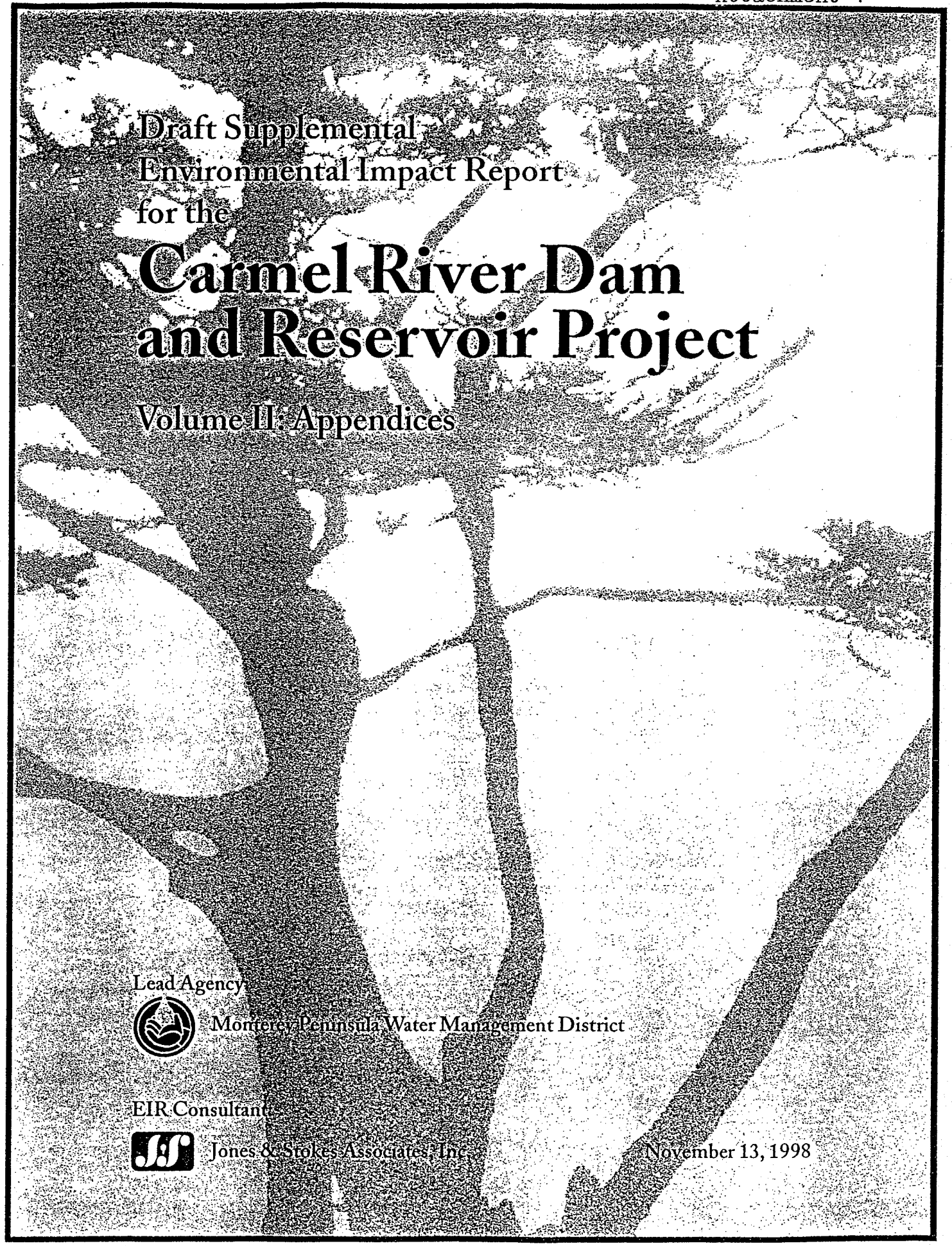
Attachment 4



Draft Supplemental Environmental Impact Report for the Carmel River Dam and Reservoir Project

Volume II: Appendices

Lead Agency:

Monterey Peninsula Water Management District

EIR Consultant:

Jones & Stokes Associates, Inc.

November 13, 1998

- function as the water supply source for a redevelopment area in Sand City while at the same time offsetting a portion of Cal-Am's diversions from the Carmel River.

A.3.2.2 Conclusions

Desalination plants of various sizes have been shown to be technically feasible throughout the world, although questions exist about the physical and institutional feasibility of large plants (larger than 6 MGD) in certain locations on the Monterey Peninsula because of potential limitations on the locations of intake and outfall facilities. Capital costs of larger plants are comparable to those of other large-scale alternatives, such as dams, but O&M costs are much higher. Advantages of desalination include a relatively short construction period once permits have been obtained; relative ease to add phased modules; a consistent, "drought-proof" source of supply (the ocean); various operational options; and lack of inundation effects. Disadvantages include substantial capital costs for facilities that must be incurred every 20–25 years; high operating costs and energy use; the need for regular replacement of major capital components required as a result of corrosion by seawater and other chemicals; and potential adverse environmental impacts on marine life, endangered coastal dune species, and wetlands.

A.3.3 DREDGING OF EXISTING RESERVOIRS

Dredging refers to the removal, dewatering, conveyance, and disposal of accumulated sediment from existing reservoirs to regain lost capacity (or maintain existing capacity). Cal-Am, MPWMD, and the City of Santa Barbara have evaluated the feasibility and cost effectiveness of various dredging projects. For more information, refer to summaries of earlier analyses in the 1994 NLP Final EIR (MPWMD 1994a); MPWMD worksheets prepared for the February 8, 1996 Alternatives Workshop; the San Clemente Reservoir Dredging Feasibility Study prepared for Cal-Am (Moffatt & Nichol Engineers 1996); a draft matrix of alternatives prepared for the September 8, 1997 CPUC workshop; and an MPWMD preliminary evaluation of dredging yield dated September 29, 1997 (MPWMD 1997c). Table A-8 provides a summary of information presented in these studies.

A.3.3.1 Discussion

Project Description and Operations. The two dredging options for the Carmel River system are sediment removal from the existing San Clemente and Los Padres Reservoirs, which are both owned and operated by Cal-Am. San Clemente Reservoir was completed in 1921 with an original capacity of 1,425 af at the spillway elevation of 525 feet (flashboards are assumed to be lowered permanently); existing (1998) capacity is estimated by Cal-Am to be 147 af. Los Padres Reservoir was completed in 1949 with an original capacity of 3,033 af; current capacity is estimated at 2,179 af. The estimated capacity lost to sedimentation from upstream sources (both natural and as a result of human intervention) is 1,278 af for San Clemente Reservoir and 854 af for Los Padres Reservoir, for a total lost capacity of 2,132 af.

An important new development (as of August 1998) is the fact that dredging San Clemente Reservoir presently does not appear to be an option, based on discussions to date by an interagency group of

engineering and fishery experts convened by the DWR and Cal-Am to address the existing and long-term sedimentation problems in San Clemente Reservoir. After weighing the pros and cons of several sedimentation options (including dredging the reservoir), the group favors the concept of maintaining a long-term average of about 200 af of storage in the reservoir by building sluice gates into the dam. Operated in accordance with a detailed plan to be developed by the interagency group, the sluice gates would be opened when the riverflow through the reservoir is suitable to carry sediment downstream. These gates would be incorporated into seismic retrofit designs currently being prepared at the direction of DSOD. A separate EIR on the San Clemente Dam Seismic Retrofit Project is being prepared by DWR and is scheduled for release in fall 1998; the analysis in that document will be used to update this discussion in the Final SEIR.

Water Yield. Two concepts are discussed in the following paragraphs: dredging only Los Padres Reservoir, and dredging both Los Padres and San Clemente Reservoirs. The feasibility of dredging both reservoirs is questionable in light of the current (but not formally confirmed) plans to maintain approximately 200 af of storage and build sluice gates at San Clemente Dam.

Preliminary analyses conducted by MPWMD in September 1997 indicate that neither dredging concept would substantially increase Cal-Am system reliable water yield or drought protection because of the small amounts of water storage involved. In general, the increase in the amount of storage is typically much greater than the reliable, long-term yield gained. However, from a water rights perspective, reclaiming lost reservoir storage capacity could enable Cal-Am to legally store and redivert more water each year. Specifically, by dredging Los Padres Reservoir to its original capacity, Cal-Am's licensed right at that site could be increased from the current 2,179 af to 3,033 af annually, an increase of 854 af. If both Los Padres and San Clemente Reservoirs were dredged, the potential increase in legal diversions to storage could total as much as 2,132 af. Cal-Am would have to apply for rights to divert San Clemente Dam water to storage during the high-flow winter period—when it is presently available for appropriation—for release and rediversion during the low-flow period. These changes would need to be reviewed and approved by the SWRCB. As noted above, dredging of San Clemente Reservoir does not appear to be feasible.

The Moffatt & Nichol report evaluated use of slurry pipelines (as an alternative to trucks) to convey dredged materials to help reduce traffic impacts; however, this method would require 850–1,200 af/year to keep the dredged material suspended in the pipelines. This is a substantial amount of water and would offset any capacity gained by dredging; for that reason, this method is not recommended.

Cost Parameters. As described in the Moffatt & Nichol 1996 evaluation of San Clemente Reservoir dredging options, the selected dredging conveyance method and disposal location have a substantial effect on costs. Estimated total costs to dredge and dispose of 620 af (1 million cubic yards [CY]) would range from $8 to $29 million; for 1,240 af (2 million CY), total capital costs would range from $25 to $48 million. Depending on the disposal site, estimated costs would range from about $8 per CY ($13,000 per af) to more than $29 per CY ($47,000 per af) for 1 million CY, and from about $12 to $24 per CY for 2 million CY. It is notable that these estimates do not include mitigation costs, which could be substantial. To maintain the water rights described above, a maintenance dredging program would be required to remove the estimated average of 17 af of sediment deposited each year. The 1996 Moffatt & Nichol report did not include a description of or a cost estimate for such a

rogram but noted that the dredged material from San Clemente Dam (e.g., sorted sand, gravel, and obble) would have a market value. The report suggested that entering into a partnership with onstruction or mining companies could help offset the anticipated costs but did not incorporate otential revenue into the cost estimates because of the questionable environmental feasibility of many of the options.

A similar detailed study has not been performed for dredging Los Padres Dam, which would entail removal of about 1.38 million CY (854 af) of sediment. Costs are assumed to be higher because of the longer distance to disposal sites. Assuming a range of $8–29 per CY (similar to San Clemente Dam costs), the estimated capital cost to completely regain capacity would be about $11–40 million (at 1996 price levels). Again, these estimates do not consider mitigation costs or the potential market value of the dredged and sorted materials.

Implementation Timing and Project Life. The environmental review and permitting process for a major dredging project would take at least 1-3 years to complete, given that federal (Clean Water Act Section 401 and 404, Endangered Species Act Section 7) and state (streambed alteration, regional water quality control board [RWQCB] discharge) permits would be required and substantial fishery, wetland, and water quality issues would be associated with this alternative. According to the Moffatt & Nichol report, the actual dredging and disposal of material from San Clemente Reservoir would take 1–15 years for 1 million CY (620 af) and 5–30 years for 2 million CY (1,240 af). The number of years needed would be greatly affected by the disposal option and conveyance rate used (variations of slurry pipeline, truck haul-off, barge haul-off) and weather-related impacts. Variations that feature truck haul-off would take at least 10–15 years. These periods are assumed to be similar for the same process at Los Padres Reservoir. In theory, if dredging of San Clemente Reservoir were feasible, an estimated 10–30 years would be needed to dredge both reservoirs.

Previous estimates by MPWMD consultants indicated that each reservoir receives an average of about 20 af/yr of new sediment. This is equivalent to about 32,300 CY of additional sediment that must be removed each year. Thus, the timing estimates for removal described above are low by at least 3%. Additional time may be needed because these estimates do not consider "bulking" (expansion) of material, which occurs when sediment is handled and moved.

Environmental Issues. The primary environmental benefit of dredging is that additional reservoir capacity can be obtained without inundating new habitat. The major potential adverse biological impact is the smothering of fishery and other aquatic wildlife habitat downstream of the reservoirs by uncontrolled releases of fine sediment during the dredging process. This possibility is of great concern to federal and state fishery experts and is one reason why the use of controlled sluice gates rather than dredging is presently preferred at San Clemente Dam.

Of significant local concern is the substantial traffic impact on local roads as a result of the thousands of truck trips that would be involved over many years. For example, 1 million CY (620 af) of sediment would equate to 50,000 and 83,000 truckloads at the assumed loading rates of 20 CY and 12 CY per load, respectively. Disposal of 2 million CY would require 100,000–166,000 truckloads. The number of one-way truck trips would be double this amount (i.e., 200,000–332,000) to first carry the materials to the disposal site, then return (empty) to the processing site in Carmel Valley.

Assuming an off-haul rate of 175,000 CY per year (the average of the 150,000–200,000 CY per year cited in the Moffatt & Nichol report), this would be nearly 29,200 truck trips per year [(175,000 CY per year ÷ 12 CY per load) x 2 one-way trips], which equates to 80 truck trips per day, every day of the year (actual daily trips would be higher because no trucking would take place on weekends and holidays), or at least 10 truck trips per hour for an 8-hour day. At 175,000 CY per year, a total of 5.7 years would be required to remove 1 million CY (620 af) and 11.4 years to remove 2 million CY (1,240 af). Given the already inadequate level of service on Carmel Valley Road, Highway 1, and other area roadways, the traffic impacts that would be associated with dredging seriously impair the viability of this alternative. San Clemente Drive would require ongoing maintenance and repair because of the heavy truck traffic. The estimates presented above may be 10–15% low because they do not account for the bulking (expansion) factor associated with handling and processing the dredged material. In-reservoir estimates of volume are based on measurements of compacted sediment; a 10–15% increase in volume is expected once the material is loaded into a truck.

Other Issues. The experience of the City of Santa Barbara, in a 3-year dredging project to regain some of the lost storage in Gibraltar Reservoir (City of Santa Barbara 1986), and other experts indicates that dredging to regain lost reservoir storage "is an extremely expensive, if not impossible" undertaking (Annandale pers. comm.). High cost and environmental concerns resulted in a decision by Santa Barbara to abandon dredging as a solution to developing additional water yield for the city. Internationally, water managers and engineers are now designing sediment management programs to maintain new or existing reservoir storage, rather than attempting to regain storage lost to sedimentation.

A.3.3.2 Conclusions

The concept of dredging is appealing in that lost reservoir storage could be regained and certain lost water rights could be reclaimed. The Moffatt & Nichol study at San Clemente Dam determined that removal of sediment from the reservoir is technically feasible, but serious questions exist with regard to the economic and regulatory feasibility of conveyance and disposal. Key concerns are the extremely high overall cost (and cost per af), need for large quantities of water to implement pipeline slurry options, substantial traffic impacts associated with trucking, and environmental impacts on downstream fishery and aquatic wildlife habitat. Because of these concerns, an interagency oversight group has selected a nondredging method to facilitate sediment management and maintain about 200 af of storage at San Clemente Dam. Thus, for the purposes of this appendix, subsequent evaluations of alternative plans that include dredging assume that dredging can be performed only at the Los Padres Dam site; dredging at San Clemente Dam is not presently considered a reasonably foreseeable option.

A.3.4 GROUNDWATER DEVELOPMENT, INCLUDING INJECTION AND RECOVERY

Groundwater development refers to production of additional water from alluvial (river-based) aquifers, groundwater basins, or upland sources such as fractures in mountain bedrock that may yield water. Groundwater development also refers to means of increasing groundwater storage or availability by methods such as injection and recovery, which are described below. Groundwater development typically relies on the creation and use of large production wells and other facilities (e.g.,

Table A-8. Summary of Dredging Project Alternatives

Project Description	Water Yield	Cost Parameters (1996 dollars)	Project Timing and Life	Environmental Issues	Conclusions and Other Comments*
Regain lost storage capacity at existing San Clemente and Los Padres Reservoirs. Facilities include means to remove, dewater, convey, and dispose accumulated sediment. Trucking and slurry pipelines were considered as conveyance means. Slurry pipelines require 850-1,200 af/yr of water to move material. Thus, this method is not recommended, as annual water use may outweigh storage capacity gain. Operations must be coordinated with fish life cycle and river hydrology.	Maximum capacity to be regained is 1,278 af at San Clemente Reservoir and 854 af at Los Padres Reservoir. Firm yield from dredging is minimal, but water rights could be regained by dredging, equal to regained capacity. Sediment management plans at San Clemente Dam do not include dredging there. Thus, the Los Padres site value of 854 af is assumed for this evaluation.	Capital costs for 854 af at Los Padres site are roughly estimated at $11-40 million, based on $8-29 per cubic yard ($13,000-47,000 per acre-foot). O&M costs not provided in cited reports. These estimates do not include removal of annual sediment inflow, bulking factors, or mitigation costs, which could be substantial. Costs do not reflect possible income from dredged material, if separated into salable components.	Up to 3 years needed for environmental review and to obtain permits. 5-15 years for truck haul-off (854 af), depending on disposal site, quantity, and weather conditions. At 20-af/yr infill rate, regular sediment removal is needed to maintain storage capacity at Los Padres Reservoir.	Major Benefits: Recovered reservoir capacity obtained without inundating habitat. Avoids sediment passage over San Clemente Dam. Major Adverse Effects: Smothering of fishery and aquatic wildlife habitat downstream of dredge site during dredging period; water chemistry effects. Substantial, chronic, long-term traffic impacts from reservoir to disposal site.	Dredging is technically feasible, but serious questions about environmental and economic feasibility remain. Dredging at San Clemente site is not likely based on interagency discussions in summer 1998. Only the Los Padres site will be considered in this analysis. Advantages include recovery of storage capacity without inundating new areas. Disadvantages include extremely high cost per acre-foot, substantial traffic impacts, location of suitable disposal site, and potential harm to fishery habitat during dredging.

* "Feasible" means project is a reasonably foreseeable means to provide lawful supply for Cal-Am water system. See text for further discussion.