parts of the county) within the District can maintain their water demand within the limits of available water supply, the District has assigned to each jurisdiction an allocation of water available for its use. The allocation system is the key element in the process by which water demand and water supply are kept in balance. If a jurisdiction's water usage exceeds its allocated supply, a District ordinance requires that a moratorium be declared on all new water connections in that jurisdiction.

The District presently allocates 20,000 AF/year of water production for the Cal-Am service area, based on normal year demand. This is a system capacity limit that is set at a level that ensures an adequate drought reserve and appropriate environmental protection. Without an increase in supply, growth of water usage beyond this allocation limit is presently judged to have adverse impacts on drought reserve and the environment. In addition, a limit to the total number of water meters that can be set is also imposed.

3.4.2 WATER CONSERVATION PROGRAM

Limited water supplies and increases in per-capita water consumption have spurred water conservation as a means to stretch existing water supplies. Additional benefits from conservation include reduced stress to the environment and increased community protection from drought. Each city and the county determines how the water saved in its jurisdiction should be utilized. Each community has determined that the savings should be applied to new development with a small set-aside, in some cases, for a reserve. The District's policy is to limit the reinvestment of conservation savings into new development to 50% of the total savings.

The MPWMD has adopted a water conservation goal of 9% by the year 1990. This is approximately 1,530 acre-feet of water, roughly 8.2% of the total water supply available. The District has also established a long-range goal of 15% reduction over projected use by the year 2020. To achieve these goals, a water conservation plan has been adopted, and measures outlined in the plan are being implemented. The following paragraphs briefly outline the principal measures.

Water Conservation Ordinance

The cornerstone of the District's water conservation program is a water conservation ordinance. This ordinance is expected to reduce water consumption for new development by 20-30% compared to typical residential demand. This is approximately .06 to .09 AF per house per year. Additional water savings of over 10% per house are projected for existing development. Based on provisions in the ordinance, this savings would be gained by retrofitting plumbing fixtures at the time a property is sold. These savings are expected to be significant, as some 200 to 300 residential units are sold each month within the District boundaries. Further savings will be realized from commercial properties as they transfer ownership or change use. The requirements for the ordinance are outlined below:

- New Construction

  1.5 gallon/flush toilets
  2.5 gallon/minute showerheads
  2.5 gallon/minute faucet aerators

- Existing Buildings

  At time of sale, replace toilets with 1.5 gallon/flush maximum; replace showerheads with 2.5 gallon/minute type; install faucet aerators which limit flow to 2.5 gallon/minute. Exemptions are provided for projects which already have 3.5 gallon/flush toilets. In these buildings, toilet flow reduction devices which reduce flow by 1.0 gallon/flush must be installed.

  If floor area is increased by 25% over existing, the above requirements are imposed.

  For commercial uses, when there is a change in business use, the above mentioned requirements are imposed.

  All commercial land uses must install a toilet flow reduction device and change showerheads to types using no more than 2.5 gallons/minute by December 13, 1987.

Water Conservation Kit Program

The District is planning a conservation kit distribution program for the Spring of 1988. Kits would be provided to all residences within the District (some 44,000 housing units). Water savings of 10-11 gallons per person per day are realistic based on savings in similar programs in San Jose, California and Phoenix, Arizona. This is approximately 10% of typical residential water use or approximately 800 to 1,000 AF of water annually.

Turf Management Program

Golf course, school campuses, military parade grounds and other turf areas consume significant amounts of water. Golf course water use alone accounts for 1,200 AF of water annually on the greater Monterey Peninsula. The MPWMD has cosponsored seminars on turf management.

Leak Detection

The District holds periodic seminars on leak detection to assist water purveyors in improving efficiencies. California-American Water Company, the principal water purveyor for the Monterey Peninsula, has an unaccounted water factor of 8%, which compares well with the industry average of 15%. This factor includes fire flows, line flushing and sewer cleaning as well as water loss due to leakage. Other, smaller mutual water companies have water loss percentages much greater, as much as 30%.

Public Awareness

The District has an on-going public awareness campaign to promote water conservation. These programs include brochures, public service announcements and speakers on conservation.

3.4.3 WASTEWATER RECLAMATION

The District is cooperating with the Carmel Sanitary District (CSD), Pebble Beach Community Services District (PBCSD), the Pebble Beach Company, Cal-Am Water Company and golf courses in Del Monte Forest to develop a wastewater reclamation project for greenbelt and golf course irrigation. The project would provide about 800 AF/year of subpotable water for open space in Carmel and Del Monte Forest. An equivalent amount of potable water would be available to the District for allocation. Tertiary treatment facilities would be added to the existing CSD wastewater treatment plant.

The District has entered into a Memorandum of Understanding with the Pebble Beach Company that outlines several agreements. The District would, in concept, dedicate a portion of the potable water freed by reclamation for new construction in Del Monte Forest; Pebble Beach Company agrees, in concept, to guarantee coverage of the project's annual cost.

CSD and the Pebble Beach Company have negotiated a separate agreement in which the Company would pay the design costs for the project. Additional agreements are being negotiated with Cal-Am for water delivery, with the golf courses for purchases of the reclaimed water and with CSD/PBCSD for facility operations. The District hopes to conclude these negotiations in 1987, to complete design in 1988 and to complete construction in 1989. An EIR and preliminary design have been completed for the project.

3.4.4 WATER RESOURCE INVESTIGATIONS

MPWMD staff and consultants have conducted a number of investigations to define and evaluate water resources within the District in order to improve surface and groundwater management. Refined estimates of groundwater storage capacity were determined and relationships between pumping capacity and groundwater storage were developed. Monitoring wells were drilled that explored the water supply potential of undeveloped areas within the Seaside inland groundwater basin. Several studies have also been conducted on the hydrogeology of the Seaside coastal groundwater basin to assess proposed management methods, production potential and long-term yield. California Public Utilities Commission consent was obtained to increase the long-term yield from Seaside.

The District has developed and coded an extensive computer simulation model (CVSIM) of the Carmel Valley and Seaside Basin water resources. The model aids in assessing various water supply alternatives and management scenarios. The District is drafting a comprehensive Carmel River Watershed Management Plan. Its purpose is to restore, protect and maintain watershed resources through the implementation of cooperative programs with several state and local agencies.

3.4.5 DOWNSTREAM DIVERSION OF RIVER FLOW

Cal-Am can withdraw water from the Carmel Valley by direct diversion from the existing San Clemente Dam or by pumping the wells lower down the valley. Water taken directly from the dam is treated at the filter plant before distribution to customers. Prior to 1985, Cal-Am could take as much water as possible from the reservoir, with the balance taken from the wells. On an average, this operating practice had resulted in Cal-Am obtaining 55% of its total water production directly from the dam.

In December 1984, the District passed Ordinance No. 19 requiring that Cal-Am divert no more than 35% of annual water production directly from the dam and allow more water to flow down the river. To replace the water not diverted at the dam, Cal-Am has increased its pumping from the wells lower down the valley. The water released down the river benefits the fishery and riparian vegetation before being extracted for water supply without a significant loss of water for the latter purpose. Thus, the water is essentially "multiple use" water.

Even with the implementation of Ordinance No. 19, upstream diversions can reduce the flow of the Carmel River by as much as 16 cubic feet per second (cfs). During dry seasons, this 16 cfs represents a large percentage of river inflow.

3.4.6 CARMEL RIVER MANAGEMENT PROGRAM

The District began implementation of the Carmel River Management Program in July 1983. The goal of the program is to restore the Carmel River to its former state as much as possible. The 10-year program consists of numerous individual bank stabilization and river training projects designed to prevent erosion and encroachment of riverside property, improve river bottom conditions for aquatic life and reestablish the corridor of riparian vegetation. Over 50,000 linear feet of willows have been planted and maintained throughout the middle and lower river reaches since 1984.

3.4.7 IRRIGATION PROGRAM

The County of Monterey required Cal-Am to irrigate riparian vegetation near four production wells in the lower Carmel Valley as part of its use permit. The District was charged with implementing the irrigation program. District and Cal-Am consultants determined the relationship between well pumping, groundwater drawdown and elevated plant stress; various irrigation techniques were also analyzed.

A portable irrigation system was developed and is deployed by the District whenever selected environmental parameters indicate plant stress. A regular monitoring program also assesses the irrigation system's performance. Results to date conclude that irrigated areas have alleviated stress to key reaches of the riparian corridor.

3.5 FEASIBLE WATER SUPPLY IMPROVEMENT ALTERNATIVES

MPWMD staff evaluated a broad range of water supply improvement alternatives before identifying the three feasible alternatives addressed in this EIR/EIS as worthy of detailed evaluation. Chapter 2 discusses those alternatives that were considered but rejected as infeasible, together with a description of the process used to select feasible alternatives. Alternatives addressed in detail in the EIR/EIS include three sizes of reservoirs at the New San Clemente site and the No Project alternative.

Alternative A consists of a roller compacted concrete dam sized to create a 29,000 AF storage reservoir. It would be located on the Carmel River, approximately 3,600 feet downstream of the existing San Clemente Dam and would include fish passage facilities for migratory steelhead. Associated physical components include increased production capacity via new wells in the Carmel Valley and Seaside aquifers, and expanded treatment capacity at the Begonia plant. Management and operation components include fishery flow releases, phasing of new yield and continuation of existing river management programs. This alternative was described as the proposed alternative in Army Corps of Engineers permit application # 16516S09.

Alternative B would be similar to Alternative A, but smaller. The dam would be sized to create a 20,000 AF reservoir. Alternative C would be similar to Alternative B, but smaller still. In this case, the dam would be sized to create a 16,000 AF reservoir. The dam location and associated project components would be the same for all alternatives.

The three reservoir sizes represented by Alternatives A, B and C represent the range of feasible alternatives. The 29,000 AF project (Alternative A) is the largest sized reservoir proposed in the water rights application and Corps of Engineers permit. The 16,000 AF project (Alternative C) is the smallest sized reservoir that would pass the minimum criteria established by the District (see Chapter 2). The 20,000 AF project (Alternative B) represents an intermediate point between the other two alternatives, and as such a great deal of research has been performed on it. These three reservoir sizes represent three points from a continuum of sizes ranging from 16,000 AF to 29,000 AF.

3.6 ALTERNATIVE A: 29,000 AF SAN CLEMENTE PROJECT[7]

New San Clemente Dam would be located on the Carmel River approximately 16 miles southeast of the City of Monterey and 3.5 miles south of Carmel Valley Village. The new dam would be about 3,600 feet downstream of the existing dam and 18 river miles from the Carmel River mouth. The new reservoir would completely inundate the existing San Clemente Dam and reservoir. A plan of the dam and reservoir is shown in Figure 3-2. A cross section through the dam is shown in Figure 3-3.

3.6.1 PHYSICAL CHARACTERISTICS

New San Clemente Dam would be a 300-foot high roller-compacted concrete (rollcrete) dam measuring 900 feet along its crest. The crest would be at elevation 689.0 feet above mean sea level (msl), and the normal maximum water surface elevation would be at 662.0 feet msl. The dam would be designed to withstand the maximum credible earthquake on nearby faults and to meet all requirements of the State Department of Water Resources, Division of Safety of Dams. It should be noted that the dam height could be increased to impound up to a 45,000 AF reservoir, if authorized at some future date.

The reservoir formed by New San Clemente Dam would provide 29,000 AF of gross storage at the normal maximum water surface elevation of 662.0 feet msl. About 2,000 AF have been reserved to accommodate sediment that washes down from the upper reaches of the watershed, leaving 27,000 AF of usable or "active" storage. The surface area of the reservoir would be 345 acres at 662.0 feet msl, and would completely inundate the existing San Clemente Dam and Reservoir.

Most of the proposed reservoir area is covered with heavy scrub or trees that would be removed to a level of about 668.0 feet msl. Timber would be harvested and used for lumber and firewood. The remaining spoils would need to be disposed of, possibly by burning.

A spillway would be included near the center of the dam to allow water in excess of the reservoir's capacity to pass safely over the dam. The spillway would consist of a 147 foot wide overflow structure and would include a stilling basin at the downstream toe of the dam to prevent erosion of the river banks. At elevation 687.5 feet msl, the spillway

PLAN VIEW OF 29,000 AF RESERVOIR - ALTERNATIVE A

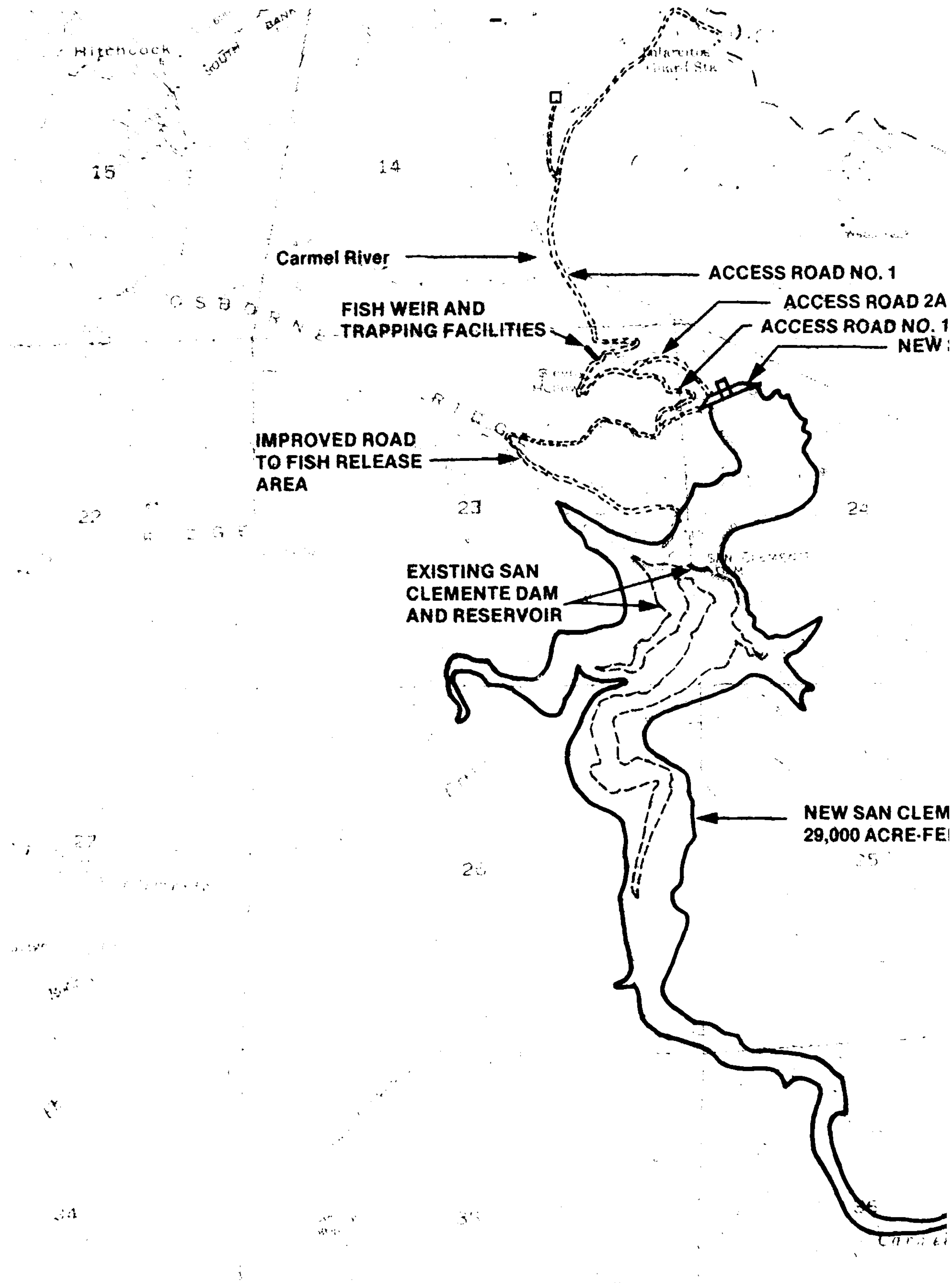
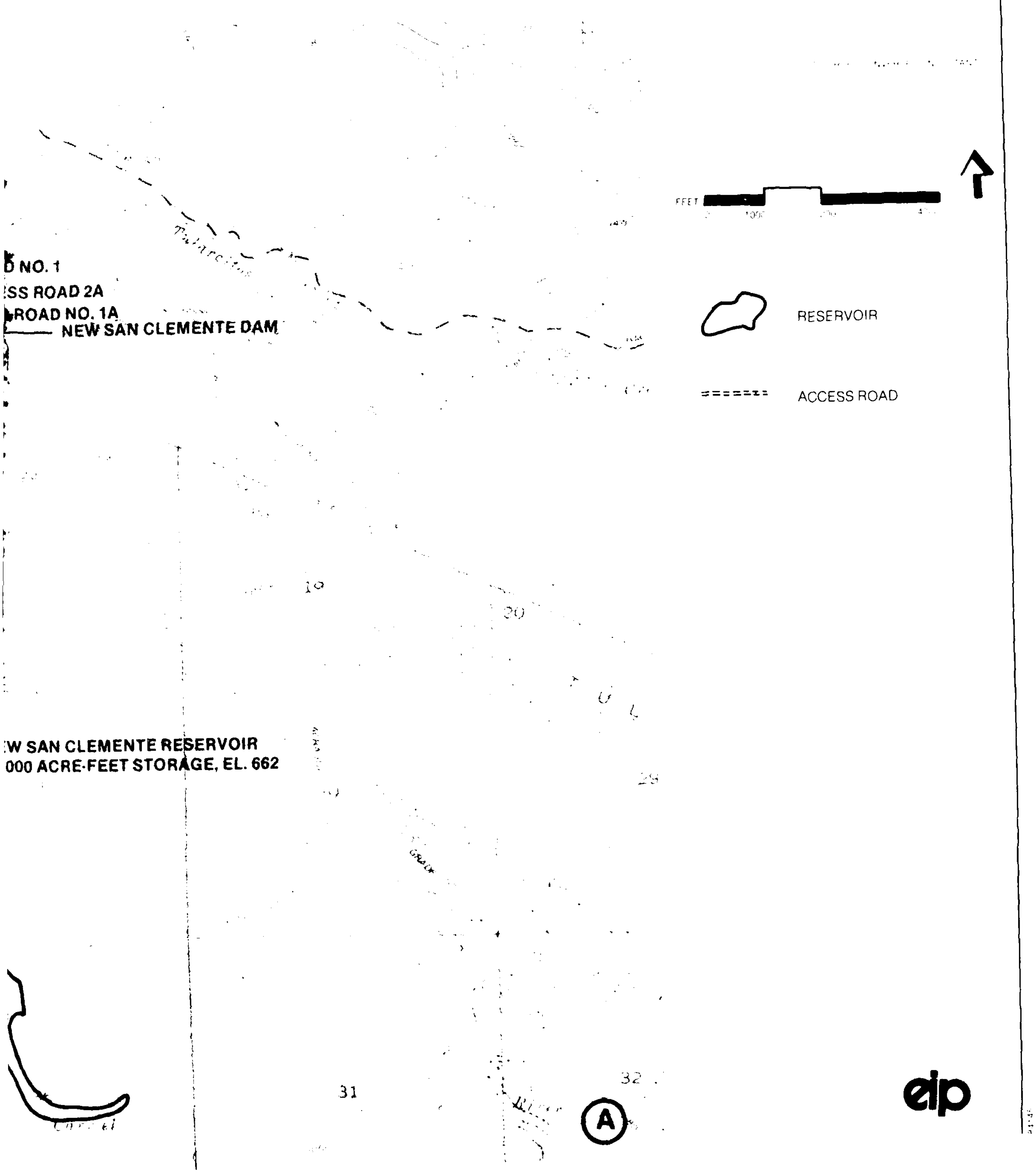


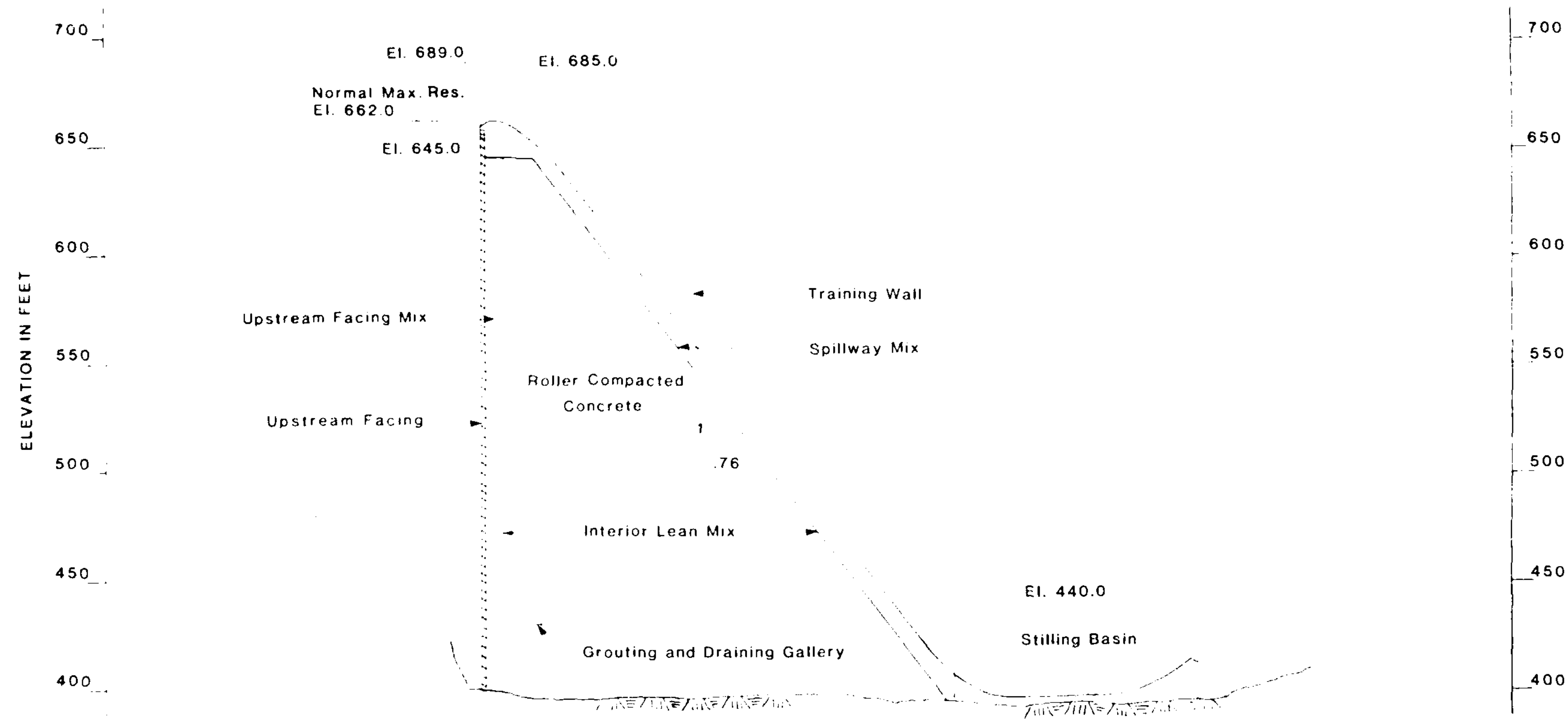
FIGURE 3-2



D NO. 1
SS ROAD 2A
ROAD NO. 1A
NEW SAN CLEMENTE DAM
W SAN CLEMENTE RESERVOIR
000 ACRE-FEET STORAGE, EL. 662
FEET
RESERVOIR
ACCESS ROAD
19
20
29
31
32
A

SECTION OF DAM (SPILLWAY)

FIGURE 3-3



would have a capacity of 77,000 cfs. This capacity is the estimated probable maximum flood (PMF) as determined by the U.S. Army Corps of Engineers.

A multiple level intake structure would be built near the upstream face of the dam that would allow water to be released to the river below the dam or to be conveyed by pipeline to the Carmel Valley filter plant. Two regulating valves would be installed at the outlet works: an 18- and a 48-inch diameter fixed-cone valve. The 18-inch valve would be used for low-flow releases; the total discharge capacity would be 720 cfs with the reservoir at 662.0 feet MSL.

The current proposal does not include a powerhouse at this time, although the intake facilities and other structural features of the powerhouse would be constructed when the dam is built to allow the later addition of power generation equipment. If a powerhouse is constructed in the future, it would contain a base unit of 400 kilowatt (kw) capacity and a peaking unit of 1,050 kw capacity.

Migrating fish would be accommodated in a similar fashion for both upstream and downstream passage. A trap and truck system would be used to pass migrating adult steelhead trout over the dam. Upstream migration facilities would consist of a fish weir and ladder near Sleepy Hollow Flat, a trapping facility, and a truck for hauling. Downstream migration would be accomplished through the use of a fish attraction horn, overflow spillway gate, multi-level intake and travelling screens, holding tanks, hoist, and truck.

Three permanent access roads would be constructed for the project (see Figure 3-3). Access Road No. 1 would extend from the gate near the existing Cal-Am treatment plant to the Sleepy Hollow Flat. Access Road No. 1A would extend from the Sleepy Hollow Flat to the top of the dam, at elevation 688.0 feet msl on the left abutment. Access Road No. 2A would extend from the Sleepy Hollow Flat to the downstream toe of the dam, near the left abutment.

The road linking Carmel Valley Road to the three access roads would be the existing San Clemente Drive, through the Sleepy Hollow Subdivision. This road, including Tularcitos Creek Bridge, would be widened and improved during construction in order to accommodate heavy trucks and equipment. The road would be returned to its original condition once construction is complete. In addition, minor improvements would be made on the existing "out" road on the left abutment at Sleepy Hollow Flat, as this road would be used to truck the fish around the dam.

3.6.2 CONSTRUCTION METHODS

Construction of New San Clemente Dam would take approximately two years. The relatively short construction period is attributable to the type of construction material and method chosen—roller-compacted concrete or "rollcrete". Rollcrete is a mixture of damp gravel or crushed rock and cement that can be placed with earthmoving machines rather than by more labor-intensive conventional concreting. Because rollcrete must be placed continuously, work at the site during this 7-9 month phase would proceed around-the-clock.

Crushed rock for the dam would be obtained from the dam foundation excavation and from one or more potential quarry sites located near the reservoir. Cement and other construction materials would be brought to the site by truck. Truck traffic would be limited to daylight hours only. All trees and brush would be cleared and removed from the reservoir site before the reservoir is filled. Timber and firewood would most likely be removed from the site by truck or other means.

River diversion during construction would be accomplished by diverting the water into a six-foot diameter conduit on the left side of the river. A small cofferdam would be constructed upstream of the dam at the intake of the conduit. Flows in excess of the conduit capacity would be spilled over the temporary construction crest of the rollcrete dam. After completion of construction, the diversion conduit would be plugged with grout.

Construction of the dam would require a crew of 40 to 125 workers per shift. An average of 30 trucks per day would enter and leave the site by way of Carmel Valley Road.

3.6.3 CARMEL VALLEY WELLS

Additional wells are proposed in order to increase the production capacity of Cal-Am in Carmel Valley aquifers. Rated production capacity would total 1400 gpm (2 wells @ 700 gpm). This capacity was reduced by 13% to 1218 gpm to account for system-wide reduction in capacity. Wells would be owned, operated and located on Cal-Am property in the Boronda area (Carmel Valley Aquifer subunit 2) within 100 yards of the river. These wells would be operated conjunctively with the dam; water pumped from the aquifer would be replaced with water released from the dam. It is anticipated that these wells would be permitted only if the New San Clemente project is built.

3.6.4 BEGONIA TREATMENT PLANT

Cal-Am proposes to increase the capacity of its Begonia treatment plant through the installation of an additional filter and larger transmission line. The treatment capacity would be increased from 48 AF/day to 54 AF/day. This improvement is also planned by Cal-Am whether or not a New San Clemente project is built.

3.6.5 SEASIDE WELLS

Additional wells are proposed for the coastal Seaside aquifer. A net 600 gpm increase in production capacity is anticipated through redevelopment of one well and installation of one or two new wells. A flow of 522 gpm was used for this study (13% reduction in capacity). Specific well locations have not yet been determined. This improvement is planned by Cal-Am whether or not a New San Clemente project is built.

3.6.6 PROJECT OPERATION

The New San Clemente Reservoir would be operated with groundwater reservoirs on a conjunctive use basis. Conjunctive use entails the coordinated management of surface and groundwater reservoirs in a manner that maximizes benefits.

A schedule of minimum flows in the river has been developed for steelhead. Four water year categories have been defined, depending on runoff conditions: normal or better, below normal, dry, and critically dry. Table 3 1 shows the conditions that categorize a water year. During normal or wet years, a flow of 200 cfs (measured at the lagoon at the

TABLE 3-1

WATER YEAR CLASSIFICATIONS FOR RECOMMENDED FISHERY FLOW REQUIREMENTS ON THE CARMEL RIVER

Water Year Type	Unimpaired Carmel River Flow at San Clemente Dam Site[1] (Acre-Feet)	Recommended Annual Fishery Flow Requirement at Carmel River Lagoon[2] (Acre-Feet)
Normal or Better	> 48,100	24,308
Below Normal	31,750-48,100	17,904
Dry	14,925-31,750	9,449
Critically Dry	>14,925	3,014

[1] Flows are based on selected non-exceedance values and correspond to the 50% frequency for normal or better conditions; 25%-50% for below normal; 12.5%-25% for dry; and less than 12.5% for critically dry.

[2] Flows are maximum requirements from reservoir storage and are calculated assuming attraction flows occur at the beginning of January, February and March.

river mouth) would be released for 16 or more days between January 1 and March 31 in order to attract steelhead into the middle and upper Carmel River. Flows of 75 cfs would be maintained during this period once the 200 cfs attraction flows were initiated. During April and May, river flow would be maintained at or above 40 cfs to provide sufficient water for downstream movement of juvenile fish. For the remaining seven months of the year, a minimum flow of 5 cfs would be provided at the lagoon. Twenty cfs would be required at the Narrows in all months. Table 8-1 provides a detailed description of the release schedule.

During dry years, the duration and size of releases from the reservoir would be reduced. In a below normal year, the 200 cfs attraction flow would not begin until February, and would be limited to a minimum of 10 days. In a dry year, the attraction flow would not begin until March, and would last for five days or more; in a critically dry year, no attraction flows would be released. April and May flows would also be reduced and June-December flows to the lagoon would be eliminated in dry or critically dry years. Only a flow of 20 cfs to the Narrows would be maintained in these years.

The sequence of reservoir operations would occur as follows and is best understood by referring to the schematic diagram in Figure 3-4. During periods of high streamflow the volume of water entering New San Clemente Reservoir would exceed the volume that must be released for fish. At such times, Cal-Am would divert water from the reservoir to the filter plant and use it to satisfy water demand in their service area. If the demand was higher than production from the filter plant, the Seaside aquifer would be the first source of additional water supply. The Cal-Am wells located in the Carmel Valley would then be used when water demand exceeded the production from the filter plant and Seaside aquifer, a fairly common occurrence during the dry summer months.

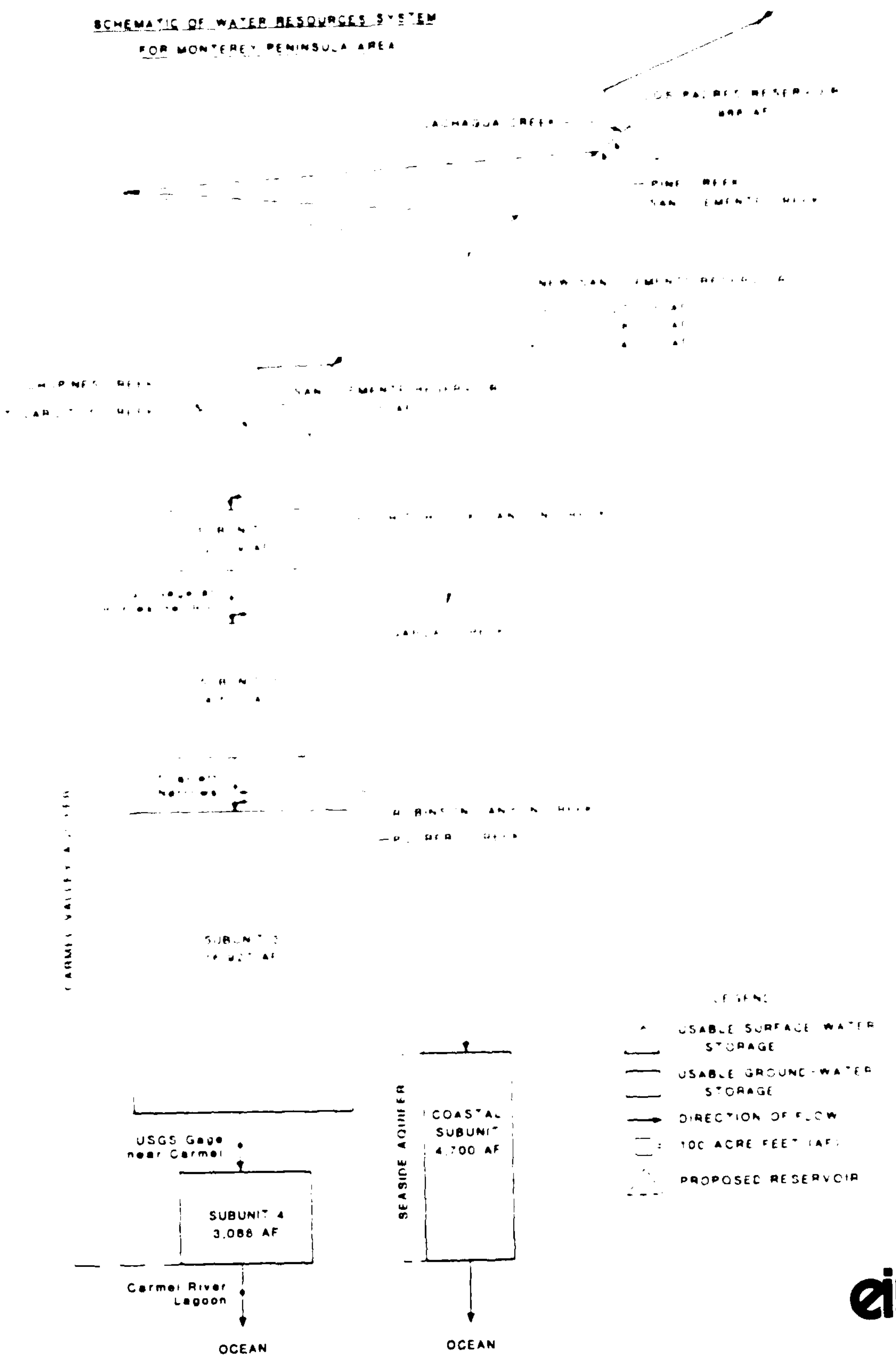
When the volume of water stored in the reservoir declines to a level below that needed for sustaining the fish release, Cal-Am would reduce direct diversion of water from the reservoir to the filter plant, based on inflow conditions to date. Instead, wells located in the lower Carmel Valley would begin pumping the bulk of the needed water from the downstream end of the aquifer. Reservoir releases would be adjusted to satisfy fish flow requirements for the given type of year and allow for the increased percolation resulting from increased groundwater pumping and subsequent lowering of the water table.

During very dry years it would not be possible to meet water demand using the downstream end of the aquifer. Under these circumstances, pumping from the Seaside aquifer would be increased to a maximum. If demand exceeded the water available from [illegible] and the lower Carmel Valley wells, or if the lower Carmel Valley aquifer was [illegible], then the Cal Am wells that penetrate the upper Carmel Valley aquifer [illegible] pumped to meet demand.

[illegible] operations plan described above is to keep the upstream end of the [illegible] to maintain the maximum amount of water in the Carmel River

SCHEMATIC OF SYSTEM

FIGURE 3-4



for fish and riparian habitat. When the upstream end of the aquifer is full, little river water percolates into the ground and more water remains in the stream. The plan is further designed to [illegible] extreme water level drawdown in any of the aquifers to preserve riparian vegetation and [illegible] pumpers.

3.6.7 WATER ALLOCATION AND PHASING

[illegible] New [illegible] increase the existing District [illegible] 22,890 AF. (See Chapter 4 [illegible] water usage should exceed the [illegible] that the District impose a [illegible] The purpose of this District wide system [illegible] drought reserve and to prevent [illegible] water usage exceeds the system capacity limit.

[illegible] would be added in three phases. [illegible] would be increased by 1,390 AF. This [illegible] growth expected to occur by the year 2000, as [illegible] plans and local coastal plans for each [illegible] AF would be allocated in the year 2000 to [illegible] growth [illegible] between the years 2000 and 2010. A third [illegible] AF would be added to the allocation in the year 2010 to accommodate growth expected to occur between the years 2010 and 2020. Once the project is [illegible] by a subsequent public vote.

The purpose of phasing the yield is to meet the needs of planned growth without stimulating further growth beyond that already permitted in existing and soon to be completed general plans and local coastal plans. Phasing of the project yield would also facilitate orderly development within the scope of existing plans.

Initially, allocations will not be made to individual jurisdictions within the District. The allocations to individual jurisdictions in the current allocation system will be dropped when the first increment of water from the new dam is added to the allocation. Allocations to individual jurisdictions could be resumed if this were requested by jurisdictions that perceived inadequacies with the allocation system.

3.6.8 CAL-AM FIRM YIELD

A simulated firm annual yield of 22,520 AF for the Cal-Am system would be provided by Alternative A. This value corresponds to the municipal supply that would be provided assuming the dry year demand projected for the year 2020 (about 24,500 AF) coupled with weather conditions identical to the 1977 drought year.

3.6.9 RECREATION

The District Board's policy is to permit passive recreational uses such as hiking, picnicking, equestrian use and sightseeing at the reservoir site, if developed by other agencies. Active recreational uses such as boating and camping would be prohibited, as would all motorized activities. No recreational or parking facilities would be constructed by the District. The Department of Fish and Game has determined that no fishing will be permitted at the new reservoir.

3.6.10 CONTINUATION OF EXISTING PROGRAMS

The 29,000 AF New San Clemente project would continue several existing programs which include the Water Conservation Program, reclamation, the Carmel River Management Program (CRMP), and the riparian vegetation irrigation program. Descriptions of these programs are found in Section 3.4, Actions Already Taken. It should be noted that the CRMP is authorized and funded until July 1993, thus, Alternative A would extend the CRMP until the year 2020.

3.7 ALTERNATIVE B: 20,000 AF NEW SAN CLEMENTE PROJECT

3.7.1 PHYSICAL CHARACTERISTICS

Alternative B would be similar to Alternative A, only smaller. Alternative B would result in the creation of a 20,000 AF reservoir by the construction of a rollcrete dam approximately 260 feet high with a crest length of 820 feet. After allowing 2,000 AF for sedimentation and dead storage, active storage would be about 18,000 AF. The normal maximum water surface would be at elevation 633.0 feet msl, and 276 acres would be inundated at this elevation (see Figure 3-5). Heavy scrub and trees would need to be removed up to elevation 639 feet msl. The spillway would be designed to pass a probable maximum flood of 77,000 cfs at elevation 658.5 msl.

3.7.2 OTHER PROJECT COMPONENTS

Intake and outlet structures, fish facilities, Carmel Valley and Seaside wells, the Begonia Treatment Plant, allocation and phasing of yield, management and program goals would be the same as described in Section 3.6. Cal-Am firm yield would be 19,760 AF.

3.8 ALTERNATIVE C: 16,000 AF NEW SAN CLEMENTE PROJECT

3.8.1 PHYSICAL CHARACTERISTICS

Alternative C would again be similar to Alternative A, only smaller still. This alternative would create a reservoir of 16,000 AF storage. Allowing 2,000 AF for sedimentation and dead storage, active storage would be about 14,000 AF. This reservoir would be created by constructing a rollcrete dam approximately 244 feet high with a crest length of 750 feet. The normal maximum water surface elevation would be at 617.0 feet msl, and would inundate 240 acres (see Figure 3-5). Heavy scrub and trees would need to be removed to an elevation of 623 feet msl. The spillway would be designed to safely pass a probable maximum flood of 77,000 cfs at elevation 642.5 msl.

3.8.2 OTHER PROJECT COMPONENTS

Intake and outlet structures, fish facilities, Carmel Valley and Seaside wells, the Begonia Treatment Plant, allocation and phasing of yield, management and program goals would be the same as described in Section 3.6. Cal-Am firm yield would be 19,040 AF.

3.9 NO PROJECT ALTERNATIVE

3.9.1 PHYSICAL CHARACTERISTICS

This section describes the scenario envisioned should the No Project alternative be selected, specifically if no New San Clemente project were to be built. This alternative is equivalent to a Corps of Engineers permit denial. The existing Los Padres Reservoir would remain unchanged in terms of facilities or management. The current average sedimentation rate for San Clemente Reservoir of 20 AF/year is assumed to continue, and could completely fill the reservoir within 20 years. Thus, a dredging program would need to be initiated as part of the No Project alternative in order to preserve the ability to divert water and maintain existing reservoir capacity.

PLAN VIEW OF ALTERNATIVES B & C

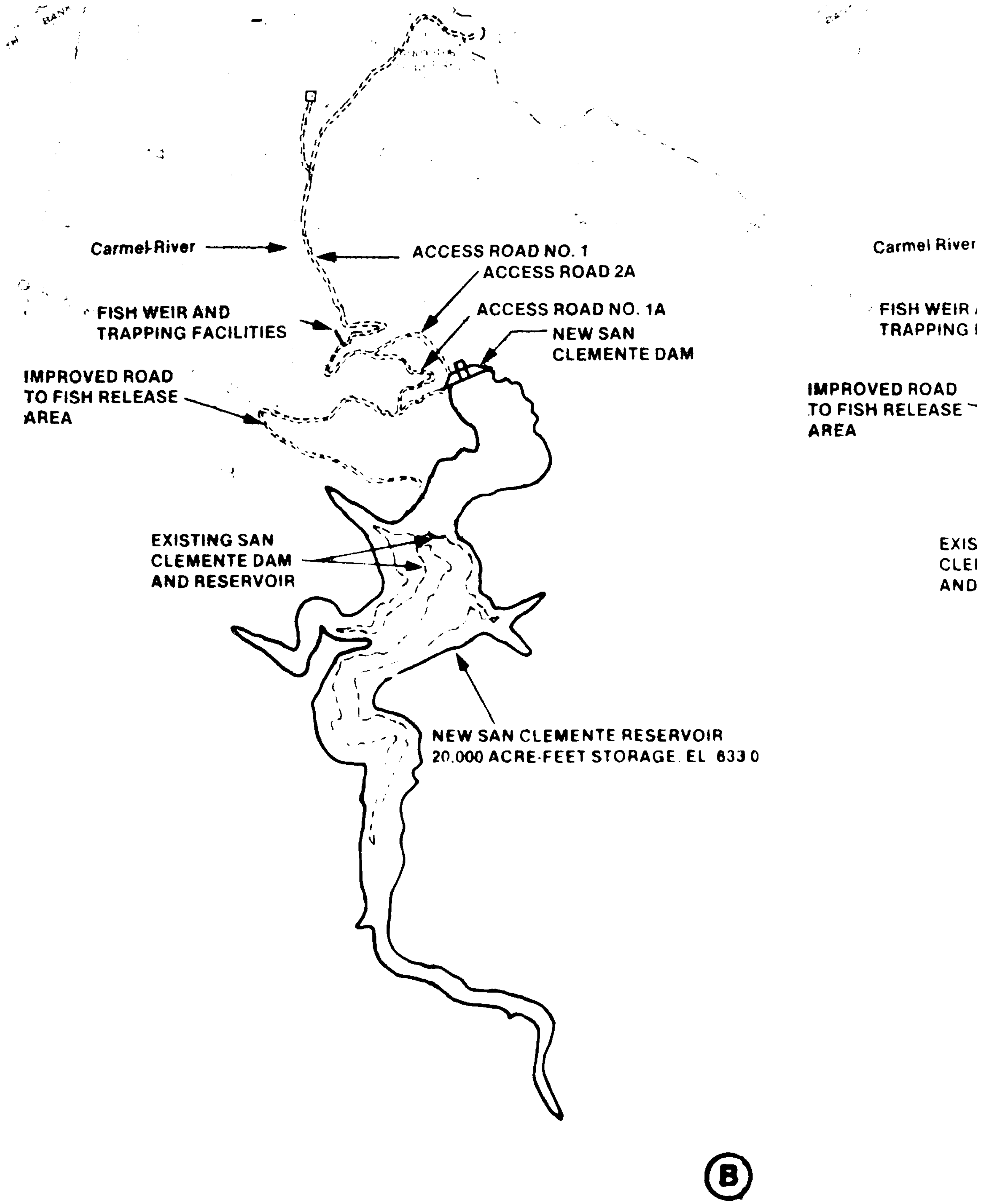
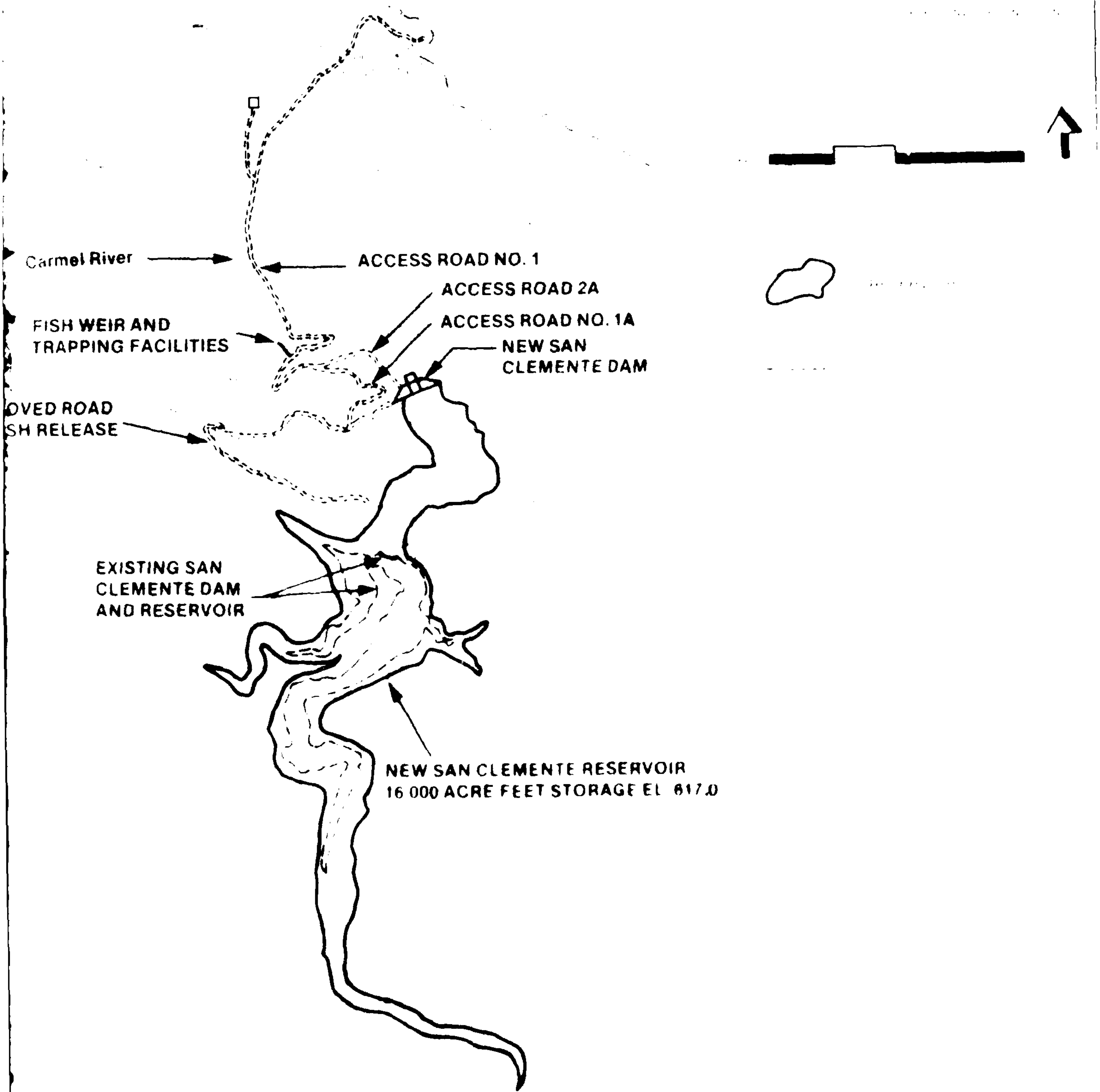


FIGURE 3-5



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The existing San Clemente Dam would remain essentially the same, except for the addition of completely mechanized flashboards. This action would not affect the present flashboard protocol (lowering in November, raising in April). Existing usable storage is defined as 220 AF (no flashboards) to 700 AF (flashboards up).

Existing fish passage facilities would be maintained. These include a fish ladder for upstream migration at the existing San Clemente Dam and a small trap and truck facility at Los Padres Dam. Downstream migration facilities include a spillway at Los Padres Dam; fish pass directly over San Clemente Dam or may use the fish ladder. A year round release of 3 cfs from the existing dam would be maintained.

3.9.2 CARMEL VALLEY WELLS/BEGONIA TREATMENT PLANT

No new Carmel Valley wells are proposed for the No Project alternative because of the potential [illegible] impacts of increased pumping with no increase in recharge. [illegible] Plant will be increased from 48 to 54 [illegible]

[illegible]

[illegible] coastal portion of the Seaside [illegible] intends to implement [illegible] anticipated through [illegible] two new wells. A reduction [illegible] Specific well [illegible]

[illegible]

[illegible]

[illegible]

Cal-Am and the Department of Fish and Game is assumed to remain in effect; it presently calls for a continuous release of at least 3 cfs from San Clemente Dam with no requirements at the Narrows or Lagoon.

3.9.5 WATER ALLOCATION

Total water deliveries in the Cal-Am service area from all sources would be limited to 20,000 AF/year production (see Section 3.4.1).

3.9.6 CAL-AM FIRM YIELD

A simulated firm annual yield of 16,590 AF for the Cal-Am system would be provided by the No Project alternative. This value corresponds to the municipal supply that would be provided assuming the dry year demand projected for the year 2020 (about 21,450 AF) coupled with weather conditions identical to the 1977 drought year.

3.9.7 RECREATION

Recreational activities are prohibited on the existing San Clemente reservoir and this would be unchanged under the No Project alternative.

3.9.8 CONTINUATION OF EXISTING PROGRAMS

The irrigation and water conservation programs would continue in their existing forms. It remains questionable as to whether or not the Carmel River Management Program (CRMP) would continue. This would be up to the discretion of property owners to reauthorize this program in 1993.

3.10 CAPITAL COST OF THE ALTERNATIVES

The estimated costs [illegible] New San Clemente [illegible] Table 3.2. [illegible] New San Clemente [illegible] $31.3 [illegible] $41.8 [illegible] $4.3 [illegible]

[illegible]

TABLE 3-2
ESTIMATED COST OF PROJECT ALTERNATIVES[1]

Alternative	Reservoir Capacity, AF	Capital Cost ($ Millions)	Annual Operation and Maintenance Cost ($ Millions)	Total Annual Cost[2] ($ Millions)
Alternative A	29,000	43.8	0.52	5.8
Alternative B	20,000	35.2	0.52	4.7
Alternative C	16,000	31.4	0.52	4.3

[1]Costs based on June 1986 estimates.

[2]Assumes financing by the sale of bonds with a 30-year term and a 9.5% interest rate.

over the next six years, regardless of whether the New San Clemente project is built, is estimated to be $6 million. If a New San Clemente Dam is built, the District anticipates that Cal Am would add new wells in Carmel Valley at an estimated cost of $660,000. The costs of the new wells in the Carmel Valley and at Seaside and the improvements to the Begonia Treatment Plant will be financed separately by Cal Am. They have not been estimated but they would be small relative to the cost of the dam and reservoir.

3.11 FINANCING THE DAM

Funds for construction will be raised through the sale of tax exempt bonds (probably revenue bonds)[11] [illegible] charges. The term and interest will be set by market conditions [illegible] For planning purposes the District has [illegible] $44 million (1986 [illegible]) for the 29,000 AF project. [illegible] 30 year term, the annual [illegible] off sooner [illegible] Adding the annual operation [illegible] $5.8 million.

In February 1987 the District Board of Directors determined that revenues to cover the annual costs would be derived from residential user fees, commercial user fees, connection charges and interest earned on the reserve fund. The residential users would pay 35% of the annual cost. This corresponds to a $49 annual increase to the average residential water bill for the 29,000 AF project. Residents whose water usage is low would pay only the lifeline rate and would have their water bill increased by only about $1 per month. Commercial users would pay 1.7 times as much per unit of water as would residential users. The commercial users would pay 35% of the annual cost, which corresponds to a $545 annual increase to the average commercial water bill. New construction would contribute 22% of project costs through connection charges. The remaining 8% would be earned as interest on the reserve fund.

Connection fees are currently being levied on new construction. The fee for a single-family home is $2,500 $3,500, depending on size, while the fee for a one-bathroom apartment is $650 $700. This fund is expected to contain about $5 million by the time a bond is passed. This would be expected to save over $600,000 annually in interest payments, or over $18 million over the 30 year repayment period. In the event a water augmentation project is not approved by the voters before December 1, 1991, the District Board is required to determine whether to provide for a refund of unused connection fees.

3.12 INSTITUTIONAL ARRANGEMENTS FOR NSC ALTERNATIVES & NO PROJECT

The District will own New San Clemente Dam and Reservoir and fish passage facilities. Cal Am will retain ownership of the existing Los Padres Dam, San Clemente Filter Plant and all downstream transmission and treatment facilities and wells. The new Seaside and Carmel Valley wells will be owned and operated by Cal Am. Operation and maintenance of the new dam, reservoir and fish passage facilities is the responsibility of the District, which may contract for these services.

Should one of the New San Clemente project alternatives be implemented, Cal Am would not be allowed any windfall profits. The California Public Utilities Commission (PUC) regulates profits based on the capital cost of improvements, depreciation and fair return on investment. Cal Am would not be the sole distributor of water from the dam. Other small systems would also receive water.

3.13 SCHEDULE FOR IMPLEMENTATION

An advisory election will be held in November 1987 to gauge public opinion on the New San Clemente concept and guide the District in expediting the appropriate project. In March 1988 the District Board of Directors is expected to certify the EIR/EIS for CEQA purposes; at this time the NEPA process should also be completed. After a water rights permit is obtained from the State Water Resources Control Board, and a Section 404 permit is obtained from the U.S. Army Corps of Engineers, an Engineer's Report for the project will be undertaken. Assuming no delays, an authorizing election will be held in 1989 to seek voter approval for the project and sale of revenue bonds to finance construction. Construction is scheduled for completion in 1993 with water deliveries to begin late that year.

3.14 REGULATORY AGENCY APPROVAL

Many government agencies are expected to review this EIR/EIS. Permits would have to be issued by several agencies before the proposed project could be implemented. A list of reviewing agencies can be found in Chapter 20.

Each of the permitting agencies is listed below together with a brief description of their responsibilities.

3.14.1 U.S. ARMY CORPS OF ENGINEERS

The U.S. Army Corps of Engineers administers Section 404 of the Clean Water Act which regulates the placement of fill material in the nation's waterways. The New San Clemente project is the subject of Permit Application No. 16516809.

The information required by the Section 404(b)(1) guidelines has been integrated into the text of this EIR/EIS. Also, since the proposed undertaking is considered a water dependent activity, there is no need to prepare an analysis to rebut the presumption regarding the availability of an alternative upland disposal site with less adverse impacts on the environment.

3.14.2 FEDERAL ENERGY REGULATORY COMMISSION

The Federal Energy Regulatory Commission is responsible for licensing all hydroelectric power generation facilities in the United States. The New San Clemente project includes facilities that would allow the District to add hydroelectric power generation to the dam at a later date. If the District chooses to do so it will file a license application with the Federal Energy Regulatory Commission.

3.14.3 CALIFORNIA STATE WATER RESOURCES CONTROL BOARD

The State Water Resources Control Board is a quasi judicial body that administers water rights within California. The District must obtain a Permit to Appropriate Water to allow it to direct additional water from the Carmel River.

3.14.4 CALIFORNIA DEPARTMENT OF FISH AND GAME

Before the District can commence construction within the Carmel River channel, it must obtain a Stream Alteration Agreement from the Department of Fish and Game under the provisions of Section 1601-1603 of the California Fish and Game Code.

3.14.5 CALIFORNIA DEPARTMENT OF WATER RESOURCES, DIVISION OF SAFETY OF DAMS

The Division of Safety of Dams licenses and inspects dams in California to ensure that public safety is protected. The plans and specifications for a new dam on the Carmel River would be subject to review and approval by the Division of Safety of Dams. The completed structure would be subject to periodic inspection by the Division.

3.14.6 CALIFORNIA DEPARTMENT OF TRANSPORTATION (CALTRANS)

The transport of oversized construction equipment to the project site would require that the District obtain a Transportation Permit from Caltrans.

3.14.7 CALIFORNIA OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (CALOSHA)

Because a new dam would be more than 36 feet high, the District would have to obtain a Permit for Construction from CALOSHA.

3.14.8 COUNTY OF MONTEREY

The transport of oversized construction equipment to the site would require that the District obtain a Transportation Permit from the County. County grading and building permits would also be needed.

3.14.9 OTHER PERMITS

Depending on the arrangements made for clearing and grubbing of the reservoir site a timber harvesting permit may be required from the California Department of Forestry. If burning of waste material takes place permits would be required from the Monterey Bay Unified Air Pollution Control District and the County of Monterey.

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[1] Riparian vegetation is the plant community that grows along rivers and streams. Only a small fraction of California's riparian vegetation remains unaltered. What remains is of great interest and concern to wildlife agencies.

[2] Population, employment and water demand projections are described in detail in Development of Water Demand and Land Use Projections in the Years 2000 and 2020 with and without a Water Supply Project, MPWMD Technical Memorandum 86-08, August, 1987.

[2a] Per capita water use in an area is obtained by dividing total water use by the area's population. It can be a somewhat misleading statistic because it is often assumed to approximate per capita residential water use. Within the District daily residential per capita water use is about 80 gallons. By 2020 it will drop to about 71 gallons. [illegible] overall daily per capita use rate will increase however because water consuming [illegible] hotel rooms will be added at faster rates than the new residents.

[2b] California Department of Water Resources, Urban Water Use in Calif[illegible] 1983.

[2c] Cal-Am's ability to produce water was constrained by [illegible] more water could have been provided.

[3] A full description of the [illegible] Simulation Model, MPWMD Technical Memorandum [illegible] description of the model [illegible] Appendix A.

[4] This report is not intended [illegible] Valley or the Seaside [illegible] appropriat[illegible] Control Board.

AD-A185 030 ENVIRONMENTAL IMPACT STATEMENT FOR THE NEW SAN CLEMENTE PROJECT MONTEREY..(U) CORPS OF ENGINEERS SAN FRANCISCO CA SAN FRANCISCO DISTRICT SEP 87 2/4

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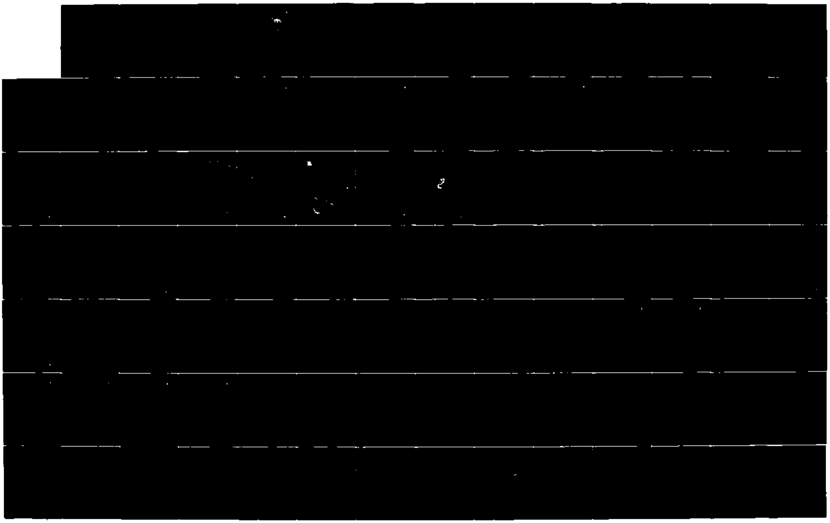
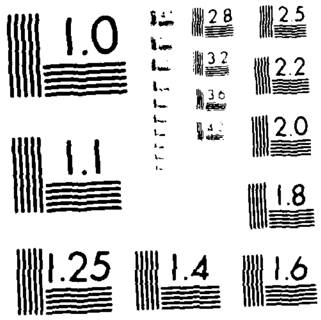




MICROCOPY RESOLUTION TEST CHART

[5]D.W. Kelley and Associates, Assessment of Carmel River Steelhead Resource; Volume II, Draft, June 1987.

[6]Monterey Peninsula Water Management District, et al, Water Conservation Plan for Monterey County, Final Draft, April 1984. The plan includes the measures listed in the text together with the substitution of reclaimed water for potable water for golf course and landscape irrigation. Water reclamation is discussed in Chapter 2, Selection of Feasible Alternatives.

[6a]The water conservation plan would have a net reduction in demand of 12% by 2020.

[7]The description of New San Clemente Dam and Reservoir, its construction method and cost were obtained from Converse Consultants, New San Clemente Project, Preliminary Design and Cost Estimate, November 1986, and Converse Consultants, New San Clemente Project Engineering Summaries of Additional EIR Alternatives, May 1987.

[8]The existing and alternative allocations are being analyzed in an EIR, and could change.

[9]It should be noted that the new reservoir and wells will increase the yield of the water system by 5,930 AF/year in a severe drought. Under normal conditions, however, the amount of additional water provided by the reservoir will be 2,895 AF/year.

[10]Revenue bonds are bonds secured by the revenue derived from the facilities that the bonds are used to finance.

4 WATER DEMAND

4.1 INTRODUCTION

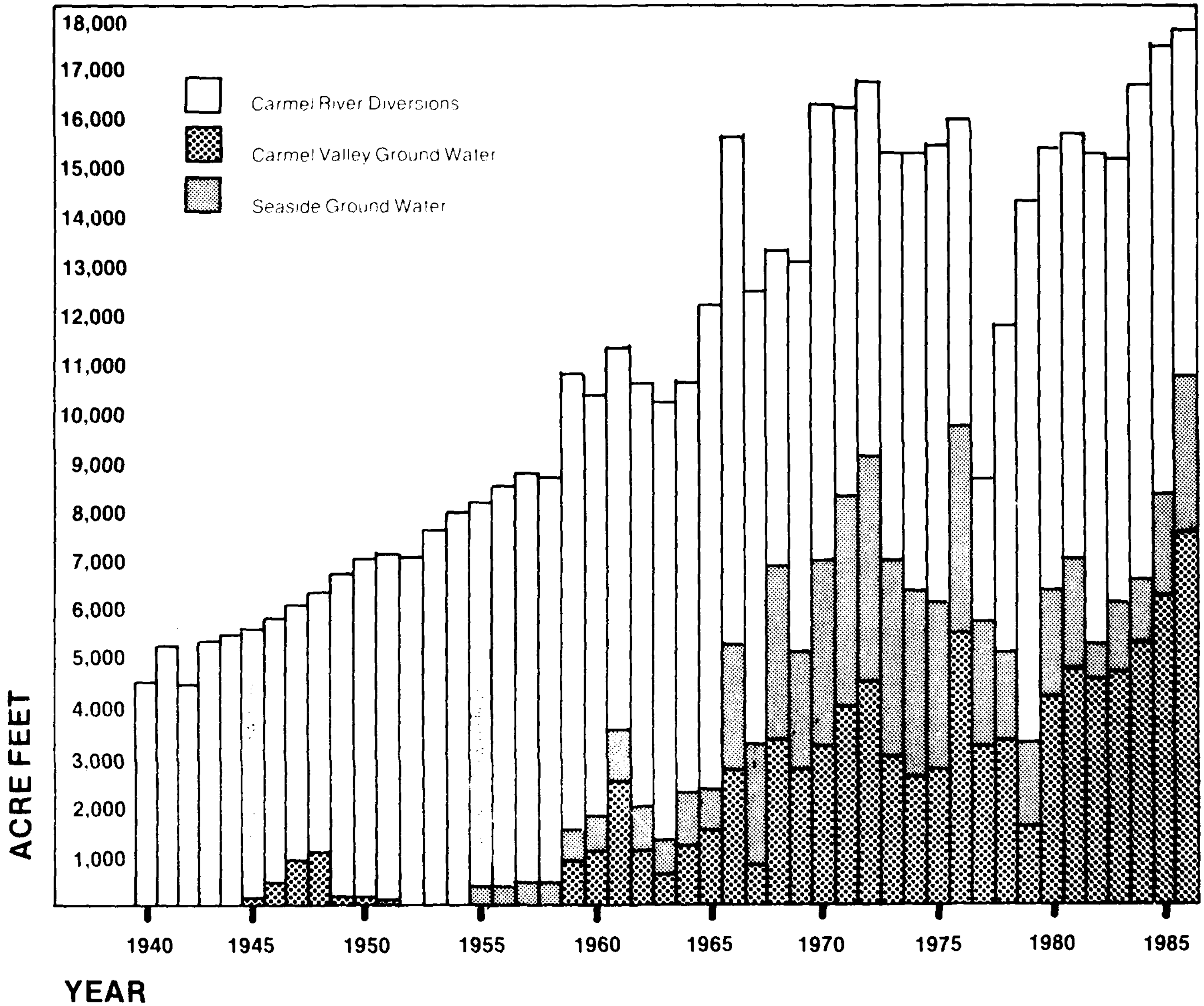
There are a variety of water users on the Monterey Peninsula. For the purpose of this EIR/EIS, municipal demand refers to residential, commercial (including golf courses) and a limited amount of agricultural use. It also includes non-metered or unaccounted water such as fire hydrants or system leaks. Most water is supplied by the Cal-Am Water Company; other distribution systems include the City of Seaside, Water West, Carmel Valley Mutual and Bishop water companies. Numerous private pumpers extract groundwater from the Carmel Valley Aquifer, Seaside Basin, or other areas within the district. Non-municipal water use such as instream releases for fish are addressed in Chapter 7, Hydrology and Water Quality, and Chapter 8, Fish and Other Aquatic Life.

Municipal water demand on the Monterey Peninsula has more than tripled since 1940. As shown in Figure 4-1, demand in the Cal-Am system steadily increased until 1970, then leveled off through 1976. Rationing imposed during 1977 and parts of 1978 resulted in a dramatic reduction in demand. Demand returned to pre-drought levels by 1980 and has continued to climb since 1984. Factors responsible for historical changes in water demand include an increasing population and economic growth, construction of water-intensive developments such as golf courses, higher water use per capita and the influence of weather on water consumption. It is notable that nearly 60% of the 1980-1986 increase in residential water demand is due to factors other than new construction.

Water demand is expected to increase in the future as a result of population and economic growth within the District boundary. This chapter explains the background, assumptions and approach used to develop water demand projections for the New San Clemente and No Project alternatives. A detailed description of the procedures used can be found in District Technical Memorandum 86-08 (November 1986, revised September 1987).[1]

CAL-AM WATER PRODUCTION

FIGURE 4-1



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4.2 DEVELOPMENT OF WATER DEMAND PROJECTIONS

Land use projections and the associated water demand projections were the foundation of several important elements of this EIR/EIS. These include:

1. Selection of feasible water supply alternatives. One important criterion was the ability to provide a selected minimum municipal water supply in the year 2020;
2. Determination of the minimum size and cost of the feasible water supply projects described in the EIR/EIS;
3. Assessment of the computer simulated performance of feasible alternatives throughout the EIR/EIS;
4. Distribution of the project costs among various types of users;
5. Determination of future water allocations and the phasing of new system yield; and
6. Comparison of the cumulative impacts of growth with and without a new water supply project (e.g., traffic, air quality, schools, sewage, fiscal impact to cities).

Several land use or water demand projections have been developed for the District since its inception in 1978. The firm of Recht, Hausrath and Associates (RHA) developed a series of water demand and land use projections from 1980 through 1985.[2] As part of this EIR/EIS, EIP Associates (EIP) assessed existing and future land use that would occur with and without a water supply project. Projections for the years 2000 and 2020 were developed to be consistent with existing zoning and general plans for each jurisdiction within the District in addition to RHA employment forecasts. In the residential sector, the number of single family homes and multiple family units were forecast. Future employment, including employment generated by golf courses and hotels, was also estimated. Separate projections were developed for the Cal-Am service area (Figure 3-1) and areas outside the Cal-Am system. Appendix E provides population and employment forecasts developed by EIP.

EIP's draft projections were submitted to the District Board in April 1986 and reviewed by planning staff and elected officials in each jurisdiction. Revised projections that incorporated comments from all jurisdictions (except Monterey County) were accepted by the Board in May 1986. At the same meeting, District staff presented water demand estimates for several residential and commercial uses, based on an extensive water use survey. These were applied to EIP's land use projections to estimate future water demand with and without a water supply project.

Written and oral comments received at public meetings after May 1986 indicated that several revisions to the original projections were necessary to more accurately assess future land and water use. In September 1986 the County Board of Supervisors submitted revised land use projections for unincorporated areas within the District. In October 1986 a special public workshop was held to address several aspects of the water demand projections. District Board decisions on these issues are summarized below:

4.2.1 NORMALIZED BASE YEAR DEMAND

Water year 1985 was chosen as the base year for water demand projections; per capita use in 1985 was also selected as a standard. Concerns were raised that water use in one year did not accurately reflect demand. Thus the average per capita demand of 0.543 AF/year during the relatively stable pre-drought period of 1966-1975 was applied to the actual number of Cal-Am customers in 1985. In this way, Cal-Am 1985 base year demand was changed from an actual value of 17,465 AF to a normalized value of 17,742 AF (an increase of 2.7%).

4.2.2 INTENSIFICATION OF WATER USE

Intensification refers to increased water use per water meter, especially within the residential sector, that is not associated with remodeling or new growth. Examples of intensification include infrequently used vacation homes being rented or sold for full-time use, grown children returning to the parental home, shared housing among unrelated adults, increases in illegal rentals and increased outdoor irrigation. Intensification may be one reason why water use per connection has risen in the past three years despite conservation efforts. The Board determined that the 1985 normalized base water use should be increased by 5% (897 AF) to account for future intensification. This value was based on the assumption that over one-half of the vacant housing stock (9% of the total housing stock in 1980) would be occupied by the year 2020.

4.2.. IMPACT OF REMODELS

Earlier water demand projections forecast new residential units and employees, but did not forecast future increases in water consumption due to remodels. Data collected in 1985-86 showed that residential and commercial remodels completed that year accounted for less than 0.1% of metered sales. At that rate, remodels would add 3.5% (628 AF) to the normalized 1985 base value by the year 2020. This factor was incorporated into the water demand projections.

4.2.4 REDUCTIONS DUE TO CONSERVATION PROGRAM

As described in Chapter 3, Description of Feasible and No Project Alternatives, the District has implemented a comprehensive water conservation program. Its goal is a 15% reduction in projected water demand in the year 2020. Thus the estimated water conservation savings that should accrue by 2020 were subtracted from the water demand expected in that year to determine the projected water demand. For the No Project scenario, a 50% reinvestment of conservation savings into new construction was assumed with a systemwide limit on water connections totalling 39,750 meters.

4.2.5 CREATION OF DISTRICT RESERVE FOR SMALL WATER SYSTEMS

In addition to the Cal-Am water distribution system, 24 smaller systems extract groundwater within the District. Annual production ranges from less than 2 AF to over 200 AF. Some of these water systems have experienced water quality or water delivery problems in the past. To allow for failure of small water systems and consequent incorporation into the Cal-Am system, the District has included a 600 AF reserve in its Cal-Am water demand projections for the year 2020.

4.2.6 INFLUENCE OF WEATHER ON ANNUAL WATER DEMAND

Cal-Am records show that production per customer during 1966-1975 varied by about 7.5% above and below the average as a function of weather. For the purpose of the computer simulation model, the Board approved the concept of increasing projected annual demand by up to 7.5% if a year is "dry." Thus, the projected normal year Cal-Am demand of 22,895 AF in the year 2020 could be as high as 24,600 AF (assuming no rationing) if that same year was critically dry.

4.2.7 WATER AUDIT AND OTHER CORRECTIONS

In October 1986 a system-wide water audit was completed by Cal-Am. The audit showed that significant amounts of water sales were incorrectly designated to some jurisdictions within the District. These errors occurred due to incorrect coding of water meters. In addition, a November 1986 letter from Cal-Am identified errors in the data used to develop the normalized base value approved at the October 1986 meeting. Given these facts, the district completely revised all water demand projections for the Cal-Am system and incorporated new data for private or non-Cal-Am groundwater pumpers.

4.3 WATER DEMAND AND LAND USE PROJECTIONS

The District developed water demand and land use projections for each jurisdiction within its boundary. These include the cities of Carmel-by-the-Sea, Del Rey Oaks, Monterey, Pacific Grove, Sand City, Seaside and unincorporated portions of Monterey County. Based on EIP's work, District studies as well as the factors noted above, projections for the years 2000 and 2020 were developed for the Cal-Am and non-Cal-Am areas. Separate estimates were made for the situation without a water supply project. Projected water demand was based on the expected number of single-family homes, multiple-family dwellings, employees (including golf courses), and hotel rooms. Population forecasts were also made based on the residential projections.

It should be noted that all water demand projections displayed in the following sections assume that conservation goals would be met. Similarly, land use projections are based on existing general land and economic projections. Actual water demand and land use will depend on market forces and future planning actions by each jurisdiction.

4.3.1 NEW SAN CLEMENTE ALTERNATIVES

Water demand and land use projections are identical for the three New San Clemente alternatives. Tables 4-1, 4-2 and 4-3 show the estimated numbers of residential dwellings, jobs and water demand in each jurisdiction for the years 1985, 2000 and 2020 if not limited by water supply. Table 4-4 summarizes the water demand and land use projections for the District as a whole for the year 2020. It should be noted that these figures apply only to the Cal-Am service area.

TABLE 4-1

ESTIMATED GROWTH IN NUMBERS OF DWELLING UNITS
WITH NEW SAN CLEMENTE ALTERNATIVES[1]

	Numbers of Dwelling Units		
Area	1985	2000	2020
Carmel	3,189	3,444	3,564
Del Rey Oaks	579	729	769
Monterey	13,066	14,249	14,549
Pacific Grove	7,755	9,165	9,718
Sand City	108	925	1,231
Seaside	7,033	8,113	8,396
Unincorp. Monterey County	10,501	12,919	13,691
TOTAL	42,231	49,544	51,918
Avg. Annual Growth Rate		1.2%	0.2%

[1] All values refer to the Cal-Am service area.

TABLE 4-2

ESTIMATED GROWTH IN NUMBERS OF JOBS
WITH NEW SAN CLEMENTE ALTERNATIVES[1]

	Numbers of Jobs		
Area	1985	2000	2020
Carmel	3,508	3,854	4,369
Del Rey Oaks	478	658	698
Monterey	26,050	32,273	37,962
Pacific Grove	4,276	5,091	5,515
Sand City	1,519	3,044	5,485
Seaside	3,966	5,933	7,347
Unincorp. Monterey County	3,141	3,826	4,556
TOTAL	42,938	54,679	65,932
Avg. Annual Growth Rate		1.8%	1.0%

[1] All values refer to the Cal-Am service area.

TABLE 4-3

ESTIMATED WATER DEMAND
IN ACRE-FEET/YEAR[1]

Area	1985	2000	2020
Carmel	1,127	1,164	1,238
Del Rey Oaks	203	264	271
Monterey	5,823	6,650	7,271
Pacific Grove	2,380	2,644	2,777
Sand City	107	557	897
Seaside	2,437	2,806	3,134
Unincorp. Monterey County	5,860	6,483	6,707
Total Cal-Am	17,937	20,825[2]	22,895[3]
Non-Cal-Am	3,960	4,082	4,093
DISTRICT TOTAL	21,897	24,907[2]	26,988[3]
Avg. Annual Growth Rate		0.9%	0.4%

[1] All values are for the Cal-Am system, unless noted otherwise. Estimates include reductions due to District's water conservation program and assume a normal water year.

[2] Includes District reserve of 257 AF.

[3] Includes District reserve of 600 AF.

Table 4-3 shows that as a result of projected growth, total water demand within the Cal-Am service area is expected to increase from 17,937 AF/year in 1985 to 20,825 AF/year in the year 2000. The year 2020 water demand projection is 22,895 AF/year. It should be noted that these figures are for normal years only, assume a successful water conservation program and include non-revenue uses such as fire hydrants. Unrationed water demand in dry years could be 7.5% higher. Thus if the year 2020 were dry, projected demand could be as high as 24,600 AF.

Table 4-4 shows that by the year 2020, the total number of residences in the Cal-Am area may increase by about 9,700 dwellings with the New San Clemente alternative. Commercial activity could generate about 23,000 new jobs, including 3,600 from hotels. As many as 6,000 hotel rooms could be built in the same period. The population within the Cal-Am area could increase by nearly 20,900 people. It should be noted that the hotel room projection includes several hundred rooms that have been approved since 1985 or are already under construction. Carmel Valley Ranch and Spanish Bay resort are two examples.

Water demand in areas outside the Cal-Am service area, as shown in Table 4-3, is small when compared to the Cal-Am system. By the year 2020, nearly 4100 AF/year would be pumped by non-Cal-Am users, about 15% of the total projected water demand. It is assumed that the non-Cal-Am water demand would be identical whether or not a new water supply project is built.

4.3.2 NO PROJECT ALTERNATIVE

The amount of new construction and future water demand would be constrained under the No Project scenario. It assumed that the existing maximum water allocation of 20,000 AF annual production will remain in effect for the Cal-Am system.[3] Thus normal year water demand in the years 2000 and 2020 would be limited to 20,000 AF/year. If these same years were dry, unrationed Cal-Am water demand could increase to 21,500 AF/year.

Planned built-out as presently envisioned could not occur in any jurisdiction under the No Project scenario. Five of the seven jurisdictions in the District presently exceed 90% of their allotted share of the water allocation. As shown in Tables 4-5 and 4-6, the growth

TABLE 4-4

LAND USE AND WATER DEMAND IN THE YEAR 2020
WITH AND WITHOUT A WATER SUPPLY PROJECT[1]

Element	1985 Base	2020 Without Project	2020 With Project	Difference Between Project and No Project	
Dwellings	42,231	47,380	51,918	4,538	dwellings
Employment	42,938	48,691	65,932	17,241	jobs
Hotel Rooms	6,878	9,669	12,865	3,196	rooms
Population	92,807	104,029	113,680	9,651	people
Water Demand	17,937	20,000	22,895	2,895	AF

[1] All values refer to the Cal-Am system. Estimates of water demand include reductions due to water conservation and assume a normal water year.

TABLE 4-5

ESTIMATED GROWTH IN NUMBER OF DWELLING UNITS
FOR NO PROJECT ALTERNATIVE[1]

Area	Numbers of Dwelling Units 1985	2000	2020
Carmel	3,189	3,363	3,363
Del Rey Oaks	579	729	729
Monterey	13,066	14,249	14,536
Pacific Grove	7,755	8,397	8,431
Sand City	108	653	653
Seaside	7,033	7,545	7,645
Unincorp. MoCo	10,501	11,653	12,023
TOTAL	42,231	46,589	47,380
Avg. Annual Growth Rate		0.7%	0.08%

[1]All values refer to the Cal-Am system and assume at least 50% reinvestment of conservation savings into new construction.

TABLE 4-6

ESTIMATED GROWTH IN NUMBER OF JOBS
FOR NO PROJECT ALTERNATIVE[1]

Area	Numbers of Jobs 1985	2000	2020
Carmel	3,508	3,508	3,508
Del Rey Oaks	478	658	658
Monterey	26,050	29,418	29,418
Pacific Grove	4,276	4,607	4,607
Sand City	1,519	2,059	2,059
Seaside	3,966	4,495	4,495
Unincorp. Monterey County	3,141	3,516	3,946
TOTAL	42,938	48,261	48,691
Avg. Annual Growth Rate		0.8%	0.04%

[1]All values refer to the Cal-Am system and assume at least 50% reinvestment of conservation savings into new construction.

rate of new dwellings and jobs would decline dramatically after the year 2000. Nearly all jurisdictions project no new dwellings or jobs after the year 2000 with the No Project alternative.

Table 4-4 shows that by the year 2020, the total number of residences in the Cal-Am area could increase by about 5,100 dwellings with the No Project alternative. More than 5,700 new jobs could be created, including 1,680 hotel jobs; nearly 2,800 hotel rooms could be built in the same period. The projected population increase is about 11,200 people. As noted above, the hotel room projection includes developments that have already been approved or are under construction.

4.3.3 COMPARISON OF IMPACTS

The year 2020 projections in Table 4-4 show that any of the New San Clemente alternatives would result in approximately 4,500 more dwellings, 17,200 more jobs, 3,200 more hotel rooms, and 9,650 more people in the Cal-Am service area than with the No Project alternative. The estimated normal year water demand in 2020 would be 2,895 AF/year greater with the New San Clemente alternatives than with the No Project alternative. The corresponding dry year demand in 2020 could be about 3,100 AF greater with the New San Clemente alternatives than with the No Project alternative.

The impact of the growth allowed by the New San Clemente alternatives and the No Project alternative is addressed in Chapter 18, Growth and Its Effects on the Monterey Peninsula.

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[1] MPWMD, 1986. Development of Water Demand and Land Use Projections in the Years 2000 and 2020 With and Without a Water Supply Project. Technical Memorandum 86-08, November 1986 (revision in preparation).

[2] Reports prepared by Recht, Hausrath and Associates include: Economic and Demand Projections (October 1980); Draft Economic and Demographic Projections (December 1982, January 1983, May 1983); Draft Growth Impacts: Housing and Employment Forecasts With and Without the Proposed Project (June 1984); Hotel Employee Projections as a Component of June 1984 Job Projections (March 1985); Hotel Employee Projections as a Component of June 1984 Job Projections Under All Three Scenarios (April 1985).

[3]A separate Environmental Impact Report on the District's allocation system is currently being prepared. The potential impacts of annual allocations ranging from 18,000 AF to 23,000 AF are being compared. In addition, several mechanisms to distribute the total allocation to jurisdictions within the District are being assessed. The maximum allocation and water distribution to jurisdictions could be revised in early 1988, based on the EIR findings.

5 WATER SUPPLY

5.1 SETTING

The Monterey Peninsula obtains its water supply from the Carmel River and from wells in Seaside and the Carmel Valley. In 1986, Cal-Am, the principal water purveyor to the Peninsula, produced about 17,600 AF of water. Of this total, about 39% was diverted from the Carmel River, 40% obtained from wells in the Carmel Valley, and 21% obtained from wells in Seaside. A historic perspective on water production is shown in Figure 4-1.

5.2 CARMEL VALLEY SIMULATION MODEL

The Carmel Valley Simulation Model (CVSIM) was used to evaluate the water supply impacts of the New San Clemente project alternatives and the No Project alternative. CVSIM is a computerized mathematical simulation of surface and groundwater resources within the District that was developed by MPWMD staff.[1,2]

The water supply impacts were modeled for each alternative with regard to municipal yield, municipal shortages, rationing and drought reserve. Projected water demands for the year 2020 were used in the simulations. Projected normal year demand in the Cal-Am service area is expected to increase from 17,937 acre-feet/year (AF/year) in 1985 to 20,825 AF/year in 2000 and to 22,895 AF/year in 2020. The No Project Alternative was simulated assuming the conditions described in Chapter 3 and with demand limited to 20,000 AF/year within the Cal-Am service area. This represents the maximum amount of water available to Cal-Am customers under the current allocation system. When reviewing the subsequent comparison of alternatives, it is useful to remember that the assumed year 2020 demand differs for Alternatives A, B and C and the No Project Alternative. For Alternatives A, B and C, the normal year demand in 2020 in the Cal-Am service area would be 22,895 AF. For the No Project Alternative, it would be 20,000 AF. The reader is referred to Chapter 4 for more detail on this subject.

The performance of each alternative was simulated for the water years 1958 to 1985. This period includes the critical water years 1976-1978, which is the driest period on record.

5.3 IMPACTS OF PROJECT OPERATION

5.3.1 IMPACTS

The following paragraphs compare the effects of Alternatives A, B and C and the No Project alternative on various aspects of water supply.

Municipal Water Yield or Production

For the purpose of this analysis, municipal yield was represented by Cal-Am system water production. Cal-Am production includes all diversions from the Carmel River and pumpage from Carmel Valley and Seaside aquifers.

Cal-Am production is directly related to demand; thus, any adjustment to demand will affect the rate of production. During dry periods demand rises, but rationing is sometimes necessary during these periods. In the CVSIM, rationing reductions are applied after the demand is increased due to dryness.

Figure 5-1 shows Cal-Am yield for the New San Clemente project and its alternatives during the 1958-1985 period. Yields are similar for most years, with the larger projects providing slightly more water overall. The greatest difference in yield occurs during the 1976-1978 drought, when the 29,000 AF New San Clemente project provides significantly more water than the smaller projects. Table 5-1 provides a summary of the annual yields for the project alternatives during this critical period.

Although none of the San Clemente Project alternatives could meet demand without rationing during an extremely dry period like 1976-1978, their yields would differ. Alternative A would produce 4,284 AF more water during the dry period than Alternative B and 6,067 AF more than Alternative C. The No Project alternative would produce 13,584 AF less than Alternative A during the same period.

SIMULATED CAL-AM ANNUAL YIELD, 1958-1985

FIGURE 5-1

SOURCE: MPWMD

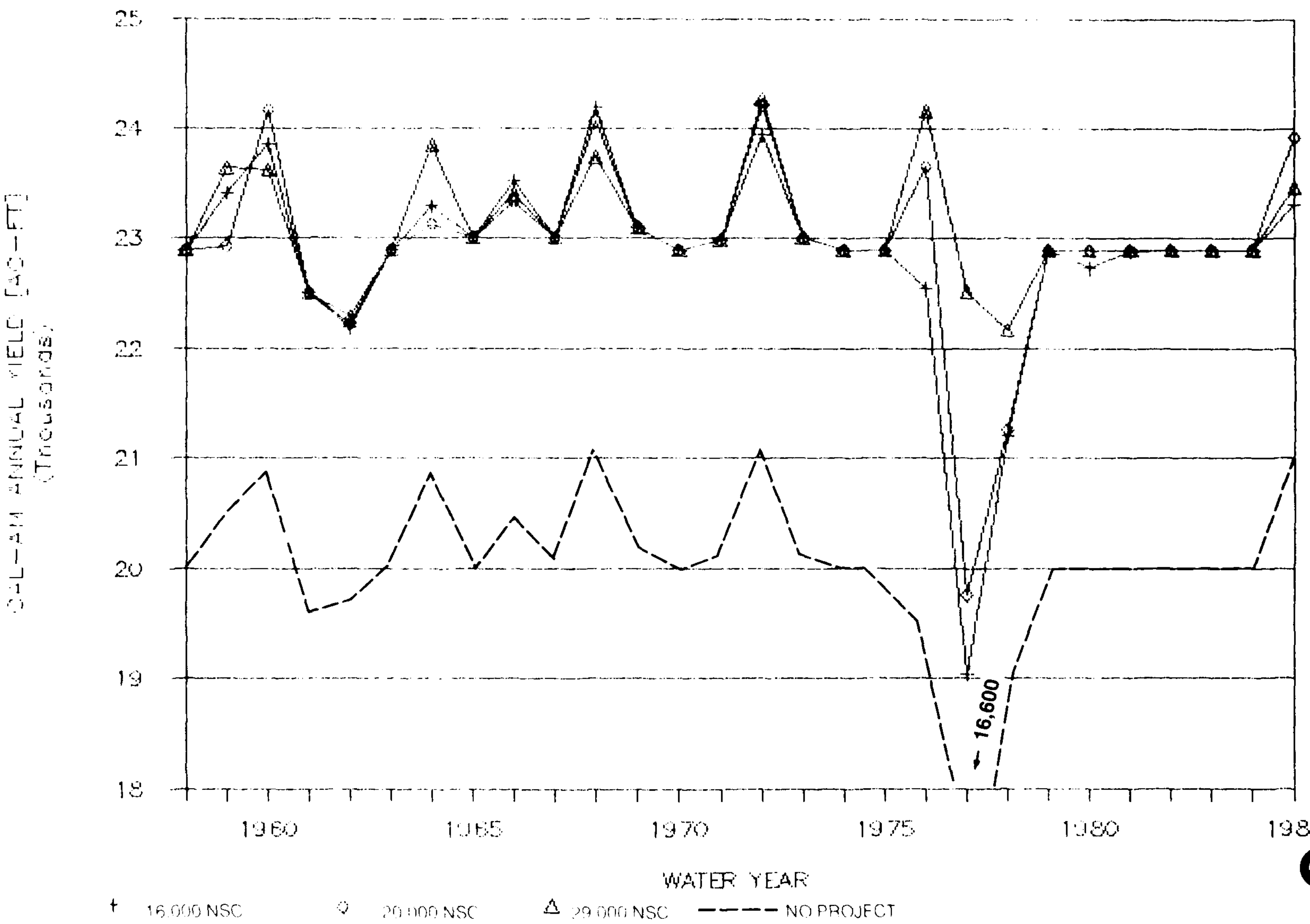

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TABLE 5-1

SIMULATED CAL-AM ANNUAL YIELD FOR THE NEW SAN CLEMENTE AND NO PROJECT ALTERNATIVES DURING THE 1976-1978 DROUGHT PERIOD

Water Year	Cal-Am Yield (Acre-Feet) 29,000 SF NSC Project	20,000 AF NSC Project		16,000 AF NSC Project		No Project	
1976	24,168	23,657	(511)	22,545	(1,623)	19,590	(4,578)
1977	22,518	19,757	(2,761)	19,037	(3,481)	16,590	(5,928)
1978	22,168	21,156	(1,012)	21,205	(963)	19,090	(3,078)
1976-1978	68,854	64,570	(4,284)	62,787	(6,067)	55,270	(13,584)

Note: Numbers in parentheses represent the difference in yield between the 29,000 AF New San Clemente project and smaller-sized alternatives or the No Project.

Municipal Water Shortages

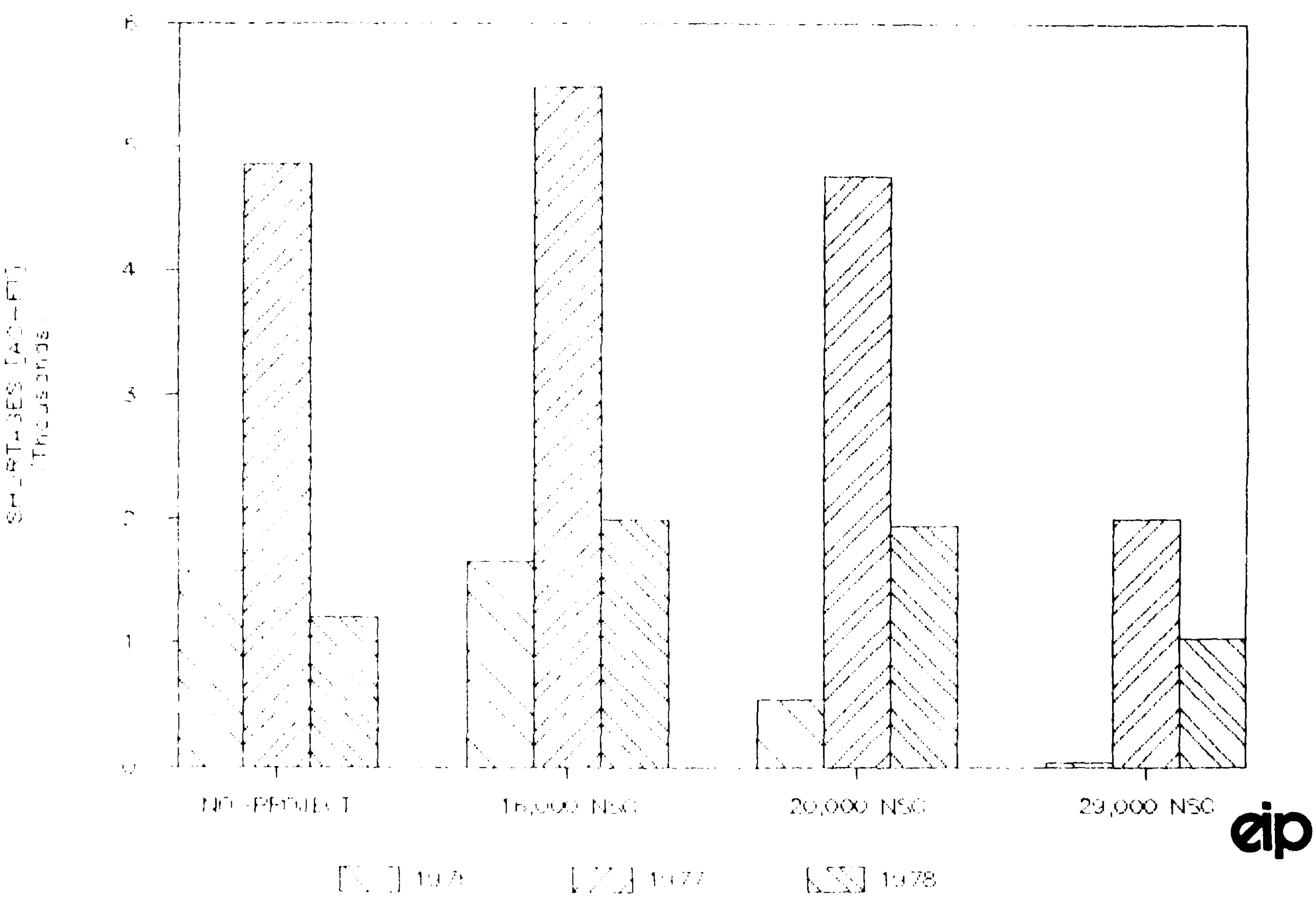
Municipal water shortages were defined as the difference between yield and unrationed demand. These shortages are affected by demand-related conditions (reductions from rationing and increases from dryness) and yield-related conditions (available storage and production capacity).

Figure 5-2 shows simulated Cal-Am annual shortages during the 1976-1978 critical period for the New San Clemente alternatives and the No Project alternative. The smaller projects would experience earlier and greater shortages, while the 29,000 AF project shows the best performance, with a negligible shortage in 1976 and sizably reduced shortages in 1977 and 1978. In this category, Alternatives B and C would perform similarly to the No Project alternative.

SIMULATED CAL-AM ANNUAL SHORTAGES DURING 1976- 1978

FIGURE 5-2

SOURCE MPWMD



Municipal Water Rationing

Rationing is a strategy used by water managers to limit demand when supplies are short or expected to be short in the immediate future. The CVSIM assumes that different levels of rationing would be triggered by certain levels of water deficiency. An explanation of how this occurs is contained in Appendix B. Table 5-2 shows the extent of demand reduction that is assumed to occur with different levels of rationing.

Simulated demand reductions due to rationing for the New San Clemente and No Project alternatives during the 1976-78 dry period are shown in Figure 5-3. The frequency of each reduction level is expressed as a percentage of the months during the 36-month period that rationing would be necessary. Under Alternative A, mandatory rationing would be necessary for about 3% of the time or one month. Under Alternatives B and C, mandatory rationing would be necessary for 12 months or about 33% of the time and 13 months or 36% of the time, respectively. Under the No Project Alternative, rationing would be necessary for 11 months or about 30% of the time. Rationing would be needed less under No Project conditions than for Alternatives B and C because demand would be less due to administrative controls.

Drought Reserve

Drought reserve refers to the water in storage that is maintained for protection against severe and sustained droughts. This reserve includes all usable reservoir and aquifer storage. Storage targets are decreased as a drought persists or intensifies and storage is depleted. A minimum reserve target totalling 9,000 AF from all sources was assigned for the end of the 1977 simulated water year.

Figure 5-4 shows the simulated drought reserve available during the 1976-1978 critical period for the New San Clemente alternatives and the No Project alternative. Each alternative satisfies the minimum reserve requirement, with the larger projects providing greater reserves. At the end of water year 1977, the worst year of the 1976-78 drought, Alternative A would have maintained a reserve 3,700 AF greater than the 9,000 AF minimum required. Alternatives B, C and the No Project would each provide between 9,300 AF and 9,700 AF of drought reserve. Thus, Alternative A would provide greater protection in a sustained drought than the other alternatives evaluated.

TABLE 5-2

DEMAND REDUCTIONS DUE TO RATIONING

Percent Reduction in Demand (%)	Levels of Rationing
0	No restrictions
10	Voluntary restrictions
25	Mandatory restrictions on outdoor uses
40	Mandatory restrictions on indoor and outdoor uses

5.3.2 MITIGATION MEASURES

The impacts of the alternatives on water supply are beneficial. No mitigation measures are suggested.

5.4 IMPACTS OF PROJECT CONSTRUCTION

Construction activities associated with the New San Clemente project alternatives would have no effect on water supply.

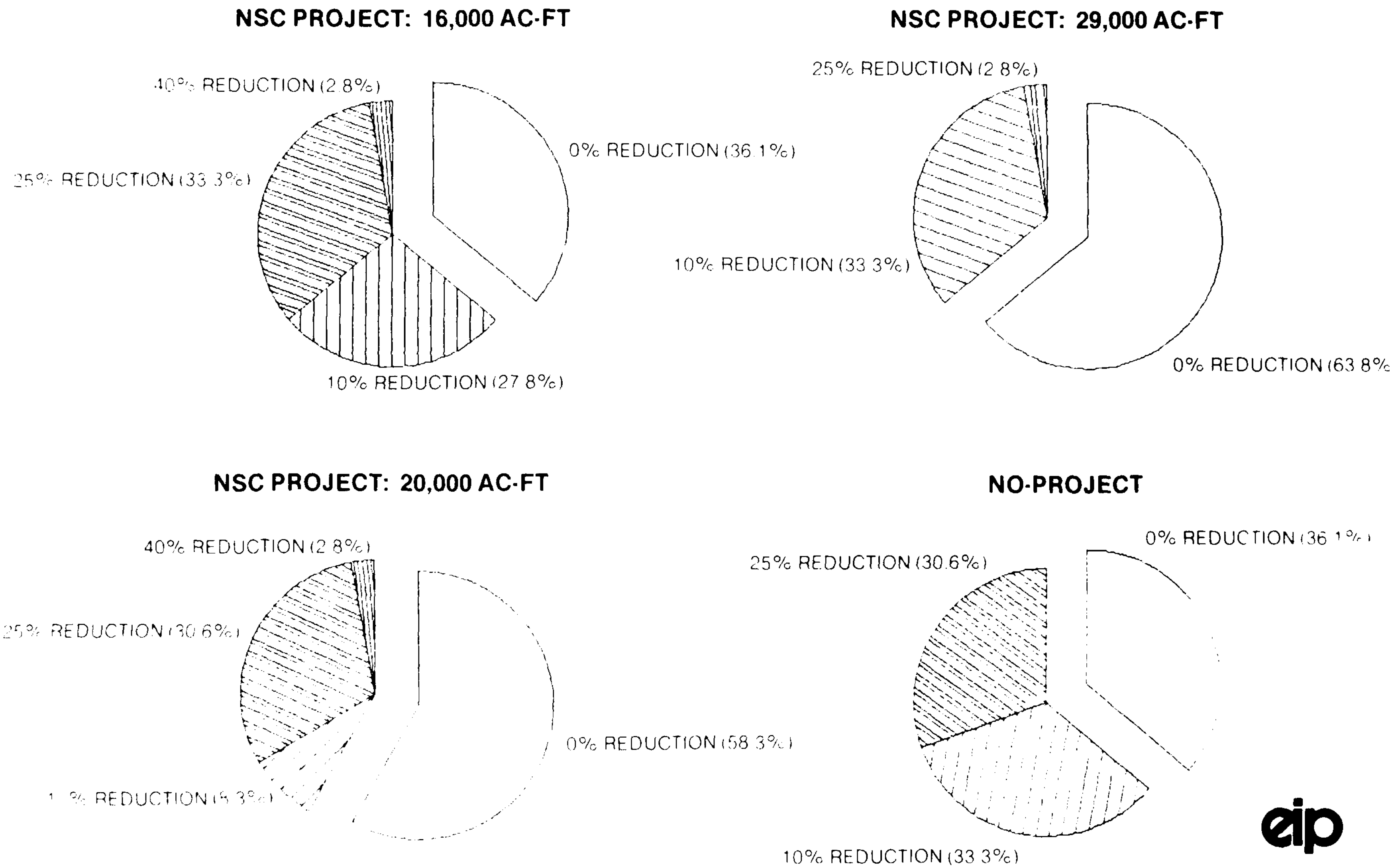
[1] This chapter was based on the report, Assessment of Water Supply Impacts for the Feasible New San Clemente Project Alternatives, Fuerst, D.W. and Y.J. Litwin, Monterey Peninsula Water Management District, August, 1987.

[2] A summary description of the Carmel Valley Simulation Model (CVSIM) is provided in Appendix B.

SIMULATED RATIONING DURING 1976-1978

FIGURE 5-3

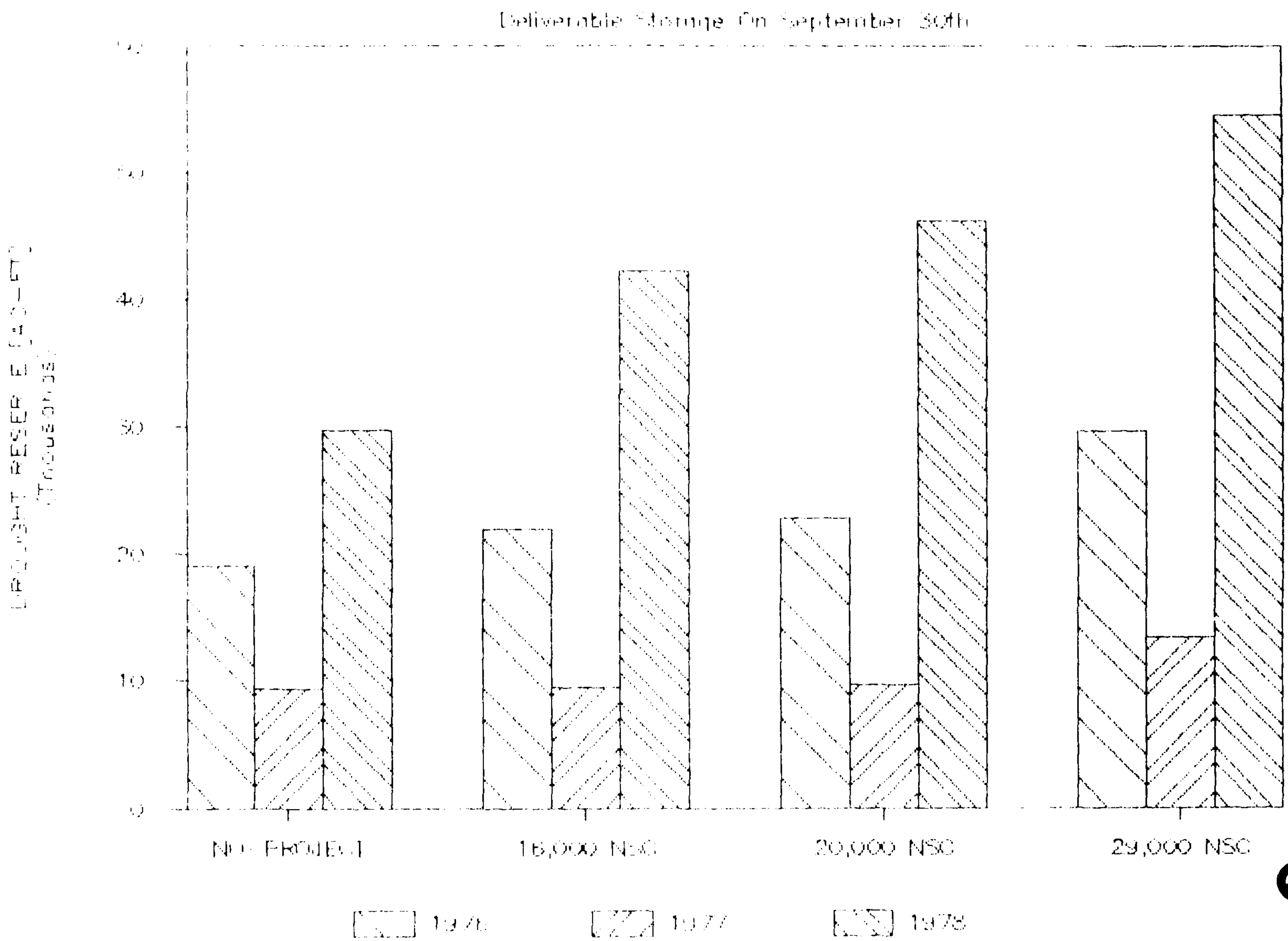
SOURCE MPWMD



SIMULATED DROUGHT RESERVE FOR WATER YEAR 1977

FIGURE 5-4

SOURCE: MPWMD



6 GEOLOGY AND SOILS

6.1 SETTING

A number of geologic studies of the proposed dam site and its surroundings have been made by the MPWMD and others to assess its suitability and safety.[1-9] The following description of the geologic features of the area is based on the results of these studies. The reader is referred to Chapter 15, Public Health and Safety, for additional information concerning dam design.

6.1.1 REGIONAL GEOLOGY

The New San Clemente Dam site is located in the northern Santa Lucia Mountains within the Southern Coast Ranges geomorphic province. This province is characterized by a series of northwest-trending mountains and valleys. The Santa Lucia Mountains are the most westerly mountain range in the province. The ruggedness of the terrain is due to regional uplifting that has continued into geologically recent times (the last 1.8 million years) as evidenced by the presence of at least two levels of river terrace deposits that are perched along the canyon walls up to 200 feet above the Carmel River bed. A map of the geology of the site vicinity is shown in Figure 6-1.

The California Coast Range province is geologically complex. Of particular interest is the presence of two dissimilar types of bedrock: one comprised of Franciscan rocks, the other of granitic and older metamorphic rocks known as the Salinian Block. The two unrelated bedrock types have been juxtaposed to each other by movement along regional faults. Overlying the Salinian Block is a thick layer of sedimentary rocks, including mudstones, siltstones, sandstones, shales and conglomerates.

6.1.2 REGIONAL SEISMICITY

Although the geologic history of the California Coast Range is not fully understood, it is thought that the many faults represent a part of the boundary between the Pacific and North American crustal plates. Many geologists believe that the earth's crust consists of a number of huge segments or plates that float on the molten rocks that form the earth's core. During the last 100 million years, the Pacific Plate has been slipping northwestward with respect to the North American Plate. This movement is accompanied by faulting.

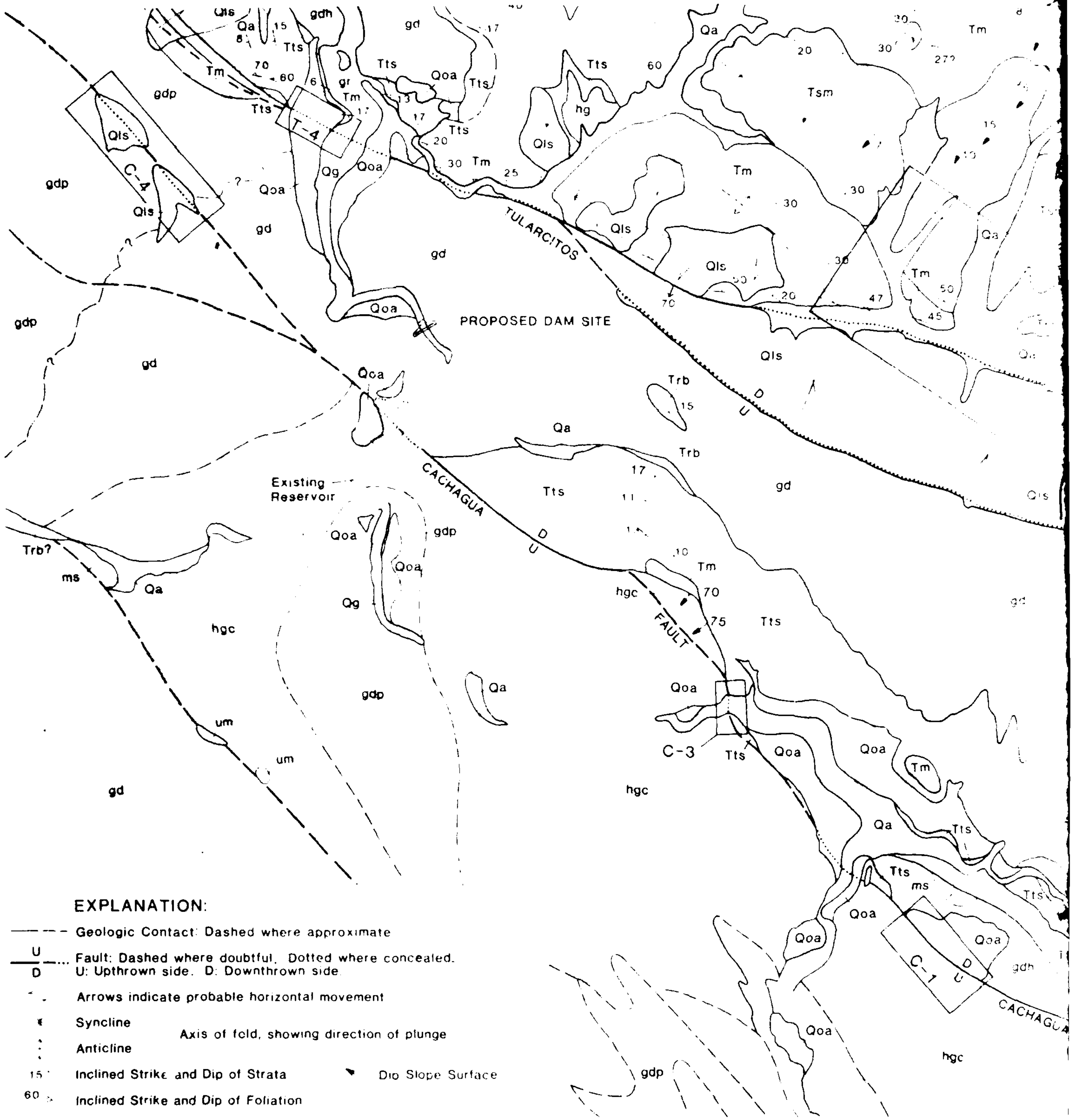
The proposed New San Clemente Dam site is located between the San Andreas fault zone, 28 miles (45 km) to the east, the Palo Colorado-San Gregorio fault zone, 12 miles (19 km) to the southwest, and the Monterey Bay fault zone, 15 miles (24 km) to the northwest. The nearest faults to the dam site are the Cachagua and Tularcitos Faults, which pass about one-half of a mile (0.75 km) to the southwest and about two-thirds of a mile (1.0 km) to the northeast, respectively.

Of great importance from the point of view of dam design is the question of whether nearby faults are active or not. An active fault is defined as one that has undergone displacement within Holocene time, or within the last 11,000 years. A capable fault is one that shows displacement at or near the ground surface within the last 35,000 years, or that can be directly associated with instrumentally recorded micro-seismicity. Thus any fault deemed active is also therefore capable, but not all capable faults are necessarily active.

Based on these definitions and the most recently available evidence and investigation, the Tularcitos Fault zone is probably active and therefore capable. Evidence suggests that the Cachagua Fault zone is not active and probably not capable.[3] For the sake of conservatism however, the Cachagua Fault is assumed to be active and a maximum credible earthquake (MCE) was designated for this fault, as well as for the Tularcitos Fault, for the purpose of seismic design of the New San Clemente Dam. Table 6-1 shows the MCE that can be expected on various faults in the vicinity of the proposed dam site, together with information on their other characteristics.

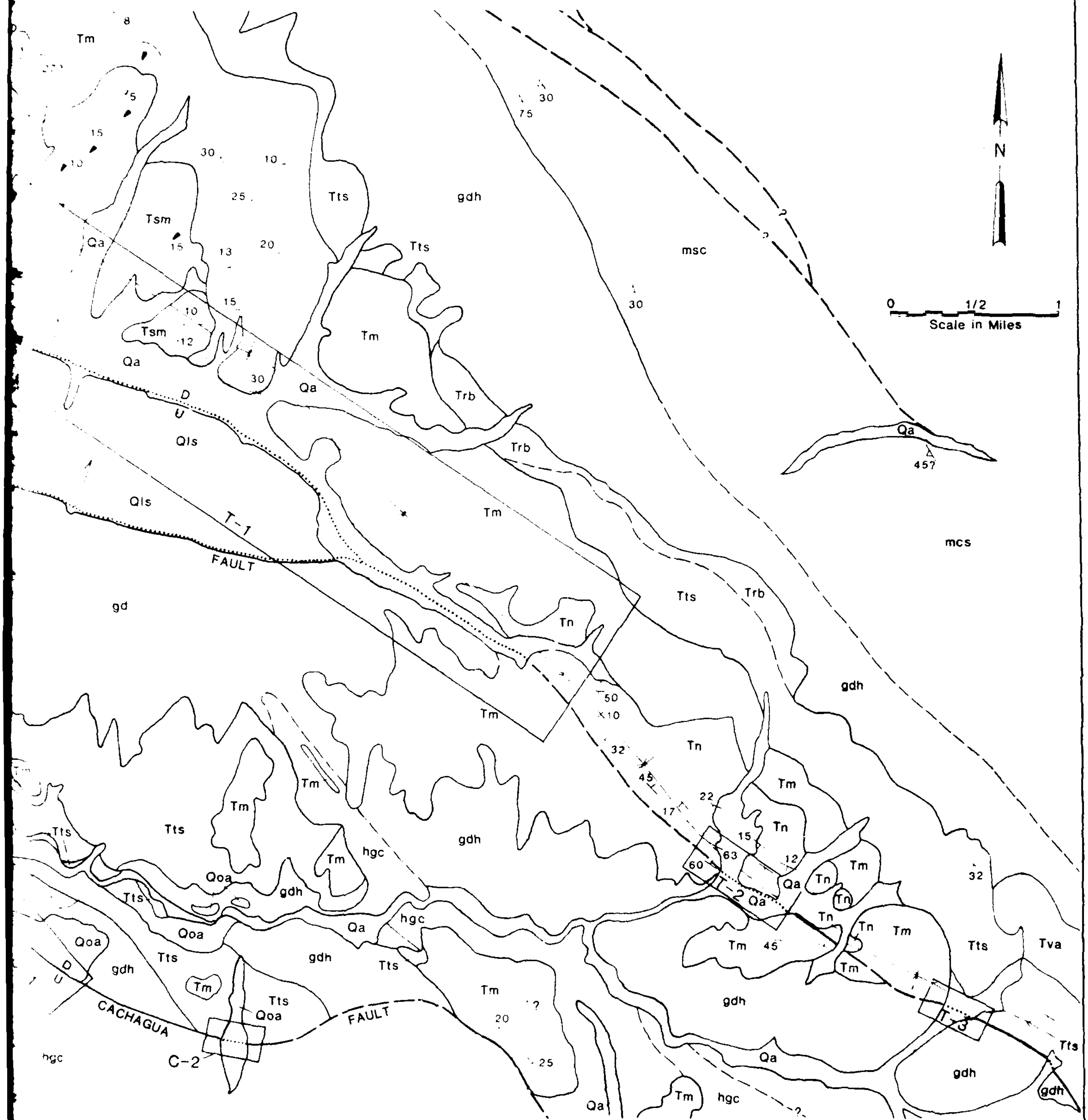
Another question of importance is the frequency of earthquakes and the severity of groundshaking at the proposed dam site. During the period between 1800 and December, 1985, approximately 520 earthquakes exceeding magnitude 4.0 were recorded within a 60-mile radius of the dam site. Within this period, there has been a statistical average of

GEOLOGY OF SITE VICINITY



Qa	Alluvium	Tm	Monterey Shale, upper part hard silicious shale	Tn	Sedimentary rocks - mostly terrestrial greenish claystone, minor sandstone	gdh	Hornblende granodiorite
Qg	Stream gravel	Tts	Temblor Fm., sandstone, undivided	gr	Granitic rocks, mainly quartz monzonite	hg	Hornblende gabbro
Qls	Landslide rubble	Tva	Volcanic Rocks, andesite flows	gd	Quartzdiorite	hgc	Coarse-grained hornblende gabbro
Qoa	Older alluvium	Trb	Red beds of Robinson Canyon, conglomerate, sandstone, clay	gdp	Porphyritic granodiorite	um	Undifferentiated metamorphics
Tsm	Santa Margarita Sandstone					msc	Metamorphic rocks, schist

FIGURE 6-1



de granodiorite

de gabbro

...ined hornblende

...ntiated metamorphics

...phic rocks, schist

ms Metasedimentary rocks - schist, gneiss, quartzite

m Metasedimentary rock - marble

T-1 / C-1 Preliminary selections - fault capability study areas

TABLE 6-1
ESTIMATED PEAK ACCELERATION OF SPECIFIC FAULTS[1]

Fault Name	Minimum Distance To Site (km)	Estimated Maximum Credible Earthquake Magnitude[2] (local)	Estimated Peak Horizontal Acceleration 50th Percentile[3] (g-force)	Bracketed Duration[4] (secs)
Cachagua	0.75[5]	6-1/4[5]	0.40	19
Tularcitos	1.0[5]	6-3/4[5]	0.50 (0.65)[6]	19
Chupines	10.0	6-1/2	0.30	19
Navy	13.0	6	0.15	12
Rinconada-Reliz	18.0	7	0.25	25
Palo-Colorado-San Gregorio	19.0	7-1/2	0.30	29
Monterey Bay	24.0	7	0.18	24
Cypress Point	34.0	6	0.06	8
San Andreas (central creep)	45.0	7-1/2	0.12	29

[1] Information in this table is taken from Reference 2.

[2] Magnitudes and peak horizontal accelerations are based on assumed fault capability. The capability of these faults have not been rigorously investigated.

[3] Hypothetical accelerations based on predicted peak acceleration curves by Joyner and Boore, 1981, Bulletin of the Seismology Society of America, v. 71., No. 6, pages 2011-2038.

[4] Duration of ground shaking with amplitudes greater than 0 05 g.

[5] Maximum Credible Earthquakes and distances for Cachagua and Tularcitos Faults updated by Geomatrix (1985).

[6] Revised by Geometrix (1985). The 84th percentile is 0.9 g-force, which is being used as the design criteria.

three magnitude 4.0 to 4.9 earthquakes each year, one magnitude 5.0 to 5.9 earthquake every three years and one magnitude 6.0 to 6.9 earthquake every 20 years. Most of the moderate and large earthquakes originate from the San Andreas fault, which lies 28 miles east of the dam site; the largest earthquake on record in the region, however, occurred in 1926 in Monterey Bay.

6.1.3 DAM SITE DESIGN CRITERIA

The site for New San Clemente Dam is located in a steep portion of the Carmel River Canyon, approximately 3,600 feet downstream of the existing San Clemente Dam and about 1,200 feet downstream of a sharp horseshoe bend in the river. The site is underlain by granitic rocks and smaller amounts of older metamorphic rocks now included in the granitic mass. A map of the engineering geology of the dam site is shown in Figure 6-2. Bedrock adequate for dam foundations can be found at a depth of 15 feet below the river channel and 30 to 40 feet below the surface on each abutment.

Maximum credible earthquakes (MCEs) were assessed for the Tularcitos and Cachagua faults using a variety of techniques.[9] Based on the results of these techniques, together with professional judgment, the estimated MCE magnitude for the Tularcitos fault is 6-3/4 and for the Cachagua fault is 6-1/4, as shown in Table 6-1. A map showing faults in the vicinity of the proposed dam site is shown in Figure 6-3.

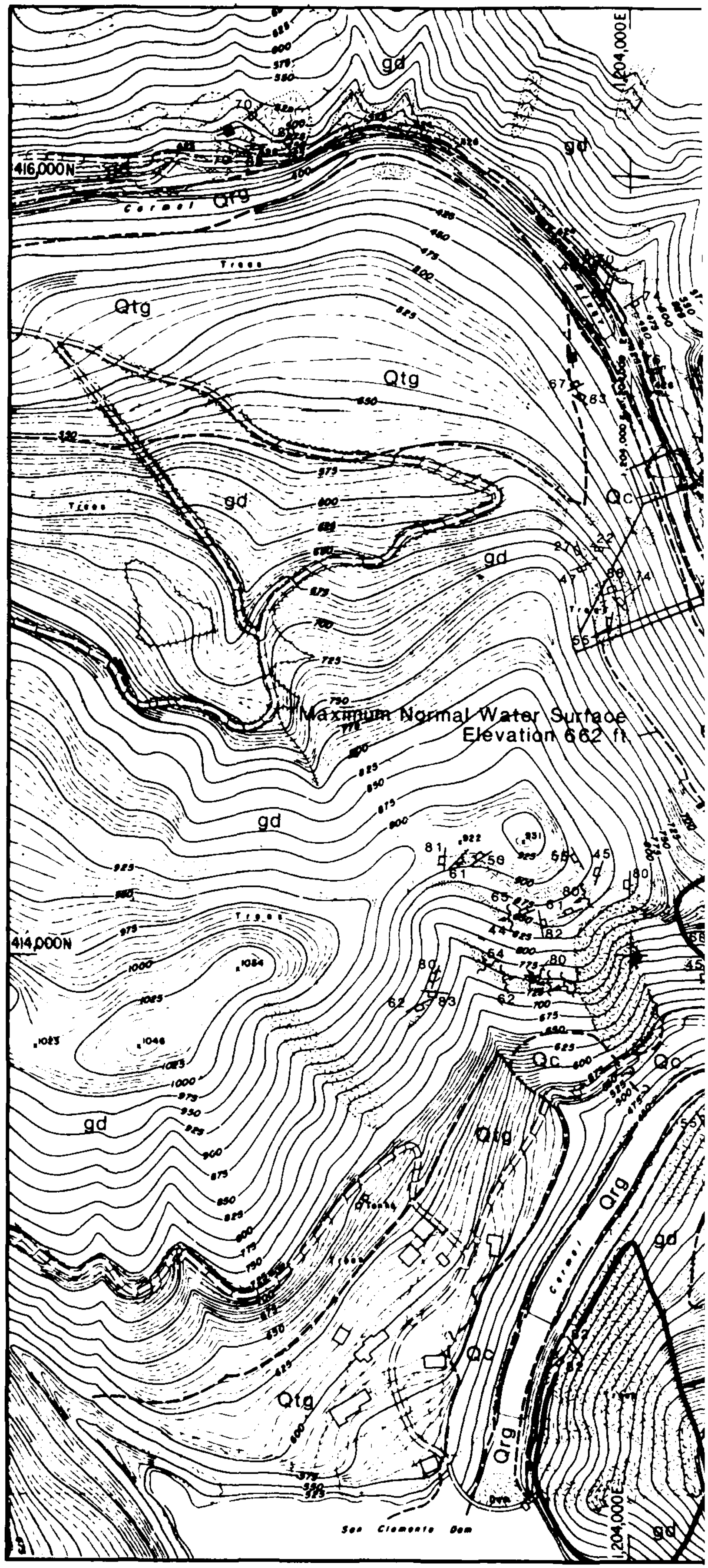
Fault activity in the immediate area of the proposed dam site was thoroughly investigated.[5,6,7,8] No active faults pass through the dam site, although a small cross fault connecting the Tularcitos and Cachagua faults or a fault sliver off the Cachagua fault may exist. If this fault does exist, no movement has occurred on it in the past 125,000 years.

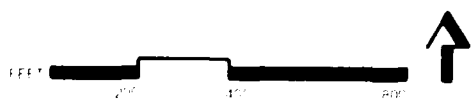
A peak horizontal ground acceleration at the 50th percentile is normally used to characterize earthquake ground motions for dam design purposes. However, the District selected a more conservative estimate of 0.9 g-force at the 84th percentile for the seismic design of the proposed New San Clemente Dam.

6.1.4 LANDSLIDES

A related geological hazard is posed by landslides. Large, rapidly moving landslides striking the reservoir could possibly generate a large wave or waves that would move

ENGINEERING GEOLOGY





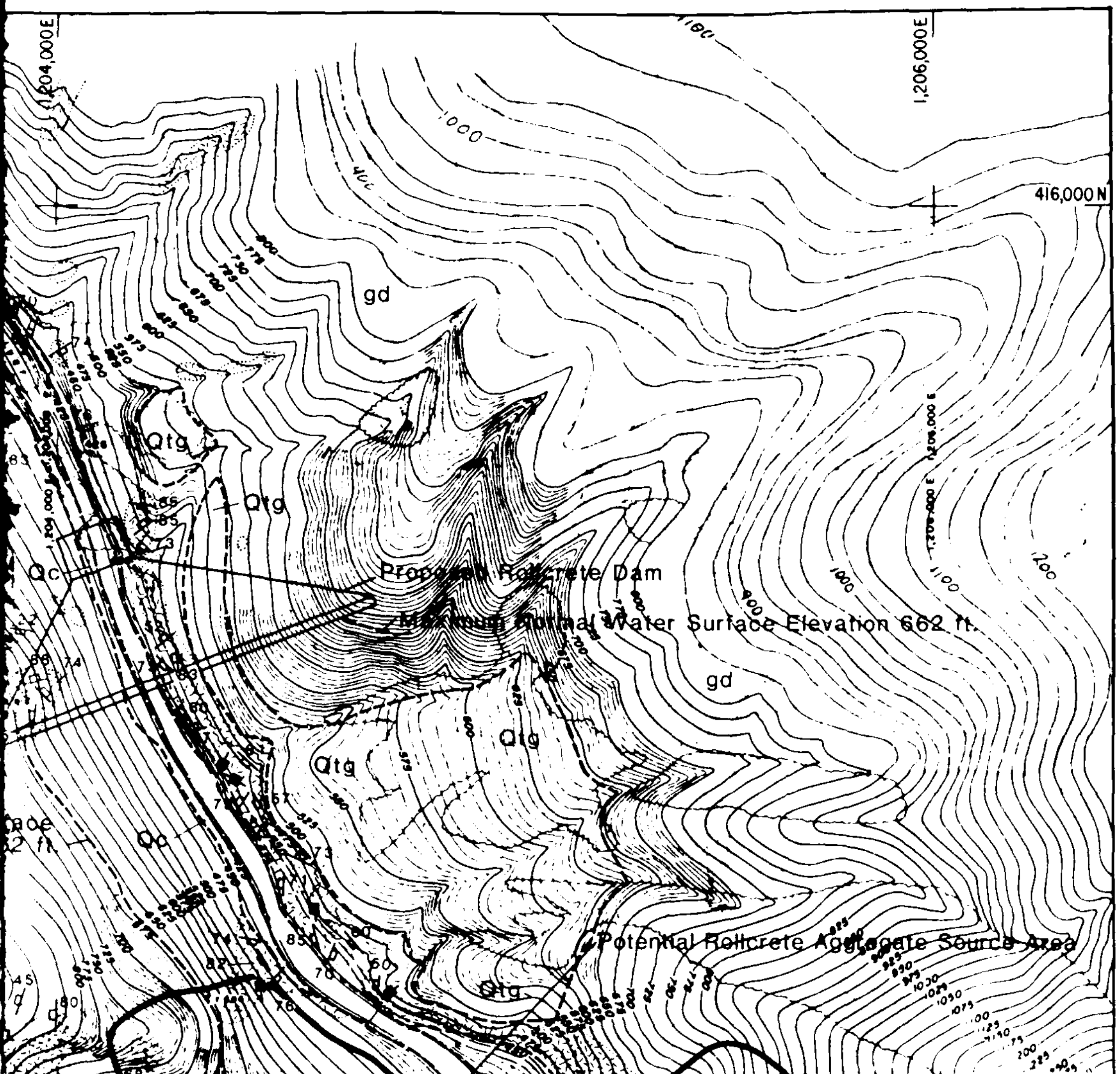
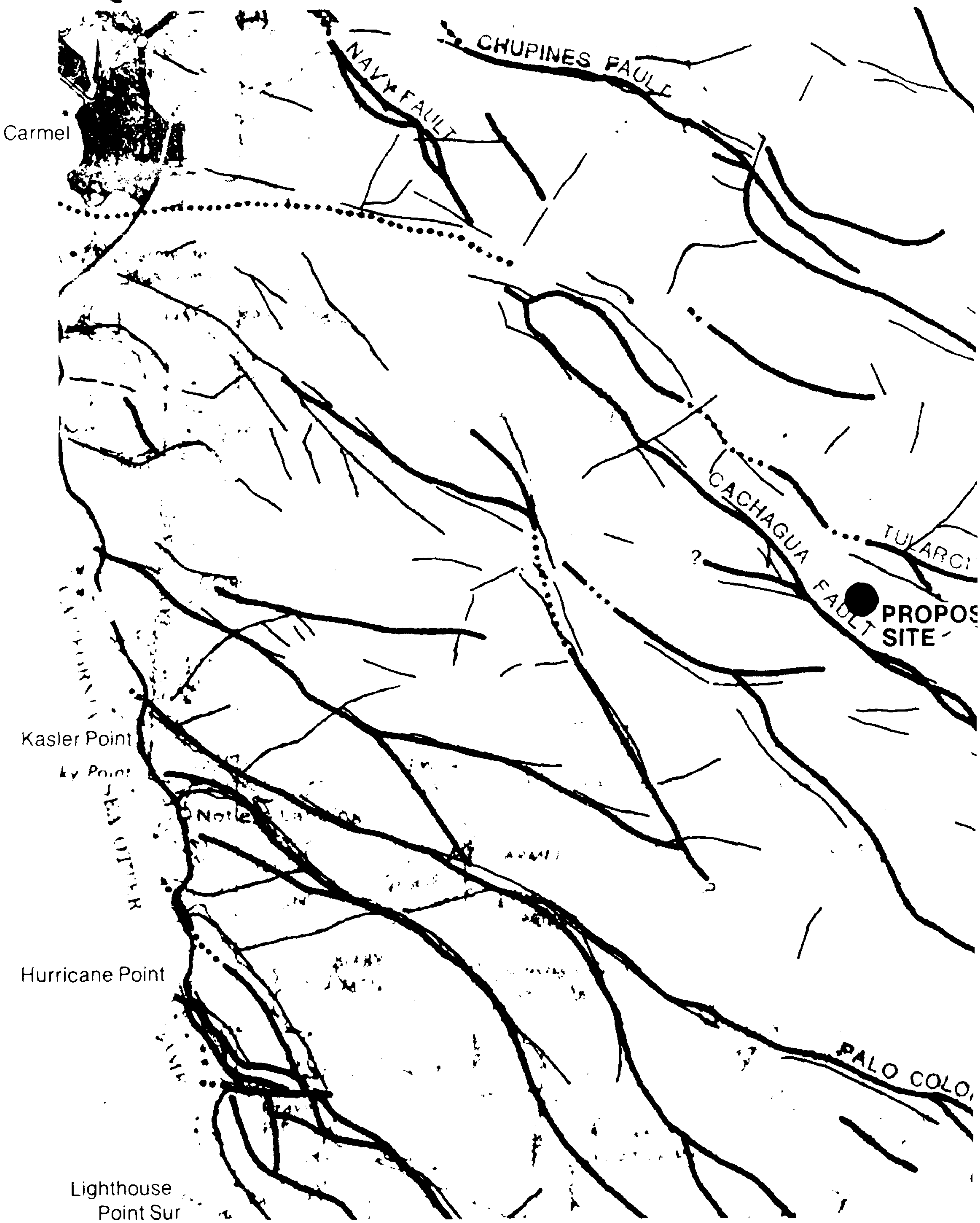

1,204,000E
1,206,000E
416,000N
414,000N
gd
Qtg
Qc
Qrg
Qrsd
Qc/Qrsd
Proposed Rollcrete Dam
Maximum Normal Water Surface Elevation 662 ft.
Potential Rollcrete Aggregate Source Area
Possible Alternative Rollcrete
Aggregate Source Areas

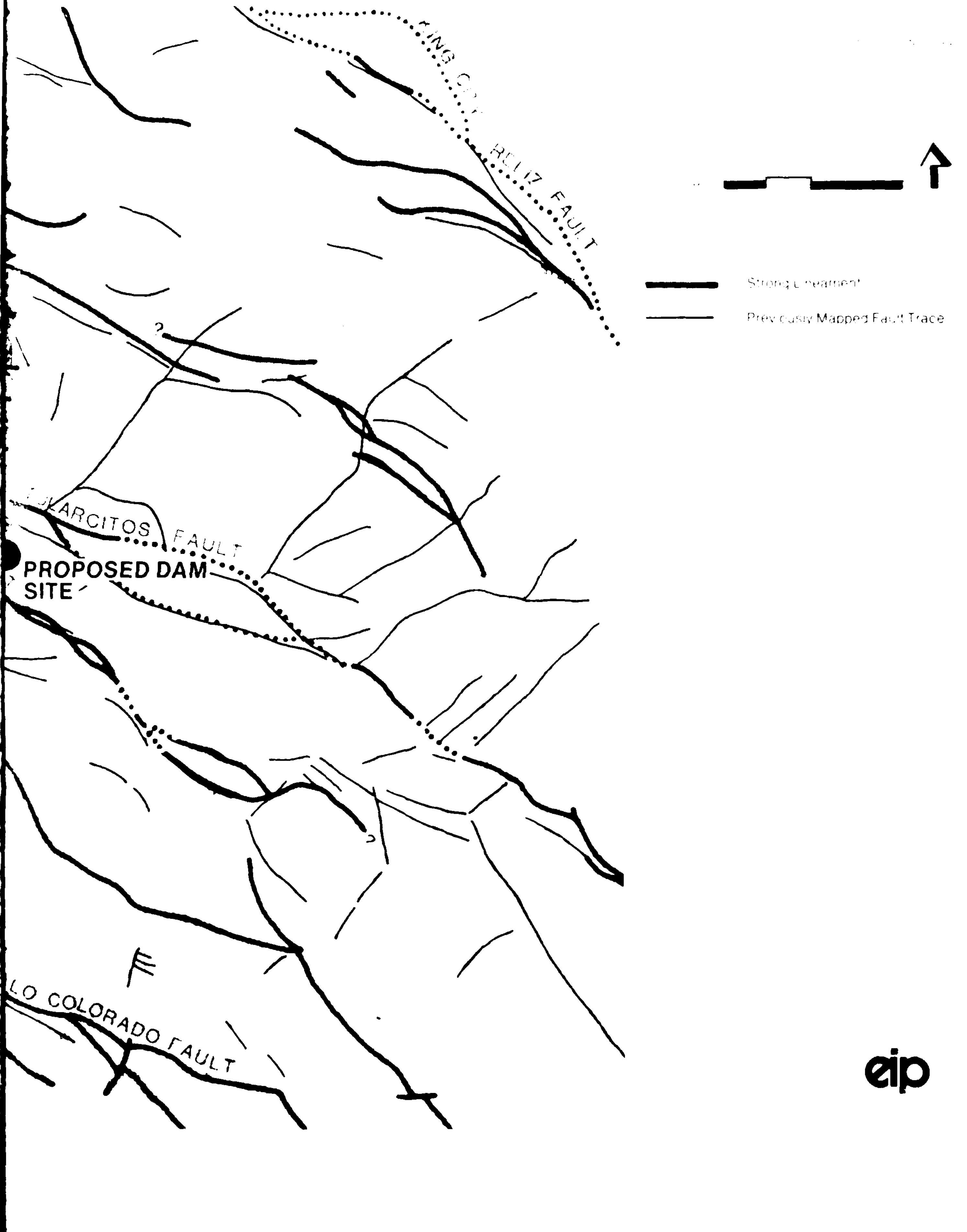
FIGURE 6-2

EARTHQUAKE FAULTS IN THE VICINITY OF PROPOSED DAM SIT



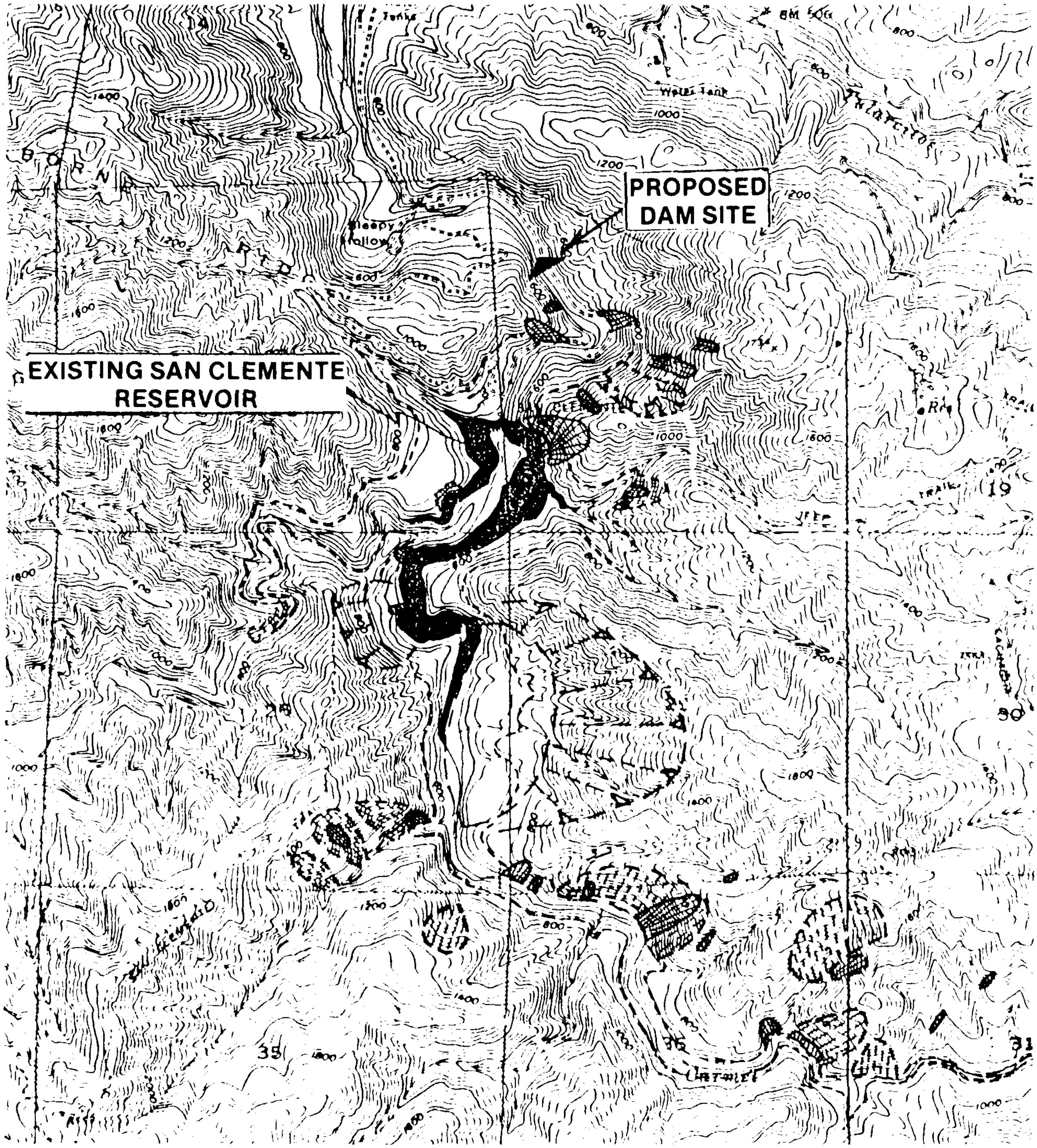
AM SITE

FIGURE 6-3



LANDSLIDES IN THE VICINITY OF PROPOSED RESERVOIR

FIGURE 6-4



NOTE:

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through the reservoir and overtop the dam, possibly resulting in a flood wave that would travel down the Carmel River channel.[8] The slide could be triggered by the rapid lowering of the reservoir from near its maximum elevation, resulting in excessive seepage pressures that would destabilize the slide mass. A slide could also be triggered by a seismic event.

Aerial photographs and field reconnaissance were employed to determine potentially hazardous landslide sites. The study area was divided into three major slope classes.

Slope Class I consists of steep slopes that lead directly into the proposed reservoir, providing the greatest hazard to the proposed reservoir; Slope Class II consists of steep slopes above drainages that flow into the proposed reservoir, providing far less potential hazard to the proposed reservoir than those of Slope Class I; Slope Class III consists of the remaining slopes in the basin and provides a low potential hazard to the proposed reservoir.

Numerous landslides in Slope Classes I and II exist above the proposed reservoir, and it is likely that slope failures will occur on these slopes during the expected lifetime of the proposed reservoir. The distribution of landslides is shown in Figure 6-4. The ages of these landslides are highly variable, and several different types of landslides exist. Two larger, possible rotational slides exist, one of which requires further study to determine the true origin of this feature.

A large slide located on the east side of the proposed reservoir (Stone Cabin Flat) and a smaller slide located on the western side as shown on Figure 6-4. Both of these slides appear to be inactive and at least quasi-stable at present. The slide plane of Stone Cabin Flat would lie below the spillway of the proposed reservoir and as such, filling of the proposed reservoir or rapid lowering of the water surface could induce movement in this large, old slide mass. The slide mass lies near the bottom of the Carmel River canyon, limiting the amount of movement that could be experienced by the slide. However, despite its position in the bottom of the canyon, the volume of the river valley below this slide that would be filled in the event of a slide is quite large. The volume of water that would be displaced is estimated at 2,755 acre-feet.[8]

The "western" landslide mass is partially inundated by the existing reservoir, and would be completely covered by the proposed reservoir. This slide seems to be supported by sediment that has filled the existing reservoir, and consequently has a low chance of sliding. This slide is estimated to displace 300-500 acre-feet of water in the event of movement. It is believed that this slide does not present a hazard for the proposed New San Clemente alternatives.

The greatest hazard to the proposed reservoir is the potential for rock falls, avalanches, debris slides or small rotational block slides off of the Class I Slopes to the east of the existing dam (see Figure 6-4). These slides could generate a rock mass of 50,000 cubic yards or more at speeds of up to 100 feet/second.

These potential landslide locations will be studied in more detail prior to project authorization. The existence of these and other potential slides on Slope Class I areas does not preclude the construction of the dam and filling of the reservoir, but further studies and slide mass monitoring may be necessary.

6.2 IMPACTS OF PROJECT OPERATION

6.2.1 ALTERNATIVE A: 29,000 AF RESERVOIR

Impacts

The dam and reservoir of the 29,000 AF project would inundate or otherwise cover an area of 345 acres as shown in Figure 3-2. The geologic resources of the area are unremarkable and have no special or unusual value. The canyons to be flooded lie in an area of granitic bedrock covered with varying depths of soil, river terrace deposits and highly weathered rock. The canyon bottoms consist of deposits of stream gravel.

The phenomenon of reservoir induced seismicity (RIS) has been known to occur where large reservoirs have triggered seismic activities. Detailed studies have shown that RIS most commonly occurs during or immediately following impoundment and filling or rapid drawdown.[9] Rarely has RIS been known to occur more than about five years after impoundment. It should be stressed that the added load resulting from the reservoir is not sufficient to cause earthquake activity or to increase the magnitude of these events; reservoir impoundment can act only as a triggering force.

On a worldwide basis, none of the New San Clemente alternatives are considered to be large or deep. Other reservoirs of similar sizes have rarely experienced RIS. The probability of occurrence of RIS associated with the 29,000 AF reservoir is assessed to be slightly higher than 4%. This means that there is slightly over a 4% chance that RIS events would occur during the useful life of the reservoir.

The structural integrity of the proposed dam and its resistance to earthquake forces are discussed in Chapter 15, Public Health and Safety.

The effect of the proposed project on sediment transport, geomorphology and beach denudation are included in Chapter 7, Hydrology and Water Quality.

Mitigation Measures

Additional studies will be performed to characterize further the potential landslide areas prior to project authorization. Monitoring of those areas that are determined to be potentially hazardous will also occur. Remedial actions may be necessary, as the potentially unstable slopes may need removal and/or repair. These actions could occur after project authorization. Care should be taken during project operation so as not to lower the water level too rapidly, as this could trigger a landslide.

6.2.2 ALTERNATIVE B: 20,000 AF RESERVOIR

Impacts

The geologic impacts of the 20,000 AF reservoir would be similar to those described in Section 6.2.1 for Alternative A. The reservoir would inundate about 276 acres, as shown in Figure 3-5.

The probability of RIS is estimated to be about 4% over the useful life of the reservoir. This could only act as a triggering mechanism, and could not affect the magnitude of seismic events.

Mitigation Measures

The mitigation measures proposed in Section 6.2.1 are recommended here also.

6.2.3 ALTERNATIVE C: 16,000 AF RESERVOIR

Impacts

The geologic impacts of the 16,000 AF reservoir would be similar to those described in Section 6.2.1. The reservoir would inundate about 240 acres, as shown in Figure 3-5.

The probability of RIS would be somewhat less than the 4% probability estimated for the 20,000 AF reservoir because of the lesser volume of this reservoir.

Mitigation Measures

The mitigation measures proposed in Section 6.2.1 are recommended here also.

6.2.4 NO PROJECT ALTERNATIVE

Impacts

The existing reservoir has a surface area of 30.5 acres. There are no geologic impacts associated with this alternative.

Mitigation Measures

None necessary.

6.3 IMPACTS OF PROJECT CONSTRUCTION

6.3.1 ALTERNATIVE A: 29,000 AF RESERVOIR

Impacts

Rock would be mined near the dam site and crushed for use as aggregate for concrete dam construction. Potential borrow areas for aggregate are shown in Figure 6-2. An estimated 400,000 cubic yards of rock would be excavated from one or more of the borrow areas.

Some material would be excavated at the dam site to construct the dam foundation. Soft rock and loose materials would be removed and cracks or fissures filled with concrete to provide a strong bearing surface and a good seal between the rollcrete dam and the bedrock foundation.

The disturbance of soil and underlying strata that would occur during construction of the proposed project would result in a period of increased erosion. Mining of rock for aggregate would require the removal of vegetation from portions of the canyon sides and the construction of haul roads or conveyers to transport rock to the crusher and concrete batch plant. Preparation of the dam foundation and establishment of a crusher, batch plant and staging areas would require the clearing of vegetation and some excavation. The widening of San Clemente Drive to improve access for construction vehicles would involve some excavation and grading. All of these activities would result in the exposure of new soil or rock surfaces that would be more vulnerable to erosion than the surfaces they replace.

Mitigation Measures

The following mitigation measures are suggested to reduce the rate of erosion during and immediately following the construction period:

- Minimize vegetation clearing and earthwork outside the inundation area.
- Establish slope design criteria that are appropriate to the geologic characteristics of the site.
- Strip, store and replace topsoil in flat and gently sloping areas outside the inundation area, where they are not subject to ground disturbance.
- Reseed or plant disturbed areas outside the inundation area with fast-growing plant species compatible with the present vegetation types.
- Build drainage structures that would route stormwater around easily erodible surfaces.
- A 1601-03 stream alteration agreement with the California Department of Fish and Game would be required to protect spawning habitat. Methods such as regravelling may be required.

6.3.2 ALTERNATIVE B: 20,000 AF RESERVOIR

Impacts

Construction methods and impacts would be similar to those described in Section 6.3.1. An estimated 300,000 cubic yards of rock would be excavated from one or more of the borrow areas shown in Figure 6-2.

Mitigation Measures

The mitigation measures proposed in Section 6.3.1 are recommended here also.

6.3.3 ALTERNATIVE C: 16,000 AF RESERVOIR

Impacts

Construction methods and impacts would be similar to those described in Section 6.3.1. An estimated 250,000 cubic yards of rock would be excavated from one or more of the borrow areas shown in Figure 6-2.

Mitigation Measures

The mitigation measures proposed in Section 6.3.1 would be recommended here also.

6.3.4 NO PROJECT ALTERNATIVE

Impacts

The No Project Alternative would not involve any heavy construction, and hence, no construction impacts would be associated with this alternative.

Mitigation Measures

None necessary.

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[1] Converse Consultants, New San Clemente Project, Preliminary Design and Feasibility Study, August 1982.

[2] Converse Consultants, New San Clemente Project, Geotechnical Studies for the Environmental Impact Report, May 1984.

[3] Converse Consultants, New San Clemente Project, Preliminary Design and Cost Estimate, November 1986.

[4] Converse Consultants, New San Clemente Project, Engineering Summaries of Additional EIR Alternatives, May 1987.

[5] Rogers E. Johnson & Associates, Investigation of Possible Fault Offsets in Stream Terraces Along the Carmel River at Sleepy Hollow, April 1984.

[6]Rogers E. Johnson & Associates, New San Clemente Dam Geotechnical Investigation: Location of Faults Through or Near the Proposed Dam Site, July 1984.

[7]Rogers E. Johnson & Associates, New San Clemente Dam Geotechnical Investigation of Faulting in the "Knothole" Area, January 1985.

[8]Rogers E. Johnson & Associates, Preliminary Report of Landsliding in the Vicinity of the Proposed New San Clemente Reservoir, December 1985.

[9]Geomatrix Consultants, Evaluation of Seismic Design Criteria, New San Clemente Dam, May 1985.

7 HYDROLOGY AND WATER QUALITY

7.1 SETTING[1]

Several hydrologic features are affected by the project alternatives. They include the surface and groundwater resources of the Carmel Valley and the groundwater resources of the Seaside area.

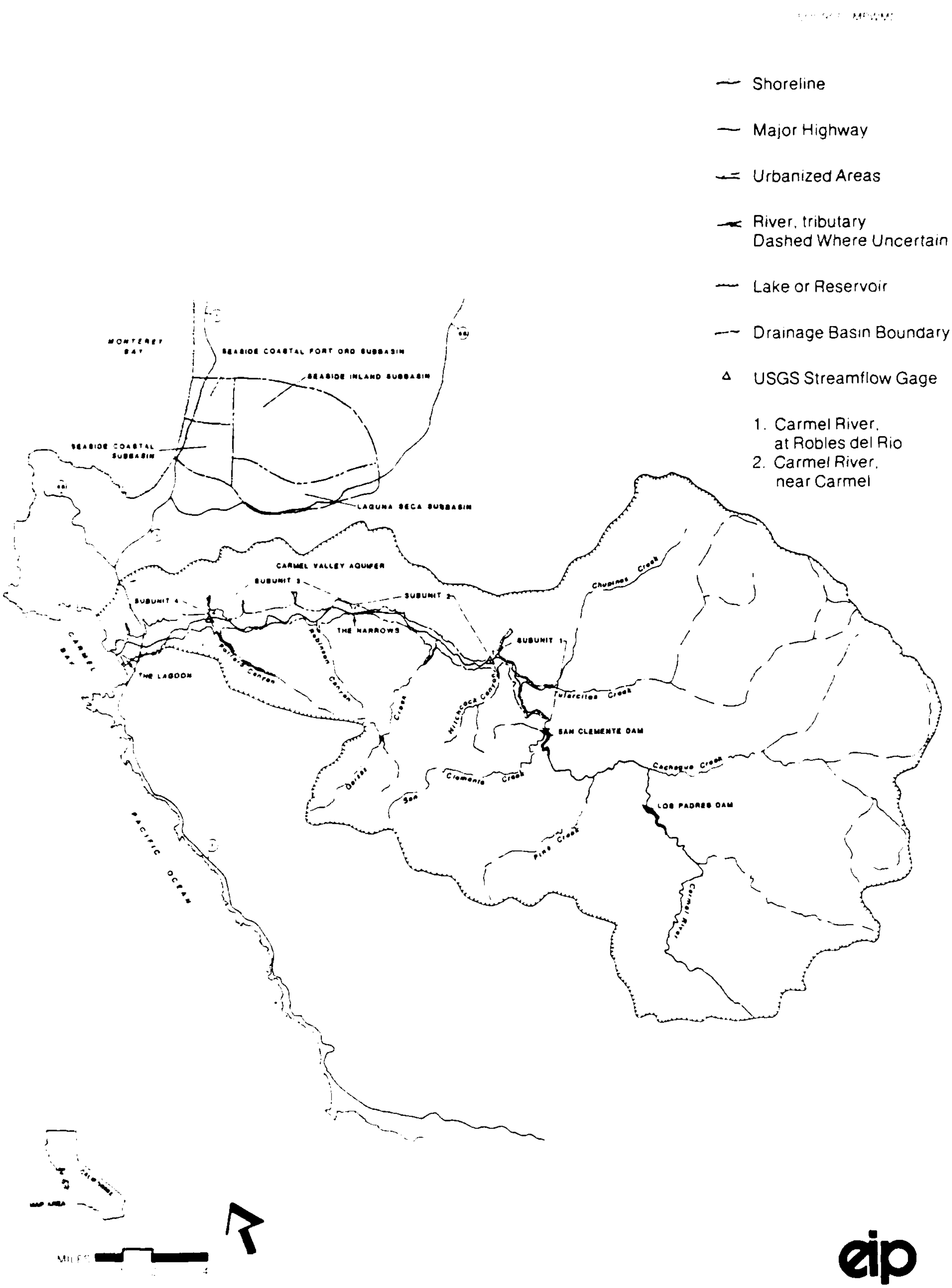
7.1.1 CARMEL RIVER BASIN

The Carmel River drains a 255-square-mile watershed in the Santa Lucia range. In the upper watershed, the river and its tributaries flow in deep, steep-sided canyons. For its last 15 miles, the river flows across the flat Carmel Valley floor to the Pacific Ocean. Figure 7-1 shows the river and its principal tributaries.

Streamflow

Rainfall occurs over the watershed primarily between November and April. The first winter rains replenish soils that have dried out during the summer and consequently little runoff occurs until December. Early runoff from the upper watershed refills Los Padres and San Clemente dams, which have been drawn down during the preceding months. After filling the reservoirs, usually by mid-December, water overflows to the lower river. Because groundwater pumping has lowered the water level in the aquifers that lie below the lower river, some of these early flows percolate into the ground, depleting flow in the river. When groundwater levels have risen, the period of highest streamflow begins, usually occurring from January through April. Average monthly flows of 200 to 400 cfs occur at this time. When the first of the large flows reaches the lagoon at the river mouth, the storm waters cross the sand barrier that separates the lagoon from the ocean and flow to the ocean begins. A channel is bulldozed through the sand barrier by the County in anticipation of the large flows to reduce the risk of flooding.

PLAN OF CARMEL RIVER AND TRIBUTARIES FIGURE 7-1



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After the rain stops, the river gradually recedes. Usually the river dries up by July. Ocean waves then close the channel through the beach, and the lagoon is formed again. From July until the rains begin, the only water remaining in the lower river is in isolated pools that gradually dry up as the groundwater table declines in response to pumping.

Flow in the river is measured at two locations by the U.S. Geological Survey—three river miles from the mouth near Carmel and 15 river miles from the mouth at Robles del Rio. Average monthly flows in the river near Carmel under natural (predevelopment) conditions and under existing conditions are shown in Table 7-1. Streamflow in the Carmel is "flashy," that is, it responds rapidly to rainfall over the watershed. Peak flows vary greatly from year to year as indicated in Table 7-2.

Existing Water Resources Development

There are presently two dams on the Carmel River—San Clemente Dam and Los Padres Dam. Both dams are owned and operated by Cal-Am. San Clemente Dam is located near the confluence with San Clemente Creek about 18 miles from the river mouth. The dam is 85 feet high and was completed in 1921. When the dam was built, the reservoir it formed had a capacity of 2,154 acre-feet (AF) which has since been reduced to about 800 AF (flashboards up) by sediment washing into the reservoir from the upper watershed.

Los Padres Dam, completed in 1949, is 148 feet high and is located about 25 miles from the river mouth. Its original reservoir capacity of 3,200 AF has been reduced to about 2,180 AF by accumulated sediment.

Both dams are used to supply water to users on the Monterey Peninsula. No flood control storage is allocated in either reservoir, although some minor flood control benefits may be attributable to the dams early in the flood season when storage space is available as a result of summer drawdown for water supply. The dams have little effect on peak flows downstream, later in the flood season, when the reservoirs are full.

TABLE 7-1
AVERAGE MONTHLY FLOWS IN CARMEL RIVER (AF)

	Below San Clemente Dam		At Carmel	
	Natural Conditions[1]	Recorded Conditions[2]	Natural Conditions[1]	Recorded Conditions[3]
October	500	112	600	74
November	1,500	1,045	2,300	831
December	5,000	4,364	7,700	5,182
January	11,400	12,153	17,600	16,445
February	16,200	16,708	25,100	21,258
March	14,900	17,249	23,300	22,231
April	8,800	11,935	13,600	13,346
May	3,400	3,890	5,300	5,200
June	1,400	1,120	2,100	1,343
July	500	330	800	302
August	200	75	300	56
September	200	58	300	20
TOTAL	64,000	69,036	99,000	86,288

[1]Estimated unimpaired runoff assuming no surface or groundwater development as reported by U.S. Army Corps of Engineers. Based on period 1902 to 1978.

[2]Average of U.S.G.S. gage records at Robles del Rio, 1958 to 1985.

[3]Average of U.S.G.S. gage records near Carmel, 1962 to 1985.

TABLE 7-2

ANNUAL MAXIMUM FLOWS, CARMEL RIVER, 1951-1982
Peak Discharge in cfs

Water Year	San Clemente Dam Spill[1]	Carmel River at Robles Del Rio	Carmel River near Carmel
1951	3,160	--	--
1952	3,030	--	--
1953	1,100	--	--
1954	630	--	--
1955	200	--	--
1956	6,670	--	--
1957	2,030	--	--
1958	10,900	12,500[2]	--
1959	2,530	2,500	--
1960	830	838	--
1961	220	22	--
1962	2,570	2,490	--
1963	7,670	4,950	7,360
1964	1,240	995	800
1965	1,240	1,220	1,620
1966	750	594	774
1967	5,950	4,750	7,420
1968	110	224	140
1969	7,900	6,900	8,620
1970	2,800	3,120	3,500
1971	900	1,170	670
1972	276	278	122
1973	2,410	3,110	5,520
1974	1,620	2,760	2,410
1975	2,190	4,740	4,300
1976	29	81	4
1977	13	34	0
1978	4,440	7,030	7,360
1979	853	1,140	1,340
1980	4,300	5,290	5,880
1981	1,140	2,320	2,133
1982	3,760	5,250	5,560

[1] Discharges based on spillway rating curve developed by the Corps of Engineers.

[2] Corps of Engineers' estimated value.

Sources: U.S. Army Corps, 1974; USGS publ. values; MPWPD measurements and ratings.

Los Padres Dam is operated by Cal-Am to maintain as much water as possible in San Clemente Reservoir.

Storm Flow, Channel Geometry and Bank Erosion

The lower reach of the Carmel is an alluvial river, a river that flows over an accumulation of sediment deposited by the river in an earlier time. This means that the shape and character of the river channel are mainly determined by erosion and deposition of sediment transported by the flow. In an alluvial river, if the flow increases, the channel erodes, becoming deeper and wider to accommodate it. If the flow decreases, sediment is deposited and the channel decreases in size.

Although alluvial rivers are naturally unstable, continuously changing in time and space, a dynamic equilibrium is established over a period of many years; this natural balance can be disturbed by man's activities, as has occurred in the Carmel River.

Before European settlement, the Carmel River was in a state of dynamic equilibrium. Periodically, extremely large floods would deposit large quantities of sediment in the lower reaches of the river. In the succeeding years, the river would gradually cut down into the sediments forming an incised, meandering channel until a great flood again altered the channel by massive sediment deposition.

Large floods occurred on the Carmel River in 1862, 1890, 1911 and 1914. In 1921, during the early stages of the natural cycle of adjustment to the 1911 flood, San Clemente Dam was completed. While the new dam prevented almost all the bedload from reaching the lower river, it was too small to significantly reduce the peak flows. Bedload is that portion of the sediment that moves downstream by rolling and bouncing along the bottom rather than being suspended in the flow. Bedload consists of coarse sands, gravels and boulders. The suspended portion of the sediment, known as suspended load, consists of fine sands, silts and clays.

The undiminished flood flows below San Clemente Dam, devoid of bedload and consequently no longer in equilibrium with the channel characteristics, began to erode material from the river bed and banks, in search of a new equilibrium. In the river reach immediately below the dam fine river bed materials were washed out leaving only coarse materials which prevent further erosion of the river bed except during the largest floods. This phenomenon, which commonly occurs below dams, is called armoring.

Further downstream, the Carmel River adjusted to the loss of bedload material by deepening its channel. As the channel deepened or incised, more of the floodflows were confined to the channel itself, rather than spreading over the floodplain. This increased the speed of water flow and the rate of bank erosion, although erosion was limited by the growth of riparian vegetation. As the river incised between 1921 and the early 1960s, an extensive riparian forest developed protecting the banks from erosion, except at bends. By about 1940 the river channel had adjusted to the presence of San Clemente Dam and a new dynamic equilibrium had been established.

In the mid- and late-1970s, a considerable amount of riparian vegetation was lost as the 1976-77 drought and groundwater pumping lowered the water table in parts of the valley. With the banks unprotected by riparian vegetation, the river adjusted to flood flows by eroding both the channel bed and the banks. After the storm flows passed, the eroded materials were redeposited in the channel bed. As a result of this process, the middle reach of the river, between the Garland Ranch Regional Park and Schulte Road, has changed drastically from a narrow, deep, meandering channel with well-developed riffles and pools to a wide, shallow channel with eroded banks and an unstable bed.

Beaches[6]

Coastal beaches are formed by sediments washed into the ocean by rivers. Any activities that alter the sediment load carried by rivers have the potential to affect beach formation and replenishment.

The Carmel River enters the Pacific Ocean within Carmel Bay. Carmel Bay is enclosed by two rocky headlands, Pescadero Point on the north and Point Lobos on the south. It is approximately 3 miles long and 2.5 miles wide with a shoreline consisting of rocky outcrops interspersed with small sandy coves. The head of a deep submarine canyon, the Carmel Canyon, penetrates the Bay. Examination of aerial photographs taken over the last 32 years indicates that the Carmel Bay beaches are in a state of equilibrium, neither increasing nor decreasing in size.

Surface Water Quality

The quality of water in the upstream reaches of the Carmel River is considered good as it originates in an undeveloped and granitic watershed. Water from tributary streams draining the sedimentary rock formations on the north side of the Carmel Valley is generally higher in dissolved solids content. The range of observed values of water quality characteristics are shown in Table 7-3. The highest mineral concentrations are generally observed in low flow periods.

7.1.2 CARMEL VALLEY AQUIFER

The principal water-bearing geologic structure in the Carmel Valley is the younger alluvium, consisting of poorly consolidated boulders, gravel, sand and silt deposited by the Carmel River in the last 10,000 years. The thickness of the alluvium increases in a downstream direction from zero, above the filter plant, to approximately 180 feet about one mile from the river mouth, with a typical thickness of 50 to 100 feet. The Carmel Valley Aquifer is unconfined and is highly permeable, recharging rapidly after extended dry periods. The aquifer can be divided into four subunits; Subunits 1 and 2 are collectively referred to as the upper aquifer. Subunits 3 and 4 are referred to as the lower aquifer.

About 85% of the water entering the aquifer percolates through the bed of the Carmel River.[2] Additional recharge comes from the tributary drainages, direct infiltration of precipitation, inflow from subsurface bedrock formations and return flow from irrigation and septic systems. Water in the aquifer is primarily lost by groundwater pumping; minor sources of loss include discharge into the river, seepage into the ocean, evapotranspiration by riparian vegetation and deep percolation into underlying strata.

Although riparian vegetation was much more abundant before the valley was developed and, consequently, evapotranspiration was greater, the water level in the aquifer in the summer and fall was high enough to feed the river and sustain year-round flow. Upstream diversion of water and large scale groundwater pumping now dry up the river during the summer months.

TABLE 7-3
RANGE OF WATER QUALITY PARAMETERS[1]

Parameter	Surface Water: Above San Clemente Dam	Surface Water: Below San Clemente Dam	Groundwater: Carmel Valley Aquifer Water Quality
Conductivity	10-500µmho	100-2,000µmho	300-3,000µmho
pH	7-8.5	7-8.5	6.5-8.5
Iron	0.1-3mg/l	0.1-80mg/l	0.1-40mg/l
Manganese	0-0.1mg/l	0-0.1mg/l	0.6mg/l
PO_4	--	0-1.4mg/l	--
TDS	50-300mg/l	50-1,500mg/l	200-1,000mg/l
Boron	0-0.3mg/l	0-0.3mg/l	0-0.2mg/l
NO_3	0-1mg/l	0-5mg/l	1-14mg/l[2]
SO_4	5-100mg/l	5-500mg/l	20-600mg/l
Cl	5-20mg/l	10-300mg/l	20-300mg/l
Dissolved Oxygen	7-13mg/l	7-13mg/l	--
Turbidity	0-200NTU	0-200NTU	--

[1]U.S. Army Corps of Engineers. Feasibility Report, 1981, unless otherwise noted.
[2]MPWMD monitoring well network in the Carmel Valley Aquifer.

Prior to 1985, Cal-Am withdrew about 45% of its water from wells in the Carmel Valley and Seaside aquifers. Conditions have changed since April 1985 in that Cal-Am must now provide about 65% of its water supply from these wells. The Carmel Valley aquifer now provides a total of about 10,200 AF in a typical year, with Cal-Am's demand being about 8,200 AF and non Cal-Am demand being about 2,000 AF. About 700 AF of the non Cal-Am pumpage is thought to return to the aquifer as recharge coming from irrigation and septic system return flow.

The quality of water in the Carmel Valley Aquifer generally reflects that in the river, as shown in Table 7-3. Water quality is generally high, making the aquifer a good drinking water source. However, water pumped from the lower aquifer requires minor treatment to reduce iron and manganese concentrations prior to municipal supply use. Also, there is concern regarding groundwater quality degradation in some areas of the Carmel Valley, particularly the Carmel Valley Village area, due to aquifer recharge from septic tank effluent. Several studies have been conducted to evaluate these conditions and various agencies are investigating ways to alleviate any potential problems in the future.[9,10] Results of water quality monitoring indicate that seawater is not intruding into the Carmel Valley aquifer. This is probably due to displacement along the Cypress Point fault which has created a barrier to water movement at the mouth of the valley.

7.1.3 SEASIDE GROUNDWATER BASIN

The Seaside groundwater basin encompasses approximately 24 square miles below the City of Seaside and Fort Ord Military Reservation as shown in Figure 7-1. The water-bearing strata are the Santa Margarita Sandstone, the Paso Robles Formation, the Aromas Sand and the older dunes, with a total thickness greater than 700 feet in places. The Seaside groundwater basin has been divided into a number of subbasins. These subdivisions include an inland subbasin underlying the Fort Ord area, the Laguna Seca subbasin, and the Seaside Coastal subbasin. The Seaside coastal subbasin can be further divided into distinct subunits.[11] Recharge of the groundwater basin occurs as infiltration of rain, subsurface flow from adjacent areas and seepage from streams. Groundwater is lost from the basin by pumping and by discharge to the ocean.

No groundwater is currently extracted from the inland subbasin underlying Fort Ord. Results of a recent monitoring well drilling investigation indicate that the groundwater development potential in this area to meet the water supply needs of the Monterey Peninsula is poor.[12]

Groundwater from the Seaside coastal subbasin is currently extracted by Cal-Am, City of Seaside and private users. Long-term yield of the Seaside coastal subbasin is estimated at 3,475 AF/year with yield to the Cal-Am system expected to be about 2,650 AF/year. The subbasin is capable of periodically meeting demands significantly greater than the estimated long-term yield without negative impacts; however groundwater extractions need to be correspondingly reduced at other times to avoid overall storage depletion and possible seawater intrusion. The subbasin's ability to meet demands of as much as 5,000 AF/year for several years without negative impacts on water quality was demonstrated during the 1970's.

Groundwater quality in the inland Seaside subbasin is suitable for most uses; however, dissolved solids content and hardness are greater than desirable for drinking water. Locally-dissolved iron concentrations are also suspected to be a problem. Sulfur concentrations have been identified as a problem in the Seaside coastal subbasin; water quality is suitable otherwise.

7.2 IMPACTS OF PROJECT OPERATION

7.2.1 ALTERNATIVE A: 29,000 AF RESERVOIR

The effects of the New San Clemente alternatives on hydrology were analyzed using the Carmel Valley Simulation Model. Each alternative was tested, using the simulation model, to determine to what degree it could meet water demand and in-stream flow requirements under differing meteorological conditions. It should be noted, however, that the New San Clemente alternatives are not strictly comparable with the No Project alternative because in the latter case it is assumed that demand is constrained by the existing water allocation system. Under "with project" conditions it was assumed that normal year demand would be 22,895 AF. Under the No Project condition it was assumed that normal year demand would be 20,000 AF.

Impacts

Alternative A could affect streamflow, channel geometry and water quality in the Carmel River and groundwater levels in the Carmel Valley and Seaside aquifers.

Streamflow. One of the purposes of the proposed water supply system improvements is to provide more streamflow in the lower reaches of the Carmel River for the benefit of migratory fish and riparian vegetation. The increased storage capacity of the new reservoir would allow a portion of the winter storm flows to be stored and released to the river during the dry summer months. Conjunctive use of the groundwater basins and reservoir storage would allow much of the water released below the dam to travel the length of the river to the lagoon once the aquifer has been recharged. Releases at the dam would be calculated to include potential losses due to percolation into the ground.

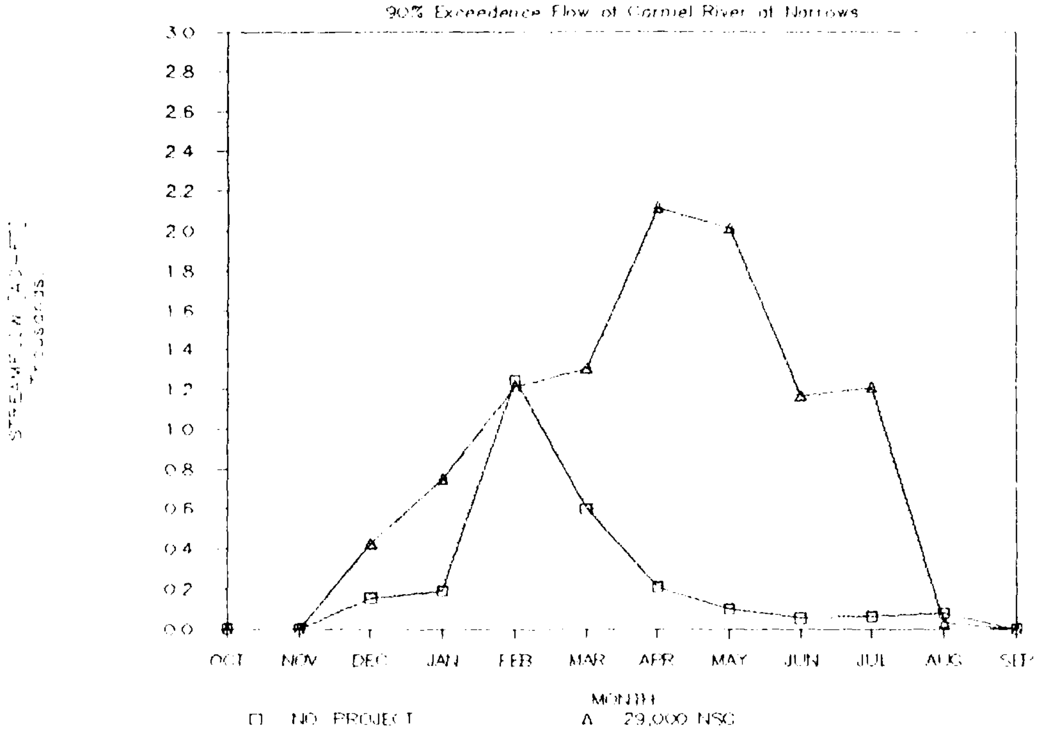
Figure 7-2 compares simulated streamflow at the Narrows and at the lagoon during dry years for Alternative A and the No Project alternative. The information was developed using the Carmel Valley Simulation Model. At the Narrows dry year stream flow would decline sharply after peaking in February under No Project conditions. With Alternative A considerable flow would be sustained through the spring and early summer. With the No Project alternative, no streamflow would reach Carmel Lagoon during dry years; it would percolate into the aquifer en route. With Alternative A, flow into the lagoon would be sustained during the winter and spring. Flow at the Narrows and Lagoon (median) for normal conditions is shown in Figure 7-3. Differences in median streamflow between the No Project and Alternative A conditions are less dramatic than during dry years, especially at the Lagoon.[4] Alternative A would provide more flow in dry months, but less flow from December through April.

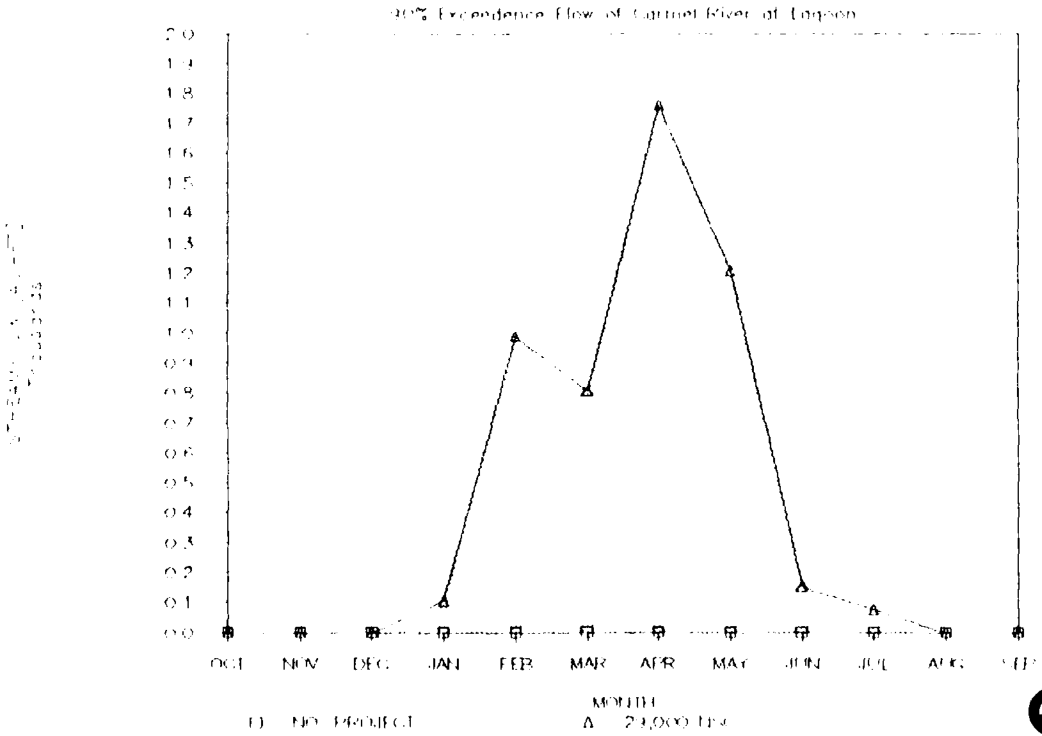
The implications of these streamflow changes for fish and riparian vegetation are described in Chapters 8 and 9, respectively.

Storm Flow, Channel Geometry and Bank Erosion. The aspect of streamflow that affects channel geometry more than any other is flood frequency. Table 7-4 shows the frequency of different size flows as measured below the existing dam for various alternatives.

SIMULATED DRY-YEAR STREAM FLOW, 1958-1985

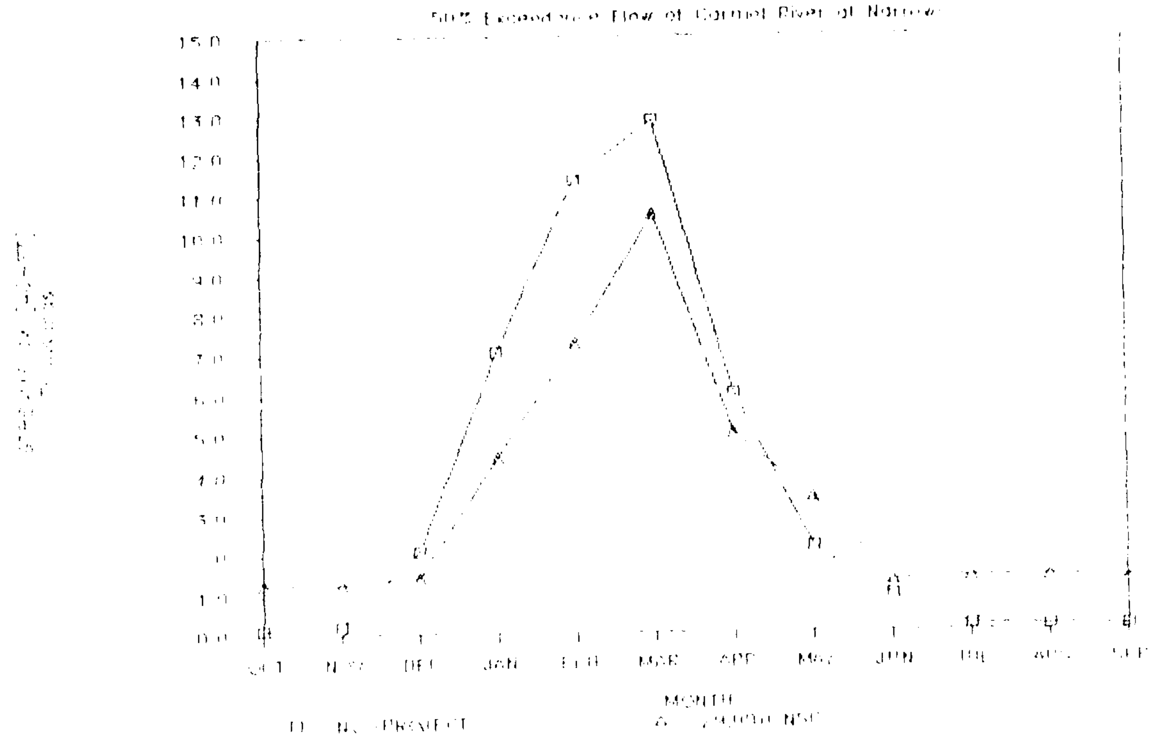
FIGURE 7-2





SIMULATED MEDIAN YEAR STREAM FLOW, 1958-1985

FIGURE 7-3



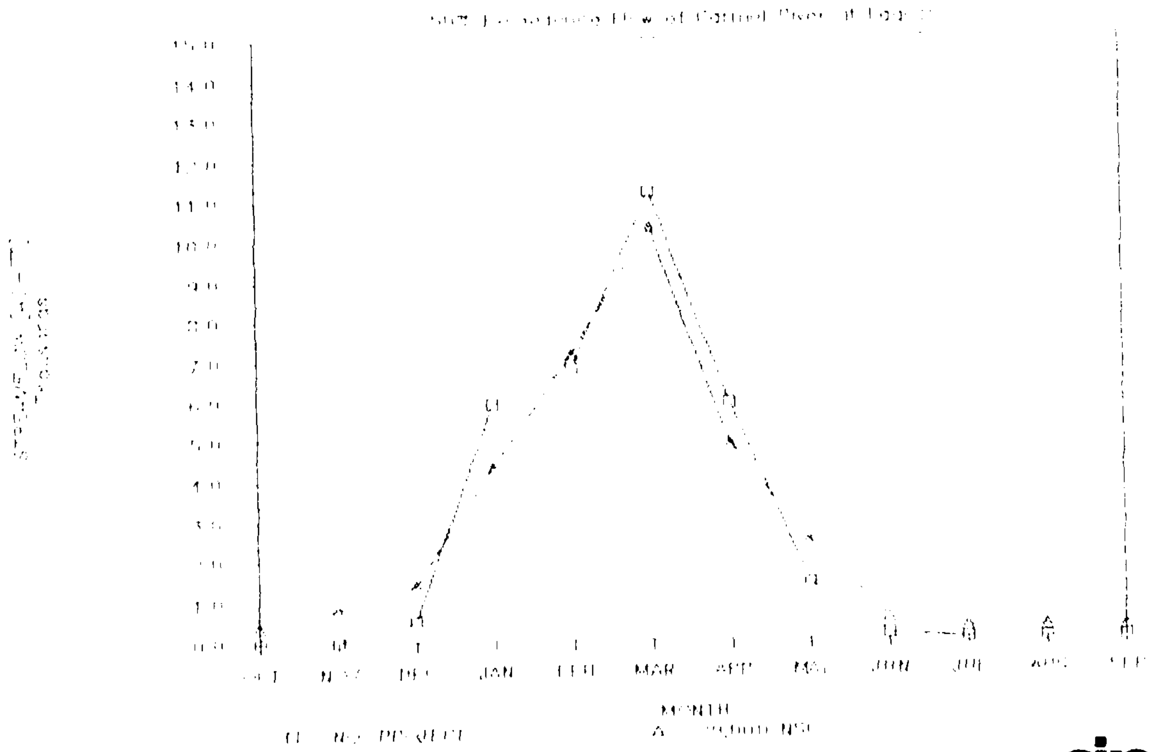


TABLE 7-4

SIMULATED STORM FLOW FREQUENCY AT ROBLES DEL RIO

Condition	Reservoir Size, AF	Maximum Flow (Cubic Feet Per Second) That Would Occur Every[1] 1.5 Years	2.0 Years	3.0 Years	5.0 Years	10.0 Years
No Project	800	860	1,730	2,650	3,480	4,390
Alternative A	29,000	210	540	1,840	2,980	4,250
Alternative B	20,000	220	920	2,050	3,050	4,170
Alternative C	16,000	220	920	2,070	3,070	4,210

[1] Annual maximum mean daily flow.

It was noted earlier that the existing San Clemente reservoir is too small to affect storm flows appreciably. In a large storm or series of storms, the reservoir fills rapidly and most of the flow passes over the dam unchecked. This would remain true with a new reservoir project, but to a more limited extent. The column on the far right of Table 7-4 shows the maximum flow that might be expected in a 10-year period with each alternative. It is apparent that in each case the flow would be about the same. The column for the 1.5 year event, which displays the maximum flows that might be expected, on the average, once every eighteen months, reveals a different story. In this case, the maximum flow with Alternative A would be only one-quarter of the maximum No Project flow. Thus, the principal effect of Alternative A would be to reduce the size of stormflows that might otherwise be expected to occur every one to five years, but without substantially altering the larger flows that occur less frequently.

Experts believe that storm flows that occur about every 1.5 years are the dominating influence on channel geometry.[5] Large floods, while capable of causing drastic changes in channel location and characteristics, are too infrequent to be the predominant influence on channel geometry. Small storm flows (less than 1.5-year events), on the other hand, do not have sufficient energy to alter channel characteristics. The dominant channel forming flow that occurs about once every 1.5 years usually corresponds with "bankfull" discharge; that is, a flow that fills the river channel from bank to bank but does not overflow onto the flood plain. Although this concept is generally accepted for a variety of systems, it does not fit the characteristics of several California coastal streams. In the middle and lower reaches of the Carmel River, bankfull discharge appears to correspond to a flow that occurs once every 10 or 20 years. Curry and Kondolf (1983) believe increased channel capacity is due to the effect of dams, poorly planned stabilization works and streambank development in the 1960's, and the loss of riparian vegetation.

Based on the concept of bankfull discharge, the reduction in the size of the storm flows that occur every 1.5 to 5.0 years as a result of Alternative A would affect sediment movement and channel geometry. The dominant channel forming flow would be reduced and the channel would tend to narrow from the present 80 to 100 feet to, perhaps, 40 feet. Vegetation, particularly willows, would increase along the channel margins, which could enhance fish habitat and reduce erosion. However, channel capacity would be reduced so that when large floods occurred, the flood levels could be raised above the levels that might be expected today. The degree to which this might occur is being studied by District staff at present.

Another consequence of the reduction in the size of small storm flows is a reduction in sediment movement. As noted earlier, the existing Los Padres and San Clemente Dams intercept most of the sediment eroded from the upper watershed of the Carmel River. Sediment from tributaries that enter the Carmel River below the existing San Clemente Dam and from the river itself, is moved downstream by river flow. Tables 7-5 and 7-6 show the predicted effect of project alternatives on sediment transport in the river at two locations. The 29,000 AF project would reduce average sediment load by 11% to 18% at the Robles del Rio and near Carmel gages, respectively.[7]

TABLE 7-5

SIMULATED MEAN ANNUAL SEDIMENT LOADS AT ROBLES DEL RIO

Condition	Reservoir Size, AF	Mean Annual Sediment Load (tons)	
		Bedload	Suspended Load
No Project	800	5,021	13,663
Alternative A	29,000	4,193	11,145
Alternative B	20,000	4,385	11,677
Alternative C	16,000	4,435	11,849

Source: Evaluation of the Effects of the Feasible New San Clemente Project Alternatives on the Channel Stability and Sediment Transport of the Carmel River, MPWMD, Technical Memorandum 87-13.

TABLE 7-6

SIMULATED MEAN ANNUAL SEDIMENT LOADS NEAR CARMEL

Condition	Reservoir Size, AF	Mean Annual Sediment Load (tons)	
		Bedload	Suspended Load
No Project	800	59,263	142,691
Alternative A	29,000	54,133	124,199
Alternative B	20,000	54,993	128,070
Alternative C	16,000	55,093	128,654

Source: Evaluation of the Effects of the Feasible New San Clemente Project Alternatives on the Channel Stability and Sediment Transport of the Carmel River, MPWMD, Technical Memorandum 87-13.

The average values may be somewhat misleading, however, because they are so heavily influenced by the very large flows which would not be much affected by the 29,000 AF project. During years that would experience only small storm flows the 29,000 AF project would reduce sediment transport in the main stem of the river quite drastically. This is illustrated by the data displayed in Table 7-7.

In a dry year such as 1961, the reservoir levels would be drawn down quite low. If there were only one or two large storms the following year, virtually all of this flow would be captured to refill the 29,000 AF reservoir. Sediment transport would be effectively eliminated that season. The storm flow of 1962 was on the order of a 3-year event, which would indicate that tributaries would be moving significant amounts of sediment. This sediment could be transported to the confluence of the tributary and the Carmel River below the dam and deposited in a delta. Releases from the dam would tend to flatten the deposited sediment out slightly and spread it over an area of several hundred yards, possibly burying gravels where fish spawn.

A second potential impact relates to changes in sediment transport rates that could lead to increased sedimentation in the Carmel River Lagoon. Below Valley Greens Drive (river mile 4.5), the river channel primarily has a sand bed. Bedload transport in this sand channel occurs at very low flows and significant amounts of sediment are transported with flows of less than 100 cfs. At the lagoon, sediment is either trapped or passed through to the ocean, depending on flow.

At high flows (greater than 500 cfs) the river tends to cut directly through the deposited sand barrier and thus flushes out sediment. At flows lower than 200 cfs, the winter waves push the river channel to the south of the beach where it generally crosses a bedrock lip. This bedrock outcrop allows flows as low as 40 cfs to pass through to the ocean, but acts as a barrier for sediment.

The New San Clemente alternatives greatly reduce the simulated spill from the dam compared to the No Project alternative. For example, spill would occur in 17 out of 28 years with Alternative A; spill would occur in 20 and 21 years out of 28 with Alternatives B and C, respectively; spill would occur in 27 out of 28 years with the No Project.

TABLE 7-7

SIMULATED ANNUAL SEDIMENT LOAD IN SELECTED YEARS AT ROBLES DEL RIO FOR ALTERNATIVE A AND NO PROJECT ALTERNATIVE

		Sediment Transport (Tons)			
		Robles Del Rio		Near Carmel	
Year	Condition	Bedload	Suspended Load	Bedload	Suspended Load
1962	No Project	1,538	6,243	27,971	39,7576
1962	Alternative A	19	517	9,781	1,679
1963	No Project	5,307	13,678	64,057	128,163
1963	Alternative A	409	4,135	52,745	36,262

Source: Evaluation of the Effects of the Feasible New San Clemente Project Alternatives on the Channel Stability and Sediment Transport of the Carmel River, MPWMD, Technical Memorandum 87-13.

While fishery releases will be made with the New San Clemente alternatives, the frequency and duration of these flows would be different than with the No Project alternative. By reducing winter storm flows and increasing summer/fall flows, the sediment transport distribution would be greatly affected. Table 7-8 compares the mean monthly bedload transport rate for the various alternatives during the low-flow months of the year.

There are two scenarios for increased sedimentation problems in the lagoon. First, in critically dry years, fishery releases will be insufficient to breach the sand bar alone, yet significant amounts of bedload will be transported into the lagoon. In the 28-year simulated record, there are four such periods as shown in Table 7-9.

TABLE 7-8

MEAN MONTHLY BEDLOAD TRANSPORT RATES NEAR CARMEL
JUNE THROUGH NOVEMBER[1]
(Tons)

Condition	June	July	August	Sept	Oct	Nov
No Project	596	115	13	5	10	703
Alternative A	596	241	168	144	182	472
Alternative B	587	227	149	133	187	468
Alternative C	587	225	149	137	181	471

[1]Simulated output for water years 1958-1985.

TABLE 7-9

COMPARISON OF DRY YEARS & SEDIMENT TRANSPORT
INTO THE LAGOON FOR ALTERNATIVE A + NO PROJECT

Condition	Time Period	Sequential Months	Max Flow (cfs) at Lagoon	Bedload Passing (Tons) Near Carmel Gage
No Project	4/60 - 2/62	22	9	213
Alternative A	"	22	30	4,560
No Project	6/67 - 1/69	18	205	2,252
Alternative A	"	18	37	6,554
No Project	5/71 - 1/73	20	600	5,273
Alternative A	"	20	40	8,227
No Project	6/75 - 1/78	31	290	1,664
Alternative A	"	31	40	6,377

The second situation would occur more frequently, and would stem from attraction and migration releases in years with no storms to flush out the lagoon. As noted previously, winter waves generally push the outflow channel southward so that it crosses over the bedrock outcrop with flows up to about 200 cfs. Therefore, even with fishery releases that provide a constant 200 cfs outflow for 3-5 days, much of the bedload would be trapped in the lagoon due to the barrier effect of the bedrock lip. Such a situation actually occurred in February 1986, when a small storm caused streamflow similar to the proposed New San Clemente fishery releases. During that period the lagoon filled with sand so that a person could wade across it without getting wet over the knees.

It appears, then, that fishery release schedules have the potential to increase sedimentation in the lagoon in years when no storm is substantial enough to flush it out. Table 7-10 shows 12 years in the simulated 28-year record where this would occur with Alternative A. This situation would occur with the No Project alternative also, but the new reservoir's fishery releases will make it occur more frequently.

Reduced sediment loads due to regulated streamflow would also increase the residence time for bedload material stored in gravel bars. With fewer flows capable of transporting significant sediment and "piercing" the armor layer of these bars, flushing excess sediment from bank erosion would be more difficult. If this sediment is more difficult to flush, there would be a greater likelihood that large gravel bars would form and direct flow against the stream banks, thus increasing erosion. This effect, however, would vary depending on the characteristics of each river reach. Increased erosion would be offset by an increase in vegetation that protects banks due to spring and summer flows released from the new dam.

Beach Replenishment. As indicated in Table 7-6, the 29,000 AF project would reduce sediment input to Carmel Bay from the Carmel River by about 11%. Because sediment enters the Bay from both the Carmel River and San Jose Creek, the reduction in sediment input from all sources would likely be 10% or less. It is not expected that this change would produce a noticeable reduction in beach size because it is within the normal range of historic variability.[6]

TABLE 7-10

SIMULATED YEARS WHEN ALTERNATIVE A SEDIMENT TRANSPORT AND FLOW DURATION COULD IMPACT THE LAGOON[1]

Year	Tons of Bedload	Peak Flow (cfs)	Duration (>200 cfs)
1959	14,208	370	13
1960	6,650	200	5
1961	2,505	30	--
1962	9,781	250	9
1964	10,163	202	7
1965	19,529	435	10
1966	13,514	216	14
1968	5,074	37	--
1971	15,376	220	7
1972	5,227	40	--
1976	4,763	30	--
1985	9,082	209	5

[1]Based on 1958-85 CVSIM simulations.

Carmel River Water Quality. The 29,000 AF project would not be expected to result in significant long-term changes in water quality in the Carmel River, with the possible exception of water temperature. The larger volume and much deeper New San Clemente Reservoir would tend to keep water temperatures cooler than in the present reservoir. Increased streamflow combined with the expected increase in riparian vegetation would also tend to reduce river water temperature. Some short-term increase in trihalomethane generation potential may occur in the first few years after a new reservoir is filled as inundated vegetation decays. This effect would be minimized, however, by vegetation clearing. See Chapter 15 for additional discussion of this issue.

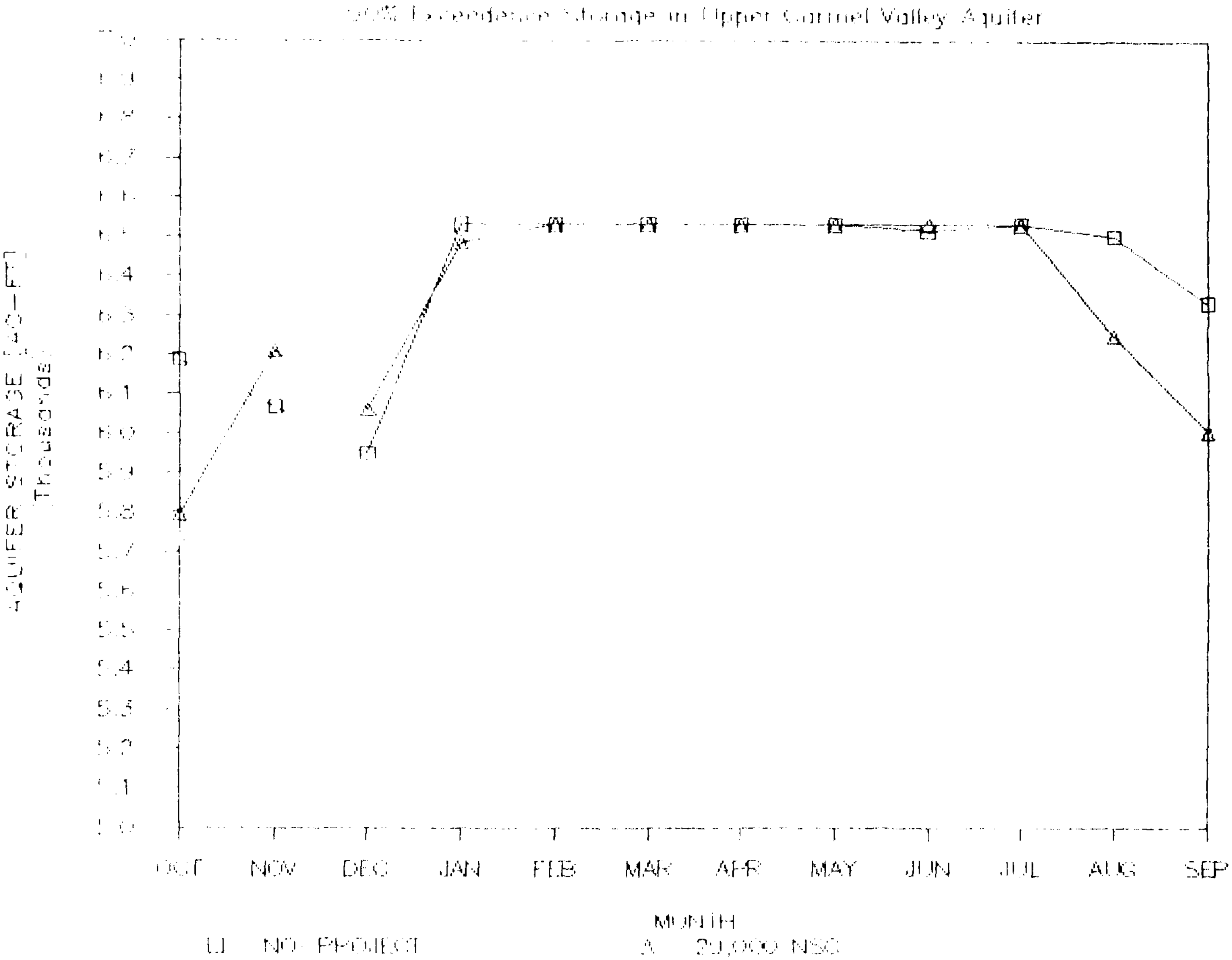
Carmel Valley Aquifer. With the 29,000 AF project in place and ground and surface water reservoirs operated conjunctively as described in Chapter 3, storage in the Carmel Valley aquifer would differ from the No Project condition during dry years. As shown in Figure 7-4, usable storage, and consequently water levels, in the upper aquifer (subunits 1 and 2) would be similar for the 29,000 AF project and the No Project condition and would approach maximum capacity from January through June. Minor depletion would occur from August through December, with the 29,000 AF alternative showing the greater depletion. This difference is explained by the presence of the new wells in the upper valley that are included in the proposed project but not part of the No Project alternative.[4]

The new wells in the upper aquifer will have negligible impacts on the local groundwater system during wet or normal years when project releases will maintain flow in the river and consequent high water levels in the aquifer. However, localized drawdowns from the new production wells will occur during dry years when project releases are not sufficient to maintain river flow and aquifer levels. This is estimated to occur about 7% of the time for the 29,000 AF project (based on the 1958-85 simulation period). Drawdowns at the wells during a prolonged dry period could be about 26 feet with the 29,000 AF alternative.[11]

As shown in Figure 7-5, usable storage in the lower aquifer (subunits 3 and 4) during dry years differs considerably for the 29,000 AF project and No Project conditions. With the 29,000 AF project, storage is several thousand acre-feet greater throughout the year and

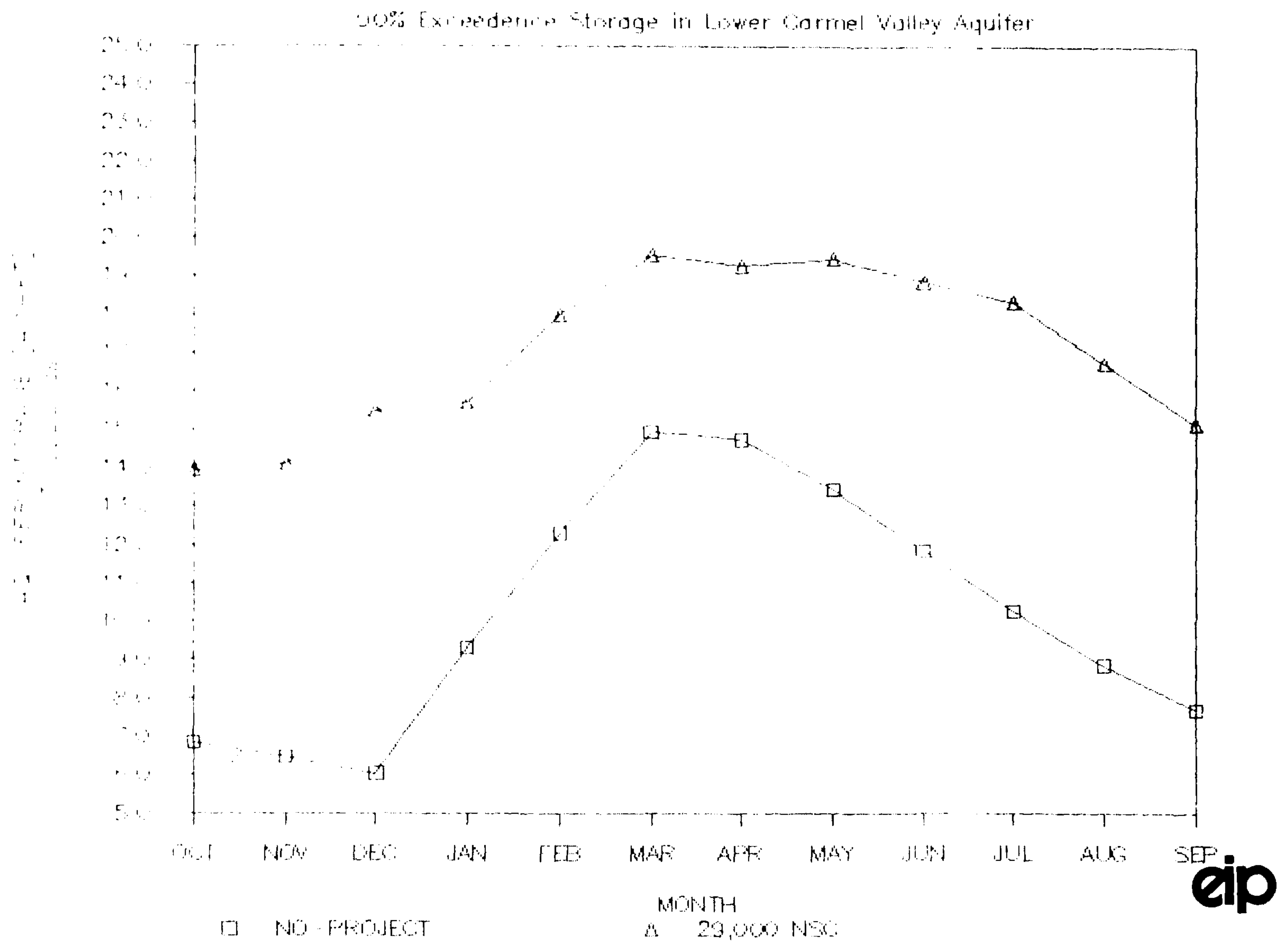
SIMULATED DRY-YEAR STORAGE IN UPPER AQUIFER, 1958-1985

FIGURE 7-4



SIMULATED DRY-YEAR STORAGE IN LOWER AQUIFER, 1958-1985

FIGURE 7-5



is near maximum in March through May. The greatest difference occurs in December when water levels with Alternative A would be 40 feet higher than under the No Project condition. During wet or normal years the differences between Alternative A and No Project conditions would be less.

Seaside Groundwater Basin. Management of the Seaside groundwater basin with the 29,000 AF project would be similar to that of the No Project alternative. Production would increase during dry years to offset demand but would be correspondingly reduced during other years so that the long-term yield of the basin is maintained. Differences in groundwater levels between the 29,000 AF alternative and the No Project alternative would have little environmental significance over the long term.

Mitigation Measures

The following mitigation measures are suggested:

- To allow accurate monitoring of post-construction channel capacity, a pre-construction flood plain survey should be undertaken to establish baseline conditions.

- Because Alternative A could result in a reduction in channel capacity downstream of the new dam, studies should be conducted at one-year intervals to determine channel capacity and flood hazard. Some vegetation clearing within the channel may be necessary for flood protection, but it would need to be balanced with the goal of enhancing the riparian corridor. The channel could also be deepened to increase its capacity.

- Gravel bars should be removed or regraded if they threaten bank stability prior to and after completion of the dam.

- Siltation of the Carmel River Lagoon should be monitored and the sand bar breached during small storms to increase sediment removal.

7.2.2 ALTERNATIVES B AND C

Impacts

Streamflow. Figures 7-6 and 7-7 compare Carmel River streamflow that would result from Alternatives A, B and C during dry years. As might be expected, the smaller reservoirs allow less streamflow during dry periods than does Alternative A, but still allow considerably more than the No Project alternative.[4]

Storm Flow, Channel Geometry and Bank Erosion. The effects of the smaller reservoirs on flood flows and channel geometry would be similar to those of the 29,000 AF project, but their magnitude would be slightly less. Tables 7-4, 7-5 and 7-6 compare the effects of various sizes of reservoir on flood frequency and sediment transport. Because all of the reservoirs under consideration would be much larger than the present San Clemente Reservoir, they would all produce a substantial change in downstream channel conditions. The changes would be qualitatively similar to those described with reference to Alternative A but somewhat less in magnitude.

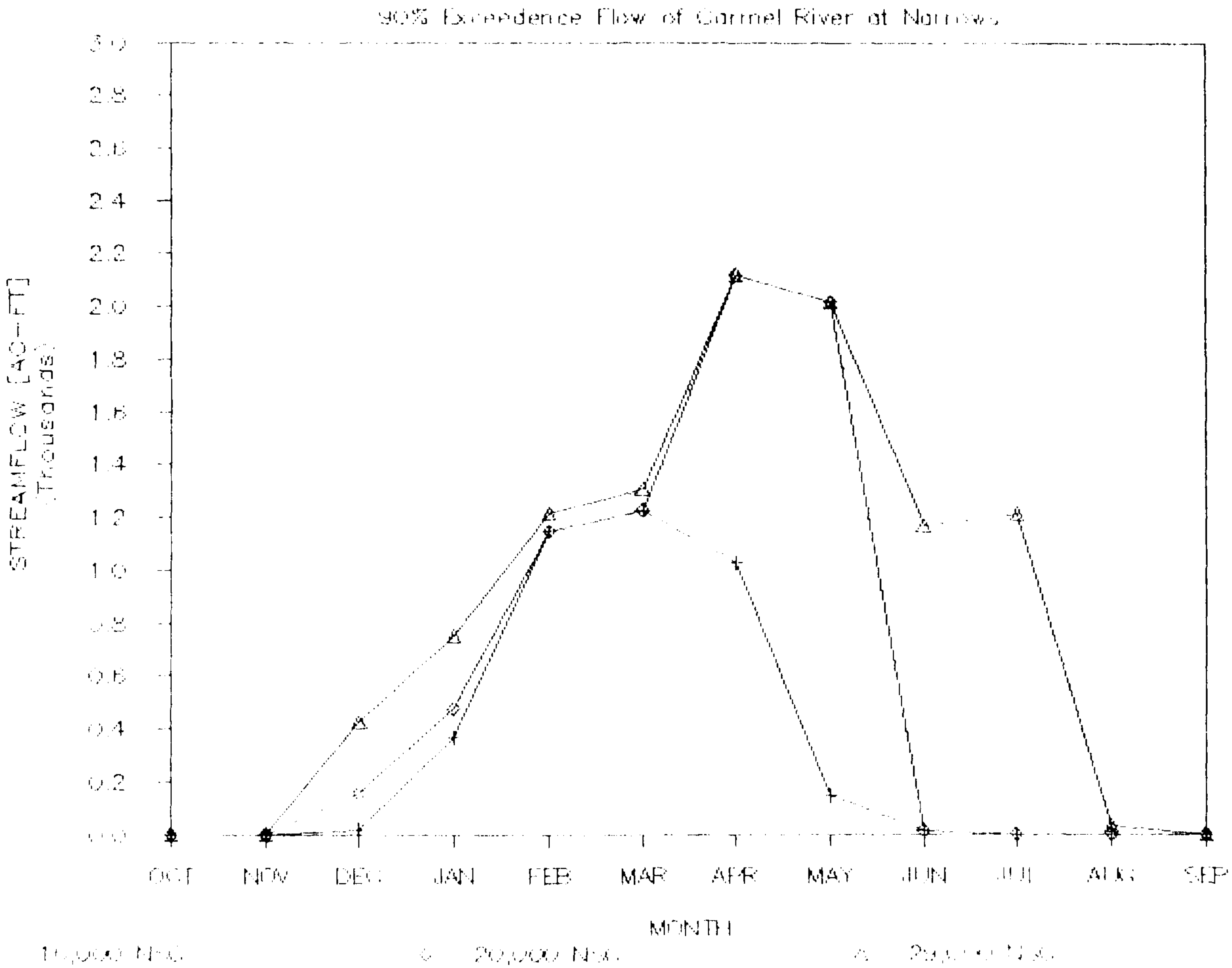
Surface Water Quality. The effects of Alternatives B and C would be similar to the effects of Alternative A.

Carmel Valley Aquifer. Figures 7-8 and 7-9 compare the effects of different size reservoirs on dry year usable storage in the upper and lower Carmel Valley aquifer. Usable storage in the upper aquifer would be similar for all project sizes from January through May. Alternatives B and C would provide less usable storage from June through December. During dry years the water level in the lower aquifer would be drawn down somewhat farther throughout the year with the smaller surface water reservoirs than with Alternative A.

Localized drawdowns from the new production wells in the upper aquifer are estimated to occur about 10% and 12% of the time for Alternatives B and C, compared to 7% for Alternative A. Drawdown at the wells could be about 30 feet for Alternatives B and C, which is about 4 feet greater than that for Alternative A.

SIMULATED DRY-YEAR STREAM FLOW AT THE NARROWS, 1958-1985

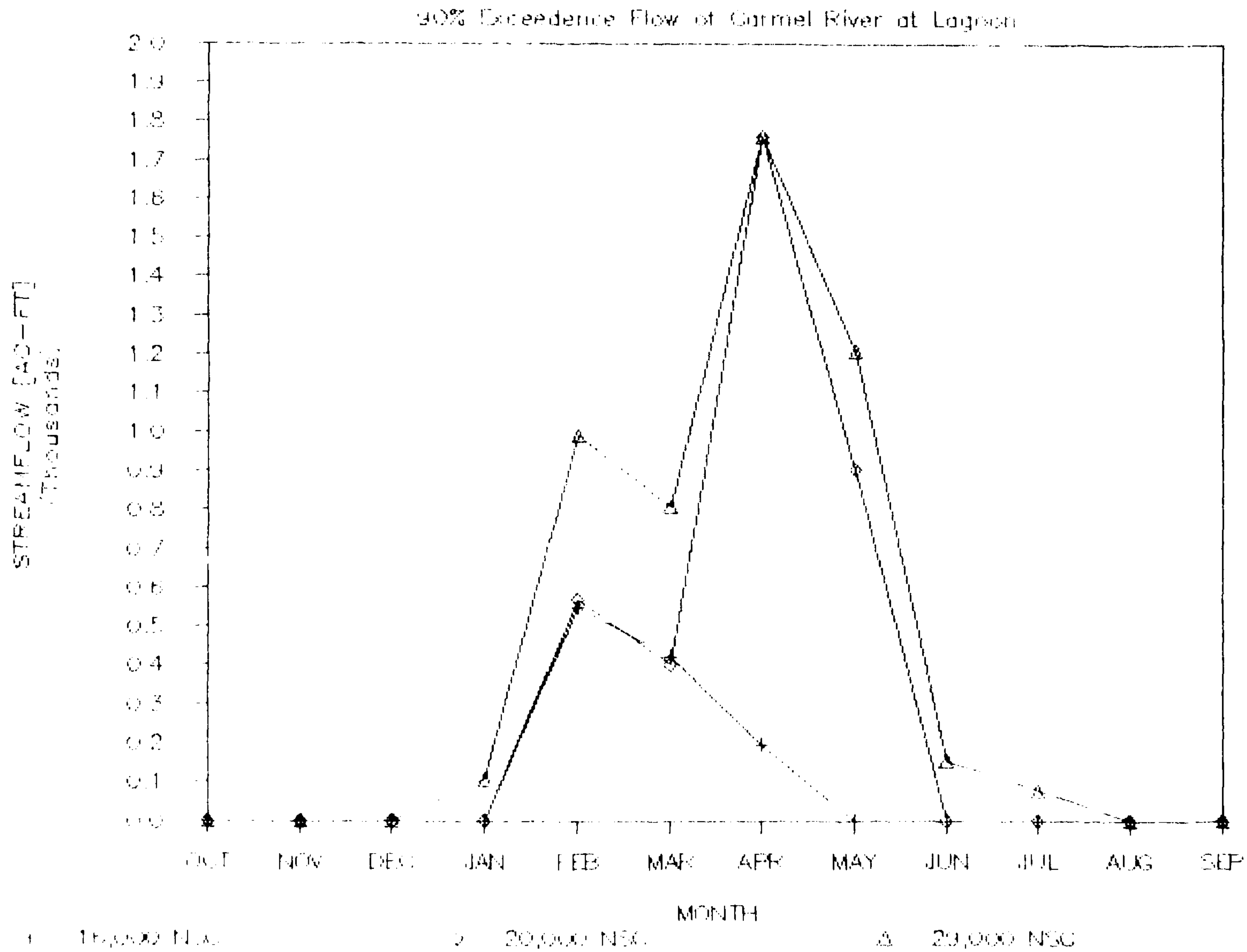
FIGURE 7-6



SIMULATED DRY-YEAR STREAM FLOW AT THE LAGOON, 1958-1985

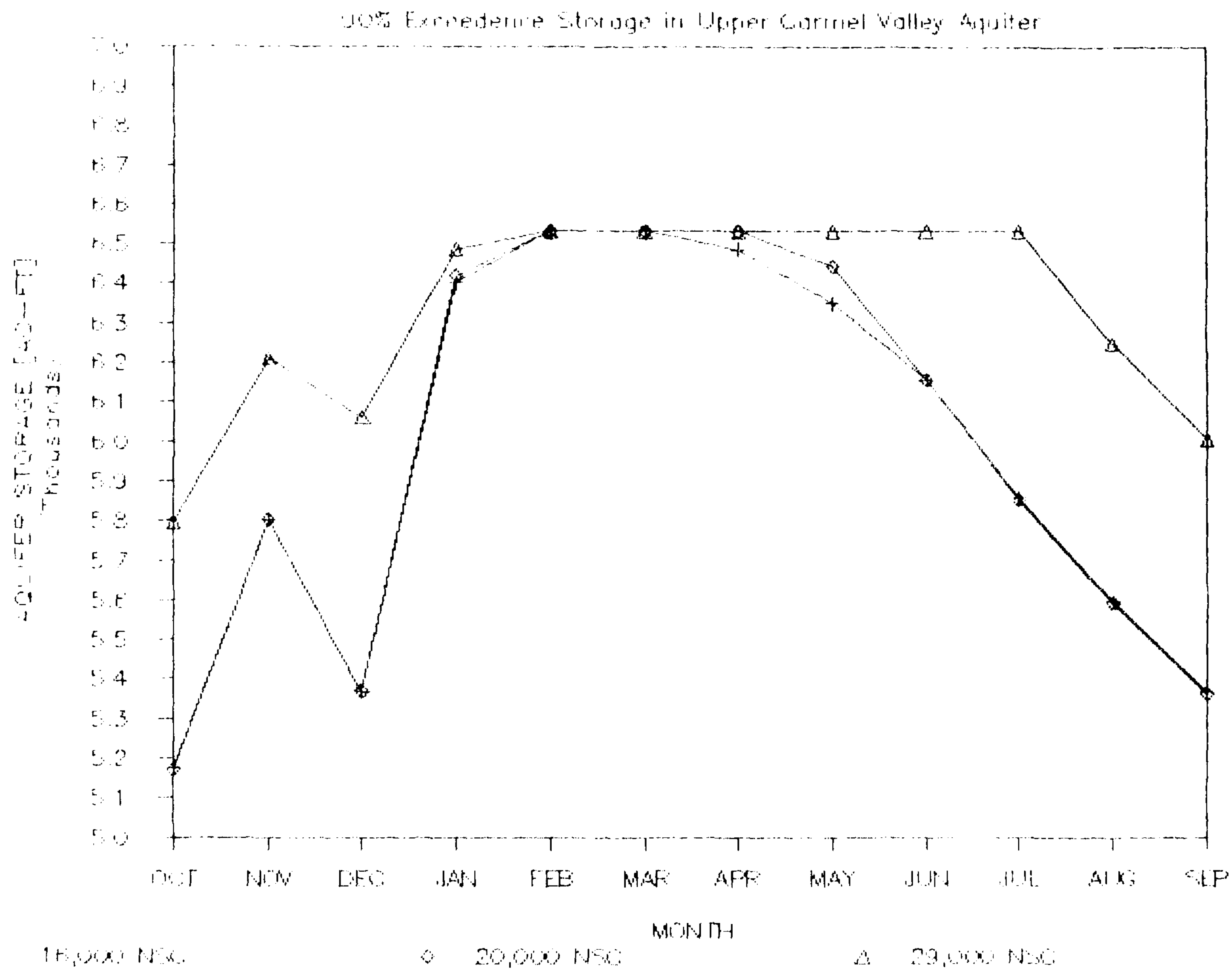
FIGURE 7-7

SOURCE: MPWMD



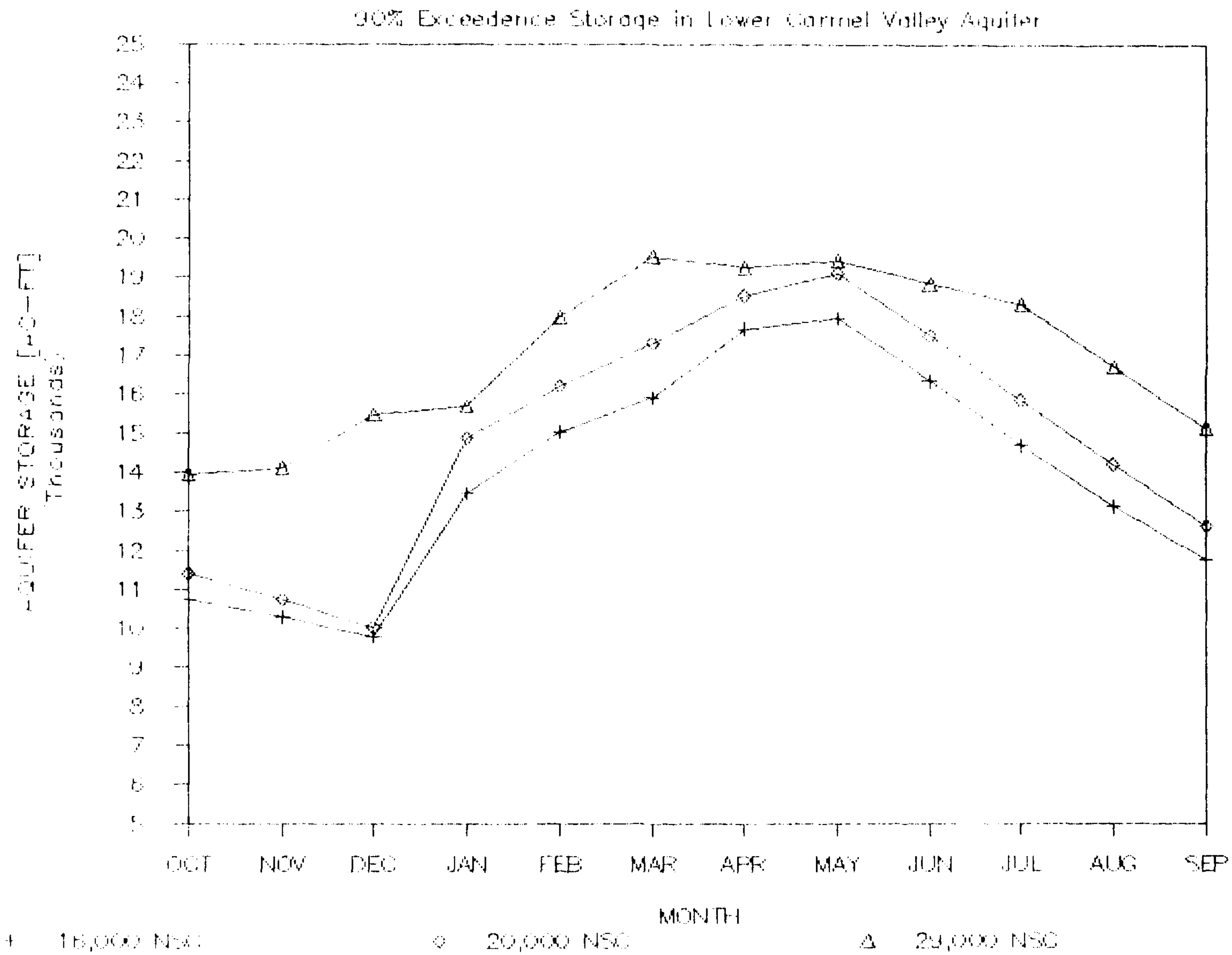
SIMULATED DRY-YEAR STORAGE IN UPPER AQUIFER, 1958-1985

FIGURE 7-8



SIMULATED DRY-YEAR STORAGE IN LOWER AQUIFER, 1958-1985

FIGURE 7-9



Seaside Groundwater Basin. As with the 29,000 AF alternative, management of the Seaside groundwater basin with smaller project alternatives would be similar to that of the No Project alternative.

Mitigation Measures

The same mitigation measures would be suggested for Alternatives B and C as were suggested for Alternative A.

7.2.3 NO PROJECT ALTERNATIVE

Impacts

Under the No Project alternative, streamflow in the Carmel River would be reduced to zero during dry years as shown in Figure 7-2. The lack of streamflow in combination with lowered water tables, due to increased pumping, would damage or destroy some of the riparian vegetation during extended dry periods. The frequency of the dominant channel-forming flood would remain the same as today, as would the rate of sediment transport. However, with continued lowering of groundwater levels and depleted streamflow, riparian vegetation would not recover and might decline further. The lack of bank vegetation would result in continued channel instability and consequent erosion damage.

Maintenance dredging of the existing San Clemente reservoir by Cal-Am is assumed as part of the No Project Alternative to maintain storage capacity. Dredging could have impacts on water quality and aquatic life. Effects that could result from dredging have not been examined and may be the subject of separate environmental documentation.

Mitigation Measures

No other measures have been identified that would avoid the lack of streamflow and lowered water tables that would occur during dry years. The periodic loss of riparian vegetation and consequent erosion and property damage loss could be made less severe by supplementary irrigation and replanting.

7.3 IMPACTS OF PROJECT CONSTRUCTION

7.3.1 ALTERNATIVES A, B AND C

Impacts

Each of the proposed alternatives would involve construction in and immediately adjacent to the Carmel River channel. During construction, river flow would be diverted around the dam site in a large culvert. Construction activity would have no impact on streamflow or the downstream aquifers. However, water quality and sediment transport could be affected by construction activities.

As noted in Chapter 6, disturbance of soil and clearing of vegetation would result in a period of increased erosion. Increased erosion would contribute sediment to the river that could damage downstream fish spawning habitat and increase municipal water treatment costs. In addition, improper handling of construction materials and fuel could impair water quality. These potentially adverse effects can be avoided or lessened by the mitigation measures listed below and in Section 6.3.1 of the previous chapter. The mitigation measures can only be stated in general terms because a detailed plan of construction has not yet been developed.

Mitigation Measures

The following mitigation measures are suggested:

- Natural drainage should be routed around borrow areas and settling basins installed downstream of the borrow areas to intercept silt before it enters stream channels.
- Water used in the rock crushing process should be routed to settling basins and recycled rather than discharged to the river.
- Excess fine material not used in the concrete mix should be distributed over flat areas outside the main natural drainage channels.
- The contractor should prepare a spill prevention plan for District approval detailing material and fuel practices and measures to prevent spills.
- Chemical toilets should be provided for the use of construction workers.

7.3.2 NO PROJECT ALTERNATIVE

Impacts

Because the No Project alternative would not involve any significant construction activities, no impacts would occur.

Mitigation Measures

None needed.

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[1] Principal sources used to develop the description of hydrology and water quality included Feasibility Report and Appendices, U.S. Army Corps of Engineers, May 1981; Carmel River Management Plan and Boronda Erosion Project, Draft Environmental Impact Report, Environmental Science Associates, August 1984; Sediment Transport and Channel Stability, Carmel River, California (draft), Curry, R.R. and G.M. Kondolf, December 1983; Analysis of the Carmel Valley Alluvial Groundwater Basin, Monterey County, California, U.S. Geological Survey, June 1984; and Groundwater in the Seaside Area, Monterey County, California, U.S. Geological Survey, September 1982.

[2] Kapple, G.W., T.J. Durbin, and M.J. Johnson, June 1984, Analysis of Carmel Valley Alluvial Groundwater Basin, Monterey County, CA, U.S. Geological Survey.

[3] An Evaluation of the Seaside Coastal Groundwater Basin; Staal, Gardner and Dunne, Inc., 1987.

[4] Assessment of Water Supply Impacts for the Feasible New San Clemente Project Alternatives, Draft Report, Fuerst, D.W. and Y.J. Litwin, June 1987.

[5] Water in Environmental Planning, Thomas Dunne and Luna B. Leopold, W.H. Freeman and Company, 1978.

[6] Impacts on Carmel River State Beach due to the New Dam at San Clemente, Thornton, E.B. and Abdelrahman, S., June, 1987.

[7] Evaluation of the Effects of the Feasible New San Clemente Project Alternatives on the Channel Stability and Sediment Transport of the Carmel River, MPWMD, Technical Memorandum 87-13.

[8] Carmel Valley and Seaside Groundwater Basins: Description of Basins and Groundwater Storage, MPWMD, Technical Memorandum 85-01.

[9]James M. Montgomery, Consulting Engineers Inc., Carmel Valley Wastewater Study, February 1982.

[10]EMCON Associates, Carmel Valley Village and Robles Del Rio Pollution Study, December 1986.

[11]Summary of Seaside Coastal Groundwater Basin Evaluation, MPWMD, Technical Memorandum 87-09.

[12]Staal, Gardner & Dunne, Inc., Fort Ord Groundwater Monitoring Well Project, January, 1987.

[13]Effects on the Upper Carmel Valley Aquifer From Additional Well Development, MPWMD Technical Memorandum 87-10.

8 FISH AND OTHER AQUATIC LIFE[1]

8.1 SETTING

The Carmel River supports a variety of fish species, the most important of which is the steelhead, (Salmo gairdneri gairdneri), a large and popular sportfish of the salmonid family. Steelhead spend their adult years in the ocean, returning to spawn in the streams where they were born. Once abundant in almost all coastal rivers and streams from Mexico to Alaska, steelhead populations have been greatly reduced, primarily as a result of man-made changes in river conditions. Dams create obstacles to fish migration, reduced streamflows make migration more difficult and lessen the amount of habitat for juvenile fish, and watershed erosion can blanket spawning areas with sand. The Carmel River supports the southernmost steelhead run in the United States. The District's fishery consultant estimates that 1,200-1,500 adult steelhead enter the river to spawn each winter and spring.

Other species that inhabit the river include rainbow trout (Salmo gairdneri) in the reaches above Los Padres Dam and some brown trout (Salmo trutta) above the Narrows. In the lower reaches, sculpin, hitch, stickleback, lampreys, turtles and crayfish can be found.

Adult steelhead congregate in Carmel Bay in October and November and begin to move upstream when the first heavy rains break through the sand bar that closes the river mouth during the summer. Fish move upstream in groups, taking about ten days to reach the fish ladder at San Clemente Dam, a distance of about 18 miles. Some spawn below the dam, but most of their young perish.[2] It is estimated that a flow of 200 cfs for about a week is needed to attract large numbers of fish into the river and that a flow of 75 cfs is needed to allow fish passage through the riffles between the dam and the river mouth.

The San Clemente fish ladder was built in 1921 and at 85 feet is the highest in California. Although no studies of its efficiency have been made, it appears to work well, presenting no significant barrier to fish migration. The reservoir upstream of the dam is small, with a surface area of 33 acres, and fills rapidly after the first rains. It does not significantly delay upstream migrating steelhead. Above the reservoir some fish migrate up San Clemente, Cachagua and Pine Creeks to spawn, while others continue upstream to the base of Los Padres Dam.

There is a fishway at the base of Los Padres Dam that leads migrating steelhead into a trap. Trapped fish are trucked around the dam and released in Los Padres Reservoir where they can continue their upstream migration to spawning areas in the upper Carmel River and its tributaries. Although the fish trap below the dam was reconstructed in 1981 to be more attractive to migrating adults, few fish return to it. The most likely reason for the low returns is that few juveniles survive after migrating down the Los Padres Dam spillway due to its abrasive surface. Above Los Padres Dam, a large amount of high-quality spawning and rearing habitat is presently underused by steelhead due to these passage problems.

After hatching and emerging from their gravel nest, young steelhead distribute themselves in suitable places and begin feeding on aquatic insects that are drifting downstream with the current. They occupy the shallow, quiet water along much of the steam's edge, but as the waters warm and they grow larger, young-of-the-year steelhead move into relatively shallow water flowing over rough, rocky bottom areas. Yearling steelhead prefer deeper water and are usually more abundant in pools or deep riffles where roots, logs or boulders provide resting habitat adjacent to fast moving water.

In winter and spring, yearling steelhead undergo physical changes that will prepare them for life in the ocean. These seaward migrating fish are known as smolts. Fish hatched above Los Padres Reservoir move through the reservoir and descend the spillway. The spillway surface at this dam is very rough and many fish are probably injured during their descent.[3] Surviving fish and those hatched below Los Padres dam make their way downstream to San Clemente Reservoir. In the spring, downstream migrating juveniles can usually pass over the San Clemente dam spillway or descend the fish ladder. In late spring, flash boards are installed at the top of the dam to increase reservoir capacity.

With the flash boards in place, fish can only migrate downstream via the fish ladder, until flow overtops the flash boards. Fish descending over the flash boards are subject to injury when they strike the concrete surface of the spillway.

Below San Clemente Dam, the smolts must travel downstream for about 18 miles to reach the ocean. During most winters, flows are sufficient to allow smolts to migrate successfully. In spring, if flows decrease rapidly, many of the migrating fish are unable to reach the ocean and become trapped in pools where they become prey to birds.

As noted above, existing conditions in the Carmel River are not favorable for steelhead. A number of factors contribute to this circumstance. The two existing dams impair the upstream migration of adult fish and the downstream migration of juveniles. Reduced summertime flows as a result of upstream water diversion at San Clemente Dam and groundwater pumping farther down the valley impair downstream migration of juvenile fish and limit the amount of habitat available to them.

The loss of riparian vegetation associated with falling groundwater levels reduces shading of the river and leads to an increase in water temperature. The steelhead is a cold water fish and cannot tolerate high water temperatures although the Carmel River steelhead may adapt to somewhat warmer water than the steelhead from more northerly rivers. Rising water temperatures in the late spring may discourage juvenile fish from migrating to the ocean; remaining in the lower reaches of the river, their chances of survival are small.

Another consequence of the loss of riparian vegetation is increased river bank erosion. Steelhead need areas of clean, well-aerated gravel in which to spawn. Erosion increases the amount of sand and gravel moving down the streambed. Sand fills the spaces in the gravel river bottom making it unsuitable for spawning.

The District's fishery consultant estimates that a run of steelhead averaging slightly more than 4,000 individuals could be supported in the Carmel River Basin if the habitat available was fully utilized. About 2,000 fish could be supported above Los Padres Reservoir, another 1,000 between Los Padres and San Clemente Reservoirs and another 1,000 below San Clemente, if in-stream flow can be maintained. However, if remedial action is not taken the steelhead run may be reduced to a remnant in the next series of dry years.

8.2 IMPACTS OF PROJECT OPERATION

8.2.1 ALTERNATIVE A: 29,000 AF RESERVOIR

Impacts

The quality of steelhead habitat would be affected by Alternative A in several ways. The release of water from the dam in accordance with a minimum flow schedule developed with fish protection in mind would, of course, benefit steelhead. On the other hand, the 29,000 AF reservoir would inundate or block approximately 3.5 miles of spawning and rearing habitat on the Carmel River itself, and on San Clemente Creek. In addition, the characteristics of the barrier to fish passage represented by New San Clemente Dam and Reservoir differ from those of the present dam.

The minimum flow schedules for steelhead in the Carmel River below New San Clemente Dam are shown in Table 8-1. They were developed by D.W. Kelley and Associates, the District's fishery consultant, to provide a basis for design of a water supply project that is compatible with the steelhead resource. The amount of water provided for the so-called "fish flows" varies depending on the total amount of water in storage in the reservoirs and aquifers. During below-normal, dry or critical years, releases would be less than in normal or wet years. In all but critical years, the minimum flow schedules are designed to provide sufficient winter flow for adult steelhead to enter, ascend the river and spawn. During the spring, sufficient flow would be provided for downstream migration of smolts; during summer and fall, flow could be sufficient for rearing of juvenile fish. In critically dry years no streamflow would be provided for upstream migration. D. W. Kelley and Associates believe that in such years it would be better for adult steelhead to remain at sea and return to spawn the following year when conditions would likely be more favorable for reproduction. It should be noted that the minimum flow schedules are targets. During normal and wet years actual flows would be usually greater than the minimum. During critical years the targets may not be achieved.

The effects of Alternative A on the steelhead run were determined using the Carmel Valley Simulation Model. The minimum flow release schedule was applied to a 56-year

TABLE 8-1

PROPOSED MINIMUM FLOW SCHEDULE FOR NEW SAN CLEMENTE PROJECT

JAN FEB MAR	APRIL	MAY	JUNE — DECEMBER
NORMAL OR BETTER WATER YEAR (or whenever reservoir storage exceeds 15,000 AF on any day for any type of water year)			
For adult migration and spawning, and for angling:	For smolt emigration:		For juvenile rearing:
A. Maintain 5 cfs to lagoon until attraction event (storm).	40 cfs to the lagoon for 30 days	31 days	20 cfs at the Narrows for all days, and 6 cfs at the lagoon for all days.
B. Attraction event triggers release of 200 cfs to lagoon for 2 days 4-7 days 4-7 days			
C. After attraction release, maintain 75 cfs to lagoon until next attraction event (go to "B" above), or through March 31 if no more attraction events occur.			
BELOW NORMAL YEARS[1]			
For adult migration and spawning, and for angling:	For smolt emigration:		For juvenile rearing:
A. Maintain 5 cfs to lagoon until attraction event; if no attraction event by March 1, release 40 cfs to lagoon all days in March.	40 cfs to lagoon for 30 days	30 cfs to lagoon for 31 days	20 cfs at the Narrows for all days, and 5 cfs at the lagoon for all days.
B. Attraction event triggers release of 200 cfs to lagoon for 0 days 5 days 5 days			
C. After attraction release, maintain 75 cfs to lagoon until next attraction event (go to "B" above), or through March 31 if no more attraction events occur.			
DRY YEARS[1]			
For adult migration and spawning, and for angling:	For smolt emigration:		For juvenile rearing:
A. Maintain 5 cfs to lagoon until attraction event; if no attraction event by March 1, release 40 cfs to lagoon all days in March.	40 cfs to lagoon for 30 days	30 cfs to lagoon for 31 days	20 cfs at the Narrows for all days, and No requirement at the lagoon.
B. Attraction event triggers release of 200 cfs to lagoon for 0 days 0 days 5 days			
C. After attraction release, maintain 75 cfs to lagoon until next attraction event (go to "B" above), or through March 31 if no more attraction events occur.			
CRITICAL YEARS[1]			
For adult migration and spawning, and for angling:	For smolt emigration:		For juvenile rearing:
A. No attraction requirement.	30 cfs to lagoon for 30 days	20 cfs to lagoon for 31 days	20 cfs at the Narrows for all days, and No requirement at the lagoon.

[1] If reservoir storage exceeds 15,000 AF on any day, the "normal or better year" release schedule would be in effect regardless of the actual 'type of water year'.

simulation of daily streamflows and the results examined to determine whether the needs of fish at different stages of their lifecycle would be met. From this analysis a qualitative determination was made of the size of the adult steelhead run that would result from each year's brood of steelhead. Table 8-2 shows the results of the analysis and compares the project alternatives to the No Project condition.

Under Alternative A, good or excellent runs would originate from habitat upstream and downstream of the dam 34% and 36% of the time, respectively. Corresponding values for the no project condition would be 6% and 8%. No run would occur from upstream and downstream habitats 23% and 29% of the time, respectively, with the 29,000 AF project. Without the project no run would occur from the upstream habitat 73% of the time and 54% of the time for the downstream habitat.

The 29,000 AF reservoir would inundate the existing reservoir and 3.5 miles of stream suitable for spawning and growth. Like the existing reservoir, the new reservoir would not provide a large amount of habitat for steelhead. In common with other deep lakes in the Coast Range, the waters of New San Clemente Reservoir would stratify during the summer and fall. High daytime air temperatures would warm the surface waters of the lake, making them less dense than the colder bottom waters and thus preventing vertical mixing. Decomposition of organic material would rob the bottom waters of their dissolved oxygen content. Because steelhead are adapted to cold, well-oxygenated waters, only a small portion of the reservoir would provide them with suitable habitat during the summer and fall.

Although the 29,000 AF reservoir would replace some spawning and rearing habitat with lake habitat of much less value, D. W. Kelley and Associates judge this adverse impact to be more than offset by the improvements to the fishery as a whole that would result from releases of water from the reservoir. In fact, Kelley estimates that the changes would result in a gain of about 400 spawning adults.

Assuming that the fish passage facilities over the new dam are successful, then the 29,000 AF project would likely allow the steelhead run to average 4,000 spawning adults if the fish passage problems at Los Padres dam are solved and 2,000 if they are not. It should be noted that tens of thousands of juvenile fish must hatch to produce the 2,000-4,000 returning adults.

TABLE 8-2

PERCENTAGE OF YEARS WITH DIFFERENT SIZES OF STEELHEAD RUN

	Upstream of Dam				Downstream of Dam			
Size of Run	No Project	Alternative A	Alternative B	Alternative C	No Project	Alternative A	Alternative B	Alternative C
Excellent	0	17	15	12	0	21	21	13
Good	6	17	12	17	8	15	13	19
Fair	2	35	35	25	10	29	29	23
Poor	19	8	6	13	29	6	4	12
Zero	73	23	33	33	54	29	33	33

New San Clemente dam would represent a more formidable barrier to fish migration than the existing dam. Upstream-migrating steelhead that reach the base of the new dam must ascend more than 300 feet to the reservoir surface compared to 85 feet at the existing reservoir. Fish would be guided to a holding pond where they would be trapped and placed in a specially equipped tank truck. They then would be driven to the reservoir and released. Although trapping and trucking would entail more handling of migrating fish than ascending a fish ladder, the latter would require more energy and perhaps would delay upstream movement. Downstream migration would also be accomplished by a fish attraction device and trap and truck.

Before selecting truck and trap as the preferred method of fish passage, the District considered a variety of options, including a hatchery, as discussed in Chapter 2.[4,5] Truck and trap was selected because it would involve very little risk of injury to steelhead and would be the least costly of the passage methods considered. Passage facilities would also preserve the gene pool of the existing population to a much greater degree than would a hatchery.

Mitigation Measures

Although the overall effect of the proposed project on the fishery would be expected to be beneficial, the following mitigation measures are suggested.

- Improvements to the fish passage facilities at Los Padres Dam should be made by California Department of Fish & Game or Cal-Am to maximize the potential of the steelhead run.
- The health of the steelhead fishery should be continuously monitored to assess the effectiveness of the fish passage facilities.

If problems develop, economically feasible modifications to the fish passage facilities should be made.

8.2.2 ALTERNATIVE B: 20,000 AF RESERVOIR

Impacts

The effects of Alternative B on the steelhead run are shown in Table 8-2. They are similar to the effects of Alternative A. Fair to excellent runs would occur downstream of the dam 63% of the time as compared to 65% for Alternative A and 18% for the No Project alternative. Fair to excellent runs would occur upstream of the dam 62% of the time as compared to 69% for Alternative A and 8% of the time for the No Project alternative. Alternative B would inundate or block about three miles of spawning habitat.

Mitigation Measures

The mitigation measures suggested for Alternative B are the same as those suggested for Alternative A.

8.2.3 ALTERNATIVE C: 16,000 AF RESERVOIR

Impacts

The effects of Alternative C on the steelhead run are shown in Table 8-2. Fair to excellent runs would occur downstream of the dam 55% of the time as compared to 65% for Alternative A and 18% for the No Project alternative. Fair to excellent runs would occur upstream of the dam 54% of the time compared to 69% for Alternative A and 8% of the time for the No Project alternative. Alternative C would inundate or block about 2.6 miles of spawning habitat.

Mitigation Measures

The mitigation measures suggested for Alternative C are the same as those suggested for Alternative A.

8.2.4 NO PROJECT ALTERNATIVE

Impacts

As indicated in Table 8-2 there would be no steelhead run downstream of the dam 54% of the time and a poor run 29% of the time under No Project conditions. Zero and poor runs would occur upstream of the dam 73% and 19% of the time, respectively. The District's fishery consultant believes that the present run would be reduced to a remnant during the next series of dry years.

Mitigation Measures

No action is proposed so no mitigation measures would be required. See Chapter 3 for discussion of actions already taken.

8.3 IMPACTS OF PROJECT CONSTRUCTION

8.3.1 ALTERNATIVES A, B & C

Impacts

During construction steelhead could be adversely affected by excessive erosion or by the creation of a barrier to fish migration. Both of these potentially adverse effects can be avoided or lessened by mitigation measures.

Mitigation Measures

The following mitigation measures are suggested:

- Temporary trap and truck facilities should be constructed prior to initiating dam construction in order to convey fish safely around the dam site.
- Erosion controls as described in Chapter 6 should be imposed to avoid excessive discharge of fine material that could be harmful to steelhead habitat.
- Any potential spawning areas adversely affected by fine sediments produced during construction should be restored when construction is complete.

8.3.2 NO PROJECT ALTERNATIVE

Impacts

No construction impacts would result from the No Project alternative.

Mitigation Measures

No action would be taken so no mitigation measures would be required.

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[1] The description of the fishery is summarized from, D.W. Kelley & Associates, June 1983, Assessment of Carmel River Steelhead Resource; Its Relationship to Streamflow and to Water Supply Alternatives, (draft).

[2] The mortality rate for young fish is always high, even under favorable conditions. At present, however, below San Clemente Dam mortality rates are higher than would be experienced if conditions were more favorable.

[3] Cal-Am has prepared plans for spillway modification that would improve conditions for descending fish.

[4] D.W. Kelley and Associates, Evaluation of Upstream Fish Passage Facilities, August 1984.

[5] D.W. Kelley and Associates, Preservation of Carmel River Steelhead Run with Fish Passage Facilities or a Hatchery Near its Base, April 1987.

9 VEGETATION AND TERRESTRIAL WILDLIFE

9.1 SETTING

The study area to be discussed in detail in this section is that portion of the Carmel River Basin from approximately three miles upriver of the existing San Clemente Dam to the river mouth. In past studies the Carmel River has been divided into three general geographical and physical sections, referred to as the lower, middle and upper river.[1,2,3] The general vegetation and wildlife habitats associated with the river canyon in the study area have been classified as either riparian forest, woodland, or scrub in the river alluvial flood plain (lower and middle river), the typically narrow riparian-mixed evergreen woodlands immediately along the river banks upstream of the alluvial plain (upper river), and the brushlands and woodlands on the steep canyon slopes in the proposed reservoir site.

In general, the wildlife in the study area is composed of the common and typical species found in the vegetation types described above. A more detailed description of each vegetation type and its associated wildlife found in the study area is provided below. Complete lists of plant and wildlife species identified in the study area are provided in Appendix C1 through C5. A map of those vegetation types within the proposed dam and reservoir area is presented in Figure 9-1.

9.1.1 VEGETATION

Upper River Vegetation

The upper river section of the study area is defined here as the areas between the Camp Stephani area, at the point where the river canyon widens, and the far reaches of the proposed reservoir inundation area, approximately three miles upriver of the existing San Clemente Dam. It is within this portion of the study area that the proposed new dam, reservoir, and associated facilities would be located. The principal vegetation types in this section of the river as as follows.

Riparian-Mixed Evergreen Forest. This vegetation type is limited to the immediate bottom of the Carmel River Canyon where the river channel is approximately 100-150 feet wide, filled with recently deposited gravel and sand between 6 and 15 feet deep, and is immediately adjacent to the canyon slopes. The vegetation structure is highly variable, ranging from a typical forest community with a tree overstory and a brush and herbaceous understory, to open stands of scattered trees with little understory, and dry washes with very little or no vegetation cover.

In some places, the riparian community is indistinguishable from the mixed evergreen forest type of the adjacent slopes. The dominant tree species are sycamore (Plantanus racemosa), cottonwood (Populus trichocarpa), white alder (Alnus rhombifolia), and willows (Salix pp.) of the riparian community, and oak (Querucs agrifolia), California bay (Umbellularia californica), and California buckeye (Aesculus californicus) of the mixed evergreen forest community.

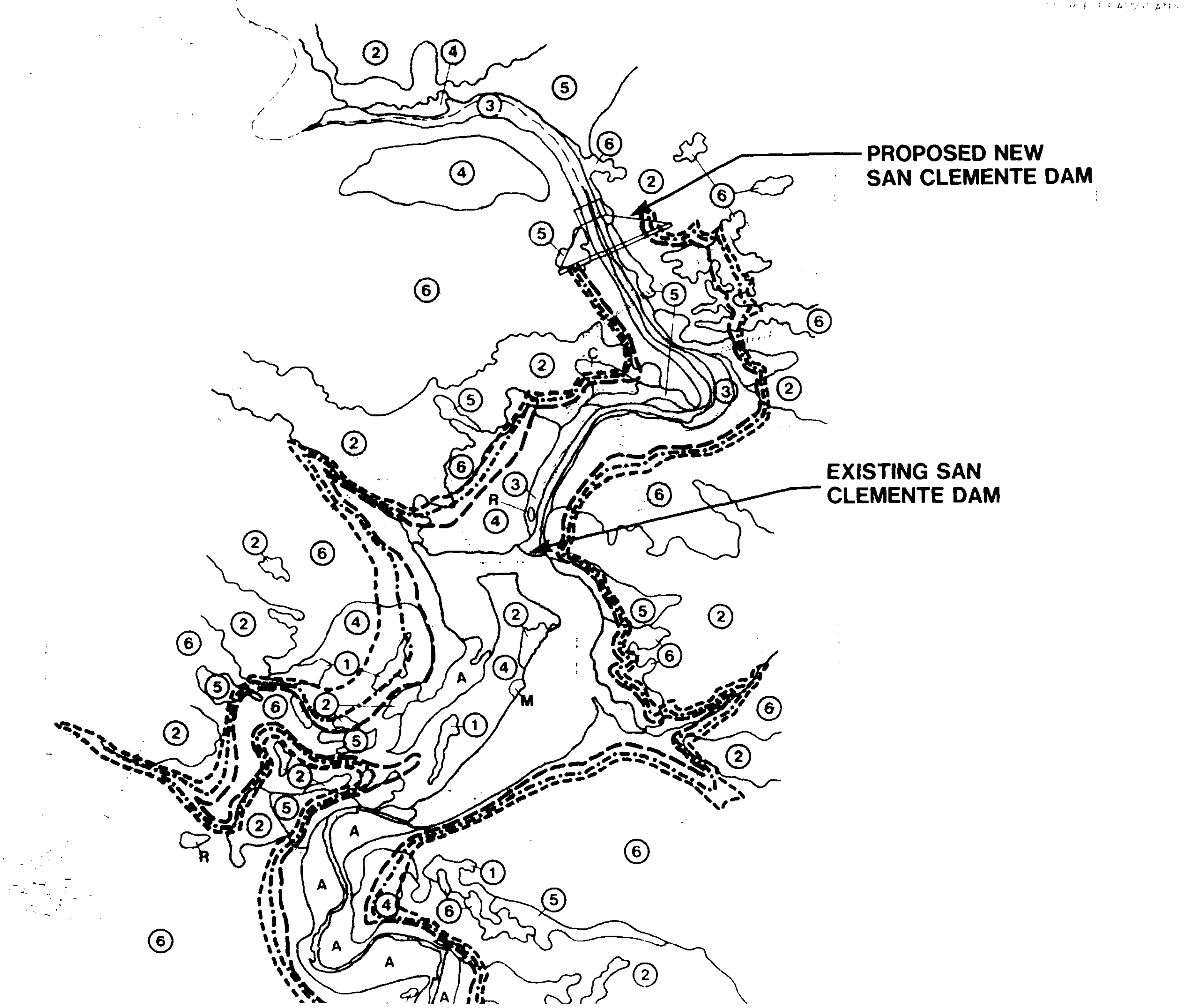
The brush understory is typically composed of poison oak (Toxicodendron diversilobum), coffeeberry (Rhamnus californica), wild current (Ribes spp.), blackberry (Rubus vitifolius), and stinging nettle (Urtica holosericea).

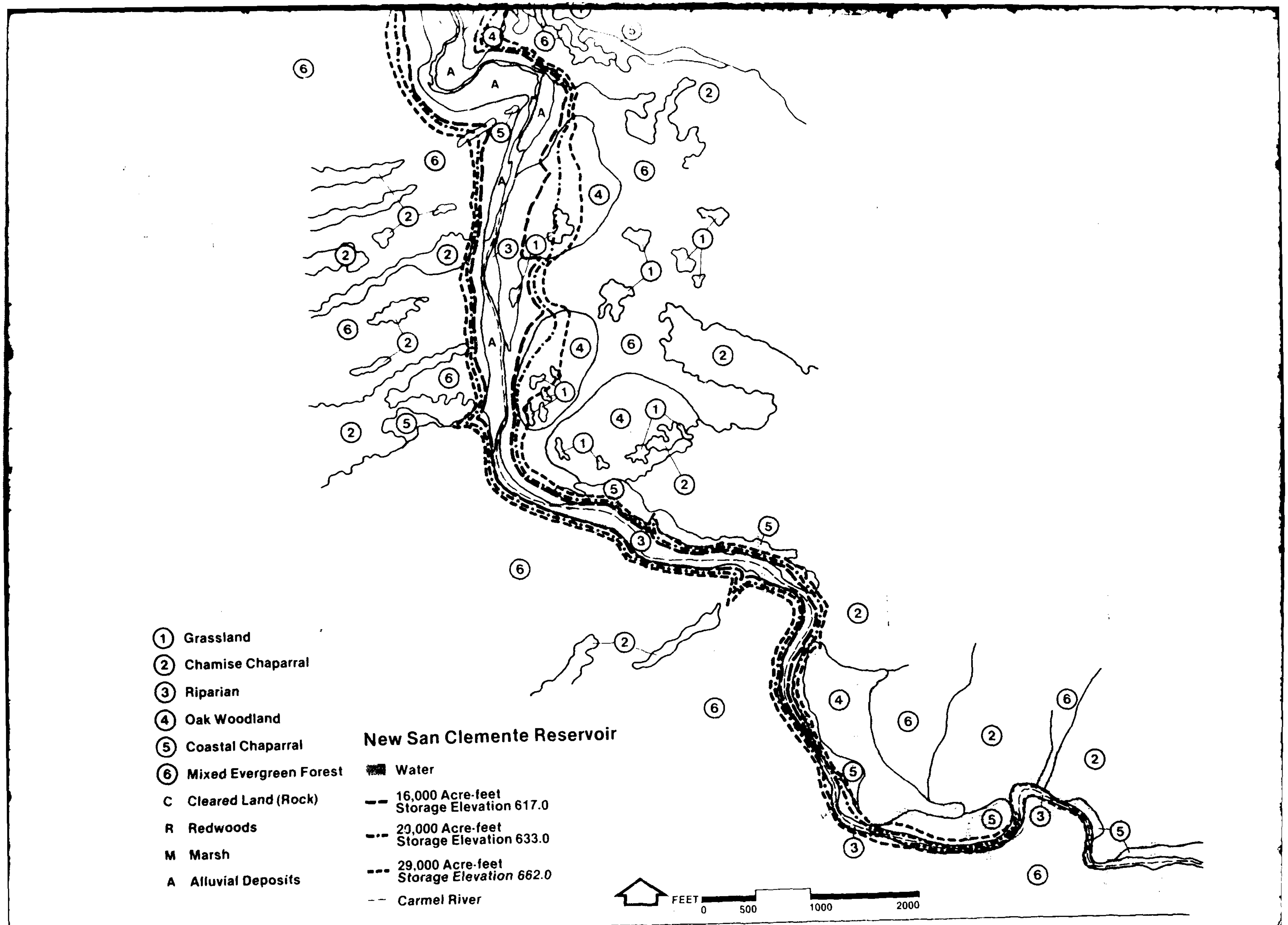
The vegetation changes from the riparian type in the canyon bottom to upland types, ranging from forest and woodlands on the cooler north- and east-facing slopes to brushland types on the dryer south- and west-facing slopes. The forest and woodland communities are as follows.

Mixed Evergreen Forest. This forest type range extends from the North Coast Ranges as far south as the northern extent of the Santa Lucia Mountains at elevations of 200-2,500 feet. The dominant tree and brush species within this plant community are California bay, madrone (Arbutus menziesii), interior live oak (Quercus wislizenii) and blue blossom (Ceanothus thyrsiflorus). The big leaf maple (Acer macrophyllum) occurs both in the riparian zone and in the wetter sites up the slope in the Mixed Evergreen Forest. Mature trees stand 100 feet tall or more and occur in dense stands with 70-100% canopy cover.

MAP OF VEGETATION

FIGURE 9-1





New San Clemente Reservoir
1 Grassland
2 Chamise Chaparral
3 Riparian
4 Oak Woodland
5 Coastal Chaparral
6 Mixed Evergreen Forest
C Cleared Land (Rock)
R Redwoods
M Marsh
A Alluvial Deposits
Water
16,000 Acre-feet Storage Elevation 617.0
20,000 Acre-feet Storage Elevation 633.0
29,000 Acre-feet Storage Elevation 662.0
Carmel River
FEET 0 500 1000 2000

Dense brush and herbaceous cover occur under the tree canopy. In the San Clemente Reservoir area this forest type is most prevalent on the north and east facing steep slopes.

Oak Woodland. On the more level topographic areas of old alluvial terraces, many of the tree species of the Mixed Evergreen Forest thin out and the oaks Q. wislizenii and Q. agrifolia) dominate. The California bay and California buckeye are scattered among the oaks as are brush species. The oak trees are 15-70 feet tall and range for dense stands of 70-100% canopy cover to open savannah-like areas with grasslands between the trees.

Redwood Stands. Spotted along the Carmel River canyon and its tributaries are pure stands of coast redwoods Sequoia sempervirens). These stands range in size form less than 10 trees to more than 30 or 40 trees in an area. The largest stand is along San Clemente Creek at about the 700-foot elevation (see Figure 9-1). The brush and herbaceous understory is rather limited under these redwoods due to the dense canopy cover and thick layer of duff on the ground. Because of this unique habitat, the vegetation associated with these redwood stands is unique when compared to the much more extensive Mixed Evergreen Forest and Oak Woodland communities in the study area.

Brushlands. On the dryer south- and west-facing slopes of the canyon, the vegetation is dominated by brushlands with occasional pockets of oak trees near the adjacent Mixed Evergreen Forest and Oak Woodlands. These brushlands, typical of regions with Mediterranean-like climate, may extend from the ridgetops down to the riparian zone along the river and its tributaries. Two types of brushland occur on the slopes in the San Clemente Reservoir vicinity -- Coastal sage scrub or "soft" chaparral and chamise chaparral or "had" chaparral.

Coastal Sage Scrub. This plant community typically occurs below the Chaparral, but in this area it is found on the steep slopes with the shallowest and rockiest soils. The brush is one to five feet tall, and, because of the rocky ground, forms a more open community. This vegetation is sometimes referred to as "soft chaparral" because many of its dominant species are not as woody or as large as the chamise chaparral. The dominant species include California coastal sage (Artemisia californica), black sage (Salvia mellifera) and Northern monkeyflower (Mimulus aurantiacus).

Chamise Chaparral. Chamise chaparral or "hard" chaparral is a dense, often impenetrable brushland of three to ten feet in height. In the San Clemente Reservoir area chamise (Adenostoma fasciculatum) is the most dominant plant, forming pure stands in some sites. Other common species include wild mountain lilac (Ceanothus sp.), Christmas berry (Heteromeles arbutifolia) and chaparral honeysuckle (Lonicera interrupta).

Lower and Middle River Vegetation

The vegetation communities of concern in this portion of the study area, from Camp Stephani to the mouth of the river, are limited to the areas of the river alluvial flood plain and the river mouth. The project alternatives are expected to have little if any effect upon the biotic habitats on the surrounding upland areas. The alternative ar expected to change the flows downriver of the dam which would have an effect upon the development of the vegetation in the river flood plain, and at the mouth of the river. The principal native vegetation communities in this portion of the study area are various riparian communities within the flood plain, and a marshland at the river mouth.

Carmel River Lagoon. There is a brackish water marshland at the river mouth. This marshland is within the Carmel River State Beach and is designated as a natural preserve. The marsh vegetation is composed of five distinct zones: California tule (Scirpus californicus); pickleweed mosaic; silverweed-rush (Potentilla-Juncus); highground transition; and riparian.[4]

The California tule zone is composed of virtually pure stands of this brackish water plant and is well defined along the banks of the river channel and sloughs. This vegetation zone is a key element of the marsh community because of the large area it covers and its value as a food and cover plant for wildlife.

The pickleweed mosaic is a complex of saltwater marsh species that dominate the low-lying areas between the California tule and the somewhat higher silverweed-rush community. This community is believed to be a product of alkaline buildup in the soils due to less freshwater flushing. The habitats nearer the river channel are flushed more often with fresh water flows in the river, thereby diluting the alkalinity of these habitats. The dominant plant species typically associated with saltmarsh communities and found in the marsh were jaumea (Jaumea carnosa), saltgrass (Distichlis spicata var. spicata), pickleweed (Salicornia virginica), and fat hen (Atriplex patula).

The silverweed-rush zone occurs in the higher reaches of the marsh. The silverweed (Potentilla egedii var. grandis) carpets large areas of the marsh. Wire grass (Juncus balticus), and spike rush (Eleochris macrostachya) also dominate areas in the marsh.

The upland habitats within the marsh are limited in extent and are dominated by blackberry thickets, coyote brush (Baccharis sp.), and ice plant (Carpobrotus sp.). These upland areas may be areas where fill was placed at some point in the past. At the east end where the river channel enters the marsh, the channel is lined with willow and acacia shrubs.

Riparian Vegetation. There have been a number of reported surveys and studies on the vegetation associated with the Carmel River flood plain.[5] The vegetation is classified as riparian, a vegetation community that is associated with water courses. The riparian vegetation of the Carmel River is typical of waterways in the Central Coastal region of California. Past urban development and agricultural practices within the valley have effectively limited the native riparian vegetation to the immediate banks of the river (seldom no more than two tree crown diameters wide) in many places. These land use practices, in combination with natural processes and other human disturbances and alterations of the river environment, have created a mosaic of plant associations and habitat types. Nine riparian habitat types were described for an avian survey conducted in 1987 for this report (see Appendix C1) and are briefly summarized below.

The lower portion of the river (river mile 1 to 5) supports a well developed riparian forest. This forest is dominated by large deciduous trees (30-60 feet tall) with overlapping canopies. The dominant tree species is the cottonwood with sycamores and willows scattered throughout. The understory varies from bare ground or low herbaceous cover (due to recent scouring) to a dense scrub thicket of alders immediately along the banks or common brush species such as poison oak and blackberry.

Riparian woodland or thickets are the most common and extensive habitat type along the river. A woodland is also dominated by large trees; however, unlike the forest type, the canopies do not overlap, and there is a wide range of tree densities. The most common tree species are identical to the forest type. A thicket is very similar to the woodland type except that these are typically dense stands of one or two tree species less than 20 feet in height. Common and dominant species of the thicket type are red willow (Salix laevigata), sandbar willow (Salix hindsiana), cottonwood, and alder. There is a continuum of size and structural complexity between the woodland and thicket types.

Riparian scrub is a common habitat type throughout the middle and lower river. It is most often, however, very limited in extent in any given area. This habitat type is most common on gravel bars. It lacks a well-established tree canopy and is dominated by low shrubs two-ten feet in height. Common and characteristic plant species in this habitat type include mugwort (Artemisia douglasiana), coyote bush (Baccharis pilularis), blackberry, mule fat (Baccharis viminea), and sweet fennel (Foeniculum vulgare). The most extensive stands of this habitat type occur in the middle river section above Garland Park.

The remaining habitat types are scattered throughout the river valley to a much smaller degree. Dry washes and barren gravel bars represent areas that have recently been scoured by the river and all that has developed is low herbaceous growth. There are numerous examples of this habitat type in the river bed areas. Emergent vegetation occurs in and along the shallow borders of deep pools with permanent surface water. Typical plant species include sedges (Carex spp.), rushes (Juncus spp.), bulrush, and cat tail (Typha spp.). At those points where the river bed is closest to the valley walls, the mixed evergreen forest-riparian type, similar to the upper river area, occurs. Remnants of this type also occur on the upper alluvial terraces. Along some small stretches of the river corridor, the native vegetation has been removed and replaced with ruderal or non native vegetation. Eucalyptus groves, grass covered banks and new rip-rap areas are examples of this habitat type.

Riparian communities are highly dynamic. The fluvial geomorphic processes of the river environment constantly create changes in these vegetation communities. The existing habitat types on the Carmel River are the result of a number of habitat perturbations, both natural and man made. The normal successional development of a riparian community is dependent upon adequate available water and a suitable substrate.

In general, the successional stages of a riparian community on the Carmel River would consist of willows, cottonwoods, and mule fat in the initial stages, followed by a mixed riparian community of alders, cottonwoods, willows on the river banks and sycamores, oaks, bays and buckeyes on the upper alluvial plains.

At the present time the Carmel River and its riparian vegetation is suffering from a combination of factors and events, including a lack of summertime flows due to diversions at the existing San Clemente dam, impacts of previous dam construction, groundwater pumping, the drought of 1976-77, and urban development. The existing riparian vegetation in the Carmel Valley is but a remnant of what once existed, and it would appear that additional riparian development is possible in the river plain. A more detailed discussion of the successional processes and historical events that have occurred on the Carmel River is provided in Appendix C6.

9.1.2 WILDLIFE

The vegetation communities described above provide a complex of habitat types that support a diversity of resident and migratory wildlife species. This is particularly true along parts of the Carmel Valley. The overall habitat value for wildlife in the Carmel River Basin is enhanced by the diversity and interspersion of habitat types. These areas where habitat types meet provide opportunities for wildlife to utilize elements from both habitat types, and are thus favorable sites for a diversity of wildlife species. There are two habitat types within the study area that are particularly significant in terms of their value to wildlife: the riparian zone along the Carmel River and its larger tributaries, and the marsh at the mouth of the river. Wetlands and riparian habitats in California have been reduced by over 90% through various land management practices. This makes these remaining marsh and riparian areas extremely valuable.

Riparian vegetation is one of the most valuable habitat types for wildlife [illegible] supports the greatest wildlife species diversity in comparison to [illegible] habitats in the study area. It provides nesting, feeding, and [illegible] game and non-game species. The dominate deciduous tree cover [illegible] of leaf litter on the ground. This moist habitat provides [illegible] amphibians, insects and other invertebrates. Many [illegible] dependent upon the waters in the river bed and [illegible] species.

AD-A185 030 ENVIRONMENTAL IMPACT STATEMENT FOR THE NEW SAN CLEMENTE PROJECT MONTEREY..(U) CORPS OF ENGINEERS SAN FRANCISCO CA SAN FRANCISCO DISTRICT SEP 87 3/4

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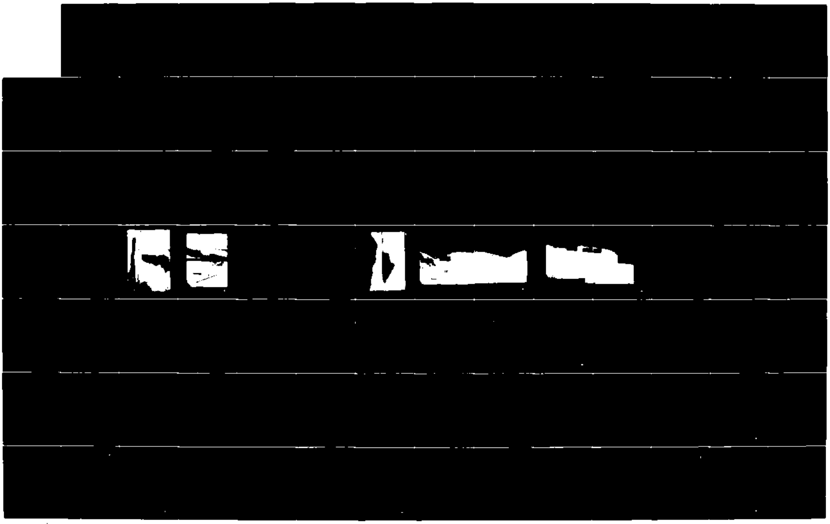

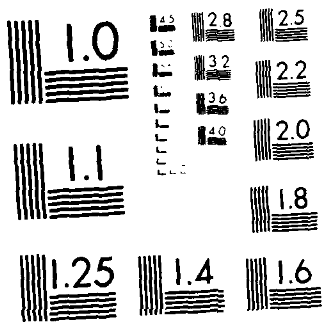

MICROCOPY RESOLUTION TEST CHART

Insectivorous birds such as warblers, common flickers, downy woodpeckers, flycatchers, phoebes, and small mammals such as shrews, voles, bats, and skunks utilize this food supply. The burrowing species utilize the cover provided by the thick litter duff and friable sandy soils to nest in. The herbaceous and shrub undercover provide cover and nesting habitat. Seed-eating birds feed on the large volumes of seed produced by many of the plant species including the willow, alder, cottonwood, sycamore, and oaks as well as the berries produced by many of the brush understory species.

Certain raptors or birds of prey that commonly occur in higher concentrations in riparian habitats include horned owls, kestrels, black-shouldered kites, and red-tailed hawks. The Coopers hawk is heavily dependent upon riparian systems for its survival. Other raptor species that commonly winter in the area and include sharp-shinned hawks, marsh hawks, osprey, and bald eagles which feed upon the fish in the river and in the reservoir.

Large mammals such as black-tailed deer, fox, coyote, and bobcat range through the area and utilize the riparian zone as a food source as well as an important source of water.

The marsh habitat at the mouth of the river provides a high quality habitat for migratory waterfowl and shorebirds. Herons and rails occur in the marsh throughout the year and the Virginia rail nests at the river mouth. There have been a number of unusual bird sightings reported from the lagoon and marsh area. Birding experts consider this area to be a "vagrant trap," an area where bird species are often seen outside their normal ranges.[6] The marsh is a favorite birding site in the region.

Marshlands of this type are also valuable habitat areas for benthic invertebrates and fishery resources. Amphibian and reptile populations in the area are limited.[6]

The other upland communities also provide valuable wildlife habitat for game and non-game species including mountain lion, wild pig, rabbits, California and mountain quail, and black-tailed deer. The U.S. Fish and Wildlife Service (USFWS) has initially determined that these upland habitat areas are of lesser value to wildlife and more plentiful on a state-wide basis when compared to other habitat types in California.[7]

The following is a brief discussion of some of the wildlife types in the study area.

Avian

Avian abundance and diversity varies directly with the abundance and diversity of vegetation. Even a narrow strip of riparian woodland in the lower river, similar to the natural extent of riparian woodland in the upper river, supported an average of 25 more species than a streambank with no such woodland. In those areas where a wider woodland occurred on the alluvial plain, similar to the north-facing slopes of the upper river where the riparian and oak woodlands merge, there was a further increase in abundance and diversity of bird species. Appendix C2 lists all the bird species observed in the study area.[8,9]

Amphibians and Reptiles

Riparian ecosystems provide habitat for an estimated 83% of the amphibians and 40% of the reptile species in California.[10] Amphibians are water-dependent for breeding and respiration and thus are most likely found in and around the riparian areas. Although reptiles are not generally as dependent on moist habitats as amphibians, many use the habitat. Appendix C3 lists all the herptofauna either observed or expected to occur in the study area.

Mammals

There are 51 mammal species within the Carmel Drainage System.[10] Forty-four of these fifty-one species are closely associated with the riparian community, while the others are believed to prefer upland habitats, such as the brushland communities. Appendix C4 lists the mammal species expected within the study area.

Endangered and Threatened Species

Pursuant to Section 7 (Consultation Procedures) of the Federal Endangered Species Act, the following actions were completed. The U.S. Army Corps of Engineers requested from the USFWS a list of endangered species that could potentially be affected by the proposed project. The USFWS identified five endangered or threatened plant and animal species that are known to occur or might occur in the project area.[11] Following receipt of this species list, the Corps designated the MPWMD as the non-Federal representative for the Section 7 consultation. A series of meetings and written communications between the USFWS and the MPWMD established an agreeable survey method for the only listed species identified in the USFWS letter, the least Bell's vireo. A specific survey for this endangered species was conducted and the Biological Assessment in the form of this EIR/EIS will be submitted to the Endangered Species Office of the USFWS. None of the species listed by the Service were observed during the field surveys conducted in the study area. A peregrine falcon was observed in the area of the existing reservoir in 1985. The following is a brief discussion of each of the rare species noted above.

Least Bell's Vireo (Vireo bellii pusillus). This small passerine bird is classified as endangered by the USFWS. It was once considered common to abundant in riparian ecosystems throughout much of California, but is now limited to just 300 breeding pairs in California.[12] The decline of this bird is believed to be related to the loss of riparian habitat throughout the state and increased parasitism by the brown-headed cowbird. There does not appear to be any published information indicating that this bird ever nested on the Carmel River.[13] The least Bell's vireo was known to occur on the Salinas River in southern Monterey County in the first part of this century. Subsequent surveys in the 1970s did not locate the species, however, a small breeding population was rediscovered in the early 1980s around Bradley.[14,15] Because there appeared to be suitable habitat for the species on the Carmel River, and vagrant males have been sighted in the Monterey Peninsula area, it was required that a specific survey be conducted.[16] No least Bell's vireos were found during this survey effort. The best potential habitat for this rare bird occurs near and just downstream of the Cal-Am water filter plant. The entire survey report is presented in Appendix C1.

Black Legless Lizard (Anniella pulchra nigra). The black legless lizard is classified as a species of special concern by the California Department of Fish and Game (CDFG), and is a candidate for listing by the USFWS. It has a limited range extending from Monterey to Morro Bay. Its preferred habitat is sand dunes or river washes where there are clumps of beach grass, bush lupins, or other shrubs. This lizard is present in the immediate vicinity of the Carmel River Lagoon.[17] The proposed project is expected to have very little if any effect upon the preferred habitat of this species (see Section 9.2.1) and thus a specific survey effort for this lizard was not conducted.

Peregrine Falcon (Falco peregrinus). This bird is classified as endangered by both the USFWS and the CDFG. It is a rare migrant and winterer, and very rare breeder in

Monterey County. This bird was once much more common in the Monterey area; however, its numbers have decreased due to pesticide poisoning, shootings, and nest-robbing for falconry. A recent effort to protect known nests and a captive-bird release program has successfully reversed the downward trend. The historical and known existing nesting areas in Monterey County are along the coast and in wilderness areas, and does not include the Carmel River drainage.[18]

Peregrine falcons may occur throughout Monterey County but are most often seen in areas which have flocks of shorebirds or ducks. These birds typically breed near marshes, lakes, rivers or other water features, and on ledges or potholes on high cliffs with a commanding view. They will nest occasionally in tree hollows or in old raptor nests. Peregrine falcons have a cosmopolitan distribution pattern, and occur in a wide variety of habitats.[19]

A male bird was observed in flight and perched on a large sycamore snag in the vicinity of the existing San Clemente Reservoir in 1985. This bird may have been migrating through the area or may have been wintering in the area. It is unlikely, although possible, that it breeds in the area, because there are no cliff areas in the immediate vicinity of the reservoir.

Eastwood's Goldenweed (Ericameria fasciculata). This stout dense shrub is a Monterey County endemic that is restricted to the sand dunes and coastal strand of Monterey and Carmel Bays. It is classified as a candidate for listing by the USFWS, and has sufficient biological information to support a proposal to list at the present time. The proposed project is expected to have very little, if any, effect upon the preferred habitat of this species (see Section 9.2.1), and thus a specific survey effort for this plant was not conducted. A limited survey of the immediate dunes at the mouth of the Carmel River did not locate this plant.

Carmel Valley Bush-mallow (Malacothamnus palmeri var. involucratus). This perennial shrub grows from 3-6 feet in stature. It has a limited distributional range between Monterey and San Luis Obispo Counties. It is classified as a candidate species that requires further study before a final ruling on its legal status can be made. It favors brushland habitats and is reported to be common after a burn.[20] Although this plant has been found in the Carmel Valley, it is also reported to be much more common in the Jolon area and on the Salinas Valley side of the Santa Lucia Mountains.[21] During the field surveys for this report, known localities for this plant were visited throughout its blooming season. This plant was not located within the project study area, however, suitable habitat does appear to occur in the area and isolated individuals may occur within the reservoir inundation area.

Carmel Valley Malacothrix (Malacothrix saxatilis var. arachnoidea). This plant is classified as a candidate for listing and requires further study before a final ruling on its legal status can be made. It is a Carmel Valley endemic commonly occurring on road cuts or outcrops of Monterey shale. During the field surveys for this report, known localities for this plant were visited throughout its blooming season. This plant was not located within the project study area. Suitable habitat, Monterey shale, does not occur in the reservoir inundation area or in other areas of disturbance. This plant was, however, found in close proximity to one of the proposed alternative riparian mitigation areas.

9.2 PROJECT OPERATIONS: IMPACTS AND MITIGATION MEASURES

9.2.1 ALTERNATIVE A: 29,000 AF RESERVOIR

Impacts

The 29,000 AF New San Clemente Dam and Reservoir would eliminate approximately 350 acres of native vegetation and wildlife habitat. The estimated acreage of each habitat type that would be inundated by the 345 acre (surface area) reservoir is presented in Table 9-1. The dam and associated features would eliminate another three acres of native vegetation and wildlife habitat.

As the reservoir begins to fill for the first time, animals will move out of the inundation area and onto adjacent lands. Some of these species would be able to populate suitable habitats in the surrounding areas provided that the surrounding areas are not already fully occupied or at carrying capacity. When the surrounding areas are at or near capacity, competition for food, increased predation and disease would reduce the successful relocation of some species. It is very difficult to estimate how many of the wildlife species now residing within the reservoir area would be able to avoid being impacted by

TABLE 9-1

HABITAT LOSS DUE TO RESERVOIR INUNDATION
(SURFACE ACRES)

	Alternative Project Reservoirs		
Vegetation Community	16,000 AF	20,000 AF	29,000 AF
Grassland (G)	2.5	3.0	6.5
Coastal Chaparral (SC)	16.0	18.5	22.0
Oak Woodland (OW)	22.5	34.5	55.5
Riparian Woodland (R)	21.5	25.0	31.0
Chamise Chaparral (CC)	21.5	25.0	31.0
Mixed Evergreen Forest (ME)	95.0	109.0	138.0
River Alluvium (A)	30.5	30.5	30.5
Existing Reservoir	30.5	30.5	30.5
Total	240.0	276.0	345.0

the loss of habitat. A safe assumption would be that the surrounding lands are at or near the same population levels as the inundation areas, and any additional competition for food and cover would probably result in some reduction in population levels for the area as a whole.

The reservoir would inundate and eliminate approximately 30 acres of riparian habitat, a habitat type of greater value and significance when compared to the other terrestrial habitats in the reservoir area. The USFWS has identified this habitat type as a resource of relatively high wildlife values and placed it into Category 2, or a habitat for which the goals of the agency is to have no net loss of in-kind habitat values.[22]

It is possible that the proposed reservoir would inundate and destroy undiscovered populations of the Carmel Valley bush-mallow; however, it is suspected that any populations that may occur in the area would be small given the fact that the plant was not discovered in the field surveys conducted to date and that the plant is reported to be more common the the Salinas side of the Santa Lucia Mountains.

Although the creation of the dam and reservoir would most definitely eliminate 31 acres of riparian habitat in the upper river, other elements of the project are expected to improve riparian habitats in the lower and middle portions of the river. Whereas now diversion from the existing dam and groundwater pumping significantly reduce summertime flows in the river, the 29,000 AF project would maintain a minimum flow at the Lagoon of between 75 cfs and 200 cfs in the winter months, 40 cfs in the spring, and 5 cfs in the remaining seven months in many years. This added water and the associated reduction in groundwater drawdown would provide moisture for seedlings during periods when under existing conditions most seedlings would die. Some areas that would otherwise continue to be devoid of vegetation, or require far more time to develop a riparian community would naturally develop a band of streamside vegetation in response to the added flows and available groundwater.

Although it is not a design element of the project, the larger dam would appreciably reduce the flood flows of a 1.5- to 5-year event. This would reduce the amount of scouring and loss of plant seedlings which would otherwise be washed away under existing conditions. The reduction of flood peaks would affect sediment movement and channel geometry. Over time, the stream channel would tend to narrow to perhaps 40 feet and streamside development of vegetation would move out over the riffle bars and point bars. This would reduce the channel capacity of the river which could increase the flood hazard of the river valley. As a result, it may be necessary to keep some portions of the river channel clear of vegetation (see Chapter 7).

The regulated flows would also reduce the sediment loads of the river and increase the resident line of bedload materials in gravel bars especially near the mouth of the tributaries (see Chapter 7). These point bars would redirect flows to the opposite bank and would increase erosion and loss of vegetation at these points of the river.

A related beneficial impact of Alternative A is that the Carmel River Management Plan would continue beyond its July, 1993 termination date. The New San Clemente project would fund the continuation of the CRMP as part of a built-in mitigation package. An additional 15-20 acres of degraded habitat could be enhanced from 1993 to 2020 by the CRMP.

Although the project would provide an increased municipal water supply for communities on the Monterey Peninsula and allow for future growth of those cities, urban development is not expected to expand out into the remaining riparian areas in the Carmel Valley. As pointed out in the conceptual mitigation plan (Appendix C6), County ordinance, and federal flood insurance (FEMA) policies restrict development in the 100-year flood plain and prohibit development in the floodway.

The expected changes in the river flows in most years are not expected to have a significant effect upon the marsh habitat at the mouth of the river. Reductions in the peak flows are not expected to be large enough to significantly alter the flows at the river mouth during the rainy season. The added flows during the summer months are expected to result in a minor change in water elevations in the marsh (less than one foot). The added freshwater flows in the summer may result in a slight shift in the vegetation composition in the marsh more towards freshwater species.

In dry years, sediments would be trapped in the lagoon at the mouth of the river because the flows to the mouth of the river would not be high enough to flush a significant amount of these sediments out of the lagoon. The added bedload would tend to fill up portions of the lagoon creating a shallower pool and potentially reducing habitat values in the lagoon.

This impact would last until normal to above normal flows occur at which time the lagoon would be restored as discussed in Chapter 7.

Mitigation Measures

The MPWMD has developed a conceptual mitigation plan in consultation with the various resource agencies (see Appendix C6). In summary, the District is proposing to mitigate for the loss of the upland habitats by providing the resource agencies with a resource management easement over approximately 1,315 acres in two parcels in and around the vicinity of the new reservoir site. The District would purchase this land from Cal-Am and negotiate with the appropriate agency(ies) on a specific resource management easement. This proposal should adequately mitigate for the loss of the upland habitats within the proposed dam and inundation areas, assuming that an agreed upon management plan and easement agreement can be achieved.

The major focus of the conceptual mitigation plan is upon the riparian habitats. In essence the riparian proposal consists of a plan to revegetate degraded areas within the riparian zone in the Carmel River Valley, if deemed necessary to maintain habitat values. To date, the District has identified 26 degraded sites totalling 43 acres that may be candidates for revegetation efforts. These candidate areas range from riffle bar areas to upper alluvial terraces. Some are privately owned while others are in public ownership. All have a sparse vegetation cover. None of these sites are in areas that would be within the scope of the CRMP.

Those sites that are already in public ownership should be targeted for a management easement or purchase because the public would be able to enjoy greater access; costs per acre may also be lower so more funds could be used for actual revegetation efforts.

An evaluation of enhanced riparian habitat values that the 29,000 AF project would produce downstream of the proposed dam and an evaluation of the riparian habitat values that would be lost in the inundation area is needed. If this evaluation determines that the beneficial effects of the project do not adequately compensate for the loss of riparian habitat values within the inundation area, then each mitigation site should be evaluated in terms of its existing habitat values and its potential and expected values after revegetation. This is the manner in which adequate compensation can be determined.

This evaluation process should be conducted in consultation with the various resource agencies.

To assure that there are no significant adverse impacts to the lagoon at the mouth of the river, a monitoring program of two to three years should be initiated after the project is completed. This program should include vegetation and wildlife monitoring. Should significant adverse changes in either vegetation or wildlife in the marsh be observed, and there is reason to believe that these changes are due to the project, corrective actions should be initiated to mitigate these impacts. The specific elements of the monitoring program should be developed in consultation with the California State Parks Department and CDFG.

9.2.2 ALTERNATIVE B: 20,000 AF RESERVOIR

Impacts

The impacts associated with Alternative B are similar to those described for the proposed project except that the area of inundation would be 276 acres as compared to 345 acres for Alternative A. Table 9-1 lists the estimated areas for each habitat type that would be inundated for each alternative. Of most significance would be the loss of 25 acres of riparian habitat (versus 31 acres for Alternative A). Alternative B would increase the dry season flow levels in the downstream river reaches compared to the No Project, but would decrease downstream flows compared to Alternative A.

Mitigation Measures

The same mitigation measures would be suggested for Alternative B as were suggested for Alternative A.

9.2.3 ALTERNATIVE C: 16,000 AF Reservoir

Impacts

The impacts associated with Alternative C are similar to those described for Alternative A. The smaller dam would result in a 240-surface-acre reservoir as compared to 345 acres for Alternative A. Approximately ten less acres of riparian habitat would be low with this alternative (21.5 acres) than would be lost with Alternative A (31 acres), as indicated in Table 9-1.

Alternative C would result in decreased downstream flows during the dry seasons compared to Alternative A, but would increase downstream flows during the dry season compared to the No Project Alternative.

Mitigation Measures

The same mitigation measures would be suggested for Alternative C as were suggested for Alternative A.

9.2.4 NO PROJECT ALTERNATIVE

Impacts

Under the No Project alternative, streamflow in the Carmel River would be reduced to zero during parts of dry years. The lack of streamflow in combination with lowered water tables due to pumping would damage or destroy some of the riparian vegetation during extended dry periods. The frequency of the dominant channel-forming flood would remain the same as under present conditions, as would the rate of sediment transport. However, with continued lowering of groundwater levels and depleted streamflow, riparian vegetation would not recover and might decline further. The lack of bank vegetation would result in continue channel instability and consequent erosion damage. It is also questionable whether the CRMP would continue beyond 1993, as property owners or a future District board must re-authorize the program at that time. If erosion control works or streambank plantings do not continue, the riparian corridor and in-stream habitat could be degraded.

Mitigation Measure

No practical measures exist to lessen or avoid the lack of streamflow and lowered water tables that would occur during dry seasons. The periodic loss of riparian vegetation and consequent loss of channel stability could be made less severe by supplementary irrigation and replanting. However, if the existing mechanism for riparian management, the CRMP, is not continued then erosion control measures would be minimal.

9.3 PROJECT CONSTRUCTION: IMPACTS AND MITIGATION MEASURES

9.3.1 ALTERNATIVES A, B AND C

Impacts

Construction activities would affect wildlife and vegeta'ion in several ways. In addition to the vegetation at the dame site and in the reservoir inundation area that would be permanently lost, additional vegetation would be cleared at the borrow sites and along the access road. If all the borrow areas were to be used, a maximum of five acres of vegetation would be cleared outside the limits of the inundation area. The acreage of each vegetation type of each potential borrow area is shown in Table 9-2. Each of the three potential borrow areas is believed to contain adequate quantities of construction aggregate. The final selection of the borrow site would depend upon the amount of overburden needed to be removed, ease of access, cut-slope stability and environmental considerations including the amount and type of vegetation and wildlife habitats that would be affected.

Some vegetation adjacent to San Clemente Drive between Carmel Valley Road and the entrance to Cal-Am's property would be cleared to improve construction vehicle access. The road would be widened from its present 18 feet up to 30 feet to better accommodate trucks. San Clemente Drive passes through an oak savanna of valley oaks (*Quercus lobata*) and California live oaks (*Q. agrifola*) and through a riparian community along Tularcitos Creek. The most significant potential impacts of road widening would be the removal of mature trees within the oak savanna, vegetation removal and erosion potential at the Tularcitos Creek crossing. Assuming the proposed roadway would follow the centerline of the existing roadway with a six-foot expansion on each side, this would require the direct removal of at least eight mature oak and bay trees (see Table 9-3). Assuming it is possible to expand the roadway from the center line of the existing roadway to avoid the trees, the number of trees that would have to be removed would be two live oaks and one bay tree. In either of the above cases, there must be some limbing of trees to allow truck traffic flow along the expanded roadway.

TABLE 9-2

AREAS OF VEGETATION TO BE REMOVED[1]
IN BORROW AREAS

Potential Borrow Areas	Plant Community		Area Of Impact (acres)
I	Chamise Chaparral (CC)		1.5
	Mixed Evergreen Forest (ME)		0.3
		Total	1.8
II	Chamise Chaparral (CC)		1.0
	Mixed Evergreen Forest (ME)		0.4
	Rock Outcrop[2] (CL)		1.0
		Total	2.4
III	Chamise Chaparral (CC)		0.7
	Coastal Chaparral		0.1
		Total	0.8

[1]The table does include vegetation removed from portions of the borrow areas that lie within the zone of inundation.

[2]Past borrow area for existing dame devoid of vegetation.

Mitigation Measures

The following mitigation measures are suggested:

- o Restoration of topsoil at borrow areas outside the inundation area and reseeding or planting with fast-growing plants compatible with the existing vegetation.
- o Design the widened San Clemente Drive to avoid felling large trees to the maximum extent possible.
- o Implement erosion control measures.
- o Construct traps in drainage channels to remove silt from stormwater or other excess water before discharge to the Carmel River.
- o Reduce width of access road by providing truck turnouts.

9.3.2 NO PROJECT ALTERNATIVE

Impacts

There would be no construction impacts.

Mitigation Measures

None required.

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[1] Williams, John, Habitat Change in the Carmel River Basin, The Carmel River Watershed Management Plan Working Paper No. 1, Monterey Peninsula Water Management District, January, 1983.

[2] Kondolf, G.M. & R.R. Curry, "The Role of Riparian Vegetation in Channel Bank Stability Carmel River, California" in California Riparian Systems, Ecology, Conservation, and Productive Management", 1984.

[3] A slight variation in these definitions occur in that stretch of the river between San Clemente Reservoir and Camp Stephani. Williams includes this stretch in the upper river while Kondolf puts it into the middle river. For purposes of this report this section of the river will be considered within the upper river because there appear to be more physical similarities with the section of river above San Clemente Reservoir.

[4] California Department of Parks and Recreation, Carmel River Lagoon and Wetland Resource Summary, May, 1985.

[5]The studies mentioned include:
Beattie, J.B. and P. Murphy, Vegetation of the Carmel River Valley, Monterey Peninsula Water Management District, October, 1981.

Woodhouse, R., Baseline Analysis of the Riparian Vegetation in the Lower Carmel Valley, January 25, 1983.

Kondolf, G.M. & R.R. Curry (see note 2).

Stone, E.C., The Dynamics of Vegetation Change Along the Carmel River, California American Water Company, March 1971.

Zinke, P.J., The Effects of Water Well Operation on Riparian and Phreatophyte Vegetation in the Middle Carmel Valley, Carmel Valley Property Owners Association, February 14, 1971.

Carlson, F.R. and K.D. Rozell, Carmel Valley Vegetation Study, Monterey County Flood Control and Water Conservation District.

Harvey and Stanley Associates, Inc., Carmel River Riparian Corridor Baseline Study, California American Water Company, January 1984.

[6]California Department of Parks and Recreation, Op.cit.

[7]U.S. Fish and Wildlife Service, 1987.

[8]Williams, M., Avifauna of the Carmel River Riparian Corridor, Monterey Peninsula Water Management District, October, 1983.

[9]Roberson, Don and Robin, Carmel River Bird Survey, 1987.

[10]Monterey Peninsula Water Management District, Riparian Mammals and Herptofauna of Carmel Valley.

[11]Op.cit., U.S.F.W.S., 1987.

[12]U.S. Fish and Wildlife Service, Least Bell's Vireo Management Plan. Unpublished draft, Portland, Oregon, 1986.

[13]Op.cit., Roberson, Don and Robin, 1987.

[14]Goldwasser, S., D. Gains and S.R. Wilbur, "The Least Bell's Vireo in California: A de facto Endangered Race." Am. Birds 34:742-745, 1980.

[15]Roberson, D., Monterey Birds, Carmel: Monterey Peninsula Audubon Society, 1985.

[16] Williams, L., List of the Birds of the Monterey Peninsula Region. Carmel: Monterey Peninsula Audubon Society, 1974.

[17] Op.cit., California Department of Parks and Recreation, 1985.

[18] Op.cit., Roberson, D., 1985.

[19] California Department of Fish and Game, Species Note Unpublished, Sacramento, California, March, 1982.

[20] California Native Plant Society (CNPS), Rare Plant Status Report, 1977.

[21] James Griffin, local botanical expert, phone conversation, January, 1986.

[22] Op.cit., U.S. Fish and Wildlife Service, 1987.

10 CLIMATE AND AIR QUALITY

10.1 SETTING

Climate in the Monterey Region is mild with warm and dry summers and wet winters. Monthly average temperatures in the late fall and winter are in the range of 49° to 55° F rising to the low 60s in the summer. Average summer temperatures are kept low by frequent coastal fog and low clouds. Temperatures are more extreme farther inland. The normal annual precipitation in the Carmel River drainage above the dam site varies from 20 to 40 inches, the higher values occurring in the southern portion of the watershed upstream of Los Padres Reservoir. Year-to-year fluctuations in precipitation are pronounced. Spanish mission records dating back to the 18th century indicate that Monterey County has experienced many severe droughts and extremely wet periods over the past two centuries.[1]

A semi-permanent high pressure cell called the Pacific High in the eastern Pacific region is the basic controlling factor for the climate of the north central coast of California. In the summer, the Pacific High causes persistent west and northwest winds along the coast. Descending warm air in the Pacific High forms a stable temperature inversion over a cool coastal layer of air. Even though this warm air acts as a lid, inhibiting vertical air movement, there is relatively good ventilation because of a strong onshore air flow that passes over cool ocean waters to bring fog and cool air into the coastal valleys.

The prevailing winds are generally from the northwest. At night, as the land cools, the direction of the flow reverses. However, in the hills the complex terrain channels the windflow, creating local conditions which may differ markedly depending on the surrounding topography.[2]

In the fall, surface winds become weak and the marine layer grows shallow, disappearing altogether on some days. The surface air flow then occasionally reverses to a weak offshore movement that limits horizontal disperson of pollutants. Because this relatively stationary air mass is held in place vertically by the Pacific High, pollutants can collect over a period of days. Pollution buildup is further worsened by north or east winds that transport pollutants into the region from either the San Francisco Bay area or the Central Valley.

During the winter months, the Pacific High migrates southward and has less influence on the region. Air frequently flows in a southeasterly direction out of the Salinas and San Benito valleys, especially during the night and morning hours. Northwest winds still dominate in the winter, but easterly flow is more frequent. The general absence of deep, persistent inversions and occasional storm systems usually results in good air quality for the region as a whole in winter and early spring.

Air quality is monitored by the Monterey Bay Unified Air Pollution Control District at a number of locations in the air basin. The monitoring station located nearest to the project site is in Salinas, 15 miles north of the site. Table 10-1 shows the data collected at this station for 1981 to 1985. Applicable state and federal air quality standards are included in Appendix D. The table indicates that air quality in the vicinity of the project is good, and is generally in compliance with air quality standards.

Air quality in the Carmel Valley is influenced by local emissions from traffic, fuel combustion and other nearby sources. Among the major categories of emissions in Monterey County, as a whole, are fuel combustion, waste burning, various industrial processes, motor vehicles, pesticides and natural sources of dust. In the immediate vicinity of the proposed dam the major sources of air pollution are naturally occurring windblown dust, and pollution transported from upwind areas.

Although the air basin is in compliance with most air quality standards, the federal ozone standard has been exceeded in the past in the air basin (including at the Carmel and Monterey stations in 1980). Because of these violations the air basin was designated a

TABLE 10-1

SALINAS AIR POLLUTANT SUMMARY 1981-1985

Pollutant	Standard	1981	1982	1983	1984	1985
Ozone (ppm)[1]						
Highest 1-Hour Average		0.08	0.08	0.08	0.07	0.09
Days > Fed. Std.	0.12	0	0	0	0	0
Days ≥ State Std.	0.10	0	0	0	0	0
Carbon Monoxide (ppm)[1]						
Highest 1-Hour Average		4.0	6.0	3.0	5.0	6.0
Days > Fed. Std.	35	0	0	0	0	0
Days ≥ State Std.	20	0	0	0	0	0
Highest 8-Hour Average		2.9	2.6	2.1	3.0	3.3
Days ≥ Fed./State Std.	9.0	0	0	0	0	0
Nitrogen Dioxide (ppm)[1]						
Highest 1-Hour Average		0.08	0.07	0.06	0.06	0.09
Days ≥ State Std.	0.25	0	0	0	0	0
Sulfur Dioxide (ppm)[1]						
Highest 24-Hour Average[2]		0.02	0.01	0.01	0.01	0.01
Days ≥ State Std.	0.05	0	0	0	0	0
Suspended Particulates (ug/^{3})[3]						
Highest 24-Hour Average		130	84	109	129	106
Days ≥ Fed. Std.	100	2	0	1	1	1
Annual Geometric Mean	60	51.2	43.9	41.3	45.2	46.0

[1]ppm: parts per million.

[2]ug/m^3: micrograms per cubic meter.

Source: California Air Resources Board, Air Quality Data Summary, 1981-1985.

non-attainment area for ozone in the 1982 Air Quality Plan for the Monterey Bay Region. The Federal Clean Air Act requires that all non-attainment areas prepare a Plan that demonstrates attainment of the standard by 1987. The 1982 Air Quality Plan was approved by the MBUAPCD, the San Benito Council of Governments and the Association of the Monterey Bay Area Governments in 1982.[2] The Plan proposes certain additional stationary source controls that are designed to result in compliance by 1987. It also raises technical questions related to the problem of estimating the effectiveness of the required controls. Air quality is discussed further in Chapter 18, Growth and Its Effect on the Monterey Peninsula.

10.2 IMPACTS OF PROJECT OPERATION

10.2.1 ALTERNATIVE A: 29,000 AF RESERVOIR

Impacts

While the 29,000 AF project would have no effect on regional climatic conditions, the enlarged reservoir would alter the climate slightly in its immediate vicinity. The local effects stem from the fact that the large body of water would exert a moderating influence on temperature. During hot summer days, the mass of cool water in the reservoir would lower the air temperature above it. On cold winter nights, the water mass would warm the air. Studies at other reservoirs suggest that the moderating influence would result in air temperatures downwind of the reservoir less than 1° F different from upwind air temperatures most of the time, although the temperature difference could be as much as 5° F under extreme circumstances.[3] The humidity of air passing over the water may also be increased slightly. No reports were found in the literature that indicate that the humidity rise is sufficient to increase the frequency of fog.

Operation of the proposed project facilities would have no discernable impact on local or regional air quality.

Mitigation Measures

Because the impacts are judged to be insignificant, no mitigation measures are suggested.

10.2.2 ALTERNATIVE B: 20,000 AF RESERVOIR

Impacts

The climatic impacts resulting from a smaller reservoir would be similar to those described in Section 10.2.1, only lessened somewhat because of the smaller surface area and volume of water impounded. Again, there would be no discernable impacts on local or regional air quality.

Mitigation Measures

None necesary.

10.2.3 ALTERNATIVE C: 16,000 AF RESERVOIR

Impacts

The impacts resulting from implementation of this alternative would be similar to those described in Section 10.2.1, only again lessened somewhat because of the smaller surface area and volume of impounded water. Again, there would be no discernable impacts on local or regional air quality.

Mitigation Measures

None necessary.

10.2.4 NO PROJECT ALTERNATIVE

Impacts

Implementation of the No Project Alternative would have no discernible impacts on climate or air quality.

Mitigation Measures

None necessary.

10.3 IMPACTS OF PROJECT CONSTRUCTION

10.3.1 ALTERNATIVE A: 29,000 AF RESERVOIR

Impacts

Short-term air quality impacts would occur from the construction of the 29,000 AF Project. Increased exhaust emissions from motor vehicles and machinery would occur on the site and along the access road. Increased emissions of particulate matter would occur as a result of earthmoving and concrete operations on the site, traffic on unpaved access roads, blasting and rock-crushing.

The transportation analysis indicates that during construction there would be an average increase of about 460 vehicle trips per day, including 60 truck trips. The travel of these vehicles over the unpaved roads at the site would generate a considerable amount of dust and could cause violations of the state and federal 24-hour standards governing concentrations of particulate matter. Vehicle exhaust would also contribute to local and regional pollutant concentrations, but the amount of the increase would not be significant and would not cause any air quality standards to be violated. The estimated tonnage of air pollutants emitted by construction vehicles is shown in Table 10-2. These emissions would not be expected to affect air pollutant monitoring stations more than a few miles downwind.

Onsite activities would also be a significant dust generator that would cause violations of the 24-hour average particulate standards. The emissions would be highest during earth movement, grubbing and concrete operations. Although the equipment and vehicles would also produce emissions due to fuel combustion, the quantities involved would not be significant and would not result in violations of any other air quality standards. It is not possible to accurately estimate the exact particulate concentrations that would occur onsite or adjacent to the roadways because of the complexity of meteorological and topographical conditions, variations in soil silt and moisture content, and the difficulty in estimating exact source strengths.

Clearing and grubbing operations would occur over the areas that would be inundated by the proposed reservoir. The spoils from this operation wou'd most likely be disposed of by

TABLE 10-2
SAN CLEMENTE DAM CONSTRUCTION AIR POLLUTION EMISSIONS[1]
(Cars and Trucks)

Pollutant	Tons Per Day
Carbon Monoxide (CO)	0.094
Hydrocarbons (THC)	0.009
Oxides of Nitrogen (NOX)	0.050
Oxides of Sulphur (SOX)	0.006
Particulates (TSP)	0.031

[1] Assumes 30 trucks and 200 cars per day over a 24-mile route, round trip. Emission factors were derived from the California Air Resources Board EMFAC 6D.

burning. Because several tons of spoils per acre would be burned, substantial amounts of particulates, carbon monoxide, sulfur dioxide, and oxides of nitrogen would be released to the atmosphere. It is difficult to accurately predict the amount of pollutants released or the concentrations that would be encountered downwind. The site would most likely be cleared during the summer months, and the spoils would be placed in numerous piles. The burning of these spoils piles would then take place during the winter months when more control would be had over the burn and the wind speeds are greater, facilitating dispersion of the smoke plume. Several piles would likely be ignited when conditions were favorable, and burning activities could continue for about one month.[4]

Mitigation Measures

The following measures are suggested to reduce dust generation:

- Watering of exposed earth surfaces at the construction site
- Paving or oiling of access roads.

In addition, carpooling, vanpooling, onsite trailer camps for workers or other measures that would reduce project-generated motor vehicle travel would produce minor air quality benefits. All vehicles should be properly maintained and pollution control equipment should be inspected periodically.

A timber harvest plan would be prepared for the final engineers report. This plan would comply with all state and local regulations regarding timber harvest and burning. Burning activities would most likely be spread out over a one month period, and would occur during the winter months. Burning would occur only when meteorological conditions were favorable and when the prevailing winds would disperse the smoke plume over unpopulated areas.

10.3.2 ALTERNATIVE B: 20,000 AF RESERVOIR

Impacts

The short-term construction impacts on air quality resulting from the implementation of Alternative B would be essentially the same as those described in Section 10.3.1. Alternative B would have a somewhat lesser impact because of the shorter duration of construction activities, about 1 to 2 months shorter.

Because of the lesser amount of lands to be inundated, less spoils would need to be burned than for Alternative A. This would lead to a lesser amount of air pollutants emitted than for Alternative A.

Mitigation Measures

The mitigation measures suggested in Section 10.3.1 would be suggested here also.

10.3.3 ALTERNATIVE C: 16,000 AF RESERVOIR

Impacts

The short-term construction impacts on air quality resulting from the implementation of Alternative C would be essentially the same as those described in Section 10.3.1.

Alternative C would have a lesser impact than Alternative A because of the shorter duration of construction activities, about 2 to 3 months shorter.

The 16,000 AF reservoir would inundate the least amount of land and would therefore have the least amount of spoils burned of the three NSC project alternatives.

Mitigation Measures

The mitigation measures suggested in Section 10.3.1 would be suggested here also.

10.3.4 NO PROJECT ALTERNATIVE

Impacts

Implementation of the No Project Alternative would have no short-term impact on climate or air quality, because no major construction is proposed and no spoils burning would be necessary.

Mitigation Measures

None necessary.

[1] Tavernetti, A.A., 1974, The Rainfall of Monterey County, Agricultural Extension Program, Salinas, California.

[2] 1982 Air Quality Plan for the Monterey Bay Region, Monterey Bay Unified Air Pollution Control District, San Benito County Council of Governments, Association of Monterey Bay Area Governments, Salinas, California, 1982.

[3] Gregory, S. and K. Smith, Local Temperature and Humidity Contrasts Around Small Lakes and Reservoirs, December 1967.

[4] James E. Greig, Consulting Forester, personal communication, 19 August 1987.

11 TRAFFIC[1]

11.1 SETTING

The site of the new dam can be reached from San Clemente Drive, a private road that extends to the existing dam from Carmel Valley Road. There is no other road by which vehicles can reach the site.

Carmel Valley Road extends about 50 miles from Highway 1 in Carmel to Highway 101, in Greenfield. From its intersection with Highway 1, Carmel Valley Road varies from a two-lane road with unimproved shoulders, and a two-lane road with improved shoulders to a four-lane divided road with a planted, curbed median.

Traffic control on Carmel Valley Road is generally exercised by stop signs on entering streets. The intersection of Carmel Valley Road and Carmel Rancho Boulevard is controlled by a multi-phase traffic signal providing left-turn phasing for east- and westbound vehicles. Carmel Valley Road is controlled by a yield sign at the T-intersection with Highway 1. However, at this intersection turning movements are limited to northbound right turns and southbound left turns from Highway 1 to Carmel Valley Road and westbound right turns from Carmel Valley Road to Highway 1. In order to travel south on Highway 1 from westbound on Carmel Valley Road, it is necessary to make a left turn at Carmel Ranch Boulevard, a right turn at Rio Road and then a left turn at Highway 1.

Traffic counts conducted by the County of Monterey in 1982 on different sections of Carmel Valley Road are shown in Table 11-1. It is apparent that there is little through traffic on Carmel Valley Road. The trip between Carmel and Greenfield can be more easily made using Highways 68 and 101. Most of the traffic on Carmel Valley Road between Highway 1 and the proposed dam site enters and leaves via Highway 1 or is purely local.

The heaviest traffic on the section of Carmel Valley Road between Highway 1 and the dam site that would be affected by construction vehicles occurs east and west of its intersection with Carmel Rancho Boulevard. The majority of the traffic is generated by commercial development near this intersection. Traffic volume on Carmel Valley Road near the dam site is 1,600 vehicles per day.

No classification count has been made of the mix of vehicles using Carmel Valley Road; however, using California Department of Transport information supplemented by observation it is estimated that 3.5% of the vehicles are trucks. Of this percentage 8-10% are larger than four-axle vehicles.

TABLE 11-1

AVERAGE DAILY TRAFFIC VOLUMES ON CARMEL VALLEY ROAD[1]

Section	All Vehicles	Trucks	Trucks With More Than Four Axles
State Highway 1 to Carmel Rancho Blvd.	17,400	609	55
Carmel Rancho Blvd. to Rio Vista Dr.	19,000	665	60
Rio Vista Drive to Schulte Road	14,000	490	44
Schulte Road to Robinson Canyon	11,000	385	35
Robinson Canyon to Miramonte Road	7,400	259	23
Miramonte Road to Los Laureles Grade	7,800	273	25
Los Laureles Grade to Esquiline Road	9,000	315	28
Esquiline Road to Cachagua Road[2]	1,600	56	5
Cachagua Road to Martin Road	600	21	2

[1] Average daily traffic volume is the average number of vehicles passing a particular spot each day irrespective of travel direction.

[2] San Clemente Drive intersects Carmel Valley Road in this section.

11.2 IMPACTS OF PROJECT OPERATION

11.2.1 ALTERNATIVES A, B, AND C: NEW SAN CLEMENTE PROJECT

Impacts

New San Clemente Dam would be visited by operation and maintenance personnel with about the same frequency as is the existing dam; that is, twice each day. During the winter and spring months, a small truck would travel San Clemente Drive between the toe of the new dam and the reservoir conveying trapped steelhead above the dam. Public vehicular access to the reservoir area would be prohibited. Thus, once construction is complete, the new dam would not affect traffic flow on Carmel Valley Road, San Clemente Drive or any other street.

Mitigation Measures

None necessary.

11.2.2 NO PROJECT ALTERNATIVE

Impacts

The No Project Alternative may include a dredging operation for the existing San Clemente Reservoir, and numerous additional vehicle trips could be associated with this operation. The existing dam is visited twice a day by operation and maintenance personnel, and these visits would continue.

Mitigation Measures

None suggested.

11.3 IMPACTS OF PROJECT CONSTRUCTION

11.3.1 ALTERNATIVE A: 29,000 AF RESERVOIR

Impacts

During project construction, traffic volumes on Carmel Valley Road and San Clemente Drive would increase. About 60 truck trips each day, 30 in each direction, would be necessary to transport construction materials and equipment to the dam site. All trucks would use Carmel Valley Road and San Clemente Drive to reach the site and would travel during daylight hours only. San Clemente Drive (including the Tularcitos Creek Bridge) would be widened and improved during construction in order to accommodate heavy trucks and equipment. The road would be returned to its original condition once construction is complete, but the bridge would remain improved.

Because roller-compacted concrete must be placed continuously, work at the site during this approximately 7-month phase would proceed around the clock. At the peak of construction work, about 300 persons would be employed at the site on a daily basis, although only 100-125 persons would be working at any particular time, assuming three eight-hour shifts. Assuming all the workers live offsite and that 1.5 persons occupy each commuting vehicle, 460 total trips each day would be added to traffic volumes on Carmel Valley Road during the peak construction period. It is assumed that all of these trips would occur on Carmel Valley Road between State Highway 1 and the site, although it is possible that a few workers might use Los Laureles Grade from Highway 68. Average daily traffic volumes on Carmel Valley Road would be increased by about 20% near the dam site. The percentage increase would decline, moving westward, to a value of 2% at the Carmel Valley Road/State Highway 1 intersection.

Performance of a road system can be evaluated on the basis of Level of Service (LOS) provided during the heaviest traffic flow. At present, Carmel Valley Road west of Esquiline Road provides a Level of Service B, which corresponds with relatively unimpaired traffic flow. East of Esquiline Road, near the dam site, Carmel Valley Road provides a Level of Service A, or completely free traffic flow. With the addition of the trucks and commute vehicles associated with dam construction, the Level of Service on Carmel Valley Road west of Esquiline Road would drop to Service C, a stable flow condition but one at which drivers' choices of speed and maneuverability are limited by the traffic volume. East of Esquiline Road, the Level of Service would remain unchanged. Monterey County Transportation Commission has indicated that, in its view, Level of Service C or better should be maintained to provide optimum driving conditions on roads in the County.

Although the percentage change in average daily traffic volumes resulting from the 29,000 AF project would be small, particularly west of Esquiline Road, the additional truck traffic would be noticeable. The impact would be primarily visual, however, and would not materially affect traffic flow, although the extra vehicles would be clearly noticeable to residents of Sleepy Hollow Subdivision and could pose a safety hazard to children.[2] Traffic resulting from a shift change at or near midnight might also be noticeable because existing traffic flows at that time are light.

East of Carmel Valley Village, Carmel Valley Road becomes narrow and winding. It might prove difficult for the larger trucks to negotiate some small radius turns. Pilot vehicles or flagmen may be needed to reduce the risk of accidents.

The areas to be inundated would need to be cleared and grubbed prior to filling the reservoir. Timber harvesting could generate numerous lumber truck trips while the lumber and firewood was being transported out from the reservoir site.

Mitigation Measures

The following measures are suggested to mitigate the effects of project construction on traffic flow on Carmel Valley Road.

- The number of workers' vehicles using Carmel Valley Road could be reduced by establishing a work camp at or near the site, or by using shuttle buses.
- Trucks could be prohibited from traveling to the site during peak traffic flow periods.
- Trucks traversing the narrow and winding section of Carmel Valley Road near the dam site could be accompanied by a flagman or pilot vehicle.

The following possible mitigation measures have been discussed by the District and homeowners in Sleepy Hollow subdivision to lessen imacts on San Clemente Drive.

- The bridge near the entrance will be rebuilt
- The entrance from Carmel Valley Road could be reconfigured
- Turnouts could be provided at intervals

- o Any displaced utilities could be placed underground
- o The roadway could be restored to its original condition when construction is complete
- o Twenty-four hour security could be provided at the entrance
- o Restrictions on construction vehicle speed and timing could be imposed
- o Workers could be driven to the site in buses or vans rather than in private automobiles
- o Trash generated by construction activities could be regularly picked up and any other necessary maintenance undertaken
- o Temporary fencing could be erected between houses and the roadway to enhance safety and privacy.

11.3.2 ALTERNATIVE B: 20,000 AF RESERVOIR

Impacts

The impacts on traffic from Alternative B would be quite similar to those described for Alternative A. Mobilization and demobilization of equipment would occur, and crew sizes would be about the same. Truck traffic would be limited to daylight hours only. The duration of construction activities would likely be shorter by about one to two months.

A lesser number of lumber truck trips would be involved than with Alternative A because of the lesser area that would need to be cleared.

Mitigation Measures

The mitigation measures suggested in Section 11.3.1 would apply here also.

11.3.3 ALTERNATIVE C: 16,000 AF RESERVOIR

Impacts

Impacts on traffic from Alternative C would be similar to those described for Alternative A. Because this alternative involves the construction of a smaller dam, the duration of construction activities would likely be about two to three months shorter than that for the 29,000 AF project.

Alternative C would have the fewest lumber truck trips of the three New San Clemente alternatives because it would necessitate the least amount of land clearing.

Mitigation Measures

The mitigation measures suggested in Section 11.3.1 would apply here also.

11.3.4 NO PROJECT ALTERNATIVE

Impacts

No construction-related traffic impacts would result from this alternative.

Mitigation Measures

None necessary.

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[1] Traffic information was drawn from Herman Kimmel and Associates, Inc., Traffic Engineering Analysis, Proposed San Clemente Dam Project, February 1984 (Revised Preliminary Draft).

[2] Personal communication to MPWMD Manager from Fred Slabaugh, Sleepy Hollow Homeowners Association, February 12, 1985.

12 NOISE[1]

Environmental noise is measured in decibels (dB). The A-weighted decibel (dBA), refers to a scale of noise measurement which approximates the range of sensitivity of the human ear to sounds of different frequencies. On this scale, the normal range of human hearing extends from about 3 dBA to about 140 dBA. A 10 dBA increase in the level of a continuous noise represents a perceived doubling of loudness; a 2 dBA increase is barely noticeable to most people.

Human response to noise is subjective, and varies considerably from individual to individual. The effects of noise can range from interference with sleep, concentration, and communication, to physiological and psychological stress, and, at the highest levels, to hearing loss. The sound level of speech is typically about 60 to 65 dBA. Sleep disturbance occurs when interior noise levels exceed 40 to 50 dBA.

Environmental noise fluctuates in intensity over time and several descriptors of time-averaged noise levels are in use. The three most commonly used are Leq, Ldn, and CNEL. Leq, the energy equivalent noise level, is a measure of the average energy content (intensity) of noise over any given period of time. Ldn, the day-night average noise level, is the 24-hour average of the noise intensity, with a 10 dBA "penalty" added for nighttime noise (10:00 PM to 7:00 AM) to account for the greater sensitivity to noise during this period. CNEL, the community equivalent noise level, is similar to Ldn, but adds an additional 5 dBA penalty to evening noise (7:00 pm to 10:00 pm). In situations where vehicles are the dominant source of noise, Leq for the peak commute hour, Ldn and CNEL of the same noise source usually differ by less than 2 dBA.

12.1 SETTING

The proposed projects would affect noise levels near the dam site and near roads that would be used by construction traffic. Noise levels at nine sites in the vicinity of the dam, the borrow areas and the construction haul road were measured in December, 1983 and are shown in Table 12-1. Noise levels are generally low, particularly at the two sites in Sleepy Hollow subdividion least affected by traffic noise and the sounds of the river.[1]

Additional noise measurements were made at two sites in Sleepy Hollow subdivision in November, 1985. The principal purpose of these measurements was to determine the nighttime ambient noise level for comparison with noise that might be generated during the night by construction activities. Some daytime measurements were also made to verify the earlier work. The results of the measurements are shown in Table 12-1 and are consistent with the earlier study results for the quieter portions of Sleepy Hollow subdivision.

Existing noise levels close to Carmel Valley Road were calculated using the Federal Highway Administration's Highway Traffic Noise Prediction Model. Calculated noise levels are shown in Table 12-2. They are based on the average daily traffic volumes shown in Table 11-1. From State Highway 1 to Carmel Valley Village noise levels 100 feet from the highway centerline are estimated to be in the range of 60 to 70 decibels. Corresponding estimated noise levels for the lightly-trafficked section of Carmel Valley Road near the proposed project site are in the range of 50 to 60 decibels.

12.2 IMPACTS OF PROJECT OPERATION

12.2.1 IMPACTS

Noise levels in the vicinity of the proposed New San Clemente project alternatives would be basically unaffected by the operation of the new facilities.

12.2.2 MITIGATION MEASURES

None necessary.

TABLE 12-1

EXISTING NOISE LEVELS NEAR THE PROPOSED DAM SITE

Location		Time	Average Ambient Noise Level (Leq)[1]	Source
1	Sleepy Hollow, Lot 23	Day	44.1	Birdsong, house construction
2	Sleepy Hollow, Lot 19	Day	31.5	Traffic, crows, light aircraft
3	100 feet from Cal-Am filter building	Day	57.3	Pump and filter noise
4	Proposed dam site	Day	55.7	River water
5	1000 feet downstream of existing dam	Day	56.0	River water
6	Near existing dam	Day	50.5	River water
7	Sleepy Hollow, Lot 5	Day	27.8	Car, tractor, dog, frog, construction
8	Intersection of San Clemente Drive and Lismore Lane	Day	51.8	Traffic, aircraft, dogs, power tools
9	Carmel River bank 2000 feet upstream of Camp Stephani	Day	48.4	River water, traffic, crow, aircraft
10a	Sleepy Hollow, Lot 4	Day	29	Wind in vegetation, birds, aircraft
10b	Sleepy Hollow, Lot 4	Night	37	Crickets, aircraft
10c	Sleepy Hollow, Lot 4	Night	29	No distinguishable source
11	Sleepy Hollow, Jack Rabbit Ridge	Day	42	Traffic, aircraft, pod filter

[1]Noise level measured in A-weighted decibels and expressed as equivalent continuous noise level.

Source: Westec Services, Noise Assessment, San Clemente Dam Enlargement, January 1984.

TABLE 12-2

PREDICTED NOISE LEVELS ALONG CARMEL VALLEY ROAD
DURING PROJECT CONSTRUCTION

Road Segment	Noise Level 100 Feet from Roadway Centerline in Decibels: Existing	During Construction	Increase
State Highway 1 to Carmel Rancho Boulevard	64.3	64.8	0.5
Carmel Rancho Boulevard to Rio Vista Drive	64.7	65.2	0.5
Rio Vista Drive to Schulte Road	63.4	64.1	0.7
Schulte Road to Robinson Canyon Road	62.3	63.2	0.9
Robinson Canyon Road to Miramonte Road	60.6	61.8	1.2
Miramonte Road to Los Laureles Grade	60.9	62.0	1.1
Los Laureles Grade to Esquiline Road	61.5	62.4	0.9
Esquiline Road to Cachagua Road	54.0	57.8	3.8

12.3 IMPACTS OF PROJECT CONSTRUCTION

12.3.1 ALTERNATIVE A: 29,000 AF RESERVOIR

Impacts

During construction, noise levels near Carmel Valley Road and San Clemente Drive would be raised as a result of increased traffic volumes. In addition, noise levels near the proposed dam site would be increased by construction activities. Table 12-2 shows the estimated noise levels that would be experienced 100 feet from the centerline of Carmel Valley Road. The estimates were made using the Federal Highway Administration's Highway Traffic Noise Prediction Model and are considered to be conservative (i.e., high) estimates of actual noise levels. Noise levels that are 100 feet from the centerline of Carmel Valley would be increased by 0.5 to 3.8 dB. A change in noise level of 2 dB or less is usually not noticeable.

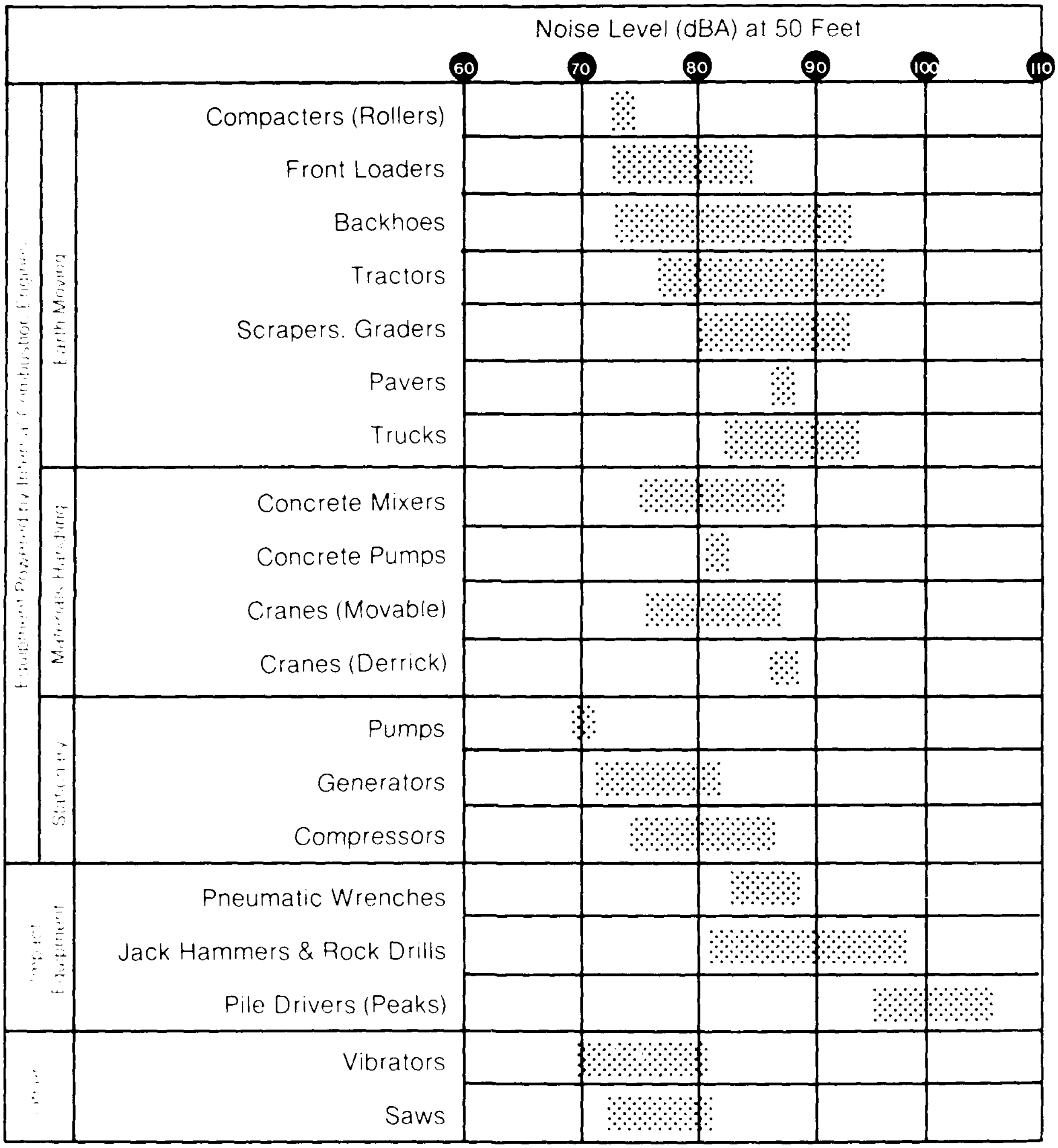
Noise levels would also be increased near San Clemente Drive as a result of construction vehicle movements. About sixty truck trips would occur each day (thirty in each direction) between 7 A.M. and 5 P.M. Shift changes would result in a traffic volume of about 150 vehicles during a period of approximately 30 minutes. There would be two or three shift changes each day. Although this volume of traffic would contribute little to average noise levels, individual noisy vehicles could be audible inside adjacent residences and could interfere with sleep.

There would be two principal sources of noise at the New San Clemente Dam construction site itself -- mobile and stationary construction equipment and explosive blasting.

Figure 12-1 shows the noise levels that might be expected 50 feet from various types of construction equipment. In addition to the equipment shown, a concrete batch plant and a rock crusher would be installed at the site. A concrete batch plant would generate 66-67 dBA at 150 feet and a rock crusher would generate a 74-84 dBA at 300 feet. It is estimated that the probable mix of equipment at the dam site would generate a noise level of 30-60 dBA at a distance of 4,000 feet, the distance to the nearest sensitive receptor (Lot 1 of Sleepy Hollow subdivision), although actual noise levels would probably be lower as a result of terrain shielding. These construction activities would continue

CONSTRUCTION EQUIPMENT NOISE RANGE LEVELS

FIGURE 12-1



NOTE: Base on limited available data samples through the night during the peak construction period (about 7 months). The loudest levels could interfere with sleep in rooms facing the construction area if windows are open.

Blasting would occur at the aggregate borrow area for a period of eight months at a frequency of two or three times each week. The type of blasting that would occur would be similar to that performed at surface mines and quarries. It produces noise and vibration different from traffic or construction equipment noise. Noise due to blasting is sudden, infrequent and variable in level. Taking no account of terrain shielding, the momentary blast noise peak that would be experienced 4,000 feet away would be in the range of 102-113 dB. Terrain shielding would lessen actual peak noise by an unknown extent. Blasting would occur only during daylight hours.

It has been determined that there is a strong correlation between the strength of ground vibrations from blasting and the level of community annoyance. Based on a methodology described elsewhere and the range of charge sizes likely to be used at the New San Clemente dam site, the range of community response to blasting was estimated.[1,2] The smallest charges are unlikely to annoy anyone more than 1,200 feet from the site. The largest charges would annoy about 20% of persons at a distance of 4,000 feet from the site.

Mitigation Measures

A number of mitigation measures are suggested that would reduce noise impacts during construction.

- Residents of Sleepy Hollow subdivision will be given advanced warning of blasting episodes. Blasting episodes will also be announced in the news media.
- The borrow site and the site of the concrete batching and rock-crushing plant could be selected to minimize noise levels at the nearest sensitive receptor.
- Construction specifications could include a provision requiring adequate mufflers on trucks and other construction equipment.
- Construction workers could be transported to the site by vanpools or shuttle bus to reduce traffic movements and noise on San Clemente Drive.

12.3.2 ALTERNATIVE B: 20,000 AF RESERVOIR

Impacts

The noise impacts discussed in Section 12.3.1 would also be applicable to Alternative B. Noise levels would be elevated as a result of construction vehicle movements and shift changes. Truck traffic would be limited to daylight hours only. Construction crew sizes would likely be the same as for Alternative A, only with a shorter duration of construction activities, about one or two months shorter. Slightly less blasting would be necesary for the project foundation and quarry than for the 29,000 AF project.

Mitigation Measures

The same mitigation measures would be suggested here as were suggested in Section 12.3.1.

12.3.3 ALTERNATIVE C: 16,000 AF RESERVOIR

Impacts

The noise impacts for Alternative C would be similar to those discussed for Alternative A. Construction crew sizes would likely be the same as those for Alternative A, only for a shorter duration, about two to three months shorter. Slightly less blasting would be necessary than for Alternative B.

Mitigation Measures

The mitigation measures suggested in Section 12.3.1 would also be suggested here.

12.3.4 NO PROJECT ALTERNATIVE

Impacts

No significant noise impacts would be associated with the No Project Alternative.

Mitigation Measures

None necessary.

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[1]Westec Services, adapted from Noise Assessment, San Clemente Dam Enlargement, January 1984.

[2]Fidell, Sanford, et al., Community Response to Blasting, J.A.S.A. 74(3), 1983.

13 VISUAL QUALITY

13.1 SETTING

The proposed dam site is located in a steep-sided section of the Carmel River Canyon. The reservoir that the dam would create would occupy the Carmel River Canyon itself, and several side canyons formed by tributary streams. The narrow canyon bottoms are heavily wooded with sycamores and willows. The north facing canyon slopes are studded with oaks while the south facing slopes are chaparral covered. Presently the most prominent visual feature is the existing San Clemente Dam and the reservoir that it forms.

Because the proposed dam site is located in rugged terrain and access to the site is controlled, few members of the public ever see it. The site is not visible from the adjacent Sleepy Hollow Subdivision. At present the only viewers of the site are Cal-Am employees and owners of surrounding land parcels.

Figure 13-1 is a view of the existing arch dam. Figure 13-2 includes views of the existing water pipeline and old secondary dam constructed prior to the arch dam upstream.

13.2 IMPACTS OF PROJECT OPERATION

13.2.1 ALTERNATIVE A: 29,000 AF RESERVOIR

Impacts

Visual impact is a measure of the degree to which visual conditions of the setting are altered to accommodate a construction project. Visual impact is also a measure of the degree to which an observer of the setting is aware of change in visual conditions brought on by a project. For the new San Clemente Dam alternatives, visual impact would be measured by a number of related factors, such as: 1) the number of people who are

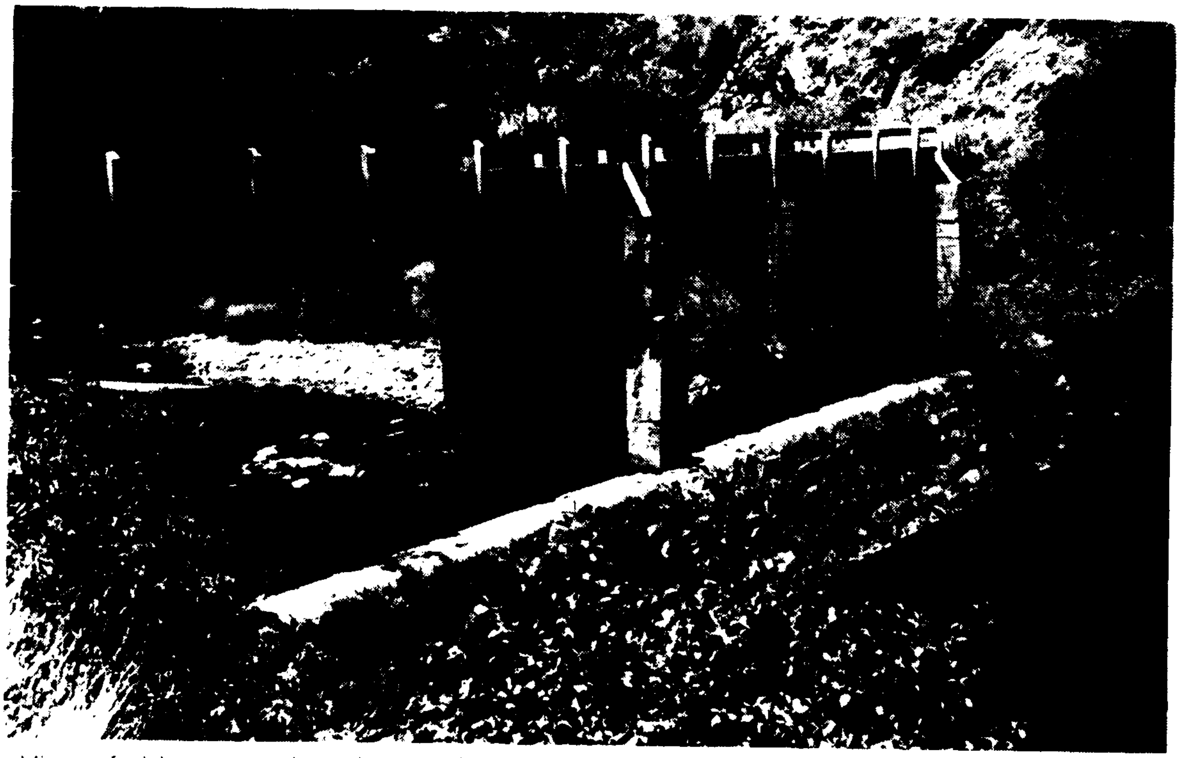
VIEW OF EXISTING DAM AND IMPOUNDMENT

FIGURE 13-1

SITE PHOTOS

FIGURE 13-2

Existing pipeline adjacent to access road.



View of older secondary dam on Carmel River.

currently exposed to the existing project site on a daily basis, 2) the number of people who would view the completed project on a daily basis, 3) the height and breadth of the dam structure, and 4) the area of inundation behind the dam.

The 29,000 AF project would establish a new water impoundment with a maximum normal water level of 662 feet above mean sea level. The new lake would inundate the existing dam and reservoir and extend about 3 miles up the Carmel River behind the new dam. The dam would be about 300 feet high and extend 900 feet between the canyon walls. The existing visual conditions of the Carmel Valley behind the new dam and below the water surface would cease to exist. Given that the public is restricted from access to and use of the project canyon area, loss of the visual resources noted above would not be considered significant.

Because of its location within the river canyon, the topography restricts visual access to the project area from Carmel Valley Road, two miles to the north. The project would not be seen from any residential structures in the area. There is one residence located directly on a ridge about 2000 feet north of and 600 feet above the proposed dam structure. The dam and impoundment would be seen from the property on which the residence is constructed, but would not be seen from the residence itself because of the vegetation and sloping terrain. The completed project would have greatest visual access from an aircraft flying directly over the project area.

The 29,000 AF project would affect the views from private lands that are presently undeveloped. Opinions would differ whether views from these lands would be impaired or enhanced. Some may feel that the conversion of river canyon to reservoir is undesirable while others may feel it adds visual interest.

Water levels below full capacity of the impoundment would reveal barren soil between the water surface and vegetation of the high water rim. The ring of bare earth would visually contrast with the woodland setting of the valley hillsides and appear out of character with the setting. However, because of the restrictions to public access and use of the project area, objections to this visual condition would not be expected to be significant. Similar bare areas would be visible at the aggregate borrow sites until the area is revegetated.

The 29,000 AF dam structure is illustrated on Figure 13-3. Figures 13-4 and 13-5 show the area of inundation as seen from hillside viewpoints west of the existing dam. The difference in maximum reservoir water surface elevation (difference between the existing and proposed impoundments), would be 137 feet.

Mitigation Measures

Because the impacts are deemed to be of little significance, no mitigation measures are suggested.

13.2.2 ALTERNATIVE B: 20,000 AF RESERVOIR

Impacts

The construction of Alternative B would create an artificial lake with a maximum normal water level at 633 feet above sea level and a surface area of 276 acres, 20% less than the surface area of the reservoir created by Alternative A. The dam would be 260 feet high and 820 feet wide at its crest. The reservoir water surface would be 108 feet higher than the existing reservoir surface. Water levels below full capacity of the impoundment would reveal bare soil between the water surface and the perimeter vegetation.

For the same reasons as noted for Alternative A above, the visual changes would not be expected to be significant.

Mitigation Measures

Because the impacts are deemed to have little significance, no mitigation measures are suggested.

13.2.3 ALTERNATIVE C: 16,000 AF RESERVOIR

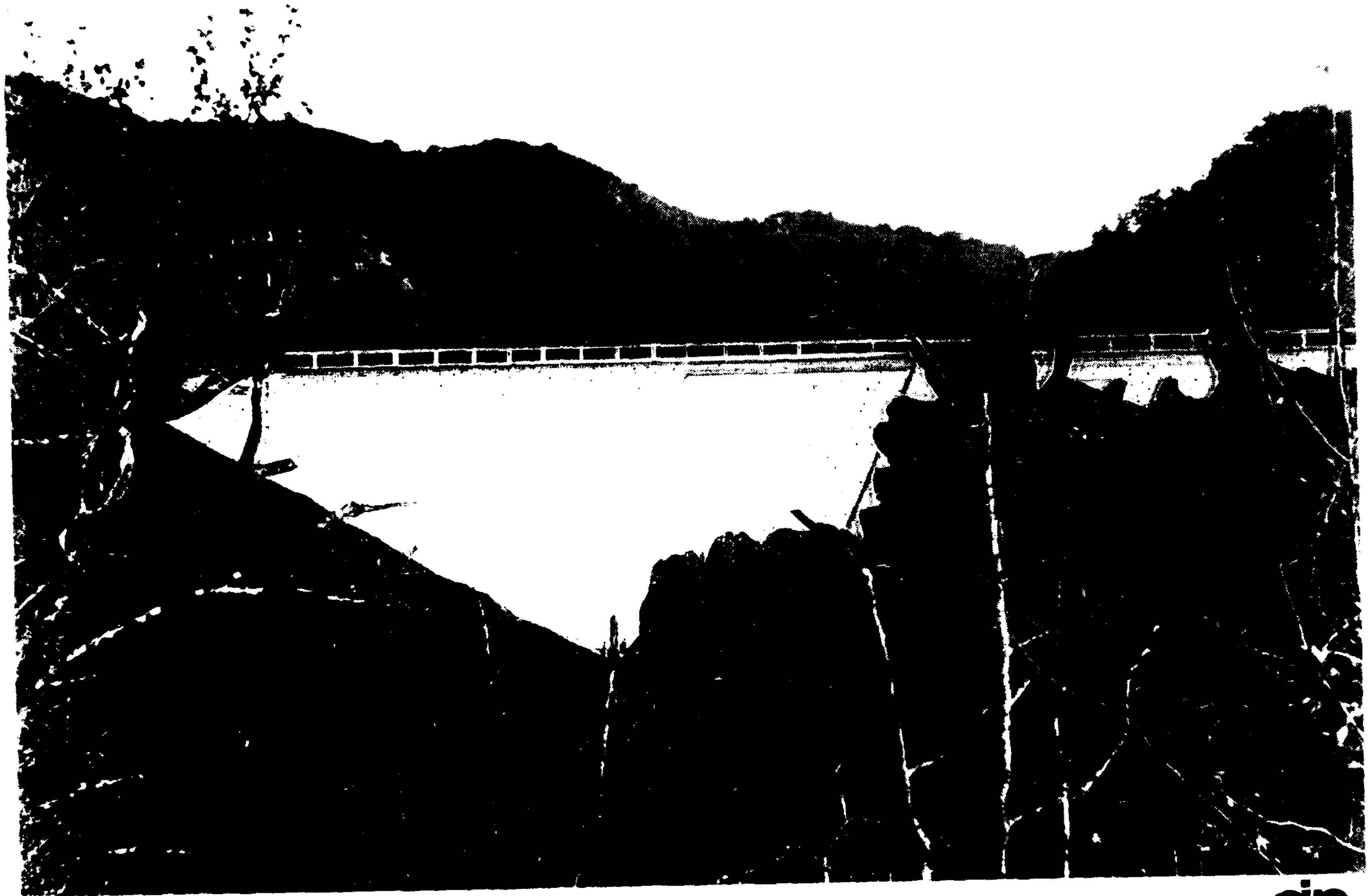
Impacts

The construction of Alternative C would create an artificial lake with a maximum normal water level at 617 feet above sea level and a surface area of 240 acres, 13% less than the surface area of the reservoir created by Alternative B. The dam would be 244 feet high and 750 feet wide at its crest. The reservoir water surface would be 92 feet higher than the existing reservoir surface. Water levels below full capacity of the impoundment would reveal bare soil between the water surface and the perimeter vegetation.

PROPOSED DAM STRUCTURE

FIGURE 13-3

SOURCE: EIP ASSOCIATES



eip

AREA OF INUNDATION
(VIEW IS FROM HILLSIDE AREA WEST OF EXISTING DAM)

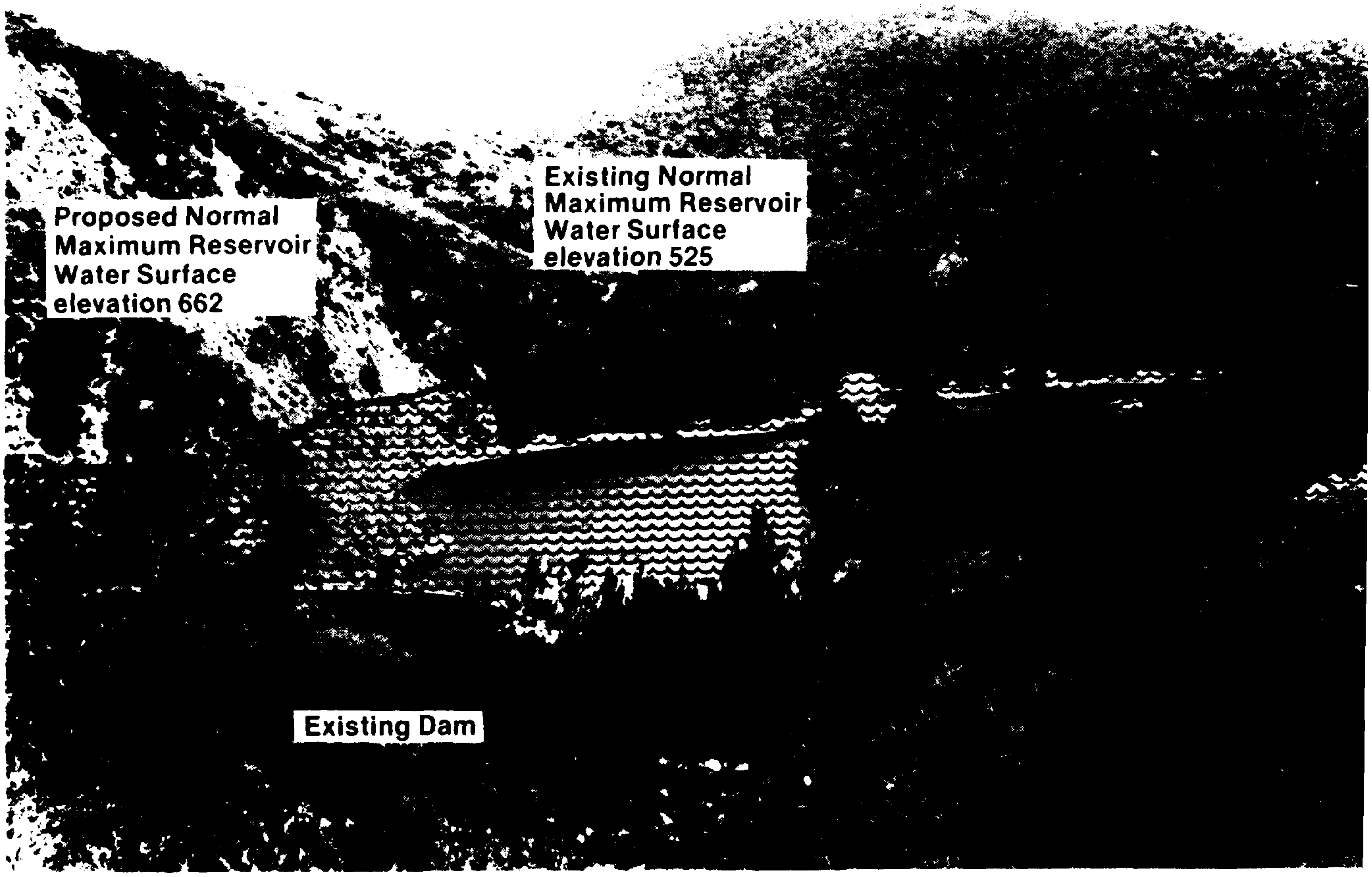
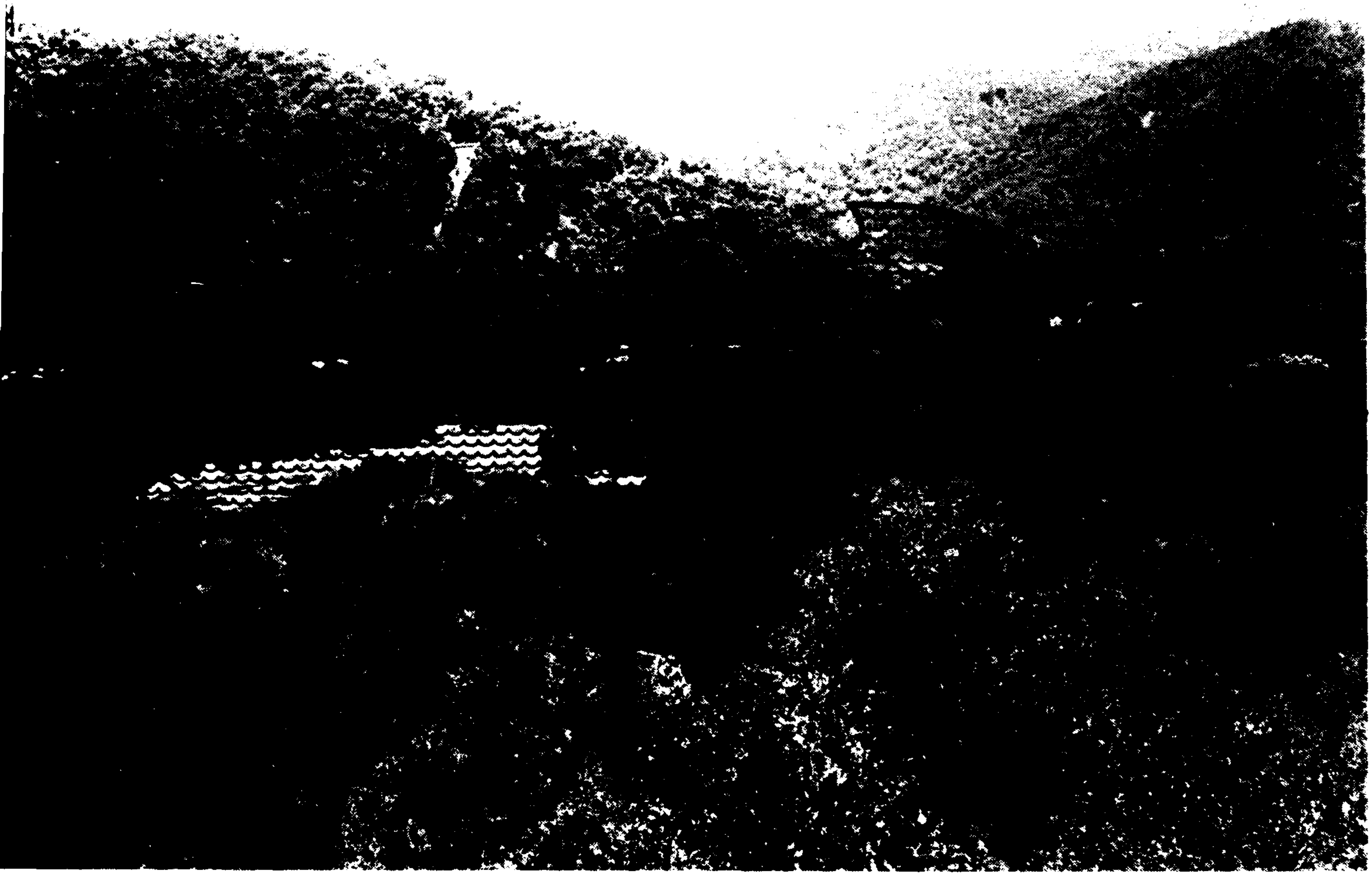
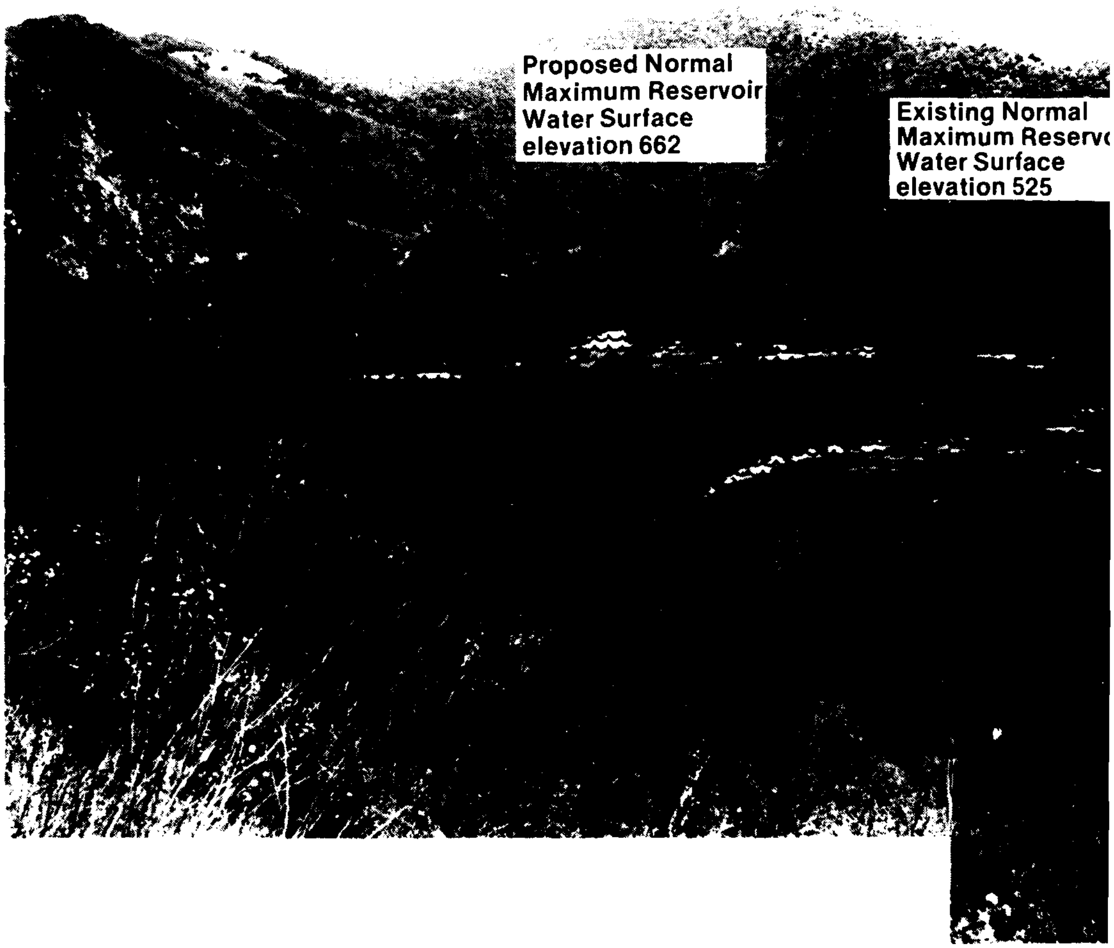


FIGURE 13-4

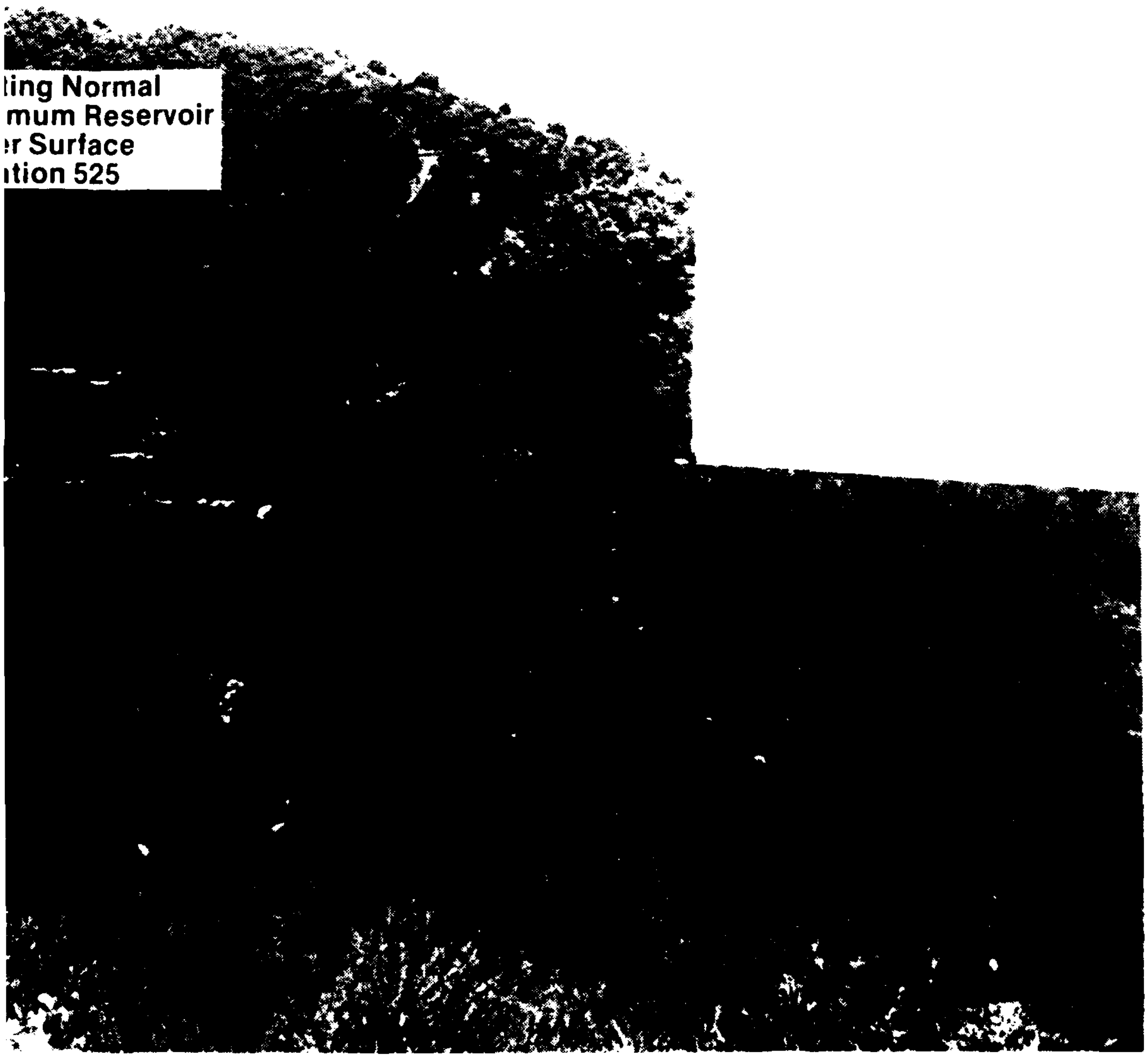


AREA OF INUNDATION
(VIEW IS FROM HILLSIDE AREA FURTHER WEST FROM VIEWPOINT SHOWN ON FIGURE 12-4)



N

FIGURE 13-5



For the same reasons as noted for Alternative A above, the visual changes would not be expected to be significant.

Mitigation Measures

Because the impacts are deemed to have little significance, no mitigation measures are suggested.

13.2.4 NO PROJECT ALTERNATIVE

Impacts

Under the No Project Alternative, none of the visual impacts associated with the proposed project would occur. The existing dam structure would not be within the area of impoundment and would remain visible from adjacent lands. Existing vegetation and visual conditions of the Carmel Valley behind the proposed dam location would remain intact.

Mitigation Measures

None are suggested.

14 HISTORY AND ARCHAEOLOGY

14.1 SETTING

In prehistoric times, the project site lay within the territory of the Esselen and Costanoan Native American groups. The Costanoans occupied the coastal areas from the Sacramento-San Joaquin Delta to Point Sur, south of Monterey. The Esselen, a much smaller group, occupied the upper Carmel River drainage and about 30 miles of the coast south of Point Sur. Very little information on the Esselen, the probable inhabitants of the project site, has survived.

During the last century, most of the property in the vicinity of the dam has been associated with the operations of Del Monte Properties Company and its predecessor, the Pacific Improvement Company. Prior to ownership by these companies, the land in the Upper Carmel Valley was open to homesteading and was settled in the 1880s and 1890s. An early survey map of the Upper Carmel River, dated 1908, indicates several cabins and homesteads were located in the present San Clemente Dam area, including Murphy's frame cabin, Murphy's stone cabin and corral and another stone cabin.

Pacific Improvement Company was incorporated in 1878 as a holding company and controlled the Central Pacific Railroad, which was operated by the "Big Four": Charles Crocker, Leland Stanford, Collis P. Huntington and Mark Hopkins. In 1880-1881, Charles Crocker built the Del Monte Hotel in Monterey, a 126-acre resort/hotel/park that catered to wealthy guests from around the world.

The Del Monte Hotel and grounds, as well as other Pacific Improvement Company holdings in the Carmel-Monterey area, required a substantial water supply. This supply came from the Upper Carmel Valley. In 1881, Pacific Improvement Company began purchasing acreage in the Upper Carmel River, including Rancho Los Laureles and a portion of Los

Tularcitos Rancho as well as additional acreage surrounding the Carmel River and its tributaries. These lands provided a watershed from which an adequate water supply could be piped to the company's holdings of approximately 7,000 acres. Located below the junction of the Carmel River and San Clemente Creek, the Carmel Dam was built for this purpose by the Pacific Improvement Company in approximately 1881-1883. Reportedly, 700 Chinese laborers were employed to build the concrete dam and its associated roads and to lay 26 miles of 12-inch pipe northwest to the Monterey and Pacific Grove area. Today the old dam still stands underwater downstream from the San Clemente Dam, and serves as a foundation for a bridge over the Carmel River.

In the 1890s and early 1900s, Pacific Improvement Company improved the original ranch house of Rancho Los Laureles and guests from the Del Monte Hotel interested in spending time in the country were transported there. Fishing and hunting trips were often planned in the Upper Carmel River Valley.

In 1915, Pacific Improvement Company holdings were acquired by Samuel F. B. Morse and associated financiers under the name of Del Monte Properties Company. The 10,000 acres of land were subsequently subdivided. In 1923, various parcels of the company's lands were sold, mostly to parties from the east coast. Resorts and ranches were established throughout the Carmel River Valley in the 1920s and 1930s, although the Del Monte Properties Company retained its holdings of lands immediately surrounding the Carmel River.

As Del Monte Properties Company holdings and the Del Monte Hotel grew, it became necessary to establish a more reliable water source on the Carmel River. In the years 1919 to 1921, the existing San Clemente Dam was built at the junction of the Carmel River and San Clemente Creek, approximately one-third mile upstream from the 1883 Carmel Dam. The dam, measuring 106 feet high above bedrock, with a crest length of 300 feet, was of concrete arch span construction and still stands.

In 1924, Del Monte Properties Company San Clemente Dam was acquired by Monterey County Water Works Company. In approximately 1930, the Water Works Company land was leased to Del Monte Properties Company at the dam, and the San Clemente Lake and Guest Ranch were established at the northwest end of the dam. The resort was operated in conjunction with Del Monte's Fish and Game Preserve, which included holdings on both sides of the Carmel River. Later in the 1930s, several fishing/hunting/horseback riding lodges were set up on Del Monte Properties Company land above and below the San Clemente Dam. An occasional early homestead cabin was also used for hunting or fishing expeditions. The resort complex at San Clemente Dam was used mostly on weekends and holidays. In the 1930s through the 1950s, rodeos were often held on a flat bench of land between the resort and San Clemente Creek.

In 1965, the American Water Works Company purchased the assets of California Water and Telephone Company (formerly Monterey County Water Works Company) and formed California-American Water Company, which took over operation of San Clemente Dam. In the same year, Del Monte Properties Company also subleased their "dude" ranch at the dam to Twin Rivers, a group of recreationists from San Francisco. The San Francisco group operated the resort on weekends and holidays, with fishing, hunting and relaxation as the main activities.

The San Clemente resort complex continued to operate, with occasional use of the fishing/hunting cabins until 1980 when Del Monte Properties Company's lease on the resort land expired and was not renewed under California-American Water Company ownership. In 1981, under the auspices of California-American Water Company, the remains of the resort were razed as part of a fire drill for the Forest Service. Only the damkeeper's cottage remains and is not permanently occupied.

In July 1978, Del Monte Properties Company sold approximately 1,600 acres of its land on the Carmel River known as Murphy's Flat to a group of ten investors. One of the stone cabins on Murphy's Flat was subsequently restored and is presently used as a vacation/weekend fishing-recreation lodge.

Several other wooden cabins established by Del Monte Properties Company in the 1930s were subsequently used by private schools in the Carmel-Monterey area as weekend camping retreats.

The foregoing information was summarized from two cultural resource survey reports prepared for the District in 1983 and 1987.[1,2]

14.2 IMPACTS OF PROJECT OPERATION

14.2.1 ALTERNATIVES A, B AND C: NEW SAN CLEMENTE PROJECT

Impacts

Historic and prehistoric resources that would be affected by the proposed alternatives have been identified and are listed in Table 14-1. Two prehistoric and six historic sites would be inundated by the proposed reservoirs. The two prehistoric sites consist of poorly developed bedrock mortars that do not appear to be associated with midden deposits or other surface artifacts. The historic sites include the remains of four cabins, the remains of the Carmel Dam and the existing San Clemente Dam.

Mitigation Measures

The first cultural resources survey prepared for the District in 1983 was reviewed by the State Office of Historic Preservation in 1984.[1,3] Based on the original archaeologist's recommendation and the State Office of Historic Preservation's comments the District undertook a more detailed survey, updating existing site records and preparing site records for previously unrecorded sites. These actions are listed in Table 14-1 as mitigation measures already implemented. The authors of the second survey report recommended that as a further mitigation measure four sites should be nominated for inclusion in the National Register of Historic Places. They include San Clemente Dam, itself an early example of a concrete arch dam, the remains of Carmel Dam and two cabins.

14.2.2 NO PROJECT ALTERNATIVE

Impacts

Operation of the No Project alternative would have no effect on cultural resources.

Mitigation Measures

None would be necessary.

TABLE 14-1

CULTURAL RESOURCES POTENTIALLY AFFECTED BY THE NEW SAN CLEMENTE PROJECT ALTERNATIVES

Designation	Characteristics	Impacts	Implemented	Further Mitigations Recommended
CA-MNT-587	Bedrock mortar	Inundation	Site record updated	None
CA-MNT-1253	Bedrock mortar	Inundation	Site recorded	None
CA-MNT-811H	Remains of wooden cabin	Inundation	Site record updated	None
CA-MNT-812H	Stone and adobe cabin	Inundation	Site record updated	Nomination to National Register of Historic Places
CA-MNT-813H	Remains of stone cabin	Inundation	Site record updated	"
CA-MNT-814H	Previously recorded wooden cabin, now destroyed	Inundation	Site record updated	None
CA-MNT-1246H	Remains of wooden cabin	None	Site recorded	None
CA-MNT-1247H	Remains of wooden cabin	None	Site recorded	None
CA-MNT-1248H	San Clemente Dam	Inundation	Site recorded	Nomination to National Register of Historic Places
CA-MNT-1249H	Remains of Carmel Dam	Inundation	Site recorded	"
CA-MNT-1250H	Unlocated cabin site	None	Site recorded	None
CA-MNT-1251H	Cabin foundation	Inundation	Site recorded	None
CA-MNT-1252H	Unlocated cabin site	None	Site recorded	None

14.3 IMPACTS OF PROJECT CONSTRUCTION

14.3.1 ALTERNATIVES A, B AND C: NEW SAN CLEMENTE PROJECT

Impacts

Assuming the implementation of the suggested mitigation measures, construction of the proposed project would not be expected to have an adverse impact on cultural resources.

Mitigation Measures

The following mitigation measures are suggested:

- Construction access roads should be routed to avoid disturbing sites CA-MNT-1246H and CA-MNT-1247H.
- Contractors should be required to stop excavation and consult a qualified archaeologist if any prehistoric or historic artifacts are encountered during construction.

14.3.2 NO PROJECT ALTERNATIVE

Impacts

Construction of the No Project alternative would have no effect on cultural measures.

Mitigation Measures

None would be required.

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[1] WESTEC Services, Cultural Resources Survey, San Clemente Dam Enlargement, December, 1983.

[2] Archaeological Consulting, Archaeological and Historical Investigations for the San Clemente Dam EIR/EIS, May, 1987.

[3] Letter to F. Adjarian from Marion Mitchell-Wilson, State Office of Historic Preservation, January 6, 1984.

15 PUBLIC HEALTH AND SAFETY

15.1 SETTING

Aspects of public health and safety that are affected by the water supply alternatives inlcude earthquake and flood hazard and the purity of drinking water. Geology and seismic safety are discussed in Chapter 6. Hydrology and flood hazard are discussed in Chapter 7 as is water quality.

15.2 IMPACTS OF PROJECT OPERATION

15.2.1 ALTERNATIVE A: 29,000 AF RESERVOIR

Impacts

The replacement of the existing San Clemente Dam with a larger dam in the Carmel Valley would increase the size of the downstream area subject to devastation in the event of dam failure. Dam failure would remain a very remote possibility. Dam failure could occur as a result of structural failure of the dam itself or its foundation. Structural failure might be promoted by groundshaking induced by movements on nearby geologic faults. The dam might be overtopped by a wave produced by a landslide, perhaps earthquake-induced, into the reservoir, (earthquakes and landslides are discussed in Chapter 5, Geology and Soils).

A study was performed for this document to estimate the flood wave heights and travel times that would result from a dam break at the New San Clemente Dam.[1] The model used hydrodynamic theory to predict the dam-break wave formation and downstream progression.

For the model input, it was necessary to estimate the potential breach characteristics. There are no obvious breach mechanisms for a rollcrete dam because it is not subject to rapid scour during overtopping, it is not subject to piping, and the gravity structure resists structural failure. Because there was no likely failure mechanism to model, it was necessary to assume a dam break that would result in a conservatively high estimate of downstream flooding. For the purposes of the study, a sudden break that would drain the reservoir in 12 minutes was assumed in combination with an already full downstream river channel.

Figure 15-1 shows the predicted inundation map for the 29,000 AF reservoir. This map shows the inundation lines and time lines, shown as dashed lines across the river channel. These lines show the time from the start of the breach until the flood wave arrives at various points downstream. A 58-foot high flood wave would reach Carmel Valley Village 18 minutes after dam failure. The wave reduced in height to 28 feet would reach the Highway 1 Bridge in 87 minutes. The consequence for life and property would be catastrophic. It should be noted, however, that the risk of failure is extremely low, particularly for a concrete gravity dam.

A number of measures have been taken by the District or are required by state law that would ensure that the risk of dam failure is minimized. The District has conducted extensive geotechnical studies of the site.[2] The studies indicate that no active earthquake fault passes through the dam site. The studies have also gathered the data necessary to estimate the maximum credible earthquake that might occur on nearby faults. Maximum credible earthquakes occurring on the Tularacitos and Cachugua Faults are estimated to be Richter magnitudes 6-3/4 and 6-1/4, respectively. Confidence bounds on these MCE estimates are one-quarter of a magnitude unit. The dam would be designed to withstand groundshaking produced by the maximum credible earthquake on the Tularcitos Fault. Overtopping of the dam as a result of a landslide would also be a remote possibility. Some additional study of landslide potential will be undertaken by the District (see Chapter 6).

The dam design must be reviewed and approved by the California Department of Water Resources, Division of Safety of Dams before construction can begin.[3] The Division of Safety of Dams is responsible for ensuring that dams do not create a threat to public safety.

Water supplied to the Monterey Peninsula from the proposed reservoir would be similar in quality to that supplied from the existing reservoir. The concentration of naturally occurring dissolved organic substances may be elevated in the first few years of dam operation as inundated vegetation decays. As a consequence, THM-formation potential of the water may be increased. THMs, trihalomethanes, are organic chemicals formed when water containing organic matter is chlorinated. THMs are known to cause cancer in laboratory animals although evidence of adverse human health effects is lacking.

Mitigation Measures

The following mitigation measures are suggested:

- Monitor THM-potential of water from the dam and comply with evolving federal standards.
- Remove vegetation from the inundation area to a greater extent than required by Division of Safety of Dams.

15.2.2 ALTERNATIVE B: 20,000 AF

Impacts

Alternative B would impound a 20,000 AF reservoir and would have about the same probability of failure as Alternative A (i.e., very remote). Failure of the 20,000 AF dam/reservoir was modeled, using conservative assumptions similar to those for the 29,000 AF dam/reservoir.

Table 15-1 compares peak elevation, peak stage, and time of flood wave arrival at six locations in the river valley for the 29,000 AF and the 20,000 AF reservoirs. The smaller reservoir produces a slightly smaller flood wave that travels more slowly down the river channel than the 29,000 AF reservoir. The variation is slight, however, particularly in the downstream reaches.

As discussed in Section 15.1.1, the THM-formation potential of the impounded water may be increased as a result of the temporary increase in dissolved organic matter. It is difficult to predict the concentration of these substances in the water, but it is expected that the THM-formation potential for the 20,000 AF reservoir would be roughly the same as that for the 29,000 AF reservoir.

Mitigation Measures

The mitigation measures proposed in Section 15.1.1 are also suggested here.

15.2.3 ALTERNATIVE C: 16,000 AF RESERVOIR

Impacts

The impacts on public health and safety of Alternative C would be quite similar to those described for Alternative A regarding THMs and dam failure. Failure of the 16,000 AF dam/reservoir was modeled in the same way as Alternatives A and B. The results of the modeling are shown in Table 15-1. The consequences of failure of Alternative C would be somewhat less severe than those predicted for Alternatives A and B.

Mitigation Measures

The mitigation measures proposed in Section 15.2.1 are proposed here also.

15.2.4 NO PROJECT ALTERNATIVE

Impacts

The No Project Alternative would entail minimal risk to public health and safety. In terms of dam safety, the risk of failure of the existing concrete arch dam is higher than that of the proposed concrete gravity dam because of technical advances in the design of structures to resist earthquake forces. However, the consequences of failure would be much smaller for the existing dam than for the enlarged San Clemente Reservoir

Mitigation Measures

None necessary.

15.3 IMPACTS OF PROJECT CONSTRUCTION

15.3.1 A, B AND C: NEW SAN CLEMENTE PROJECT

Impacts

The construction site could pose a hazard to public health and safety from the intrusion of unauthorized persons. Construction-related traffic coulo also pose an increased threat to the public. These effects are discussed in Chapter 10, Traffic. Construction workers

DAM BREAK STUDY INUNDATION MAP - 29,000 AF PROJECT

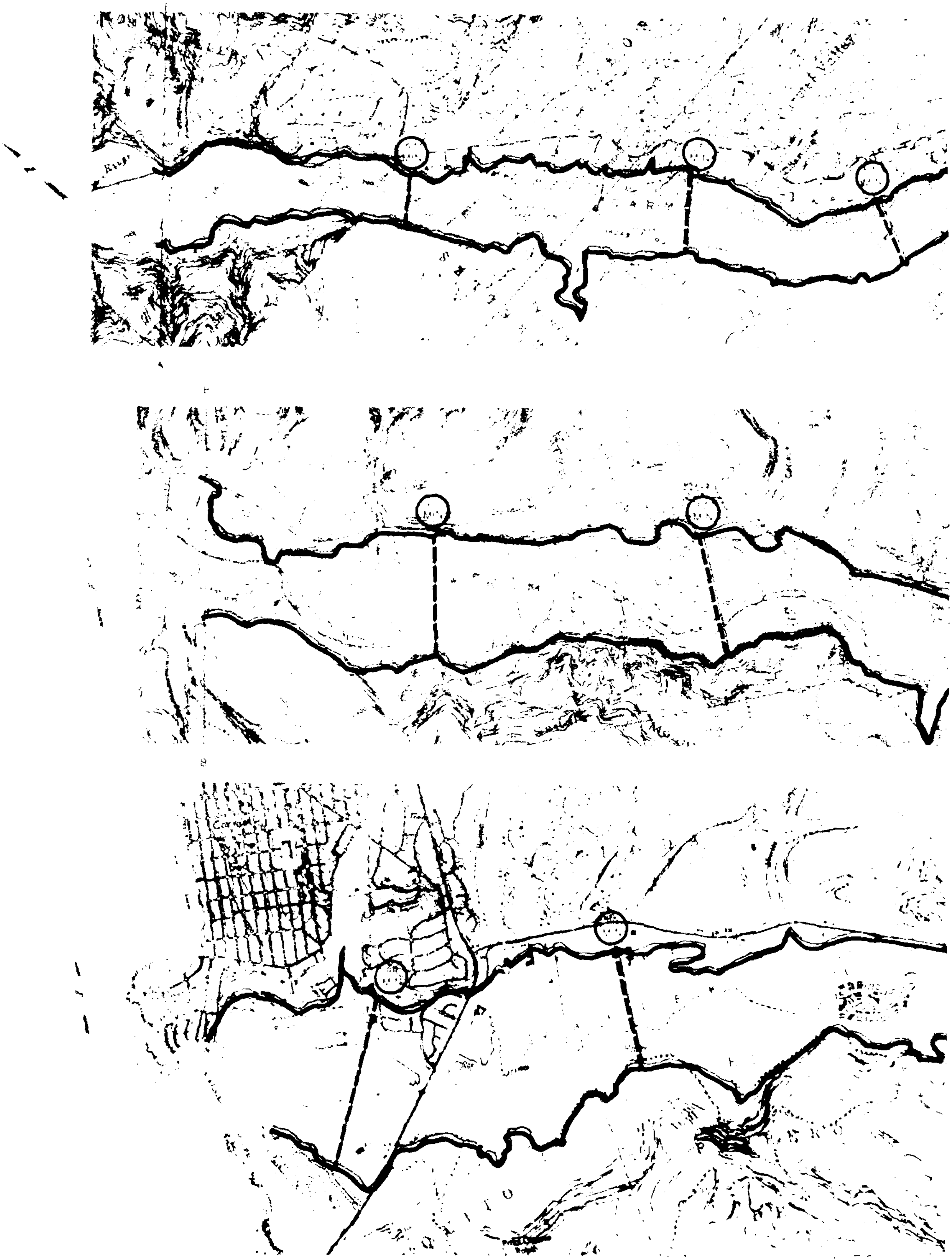

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FIGURE 15-1

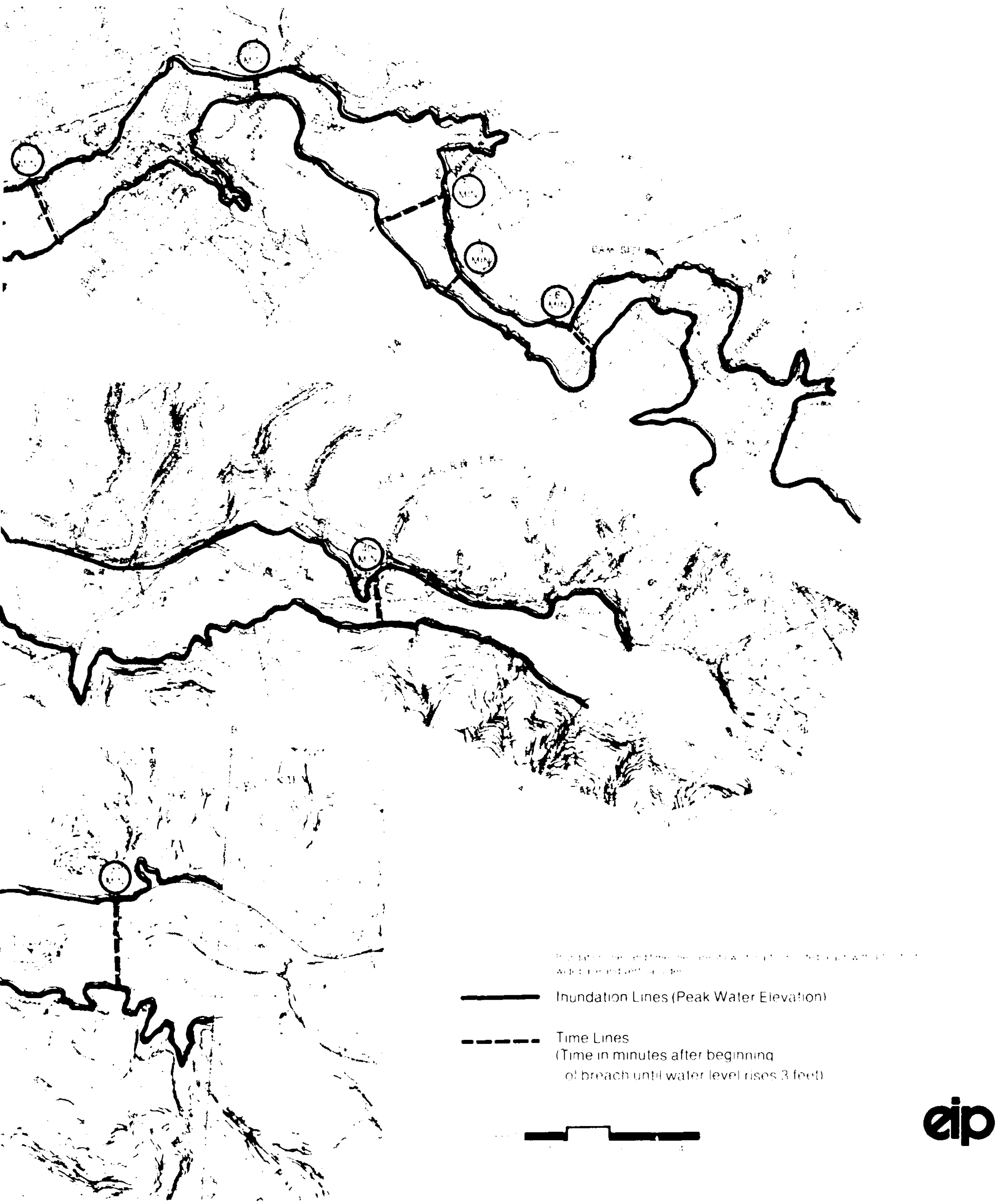

TABLE 15-1

COMPARISON OF PEAK FLOOD ELEVATIONS AND TIMES FOR A SIMULATED DAM BREAK[1]

Location	Time from Start of Breach Formation to Flood Wave Arrival			Peak Elevation (Ft.)[2] (Peak Stage)		
	16,000 AF Reservoir	20,000 AF Reservoir	29,000 AF Reservoir	16,000 AF Reservoir	20,000 AF Reservoir	29,000 AF Reservoir
Sleepy Hollow Area	6 mins.	6 mins	6 mins.	El. 506 (119 ft.)	El. 514 (127 ft.)	El. 530 (143 ft.)
Esquiline Bridge (Carmel Valley Village)	18 mins.	18 mins.	18 mins.	El. 315 (46 ft.)	El. 318 (49 ft.)	El. 327 (58 ft.)
Scarlet Road (The Narrows)	41 mins.	41 mins.	40 mins.	El. 181 (46 ft.)	El. 181 (46 ft.)	El. 185 (50 ft.)
Schulte Bridge	57 mins.	55 mins.	53 mins.	El. 117 (36 ft.)	El. 120 (39 ft.)	El. 124 (43 ft.)
Carmel Valley Country Club	70 mins.	67 mins.	64 mins.	El. 89 (38 ft.)	El. 91 (40 ft.)	El. 94 (43 ft.)
Highway 1 Bridge	97 mins.	93 mins	87 mins	El. 35 (24 ft.)	El. 36 (25 ft.)	El. 39 (28 ft.)

Source: Converse Consultants (1987)

[1] Assumes sudden dam break and full downstream river channel.

[2] Number in parenthesis indicates height of the wave above Carmel River streambed.

would be exposed to dangerous equipment and activities. Blasting could pose a fire hazard.

Mitigation Measures

- Controlled access to the construction site should be maintained at all times as part of the site security plan.
- Hard hats will be required at all times; at the construction site contractors will be required to follow a strict safety plan.
- All handling of explosives and flammable materials will be in accordance with regulations.

---

[1] Converse Consultants Northern California, New San Clemente Project Dam Break Study Report, May 4, 1987.

[2] Studies include Converse Consultants, New San Clemente Project, Preliminary Design and Feasibility Study, August 1982; New San Clemente Project, Geotechnical Studies for the Environmental Impact Report, January 1984; and Rogers E. Johnson and Associates, New San Clemente Dam Geotechnical Investigation; Location of Faults Through Or Near the Proposed Dam Site; July 1984. Rogers Johnson & Associates, New San Clemente Dam, Geotechnical Investigation of Faulting in the Knothole Area, January 1985. Rogers Johnson & Associates, Investigation of Possible Pleistocene Faulting of Stream Terraces Along the Carmel River at Sleepy Hollow, April 1985.

[3] State Department of Water Resources, Division of Safety of Dams, Statutes and Regulations Pertaining to Supervision of Dams and Reservoirs, 1984.

16 LAND USE

16.1 SETTING

Most of the land in the vicinity of the existing San Clemente Reservoir is undeveloped, consisting of steep slopes covered with dense chaparral and oak woodland. The one exception is the Sleepy Hollow Subdivision, comprised of about 20 homes. The proposed construction site and the bulk of the land surrounding the existing reservoir is owned by the California-American Water Company (Cal-Am). The remaining lands not owned by Cal-Am belong to private landowners.

Access to the reservoir site for construction vehicles would be via San Clemente Drive, a private road that extends from Carmel Valley Road to the reservoir. Two other private roads have access to the site, although they would not be appropriate to provide heavy vehicle access.

The existing San Clemente reservoir has a surface area of about 33 acres. The land in the vicinity of the existing reservoir is zoned as an "N" classification. This is a rural classification, permitting agricultural and single-family uses on 1,000-acre minimum building sites. There does not appear to be any conflicting land use or zoning issues, as the land has historically been used for water storage purposes.[1]

Recreation is currently prohibited at the reservoir site. The surrounding lands are privately owned, and no public access is permitted.

16.2 IMPACTS OF PROJECT OPERATION

16.2.1 ALTERNATIVE A: 29,000 AF RESERVOIR

Impacts

The 29,000 AF reservoir would have a surface area of about 345 acres, 312 acres more than is currently inundated. This would result in the conversion of some undeveloped land into a reservoir, but there would be no basic change to the character of the area. The lands that would be inundated would need to be cleared of vegetation prior to filling the reservoir.

The majority of the lands to be inundated are subject to "flowage easements", which give the District the right to flood the land. Lands that are not subject to such easements would need to be acquired by the District or the District would need to make some alternate arrangement to allow their flooding.

The purchase of any private lands by the District would change their status from private to public lands. Recreational uses would then be allowed in the vicinity of the proposed reservoir. The District does not propose construction of recreational or parking facilities as part of the project. Permitted recreational activities would include passive, non-motorized uses such as hiking, picnicking, equestrian use and sightseeing. Motorized access to the dam site would be prohibited, as would active recreational uses such as boating and camping. The District would comply with California Department of Fish and Game standards regarding fishing activities at the proposed New San Clemente Reservoir.

Mitigation Measure

No mitigation measure is proposed for the inundation of land subject to flowage easements. For land not subject to such easements, the District would compensate, or make some other arrangement with, those landowners whose land would be inundated.

16.2.2 ALTERNATIVE B: 20,000 AF RESERVOIR

Impacts

The 20,000 AF reservoir would have a surface area of about 276 acres, thus inundating 243 acres more than at present, but less than that for Alternative A. Recreational uses and other impacts would be the same as for Alternative A.

Mitigation Measure

The mitigation of compensation for inundating land not subject to flowage easements would be the same as that for the 29,000 AF project.

16.2.3 ALTERNATIVE C: 16,000 AF RESERVOIR

Impacts

The 16,000 AF reservoir would have a surface area of about 240 acres, thus inundating 207 acres more than presently exists, but less than that for Alternatives A or B. The recreational uses and other impacts would be the same as for Alternatives A and B.

Mitigation Measure

The mitigation measure suggested would be the same as that for Alternatives A and B.

16.2.4 NO PROJECT ALTERNATIVE

The No Project alternative would have no impacts on the land uses in the vicinity of the existing San Clemente Reservoir; no additional land would be inundated and no land acquisition would be necessary.

Mitigation Measure

None are suggested.

[1] Joel Panzer, Monterey County Planning Department, personal communication, July 8, 1987.

17 SOCIOECONOMICS

17.1 SETTING

17.1.1 POPULATION

The boundaries of the Monterey Peninsula Water Management District (MPWMD) contain several incorporated cities as well as unincorporated areas of Monterey County. Table 17-1 shows the population growth in these areas during the 1970s and early 1980s.

As shown in the Table 17-1, the District's population increased by nearly 40% in the 15 years between 1970 and 1985. The City of Seaside showed the highest percentage increase in growth (82%) with the unincorporated areas second at 45%. The two smallest communities experienced population declines during this period. More than 75% of the District's population lives in incorporated cities.

17.1.2 EMPLOYMENT

The strong employment sectors in Monterey County as a whole are the military, services, agriculture and retail trade.[1] In 1980, these four sectors constituted nearly 70% of total employment in the County. The MPWMD service area, however, includes relatively little of the County's agricultural employment, but most of the military employment and the service/retail trade related to the tourist industry. The tourist industry is anticipated to be a major growth sector in this part of the County. The MPWMD service area had a total employment of 39,289 in 1980 (excluding Fort Ord), about 35% of the County total. The distribution of total employment among Peninsula jurisdictions appears in Table 17-2.

Monterey is clearly the dominant employment center in the region, based on the total number of jobs in each jurisdiction and a comparison of jobs to housing in each community (Table 17-3). Pacific Grove and Seaside are largely residential communities.

TABLE 17-1

POPULATION IN MPWMD SERVICE AREA: 1970-1980

JURISDICTION	1970[1]	1980[2]	1985[3]	1970-1985 Percent Change
INCORPORATED CITIES				
Carmel	4,525	4,707	4,830	6.7
Del Rey Oaks	1,823	1,557	1,560	-14.4
Monterey	26,302	27,558	29,400	11.8
Pacific Grove	13,505	15,755	16,100	19.2
Sand City	212	190	200	-5.7
Seaside	20,165	36,567	36,700	82.0
UNINCORPORATED AREAS	19,222	27,000[4]	27,800[4]	44.6
TOTAL	85,754	113,334	116,590	36.0

[1]Monterey County Planning Department, Demographic Analysis of Monterey County, June, 1982.

[2]1980 U.S. Census.

[3]California Department of Finance, 1985.

[4]EIP Associates, based on the following data sources: Monterey County Planning Department, Association of Monterey Bay Area Governments, Recht-Hausrath Associates. Assumes the number of persons per household remains constant from 1980 to 1985.

17.1.3 POPULATION AND EMPLOYMENT GROWTH POTENTIAL

Based upon current general plan policies and the availability of suitable land, certain cities and unincorporated areas within MPWMD appear to have more potential for growth than others. Specific growth projections are discussed in Chapter 4, but the following discussion generally characterizes growth potential in each of the communities. Carmel and Del Rey Oaks have limited potential for growth, based on current zoning and the amount of available vacant land. Over the next 35 years, the two communities are projected to support only a 600-unit increase in residences and 1,200 new employees. Monterey and Seaside are projected to support the greatest increase in employment, with nearly 20,000 new jobs generated between the two by the year 2020. However, these same communities are projected to have an increase of only 3,000 units of housing during the same timeframe. Sand City is projected to grow the fastest of all the communities, with a three-fold increase in employment and a ten-fold increase in residences, but the absolute amount of employment growth in that community would be only 1,100 jobs. More housing is projected to be built in Sand City than in any other community, with a 4,000-unit increase over 35 years. Pacific Grove is projected to grow at a steady but not dramatic rate, adding nearly 2,000 housing units and 1,500 employees over 35 years.

In the unincorporated areas, the Highway 68 area has significant growth potential being the corridor connecting the Monterey Peninsula with the county seat of Salinas. The Carmel Valley is an additional growth area.

17.1.4 WATER RATE STRUCTURE

Water connection fees and service charges vary by type of use; all fees are likely to be affected by a new water supply project. The MPWMD levies water connection fees, but because the District is not a water purveyor, it does not charge water use fees. Annual studies of water use in the District provide the basis for the connection fee structure. Residential structures are charged for the number of plumbing fixture units in the dwelling unit. In 1987, the charge is $120 per fixture unit; the average connection charge for a home is about $2,500.[2] Charges for non-residential connections are based on the specific user category (e.g., restaurant, fast food, office, hotel) represented. The charge

TABLE 17-2
EMPLOYMENT IN MPWMD SERVICE AREA
1980-1985

Jurisdiction	1980[1]	1985[4]
Incorporated Cities		
Carmel	3,400[2]	3,508
Del Rey Oaks	415	478
Monterey	23,615	26,050
Pacific Grove	3,858	4,276
Sand City	1,214[3]	1,519
Seaside	3,616	3,966
Unincorporated Areas	3,171[4]	3,171
Total	39,289	42,968

[1] Recht Hausrath Associates, Socioeconomic Impacts of The Proposed San Clemente Dam, June, 1984.

[2] Carmel-by-the-Sea General Plan, February, 1984.

[3] Sand City Housing Element, June, 1985.

[4] EIP Associates. See Appendix E for further discussion.

TABLE 17-3

JOBS/HOUSING RATIOS

Jurisdiction	1980	1985
Carmel	1.09	1.10
Del Rey Oaks	0.72	0.83
Monterey	1.80	1.86
Pacific Grove	0.51	0.55
Sand City	12.91	14.06
Seaside	0.47	0.51
Unincorporated Areas	0.29	0.28

Source: EIP Associates, based on the following data sources: 1980 U.S. Census, Association of Monterey Bay Area Governments, Recht-Hausrath Associates.

is based on a figure of $11,890 per acre-foot (1987 rate), multiplied by the projected average annual water use in each user category.[3]

Service charges for monthly water use are made by Cal-Am and the other water suppliers in the District. The primary water purveyor, Cal-Am, charges an average of $41 every two months for residences.

17.2 IMPACTS OF PROJECT OPERATION

17.2.1 ALTERNATIVE A: 29,000 AF RESERVOIR

Impacts

The 29,000 AF project would employ one additional person for operation and maintenance purposes. This would not represent a significant increase in local employment.

User fees would be instituted to cover the annual costs of the proposed project; connection fees have already been increased in anticipation of the District's funding of a water supply project. In February 1987, the District's Board of Directors determined that 35% of the project would be funded from residential user fees, 35% from commercial user fees, 22% from connection charges and 8% from interest earned on the reserve fund. For residential users, financing the project would mean an average increase of $4.08 (1986 dollars) in the monthly Cal-Am bill (Table 17-4). The average monthly increase in commercial water bills would be $45.41. These increases would begin when the project begins to deliver water. Connection charges for water meter permits would increase annually in accordance with the San Francisco Consumer Price Index.

Several caveats apply to these calculations of fee increases. First, these calculations include only the costs of constructing, operating and financing the project; they do not include the costs of mitigating its adverse impacts. Therefore, final costs are expected to be somewhat higher than those shown here.

Second, the recent California Supreme Court ruling in the San Marcos case held that government agencies are exempt from paying water connection fees. As a result, the District may not be able to collect several million dollars from the U.S. military and local governments for water connections. Loss of this revenue was not incorporated into the financing study; user charges and other connection fees would probably increase to offset losses from this source.

Transfer of land for the reservoir from private to public ownership would reduce annual property tax revenue to the County of Monterey by approximately $14,000. Property tax revenue from increased growth in the unincorporated areas of the County would tend to offset tax losses caused by the project, although no detailed study has been performed.

Mitigation Measures

No mitigation measures are suggested.

17.2.2 ALTERNATIVE B: 20,000 AF RESERVOIR

Impact

Table 17.4 indicates that the monthly increase in the average residential and commercial water bills would be $3.35 and $37.30 (1986 dollars) respectively. Other impacts to employment and property tax revenues would be roughly the same as those outlined for Alternative A.

Mitigation Measures

None are suggested.

17.2.3 ALTERNATIVE C: 16,000 AF RESERVOIR

Impacts

Under this alternative, average monthly increases in water bills would amount to $3.03 for residences and $33.71 for commercial establishments (Table 17-4). Other impacts would be approximately the same as those outlined for Alternative A.

Mitigation Measures

None are suggested.

17.2.4 NO PROJECT ALTERNATIVE

If no project is approved by December 1, 1991, the District Board of Directors must determine if there is to be a refund of the unused connection fees collected thus far that

TABLE 17-4

MONTHLY USER FEES CHARGED TO FINANCE A WATER SUPPLY PROJECT[1] (1986 DOLLARS)

Alternative	Residential	% Increase in Average Cal-Am Bill	Commercial	% Increase in Average Monthly Cal-Am Bill
29,000-AF	$4.08	20%	$45.41	N/A[2]
20,000-AF	$3.35	16%	$37.30	N/A[2]
16,000-AF	$3.03	15%	$33.71	N/A[2]

[1]These calculations include only the costs of constructing, operating and financing the alternatives; they do not include the costs of mitigating impacts of the alternatives. Final costs are expected to be somewhat higher than those shown here.

[2]N/A: Not available. The variation in use charges among commercial establishments is too great to calculate the percentage change in the average bill.

Source: Monterey Peninsula Water Management District.

have been placed on reserve to fund a water supply project. If no project is approved, it is likely that connection fees would return to the scale used prior to the Board's consideration of a potential water supply project. In the case of the average residence, this would mean a fee of less than $100, compared to the current average of $2,500.

17.3 IMPACTS OF PROJECT CONSTRUCTION

17.3.1 ALTERNATIVES A, B AND C: NEW SAN CLEMENTE RESERVOIRS

Impacts

Construction of any of the proposed alternatives would cause a temporary increase in employment. Assuming that construction lasts two years and that labor represents 30% of the cost of the project, 130 to 180 jobs of two-year duration would be created. This temporary increase represents a minimal portion of job growth projected to occur in the region. Contractors would be asked to hire as many local workers as possible.

Mitigation Measures

None are required.

17.3.2 NO PROJECT ALTERNATIVE

There would be no construction impacts generated by the No Project Alternative.

Mitigation Measures

None are required.

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[1] U.S. Department of Commerce, Bureau of the Census, 1980 Census of Population, Washington D.C., 1983.

[2] Henrietta Stern, Monterey Peninsula Water Management District, telephone communication, July 7, 1987.

[3] Ibid.

[4] Lawrence Foy, Vice President and Monterey District Manager, Cal-Am Water Company, telephone communication, August 30, 1987.

18 GROWTH AND ITS EFFECTS ON THE MONTEREY PENINSULA

18.1 INTRODUCTION

This section of the document examines the effects of growth in the Monterey Peninsula. If none of the project alternatives are built, growth that is now planned for the Peninsula will be constrained beginning in the early 1990s by lack of municipal water supply. Planned growth in some communities is already constrained where a jurisdiction has met or exceeded its allocation of the existing water supply. With the expansion of the water supply system one obstacle to growth would be removed. Issues associated with growth -- increased traffic, air pollution, sewage capacity needs and demand for other infrastructure -- pose serious questions regarding the quality of life in the Peninsula area, warranting a detailed analysis.

The ideal forum to discuss the impacts of growth on the quality of life in the Monterey Peninsula would be a comprehensive land use plan for the region. However, no such document exists. The Association of Monterey Bay Area Governments (AMBAG), the County of Monterey and the cities in the area all have addressed the topic of growth impacts in various documents. However, there is no land use planning agency whose jurisdiction coincides with the boundaries of the Monterey Peninsula Water Management District's service area, and therefore no agency with the authority to develop Peninsula-wide policies relating to growth. As a result, the first step in the growth analysis for the proposed reservoirs was to enlist the help of local agency planners in developing employment and housing growth projections for each jurisdiction on the Peninsula. The projections and how they were developed are described in detail in Appendix E and summarized below.

The starting point for these projections was a set of economic forecasts prepared by Recht Hausrath Associates in 1980, updated in 1982 and 1984. Each local agency then provided more specific information regarding the types and amounts of development allowed, given current plans and policies. The growth projections that arose from this information became the "planned growth" scenario. If no new water supply becomes available, only a portion of planned growth will occur; this portion represents the scenario of "constrained growth." Both scenarios indicate growth at the year 2000 and at 2020. They are shown in Figure 18-1 and discussed in more detail in Chapter 4.

The second stage of the analysis involved applying the growth projections to environmental and social factors in order to estimate impacts on quality-of-life indicators such as traffic, air quality, wastewater and solid waste removal, schools and the fiscal health of local jurisdictions. Various land uses affect local resources differently; for example, hotels generate more wastewater per square foot than do most other commercial uses, and there are typically more school children per single-family home than per multi-family dwelling. The analysis assumes that the comprehensive set of detailed land use data and growth projections now assembled can supply the framework for estimating changes to the aforementioned indicators.

It should be noted, however, that the authors of the EIR/EIS do not believe that the effects of growth described in this chapter can be directly and solely attributed to the water supply system improvements. They are the result of market forces and local land use planning policies. Failure to improve the water supply system would constrain growth but improvement of the system would not induce growth beyond current plans. This issue is discussed in more detail below.

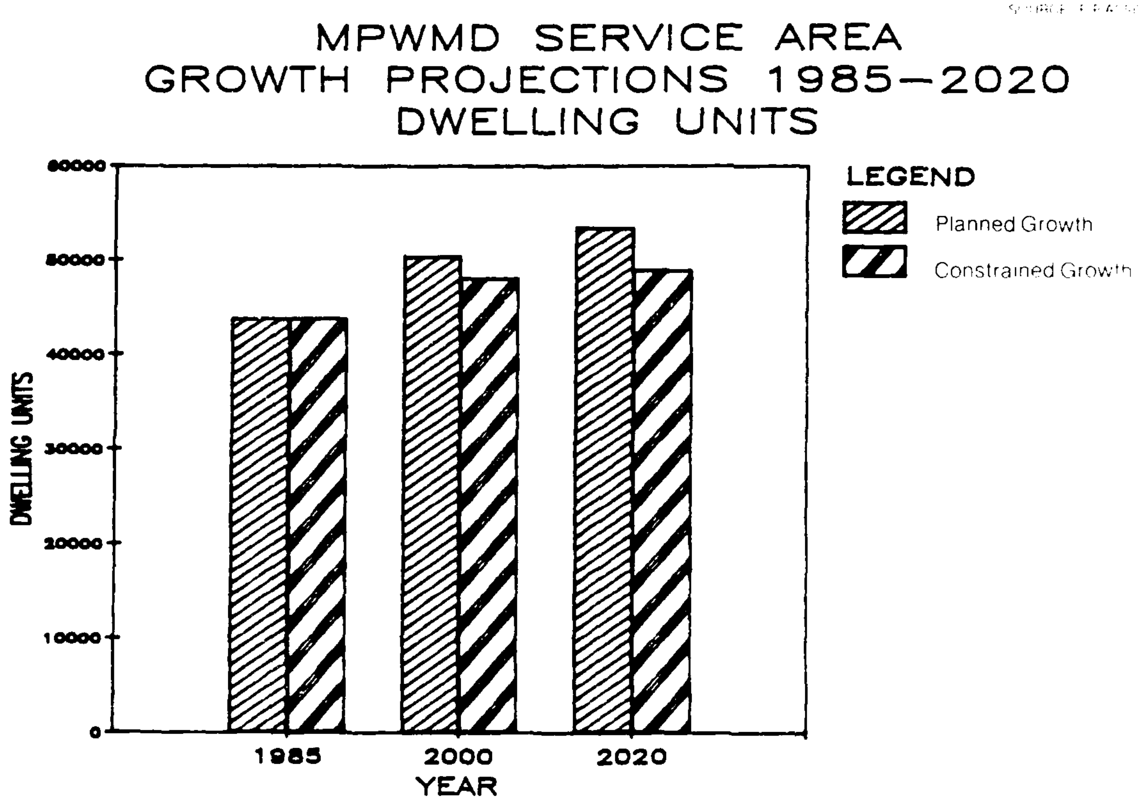
18.2 POTENTIAL FOR GROWTH INDUCEMENT

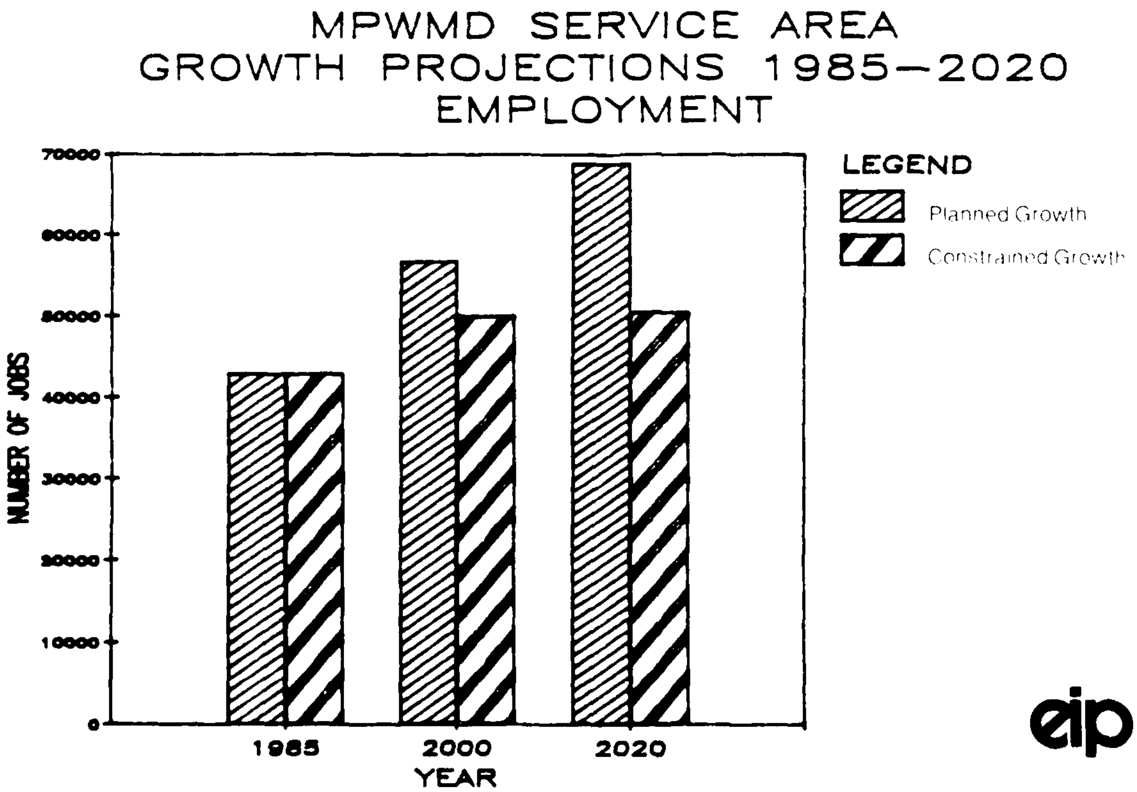
The California Environmental Quality Act (CEQA) statutes require an EIR to discuss the growth-inducing effects of a proposed project (Section 21100(g)). CEQA Guidelines suggest that projects that remove obstacles to growth, such as the expansion of a wastewater treatment plant, may be determined to be growth-inducing because such projects allow growth that otherwise might not occur (Section 15126(g)).

The authors of this EIR/EIS make a distinction between projects that are growth-inducing and those that are growth-accommodating. The statement that a project is growth-inducing if it accommodates "growth that otherwise might not occur" could be misleading. It is the responsibility of infrastructure providers like the District to accommodate

MPWMD SERVICE AREA
GROWTH PROJECTIONS 1985-2020
DWELLING UNITS / EMPLOYMENT

FIGURE 18-1





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growth consistent with the general plans of the communities that they serve. A project accommodates growth when it enables fulfillment of community plans. However, a project creates potential for growth-inducement when construction or improvement of infrastructure provides capacity for land development and population increases that exceed the planned growth of an area. The proposed water system improvements would have the potential to induce growth if they accommodated significantly more development than allowed by the current general plans of the jurisdictions served by the system. In that case, development might occur taking advantage of the excess capacity, despite community goals to the contrary.

Many factors combine to cause growth in any particular area. Probably the two most important factors causing (or restraining) growth are market forces and community governments. (Other factors, such as the availability of properly zoned land; sufficient water, wastewater, roads, schools and public safety services; and a pleasant climate all affect a region's growth rate.) Local governments influence growth by allowing or preventing construction in particular areas or in the entire community, by means of general plan land use policies. Growth policies often indicate the buildout population that a community's land area and infrastructure can comfortably support. After public review, the plans and policies are adopted by elected officials; presumably, these officials reflect the will of the community. These same elected officials approve and veto specific development proposals. The environmental impact reports (EIRs) of both the community's plans and the specific development proposals must discuss the growth-inducing effects of their implementation.

However, no one writes EIRs on the growth-inducing effects of market forces. Because community governments have the next most important effect on growth, the single most important arena for discussion of growth-inducing impacts is a community's general plan EIR. It is the communities who decide where and how much growth is to occur via general plans and land use elements; citizens and interest groups and other government agencies have the opportunity to comment during the preparation and adoption of these plans and during the public hearings on their EIRs. As this EIR/EIS indicates, the growth projections shown here are consistent both with each community's general plan and with the AMBAG projections.

Once plans are adopted by a community, it is the responsibility of public service agencies --water and wastewater treatment agencies, school districts, police and fire protection departments, etc. -- to respond to the community's desires as expressed in the general plan. In order to plan for their own staffing and facilities, these agencies must consider the plans of the communities that they serve.

The proposed alternatives are sized to meet the Peninsula's projected municipal water demand in the year 2020. The water demand estimates are based on population and employment projections that are consistent with present land use plans. In addition the District plans to allocate water from the new reservoir in three phases at a rate consistent with planned growth (see Section 3.6.7). The project's allocation limit and the three-step phasing of the allocation will be part of the project voted on by the public and, once approved, can be increased only by another public vote. The project alternatives are judged to be growth accommodating because they would allow presently planned growth to occur without being constrained by a lack of water supply. They would not be growth inducing because they would not allow growth in excess of that already planned.

18.3 TRAFFIC

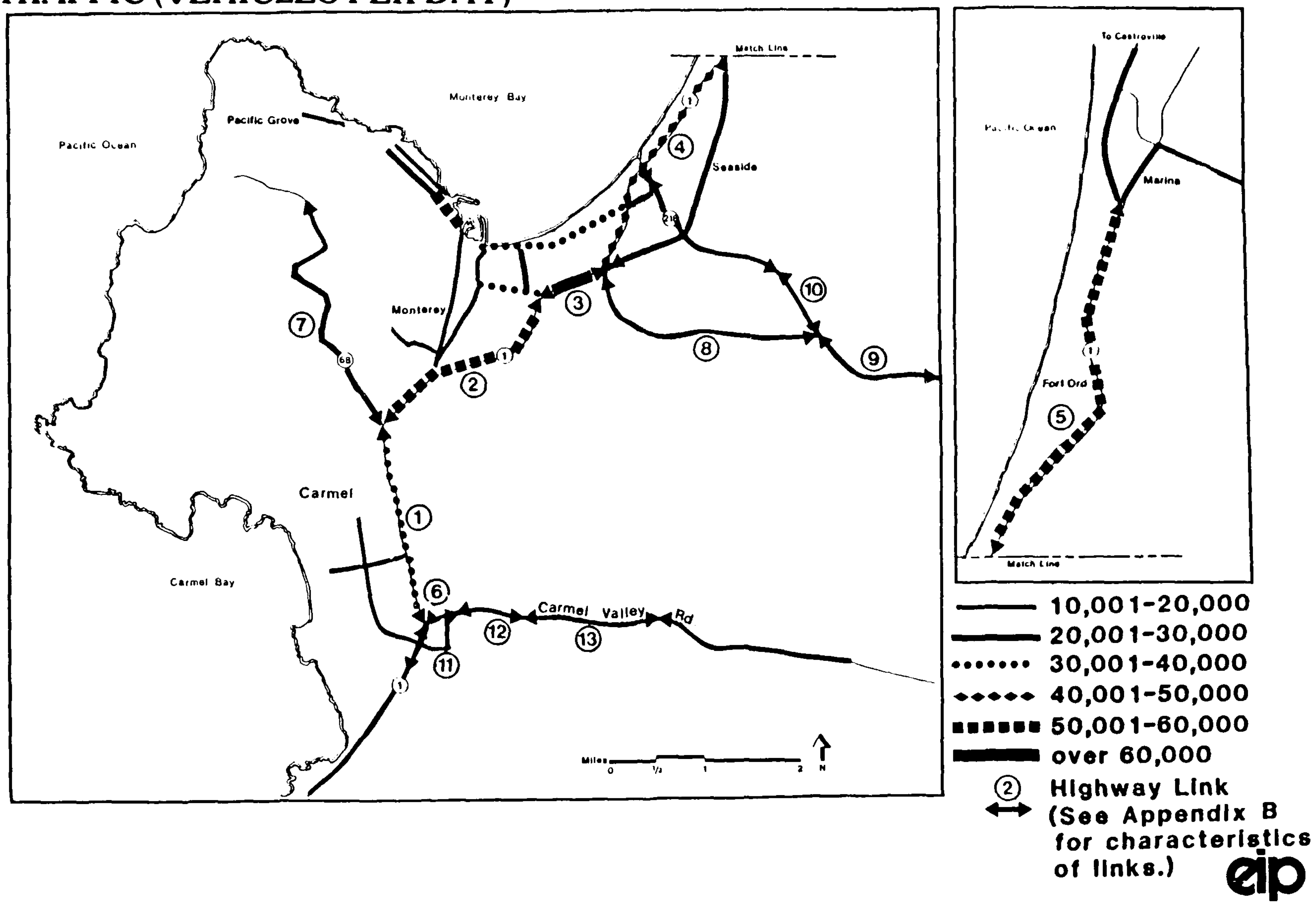
This section of the report analyzes the traffic implications of projected growth on major regional transportation corridors on the Monterey Peninsula for the years 2000 and 2020. The growth projections encompass the two scenarios described in the previous section: planned growth, which would be consistent with existing policies and plans, and constrained growth, which is planned growth that would be constrained by the lack of sufficient water to support it. The analysis indicates that significant improvements to the transportation system are necessary to accommodate future growth. Section 18.8, Fiscal Impacts, briefly discusses financing for the road improvements.

18.3.1 METHODOLOGY

The analysis uses 1984 freeway and major roadway traffic counts (Figure 18-2) as provided by Caltrans and the Monterey County Public Works Department, to establish existing levels of service on major highways of the Peninsula (Figure 18-3).[1,2] Traffic volumes were projected for future years by conducting travel demand forecasts for the years 2000 and 2020. Travel demand forecasts were made in three steps: quantifying trip generation

1984 MONTEREY PENINSULA AVERAGE DAILY TRAFFIC (VEHICLES PER DAY)

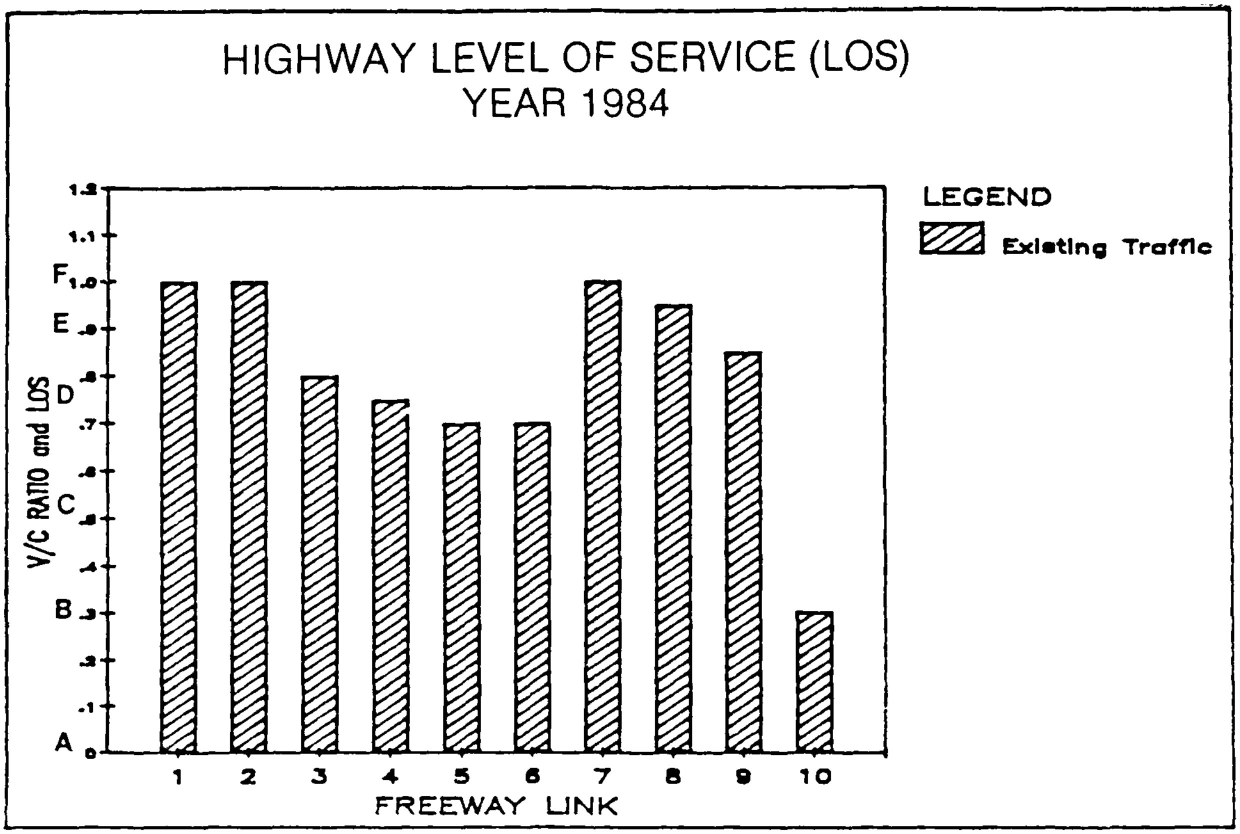
FIGURE 18-2



HIGHWAY LEVEL OF SERVICE (LOS)

FIGURE 18-3

SOURCE: EIP ASSOCIATES



LINK	DESCRIPTION
1	SR 1 from Carmel Valley Road to Carmel Hill
2	SR 1 from Carmel Hill to Sloat undercrossing
3	SR 1 from Sloat undercrossing to SR 68 (N)
4	SR 1 from SR 68 (N) to Ord Village
5	SR 1 from Ord Village to South Marina
6	Carmel Valley Road from SR 1 to Carmel Rancho Boulevard
7	SR 68 – Holman Highway
8	SR 68 from east junction SR 1 to SR 218
9	SR 68 from SR 218 to Las Laureles Grade
10	SR 218 north of SR 68

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based on type of land development (including background growth in trips), calculating mode splits (e.g., figuring the percentage of people traveling by private car or transit), and assigning routes traveled. This analysis incorporated the conservative assumption that all trips are made by private auto; route assignment was premised upon the assumption that drivers would take routes that minimize travel distances and continue existing traffic patterns except that increased commuting from Salinas and Marina was explicitly taken into account due to the changing jobs/housing balance in the land use projections. The background growth in trips is in addition to the trips calculated directly from the housing and employment growth projections, and is attributable to tourist/visitor trips among other factors. The background growth rate is 1% per year non-compounded, so that by the end of the study period (2020) this amounts to a 35% increase in traffic.

After calculating future volumes, the analysis generates predicted highway levels of service (LOS) by incorporating proposed highway improvements. The list of improvements below have been taken from the Regional Transportation Plan,[3] although some are also mentioned in the draft Route Concepts Reports prepared by Caltrans.

- Hatton Canyon Freeway construction
- Carmel Valley Road widening from State Route 1 to Carmel Rancho Boulevard and from Via Petra to Valley Greens Road
- Holman Highway widening
- State Route 68 widening from its eastern junction with State Route 1 to Las Laureles Grade
- State Route 1 widening from Route 68 to Ord Village.

18.3.2 EXISTING TRAFFIC

Several highway segments on the Peninsula are currently crowded in the peak hour to the point that they are classified as having poor levels of service (Figure 18-3). "Poor" LOS is defined by Monterey County as worse than LOS C in the peak hour. "Poor" LOS is defined in the Highway Capacity Manual as worse than LOS D in the peak hour.[4] This analysis uses the County's definition for identifying links with poor LOS. Links with poor LOS are as follows:

Route	Location	1984 LOS
SR 1	Carmel Valley Road to Carmel Hill	E/F
SR 1	Carmel Hill to Sloat Undercrossing	E/F
SR 1	Sloat Undercrossing to SR 68	D
SR 1	SR 68 to Ord Village	C/D
CV Rd	SR 1 to Carmel Rancho Boulevard	E
SR 68	Holman Highway: Stuart to W. Jct. SR 1	E/F
SR 68	E. Jct. SR 1 to SR 218	E
SR 68	SR 218 to Las Laureles Grade	D

A number of streets in the cities on the Peninsula are operating at poor conditions. These streets have not been analyzed specifically for this study, but it is important to recognize that as traffic increases in the region, conditions on these routes will degrade further. Del Monte Avenue in Seaside is operating above capacity, particularly between Highway 218 and Broadway. Traffic projections for the next ten years indicate that the volumes on the segment north of Broadway will soon exceed the capacity of the road. This northern segment must be widened to six lanes at substantial cost.[5]

Fremont Street in Seaside also experiences congestion during peak hours. In 1979, the County recommended removing parking on this street as a means of gaining adequate street capacity. This has not been implemented as yet.

Carmel Valley Road, between Los Laureles Road and Ford Street is currently operating at LOS D. A recent EIR prepared on the Carmel Valley Master Plan recommends that this segment either be widened to include either four lanes or a center left-turn lane with other alignment improvements.[6] With this increase in capacity, the road segment can handle projected traffic growth in this area.

Other major roadway links on the Peninsula maintain acceptable levels of service, as follows:

Route	Location	1984 LOS
SR 1	Carmel River to Carmel Valley Road	C
SR 1	Ord Village to South Marina	C
CV Rd	Carmel Rancho Boulevard to Via Petra	B
CV Rd	Via Petra to Valley Greens	B
SR 218	North of SR 68	A/B

18.3.3 YEAR 2000 CONDITIONS

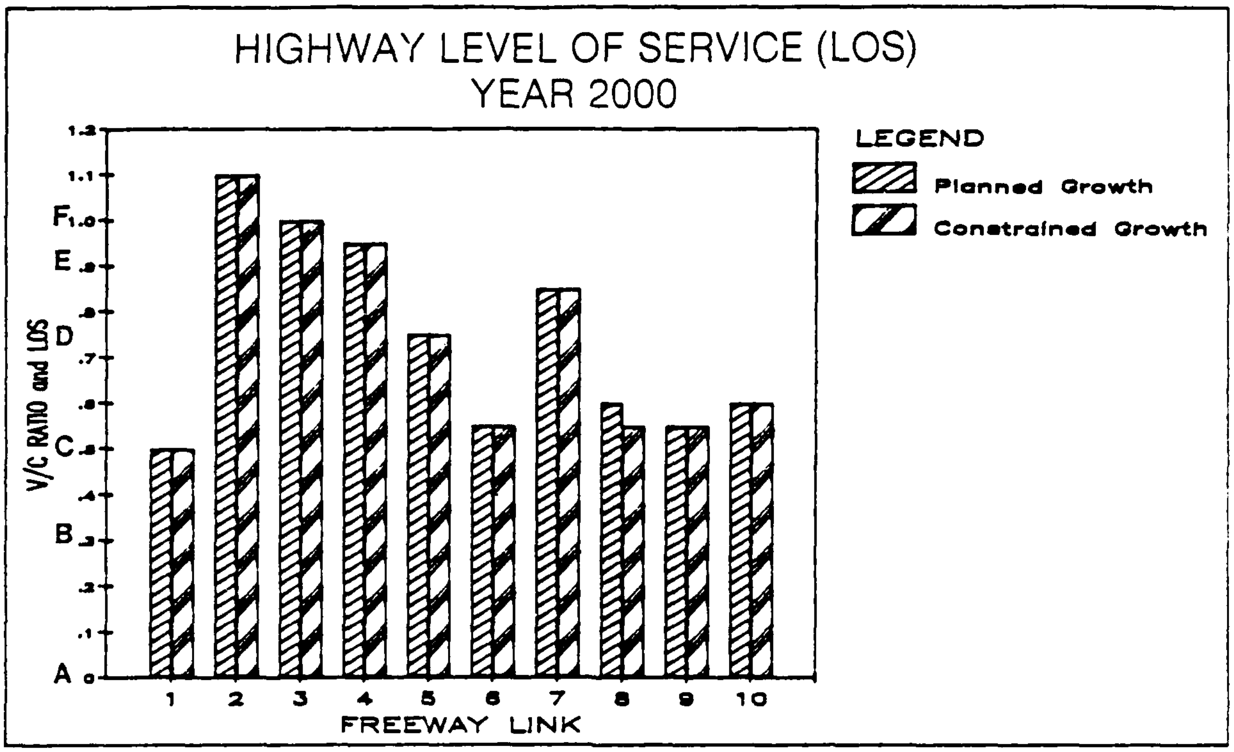
Further development on the Peninsula would lead to higher traffic volumes on major highways by the year 2000 under both the planned and constrained growth scenarios (Figure 18-4). Highway modifications are planned, however, that would improve or maintain LOS on several links despite heavier travel demand. These improved links are as follows:

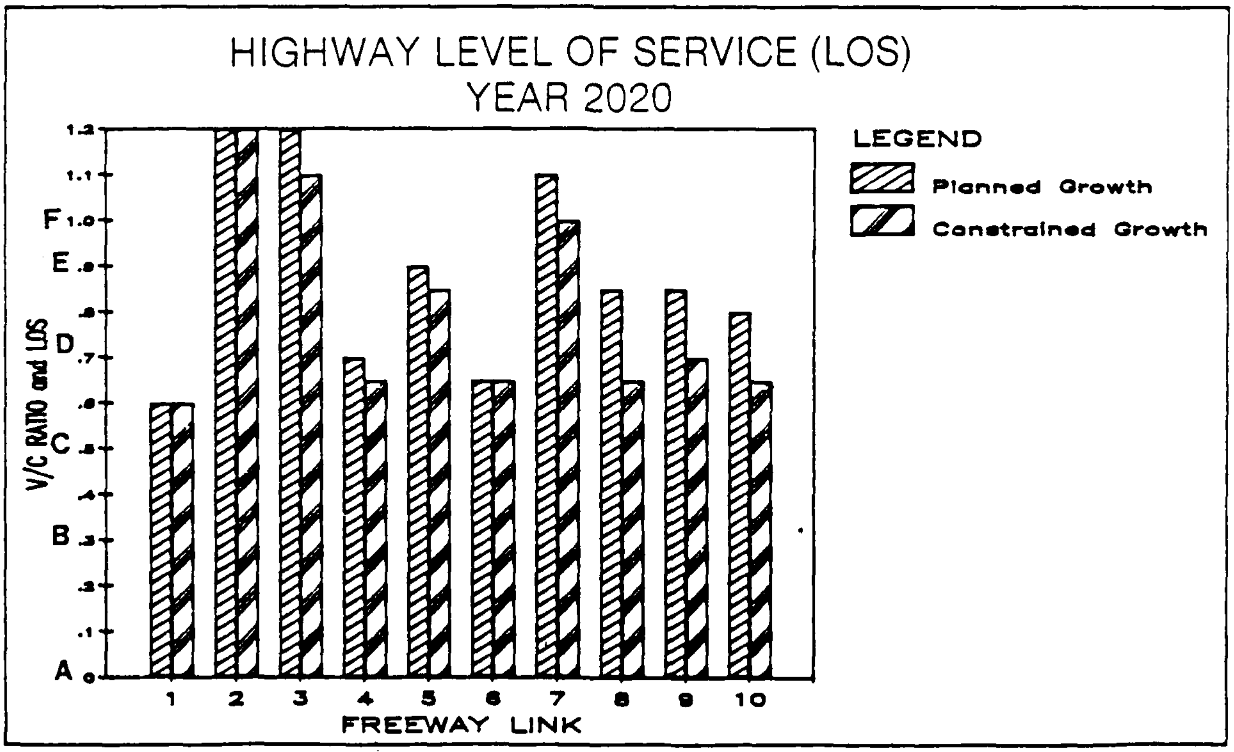
Route	Location	1984 LOS	LOS Planned Growth	LOS Constrained Growth
SR 1	Carmel River to Carmel Valley Road	C	C	C
SR 1	Carmel Valley Road to Carmel Hill	E/F	B/C	B/C
CV Rd	SR 1 to Carmel Rancho Boulevard	E	C	C
CV Rd	Via Petra to Valley Greens	B	B	B
SR 68	Stuart to W. Junction SR 1	E/F	D	D
SR 68	E. Junction SR 1 to SR 218	E	C	C
SR 68	SR 218 to Las Laureles Grade	D	C	C

State Route 1 between Carmel River and Carmel Valley Road would remain at constant LOS *during* the study period, but in fact the amount of traffic on this segment would increase due to projected growth. The level of increase would not be sufficient to change the LOS designation, but it probably would be noticeable to local residents. This is an important consideration when reviewing this analysis. The LOS designations indicate the various stages of traffic movement in relation to the road capacity as illustrated in Figures 18-3 and 18-4, but actual traffic volumes will increase on all road segments in the future.

HIGHWAY LEVEL OF SERVICE (LOS) YEAR 2000

FIGURE 18-4





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As could be expected, LOS on other links would deteriorate as a result of increased traffic. These include:

Route	Location	1984 LOS	LOS Planned Growth	LOS Constrained Growth
SR 1	Carmel Hill to Sloat Undercrossing	E/F	F	F
SR 1	Sloat Undercrossing to SR 68 (N)	D	E/F	E/F
SR 1	SR 68 (N) to Ord Village	C/D	E	E
SR 1	Ord Village to South Marina	C	C/D	C/D
CV Rd	Carmel Rancho Boulevard to Via Petra	B	C	C
SR 218	North of SR 68	A/B	C	C

Additional highway modification would improve LOS on the worst links to an acceptable level. The first two improvements on the list below are part of Caltrans' current plans, but as of this writing are not scheduled to be constructed by 2000.

Route	Location	LOS Planned Growth	LOS Constrained Growth
SR 1	Carmel Hill to Sloat UC - add 2 lanes; total 4	C	C
SR 1	Sloat UC to SR 68 - add 2 lanes; total 6	C	C
SR 1	SR 68 to Ord Village - add 2 lanes; total 4	C	C

18.3.4 YEAR 2020 CONDITIONS

As demonstrated in the year 2000 analysis, ongoing highway widenings and other modifications are expected to lead to improved LOS at several links in the system by year 2020 despite heavier traffic volumes (Figure 18-4). Links expected to benefit from highway construction projects include:

Route	Location	LOS Existing	LOS Planned Growth	LOS Constrained Growth
SR 1	Carmel Valley Road to Carmel Hill	E/F	C	C
SR 1	SR 68 to Ord Village	C/D	C	C
CV Rd	SR 1 to Carmel Rancho Boulevard	E	C	C
SR 68	E. Junction SR 1 to SR 218	E	D	C

Highway segments expected to undergo deteriorating LOS are as follows:

Route	Location	LOS Existing	LOS Planned Growth	LOS Constrained Growth
SR 1	Carmel Hill to Sloat Undercrossing	E/F	F	F
SR 1	Sloat Undercrossing to SR 68	D	F	F
SR 1	Ord Village to South Marina	C	D/E	D
CV Rd	Carmel Rancho Boulevard to Via Petra	B	C	C
CV Rd	Via Petra to Valley Greens	B	C	C
SR 68	Holman Highway; Stuart to W. Jct. SR 1	E/F	F	E/F
SR 218	North of SR 68	A/B	D	C

Several improvements not currently planned would improve LOS on the following links:

Route	Location	LOS Planned Growth	LOS Constrained Growth
SR 1	Carmel Hill to Sloat UC - add 2 lanes; total 6	D	D
SR 1	Sloat UC to SR 68 - add 2 lanes; total 8	D	D
SR 68	Holman Highway - upgrade from 4-lane highway to 4-lane freeway	C	C
SR 68	E. Jct. SR 1 to SR 218 - add 2 lanes; total 6	C	B

According to current County policy, several of the links discussed would still have unacceptable LOS during the peak hour, even with construction of additional highway improvements. Portions of State Route 1 (from Carmel Hill to the south junction with State Route 68 and from Ord Village to South Marina) would experience LOS D during the peak hour under both the planned and constrained growth scenarios. State Route 218 (north of State Route 68) would experience LOS D with planned growth but would be at LOS C with constrained growth. Additional highway modifications to improve traffic flow at these locations are possible if the decision-makers find that expected levels of service are unacceptable. However, given the borderline "D" LOS assigned to several of these locations, it is unlikely that the expense of highway widenings would be justified for the small gain in expedited traffic flow.

18.4 SCHOOLS

This section of the report combines information about projected school enrollment and the capacity of Monterey Peninsula public schools in order to describe when and where overcrowding will occur. Although overcrowding is expected to be serious and chronic at Salinas Union High School, the majority of Peninsula school districts will be able to serve the needs of the projected population without a significant financial outlay. Information presented here shows that, although capacity problems are likely at some facilities, there is generally excess capacity expected at other schools within the same district. It is likely, then, that the school districts could house all the students with minimal capital cost by reassigning groups of students from one school to another.

AMBAG published a study entitled School Enrollment Projections: 1980-2020 in January 1986, which projected school enrollments by school district and grade levels to the year 2020.[7] This study forms the basis of the following assessment of school capacity on the Monterey Peninsula. In order to develop projections of the school-age population, AMBAG relied upon the Economic Base Model first developed by the agency and Recht-Hausrath Associates. Assumptions incorporated into the model are discussed in several AMBAG reports; these assumptions incorporate data reflecting birth rates and the aging of the population.

As discussed previously, AMBAG's growth forecasts are not directly comparable to the land use-based projections included in this document for two reasons: AMBAG's published projections deal with the entire Monterey County, not individual cities; and AMBAG's unpublished projections for the Peninsula cities provide population but not dwelling unit forecasts through the year 2020. Projections, on the other hand, estimate dwelling unit and employment increases for each city and unincorporated area of the Monterey Peninsula.

If one assumes that the number of persons per household in each city remains constant from 1980 through 2020, then a comparison of AMBAG figures with the projections published in this document is possible. AMBAG population forecasts can be converted into projections of households and this household estimate can be compared to the EIP projections. These projections of unconstrained growth are higher than AMBAG's in each of the cities and lower than AMBAG's in county areas. For the Peninsula as a whole, these projections are slightly lower than AMBAG's.

AMBAG's school district enrollment projections can be viewed in light of the differences between the two sets of growth projections. After outlining the instances where EIP's projections exceed AMBAG's, an average student-per-household ratio was applied to the difference in households projected by EIP and AMBAG. The number of students calculated according to these differences were then added to or subtracted from the AMBAG enrollment projections and evaluated in light of the capacity at each school district.

The following sections detail projected enrollment levels and capacity difficulties of each school district on the Monterey Peninsula, first assuming growth as planned in local planning documents and policies. Second, the constraining effect that lack of an expanded water supply would have on enrollment projections is briefly addressed for each District.

18.4.1 CARMEL UNIFIED SCHOOL DISTRICT

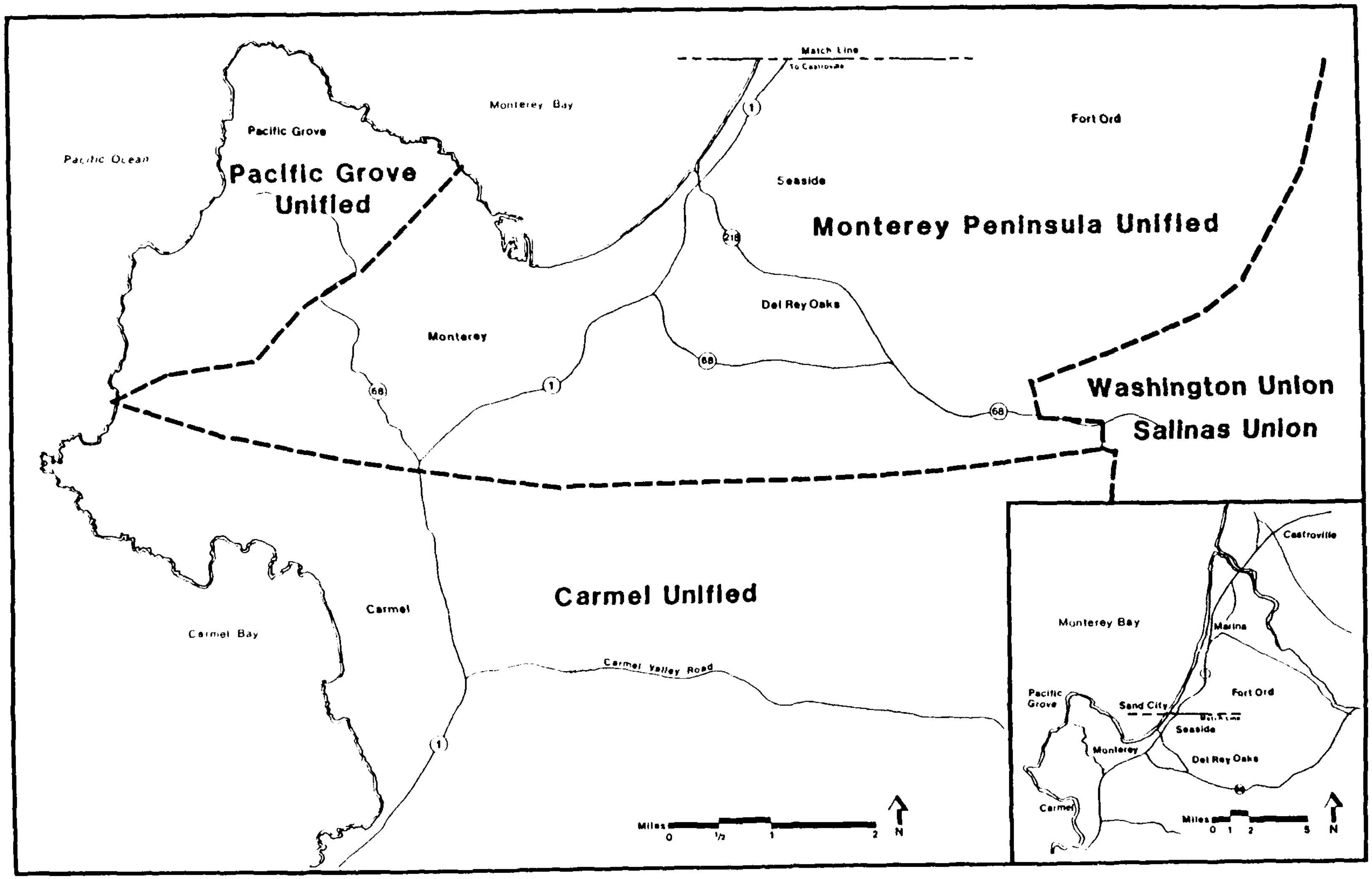
The Carmel Unified School District includes the communities of Carmel, part of Del Monte Forest, Carmel Valley and other unincorporated areas of Monterey County (Figure 18-5).

Elementary Schools

Carmel Unified schools serve grades K-5 in elementary schools with a total capacity of 1,150 students. With both planned and constrained growth, elementary school enrollment is projected to increase steadily through 1999 and peak with 1,150-1,170 students at approximately 100-102% of capacity (Figure 18-6). Some overcrowding would occur in the years 1997-2002, or 5 of the next 35 years. Enrollment is projected to decline steadily from 1999 through 2015 before beginning to increase again. No capacity problems are expected after 2002 under either growth scenario; however, enrollment under the constrained growth scenario would be slightly lower than enrollment in the planned growth scenario in the years after 2000.

SCHOOL DISTRICT BOUNDARIES

FIGURE 18-5



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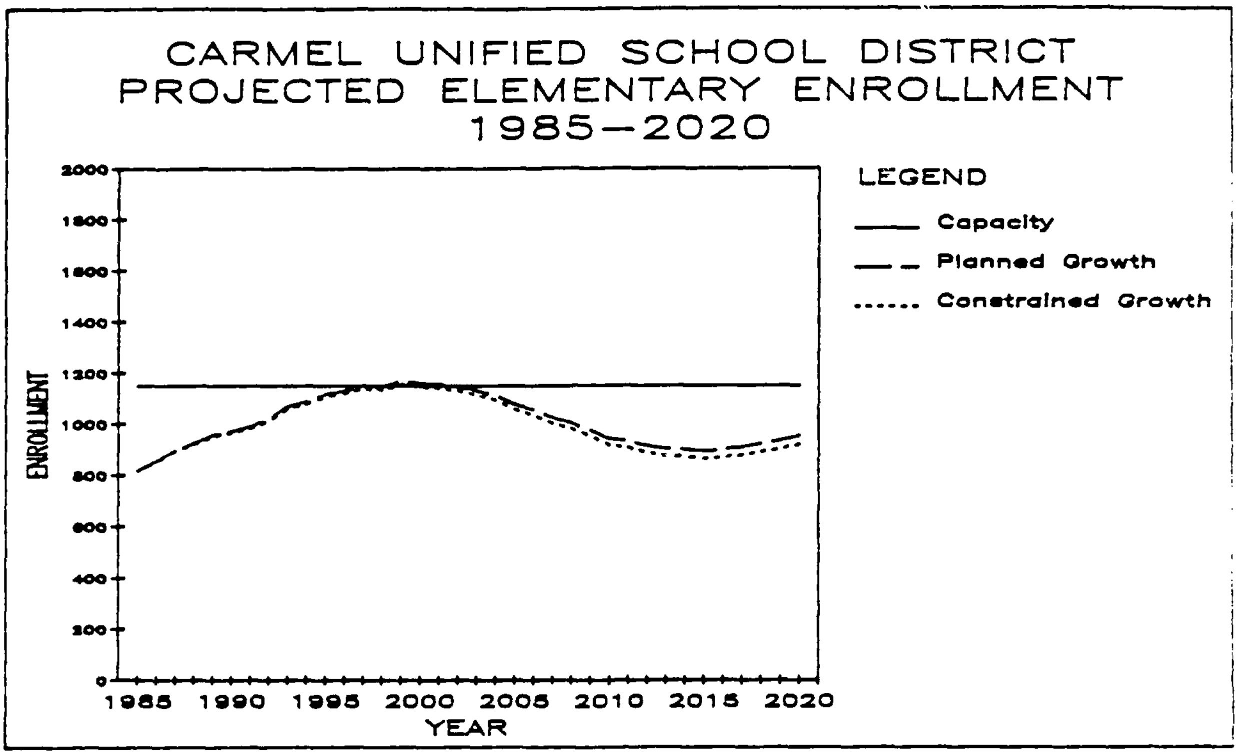
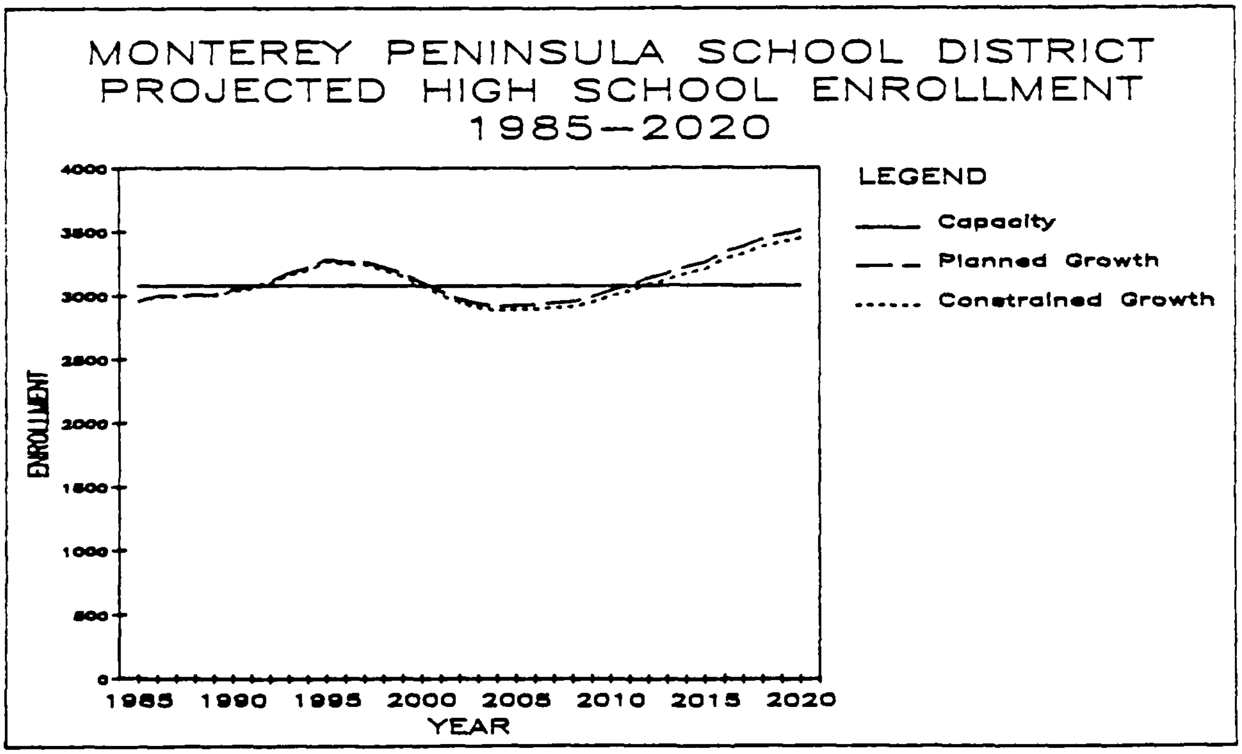
CARMEL & MONTEREY PENINSULA UNIFIED SCHOOL DISTRICT PROJECTED ENROLLMENT 1985-2020

FIGURE 18-6





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The School District recently closed Carmelo School, which has a capacity of 224 students. Reopening this site around 1995 would ensure sufficient capacity through the peak years. The site could be closed again around 2005, after enrollment declines again. The School District notes, however, that some remodeling expense would be required prior to reopening the school; the expense may not be justified in light of the small number of students needing space or the 5-year capacity shortage.[9] In that case, the School District could consider renting one or two portable classrooms for as long as necessary. Local developers could be assessed impact fees to cover this additional expense.

Middle Schools

No capacity problems are foreseen for Carmel School District middle schools, which have combined capacity of about 910 students. Enrollment is expected to increase fairly steadily through the year 2004, when it peaks at 74% of capacity before declining again. Enrollment should begin to rise again shortly before the year 2020. Average enrollment over the next 35 years is expected to be about 66% of capacity with planned growth. This figure would be slightly lower after the year 2000 if growth is constrained by lack of water or other infrastructure capacity.

High School

No problems are projected in keeping enrollment within the 1,050-student facility. Enrollment is expected to rise fairly steadily through 2008, when it peaks at about 86% of capacity before declining again. Average enrollment over the next 35 years is projected at about 76% of capacity; enrollment in the years 2000-2020 would be slightly lower under the constrained growth scenario.

18.4.2 MONTEREY PENINSULA UNIFIED SCHOOL DISTRICT

The Monterey Peninsula Unified School District serves the communities of Del Rey Oaks, Fort Ord, Marina, Monterey, Sand City, Seaside and some unincorporated Monterey County areas (Figure 18-6). A major part of the School District's service area lies outside the scope of this study; it should be noted, therefore, that decisions affecting growth on the Peninsula may not change growth rates or policies in communities further to the [illegible] and may not totally alleviate the effects of growth on the District.

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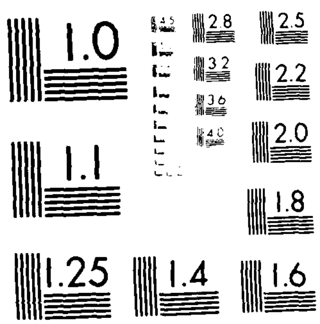


MICROCOPY RESOLUTION TEST CHART

Elementary Schools

No capacity problems are foreseen for Monterey elementary school facilities, which have combined capacity of about 10,000. Enrollment is projected to range from about 7,000 to 7,800 over the next 35 years, with average enrollment at less than 75% of capacity. If growth is constrained by lack of infrastructure, enrollment could be expected to fall off by several percent after the turn of the century.

Middle Schools

With total capacity of about 3,600 and average enrollment of about 3,000, no capacity problems are foreseen for Monterey middle schools. Enrollment is expected to increase through 1994, decline steadily through 2004, and then rise to a peak at about 88% of capacity in 2018 before leveling off. Over the next 35 years, enrollment would average about 83% of total capacity, assuming unconstrained growth. If lack of infrastructure capacity prevents planned growth from occurring, average enrollment would be somewhat lower than projected in the years after the turn of the century.

High School

Growth forecasts predict episodic overcrowding at the high school through the year 2020 (Figure 18-6). Projections show that the school's capacity of about 3,100 would be reached or exceeded nearly 55% of the time over the next 35 years. Enrollment is on a steady upward trend now and should peak at about 107% of capacity in 1995 (enrollment of 3,290); after declining enrollment through 2004, the number of enrolled students would rise steadily again to peak at about 114% of capacity in 2020 (enrollment of 3,515). With constrained growth, crowding would be expected to be slightly less severe in the years after 2000. However, enrollment would still be expected to peak in 2020, at about 112% of capacity. Enrollment would average 104% (constrained growth) or 105% (planned growth) of capacity during the forecast period.

There are several solutions the School District could consider in the future; one or a combination of several solutions would alleviate the projected overcrowding. The School District could relocate the ninth grade classrooms to the middle schools, which are expected to have excess capacity of at least 600 students in all future years. If it seems that the middle school would then be crowded, the sixth grade classrooms could be moved to elementary schools, which should have excess capacity of at least 2,500 in all future years. If necessary, portable school classrooms could be added to relieve temporary space shortages. Local housing developers could be assessed school impact fees to fund the District's reorganization and/or temporary classroom rentals.

18.4.3 PACIFIC GROVE UNIFIED SCHOOL DISTRICT

The Pacific Grove Unified School District service area includes the City of Pacific Grove and a portion of Pebble Beach (Figure 18-5).

Elementary Schools

Elementary schools, with a total capacity of 1,100, are expected to reach or slightly exceed capacity in the years 2015-2020. At the worst, the schools would operate at about 102% of capacity with 20 students too many. Average enrollment over the next 35 years is expected to be about 95% of capacity. If growth is constrained in the future, average school enrollment would be substantially less than predicted; school capacity would be sufficient during the time frame of these projections.

The School District could consider reopening one or both of the closed elementary schools, which have a combined capacity of 2,100.[10] It may be simpler and cheaper, however, to rent a portable classroom for the few students that the District cannot house in existing facilities in operation.

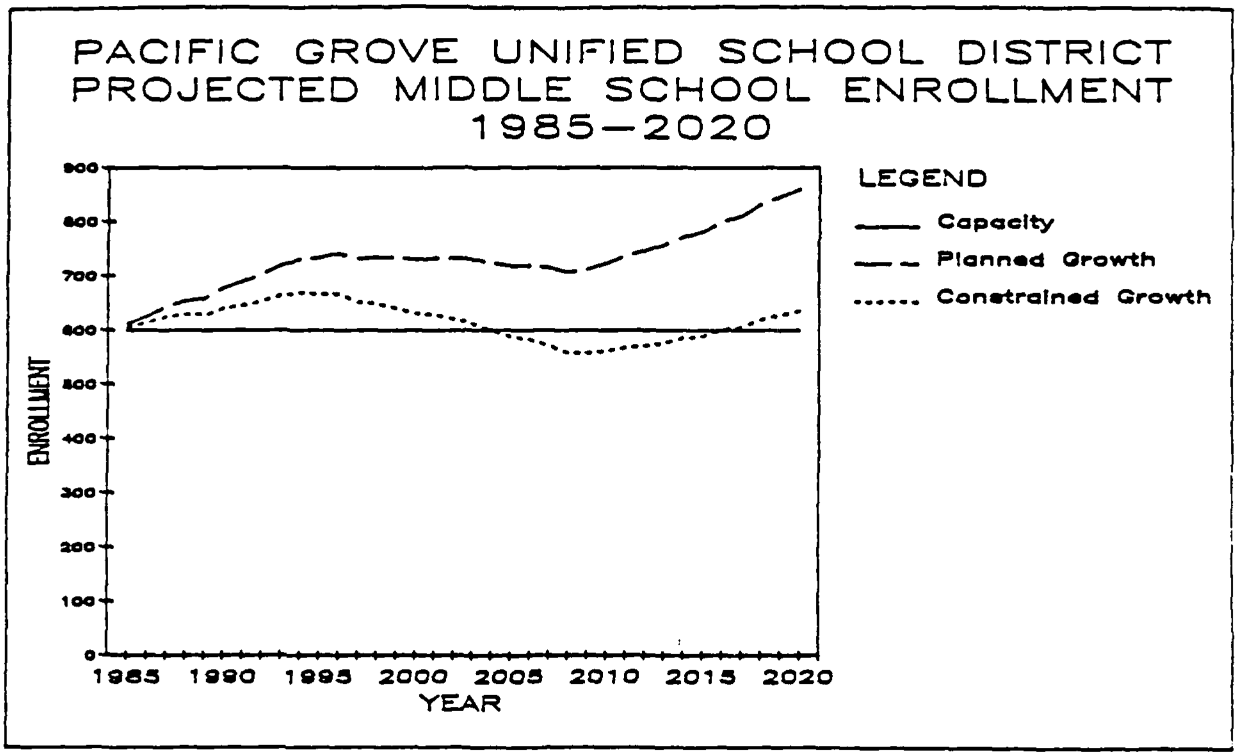
Middle Schools

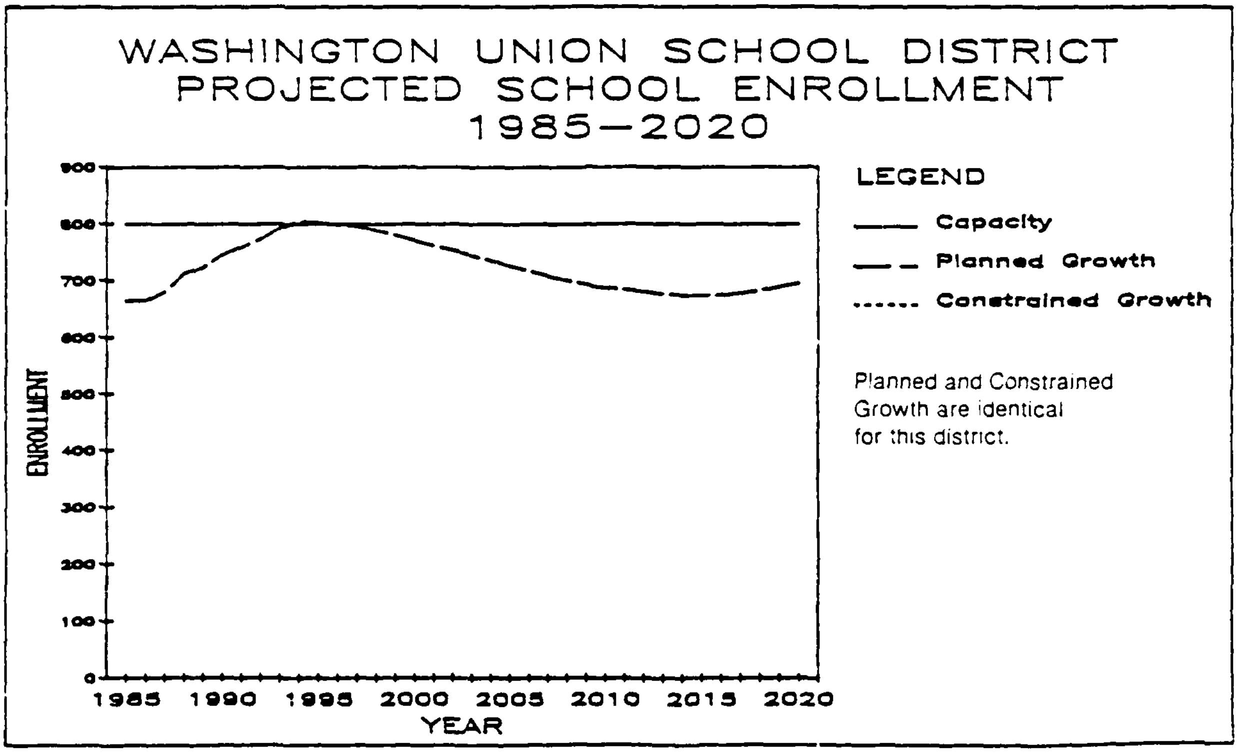
The Pacific Grove middle school, with total capacity of 600, is projected to experience overcrowding in all years from 1985 through 2020 (Figure 18-7). Average enrollment is projected at about 125% of capacity through the forecast period. Assuming growth as planned, the worst crowding would occur in 2020, when the school would operate at about 144% of capacity with 860 students enrolled; enrollment at that time would still be on an upward trend and could become worse.

If growth constraints are imposed because of lack of infrastructure capacity, enrollment would be substantially less than projected for planned growth. Enrollment would probably be less than 100% of capacity during the years 2005-2015, but enrollment would rise again

PACIFIC GROVE & WASHINGTON UNION SCHOOL DISTRICT PROJECTED ENROLLMENT 1985-2020

FIGURE 18-7





and exceed capacity before 2020. Average enrollment under this scenario would be about 105% of capacity; maximum enrollment would occur in 1996 at 111% of capacity.

The School District could consider reopening one or both of the closed elementary schools (combined capacity of 2,100) in order to house classrooms from the middle school. As noted above, the worst crowding would occur under planned growth and would require space for about 260 students, which would probably be too many to house in portable classrooms. In addition, the chronic nature of the projected capacity problem at the middle school level suggests that additional permanent facilities should be dedicated to those grade levels.

High School

No capacity problems are foreseen in the high school, which has capacity for 1,000 students and average projected enrollment of about 850 (85% of capacity). Enrollment is projected to increase steadily from 1990 through 1998, when it peaks at about 90% of capacity; a steady decline is then expected through 2010 before enrollment rises again to 90% of capacity in 2020. Enrollment would still be on an upward trend at this point, however, and could continue rising.

18.4.4 SALINAS UNION HIGH SCHOOL DISTRICT

The Salinas Union High School District encompasses a large area around and including the City of Salinas. The District also includes a small portion of the Highway 68 area, but residents of only the Laguna Seca and Hidden Hills developments would attend this high school (Figure 18-5). Students from the study area would encompass less than 4% of the District's enrollment during the forecast period; it is unlikely that development of either growth scenario would significantly affect capacity at Salinas Union schools.

The Salinas high school facilities are overcrowded now and projected to become worse. AMBAG estimates that students will exceed available capacity by more than 2 to 1 by the year 2020.

Several solutions to relieve the chronic overcrowding are planned or underway. A new junior high school is scheduled to open by 1988 and an expansion is planned for the Alisal

High School, also scheduled for completion by 1988. The School District is currently working with the City to find a site for a new high school in the northeast area of Salinas; an opening date for that facility could be expected as soon as 1990.[11]

The School District is also considering renting portable school classrooms or other space to relieve short-term crowding. In addition, it is possible that future attendance boundaries might change. In that case, some students, such as those in the Highway 68 area, could attend Monterey High School in the future. This last solution could exacerbate crowding at the Monterey facility unless appropriate action is taken by that school district.

18.4.5 WASHINGTON UNION SCHOOL DISTRICT

Washington Union boundaries encompass primarily some unincorporated areas of the County, including part of the Highway 68 area and Toro Park (Figure 18-5). Residents of the study area that would attend schools in this District would live in Laguna Seca and Hidden Hills.

School District enrollment is expected to slightly exceed its capacity of 800 students for several years around 1995 (Figure 18-7). At worst, the school would operate at about 102% of capacity, with 15 students too many. Average enrollment over the next 35 years would be about 93% of capacity. This figure would not change under the scenario of constrained growth.

The most likely solution to the District's overcapacity problems would be to lease portable facilities for the few years that it is necessary. Local developers could be assessed impact fees to pay for this extra operating expense.

18.5 SOLID WASTE

The Monterey Regional Waste Management District (MRWMD) service area extends from Castroville to Big Sur and serves the entire Peninsula. The service area was enlarged a few years ago, and the MRWMD is now negotiating with Fort Ord for inclusion in the service area by 1988. There is also the possibility that the MRWMD would collect and dispose of solid waste from the Salinas area if north County landfill sites close.[12]

. e MRWMD operates a landfill near Marina, which is located approximately two miles north of the City and one mile east of Highway 1. The Marina landfill has approximately 90 years of available capacity, assuming a 2% annual growth rate.[13] The projections for planned growth included in this document are consistent with the MRWMD's growth assumption, so it is evident that Monterey Peninsula planned development would not exceed the landfill's capacity.

18.6 WASTEWATER

18.6.1 MONTEREY REGIONAL WATER POLLUTION CONTROL AGENCY

The Monterey Regional Water Pollution Control Agency service area includes the communities of Del Rey Oaks, Monterey, Pacific Grove, Sand City, Seaside, Salinas and surrounding areas (Figure 18-7).

The Agency is currently consolidating five treatment plants into one regional facility with capacity of 20.9 mgd (million gallons per day).[14] A plant expansion is in process for a total capacity of 29.6 mgd, which would serve the Agency's population through the year 2000.[15] (See Section 18.8.3 for a discussion of wastewater facility expansion financing.)

In the Systems Capacity Analysis report and subsequent updates, AMBAG notes that by the year 2020, the Agency would have unallocated capacity that could serve an additional 5,700 people.[16] EIP projections of growth in the cities in the Agency's service area estimate about 5,000 people more than AMBAG projections by the year 2020. Therefore, it is expected that neither constrained nor unconstrained growth on the Peninsula would outstrip the Agency's ability to treat wastewater in future years.

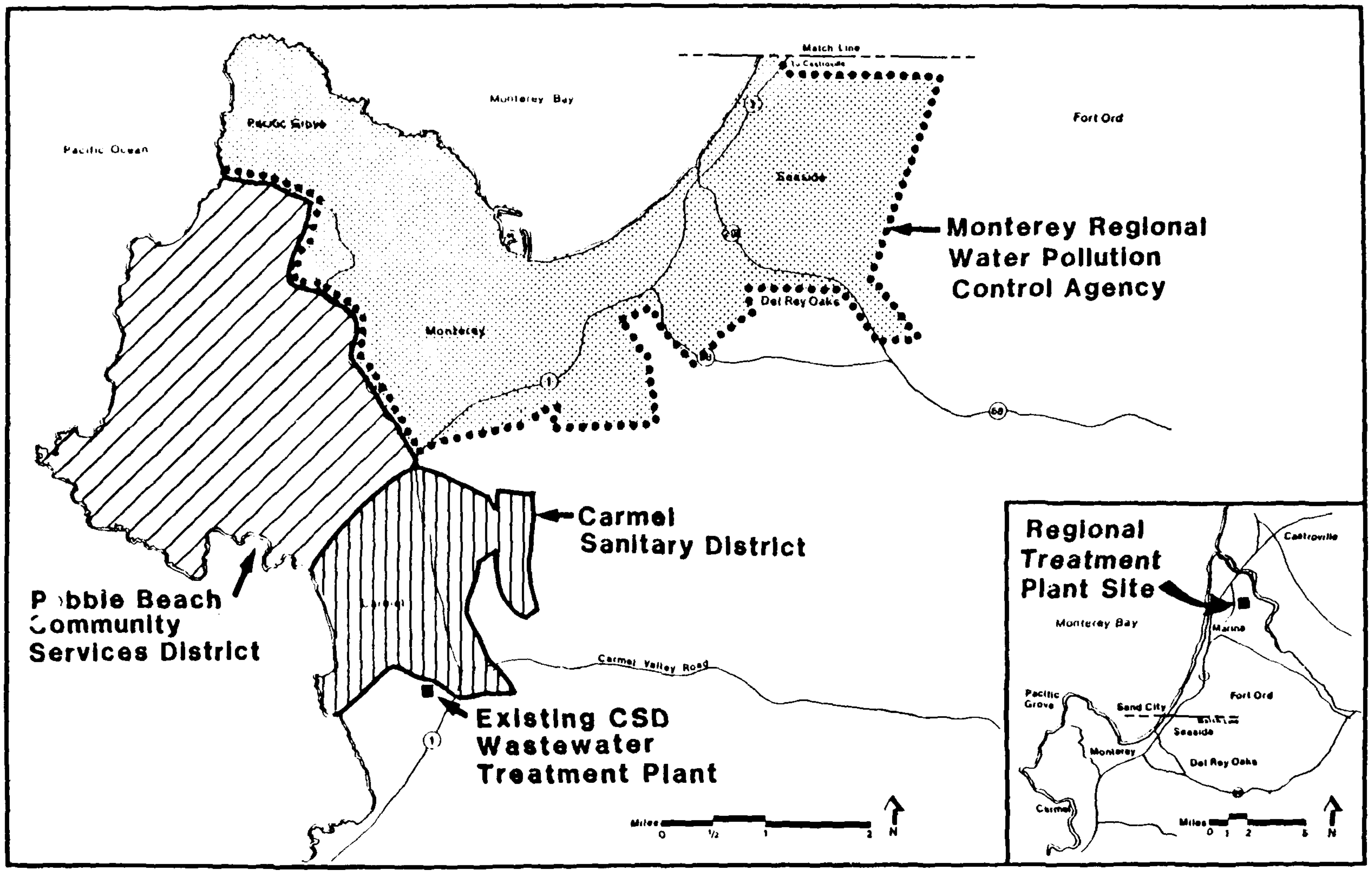
18.6.2 CARMEL SANITARY DISTRICT

The Carmel Sanitary District (CSD) service area includes the City of Carmel and unincorporated County areas south along the coast approximately to Highlands Inn and east into Carmel Valley approximately to Valley Greens Drive (Figure 18-8).

The CSD recently upgraded the treatment plant to facilitate wastewater reclamation. At that time, plant capacity was also increased to 4.0 mgd from its previous rating of 2.4 mgd. The CSD retains ownership of two-thirds of the plant's capacity and the remainder

SANITATION DISTRICT SERVICE AREAS

FIGURE 18-8



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is used by the Pebble Beach Community Services District. The CSD states that the plant will now accommodate all planned and projected growth within the service area at least through the year 2020.[17]

The Carmel Sanitary District, the Pebble Beach Community Services District (PBCSD) and the Monterey Peninsula Water Management District are currently preparing a memorandum of understanding that will authorize construction of a jointly-operated water reclamation facility at the CSD treatment plant site. If the facility is constructed, CSD estimates that by the summer of 1989, it would produce about 800 AF/year of reclaimed water to be used on golf courses in Pebble Beach. PBCSD would finance the $15 million project in return for a potable water entitlement of about 400 AF/year from the MPWMD, to be used to develop currently vacant lands in Pebble Beach. The remaining 400 AF/year of potable water "saved" by the reclamation project would be available to the MPWMD as drought reserves or allocated for municipal water use.[18]

18.6.3 PEBBLE BEACH COMMUNITY SERVICES DISTRICT

The Pebble Beach Community Services District serves the Del Monte Forest Area (Figure 18-7). As noted above, the PBCSD owns one-third the capacity of the CSD/PBCSD joint treatment plant. PBCSD officials note that growth consistent with current plans, which are somewhat higher than the projections prepared for this report, will be served adequately by the expanded facility.[19] Capacity problems could occur, however, if there is extensive construction of "granny flats" in the future. Such construction would be regulated by County ordinance.

18.6.4 SEPTIC SYSTEMS

Much of the Carmel Valley area is served by septic systems. A 1982 Montgomery Engineers report detailed potential problems with groundwater contamination due to overuse of septic systems in the Valley.[20] The report stated that septic system capacity was already met in the Carmel Valley Village and Schulte Road areas. Future capacity problems could be avoided by limiting dwelling units in the Valley to 9,540, avoiding development in the most sensitive areas, and supplementing septic systems with package sewer systems or tie-ins to existing systems where necessary.

AMBAG's Systems Capacity Analysis states that the Valley's population in 2020 would exceed the septic capacity of the area by 5,531 people. AMBAG forecasts for that year equal a total of approximately 9,430 households; of these, there would not be sufficient capacity for about 2,260 dwelling units.

EIP projections for the Carmel Valley state that a total of approximately 6,605 dwelling units would build out by the year 2020. This figure is about 70% of both the maximum amount stated in the Montgomery report and the year 2020 estimates provided by AMBAG. As long as development of environmentally sensitive areas is avoided, as noted in the forthcoming Carmel Valley Area Plan, it is not likely that there would be septic system capacity problems in the Carmel Valley.[21]

It should be noted that in addition to Carmel Valley, septic systems are also present in Sand City. It appears that these systems function properly at this time.

18.7 AIR QUALITY

Impacts of the Peninsula's growth on air quality were analyzed for the two scenarios of future development in the region, planned and constrained growth, for the years 2000 and 2020. Using information on existing and future traffic conditions on major Peninsula roadways, together with vehicular emission rates characteristic of California, emission totals for vehicles using these roadways were estimated. These totals are shown in Table 18-1.

Projections of planned housing and commercial growth on the Peninsula are consistent with growth assumptions used in the development of the 1982 Air Quality Plan. Although growth projected for individual Peninsula cities is higher than that projected by AMBAG, which coauthored the Plan, growth projections for County areas and the Peninsula as a whole are somewhat lower than AMBAG projections. Growth as planned (or constrained growth) would therefore be consistent with regional air quality goals.

TABLE 18-1

PROJECTED AIR POLLUTANT EMISSIONS ON MAJOR ROADS
IN THE MONTEREY AREA
(Tons/Day)

		Year 2000		Year 2020	
Pollutant	1984	Constrained Growth	Planned Growth	Constrained Growth	Planned Growth
Total Organics	3.14	2.55	2.63	3.27	3.76
Reactive Organics	2.68	2.18	2.25	2.78	3.22
Nitrogen Oxides	1.59	1.16	1.18	1.23	1.30
Carbon Monoxide	32.75	20.39	21.09	25.01	31.14
Sulfur Dioxide	0.11	0.14	0.15	0.16	0.18
Particulates	0.24	0.27	0.28	0.31	0.35

It should be noted, however, that under present emission control regulations, reactive organic compounds (ROGs) emissions in the year 2020 are projected to be higher than they are at present, with planned or with constrained growth. ROGs, along with nitrogen oxide (NOx), contribute to the formation of photochemical oxidants, or smog, in the atmosphere. The air basin in which the Monterey Peninsula is located currently violates federal standards for oxidants. High concentrations of oxidants produce eye irritation and impair breathing. As Table 18-2 shows, Peninsula traffic under the planned growth scenarios would account for 0.54 tons/day of ROG of the basin's increase by the year 2020; this increment amounts to an increase of 20.1% over the Peninsula's 1984 emissions levels. Constrained Peninsula growth would account for an additional 0.10 tons/day of ROG from vehicle sources over 1984 levels by the year 2020; this increment would be an increase of 3.7% over 1984 Peninsula emissions. Continued basin-wide growth would also cause increases in motor vehicle-generated ROG emissions in the area as a whole. It is likely, therefore, that occasional high oxidant levels would continue to plague the air basin into the next century, and the ROG emissions associated with the planned growth scenarios would contribute to the continuance of this problem.

In contrast to the broadly distributed high oxidant levels produced by regionwide emissions of ROG and NOx, problems associated with pollutants like carbon monoxide (CO) and particulates are generally confined to the vicinity of strong local sources, primarily heavily-traveled, congested roadways. Because of the large increases in traffic expected on local roadways as a result of growth permitted by the New San Clemente project and other cumulative regional growth, CO and particulate air quality standards may be exceeded near these roadways under both constrained and planned growth scenarios. The Carmel Valley in particular has been an area of concern regarding CO levels. The geography of the valley and its relationship to prevailing air currents makes it especially prone to the buildup of pollutants. The air quality analysis in the recent Carmel Valley Master Plan EIR (May, 1985) suggests that future traffic volume alone will probably not be sufficient to create CO violations, but the added effect of wood burning stoves in new homes may create unhealthful levels of CO, among other pollutants. Elevated concentrations of CO impair oxygen transport in the bloodstream, aggravate cardiovascular disease, impair central nervous system functioning and cause fatigue, headache, dizziness and confusion.

Because there are few large sources of SO2, H2S, and sulfates in the NCCAB, these pollutants are not expected to cause problems under either constrained or planned growth scenarios.

The vehicular emissions generated with planned and constrained growth in the Monterey Peninsula region, as presented in Table 18-2, should be viewed in the context of future decreases and increases in basin-wide emissions and the emissions reductions specified in the Air Quality Plan. It is not possible at present to determine how these yearly emissions would affect ambient air pollution concentrations. The Monterey Bay Unified Air Pollution Control District (MBUAPCD) is currently developing a model that would translate quantified emissions (such as those presented in Table 18-2) into air pollution concentrations, but the model will not be available for several years. The District should, however, keep this modeling effort in mind for future application to the Monterey Peninsula region.

TABLE 18-2

AIR POLLUTANT EMISSIONS INVENTORY
NCCAB AND MONTEREY PENINSULA[1]
(Tons/Day)

Mobile Source Pollutant	Estimated 1984 Emissions[2]	Projected 2000 Emissions	Projected 2020 1984-2000	% Change 1984-2000	% Change 2000-2020
Total Organics					
NCCAB	29.59	24.77	N/A	-16%	N/A
Peninsula					
Planned Growth	3.14	2.63	3.76	-16%	43%
Constrained Growth	3.14	2.55	3.27	-19%	28%
Reactive Organics					
NCCAB	27.34	22.51	N/A	-18%	N/A
Peninsula					
Planned Growth	2.68	2.25	3.22	-16%	43%
Constrained Growth	2.68	2.18	2.78	-19%	28%
Nitrogen Oxides					
NCCAB	36.29	31.44	N/A	-13%	N/A
Peninsula					
Planned Growth	1.59	1.18	1.30	-26%	10%
Constrained Growth	1.59	1.16	1.23	-27%	6%

[1] Pollutant emissions for the Peninsula calculated from freeway traffic only.

[2] 1984 NCCAB emissions estimated by interpolating the 1981 and 1987 emissions inventories. This column will be revised pending receipt of the CARB's measured 1984 emissions inventory.

Sources: Monterey Bay Unified Air Pollution Control District
Geoffrey Hornek; EIP Associates

18.8 FISCAL IMPACTS

18.8.1 INTRODUCTION

The purpose of this part of the study is 1) to provide information regarding the relative fiscal impacts of growth on the cities compared with their current fiscal status; and 2) to discuss the regional infrastructure that must be constructed to accommodate the growth both with and without the dam.

This discussion addresses only the indirect fiscal effects associated with growth in the study area, and does not discuss the socioeconomic impacts of financing the San Clemente Dam itself. The dam financing is addressed in Chapters 3 and 17 of this report.

18.8.2 FISCAL IMPACTS TO CITIES

In any municipal jurisdiction, new growth generates additional public revenues through increases in property valuation, retail sales, or use of services for which fees or franchise taxes are charged. New growth also increases the demand for public services and thus raises the cost of government. The cost to government will include the operating expenses that recur annually, but may also include one-time capital expenditures necessary to upgrade a city's infrastructure such as streets, water and sewer systems, or facilities like libraries or fire stations.

The relationship between annual costs and revenues generated by each land use type may remain relatively stable over time as the community grows, assuming the basic rules for collecting revenues do not change as happened when Proposition 13 was passed. However, the need for capital expenses depends upon the city's existing service capacities. Once installed, most capital projects serve a large increment of growth occurring over a number of years. Thus, the capital budget tends to be more "bulky" and less uniform across communities.

The approach in this analysis has been to separate the issue of annual operating costs from capital projects. The analysis projects the relationship between annual government costs and revenues into the future based on projected changes in the land use mix for each of the cities in the study area. The focus is to determine whether the cities would be benefitted or adversely affected relative to their current fiscal status as a result of the growth projected under both scenarios. Capital projects are discussed on the basis of information supplied by each of the cities and are not projected directly on the basis of the land use projections done for the study. The unincorporated County areas have not been included in this analysis due to the difficulty of separating the Peninsula portion of County out of the total County budget.

In order to estimate the annual cost/revenue impacts of growth on the cities, municipal funds were allocated by residential and commercial land uses. Table 18-3 shows an example of this exercise for the City of Seaside. The 1985 budget total shows the general fund budget for the City. The budget is approximately balanced, with revenues slightly higher than costs. The ratio of revenues to costs at the bottom of the table is therefore shown as 1.00, meaning that for each dollar of expense, a dollar of revenue is shown in the budget. The ratio of 1.00 is not intended to imply that Seaside necessarily has all the revenue it needs to provide what it considers an adequate level of service; rather, the ratio simply reflects the current balance between costs and revenues.

Since the land use projections for the study are divided by housing units and employment, it is important to consider the contribution made by each land use to the fiscal status of the City. This has been done in the remaining two columns in Table 18-3. On the revenue side, certain funds are generated by only one land use type, in other cases the contribution is shared. Sales taxes and hotel occupancy taxes are generated only by commercial and hotel properties. State subventions, part of the category listed as "Other Agencies," are generally allocated on the basis of residential population. Property taxes, on the other hand, are paid by all kinds of property. The County Assessor does not keep records of the distribution of assessed value for different types of land uses. To allocate these revenues among the two land use types, EIP made assumptions regarding the average values of residential and commercial properties. The average values were then applied to 1985 land use inventory data to calculate an approximate percentage weight for commercial and residential assessed values. This weight was then multiplied by the property tax revenues shown in the budget.

The costs were allocated using average factors calculated either on the basis of relative assessed value or the relationship between population and employment in the City. The visitor population in hotels was also factored into the service costs attributable to the commercial sector.

TABLE 18-3

EXAMPLE OF BUDGET BREAKDOWN BY LAND USE
CITY OF SEASIDE
FISCAL ANALYSIS
1985 BUDGET

	Total	Residential	Commercial
Revenues			
Property Tax	$ 999,000	$ 796,876	$ 202,124
Sales Tax	2,100,000		2,100,000
Utility/Franchise	876,000	737,445	138,555
Hotel Occupancy	200,000		200,000
Licenses/Permits	285,000	28,500	256,500
Other Agencies	1,923,000	1,923,000	
Other	812,250	812,250	
Total	$7,195,250	$ 4,298,071	$2,897,179
Costs			
General Government	$ 860,957	$ 705,480	$ 155,477
Police	2,101,600	1,722,081	379,519
Fire	1,239,100	988,397	250,703
Community Development	348,329	285,426	62,903
Community Services	1,322,200	1,083,429	238,771
Public Works	1,316,600	1,050,217	266,383
Total	$7,188,786	$ 5,835,031	$1,353,755
Balance	$ 6,464	$ (1,536,960)	$1,543,424
Ratio of Revenues to Costs	1.00	0.74	2.14

The ratios shown at the bottom of Table 18-3 indicate that residential development requires more in costs for services than it returns in revenues, while for commercial development, the opposite relationship is true. The 0.74 in the residential column means that revenues generated by existing residential units is only 74% of the costs of current services to serve the residential population. In the commercial column, it can be seen that revenues are more than double costs. A major reason for this result is that commercial activity generates large amounts of revenues in addition to the property tax, but does not generate extraordinary costs for services.

Similar calculations have been done for each of the cities as summarized in Table 18-4. In every case, commercial development returns a better fiscal balance than residential development. This is significant because the regional projections show relatively high levels of employment growth in relation to housing growth. Table 18-5 shows how changes occur as a result of growth. Comparison of the left hand and right hand columns, which show the 1985 and 2020 ratios respectively, indicates that all of the cities improve over their current situation if planned growth occurs with the dam, with the exception that Carmel and Pacific Grove dip slightly in 2000 but regain their current balance by 2020. Without the dam, Carmel and Pacific Grove would experience a worsening fiscal balance and the other cities would not do as well as they would with the higher planned growth levels.

The significance of these results varies with each city depending upon the current adequacy of services and the need for capital improvements. The City of Carmel-By-The-Sea is embarking on an important capital improvement program for street maintenance and drainage improvements.[22] The current road and drainage system is severely under-designed to handle the volume of current traffic and development. The character of growth in the near term and the projected relationship of costs and revenues may further strain the City's ability to raise revenues for these capital projects.

The City of Pacific Grove currently is under-staffed to provide the desired level of City services.[23] The increase in City costs relative to revenues through the year 2000 will further exacerbate this situation.

TABLE 18-4

EXISTING RATIOS OF GOVERNMENT GENERAL FUND REVENUES AND COSTS GENERATED BY RESIDENTIAL AND COMMERCIAL LAND USES FOR CITIES IN THE STUDY AREA[1]

	Total	Residential	Commercial
Carmel	1.00	0.61	1.55
Del Rey Oaks	1.00	0.92	1.26
Monterey	1.00	0.71	1.47
Pacific Grove	1.00	0.64	2.19
Sand City	1.00	0.72	1.05
Seaside	1.00	0.74	2.14

[1] The figures in the table represent the ratio of general government revenues to costs. A ratio of 1.00 means that revenues and costs are exactly balanced. A ratio less than 1.00 (e.g., 0.61) means that costs generated by that land use exceed the revenues generated. A ratio higher than 1.00 means that revenues are higher than costs.

TABLE 18-5

EXISTING AND PROJECTED RATIOS OF GOVERNMENT GENERAL FUND REVENUES AND COSTS FOR CITIES WITHIN THE STUDY AREA

City	1985 Ratio	1985-2000 Growth	2000 Ratio	2000-2020 Growth	2020 Ratio
Planned Growth With the Dam					
Carmel	1.00	0.92	0.99	1.18	1.00
Del Rey Oaks	1.00	1.06	1.02	1.01	1.02
Monterey	1.00	1.26	1.03	1.37	1.06
Pacific Grove	1.00	0.96	0.99	1.03	1.00
Sand City	1.00	2.57	2.06	1.51	1.86
Seaside	1.00	1.36	1.06	1.75	1.12
Constrained Growth Without the Dam					
Carmel	1.00	0.64	0.99	0.00	0.99
Del Rey Oaks	1.00	1.04	1.01	0.00	1.01
Monterey	1.00	1.32	1.02	0.71	1.02
Pacific Grove	1.00	0.92	0.99	0.64	0.99
Sand City	1.00	2.05	1.58	0.00	1.58
Seaside	1.00	1.20	1.02	0.74	1.01

The City of Del Rey Oaks was recently forced to impose a special tax to balance the budget.[24] The increase in hotel and commercial development may mean that this tax can be suspended in the future.

The City of Monterey has established an ambitious capital improvements program. The continued improvement in the City's cost/revenue balance contributed by the projected growth suggests that ample revenues can be accrued for this program.

The City of Seaside will gain substantially from the type of commercial and hotel development planned for the City, however, significant capital costs will be required to implement the core of this development. The dredging of the lagoon is estimated to cost $3.5 million. The City hopes to fund a portion of the cost with a federal Economic Development Administration grant and may need to establish an assessment district to fund the remaining portion.[25]

While the balance of growth in jobs and housing on the Peninsula generally results in favorable fiscal results for cities there, the Salinas and Marina areas, which would supply the additional labor force, may not benefit fiscally. The growth scenarios would result in increased housing growth in these communities without necessarily boosting job growth. This situation could adversely impact the fiscal health of Marina and Salinas unless they take independent measures to plan for the influx of residents and balance their own community growth with additional economic development projects.

18.8.3 REGIONAL CAPITAL IMPROVEMENTS

Traffic Improvements

A number of major roadway improvements are forecast in order to accommodate projected traffic levels. The traffic analysis begins with the assumption that several planned improvements will be built, although not all of these have as yet been funded. The planned improvements include:

- o Hatton Canyon Freeway construction

- Carmel Valley Road widening from State Route 1 to Carmel Rancho Boulevard and from Via Petra to Valley Greens Road
- Holman Highway widening to four lanes
- State Route 68 widening from its eastern junction with State Route 1 to Los Laureles Grade
- State Route 1 widening from Route 68 to Ord Village.

Cost estimates have been prepared for one of these projects, the Hatton Canyon Freeway at $25 million. Other projects in the vicinity for which cost estimates are available include the Prunedale widening on US 101 at $55 million, and the State Route 68 widening from Reservation Road to just east of Torero Drive at $6.6 million.[26] These projects involve various features such as bridges and interchanges, but on an average will cost about $2 million per lane mile. Based on this average, the projects listed above besides the Hatton Canyon Freeway could cost nearly $70 million, bringing the total cost of currently planned improvements to about $95 million.

In addition to the improvements listed above, further improvements will be necessary to accommodate projected growth.

- Add two additional lanes to State Route 1 between Carmel Hill and the eastern interchange with Highway 68. (This item is listed as two separate links in the traffic analysis.)
- Add two lanes on Highway 68 between the eastern interchange with State Route 1 and State Route 218.
- Upgrade the Holman Highway from a four-lane highway to a four-lane freeway.

Based on the average costs of $2 million per lane mile, the first two improvements would cost approximately $36 million. The Holman Highway improvement would involve additional cost as well, but the potential complexity of the design does not permit any estimate of cost at this time. The cost estimates discussed here are intended only to provide illustrative information, since detailed designs of the proposed improvements have not been done.

Since the improvements discussed here are all on state highways, the projects would qualify for federal aid. Most of the projects could apply for Federal Aid Primary, which funds 90% of the project with federal money and 10% with state money. No local match of funds is required for these grants. The Holman Highway project would need to use Federal Aid Secondary funds which are ordinarily used for street improvements by the cities and the county. Under the funding process for Federal Aid Primary, each project must be included in the State Transportation Improvement Program (STIP) which sets out a five-year schedule for projects. Each new project is put in the fifth year of the program, which means that an automatic five-year lag between a project's inclusion in the STIP and its actual funding period. Currently, the only project on the Monterey Peninsula in the STIP is the Hatton Canyon Freeway.

Projects are proposed to the state by local jurisdictions; therefore, local control is maintained for setting priorities for the expenditure of available funds, but the amount and timing of funds is under state control as the state must balance the needs of all California jurisdictions. Currently, the top priority for Monterey County is the Highway 101 bypass in North County mentioned above, which is on a 10-15 year timeline.

There have been no indications that the Federal Aid Primary program will be substantially changed due to recent budget actions at the federal level. However, it is clear from the administrative procedures implementing the program that, at best, it is a long range funding source for the improvements discussed here.

Other local options for generating funds for highway improvements have been considered in the County including a development impact fee and an increase in the sales tax which could be dedicated to regional transportation projects. These funding mechanisms have been implemented in other regions and have generated substantial and well-targeted revenues to complete regional and local improvements.

In order to accommodate planned growth by the year 2020, the Peninsula region needs to set clear priorities for improving the transportation system and needs to set in motion rather quickly the procedures for securing sufficient funds.

Regional Sanitation Improvements

The expansions needed for the sewage treatment plants are programmed from a combination of local capital reserves and federal grants. The Monterey Regional Water

Pollution Control Agency is currently replacing five outdated plants with one large plant that has 20.9 mgd capacity. The financing for this project came from a federal grant (69%) and from the agency's capital revenues.

The agency is now planning further expansions of the plant, to total 29.6 mgd, in three stages. This expansion should accommodate projected planned growth through the year 2000. The cost of these expansions will total $10.7 million (1985 dollars). The agency plans to float bonds, supplemented by capital reserves, to finance the projects. The debt service on the bonds will be paid from connection fees. The connection fees were recently raised and will now change with indices published in the Engineering News Record so that adequate revenues can be collected to fund the necessary improvements.

The Carmel Sanitary District has recently completed improvements to their treatment plant that will allow processing of 4 mgd, a capacity adequate for the year 2020 projections of planned growth with the dam. The project cost $6.6 million, 88% of which was funded with an EPA grant, given for the purpose of upgrading the level of treatment at the plant.

Adequate funding mechanisms appear in place to complete necessary improvements to the regional sewage treatment system to accommodate planned growth with the New San Clemente Dam.

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[1] California Department of Transportation, Traffic Volumes on California State Highways, Sacramento, 1984.

[2] County of Monterey, Department of Public Works, 1984 Annual Average Daily Traffic, Salinas, 1985.

[3] County of Monterey, Department of Public Works, 1984 Regional Transportation Plan, Salinas, 1984.

[4] Highway Research Board, Highway Capacity Manual (Special Report 87), Washington D.C., 1965.

[5] Monterey County Transportation Study, Monterey Peninsula Corridor Study, Salinas, January, 1979.

[6]Planning Analysis and Development, Inc., Subsequent Carmel Valley Master Plan Draft EIR, May, 1986.

[7]Association of Monterey Bay Area Governments, School Enrollment Projections: 1980-2020: Methodology and Assumptions, January, 1986.

[8]Association of Monterey Bay Area Governments, Regional Population & Employment Forecast: 1980-2020, November, 1984.

[9]Vance Baldwin, Assistant Superintendant, Carmel Unified School District, telephone communication, July 9, 1986.

[10]Marian McEwing, Administrative Secretary, Pacific Grove Unified School District, telephone communication, July 8, 1986.

[11]Anna Moger, Secretary to the Superintendant of Schools, Salinas Union High School District, telephone communication, July 9, 1986.

[12]William Merry, District Engineer, Monterey Regional Waste Management District, telephone communication, July 3, 1986.

[13]Ibid.

[14]Ken De Ment, Agency Manager, Monterey Regional Water Pollution Control Agency, telephone communication, August 30, 1987. Paul Scheidegger, Brown and Caldwell, MRWPCA Consulting Engineers, telephone and written communications, July 7, 8, and 11, 1986.

[15]Karen Wilson, Finance Department, Monterey Regional Water Pollution Control Agency, telephone communications, July 15 and 16, 1986.

[16]Association of Monterey Bay Area Governments, Systems Capacity Analysis, November 1985, and 1986 updates.

[17]Mike Zambory, General Manager, Carmel Sanitation District, telephone communication, July 15, 1986.

[18]Ibid, August 30, 1987.

[19]Richard Andrews, General Manager, Pebble Beach Community Services District, telephone communication, July 15, 1986.

[20]James M. Montgomery Consulting Engineers, Inc., Carmel Valley Wastewater Study, February 1982.

[21] County of Monterey Planning Department, Carmel Valley Area Plan, unpublished as of this writing.

[22] Greg D'Ambrosio, Finance District, City of Carmel-By-The-Sea, personal communication, June 19, 1986.

[23] Gary Bales, City Manager, City of Pacific Grove, personal communication, July 3, 1986.

[24] Robert Franco, Mayor, City of Del Rey Oaks, personal communication, June 19, 1986.

[25] Rod Stewart, Finance Director, City of Seaside, personal communication, June 19, 1986.

[26] Data from Monterey County Transportation Improvement Plan. Information supplied by George Gerstel, AMBAG.

19 STATUTORY SECTIONS

19.1 INTRODUCTION

Both the National Environmental Policy Act (NEPA) and the California Environmental Quality Act of 1970 (CEQA) require that various summary statements addressing specific topics be discussed within all environmental impact reports/environmental impact statements (EIR/EISs). The NEPA- and CEQA-mandated impact overview requirements discussed in this section are the no-project alternative, significant adverse effects that cannot be avoided, cumulative impacts, the relationship between short-term uses of the environment and long-term productivity, and irreversible environmental changes.

19.2 NO PROJECT ALTERNATIVE

The no-project alternative is defined in Chapter 3, Description of Feasible and No Project Alternatives. It is analyzed in detail throughout the text, therefore no additional information is presented here.

19.3 SIGNIFICANT ADVERSE EFFECTS THAT CANNOT BE AVOIDED

The California Environmental Quality Act requires that significant adverse environmental effects that cannot be avoided must be identified in an EIR on a proposed project. Sections 15064 and 15065 of the State's guidelines for implementing the California Environmental Quality Act state that "A significant effect on the environment is defined as a substantial or potentially substantial adverse change in the physical conditions which exist in the area affected by the proposed project including land, air, water, minerals, flora and fauna, ambient noise and objects of historic or aesthetic significance." Economic impacts alone are not considered to be significant effects on the environment unless they result in significant physical impacts. While the guidelines provide some elaboration of what is meant by a "significant" impact, it cannot be defined precisely. Ultimately it remains up to the author of the EIR to make some judgment on the matter.

In making the determination of significance it was assumed that to be judged "significant and unavoidable" an adverse impact would have to involve a permanent degradation in the quality of the environment or the destruction of important natural and cultural resources that cannot be eliminated by the incorporation of mitigation measures. Several of the impacts of the New San Clemente Project alternatives are judged to be significant for the following reasons. The loss of steelhead spawning habitat due to inundation behind the dam is a significant loss, although it is made less significant by the elimination of conditions downstream of the dam that would be expected to lead to the demise of the steelhead run in the next series of dry years. Likewise the loss of riparian vegetation due to inundation is significant although partially offset by improved conditions for riparian vegetation downstream of the dam and by the District's proposed mitigation program. Adverse effects of a new dam and reservoir on visual quality were judged to be insignificant because few have access to the altered viewsheds. The impacts of the project alternatives on cultural resources are reduced to insignificance by the mitigation measures. The adverse effects of project construction on traffic, noise and air quality can be lessened by mitigation and would not involve a long-term change in environmental quality.

19.4 CUMULATIVE IMPACTS

The California Environmental Quality Act (CEQA) requires consideration in an EIR of impacts that are individually limited but cumulatively considerable. "Cumulatively considerable" refers to the incremental effects of an individual project that are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.

The cumulative effect of water resources development on the Carmel River is described in Chapter 7, Hydrology and Water Quality. The most significant effect has been a reduction in streamflow, both through surface impoundment and subsurface withdrawals. This has adversely affected both the aquatic and riparian habitats. Implementation of the New San Clemente project or one of its alternatives would serve to improve these habitats as discussed in Chapters 8 and 9.

19.5 RELATIONSHIP BETWEEN SHORT-TERM USES OF THE ENVIRONMENT AND LONG-TERM PRODUCTIVITY

None of the alternatives involve short-term use or exploitation of the natural environment at the expense of long-term productivity.

19.6 IRREVERSIBLE OR IRRETRIEVABLE COMMITMENT OF RESOURCES

Construction of the New San Clemente Project alternatives would inundate lands that are not presently inundated. This conversion of lands to water storage facilities would significantly alter the local environment near the existing reservoir.

The project would have a net beneficial effect on the aquatic and riparian habitats of the Carmel River.

Construction of the new facilities represents an irreversible commitment of most of the materials and all of the energy involved in their construction.

20 PUBLIC INVOLVEMENT

20.1 PUBLIC INVOLVEMENT

The District has integrated extensive public involvement into the planning process for the New San Clemente project. Public involvement has taken several different forms including public hearings, workshops and District Board meetings at which the public were offered an opportunity to comment. A complete listing of public meetings and an indication of the topics covered is contained in Table 20-1.

20.2 REGULATORY REVIEW

Many government agencies are expected to review this EIR/EIS. Copies of the EIR/EIS will be sent to the following agencies for their consideration.

FEDERAL AGENCIES

- Advisory Council on Historic Preservation
  Washington, D.C.
- Agriculture Stabilization and Conservation Service
  Davis, CA
- Forest Service
  San Francisco, CA
- Soil Conservation Service
  Davis, CA
- National Oceanic and Atmospheric Administration
  Washington, D.C.
- Department of Energy
  Washington, D.C.
- Environmental Protection Agency,
  Washington, D.C.

- Environmental Protection Agency
  San Francisco, CA
- Federal Emergency Management Agency
  Washington, D.C.
- Federal Emergency Management Agency
  San Francisco, CA
- Department of Health and Human Services
  Washington, D.C.
- Department of Housing and Urban Development
  San Francisco, CA
- Department of the Interior
  Washington, D.C.
- U.S. Coast Guard
  Alameda, CA
- Federal Highway Administration
  San Francisco, CA
- U.S. Fish and Wildlife Service
  Sacramento, CA
- National Marine Fisheries Service
  Santa Rosa, CA
- U.S. Army
  Fort Ord, CA

STATE AGENCIES

- California State Water Resources Control Board
- California Department of Fish and Game
- California Department of Water Resources, Division of Safety of Dams
- California Regional Water Quality Control Board — Central Coast Region
- California Department of Transportation
- California Department of Boating and Waterways
- California Department of Forestry
- California State Office of Historic Preservation
- California Department of Parks and Recreation
- California Air Resources Board

- California Department of Health Services
- California Coastal Commission
- California Department of Conservation
- Native American Heritage Commission

REGIONAL AND LOCAL AGENCIES

- County of Monterey
- Monterey Bay Unified Air Pollution Control District
- Association of Monterey Bay Area Governments
- Cities of Carmel by the Sea, Monterey, Seaside, Pacific Grove, Del Rey Oaks and Sand City
- Regional Water Quality Control Board

TABLE 20-1

NEW SAN CLEMENTE PROJECT
PUBLIC INVOLVEMENT

Date	Type[1]	Topic
May 11, 1987	BM	Formal selection of Feasible Alternatives for EIR/EIS
April 30, 1987	BM/W	1. Selection of Feasible Alternatives for EIR/EIS (Supplementary Analysis) 2. Hatchery vs Downstream Fish Passage Facilities
April 14, 1987	BM/W	1. Water rationing code in model 2. Hatchery vs. Downstream Fish Passage Facilities
March 10, 1987	BM/W	1. CVSIM model calibration results and inflow record 2. Drought return probability
December 10, 1986	BM/W	1. Selection of Feasible Alternatives for EIR/EIS (Original Analysis) 2. Tertiary screening of Alternatives for EIR/EIS
October 30, 1986	BM/W	Secondary screening of Alternatives for EIR/EIS
October 9, 1986 and October 9, 1986	BM/W BM/W	1. Revisions to demand projections 2. Conservation impacts 3. No project allocation 4. Rationing plan 5. Drought vulnerability criteria
September 3, 1986	BM/PH	Scoping sessions (2) for EIR/EIS
August 27, 1986	BM/W	Cumulative Impacts/Demand Projections
August 20, 1986	BM/W	Initial screening of Alternatives for EIR/EIS.
August 7, 1986		Notice of Intent to Prepare EIS published in Federal Register
August 6, 1986	BM/W	Preliminary Results of CVSIM Model Project and No Project Performance
July 23, 1986	BM/W	Draft: Cumulative Impacts/Demand Projections
July 21, 1986		Corps of Engineers Public Notice published in Federal Register
July 2, 1986	BM/W	Preliminary Design and Cost Estimate for 29,000 AF New San Clemente Dam
May 29, 1986	BM/W	Land use and water demand projections

TABLE 20-1 cont'd

Date	Type[1]	Topic
February 27, 1986	BM/W	1. Sizing of New San Clemente Dam for EIR 2. Computer model review 3. Shortfall criteria 4. Fishery mitigation 5. Project yield 6. Implications of sizing
February 4, 1986	BM/W	1. Criteria for evaluation of Alternatives for EIR 2. Project schedule
April 19, 1985	W	Environmental Impacts: climate, geology/soils, wildlife and vegetation, air quality, traffic, noise, history and archaeology, and visual quality
March 15, 1985	W	Environmental Setting: climate, geology/soils, wildlife and vegetation, air quality, traffic, noise, history and archaeology, and visual quality
February 15, 1985	W	Project Description -- Preliminary Draft EIR
January 18, 1985	W	Geoseismic Studies: Faulting near dam site
October 8, 1984	BM/PH	Selection of preferred access route for New San Clemente Project EIR
February 13, 1984	BM/PH	1. Consider Memorandum of Understanding for 45,000 AF New San Clemente Project Study -- joint use with Marina and Fort Ord 2. Receive draft geotechnical report 3. Consider draft water conservation plan
January 27, 1984	W	Impacts on transportation, recreation, noise and air quality
January 9, 1984	BM/PH	1. Consider agreement to fund study of 45,000 AF New San Clemente Dam for joint use with Fort Ord and Marina 2. Receive draft geotechnical study 3. Consider draft conservation plan
December 12, 1983	BM/PH	EIR Project Definition: Recreation and "no project"
November 30, 1983	W	Impacts on land use, planning programs and cultural resources

TABLE 20-1 cont'd

Date	Type[1]	Topic
November 18, 1983	W	Tour of New San Clemente site for EIR Advisory Committee Members
October 25, 1983	W	Discuss geotechnical, water resources and biological resources
September 15, 1983	W	Over 100 groups, agencies and individuals invited to form an EIR Advisory Committee on New San Clemente Dam -- 43 respond.
June 13, 1983	BM	Adopt Scope of Work for Water Supply Project EIR
August 9, 1982	BM/PH	Adopt Scope of Work for Water Supply Project EIR
July 12, 1982	BM/PH	Environmental determination for District Water Supply Project
July 2, 1982	n/a	State Clearinghouse circulates Notice of Preparation and Initial Study for Water Supply Project, SCH# 82062910.
June 14, 1982	BM/PH	Environmental Impact Determination based on Initial Study for District water supply project.

[1] BM = Full Board Meeting
W = Public Workshop
PH = Public Hearing

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