CHAPTER 3.0

DESCRIPTION OF THE ALTERNATIVES
3.0 DESCRIPTION OF THE ALTERNATIVES

3.1 OVERVIEW

3.1.1 SUMMARY OF PROJECT/ACTION ALTERNATIVES

No “preferred alternative” has been designated by the Lead Agencies. The Proponent’s Proposed Project is dam strengthening with in-place sediment stabilization (under the National Environmental Policy Act (NEPA), this is termed the “proposed action”). The following alternatives to the Proponent’s Proposed Project were considered in the Environmental Impact Report/Environmental Impact Statement (EIR/EIS):

- Alternative 1 Dam notching with partial sediment removal
- Alternative 2 Dam removal with total sediment removal
- Alternative 3 Carmel River reroute and dam removal with in-place sediment stabilization
- Alternative 4 No Project

These alternatives are summarized in Chapter 2 and described in detail below. The Proponent’s Proposed Project and alternatives include site access, sediment removal and disposal, fish passage, and water diversion. The project and its alternatives meet the requirement of increasing the safety of San Clemente Dam (SCD) to meet design criteria for withstanding a Maximum Credible Earthquake (MCE) and passing a Probable Maximum Flood (PMF).

Table 3.1-1 presents a summary of the comparative costs of the Proponent’s Proposed Project and action alternatives. The table includes construction as well as operation and maintenance costs. These totals include escalation, engineering, management, administrative, mitigation and permitting costs; they do not include financing costs. Costs are escalated to the year 2009 at 12 percent per year, except in the case of Alternative 2, which will require an additional year for construction and is escalated to 2010. These costs are preliminary and are expected to change.

The California American Water Company (CAW) is currently exploring funding strategies for the action alternatives. In general, CAW would seek approval from the California Public Utilities Commission (CPUC) for recovery through water sales revenues of the cost of any project it must carry out to meet regulatory requirements. However, the CPUC will not rule on which costs may be included in the rate base until such a rate hearing occurs.
### Table 3.1-1: San Clemente Dam Seismic Safety Project Alternative Cost Comparison Table

<table>
<thead>
<tr>
<th>Cost Breakdown</th>
<th>Proponent's Proposed Project Dam thickening</th>
<th>Alternative 1 Dam Notching</th>
<th>Alternative 2 Dam Removal</th>
<th>Alternative 3 Carmel River Bypass and Dam Removal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction Field Costs</td>
<td>$19,477,000</td>
<td>$37,259,000</td>
<td>$43,775,000</td>
<td>$31,192,000</td>
</tr>
<tr>
<td>Operation &amp; Maintenance Costs</td>
<td>$1,000,000</td>
<td>$1,200,000</td>
<td>$200,000</td>
<td>$200,000</td>
</tr>
<tr>
<td>Subtotal Cost</td>
<td>$20,477,000</td>
<td>$38,459,000</td>
<td>$43,975,000</td>
<td>$31,392,000</td>
</tr>
<tr>
<td>Cost + 25% Contingency</td>
<td>$25,596,000</td>
<td>$48,738,500</td>
<td>$56,076,000</td>
<td>$39,240,000</td>
</tr>
<tr>
<td>Construction Cost + 25% Contingency and Escalation</td>
<td>$35,960,537</td>
<td>$68,474,083</td>
<td>$88,236,672</td>
<td>$55,129,375</td>
</tr>
<tr>
<td>Implementation Cost</td>
<td>$13,000,000</td>
<td>$27,000,000</td>
<td>$30,000,000</td>
<td>$20,000,000</td>
</tr>
<tr>
<td>Total Cost</td>
<td>$49,000,000</td>
<td>$95,000,000</td>
<td>$118,000,000</td>
<td>$75,000,000</td>
</tr>
</tbody>
</table>

Notes:
1. Financing costs are not included.
2. Total costs are rounded to the nearest $1,000,000.
3. Construction costs are escalated at 12 percent to 2009 $ for all alternatives except Alternative 2, where the total cost is escalated to 2010 $.
4. Implementation costs include engineering, management, administrative, mitigation, and permitting costs.

No other feasible funding source or strategy for the dam notching (Alternative 1) or dam removal (Alternative 2) has been identified to date. For the Carmel River reroute (Alternative 3), the State of California has indicated a preliminary interest in funding the project under a scenario in which CAW would turn over the project and property surrounding the Dam to the California Coastal Conservancy, plus contribute a share of the funding.

### Access Alternatives

An evaluation of the possible access routes for project construction was conducted and the results are summarized below in Table 3.1-2 which presents the use of various access routes by alternative, and the level of improvements planned.

For the Proponent’s Proposed Project (Dam Strengthening), the Tularcitos Access Route was selected. For Alternative 1 (Dam Notching), Alternative 2 (Dam Removal), and Alternative 3 (Carmel River Reroute and Dam Removal), the Cachagua Access Route would be the primary route providing access above the Dam, to mobilize equipment, excavate sediment, and move sediment to disposal areas.

The Proponent’s Proposed Project would use the section of San Clemente Drive from Carmel Valley Road through Sleepy Hollow (to the point where it intersects with the new Tularcitos Access Route) only until the Tularcitos Access Route is complete (approximately eight months during CY 3). It would also use the section of San Clemente Drive from the Tularcitos Access point for access to the Dam.
### Table 3.1-2: Access Routes Used by Alternative

<table>
<thead>
<tr>
<th>Roadway</th>
<th>Proponent’s Proposed Project</th>
<th>Alternative 1</th>
<th>Alternative 2</th>
<th>Alternative 3</th>
<th>Alternative 4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Carmel Valley Road</strong></td>
<td>minor improvement, major arterial serving all access routes</td>
<td>minor improvement, major arterial serving all access routes</td>
<td>minor improvement, major arterial serving all access routes</td>
<td>minor improvement, major arterial serving all access routes</td>
<td>no improvements, existing levels of use</td>
</tr>
<tr>
<td><strong>San Clemente Drive</strong></td>
<td>minor improvements for initial access until Tularcitos completed (approximately two months of CY 3)</td>
<td>minor improvements for secondary access below dam, mobilization, demobilization</td>
<td>minor improvements for secondary access below dam, mobilization, demobilization</td>
<td>minor improvements for secondary access below dam, mobilization, demobilization</td>
<td>no improvements, existing levels of use</td>
</tr>
<tr>
<td><strong>Tularcitos Road</strong></td>
<td>new permanent road, primary access</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cachagua Road</strong> (part of Cachagua access route)</td>
<td>permanent improvement, primary access</td>
<td>permanent improvement, primary access</td>
<td>permanent improvement, primary access</td>
<td>no improvements, existing levels of use</td>
<td></td>
</tr>
<tr>
<td><strong>Jeep Trail</strong> (part of Cachagua access route)</td>
<td>substantial permanent improvements, primary access</td>
<td>substantial permanent improvements, primary access</td>
<td>substantial permanent improvements, primary access</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Road from Jeep Trail to Reservoir &amp; Dam</strong> (part of Cachagua access route)</td>
<td>new temporary road, primary access</td>
<td>new temporary road, primary access</td>
<td>new temporary road, primary access</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Alternatives 1, 2, and 3 would use San Clemente Drive from Carmel Valley Road through Sleepy Hollow to reach areas below the Dam which would not be accessible from the Cachagua route. These alternatives will use San Clemente Drive for initial mobilization of equipment needed below the Dam at the beginning of the project and demobilization of this equipment at the end of the project. San Clemente Drive would also be used to provide access below the Dam for construction workers, and occasionally during the project for trucks carrying supplies or equipment. This access route was selected over the Tularcitos Access Route for these alternatives to avoid potential impacts on terrestrial biology. More than 75 percent of the traffic associated with these alternatives is associated with work above the Dam (e.g., construction of the reroute, sediment removal, and dam removal). Periods of mobilization and demobilization using the San Clemente Drive route are expected to occur over a period of several weeks and involve 15-30 trips with heavy equipment during that period. The access routes are described briefly below:
San Clemente Drive Access Route
This access route following San Clemente Drive through Sleepy Hollow was originally proposed and analyzed in the 2000 RDEIR (Denise Duffy & Associates 2000). This existing access route includes San Clemente Drive from Carmel Valley Road through the Sleepy Hollow Community, plus the unimproved High Road and Low Road to the top of the Dam, the unimproved plunge pool road to the base of the Dam, and other unimproved roads serving existing CAW facilities such as the Carmel Valley Filter Plant (CVFP). Minor improvements will be made to San Clemente Drive to accommodate the planned use of this route as described above.

Tularcitos Access Route
This route was also briefly analyzed as a CEQA Alternative in the 2000 RDEIR (Denise Duffy & Associates 2000). This route includes most of the route of the Proposed Project access, but diverges south of the houses on San Clemente Drive and would intersect Carmel Valley Road approximately 750 feet west of San Clemente Drive. This route also includes construction of a new crossing of Tularcitos Creek via a steel truss bridge with a span of approximately 200 feet, with a wood deck and concrete abutments.

Cachagua Access Route
This access route follows Cachagua Road from Carmel Valley Road to an existing 4WD road (the “Jeep Trail”) leading to sediment disposal Site 4R. The sediment site is accessed via a conveyor belt system from San Clemente Reservoir. A new temporary road would be built to connect the Jeep Trail to the reservoir and dam.

3.1.2 ALTERNATIVES CONSIDERED AND ELIMINATED

Dam Alternatives

Dam Strengthening
A 1997 Design Memorandum on Structural Improvements for San Clemente Dam (SCD) by Woodward Clyde Consultants (WCC) described a number of alternatives for dam strengthening. WCC eliminated some of these and others were evaluated and eliminated in the previous California Environmental Quality Act (CEQA) process. These alternatives and the reasons for eliminating them are:

POST-TENSIONED TENDONS
Installation of 8 post-tensioned tendons spanning horizontally between the abutments and bearing against the upstream face of the Dam. This alternative would require draining the reservoir every 5 years to test the long-term pre-stressed load in each tendon. The test would entail essentially the same procedures and equipment used to initially tension the tendons and would be expensive. This complex concept was eliminated due to serious construction, cost, and maintenance issues.
ARCH BEAMS
Construction of reinforced concrete beams on the downstream face of the Dam to provide partial support. The effect on reduction of stress during a MCE was minimal. This concept was eliminated as infeasible.

ARCH BEAMS WITH BUTTRESS SUPPORT
Construction of two horizontal arch beams supported by buttresses on the downstream face of the Dam. This concept was eliminated because it could impair fish ladder performance.

ARMORING
Armoring with shotcrete to increase dam stiffness and strength. This concept was eliminated because it would be ineffective in providing protection against the MCE and therefore would not meet project purpose and need.

ROLLER COMPACTED CONCRETE
Construction of a roller compacted concrete gravity section against the downstream face of the Dam. This alternative was eliminated due to significant environmental impacts due to encroachment into existing wetlands on the downstream side of the Dam (as compared to other dam strengthening alternatives that would not cause comparable impacts).

REMOVAL OF DAM SUPERSTRUCTURE
Removal of dam superstructure (including gates, piers, and walkways) to reduce dam stresses. This concept was eliminated because, although it would significantly reduce stress on the Dam, The Dam would still exceed acceptable stress levels and would require further notching to fully meet project purpose and need.

New San Clemente Reservoir
Construction of a new 23,000 to 29,000 acre feet (AF) reservoir that would inundate the existing dam and reservoir was proposed by Monterey Peninsula Water Management District (MPWMD). This concept was eliminated in February 1989 when State and Federal regulatory agencies rejected the MPWMD EIR/EIS as inadequate and indicated that the new reservoir may be infeasible due to extensive environmental impacts.

Dam Removal
An extensive review of dam removal literature was provided as part of the previous Recirculated Draft EIR (Denise Duffy & Associates 2000). The material in that Draft, as well as more recent work, was considered in preparing Alternatives 2 and 3, which would remove SCD.
CHAPTER 3.0
Description of the Alternatives

**Dam Removal through Notching and Localized Sediment Management**

This concept was developed by the Institute for Fisheries Resources through an independent community process. Under this concept, the Dam would be notched, the area downstream of the Dam would be filled, and sediments behind the Dam would be dredged to construct a series of terraces stabilized with walls upstream and downstream of the Dam. A graded ramp would be constructed upstream of the Dam at a slope of approximately one percent until the old streambed is intersected. A graded ramp would be constructed downstream of the Dam at a slope of approximately 4 percent beginning at the Old Carmel River Dam (OCRD) until the profile reaches the level of the notched dam. Although the concept was intended to provide a stable, fish-friendly solution, it was eliminated due to engineering concerns about its stability and regulatory agency concerns that it would create multiple barriers to fish passage and would fill waters of the U.S. in the channel below the Dam.

**Access Alternatives**

As part of the SCD Seismic Safety Project EIR/EIS, a preliminary screening analysis was conducted for the potential major access routes to and from SCD. The purpose of the screening analysis was to choose one preferred access route to be used with each dam alternative described in the EIR/EIS. The preliminary access route screening analysis is provided as Appendix F to the EIR/EIS. Four potential major access routes were considered in the screening analysis: the Sleepy Hollow (now identified as the San Clemente Drive access) Route, the Sleepy Hollow Homeowners Association (SHHA) Proposed Route, the Tularcitos Route, and the Cachagua Route.

Based on the preliminary access route screening, all access routes that would entail the use of trucks to haul sediment from the reservoir were eliminated. A sediment site was selected that could be accessed by a conveyor belt system from the Dam. For the two alternatives that require sediment transport and disposal (Alternatives 1 and 2), the Cachagua route would be used to access the sediment site during site preparation and construction of the conveyor belt system.

For the Proponent’s Proposed Project (Dam Strengthening), the Sleepy Hollow route was eliminated due to the potential impacts of truck traffic to a rural residential community, including safety concerns and impacts to pavement structure. The SHHA route was eliminated due to potential impacts to undisturbed riparian vegetation and habitat for sensitive species.

For access below the Dam under Alternative 1 (Dam Notching), Alternative 2 (Dam Removal), and Alternative 3 (Carmel River Reroute and Dam Removal), the Tularcitos Access Route was eliminated due to its greater biological impacts and because these alternatives used the Cachagua Access Route for a substantial part of the alternative’s access needs.
A fifth access route called the Stone Pine Route was eliminated as a feasible option early in the environmental review process due to known environmental and physical constraints, including significant impacts to biological resources, a major river crossing, construction in a sensitive riparian habitat near listed species, higher costs, and regulatory uncertainty.

The eliminated access routes are described briefly below:

**Sleepy Hollow Homeowner’s Association (SHHA) Route**

This access route alternative was proposed by the Sleepy Hollow Homeowner’s Association and briefly analyzed as a CEQA Alternative in the 2000 RDEIR (Denise Duffy & Associates 2000). The route follows the Sleepy Hollow Route, diverging south of the residential area on San Clemente Drive and intersecting Carmel Valley Road approximately 3300 feet west of San Clemente Drive. This route also includes construction of a new crossing of the Carmel River.

**Stonepine Access Route**

This alternative was proposed to use the existing Stonepine neighborhood intersection with Carmel Valley Road at a point approximately two miles west of San Clemente Drive. This route would have required improvement of the existing Stonepine Bridge or the construction of a new bridge across the Carmel River and a roadway within an active floodplain.

**Sediment Management Alternatives**

A variety of alternatives have been considered to remove and dispose of sediment. Some were considered and eliminated earlier in the CEQA process and others were eliminated in an engineering screening and environmental constraints analysis done for the EIR/EIS. San Clemente Reservoir has been estimated to contain approximately 2.5 million cubic yards of sediment (Mussetter Engineering, Inc. [MEI] 2003). Montgomery, Watson and Harza (MWH) performed an engineering screening analysis of potential sediment disposal sites (Appendix G, Screening of Sediment Disposal Sites) and ENTRIX performed an environmental constraints analysis of the sites identified by MWH. The purpose of the screening analyses was to recommend selection of potential sediment disposal site(s) for use with Alternatives 1 and 2 (Dam Notching and Dam Removal). The required sediment disposal capacity for the Dam removal Alternative is approximately 2.5 million cubic yards. For the Dam notching Alternative, the estimated volume of sediment to be removed is approximately 1.5 million cubic yards (MEI 2005). The sediment transport and disposal Alternatives are described and the results of engineering screening are presented in Appendix G. The results of the environmental constraints analysis for the sediment transport and disposal Alternatives are presented in Appendix H. Those alternatives that were considered and eliminated are briefly summarized below.
CHAPTER 3.0
Description of the Alternatives

Removal and Conveyance of Sediment

EXCAVATION AND CONVEYANCE BY SLURRY PIPELINE TO SEDIMENT DISPOSAL SITE
This conveyance alternative was eliminated due to the consumption of water that would have been required (as compared to the conveyor belt alternative, which would not consume water).

EXCAVATION AND CONVEYANCE BY TRUCK TO SEDIMENT DISPOSAL SITE
This conveyance alternative was eliminated due to large potential impacts to roads and bridges, traffic, safety, and residential communities along the truck haul route.

CONVEYANCE OF SEDIMENT IN NATURAL STREAM CHANNEL TO OCEAN
The previous CEQA process considered alternatives that allow uncontrolled release of the accumulated sediment in the reservoir for conveyance in the natural stream channel to the ocean. This alternative was eliminated due to significant and unavoidable downstream potential stream impacts to fish, aquatic habitat, floodplains and flooding; potential effects of sedimentation in the Carmel River estuary; and potential marine impacts to Monterey Bay National Marine Sanctuary.

Disposal of Sediment

DISPOSAL IN LANDFILL
Three landfill sites were considered and eliminated during the engineering and environmental screening. Sites 1 and 2A were paired to provide the full capacity required to process all of the sediment contained in the reservoir. These sites were eliminated because their capacities would have only marginally accommodated the required sediment volume, they impact known cultural resources, and they have incompatible neighboring land uses and visual impacts. Site 6R required a relatively long sediment haul route traversing residential areas and Carmel Valley Road. This alternative was eliminated due to traffic and safety impacts caused by truck haul, or the greater energy or water consumption required for the slurry pipeline or conveyor belt sediment conveyance.

OTHER SITES PREVIOUSLY IDENTIFIED
Other potential sediment disposal sites identified in a previous mapping study (California Department of Water Resources [DWR] 2002) include those referred to as Sites 2B through 2E, 3 and 5. These sites were only briefly considered and dismissed from further evaluation for purposes of the screening study. Sites 2B through 2E are small and of limited (and insufficient) capacity. Site 6R required a relatively long sediment haul route traversing residential areas and Carmel Valley Road. This alternative was eliminated due to traffic and safety impacts caused by truck haul, or the greater energy or water consumption required for the slurry pipeline or conveyor belt sediment conveyance.
costly than at Site 4R. Lastly, Site 5 consists of a steep slope overlooking Carmel River and appears to be unsuitable for sediment storage.

STAGING AND EXPORT FOR SALE
MWH conducted an investigation of the commercial value of sediment in San Clemente reservoir (Appendix I). The study concluded that cost-effective development of mineral resources in the sediment now stored in San Clemente Reservoir does not appear to be feasible at this time. While the sediment could be processed into products that have commercial value, this value is completely offset by the incremental processing and transportation costs involved. There is not a positive benefit-cost ratio for selling the sediment based on current market conditions.

Dam/Sediment Management Alternatives Considered During Previous CEQA Review
The RDEIR (Denise Duffy & Associates 2000), issued in 2000 considered nine combined dam/sediment management alternatives. However, the RDEIR did not compare the environmental impacts of these alternatives or provide reasons for eliminating them. Several of these alternatives have been carried forward in this EIR/EIS, which captures the range of alternatives without unnecessarily multiplying alternatives.

MITIGATED RETROFIT WITH SEDIMENT MANAGEMENT
This alternative combines the proposed dam thickening project with sediment management through the operation of two high-level sediment ports with sluice gates, management of sediment transport past the Dam and downstream, and spot dredging. This alternative is similar to the Proponent’s Proposed Project considered in this EIR/EIS.

NOTCHING WITH DREDGING
Under this alternative the Dam superstructure would be removed and the Dam would be notched to an elevation of 506 feet and a lower fish ladder would be constructed. Sediments accumulated behind the Dam would be dredged to prevent uncontrolled downstream release. This alternative is essentially the same as Alternative 1 considered in this EIR/EIS.

NOTCHING WITHOUT DREDGING
This alternative is identical to the preceding alternative except that dredging would not be performed. This alternative has been eliminated due to the potential impacts from sedimentation, loss of channel stability, and flooding and impacts to fish habitat and the California red-legged frog (CRLF) associated with an uncontrolled release of sediment downstream.
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NOTCHING WITH SEDIMENT MANAGEMENT AND SMALL RUBBLE DAMS
This alternative combines dam thickening (the Proponent’s Proposed Project considered in this EIR/EIS) with sluice gates installed in two phases. Sediment accumulated behind the reservoir would be dredged, barged, and sluiced at double the throughput rate. The Dam would be notched to 506 feet and a lower fisher ladder would be constructed. A series of rubble dams would be installed between SCD and OCRD to provide grade control and fish passage. This alternative was considered and eliminated due to long-term significant adverse impacts to fish (over a 40-year period) before the design would provide stable fish passage and stream habitat.

DAM REMOVAL WITH DREDGING
This alternative involves dredging of accumulated sediments followed by removal of the Dam by breaching the spillway to an elevation of 457 feet. This alternative is essentially the same as Alternative 2 considered in this EIR/EIS.

PHASED DAM REMOVAL WITHOUT DREDGING
This alternative is identical to the preceding alternative except that dredging would not be performed. This alternative was eliminated due to the potential impacts from sedimentation, loss of channel stability, flooding and impacts to fish habitat and the CRLF associated with an uncontrolled release of sediment downstream.

COMPREHENSIVE DAM REMOVAL WITH SEDIMENT MANAGEMENT
This alternative provides a phased approach to dam notching, culminating in dam removal. Sluice gates would be installed and operated prior to each increment of dam notching. Controlled sediment releases to the Carmel River below the Dam would occur over a 60 to 100 year period. When complete, this alternative would theoretically provide unimpeded fish passage, release bedload (including spawning gravel) from the upper watershed, and restore the river and canyon to its pre-dam conditions. However, this alternative would have substantial long-term impacts to water quality and fish for 60 to 100 or more years. Additionally, the ability to “control” releases was not demonstrated, and potential flooding impacts were also considered in eliminating this alternative.

DEMOLITION AND MINING
This alternative would remove the Dam immediately through demolition to its base at elevation 457 feet. An attempt would be made to mine the released sediment. It was considered doubtful that mining could keep pace with downstream transport of sediment. The sediment releases associated with this alternative could jeopardize the listed steelhead trout population in the river as well as CRLF; result in substantial channel aggradation and bank migration and significantly increase flood risk; and risk loss of property, public infrastructure, and human life. Therefore, this alternative was eliminated.
CHAPTER 3.0
Description of the Alternatives

MITIGATED RETROFIT AND DREDGE TO RESTORE CAPACITY
This alternative considered dredging the reservoir to restore its water storage capacity while retrofitting the Dam for seismic and flood-safety. This alternative was considered and eliminated due to significant, unavoidable water quality, steelhead trout, and CRLF impacts associated with dredging, as well as traffic, noise and air quality impacts associated with sediment disposal.

Water Diversion Alternatives
Installation of Water Wells in the Russell Field Area
This alternative considered three 2,400-gpm wells installed to a depth of approximately 80 feet in the alluvial deposits in the Russell Field area. The wells would be equipped with vertical turbine pumps delivering water to CAW’s filter plant with an elevation head equivalent to that provided by the reservoir (total lift of approximately 200 feet to El 525). The wells would discharge to a common 24-inch-diameter, 2,000-foot-long, steel pipeline that would connect to the existing treatment facilities in the vicinity of the CVFP. Well installation would include the stainless-steel screen and casing, a properly installed filter pack, concrete slab at the well head, manifold piping, and valving. The pumps would have 100-hp electrical motors energized from a nearby 12-kV power line. Motor starters, switchgear, instrumentation and controls would be included in the outdoor-type installation. This alternative was eliminated due to cost and operational considerations.
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3.2 PROPOSED PROJECT: DAM THICKENING

3.2.1 OVERVIEW

The Proponent’s Proposed Project (or in NEPA terms, the proposed action) is to retrofit the existing SCD, which is owned and operated by the Coastal Division of the CAW. The proposed improvements are intended to comply with DWR, Division of Safety of Dams (DSOD) requirements to address safety deficiencies and guard against failure from an MCE, and a PMF event, which could erode dam abutments.

Engineering investigations have identified structural improvements described as "downstream dam thickening" as the most appropriate design option for strengthening the Dam. This approach was the preferred project alternative in a 1995 report prepared for CAW by WCC, entitled Structural Improvement of San Clemente Dam, Preliminary Feasibility Study. MWH reviewed and approved this approach in 2004 for this EIR/EIS. DSOD confirmed that the Dam thickening alternative is an acceptable design (July 1, 1998, letter) and approved the contract drawings and specifications for the retrofit in 2001.

3.2.2 PROJECT LOCATION

For the purposes of this Final EIR/EIS, the Proponent’s Proposed Project study area and area of potential effect comprises the reservoir, dam, CVFP, access roads, and affected reaches of the Carmel River and San Clemente Creek. Figures 3.2-1 and 3.2-2 depict the project region and vicinity, respectively.

The Project Area is within the upper reaches of the Carmel River in an unincorporated area of Monterey County. SCD sits at the confluence of Carmel River and San Clemente Creek (River Mile [RM] 18.5), approximately 15 miles southeast of the City of Carmel-by-the-Sea and 3.7 miles southeast of the Carmel Valley Village. Approximately five miles upstream of the SCD, is Los Padres Dam (LPD) at RM 23.5 on the Carmel River. SCD impounds a reservoir and serves as a surface water diversion point from the Carmel River.

The Project Site and most of the land surrounding the reservoir are owned by CAW. Land adjacent to the reservoir is largely undeveloped, consisting of steep slopes covered with dense chaparral and oak woodland. The CVFP is 1.5 miles north of the Dam. Surface water from the reservoir is gravity-fed to the CVFP. The Sleepy Hollow subdivision is located on San Clemente Drive adjacent to Carmel Valley Road and consists of 23 estate-sized lots with 16 completed residences. The Sleepy Hollow Steelhead Rearing Facility (SHSRF), constructed and operated by the MPWMD on land owned by CAW, is located less than one mile downstream of the existing dam.
3.2.3 EXISTING STRUCTURE & OPERATIONS

San Clemente Dam

SCD is a concrete arch dam constructed in 1921, with a maximum structural height of 106 feet and a crest length of 300 feet. The reservoir impounded by SCD is currently used in conjunction with the Los Padres Reservoir and Upper Carmel Valley Aquifer wells as a source of water diversions to the CVFP. The reservoir and the CVFP are also an important water source for unincorporated Carmel Valley Village during the winter, although diversions are limited during low flow seasons. Currently, the reservoir serves as a point of diversion to serve the Peninsula and is operated to facilitate fish passage. A major portion of the Monterey distribution system relies upon the pressure head supplied by diversion from the reservoir, and many of the appurtenant system components (e.g., pumps, feed systems, etc.) were designed and installed accordingly.

Currently, CAW is limited to direct diversion of 1,137 AF at SCD based on the amount of water actually put to use by its predecessors prior to 1914. This is equivalent to a continuous direct diversion rate of 3.185 cubic feet per second (cfs) over a typical 180-day, six-month long dry season.

Pursuant to the 2001 Conservation Agreement between CAW and the National Marine Fisheries Service (NMFS), during low flow periods (defined as times when stream flow in the Carmel River at the Don Juan Bridge [RM 10.8] gage is less than 20 cfs for five consecutive days), CAW is required to cease surface diversions from SCD and to limit its production from wells in the Upper Carmel Valley Aquifer to maintenance levels, with no more than a combined instantaneous diversion of 0.5 cfs from the Russell wells. At these times, CAW maximizes production from its wells in the Lower Carmel Valley Aquifer and Seaside facilities. These requirements were added to State Water Resources Control Board (SWRCB) Order 95-10 in 2002 and are also referenced in the Annual Memorandum of Agreement (MOA) on Carmel River flows described under “Dam Construction Reservoir Drawdown and Stream Diversion” in this chapter. Refer to Section 1.5 of this Final EIR/EIS for a discussion of federal, state, and local regulatory requirements, including those of NMFS and the SWRCB.

The SCD crest is at Elevation 537 feet. (Figure 3.2-3 and 3.2-4) show the plan and profile of the existing dam. The spillway is an overpour structure with a crest elevation of 525 feet located at the center of the Dam. The original design storage capacity of the reservoir was 1,425 acre-feet at the spillway crest and 2,260 acre-feet at the top of the gates with the spillway gates in place. However, siltation has reduced the storage capacity of the reservoir to less than 150 acre-feet at the spillway crest, based on results of a survey conducted in March 2002 by CAW.
All spills since 1996 have occurred when the reservoir water level exceeds Elevation 525 feet. Operational restrictions are established annually via an MOA signed by California Department of Fish & Game (CDFG), MPWMD, and CAW (see Section 1.4).

Prior to 1996, the reservoir was operated without the spillway flashboards during the winter peak flood season (generally November 1 to April 30) and with flashboards in place during the spring, summer and into fall. The MPWMD was concerned that the shallow water levels occurring in the reservoir with the flashboards installed were responsible for elevating water temperatures in the Carmel River downstream of SCD and at the SHSRF. MPWMD requested that CAW control the reservoir without the spillway flashboards (MPWMD letter to CAW, April 22, 1997); flashboards have not been used at the Dam since 1996.

The outlet structure consists of a concrete outlet tower attached to the back end of the Dam with three intake gates at elevations of 515, 495, and 470 feet. The lower two gates cannot be operated due to buildup of sediment; water can be taken out from the highest gate. The upper gate has been fitted with a standpipe with an intake elevation of 522 feet to extend the intake above the current sediment level of about 515 feet surrounding the outlet tower. A valve house is located at the downstream toe of the Dam on the right abutment (looking downstream). The valve house contains a diversion structure that directs water to a conveyance pipe for treatment at the CVFP and to a low-level discharge pipe to the river. The eastern-most spillway bay (on the right side of the spillway looking downstream) is permanently closed to prevent damage to the valve house and appurtenant structures at the toe of the Dam during spilling. Two additional pipes extend through the Dam at approximately Elevation 454 feet, but the intakes to these pipes have been buried by sediment and are not operational.

In 2002, DSOD ordered modifications to SCD to meet interim dam safety requirements (see Section 3.6). These included installing six 12-inch valued ports in the Dam to draw down the reservoir to 515 feet during low flow periods.

**Fish Ladder and Fishery Habitat**

A fish ladder approximately 68 feet high is located on the west side of the Dam (left abutment), and provides passage for migrating steelhead between the plunge pool at the downstream base of the Dam and additional spawning habitat on Carmel River and San Clemente Creek upstream of the reservoir.

**Carmel Valley Filter Plant**

The CVFP is a surface water direct filtration and treatment facility operated by CAW, located approximately two miles downstream from the SCD on the east bank of the Carmel River. A 24-inch diameter diversion pipe parallel to the Carmel River delivers water from the reservoir to the CVFP. Access to the CVFP from Carmel Valley Road is via San Clemente Drive. No changes to the CVFP are proposed as part of this project.
3.2.4 PROJECT CHARACTERISTICS

This section describes the SCD Strengthening Project, including abutment protection, spillway and crest modifications, electrical system upgrades or improvements, and replacement of the fish ladder. Sediment accumulated behind the Dam would be left in place. It also summarizes construction activities necessary to complete the project and describes improvements to and/or new roads proposed as part of the project.

**Dam Thickening**

The proposed seismic retrofit project consists of thickening the Dam on the downstream side and providing abutment protection, particularly on the right abutment (as seen facing downstream). Figures 3.2-5 and 3.2-6 provide an overview of the Dam thickening plan and profile for the Proponent’s Proposed Project. The Dam would be thickened by the placement of 50 to 60 cast-in-place concrete blocks, each approximately 50 feet in length and 10 feet in height, on the downstream face of the Dam. Each block would be tied to the existing dam structure with reinforced steel dowels. The thickness of the new concrete would be approximately proportional to the original thickness at each location along the Dam profile. For example, above Elevation 465 feet, the Dam would be thickened by 80 percent, ranging from 4.2 to 8.8 feet of concrete added; below Elevation 465 feet, 9 feet of concrete would be added. Figure 3.2-7 illustrates typical sections of the thickened dam.

**Staging, Concrete Mix, and Production Plant**

The project requires a concrete batch plant for concrete. The batch plant requires a level area approximately 5 acres (about 218,000 square feet) in size with good road access in order to move in/out the larger pieces of batch pant equipment and aggregate materials. The presence of mountainous terrain up the canyon area closer to the Dam, and narrow, winding access roads limits possible site locations for the batch plant to near Carmel Valley Road. A smaller site closer to the Dam, was considered, but it was determined to not be large enough to allow large trucks to turn around. Therefore, it is not feasible to locate the batch plant closer to the Dam. Additionally, the proximity of electric power lines avoids the need to use of diesel generators for batch plant operation. This avoids additional emissions of NOX, CO, ROC, SO2, and diesel fine particulate (PM10).

A portable concrete batch plant is proposed as shown in Figure 3.2-8. The proposed location for the concrete batch plant is an approximately 5-acre site, located about 2,400 feet northeast of the existing CVFP. This level area of CAW property has been disturbed in the past and sufficient lay-down area is available at this location. In addition, eighteen-yard transfer trucks could off-load raw materials directly onto stockpiles for use in concrete production.
NOTES:
1. USE THIS SCALE ON DRAWING SHEET FOR OVERALL DAM GEOMETRY. PLACE CONCRETE
   CENTER LINES IN PROPER LOCATION ONICIAL SECTION. ON THE DRAWING
   SHOW THE COLUMNS LINES OF THE CENTER LINES SHOW THE CENTER
   USE THE SCALE 5/16" BY KEVIN MCDONALD. CONCRETE PLACEMENT.
2. FORM CONCRETE UNLESS MEASURE OUTSIDE NO QUALITY RIGHT LIFT
3. FORM CONCRETE UNLESS (HORIZONTAL) MORE NO QUALITY RIGHT LIFT
4. CONCRETE LIFT HEIGHT IS A MAXIMUM. CONTRACTOR MAY SUBMIT ALTERNATE
   LIFT HEIGHT FOR APPROVAL BY ENGINEER.

SOURCE: Woodward-Clyde International (11/98)
An additional proposed location for staging is an approximately 0.65 acre (28,000 square feet) site, located about 2,600 feet south of the CVFP along the unpaved access road that leads from San Clemente Drive to the Dam. The site was used as a construction and soil processing staging site for a facilities improvement project called the CVFP Clearwell (Water Tank) Project. If additional construction staging is necessary, this site may provide area for construction equipment and material storage. However, the Clearwell staging area is not large enough to accommodate the concrete batch plant needed for the project.

Based upon construction materials studies, the preferred source of aggregate is imported aggregate, since the quality of onsite aggregate is highly variable. By using an off-site source of aggregate, processing time can be eliminated and development and maintenance of a construction schedule is more predictable.

Off-site aggregate will be delivered and stockpiled near the concrete batch plant over an extended period of time in advance of the retrofit. Materials hauled to the batch plant for the retrofit include about 10,000 tons of coarse aggregate, 5,000 tons of sand, 24,000 sacks of cement, and 8,000 sacks of fly ash. This material will be used at the batch plant to produce approximately 5,800 cubic yards of concrete for the Dam and 1,400 cubic yards for the fish ladder. The concrete would be hauled to the Dam in concrete mixer trucks.

**Dam Construction Reservoir Drawdown and Stream Diversion**

The reservoir would be partially drained prior to concrete placement to reduce the hydrostatic force against the Dam while under construction. This would also provide some storage capacity as a contingency in case of unexpected storms. The water surface elevation would be lowered to approximately Elevation 510 feet. In addition, stream flows would be passed downstream to maintain the flow and habitat in the Carmel River during construction. Figure 3.2-9 provides an overview of drawdown characteristics for the proposed dam thickening.

The need to draw down the reservoir during construction constrains the main construction activities to a period when streamflow is low enough to be passed through a bypass pipeline and around the construction dam site. The target streamflow for construction is about 50 cfs.

The following steps would be taken to draw down the reservoir while maintaining the stream flow:
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• Draw down the reservoir using the existing intake structure with gates at Elevations 515 feet and 495 feet. The high and mid level intake gates at Elevations 515 and 494 feet will need to be exposed from deposited sediments to draw down water below Elevation 515 feet. A sheetpile barrier would be installed around the intake. The sediment between the sheetpile barrier and the Dam intake would be removed and dewatered in a temporary basin. After the turbidity has cleared the reservoir would be lowered to Elevation 510 feet.

• At some point the turbidity of the water in the reservoir may be too high to release it directly downstream. A diversion facility, consisting of a sheetpile cutoff wall, would be installed in the channel upstream to divert incoming flows from the Carmel River through a 36-inch-diameter bypass pipeline. This pipeline would convey the river flow to the existing mid-level intake (which may be sealed to keep out turbid water) and continue through the existing 30-inch-diameter pipeline approximately 500 feet downstream of the Dam to an energy dissipation structure where the water would be released to the Carmel River bed. During the construction season most of this bypass flow is anticipated to be released from Los Padres Reservoir upstream. A similar, smaller sheetpile diversion facility and pipeline may be required to divert flows from San Clemente Creek around the Dam.

• Well points would be installed within the sediment deposits downstream of the diversion facility, as necessary to capture leakage water to maintain the water surface in the reservoir at the desired level. Pumps would be equipped with filters so that water coming out of the wells would be sufficiently clear to pass downstream.

Exact locations of the diversion facility and well points would depend on the actual sediment level when construction begins, and will be determined in the field at the time.

**Site Activities at Plunge Pool**

The process of thickening SCD requires dewatering the plunge pool at the downstream toe of the Dam, drying the downstream dam face, and installing two cofferdams downstream of the plunge pool to keep the site dry and to provide a settling basin.

The plunge pool downstream of the Dam would be completely drained prior to construction to prepare the foundation for the new concrete and to allow access for construction workers and machinery for placement of concrete. To keep the plunge pool staging area dry during construction, two cofferdams would be installed. One cofferdam is required to prevent backflow from the Carmel River. The second one would be located upstream to create a settling basin between the cofferdams. This basin would hold any leakage from the downstream cofferdam, and be used to allow settling or filtration of turbid water before it is released downstream.

The lower portion of the thickened dam would not be exposed to the plunge pool waters while the concrete cures. The temporary downstream cofferdam would not be removed until it has cured for at least 28 days, which is the standard concrete curing time. Due to the elevation above the plunge pool, the upper portions of the thickened dam would not
have any potential to be in direct contact with water during the curing process. After construction is completed and the cofferdams are removed, the cofferdams and the solids accumulated in the settling basin would be removed and used locally. Larger materials would be placed on-site for erosion protection and fines would be disposed of in the reservoir area.

The foundation surface and the downstream face of the Dam would be prepared prior to placing the new concrete overlay. Foundation preparation includes removal of alluvial deposits, loose rock blocks, overhanging rock, and weathered and highly jointed rock down to sound rock. Material would be taken to a local disposal site or used onsite as described above. Care would be taken not to undermine the existing dam. Other preparation includes cleaning the foundation surface with high-pressure water jets; excessive excavation of shear zones and dikes; dental excavation of loose infill materials and washing these zones; filling of joints with slush grout; and filling of voids and depressions with dental concrete.

Dam downstream face preparation would include: sandblasting or water blasting of the downstream surface to clean the surface; drilling holes and installing steel dowels; and pre-wetting the surface for the 24 hours prior to concrete placement to maximize the bond between the new concrete blocks and the existing concrete.

A large tower crane with a concrete bucket would be used to place the concrete. The crane would be located downstream of the Dam in the drained plunge pool to provide adequate access to the entire footprint of the Dam, from the crest down to the foundation. Bucket placement has been assumed instead of pumping. Pumping is not suitable for this application because it would require a higher slump and smaller aggregate. This would result in more shrinkage and would therefore be detrimental in bonding the new concrete to the old, which is a concern of DSOD.

New outlet valves would be installed and tested after concrete placement. In the final task before demobilization, the construction joints between the concrete blocks would be grouted through a system of embedded grout pipes after the concrete has cured. In a dry year this could occur as late as January, otherwise it would take place after uncontrolled winter spills have stopped.

**Abutment Protection**

The rock at the right abutment appears to be insufficient to support the loads imposed by the thickened structure. To provide sufficient support for the thickened dam, the right abutment may require extending a new concrete wall approximately up to 50 feet into the abutment to tie into more competent rock. Scaling would be required to remove weathered and fractured rock, and rock bolting may be necessary to secure some potentially unstable rock blocks. In addition, much of the right abutment would be covered with reinforced concrete or shotcrete to protect it from the erosive forces applied by overtopping flows.
The left abutment is likely acceptable except for localized areas that would require
dental excavation or strengthening of intensely fractured rock and filling of voids. Rock
bolting would be performed to secure potentially unstable rock bolts. Portions of both
abutments that exhibit weathering or a significant degree of cracking would be covered
with shotcrete as appropriate to protect the surface from scour during overtopping.

Final design would include detailed geologic mapping and a drilling program into rock
on both the left and right abutments to further define rock quality, joint orientation and
stability, enabling further refinement of the preliminary design assumptions, excavation
plan, and construction quantities.

**Spillway and Crest Modifications**

The spillway and dam crest would be modified to increase the effective spillway width
and reduce the amount of overtopping during the PMF. The spillway superstructure
(shown in Figure 3.2-4) on the top of the Dam would be removed. The normal maximum
controlled water surface will be limited to Elevation 525 feet with no flashboards or
gates. The hydraulic capacity of the spillway would be increased by reducing the
number of piers from 23 to 2, thereby increasing the effective spillway width. In addition,
the increased spacing between piers would reduce the buildup of downed trees and
other debris at the existing closely spaced piers. A catwalk bridge would be constructed
across the three spillway bays.

The Dam crest would be raised from Elevation 537 feet to Elevation 539.5 feet by
constructing a parapet wall along the upstream edge of the crest. This has no effect on
current or future water storage. These measures would increase the spillway capacity at
the parapet elevation from about 20,000 cfs to about 27,000 cfs. This compares to a
100-year flood flow of about 25,000 cfs. Overtopping of the parapet wall during a PMF
would be reduced from 14 feet to 10 feet. The spillway design would be modified to
increase the cantilever (overhang) from one foot to 4 feet, maintain the center bay set at
Elevation 525.0 feet and raise the crest of the side bays to Elevation 525.5 feet. These
modifications to the spillway design have been incorporated into the project to minimize
the potential for out-migrating fish to strike the Dam face.

**Modification of Low-Level Outlet Works**

The existing low-level outlet works include an upstream gate house over a stilling well.
Three manually operated sluice gates control inflow into the well. A 24-inch-diameter
pipe passes through the Dam and connects the existing well to a 24-inch-diameter steel
wye branch just downstream of the Dam. One leg of the wye has a 24-inch gate manual
shutoff valve and a 12-inch manual flow control valve and discharges to the river. The
other is controlled with a 24-inch manual gate valve and discharges to the 30-inch-
diameter pipeline to the CVFP. The wye and valves are in a small valve house at the
toe of the Dam that is within the footprint of the proposed concrete buttress.
Due to the sedimentation buildup on the upstream face of the Dam in this area, the existing control structure will be abandoned-in-place and a new structure and outlet pipe will be constructed on the left upstream face of the Dam, in the vicinity of the new 10-ft. diameter sluice pipe at Station (Sta) 6+23. The three manually operated sluice gates controlling inflow into the existing well will be abandoned-in-place and removed from service. The existing 24-inch diameter pipe penetrating the Dam will be abandoned-in-place and infilled with concrete. A single manually operated sluice gate will be installed at the new outlet works location at approximately Sta 6+12 and invert Elevation 519. Trashrack protection of the upstream intake will be provided. The existing wye branch, valves and building downstream of the Dam will be removed. The new 24-inch pipe penetrating the left side of the Dam would be routed down the left downstream face of the existing dam, and across the Dam to the right downstream face, where a new wye branch and 24-inch butterfly valves will be provided connecting to the CAW water system. The leg to the river will include a 24-inch manual shutoff valve and a pneumatically operated 12-inch flow control valve. The leg to the CVFP pipeline will have a 24-inch pneumatically operated shutoff valve. Control of flow will be from the filter plant.

The new 24-inch pipe located on the downstream face of the existing dam will be encased in the new cast-in-place concrete blocks, in order to protect it from discharges over the spillway. The pipe has been routed near the base of the Dam in order to maximize the concrete encasement of the pipe. At the elevations shown, the additional concrete thickness is at least 6 feet, compared to the 2 feet diameter of the pipe. The dowels connecting the new concrete to the Dam are 14 inches long, leaving almost 5 feet of concrete for unobstructed placement of the pipe.

The invert of the new 24-inch pipe on the upstream face of the Dam has been placed as low as reasonably possible (and therefore close to the 10-foot diameter sluice pipe) to maximize water depth, while minimizing blockage from debris near the surface, or passage of sediment from below.

One possible alternative to placement of the pipe within the new downstream concrete face would be to run the pipe across the new downstream face of the Dam, horizontally underneath the new 4-foot wide lip of the spillway. This would eliminate the direct flow of water onto the pipe during spilling by raising it to a protected area. However, service and maintenance of the pipe in this location near the top of the Dam would be difficult.

**High-Level Outlets**

A high-level outlet equipped with a 10-foot diameter sluice gate would be installed during the proposed dam thickening as shown in Figure 3.2-5. This will enable controlled and limited sediment releases to maintain both upstream passage to the fish ladder exit and access to the upper gates of the existing low-level outlet works. The discharge of sediment would be regulated by the United States Army Corps of Engineers (USACE) as described in Chapter 1. It is anticipated that the high-level
outlets would be operated during the rising limb of early to mid-season storms to release small amounts of sediment while maintaining flow in the fish ladder.

The outlet would be positioned near the fish ladder exit with the invert below the level of the spillway crest (Figures 3.2-5 and 3.2-6). The exact location and elevation of the outlet would be determined in conjunction with the final design of the fish ladder. The gate could be opened during high flows (in excess of ladder flow capacity) to keep the river flowing through the approach channel to the ladder exit as much as practicable. The objective would be to keep the river channel through the reservoir sediments directed at the vicinity of the ladder exit. Therefore, the sluice gate would be located as close as possible to the ladder exit consistent with downstream plunge pool conditions, abutment protection requirements, and fish fall-back considerations.

The outlet would be formed in the new concrete section of the Dam. In the existing concrete section, it would be constructed by drilling an oversized conduit through the existing concrete, placing an inner steel liner in the conduit, and grouting the annulus between the steel liner and the excavated conduit. The lined outlet would discharge to the downstream face of the thickened dam. This gate would be installed against the upstream face of the existing dam. A trashrack would be installed upstream of the gate to protect it from logs and large debris. Minor sediment excavation would be needed to allow installation of the gate and trashrack. This may be accomplished by installing a small sheetpile barrier around the proposed gate inlet. The sediment between the sheetpile barrier and the gate inlet would be removed.

**Electrical System**

The existing electrical service is supplied by a Pacific Gas & Electric (PG&E) 12-kilovolt (kV) 3-phase pole line located immediately outside an onsite structure above the left abutment of the Dam. Pole mounted transformers provide 3-phase service, which in turn provides service to the Dam itself and a nearby CAW owned residence. Construction power requirements are dependent upon the type and location of any cranes, and dewatering requirements. The need for 480-volt 3-phase 150-kilovolt-ampere (kVA) service has been identified for electrical upgrades for the Dam thickening. This would require changing the transformer but would not require new power poles. A new 50-ampere (amp) service panel would be installed in place of the existing 15-amp service panel. The existing structure would be replaced with a small pre-engineered building that would house the electronic controls for the outlet valves.

**3.2.5 PROJECT ACCESS AND IMPROVEMENTS**

**Access from Carmel Valley Road to San Clemente Dam**

Access to the Dam and reservoir is currently provided via San Clemente Drive, a gated road that extends from Carmel Valley Road, through the Sleepy Hollow Subdivision. San Clemente Drive crosses Tularcitos Creek over a single-lane bridge approximately 17 feet wide and leads to CAW gates at the southern bounds of the Sleepy Hollow subdivision. This locked gate prevents public access to the reservoir. San Clemente
Drive is paved from Carmel Valley Road to the locked gate. The road is unpaved from the locked gate to the reservoir. Two other private roads have gated access to the Project Site from private properties to the south and west.

From the turnoff to the filter plant, San Clemente Drive runs approximately 1.7 miles to the base of the Dam. A narrow “pipeline access route” parallels a portion of this route. Access to the left abutment of the Dam is possible by either the “High Road,” crossing a ford across the Carmel River, or via the “Low Road,” using an existing bridge across the river at the OCRD 1,800 feet downstream from SCD. Improvements will consist of widening and providing turnouts along sections where the terrain permits, and grading and pruning sections of the road. Improvement of the plunge pool access road between the OCRD and the base of SCD would also be necessary to stage the tower crane and other construction equipment at the base of the Dam. The Old Carmel River Dam Bridge (OCRB) would also require upgrading to accommodate heavy loads and large trucks carrying construction equipment. Approaches to the bridge would require modification for long loads and some structural members would be replaced.

**Access from Carmel Valley Road to CVFP (Tularcitos Access Route)**

The 3-mile access road to SCD from Carmel Valley Road would require realignment and improvements to accommodate heavy equipment used for construction activities. Road realignment includes construction of a new access road (Tularcitos Route) to provide a better line of sight and to bypass the Sleepy Hollow subdivision. The new road would start at Carmel Valley Road about 800 feet west of San Clemente Drive, transverse Tularcitos Creek over a new bridge, and provide access to the proposed staging area and batch plant. The existing road between the staging area and the filter plant would be upgraded and widened.

This road would be developed as a permanent access road to the CVFP and SCD. After completion of the road, the portion of the San Clemente Road that runs through Sleepy Hollow would no longer be used except for emergencies. The location of the proposed turnoff from Carmel Valley Road was selected along a straight section of Carmel Valley Road and provides a sight distance of at least 300 feet in either direction. "Truck Crossing – 500 Feet" signs would likely be necessary on both Carmel Valley Road approaches. An encroachment permit would be required from the County of Monterey. A 100-foot transition on the West Side of the intersection would be constructed. Asphalt pavement for the transition section and 25 feet from the intersection would be installed to protect the Carmel Valley Road edge of pavement and to reduce dust at the intersection.

Approximately 175 feet south of Carmel Valley Road the alignment crosses Tularcitos Creek, where a permanent single-lane bridge will be constructed. This is planned to be a steel truss bridge with a span of approximately 200 feet with a wood deck and concrete abutments. Though this creek normally contains minimal flow, the contributing watershed at this location is approximately 36,000 acres. A 100-year storm would result in a flow of approximately 5,500 cfs. It has been estimated that a bridge with a clear
area of approximately 800 square feet underneath would be necessary to pass flood flows of this magnitude.

The proposed road itself from Carmel Valley Road to the CVFP would consist of a 22-foot wide graded section with a 3-foot-wide drainage ditch. The surface would have 6 inches of Class II base rock installed. After construction of the Dam improvements, a double seal coat would be placed as a minimum-wear surface. Fifteen-inch diameter culverts with inlet structures would be installed at approximately 400-foot intervals for drainage.

About 1,100 feet from Carmel Valley Road the access road must cross the existing 30-inch diameter discharge line from the CVFP. This pipe is supported approximately three feet above the ground by concrete piers at approximately every joint. This crossing is also located on a ridge at a saddle. The proposed access road would pass over the pipe. This will require removal of the concrete pipe supports and subsequent burial of the pipeline below the planned road surface.

Beyond 1,300 feet from Carmel Valley Road towards the CVFP, the proposed access road is on flat land where little grading is required. From 2,700 feet from Carmel Valley Road, the proposed access road follows an existing single lane road until about 4,300 feet from Carmel Valley Road. At approximately 3,250 feet from Carmel Valley Road the road crosses over the existing 30-inch diameter pipeline again. At approximately 3,900 feet from Carmel Valley Road, the alignment connects with existing pavement next to the CAW caretaker's house. The existing pavement would be widened to two lanes to approximately 4,300 feet from Carmel Valley Road. At this point the two-lane road could be split into two one-lane roads: the existing single-lane paved road leading up to and beyond the existing water tanks to San Clemente Drive (approximately 900 feet), and the pipeline access road, which also joins San Clemente Drive.

**Access from Existing Gate to San Clemente Dam**

San Clemente Drive is a one-lane unpaved service road with turnouts from the locked gate (at San Clemente Drive Station Sta 51+80; refer to Figure 3.2-2 for station reference location) to the junction of the upper and lower dam roads, a 3,200-foot-long reach. Under the Proposed Project, this section is to be widened where conditions warrant, providing an 11 to 12-foot road width for one-way, controlled traffic. Rock outcrops or trees may make two-way travel difficult on several short segments of this route. This may be acceptable provided there is adequate sight distance for approaching vehicles. The General Contractor can also use flagmen, radios, and designated pullouts to control two-way traffic on one-lane access roads.

San Clemente Drive splits at the concrete ford over the Carmel River (near Sta 83+00), with one lane providing access to the base of the Dam, and one lane providing access to the top of the Dam. The low road to the top of the Dam crosses Carmel River at the OCRB. The OCRB has an overall length of approximately 200 feet and requires structural improvements to carry heavy trucks. These improvements would consist of
replacing the existing piers with stronger and more deeply set piers, resetting the steel structure and replacing the wood deck with a wider, stronger steel deck. Two piers that extend approximately 15 feet above the OCRD crest currently support a bridge constructed of steel I-beams with timber decking and guardrails. The bridge is supported by the two intermediate piers as well as abutments at either end of the bridge on the river’s northern and southern side, completing the bridge span and access road connection across the Carmel River. The southern bridge abutment is reinforced by a masonry wall that extends down to the edge of the river bank.

The existing OCRB would require structural improvements in order to accommodate heavy loads from construction equipment using the bridge to access the SCD left abutment and as part of the one-way access route for construction traffic (for the Proponent’s Proposed Project only). The new bridge will be designed to handle double-axle loads (Caltrans category H1544, Type 3 legal loads), whereas the current bridge is rated to handle only light duty traffic.

In addition, approaches to the bridge would need to be modified for long loads. The new alignment of the bridge would change slightly by moving the north bridge abutment approximately 10 feet west. The bridge improvements would include:

- Demolition and replacement of the existing piers just upstream of OCRD with stronger and more deeply set, 4-foot diameter drilled piers;
- Excavation of a new foundation at the northern abutment;
- Demolition and replacement of the existing beams that support the bridge on the abutments;
- Removal (prior to pier demolition) and then resetting the steel structure (i.e., I-beams that support the bridge deck); and
- Replacing the wood deck with a wider, stronger steel deck.

The high road access to the Dam begins at the junction with the low access road. This road is a single lane and climbs approximately 500 feet then drops almost 400 feet to the top of the Dam, an overall distance of approximately 10,500 feet. The road requires grading and some widening, cut or fill slope stabilization, and vegetation removal.

At the OCRD, an existing unimproved single lane road follows the East Side of the Carmel River to the plunge pool at the base of the Dam ("plunge pool access road"). This road has been in limited use and has a number of washouts from the 1995 and 1998 floods. The roadbed would be filled with sand and gravel and topped with crushed rock to create a safe, uniform surface. This road can be upgraded with minimum tree pruning and removal to provide one lane, two-way access and designated pullouts.
CHAPTER 3.0
Description of the Alternatives

The majority of truck traffic would use the low road and plunge pool access road to the staging and work area at the base of the Dam. It is possible that the low road could be the route for "inbound" traffic to the top of the Dam and the high road could be the route for "outbound" vehicles, for materials that are brought to the top of the Dam.

**Pipeline Access Road**
A 3,000-foot-long existing dirt road (pipeline road) begins at the southerly end of the filter plant and parallels the raw water pipeline to the Dam until it joins San Clemente Drive. Because of a switchback and its steep grade, this road could be used by empty trucks returning to the batch plant as a partial one-way loop. After leaving the filter plant, the pipeline road immediately crosses over the pipeline and heads south adjacent to the westerly side of the exposed pipeline. Within 300 feet of the crossing, the road narrows. There are three sections of this road that are between 9.0 and 9.5 feet wide. Attempts have been made to install wooden retaining walls (one to two feet high) to retain the fill on the downhill side. These retaining walls are failing and would not stand up to 10-wheel truck traffic. Clearing of limbs and grading to a smooth surface would be necessary. The road passes over the raw water pipeline at three locations. Sufficient cover over the pipeline must be maintained to prevent damage to the pipeline.

The three narrow sections would require widening to approximately 11 feet for use by construction equipment. Retaining walls approximately 30 to 50 feet long and up to three feet high would need to be installed. A switchback near the southern end of the road would be improved, but there may not be sufficient space for a 10-wheel truck to make a continuous turn without having to stop and back up at least one time.

From the switchback, the road rises over a distance of 400 feet to join San Clemente Drive (San Clemente Drive approximate Sta 64+50). Most of this section of road (approximately 300 feet) is at a 21 percent grade. Because of the switchback, which probably would require one back-up movement to negotiate, and the 300 feet of 21 percent grade, it is likely the pipeline access road would only be used for empty vehicles during construction.

### 3.2.6 FISH PASSAGE

**Old Carmel River Dam (OCRD) Fish Passage Improvements**
The OCRD, approximately 1,800 feet downstream of SCD, was built in 1893. This 32-foot high masonry-faced dam was originally constructed as a water diversion facility, but no longer serves any diversion function. It is approximately 140 feet long, 8 feet wide at the base and 4 feet wide at the crest. A pool and weir fish ladder is located on the left bank (looking downstream) of the Dam, constructed in part by excavating rock from the steep wall of the canyon. The right bank contains an open passageway approximately 4 feet wide by 15 feet high that at one time was equipped with a gate and operated as a sluiceway and control to raise water levels for operation of a diversion. This structure was modified in 1992 and 2000 by removing several stoplogs and the gate structure from the passageway.
The OCRD was retrofitted with a fish ladder on the west side (left, looking downstream) about the time that SCD was constructed. Significant problems with adult upstream fish passage at OCRD have been documented. These include poor attraction flow and rock and debris jams in the fish ladder, causing the majority of fish to bypass the ladder and attempt to jump the Dam. The thick dam crest creates an area of local high velocity that often results in fallback of fish that successfully jump the Dam. Therefore, the project proposes to notch the east end of the OCRD (right side in downstream) about 9 feet deep and 19 feet wide to improve low flow passage without inducing geomorphic changes to the downstream pool configuration. The proposed OCRD notching and bridge improvements are shown in Figures 3.2-10 and 3.2-11).

**San Clemente Dam Fish Ladder Replacement**

The existing fish ladder does not conform to current fish ladder criteria. It would be removed and replaced with a vertical-slot ladder. The ladder would be demolished after the migration season ends (June) to make way for grading and framing a new ladder.

The new ladder would be poured and finished by late summer/fall in time for fish to use it in the next migration season.

The proposed ladder entrance is located on the left bank (looking downstream) of the plunge pool, near the location of the existing ladder entrance. The proposed ladder exit is located on the left abutment at the top of the Dam, approximately 68 feet in elevation above the plunge pool water surface level. The transportation channel of the proposed ladder would be comprised of 68 pools, each having typical dimensions of 10 feet long by 8 feet wide, resulting in an average slope of 10 percent and a total length of 730 feet (including entrance, outlet and resting pools). The proposed layout divides the transportation channel into four segments; each connected by a switchback that also serves as a resting pool (Figure 3.2-12)

The conceptual fish ladder hydraulic operating conditions are summarized as follows. For stream flows up to 55 cfs, all flow would pass through the proposed ladder. For stream flows in the range of approximately 55 to 115 cfs, most of the flow (55 to 62 cfs) would pass through the proposed ladder. The remaining flow would spill over the lower, center spillway (at Elevation 525.0 feet). Above stream flows of approximately 115 cfs, spill would also occur at the higher two spillway segments (Elevation 525.5 feet). The high design flow of 773 cfs (based on five percent exceedence) is expected to occur at approximate reservoir Elevation 526.7 feet. At this elevation, approximately 73 cfs would pass through the proposed ladder, while approximately 700 cfs would pass over the spillway. At the low fish passage design flow, there would be approximately 2 feet of water depth in the vertical slot above the 12-inch sill, resulting in a pool depth of about 3 feet.
Figure 3.2-11

PRELIMINARY
NOT FOR CONSTRUCTION
LAST REVISED 7/9/99

SOURCE: Woodward-Clyde International (11/98)
The proposed ladder would be equipped with baffle walls at 10-foot intervals that create 68 standard pools within the transportation channel. Each baffle wall would have a 15-inch-wide vertical slot that extends the full height of the channel, except for a 12-inch-sill located at the bottom of the slot (Figure 3.2-13). At 70 cfs flow, the water depth would be approximately 8.5 feet above the top of the sill, and there would be a consistent velocity of approximately 6.6 feet per second through the slot regardless of depth. A total depth of 12 feet in each step of the ladder (including the 1-foot sill) would give the ladder a maximum capacity of approximately 90 cfs. The entire ladder would be covered with grillage to prevent fish from jumping out of the ladder, as well as to prevent falling rock from entering the ladder.

The entrance pool for the proposed ladder (located in the plunge pool) would be designed to provide a minimum of 3 feet water depth under low flow conditions. Given the estimated low water surface at Elevation 457 feet, the entrance pool would have an estimated floor at Elevation 454 feet.

The existing ladder exit orifice (at the upstream face of the Dam) would be modified to achieve proposed hydraulic operating conditions in which all stream flow up to 55 cfs would be routed through the ladder. The existing orifice is 4 feet wide by 2 feet high with invert at Elevation 524.5 feet. The proposed ladder exit would lower the invert to Elevation 518.0 feet and would provide a 2-foot wide slot that is 8.5 feet high. The ladder exit would be equipped with a trash rack on the upstream face of the Dam, and it would have a bulkhead closure to allow ladder closure for maintenance or for protection under extreme high flow conditions. Dredging may be used to establish a fish passage channel prior to the beginning of each migration season.

**Reservoir Maintenance**

The river channel upstream of the fish ladder exit would be regularly inspected to assure that adequate channel depths exist for upstream passage of adult steelhead. When necessary, and when flow and rainfall conditions are met, sediment management operations would be conducted to maintain the upstream river channel for fish passage (see the Sediment Operations and Management Plan [SOMP] for Fish Passage, Appendix J for further detail).

The sluice gate and associated sluice way will be installed through the Dam at invert elevation of 515 feet, offset 10 feet horizontally and 2.7 feet vertically (down) from the fish ladder invert (Figures 3.2-5 and 3.2-6). The sluice way will be constructed by sawcutting a 10+ foot diameter orifice into the existing dam and inserting a 10 foot nominal diameter steel liner to complete passage through the thickened dam to the downstream face. The 10-foot internal diameter sluice gate, constructed of steel and cast iron (Figures 3.2-5 and 3.2-6), will be anchored to the Dam upstream face and remotely operated by an automated gate opening mechanism. The automated operating mechanism and manual emergency crank will be located at the Dam crest, where a physical connection to the gate via a threaded steel bar is turned to lift the gate for opening and closing.
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3.2.7 CONSTRUCTION SCHEDULE AND OPERATIONS

A conceptual schedule is presented in Figure 3.2-14. Following the State Notice of Determination (NOD) and Federal Record of Decision (ROD), final engineering studies would begin in CY 2. Preparation of final design drawings for the Dam, development of studies and design drawings for the fish ladder, and bidding of a construction contract package would occur in CY 3. Actual schedules will vary depending on when work begins.

Construction will occur in two distinct phases. Phase 1 generally includes mobilization, construction of the new Tularcitos Access Road to the CVFP, OCRD bridge improvements, road aggregate delivery, improvements to existing access roads and demobilization. Phase 2 includes the seismic retrofit of the Dam and fish ladder construction, including mobilization, delivery of concrete aggregate, reservoir dewatering and diversion, foundation excavation for the Dam thickening and fish ladder, concrete placement for both dam and fish ladder, valve and gate installation, joint grouting, and demobilization.

The majority of the work in Phase 1 is planned to take approximately 10 months between December of CY 2 and October of CY 3. Phase 2 is planned to take approximately one year beginning in February of CY 4 and concluding the following February. Fieldwork in the reservoir area would start on or about February 25. Installation of the dewatering system is estimated to take one month, with closure of the cofferdams on or about May 31. Fish rescue and drawdown of the reservoir and plunge pool would continue until about June 30. In-stream construction operations would take place from June to December of the CY 2. Placement of the concrete would be completed in prior to commencement of the rainy season. Removal of cofferdams and demobilization of in-stream construction operations would occur from December of year to February of CY 5.

From January to February of CY 5, only minor activities are planned, including joint grouting valve installation and testing, and electrical, instrumentation and controls completion. Joint grouting would begin at least 90 days after each individual section of concrete has been poured and only when any uncontrolled spills have been eliminated. The upper portions of the Dam thickening outside of the spillway would be scheduled for grouting last. In wetter years this would mean final joint grouting could end several months later during the next dry season.
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Construction Crews

The requirements for labor, which affects the number of vehicle trips to and from the site, vary from an approximate average of 15 workers per day during Phase I (road construction and improvements scheduled for one season for approximately eight months), to an approximate average of 60 workers per day during Phase II (dam rehabilitation and fish ladder construction). A maximum of about 80 workers would be needed during July through October when forming and concrete placement would occur for the Dam and the fish ladder. Construction crews could be transported to work in car pools to minimize construction traffic.
3.3 ALTERNATIVE 1: DAM NOTCHING

3.3.1 OVERVIEW

This alternative would notch SCD to guard against failure from an MCE and a PMF, as described in Section 3.2. It would meet the need to reduce seismic and PMF safety risks by notching the Dam to approximately elevation 506 feet in the area of the existing spillway bays. Accumulated sediment behind the Dam would be removed down to the level of the notch. Approximately 1.5 million cubic yards (930 AF) of accumulated sediment would be removed from behind the Dam over three seasons by excavation with heavy earthmoving equipment. A conveyor-belt system would be used to transport the sediment to a disposal area east of the reservoir.

The existing fish ladder at SCD would be replaced to accommodate the new spillway and reservoir height. In addition, a notch would be cut into OCRD, which is about 1800 feet downstream of SCD, in order to provide adequate fish passage. The river channel exposed through partial removal of sediment in the historic reservoir inundation zone would be reconstructed.

During the active construction seasons, the Carmel River and San Clemente Creek would be diverted and the reservoir would be dewatered around the reservoir and dam site. CAW's new diversion intake would be installed upstream to replace the existing intake at the Dam to avoid interruption of this source of CAW's water supply. The intake would divert through a separate temporary bypass line around the construction site into CAW's existing system. The permanent transmission line to connect the new diversion intake to the existing transmission line to CVFP would be installed at an appropriate point in the construction process.

This project is expected to take six years to complete, including environmental review, permitting, design, infrastructure improvements, sediment removal, dam notching, and channel reconstruction. The schedule could be affected by the effects of annual precipitation on river flow conditions in the spring. Construction activities necessary to complete the project are summarized below. Improvements to and/or new roads as part of the proposed project are also conceptually described.

3.3.2 PROJECT LOCATION & ACCESS

The project study area, area of potential effect, facilities, and land ownership are described in Section 3.2. Figures 3.2-1 and 3.2-2 depict the project region and vicinity, respectively.

3.3.3 EXISTING STRUCTURE & OPERATIONS

SCD and reservoir associated facilities; dam and reservoir operations, the CVFP, the existing fish ladder, and current provisions for fish passage are described in Section 3.2.
3.3.4 PROJECT CHARACTERISTICS

This section describes the SCD dam notching project, including modification of the CAW water diversion point; electrical system; sediment excavation, transport and disposal; access roads; stream diversion and reservoir drawdown and dewatering; and replacement of the fish ladder. It also summarizes construction activities necessary to complete the project.

**Dam Notching**

Notching SCD to approximately elevation 506 feet in the area of the existing spillway bays would reduce the pressure on the Dam sufficiently to avoid catastrophic failure of the Dam during a MCE event. Notching to this elevation would also be sufficient to prevent overtopping of the Dam during the PMF. The Dam notching plan and profile is illustrated in Figures 3.3-1 and 3.3-2.

Notching would not proceed until sediment removal is complete (see discussion below). As shown on Figure 3.3-2, the existing spillway piers, gates, catwalk, and the concrete that forms the existing dam directly under the spillway would be removed down to about elevation 503 feet. A new concrete overflow weir would be constructed above the saw-cut surface to provide a hydraulically smooth overflow section with invert elevation at 506 feet. The new concrete would be tied to the existing concrete using reinforcing steel dowels. The new wing walls due to deepening of the spillway will be reinforced for safety if needed. The deepening of the spillway opening and the removal of the intermediate piers would increase the spillway capacity from the existing 20,000 cfs to the PMF peak flow of about 81,000 cfs when the reservoir water surface is at the parapet elevation.

The plunge pool downstream of the Dam would be completely drained prior to dam notching to allow access for construction workers and machinery for notching operations and new fish ladder construction. To keep the plunge pool staging area dry during construction, two cofferdams would be installed as described in Section 3.2.

Notching would be accomplished by saw-cutting the concrete in large blocks. Approximately 700 cubic yards of concrete would be removed. A large tower crane would be used to remove the sawcut concrete blocks and to place the new concrete at the Dam and fish ladder. The crane would be located downstream of the Dam in the drained plunge pool to provide adequate access to the Dam and fish ladder. The concrete blocks would then be further broken up into pieces of sizes that could be loaded and transported by off-highway trucks to the sediment disposal pile for use in erosion control. A large excavator equipped with a hydraulic hammer would be used to reduce the size of the concrete blocks as needed. Light blasting may also be used to break up the largest concrete pieces into smaller, more manageable pieces.
PROFILE ALONG VERTICAL PROJECTION
OF DOWNSTREAM ARC OF EL. 535
(LOOKING UPSTREAM)

NOTES:
1. ALL INFORMATION WAS GENERATED FROM
ORIGINAL DRAWINGS DATED AUGUST 31, 1998,
2. NEW FISH LADDER FOR DAM NOTCHING ALTERNATIVE
TO BE SIMILAR IN DESIGN AS FOR DAM THICKENING
ALTERNATIVE, EXCEPT SHIFT LESS IN HEIGHT.

SOURCE: Woodward-Clyde International (11/98)
Modification of Low-Level Outlet Works and CAW Water Diversion Point

The existing low-level outlet works are described in Section 3.2.

Current CAW infrastructure and operations depend upon a water surface elevation of 525 feet at the point of diversion at San Clemente Reservoir (The Dam’s low-level outlet works) to provide the required hydraulic head in the conveyance pipeline between the Dam and the downstream filter plant, to drive the water through the existing filters to the clearwell for distribution. The clearwell provides the hydraulic head for distributing the treated water into the distribution system. Therefore, the point of diversion would need to be replaced at a 525-foot elevation to avoid extensive improvements to the existing filter plant. The maximum anticipated rate of diversion is 16 cfs, although summer diversions are not expected to exceed 3 to 4 cfs. The existing intake at the Dam could not be used for the notching alternative because the 19-foot loss in reservoir height would not meet minimum head requirements.

Based on cost and operational considerations, a subsurface screened intake at the head of San Clemente Reservoir was tentatively selected as the new water diversion point for the Dam notching alternative. This option, similar to a Ranney intake system, would consist of a network of 12-inch diameter stainless-steel perforated pipes embedded in the gravels and cobbles that line the river bottom. The intake pipes would discharge to a common manifold and to a conveyance pipeline. Based on the longitudinal profile of the Carmel Branch developed by MEI (MEI 2003), the screened intake would need to be constructed and maintained approximately 6,000 to 6,500 feet upstream of the Dam in order to provide a diversion at an elevation of 525 feet. The exact location of the intake would need to be determined in the field in conjunction with sediment removal operations. CAW’s new diversion intake would be installed upstream to replace the existing intake at the Dam to avoid interruption of this source of CAW’s water supply. During the construction phase, the intake would divert through a separate temporary bypass line around the construction site into CAW’s existing system. The existing 30-inch-diameter steel conveyance pipeline would be extended from its current end at the Dam site to the location of the new intake. This permanent transmission line to connect the new diversion intake to the existing transmission line to CVFP would be installed at an appropriate point in the construction process.

The approximate location of the new screened intake and anticipated alignment of the pipeline extension are shown on Figure 3.3-3. The new pipeline would connect to the existing 30-inch pipeline at the downstream toe of the Dam, just upstream of the existing control valves. The existing wye branch, dam outlet valves, and building would be abandoned. Control of flow would be from the filter plant.
High-Level Outlet
A high-level outlet equipped with a sluice gate would be installed during the proposed dam notching in order to provide the ability to make controlled and limited maintenance sediment releases to maintain upstream passage to the fish ladder exit. The sluice gate would be operated as described in Section 3.2. The outlet would be positioned in the left (west) part of the Dam, near the fish ladder exit and below the level of the new spillway crest. The exact location of the outlet would be determined in conjunction with the final design of the fish ladder, following the criteria stated in Section 3.2.

The outlet would be constructed by excavating an oversize conduit through the concrete of the existing dam, placing an inner steel liner in the conduit. Construction details for the outlet and trashrack would be similar to those described in Section 3.2. Minor sediment excavation to allow installation of the gate and trashrack would be accomplished as part of sediment removal operations during the final season of sediment excavation in the reservoir.

Electrical System
The existing electrical service to SCD is supplied by PG&E via an existing 60-kV transmission line from the Laureles substation in Carmel Valley. The 60-kV line follows San Clemente Drive to the High Road intersection, continuing west from that point away from the Project Area. A 12-kV 3-phase pole line branches from the Sleepy Hollow intersection to provide power to SCD, terminating outside an onsite structure above the left abutment of the Dam. Pole mounted transformers provide 3-phase service to the Dam and a nearby CAW-owned residence.

Power requirements for this alternative are governed by the power needs for the conveyor system. The sediment would be transported via connected conveyor segments with 75- to 200-horsepower (HP) (100- to 350-kilowatt [kW]) motors at each segment. Motor load is estimated to total 1,850 HP on an operating basis. Dewatering requirements, construction office trailers, equipment maintenance shop, and night lighting would impose smaller additional loads. Preliminary discussions with PG&E indicate that the configuration of the existing PG&E 60-kV and 12-kV power lines would not be able to handle the total load demand and supply the needed power. Based on preliminary power system evaluations, the most efficient way of supplying the needed power may be to use one or more diesel-power generator sets. A combined capacity of two megawatts would be sufficient to meet project electrical needs. The diesel generator would be comparable to a CAT 3608 TA turbocharged and after-cooled unit, with capacity of 2,000 kW, run in a primary mode (full-time) and equipped with a secondary reduction catalytic device and an add-on particulate filter to meet local air quality requirements.

Sediment Excavation, Transport and Disposal
Accumulated sediment behind the Dam would be removed down to the level of the notch. San Clemente Reservoir has been estimated to contain approximately 2.5 million
cubic yards of sediment (MEI 2003). The sediment consists of sandy gravel, gravelly sand, sand, silty sand, and sandy silt. The finer-grained sediment is located nearest to the Dam in both the Carmel River and San Clemente Creek arms of the reservoir. The coarser (more gravelly and cobbly) materials are encountered in the upper reaches of the Carmel River arm. Previous sediment transport modeling studies determined that removing or notching the Dam and letting the river flush the sediments downstream in an uncontrolled manner would pose unacceptable risks for sediment accumulation and flooding in downstream reaches of the river. To mitigate these risks, notching of the Dam requires the prior removal of the sediment accumulated in the reservoir to a depth (near the Dam) that coincides with the new spillway elevation. Based on recent studies (MEI 2005), the volume of sediment removal would be approximately 1.5 million cubic yards. As a result of the sediment removal efforts, the upstream reaches of the original (pre-1921) Carmel River and San Clemente Creek stream channels would be exposed and require reconstruction.

Several excavation methods (mechanical excavation and hydraulic dredging) are considered feasible (see Appendix G for more detail). Mechanical excavation and transport by conveyor appear to have a slight cost advantage, are simpler, and would have lesser environmental impacts than other methods. The selected approach is described in more detail below.

**Sediment Excavation**

The sediment would be removed in planes approximately parallel to the existing surface of the sediment in the reservoir. This approach would minimize the amount of sediment movement in the winter. In combination with reservoir dewatering and sediment pre-draining activities described below, it would also help maintain the excavation work above the groundwater level for as long as possible. A portion of the original streambed that existed in 1921 would be exposed in the upper reaches of the Carmel River and San Clemente Creek during the second season of sediment removal operations.

Excavation of sediment above the water table would be performed using self-loading scrapers or similar self-propelled excavating equipment. The scrapers would transport the material to a central stockpile area within the reservoir area, where the material would be allowed to drain further. The stockpile area would be located at the mouth of the ravine where the sediment disposal site is located. The tentative stockpile site, called Site 4R, is shown on Figure 3.3-3.

**Sediment Transport**

The excavated sediment would be transported to a central stockpile in the reservoir near the mouth of the ravine where Site 4R is located. From the stockpile, a gravity-feed reclaim tunnel system would be used to feed the sediment to a 3,500-foot-long, 36-inch overland belt-conveyor system that would transport the sediment to the site. Gravity feed reclaim tunnel systems are used typically used in mining applications, and consist of a buried hopper (box structure with opening at the top) underneath the excavated
sediment stockpile that collects and deposits sediments onto the conveyor system, a tunnel structure (similar to a half round culvert) that protects the conveyor leading to the hopper, and the conveyor equipment.

The conveyor system would possess a peak capacity of 700 cubic yards per hour. An average sustained rate of 500 cubic yards per hour is assumed for purposes of calculating seasonal production. The belt conveyor would be installed along a 25-foot-wide access road linking the reservoir and the disposal site. The road would be used for access to the reservoir and operation and maintenance of the conveyor. The approximate route and profile of the road and conveyor is shown in Figure 3.3-4. At the disposal site, a traveling radial stacker conveyor would be used to discharge and spread the sediment across the disposal area in preparation for compaction.

**Sediment Disposal**

Sediment disposal for this alternative would be at Site 4R, located in a relatively steep, undeveloped, forested ravine approximately 3,500 feet east of San Clemente Reservoir. The ravine supports an ephemeral stream that carries local runoff during storm events. Existing access to the ravine is via a Jeep Trail that begins at the Cachagua Grade. The Jeep Trail would need to be improved significantly to enable the mobilization of construction equipment to the site and the reservoir (see discussion below).

A plan of Site 4R and a capacity curve for the site is shown in Figure 3.3-5. The maximum capacity of the site is undetermined but is well in excess of the estimated required volume of 1.5 million cubic yards (ample capacity to store all sediment excavated under this alternative). The toe of the sediment pile would be located at approximate elevation 920 feet. The top of the sediment pile would be at about elevation 1,110 feet in order to contain all of the sediment accumulated in the reservoir. The footprint area of the sediment pile would be approximately 16 acres. The watershed area tributary to the sediment pile site is approximately 252 acres.

The property where Site 4R is located is owned by the Monterey Peninsula Regional Park District (MPRPD). The use of Site 4R as sediment disposal site and access easements would need to be negotiated with the MPRPD.

Site preparation prior to sediment disposal would include (1) the clearing and grubbing of trees and vegetation from the sediment pile footprint, (2) the removal of any existing facilities (none have been identified), and (3) the stripping and stockpiling of organic soils for use in subsequent restoration and revegetation of the site once sediment placement has been completed. In addition, a culvert pipe would likely be placed along the ravine bottom the full length of the site to help manage storm waters and minimize erosion during construction operations. BMPs identified in the SWPPP (Appendix K) would be implemented for site preparation.
PROFILE OF ACCESS ROAD TO RESERVOIR SITE

PROFILE OF HAUL ROAD

TYPICAL ACCESS ROAD SECTION

Scale: 1" = 15'
Bulldozers would be used to spread sediment into thin, nearly horizontal lifts. Each lift would be compacted using the bulldozers or vibratory compactors. The sediment pile would be constructed with a stable side slope (averaging 2.75:1). Concrete debris from dam notching could be placed on the pile for long-term erosion protection at the toe of the pile and on the groins along the contact between the pile and the hillside abutments.

At the end of each construction season, the site would be winterized by: (1) providing interim drainage and diversion of ravine flows, (2) stabilizing sloping sediment surfaces and other disturbed areas by installing erosion protection features such as erosion control mats or straw mulch and wattles, and (3) providing sediment collection features such as silt fences, straw bales, and sediment traps along the toe of the pile and other disturbed areas.

Once placement of sediment and concrete debris has been completed, the topsoil from the temporary topsoil stockpile set aside during site stripping would be spread over the sediment pile. The graded surface would be stabilized with erosion control measures as described above and revegetated with native plants and trees obtained from the site vicinity. A typical section for the sediment pile is shown in Figure 3.3-6.

**Stream Diversion and Reservoir Drawdown and Dewatering**

Both the Carmel River and the San Clemente Creek would be diverted around the active areas of sediment excavation during the construction season. Stream flows would be passed downstream to maintain the flow and habitat in the Carmel River during construction. Within the reservoir area, the reservoir level would be drawn down, and the sediment deposits would be pre-drained to keep the active excavation area as dewatered and drained as possible to enable operation of scrapers and similar self-propelled earthmoving equipment.

A construction requirement for reservoir drawdown constrains the main construction activities to a period when streamflow is low enough to be passed through a bypass pipeline and the Dam outlet works. The target streamflow to divert the Carmel River is assumed to be a flow of about 50 cubic feet per second (cfs) or less. A diversion facility, consisting of an interlocking sheetpile cofferdam, would be installed in the channel at the upper end of the reservoir to divert incoming flows from the Carmel River through a 36-inch-diameter bypass pipeline. The sheetpiles would be driven down through the sediment to bedrock. The upper end of the sheetpiles would extend about five feet above the existing streambed to develop sufficient head at the bypass pipe intake. A removable section would be disassembled annually to allow stream and fish passage during non-construction periods.
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Another sheetpile cofferdam would be constructed across San Clemente Creek to divert it into an 18-inch pipeline. These bypass pipelines would convey the stream flows to some of the existing drawdown ports at SCD and/or to the existing mid-level intake (which may be sealed to keep out turbid water). Water passed through the drawdown ports would discharge to the existing plunge pool downstream of the Dam. Water discharged through the mid-level intake would continue through the existing 30-inch-diameter pipeline approximately 500 feet downstream of the Dam to an energy dissipation structure where the water would be released to the Carmel River bed. During the construction season most of this bypass flow will be released from Los Padres Reservoir upstream.

Prior to commencing excavation, the reservoir would be drawn down below the level of the drawdown ports, if possible, by using the existing mid-level intake structure with gate invert at elevation 494 feet. The reservoir water surface first would be drawn down by gravity to the invert of the drawdown ports at elevation 515 feet and then further lowered to the lowest level possible, approximately elevation 495 feet. However, sediment has accumulated against the upstream face of the Dam to about elevation 510 feet. This sediment deposited at the mid-level intake structure (at elevation 494 feet) would need to be removed to draw the reservoir water below elevation 515 feet. A sheetpile barrier would be installed around the intake. The sediment between the sheetpile barrier and the Dam intake would be removed. After the turbidity has cleared, the reservoir would be lowered to elevation 495 feet. Alternatively, water could be pumped from the deepest part of the reservoir near the central part of the Dam and discharged to the river either by pumping into the outlet works or the drawdown ports.

Reservoir drawdown and sediment excavation operations would be managed to promote pre-drainage of the sediments ahead of the excavation. As the level of the sediment is lowered, drainage trenches would be excavated to drain to low points, from where water would be removed. Water originating from local precipitation, springs, and/or seepage through the stream diversion structures may seep into the construction area, bounded upstream by the diversion structures and downstream by the Dam. This excess water would also need to be drained, conveyed, collected and removed from the excavation. In addition to drainage trenches, well points may be installed within the sediment deposits, as necessary to help capture leakage water and maintain the water surface in the reservoir at the desired level, i.e., below the bottom of the excavation.

Water within the construction area would be turbid due to the earthmoving operations. The remaining pond adjacent to the Dam would be used as a desilting basin during the construction season. At some point the turbidity of the water in the reservoir may be too high for directly releasing it downstream. Excess water from within the reservoir would then need to be treated using a filtration system to remove turbidity and excess iron compounds. The treated water would be discharged to the river.

At the end of the first sediment excavation season, the initial storms that exceed the diversion capacity would fill the reservoir, after which time the diversion pipe would be
disconnected from the sheetpile cutoff and the river flow would be re-established through the reservoir.

For the second sediment excavation season, before re-starting the sediment excavation operation, the water level in the reservoir would need to be drawn down again as described above.

Exact locations of the diversion cutoff walls and pipelines, drainage trenches and well points would depend on the actual sediment level when construction begins, and will be field determined at that time.

**3.3.5 PROJECT ACCESS AND IMPROVEMENTS**

Existing vehicle access to SCD and the filter plant from Carmel Valley Road is described in Section 3.2. Improvements to these existing access roads are also described in Section 3.2.

**Access to Sediment Disposal Site and Reservoir**

Road access to the sediment disposal site and San Clemente Reservoir would be established via Cachagua Grade. An existing Jeep Trail that extends between a gated entrance off Cachagua Grade and the sediment disposal site would be improved, and a conveyor-belt system would be installed between the reservoir and the sediment disposal site.

The primary access used to develop the sediment disposal site and access the reservoir would be via Carmel Valley Road and Cachagua Grade. An existing dirt road leads to the sediment disposal site, entering off Cachagua Grade approximately three miles from the intersection with Carmel Valley Road. A locked steel swing gate controls the entrance. "Truck Crossing — 500 Feet" signs would likely be necessary on both Cachagua Grade approaches. Asphalt pavement would be placed at the intersection to protect the Cachagua Grade edge of pavement and to reduce dust at the intersection.

About 1.5 miles of this existing dirt road (from the intersection with Cachagua Grade to the sediment disposal site) would need to be improved to allow access of construction personnel and equipment. Improvement of the existing road would consist of widening the road to a width of 20 feet (minimum width of 15 feet with turnouts for passing in tight reaches), improving the radius of curvature at sharper curves to allow passage of large trucks, and constructing a drainage ditch along the uphill edge of the road. The road surface would have 6 inches of Class II base rock installed. A double chip seal coat would be placed as a minimum wearing surface. Fifteen-inch-diameter or larger culverts with inlet structures would be installed at approximately 400-foot intervals for drainage. The Jeep Trail would be left in its improved condition. No additional maintenance would be required on the Jeep Trail than already exists.
A new 0.5-mile-long access road would be constructed from the disposal site to the reservoir. A typical cross-section is shown on Figure 3.3-5. The road would be excavated along the slope of the ravine and would consist of a 25-foot-wide surface and 3-foot drainage ditch. The excavated slope above the road would be stabilized with small anchors, wire mesh and shotcrete as needed. The road surface would have 6 inches of Class II base rock installed. The belt conveyor would be installed along the outside edge of the road and would be accessible to maintenance equipment operating from the road. The road’s travel surface would be sealed with a double chip seal coat. Fifteen-inch diameter or larger culverts with inlet structures would be installed at approximately 400-foot intervals for drainage. This road would be restored to pre-construction conditions after completion of the project.

3.3.6 FISH PASSAGE

**Old Carmel River Dam Fish Ladder Improvements**

Fish passage improvements to the OCRD are the same as are described for the Dam strengthening project in Section 3.2.

**San Clemente Dam Fish Ladder Replacement**

The existing fish ladder is described in Section 3.2. The ladder would be demolished after the migration season ends (June) to make way for grading and framing a new ladder. The new ladder would be poured and finished by late summer/fall in time for fish to use it in the next migration season.

The design of the replacement fish ladder would be substantially the same as shown in Section 3.2 (Figure 3.2-12), except shorter. The proposed ladder entrance is located on the left bank (looking downstream) of the plunge pool, near the location of the existing ladder entrance. The proposed ladder exit is located on the left abutment, ascending approximately 49 feet from the pool below. The transportation channel of the proposed ladder would be comprised of 49 pools, each having typical dimensions of 10 feet long by 8 feet wide, resulting in an average slope of 10 percent and a total length of 540 feet (including entrance, outlet and resting pools). The proposed layout divides the transportation channel into four segments, each connected by a switchback that also serves as a resting pool.

The conceptual fish ladder hydraulic operating conditions are summarized as follows. For stream flows up to 55 cfs, all flow would pass through the proposed ladder. For stream flows in the range of approximately 55 to 115 cfs, most of the flow (55 to 62 cfs) would pass through the proposed ladder. The remaining flow would discharge over the spillway (at elevation 506.0 feet). The high flow fish passage condition of 773 cfs is expected to occur at approximate reservoir elevation 507.3 feet. At this elevation, approximately 65 to 70 cfs would pass through the proposed ladder, while just over 700 cfs would pass over the spillway. At the low flow fish passage condition of 15 cfs, there would be approximately 2 feet of water depth in the vertical slot above the 12-inch slot, resulting in a pool depth of about 3 feet.
The proposed ladder would be equipped with baffle walls at 10-foot intervals that create 49 standard pools within the transportation channel. Each baffle wall would have a 15-inch-wide vertical slot that extends the full height of the channel, except for a 12-inch-sill located at the bottom of the slot. At 70 cfs flow, the water depth would be approximately 8.5 feet above the top of the sill, and there would be a consistent velocity of approximately 6.6 feet per second through the slot regardless of depth. A total ladder depth of 12 feet (including the 1-foot sill) would give the ladder a maximum capacity of approximately 90 cfs. The entire ladder would be covered with grillage to prevent fish from jumping out of the ladder, as well as to exclude falling rock from entering the ladder.

The entrance pool for the proposed ladder (located in the plunge pool) would be designed to provide a minimum of 3 feet water depth under low flow conditions. Given the estimated low water surface at Elevation 457 feet, the entrance pool would have an estimated floor at Elevation 454 feet.

The existing ladder exit orifice (at the upstream face of the Dam) would be lowered in a manner consistent with the overall lowering of the reservoir surface. In addition, the exit orifice would be located to achieve proposed hydraulic operating conditions in which all stream flow up to 55 cfs would be routed through the ladder. The existing orifice is 4 feet wide by 2 feet high with invert at elevation 524.5 feet. The proposed ladder exit would lower the invert to Elevation 499.0 feet and would provide a 2-foot wide slot that is 8.5 feet high. The ladder exit would be equipped with a trash rack on the upstream face of the Dam, and it would have a bulkhead closure to allow ladder closure for maintenance or for protection under extreme high flow conditions.

Dredging may be used to establish a fish passage channel prior to the beginning of each migration season.

**Reservoir Maintenance**

Maintenance of the river channel through the reservoir upstream of the fish ladder exit would be the same as described in Section 3.2 for the Proponent’s Proposed Project.

**3.3.7 PARTIAL RECONSTRUCTION OF THE RIVER CHANNEL AND REVEGETATION OF THE VALLEY FLOOR**

Excavation under this alternative would lower the surface of the sediment deposits in San Clemente Reservoir by approximately 19 feet. The new sediment surface in the reservoir would be at about the same grade as the current sediment surface. The partial removal of the reservoir sediment would expose a portion of the pre-1921 alluvial deposits in the river channel and floodplain along the sides and the upstream reaches of the historic reservoir inundation zone, uncovering approximately 2,000 feet of the upstream portion of the Carmel River branch and 900 feet of the San Clemente Creek branch in the current reservoir inundation area.
After the sediment surface is lowered to its planned depth, the following three-stage channel would be provided through selective contouring along both the Carmel River and San Clemente Creek:

- The relatively wide river/creek valley formed by the remaining alluvial deposits;
- A bankfull channel appropriately sized with capacity for a two-year flood event;
- A thalweg (low-flow channel) to pass median annual flows and provide depths needed for fish migration even during low flows.

The broad valley containing the reconstructed stream channel would generally follow the 1921 contours in the upper reaches of the Carmel River and San Clemente Creek and the lowered sediment surface in the portions of the reservoir closer to the Dam. The bankfull and thalweg channels would be reconstructed by limited grading of the existing alluvial deposits. Habitat complexity would be promoted within the channel by constructing pools, runs, and riffles, to provide suitable depth and velocity conditions for steelhead migration. Instream structures such as downed trees and boulders would be placed at strategic locations to improve conditions along the stream channels.

Stabilization of exposed land would be accelerated by planting the exposed reservoir canyon slopes with native upland vegetation. Likewise, once the channel has been contoured, the establishment of riparian vegetation on the lowered sediment terraces would be accelerated through cultivation and planting of selected areas of the valley floor. Native saplings of suitable riparian species would be obtained from nearby reaches of the Carmel River and San Clemente Creek and planted at appropriate densities along the stream banks. Temporary stabilization of stream banks would also be provided using vegetative matter and plantings.

### 3.3.8 CONSTRUCTION SCHEDULE AND OPERATIONS

A conceptual schedule is presented in Figure 3.3-7. Following the state NOD and federal ROD, final engineering studies would begin in Year 2. These include geotechnical investigations for the sediment site and access roads; design of the access roads and conveyor system; design of the sediment pile including stability and hydrologic analyses; design of the new fish ladder and high-level outlet; design of the new water intake and conveyance pipeline extension; design of the Dam notching; planning and design of stream bypass and dewatering facilities; design of the reconstruction of the Carmel River and San Clemente Creek channels; and design of mitigation or habitat enhancement plans for red-legged frogs and steelhead. A construction contract package is planned to be developed and construction bids solicited late in CY 1, for award in early in CY 2.
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Figure 3.3-7 SAN CLEMENTE DAM SEISMIC SAFETY EIR/EIS PROJECT
ALTERNATIVE 1- DAM NOTCHING
CONCEPTUAL SCHEDULE

Project: SAN CLEMENTE DAM NOTCHING
Date: Mon 12/10/07
Construction would occur in two distinct phases. Phase 1, in CY 3, would include mobilization, construction of the new access road to the CVFP, OCRD bridge improvements, road aggregate delivery, improvements to existing access roads (high road, low road, plunge pool access road, and pipeline access road), improvement of the access road from Cachagua Grade to the sediment disposal site, and construction of a new access road from the sediment disposal site to the reservoir. The sediment disposal site would be cleared of vegetation and prepared for delivery of the conveyors and radial stackers. After the new road is completed, the supports for the conveyor would be installed and eventually the conveyor sections would be fastened to the supports. First year work may also possibly include construction of some of the stream diversion features and would conclude with demobilization for the winter. In addition, a new water diversion facility would be constructed to replace CAW's existing water diversion at the Dam.

Phase 2 (CY 4, 5 and 6) would include the construction of temporary roads across the reservoir sediment surface to allow access of excavating equipment, the removal of sediment, the notching of the Dam, construction of the new fish ladder, construction of the new river intake and conveyance pipeline extension, the reconstruction of stream channels, and the restoration and revegetation of the sediment pile and reservoir area. It would include seasonal mobilization, stream diversion and reservoir dewatering, and interim stabilization of the sediment pile the first winter.

The majority of the work in Phase 1 is planned to take approximately 10 months between March and December of year three. Phase 2 is planned to take three years. During CY 4, 5 and 6, mobilization would occur during the month of March. Fieldwork in the reservoir area would start early May. Installation of diversion and dewatering facilities would take about one month, with closure of the cofferdams on or about May 31. Fish rescue would continue until June 30. Drawdown of the reservoir would continue until about October. Actual sediment removal operations would take place during a five-month period from June through October. Removal of cofferdams and demobilization of in-stream construction operations would occur October to the end of November. Allowing for holidays and a few days of bad weather, it was assumed that each season would have approximately 100 working days of actual sediment-removal production operations.

Sediment excavation, transport and placement operations would be conducted in two 10-hour shifts, five days per week. The equipment for sediment excavation and transport can sustain an average rate of 500 cubic yards per hour with a peak capacity of 700 cubic yards per hour. The estimated sediment removal rate is about 900,000 cubic yards per season. Two seasons would be required for sediment removal for the Dam notching alternative.

During the last year of sediment removal operations, sediment removal would be completed in August. The Dam notching activities would begin around June of year 6, concurrently with the sediment removal operations. Notching and sediment removal
would be completed August of CY 6. Fish ladder construction would take place during a five-month period from June to October of CY 5. Spillway overflow weir construction would occur August to September of CY 6. Approximately 1,500 cubic yards of concrete would be procured from an off-site commercial concrete plant and would be transported to the site by ready-mix trucks. Concrete placement operations may require an average of four or five concrete truckloads per day. Placement of concrete would be completed in mid November prior to commencement of the rainy season. Removal of cofferdams and demobilization of in-stream construction operations would occur later in November.

Reservoir restoration and channel reconstruction activities would take place concurrently with sediment removal activities. This work would begin at the upstream end of the reservoir and progress downstream as new areas of the historical stream terraces and channel are uncovered. Additional time would be needed at the conclusion of the sediment removal, dam notching, and cofferdam removal operations to complete the reconstruction of the newly exposed portions of the river channel and the revegetation of the old reservoir and sediment inundation areas.

**Construction Crews**

The requirements for labor, which affects the number of vehicle trips to and from the site, vary from an approximate average of 20 workers per day during Phase I (road construction and improvements scheduled for one season for approximately eight months), to an approximate average of 45 workers per day during Phase II (sediment excavation and disposal, dam modification, and fish ladder construction). A maximum of about 60 workers would be needed during the third year, when sediment excavation and removal would be completed at the same time that dam notching and form erection and concrete placement occur for the fish ladder. Construction crews could be transported to work in car pools to minimize construction-related traffic.
3.4 ALTERNATIVE 2: DAM REMOVAL

3.4.1 OVERVIEW
This alternative would remove SCD to prevent failure from an MCE and a PMF, as described in Section 3.2. Approximately 2.5 million cubic yards (1,555 AF) of accumulated sediment would be removed from behind the Dam over three seasons by excavation with heavy earthmoving equipment. A conveyor belt system would be used to transport the sediment to a disposal area east of the reservoir. The Dam would be demolished and removed from the site. The fish ladder will be demolished and removed.

During the active construction seasons, the Carmel River and San Clemente Creek would be diverted around the reservoir and dam site, and the reservoir would be dewatered. CAW’s new diversion intake would be installed upstream to replace the existing intake at the Dam to avoid interruption of this source of CAW’s water supply. During construction, the intake would divert through a separate temporary bypass line around the construction site into CAW’s existing system. The permanent transmission line to connect the new diversion intake to the existing transmission line to CVFP would be installed at an appropriate point in the construction process. A notch would be cut into OCRD, which is about 1800 feet downstream of SCD, in order to provide adequate fish passage. The river channel exposed through removal of sediment in the historic reservoir inundation zone would be reconstructed.

This project is expected to take seven years to complete, including environmental review, permitting, design, infrastructure improvements, sediment removal, dam demolition, and channel reconstruction. Actual site work, from mobilization to demobilization, would require about five years. The effects of annual precipitation on river flow conditions could affect the schedule in the spring. Construction activities necessary to complete the project are summarized below. Improvements to and/or new roads as part of the proposed project are also conceptually described.

3.4.2 PROJECT LOCATION & ACCESS
The project study area, area of potential effect, facilities, and land ownership are described in Section 3.2. Figures 3.2-1 and 3.2-2 depict the project region and vicinity, respectively.

3.4.3 EXISTING STRUCTURE & OPERATIONS
SCD and reservoir, associated facilities, dam and reservoir operations, the CVFP, the existing fish ladder, and current provisions for fish passage are described in Section 3.2.
3.4.4 PROJECT CHARACTERISTICS

This section describes the SCD removal alternative, including demolition and removal; sediment excavation, transport and disposal; access roads; and stream diversion and reservoir drawdown and dewatering. It also summarizes construction activities necessary to complete the project.

**Dam Removal**

Dam removal would not proceed until sediment removal is complete (see discussion below). At the conclusion of the sediment removal process, SCD would be demolished using explosives. This involves the demolition and removal of about 7,000 to 8,000 cubic yards of concrete from the site. The concrete debris would be further broken up into pieces of sizes that could be loaded and transported by off-highway trucks to the sediment disposal pile for use in erosion control.

The plunge pool downstream of the Dam would be completely drained prior to dam demolition to allow access for construction workers and machinery for demolition operations. To keep the plunge pool staging area dry during demolition, two cofferdams would be installed as described in Section 3.2.

A truck-mounted crane may be used to drill the holes into the Dam and load the explosives. The crane could be located downstream of the Dam in the drained plunge pool to provide adequate access to the entire footprint of the Dam, from the crest down to the foundation. The crane would also be used to lift out the concrete debris. Large excavators equipped with hydraulic hammers or shears would be used to reduce the size of the concrete debris as needed. Light blasting would also be used to break up the largest concrete pieces into smaller, more manageable pieces.

The existing fish ladder on the left (west) abutment of the Dam will be demolished and removed. The instrument hut near the left abutment also would be removed. The Dam-tender dwelling would be preserved and possibly converted to other uses.

**Modification of CAW Water Diversion Point**

Section 3.3 describes current CAW infrastructure and operations requirements for a point of diversion that will provide the required hydraulic head to drive the water through the existing filters to the clearwell for distribution. A subsurface screened intake at the head of San Clemente Reservoir was tentatively selected as the new water diversion point for the Dam removal alternative. This option is described in Section 3.3. The approximate location of the new screened intake and anticipated alignment of the pipeline extension are shown on Figure 3.3-3.

**Electrical System**

The existing electrical service and proposed modifications required to meet power requirements for this alternative (primarily for the conveyor system) are described in Section 3.3.
Sediment Excavation, Transport & Disposal

San Clemente Reservoir has been estimated to contain approximately 2.5 million cubic yards of sediment (MEI 2003). The characteristics of this sediment are described above, in Section 3.3. To mitigate risks for sediment accumulation and flooding in downstream reaches of the river, removal of the Dam requires the prior removal of the sediment accumulated in the reservoir since the Dam was placed in service in 1921 (note that during dam construction the streambed was excavated to about 20 feet below its original level at the Dam). As a result of the sediment removal efforts, the Carmel River and San Clemente Creek stream channels would be exposed and require reconstruction.

Several excavation methods (mechanical excavation and hydraulic dredging) are considered feasible (see Appendix G for more detail). Mechanical excavation and transport by conveyor appear to have a slight cost advantage, are simpler, and would have lesser environmental impacts than other methods. The selected approach is described in more detail below.

Sediment Excavation

The mechanical excavation of sediment would be conducted using the methods described in Section 3.3. During the first sediment removal season, the sediment would be excavated from a starting elevation ranging between 525 to 545 feet to an elevation of 505 to 525 feet. During the second season, excavation would reach a target elevation of approximately 480 to 500 feet. During the third construction season, the remaining sediment would be removed to approximately the depth of the original streambed that existed in 1921.

Pre-drainage of sediments prior to excavation would likely become ineffective in the silt deposits that exist below about elevation 485 feet within 600 to 900 feet of the Dam (see Figures 3.5a and 3.5.b in MEI 2003). These materials would not be reached until the last sediment excavation season. They would be mucked out using large excavators, draglines, or clamshells working from firm ground. The excavated materials would be placed in a drying/staging area in the immediate vicinity of the point of excavation, from where they would be excavated again and transported to the central stockpile area and conveyor loading facility.

Sediment Transport

The excavated sediment would be transported to a central stockpile in the reservoir near the mouth of the ravine where Site 4R is located. Section 3.3 describes the conveyor belt system proposed for use.
Sediment Disposal

A plan of Site 4R and a capacity curve for the site are shown in Figure 3.3-4. The maximum capacity of the site is undetermined but is well in excess of the estimated required volume of 2.5 million cubic yards. The footprint area of the sediment pile would be approximately 23 acres. The watershed area tributary to the sediment pile site is approximately 252 acres.

Site preparation prior to sediment disposal, disposal site operations and maintenance, and site restoration would all be the same as described in Section 3.3.

Stream Diversion and Reservoir Drawdown and Dewatering

Both the Carmel River and the San Clemente Creek would be diverted around the active areas of sediment excavation during the construction season. The approach to diversion, reservoir drawdown and dewatering is the same as described in Section 3.3.

3.4.5 PROJECT ACCESS AND IMPROVEMENTS

Road access to the sediment disposal site and San Clemente Reservoir would be established via Cachagua Grade. An existing jeep trail that extends between a gated entrance off Cachagua Grade and the sediment disposal site would be improved, and a conveyor belt system and maintenance road would be installed between the reservoir and the sediment disposal site. Road realignment and improvements are discussed in more detail below.

Access from Carmel Valley Road to San Clemente Dam

Existing vehicle access to SCD and the filter plant from Carmel Valley Road is described in Section 3.2. Improvements to these existing access roads are also described in Section 3.2.

Minor improvements may be made to the “High Road” (crossing a ford over the Carmel River) or “Low Road” (using an existing bridge across the river at the OCRD). These roads may require localized grading and/or widening, cut or fill slope stabilization, and vegetation removal. However, no major improvements are contemplated since the primary access to the reservoir will be via Cachagua Grade as described below.

At the OCRD, an existing unimproved single lane road follows the southeast side of the Carmel River to the plunge pool at the base of the Dam. This road has been in limited use and had a number of washouts from the 1995 and 1998 floods. This plunge pool access road would be improved to place the downstream cofferdams and stage the crane and other construction equipment used in demolition operations at the base of the Dam. Some tree pruning and removal would be needed. The roadbed would be filled with sand and gravel and topped with crushed rock to provide one lane, two-way access and designated pullouts. An asphaltic sealant coat would be applied to the crushed rock to stabilize it and prevent it from moving into the river.
Access to Sediment Disposal Site and Reservoir
The primary access used to develop the sediment disposal site and access the reservoir would be via Carmel Valley Road and Cachagua Grade. This access and proposed improvements to it are described in Section 3.3.

3.4.6 PARTIAL RECONSTRUCTION OF THE RIVER CHANNEL AND REVEGETATION OF THE VALLEY FLOOR
Removal of the reservoir sediment would expose the pre-1921 alluvial deposits in the river channel and floodplain through the historic reservoir inundation zone. A three-stage channel would be provided through selective contouring along both the Carmel River and San Clemente Creek. The channel would be similar to but longer than the one described in Section 3.3.

3.4.7 CONSTRUCTION SCHEDULE AND OPERATIONS
A conceptual schedule is presented in Figure 3.4-1 Project Schedule. Following the State Notice of Determination and Federal Record of Decision, final engineering studies would begin in CY 2. These include geotechnical investigations for the sediment site and access roads; design of the access roads and conveyor system; design of the sediment pile including stability and hydrologic analyses; design of the new water intake and conveyance pipeline extension; planning for demolition of the Dam; planning and design of stream bypass and dewatering facilities; design of the reconstruction of the Carmel River and San Clemente Creek channels; and design of mitigation or habitat enhancement plans for CRLF and steelhead. A construction contract package is planned to be developed and construction bids solicited late in CY 1, for award early in CY 2.
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**Figure 3.4-1 SAN CLEMENTE DAM SEISMIC SAFETY EIR/EIS PROJECT**

**ALTERNATIVE 2: DAM REMOVAL**

**CONCEPTUAL SCHEDULE**

**Project: SAN CLEMENTE DAM REMOVAL**

**Date: Mon 12/10/07**
Construction would occur in two distinct phases. Phase 1, in CY 3, would include mobilization, improvement of the access road from Cachagua Grade to the sediment disposal site, and construction of a new access road from the sediment disposal site to the reservoir. The sediment disposal site would be cleared of vegetation and prepared for delivery of the conveyors and radial stackers. After the new road is completed, the supports for the conveyor would be installed and eventually the conveyor sections would be fastened to the supports. Phase 1 work may also possibly include construction of some of the stream diversion features and would conclude with demobilization for the winter. In addition, a new water diversion facility would be constructed to replace CAW's existing diversion facility at the Dam. Phase 2, in CY 4, 5 6, and January of CY 7 would include the construction of temporary roads across the reservoir sediment surface to allow access of excavating equipment, removal of sediment, demolition of the Dam; reconstruction of stream channels, and restoration and revegetation of the sediment pile and reservoir area. It would include seasonal mobilization, stream diversion and reservoir dewatering, and interim stabilization of the sediment pile the first winter. The permanent transmission line to connect the new diversion intake to the existing transmission line to CVFP would be installed at an appropriate point in the construction process.

The majority of the work in Phase 1 is planned to take approximately nine months between March and November of CY 3. Phase 2 is planned to take three years and one month. During each of these years, mobilization would occur during the month of March. Fieldwork in the reservoir area would start approximately around May. Installation of diversion and dewatering facilities would take about one month, with closure of the cofferdams on or about May 31. Fish rescue would continue until June 30. Drawdown of the reservoir would continue until about October Actual sediment removal operations would take place during a five-month period from June through October. Removal of cofferdams and demobilization of in-stream construction operations would occur in November. Allowing for holidays and a few days of bad weather, it was assumed that each season would have approximately 100 working days of actual sediment-removal production operations.

Sediment excavation, transport and placement operations would be conducted in two 10-hour shifts, five days per week. The equipment for sediment excavation and transport can sustain an average rate of 500 cubic yards per hour with a peak capacity of 700 cubic yards per hour. The estimated sediment removal rate is about 900,000 cubic yards per season. Three seasons would be required for sediment removal for the Dam removal alternative.

During the last year of sediment removal operations, sediment removal would be completed in October. The upper portion of the Dam would be demolished while sediment removal is being completed, and dam demolition and removal activities would continue into the fall and be completed in October. Removal of cofferdams and demobilization of in-stream construction operations would occur from October to the end of November.
Reservoir restoration and channel reconstruction activities would take place concurrently with sediment removal activities. This work would begin at the upstream end of the reservoir and progress downstream as new areas of the historical stream terraces and channel are uncovered. Additional time would be needed at the conclusion of the sediment removal, dam demolition, and cofferdam removal operations to complete the reconstruction of the newly exposed portions of the river channel and the revegetation of the old reservoir and sediment inundation areas.

**Construction Crews**

The requirements for labor, which affects the number of vehicle trips to and from the site, vary from an approximate average of 15 workers per day during Phase I (road construction and improvements scheduled for one season for approximately eight months), to an approximate average of 40 workers per day during Phase II (sediment excavation and disposal). A maximum of about 60 workers would be needed during July through October. Construction crews could be transported to work in car pools to minimize construction-related traffic.
3.5 ALTERNATIVE 3: CARMEL RIVER REROUTE & DAM REMOVAL

3.5.1 OVERVIEW

This alternative would remove SCD to prevent failure from a MCE and a PMF, as described in Section 3.2. Approximately 380,000 cubic yards (235 AF) of accumulated sediment behind the Dam on the San Clemente Creek arm of the reservoir would be relocated to the Carmel River arm, where the bulk of accumulated sediment already has been deposited. A portion of the Carmel River would be permanently bypassed by cutting a 450-foot-long channel between the Carmel River and San Clemente Creek, approximately 2500 feet upstream of the Dam. The bypassed portion of the Carmel River would be used as a sediment disposal site for the accumulated sediment. The spoils from channel construction (235,000 cubic yards or 145 AF) would be used for construction of a diversion dike at the upstream end of the bypassed reservoir arm. The Dam and fish ladder would be demolished and removed from the site.

During the active construction seasons, the Carmel River and San Clemente Creek would be diverted around the reservoir and dam site, and the reservoir would be dewatered. CAW’s new diversion intake would be installed upstream to replace the existing intake at the Dam to avoid interruption of this source of CAW’s water supply during construction. The intake would divert through a separate temporary bypass line around the construction site into CAW’s existing system. Accumulated sediment would be removed from behind the Dam over one season by excavation with heavy earthmoving equipment. The equipment would transport the sediment to a disposal area in the bypassed portion of the reservoir. The sediments at the downstream end of the bypassed reservoir arm would be stabilized and protected from erosion. The San Clemente Creek channel would be reconstructed through its historic inundation zone from the exit of the diversion channel to the dam site. The permanent transmission line to connect the new diversion intake to the existing transmission line to CVFP would be installed at an appropriate point in the construction process.

A notch would be cut into OCRD, which is about 1800 feet downstream of SCD, in order to provide adequate fish passage.

This project is expected to take five years to complete, including environmental review, permitting, design, infrastructure improvements, sediment removal, bypass channel excavation, diversion dike construction, dam demolition, and creek channel reconstruction. The effects of annual precipitation on river flow conditions could affect the schedule in the spring. Construction activities necessary to complete the project are summarized below. Improvements to and/or new roads proposed as part of the project are also conceptually described.

3.5.2 PROJECT LOCATION & ACCESS

The project study area, area of potential effect, facilities, and land ownership are described in Section 3.2. Figures 3.2-1 and 3.2-2 depict the project region and vicinity,
respectively. An overview of the site is shown on Figure 3.5-1, and a detailed site plan is shown on Figure 3.5-2.

### 3.5.3 EXISTING STRUCTURE & OPERATIONS

SCD and reservoir, associated facilities, dam and reservoir operations, the CVFP, the existing fish ladder, and current provisions for fish passage are described in Section 3.2.

### 3.5.4 PROJECT CHARACTERISTICS

This section describes the Carmel River reroute and dam removal project, including demolition and removal; sediment excavation and relocation; access roads; stream channel restoration; and stream diversion and reservoir drawdown and dewatering. It also summarizes construction activities necessary to complete the project.

**Dam Removal**

Dam removal would not proceed until sediment in the San Clemente Creek arm is relocated to the Carmel River arm. At the conclusion of the sediment removal process, SCD and existing fish ladder would be demolished in the same manner as described for alternative 2 (Section 3.4).

**Modification of CAW Water Diversion Point**

Section 3.3 describes current CAW infrastructure and operations requirements for a point of diversion that will provide the required hydraulic head to drive the water through the existing filters to the clearwell for distribution. A subsurface screened intake at the head of San Clemente Reservoir was tentatively selected as the new water diversion point for the Dam removal alternative. This option is described in Section 3.3. The approximate location of the new screened intake and anticipated alignment of the pipeline extension are shown on Figure 3.3-3. The permanent diversion intake and temporary water diversion pipeline would be installed to replace the existing intake at the Dam to avoid interruption of this source of CAW's water supply while the project is under construction. The permanent pipeline will be installed at an appropriate point in the construction process.
DIVERSION CHANNEL TYPICAL CROSS-SECTION
(LOW-FLOW THALWEG & INSTREAM FEATURES NOT SHOWN)

ORIGINAL GROUND PROFILE
CONCRETE DIVERSION SILL
FLOW

DIVERSION CHANNEL TYPICAL PROFILE

UPSTREAM
COMPACTED FILL
50'
DOWNSTREAM
COMPACTED SEDIMENT

El. 530±
El. 605±
El. 530±
El. 490±

BEDROCK
SOIL-BENTONITE CUTOFF WALL

DIVERSION DIKE AND SEDIMENT PILE TYPICAL CROSS-SECTION

SCALE IN FEET

Figure 3.5-3
**Electrical System**

The existing electrical service is described in Section 3.3. Construction power requirements would be limited for the bypass construction and dam removal because the sediment and dam removal operations would be primarily performed with diesel-powered equipment. However, it is anticipated that sediment removal would include smaller loads due to factors such as dewatering requirements, construction office trailers, equipment maintenance shop, and night lighting. Based on preliminary discussions with PG&E, the configuration of the existing PG&E 60-kV and 12-kV power lines would be able to handle the construction load and supply the needed power through temporary 12-kV extensions from the left abutment. Several substations (transformers, breakers, motor starters, controls, etc.) would be installed along the extended line to power lighting, dewatering pumps, etc. The feasibility of this alternative approach would need to be confirmed during design by PG&E by conducting the appropriate utility load studies, protection studies, short circuit studies, and coordination studies. Associated changes that the utility might require as a result of these studies would need to be implemented.

**Sediment Excavation & Relocation**

San Clemente Reservoir has been estimated to contain approximately 2.5 million cubic yards (1,550 AF) of sediment (MEI 2003). The characteristics of the sediment are described above, in Section 3.3.

**Sediment Disposal Site**

The Carmel River Reroute and Dam Removal alternative would use the bypassed arm of the Carmel River (where the bulk of accumulated sediment has already been deposited) as a disposal site, minimizing sediment excavation quantities and transport distances. This alternative would confine all work, excluding access improvements, within the existing reservoir site boundaries. Because of the site’s remoteness, sediment removal could proceed in two daily shifts without disturbing neighboring communities or sensitive receptors, thus resulting in a shorter schedule than for some of the other sites considered.

The maximum capacity of the disposal site is undetermined but is well in excess of the required excavated volume of 380,000 cubic yards estimated by MEI (MEI 2005). Thus, the bypass site has ample capacity to store all sediment. The toe of the sediment pile would be located at approximate elevation 530 feet. The top of the sediment pile would be at about elevation 550 feet in order to contain all of the sediment accumulated in the San Clemente Creek portion of the reservoir. The footprint area of the sediment pile would be approximately 13 acres. The watershed area tributary to the sediment pile site is approximately 21 acres.
CHAPTER 3.0
Description of the Alternatives

Sediment Excavation, Transport, and Placement

Several excavation methods (mechanical excavation and hydraulic dredging) are considered feasible (see Appendix G for more detail). Mechanical excavation appears to have a slight cost advantage, is simpler, and would have lesser environmental impacts than other methods.

It is anticipated that the sediment would be removed in planes approximately parallel to the existing surface of the sediment in the San Clemente Creek arm of the reservoir. This approach is consistent with the preferred excavation method using scrapers. In combination with reservoir dewatering and sediment pre-draining activities described above, this method would also help maintain the excavation work above the groundwater level for as long as possible. The third year of construction will be dedicated to access improvements and temporary stream diversion features. During the fourth construction season, the sediment would be removed to approximately the depth of the original streambed that existed in 1921 (note that, at the Dam, the streambed was excavated to about 20 feet below its original level). However, it is anticipated that final sediment removal and clean up would occur during the fourth construction season prior to dam removal operations.

Excavation of sediment above the water table would be performed using self-loading scrapers or similar self-propelled excavating equipment. The scrapers would transport the material to the disposal area on the bypassed reservoir arm, where the material would be allowed to drain further, and then compacted in place. The proposed disposal site location and layout is shown on Figure 3.5-2.

Pre-drainage of sediments prior to excavation would likely become ineffective in the silt deposits that exist below about elevation 485 feet within 600 to 900 feet of the Dam (see Figures 3.5a and 3.5.b in MEI 2003). These materials would be reached towards the end of the initial sediment excavation season. They would need to be mucked out using large hydraulic excavators, draglines, or clamshells working from firm ground. The excavated materials would be placed in a drying/staging area in the immediate vicinity of the point of excavation, from where they would be excavated again and transported to the disposal area on the bypassed reservoir arm.

Scrapers and other earthmoving equipment would transport the excavated sediment from San Clemente Creek to the bypassed Carmel River arm via a connecting road that traverses the land peninsula between the two reservoir arms. The approximate route and profile of the road is shown in Figure 3.5-4. At the disposal site, a bulldozer would be used to spread the sediment across the disposal area in preparation for compaction.

Site preparation prior to sediment disposal would include (1) the clearing and grubbing of trees and vegetation from the sediment pile footprint, (2) the removal of any existing facilities (none have been identified), and (3) the stripping and stockpiling of organic soils (minimal) for use in subsequent restoration and revegetation of the site once sediment placement has been completed.
Upon delivery of sediment to the site, the sediment would be spread by means of bulldozers into thin, nearly horizontal lifts. Each lift would be compacted using the same bulldozers or vibratory compactors. The sediment pile would be constructed with a side slope as required for stability. The side slope has been assumed to average 2-3/4 horizontal to 1 vertical for the purpose of performing site capacity calculations. Concrete debris from dam removal would be placed on selected areas of the pile to provide long-term erosion protection. Such areas include the groins along the contact between the pile and the hillside abutments. A large percentage of the concrete used to construct the Dam does not have reinforcement. However, where reinforced concrete exists in the concrete debris from demolition, it will be separated out and disposed of at an offsite facility. This is not anticipated to require extensive offsite disposal hauling during construction.

At the conclusion of each construction season, the portions of the excavation and disposal site above the maximum reservoir level (El. 525) would need to be winterized. This would involve (1) providing interim drainage and diversion of ravine flows, (2) stabilizing sloping sediment surfaces and other disturbed areas by installing erosion protection features such as erosion control mats or straw mulch and wattles, and (3) providing sediment collection features such as silt fences, straw bales, and sediment traps along the toe of the pile and other disturbed areas.

Once placement of sediment and concrete debris has been completed, the topsoil from the temporary topsoil stockpile developed during site stripping would be spread over the sediment pile. The graded surface would again be stabilized with erosion control measures as described above and would be revegetated with native plants and trees obtained from the site vicinity. A typical section for the sediment pile is shown on Figure 3.5-5, which abuts against the diversion dike on one end.

**Slope Stabilization of Sediment in the Carmel River Channel**

As part of the sediment excavation and disposal activities, the bypassed sediment in the Carmel River arm, roughly 100 feet upstream of the Dam, would be excavated and graded to produce a 4 horizontal to 1 vertical slope with a maximum length from crest to toe of about 330 feet. The slope would span the width of the river channel (~300 feet) with the top of slope elevation at El. 527 and the toe of slope at El. 450 at the deepest point of the river channel (Figure 3.5-5). After initial excavation of the silty “muck” soils at the base of the slope by clamshell, the 4 to 1 slope would be benched at regular intervals to allow for slope stabilization construction using large augers. The large augers would produce soil-cement columns by mixing cement with the existing soil to bedrock in a grid-like pattern along most of the slope face, starting 50 feet from the top of slope. Figure 3.5-6 shows a typical soil-cement mixing pattern and a three-dimensional isometric view of the completed columns (soil excluded for clarity). The soil-cement grid would serve the dual purpose of increasing the soil strength, thus stabilizing the slope, and raising the phreatic surface in the stabilized sediments in order to maintain the existing wetland areas immediately upstream of the slope.
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Figure 3.5-5

Typical Stabilized Slope Cross Section

- Stabilized Sediment
- Organic Soil
- Existing Sediment Surface
- Sediment to be excavated and placed upstream
- Ex. Dam to be removed
- Broken Concrete
- Bedrock EL. 450 ft

Plan View - Geogrid Layout on Stabilized Slope Face

- Geogrid
- Top of Slope
- Toe of Slope

Scale in Feet

0 50 100
DEEP SOILCEMENT MIXING PATTERN

SOIL CEMENT COLUMNS

ISOMETRIC VIEW OF GROUND TREATMENT BY SOIL MIXING (NTS)
(SOIL EXCLUDED TO SHOW SOIL-CEMENT COLUMNS)

EL 527'

50' 50' 50'

ORGANIC SOIL

STABILIZED SEDIMENT

SEDIMENT

ELEVATION VIEW

BROKEN CONCRETE

BEDROCK
EL. 450'

TYPICAL STABILIZED SLOPE SECTION
After soil-cement mixing equipment demobilization, minor grading would be performed on the slope face and a geogrid would be installed on the center of slope to form a 50-foot-wide shallow channel to convey runoff from the local drainage area above the slope and minimize surface erosion. The geogrid would be placed beginning 100 feet from the top of slope, extending to the toe of slope (Figure 3.5-5). In addition, concrete debris from the demolished dam would be placed at the lower third of the slope to further stabilize the sediment and protect it against erosion from flood flows in the main river channel. Once stabilization has been completed, a 2-foot-thick layer of organic soil would be added, and the slope would be vegetated.

**Stream Diversion and Reservoir Drawdown and Dewatering**

Both the Carmel River and the San Clemente Creek would be diverted around the active areas of sediment excavation during the construction seasons. The approach to diversion, reservoir drawdown and dewatering are the same as described in Section 3.3.4.

Demolition and construction operations in the reservoir area will impact the diversion piping. Thus, burial or encasement of diversion piping will be necessary near the channel demolition areas, diversion dike foundation, and sediment disposal area. Figure 3.5-2 shows temporary diversion piping protection areas. In addition, during the final construction season when the Dam is demolished, diversion piping would be required to be routed over the Dam (instead of through the Dam intakes) along the right abutment. The diversion piping in the vicinity of the Dam would require protection during dam demolition operations (see Figure 3.5-2).

Exact locations of the diversion cutoff walls and pipelines, drainage trenches and well points would be field determined during detailed design. The Carmel River diversion will be upstream of the diversion channel inlet. The diversion on the San Clemente Creek reservoir branch would be placed upstream of the diversion channel outlet during each construction season. In general, diversion piping would follow along the reservoir banks.

**Diversion Channel and Dike Construction**

In order to permanently bypass the sediment disposal area on the Carmel River, a diversion channel must be constructed to connect Carmel River to San Clemente Creek. The location of this diversion channel is shown on Figures 3.5-1 and 3.5-2 a typical profile and section are shown on Figure 3.5-3. Blasting operations will be required to remove the large volume of rock between the two reservoir arms. Blasting operations will include:

- Clearing and grubbing of the blast area;
- An explosives magazine established onsite to store explosives;
- Pre-drilling of rock to place explosives; and
Pre-splitting of rock at the channel boundaries to define the channel geometry.

The total blasted volume of rock is estimated at about 145 AF, or about 234,000 cubic yards (MEI 2005). Most of the blasted rock will be broken into 1-foot pieces or smaller. It is anticipated that minor operations will be required to reduce a small percentage of the blasted rock into 1-foot size and smaller with hoe-rams and similar equipment. A portion of the 1-foot and larger pieces of blasted rock will be separated for use in armoring of the diversion dike face that would be exposed to river flows.

As described in further detail below, bankfull and thalweg channels would be constructed as part of the channel excavation operations. In addition, habitat complexity would be promoted within the channel by constructing pools, runs, and riffles to provide suitable depth and velocity conditions for steelhead migration. The channel profile and section in Figure 3.5-3 show only the general geometry of the channel construction as used in the MEI hydraulic analyses (MEI 2005), which included a diversion sill at the channel upstream El. 530 and a slightly steeper slope than the natural channel (i.e., approximately 3 percent).

During and after blasting operations, blasted rock material will be pushed by bulldozers and other excavation equipment a short distance from the diversion channel area to the diversion dike foundation area for use in dike construction. The diversion dike location is shown on Figure 3.5-1. The excavated material is estimated to have 30 percent greater volume than the in-place rock, or a total of about 319,000 cubic yards. In order to contain 319,000 cubic yards of material within the existing channel geometry, the size of the diversion dike will be 75 feet high (crest at El. 605), 330 feet wide at the base, and 50 wide at the crest (see cross section on Figure 3.5-3).

Diversion dike design will include compacted rock within the geometry described above and will include a cutoff wall at the diversion dike toe (Figure 3.5-3). The 200-foot-wide by 3-foot-thick by 40-foot-deep soil-cement cutoff wall will be constructed to bedrock in order to prevent undermining and seepage of river flows below the diversion dike. As previously described, 1-foot and larger blasted rock pieces will be used to armor the diversion dike face, which will encounter river flows during the PMF up to elevation 566 (MEI 2003), or approximately 39 feet below the proposed diversion dike crest.

3.5.5 PROJECT ACCESS AND IMPROVEMENTS

Project access for this alternative would follow existing routes to the base of the Dam (with minor improvements) and the Cachagua Route to the reservoir. Road access to San Clemente Reservoir would be established via Cachagua Grade. An existing Jeep Trail that extends from Cachagua Grade site would be improved to enable the mobilization of construction equipment to the Dam site and the reservoir, and to avoid major mobilization activities through San Clemente Drive and the Sleepy Hollow community. A new access road between the Jeep Trail and the reservoir would need to be constructed. Access to the left abutment of the Dam would be by the existing San
Clemente Drive and to either the “Low Road” or “High Road” which may require minor improvements. Access to the base of the Dam would be by the existing “Low Road” and the “Plunge Pool Access Road” which would also be improved.

Access from Carmel Valley Road to San Clemente Dam

Existing vehicle access to SCD and the CVFP from Carmel Valley Road is described in Section 3.2. Improvements to these existing access roads are also described in Section 3.2.

Minor improvements may be made to the “High Road” (crossing a ford over the Carmel River) or “Low Road” (using an existing bridge across the river at the OCRD). These roads may require localized grading and/or widening, cut or fill slope stabilization, and vegetation removal. However, no major improvements are contemplated since the primary access to the reservoir will be via Cachagua Grade as described below.

Improvements to the existing unimproved single lane road from the OCRD to the plunge pool at the base of the Dam are also described in Section 3.2. This plunge pool access road would need to be improved to place the downstream cofferdams and stage the crane and other construction equipment used in demolition operations at the base of the Dam.

Access to the Reservoir

The primary access used to access the reservoir, construct the bypass, and relocate sediment from the San Clemente Creek arm to the Carmel River arm would be via Carmel Valley Road and Cachagua Grade. An existing unpaved jeep road, with entrance off Cachagua Grade approximately three miles from the intersection with Carmel Valley Road, would be used (see Section 3.3 for a description of this road and proposed traffic controls and improvements to it). The road profile is shown on Figure 3.5-4, including a new access road to the reservoir described below.

A new 0.5-mile-long access road would be constructed from the improved jeep road to the reservoir. A typical cross-section of the road is shown on Figure 3.5-4 along with a composite profile that includes Cachagua Grade. The road would be excavated along the slope of the ravine and would consist of a 15-foot-wide surface and 3-foot drainage ditch. The excavated slope above the road would be stabilized with small anchors, wire mesh and shotcrete as needed. The road surface would have 6 inches of Class II base rock installed. The road’s travel surface would be sealed with a double chip seal coat. Fifteen-inch diameter or larger culverts with inlet structures would be installed at approximately 400-foot intervals for drainage.

3.5.6 RECONSTRUCTION OF THE RIVER CHANNEL AND REVEGETATION OF THE VALLEY FLOOR

As a result of the sediment removal efforts, the San Clemente Creek stream channel would be exposed and require reconstruction.
CHAPTER 3.0
Description of the Alternatives

Removal of the reservoir sediment in the San Clemente Creek arm would expose the pre-1921 alluvial deposits in the river channel and floodplain through the historic reservoir inundation zone. A three-stage channel would be provided through selective contouring along San Clemente Creek. The channel is the conceptually the same as is described in Section 3.3, but will be longer and sized to convey the combined flows of San Clemente Creek and the Carmel Rivers.

3.5.7 CONSTRUCTION AND OPERATIONS

A conceptual schedule is presented in Figure 3.5-7. Following the State Notice of Determination and Federal Record of Decision, final engineering studies would begin in Year 2. These include geotechnical investigations for the sediment stabilization features and access roads; design of the access roads; design of the sediment pile including stability and hydrologic analyses; design of the new water intake and conveyance pipeline extension; planning for demolition of the Dam; planning and design of stream bypass and dewatering facilities; design of the bypass channel and diversion dike construction; design of the reconstruction of the San Clemente Creek channel; and design of mitigation or habitat enhancement plans for CRLF and steelhead. A construction contract package would be developed and construction bids solicited late in CY 1, for award early in CY 2.

Construction would occur in two distinct phases. Phase 1, in CY 3, would include mobilization, improvement of the existing access Jeep Trail from Cachagua Grade and construction of a new access road to connect the Jeep Trail to the reservoir. First year work may also include construction of a water diversion intake and temporary transmission line for CAW as well as some of the stream diversion features. It would conclude with demobilization for the winter.

Phase 2, CY 4 and 5, would include the construction of temporary roads across the reservoir sediment surface to allow access of excavating equipment, removal of sediment, blasting and construction of the bypass channel and diversion dike, sediment slope stabilization, demolition of the Dam; reconstruction of stream channels, and restoration and revegetation of the sediment pile and reservoir area. It would include seasonal mobilization, stream diversion, and reservoir dewatering, and interim stabilization of the sediment pile for the winter. The permanent water transmission line will be installed at an appropriate point in the construction process.
Table:

<table>
<thead>
<tr>
<th>ID</th>
<th>Task Name</th>
<th>Duration</th>
<th>Start</th>
<th>Finish</th>
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</tr>
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<td>2</td>
<td>ENGINEERING DESIGN</td>
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<tr>
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<td>Mon 3/19/07</td>
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<td>Fri 4/27/07</td>
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<td>7</td>
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<td>40 days</td>
<td>Mon 4/30/07</td>
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</tr>
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<td>8</td>
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<td>100 days</td>
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<td>Mon 10/1/07</td>
</tr>
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<td>9</td>
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<td>11</td>
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<td>18</td>
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<tr>
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<tr>
<td>23</td>
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<tr>
<td>25</td>
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<td>Fri 4/1/09</td>
</tr>
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</tr>
<tr>
<td>28</td>
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</tr>
<tr>
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</tr>
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<td>45 days</td>
<td>Wed 9/23/09</td>
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</table>
The majority of the work in Phase 1 is planned to take approximately eight months between March and October during CY 3. Phase 2 is planned to take two years. During each of these years, mobilization would occur during the month of March. Fieldwork in the reservoir area would around April. Installation of temporary stream diversion and dewatering facilities would take about one month, with closure of the cofferdams on or about May 31. Fish rescue would continue until June 30. Drawdown of the reservoir would continue until about October. Actual channel excavation, sediment stabilization and excavation, and dam removal operations would take place during a five-month period from June through October. Removal of cofferdams and demobilization of in-stream construction operations would occur in November. Allowing for holidays and a few days of bad weather, it was assumed that each season would have approximately 100 working days of actual sediment-removal production operations.

Sediment excavation, transport and placement operations would be conducted in two 10-hour shifts, five days per week. (For computation of actual production, it was assumed that each shift would have one unproductive hour, that is, the 10-hour shifts would have nine hours of actual production.) The equipment for sediment excavation and transport can sustain an average rate of 300 cubic yards per hour with a peak capacity of 500 cubic yards per hour. The estimated sediment removal rate is about 380,000 cubic yards of sediment from the San Clemente Creek channel in about three months.

During the last year of sediment removal operations, sediment removal would be completed in September. The upper portion of the Dam would be demolished while sediment removal is being completed, and dam demolition and removal activities would continue into the fall and be completed in September. Removal of cofferdams and demobilization of in-stream construction operations would occur later in November.

Reservoir restoration and channel reconstruction activities would take place concurrently with sediment removal activities. This work would begin at the upstream end of the reservoir and progress downstream as new areas of the historical stream terraces and channel are uncovered. Additional time would be needed at the conclusion of the sediment removal, dam demolition, and cofferdam removal operations to complete the reconstruction of the river channel and the revegetation of the reservoir and sediment areas.

**Construction Crews**

Labor requirements affecting the number of vehicle trips to and from the site vary from an approximate average of 15 workers per day during Phase I (road construction and improvements scheduled for one season for approximately eight months), to an approximate average of 25 workers per day during Phase 2 (sediment excavation and disposal). A maximum of about 40 workers would be needed during July through October. Construction crews could be transported to work in car pools to minimize construction-related traffic.
3.6 ALTERNATIVE 4: NO PROJECT

Section 15126 of the CEQA Guidelines clarifies that the “no project” analysis must discuss the existing conditions at the time the Notice of Preparation (NOP) is published as well as what could reasonably be expected to occur in the foreseeable future if the project were not approved, based on current plans and consistent with available infrastructure and community services. Existing conditions are discussed topically in Chapter 4 of this EIR/EIS.

NEPA regulations require each Draft EIS to include an evaluation of the no action alternative (40 Code of Federal Regulations [CFR] 1502.14c). When the proposed action is a private applicant’s project, the no action alternative describes what would occur without the federal agency’s approval. Although it generally does not satisfy the project’s purpose and need, its inclusion in the EIS is required by NEPA as a basis for comparison. For the purposes of this EIR/EIS, the “no action” and “no project” alternatives are the same, and are referred to as the “No Project” Alternative.

Under the No Project Alternative, the reinforcement of the Dam would not occur and the Dam would remain in its present condition. The fish ladder would not be improved and the OCRD would not be notched under the No Project Alternative. The rate and timing of flow releases into the Carmel River would continue to be negotiated annually with NMFS, the CDFG and MPWMD, as long as the reservoir remained operable. Retrofit construction impacts would not occur. The reservoir would fill up with sediment and sediment would eventually flow downstream naturally. The existing access road would remain unchanged under the No Project Alternative.

In light of mandate from DSOD to render the Dam compliant with current seismic and PMF standards, it is highly unlikely that the No Project Alternative would occur. For the purpose of analysis, we are assuming that there would be no change to the current structures for the No Project Alternative. This is how the No Project Alternative was described in the September 2005 NOP. However, it is recognized that, in the absence of some measures to improve fish passage, one or more regulatory agencies could compel improvements ranging from upgrades to the existing ladder to full replacement of the ladder, measures to assure fish passage through the reservoir, as well as improved fish passage at OCRD. Impacts of such actions would be essentially the same as those described in Chapter 4 for the Proponent’s Proposed Project. These actions were evaluated as part of the No Project Alternative in the Draft EIR/EIS, but have been removed from the Final EIR/EIS to allow the report to conform more closely to the intent of a No Project (No Action) alternative under NEPA and CEQA and to be consistent with the September, 2005 NOP.

The No Project Alternative would not meet the project purpose and need of increasing dam safety to meet current standards for withstanding a MCE and passing the PMF at the Dam. Interim dam safety measures would continue and seismic and flood hazard
3.6.1 PROJECT LOCATION
See discussion in Section 3.2

3.6.2 EXISTING PROJECT FEATURES
See Section 3.2 for a description of the existing dam, access roads, fish ladder, and CVFP.

In 2003, DSOD required modifications to the Dam to meet interim dam safety requirements. Six ports were drilled through the Dam to allow seasonal drawdown of 10 feet to elevation of approximately 515 feet. The drawdown is timed to allow migratory fish passage. Each port was equipped with a trashrack to prevent large debris from entering the ports.

In 2004, a downstream fish passage system was installed to allow fish to exit the reservoir. The system consists of a borehole through the Dam (at 515 feet elevation) that connects a slide gate on the reservoir side of the Dam to a 14-inch pipe on the downstream side. The 14-inch polyvinyl chloride (PVC) pipe runs parallel to the fish ladder and discharges into the eighth pool in the ladder at an elevation of 513 feet. On the upstream side of the Dam is an adjustable weir, which provides surface spill into a box that then flows into the bypass system.

In addition, an Emergency Action Plan was developed in 2003 in coordination with the Carmel Valley Fire Department and the Monterey County Office of Emergency Services. Under this program, the Dam is monitored by an instrumentation system that automatically collects information about the Dam and river conditions, and transmits it to a Carmel Valley Emergency Operations Center and to the CAW Operations Center. Audible alarms indicate situations that require immediate attention. Instrumentation to monitor seismic activity and water levels at the reservoir, downstream plunge pool, and OCRB in addition to video surveillance were installed.

Sediment Management
This alternative would allow the reservoir to continue to fill rapidly with sediment and would allow uncontrolled spill of sediment over the Dam spillway within six to ten years. Sediment spills could result in significant downstream impacts as described in Section 4.4.

Water Diversion
Under the No Project Alternative, the existing water diversion from SCD to the existing downstream filter plant would remain unchanged. Water is diverted from the existing reservoir through the Dam’s low-level outlet works to a nominal 30-inch pipeline routed...
generally parallel to the low-access road (San Clemente Drive) to the CVFP downstream. The system depends upon a reservoir water elevation of 525 feet at the point of diversion to provide the required hydraulic head in the conveyance pipeline between the Dam and the downstream CVFP to drive the water through the existing filters to the clearwell for distribution. The clearwell, in turn, provides the hydraulic head for distributing the treated water into CAW’s distribution system.

The maximum rate of diversion is 16 cfs, although summer diversions are not expected to exceed 3 to 4 cfs.
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