3.17 Water Resources

This section evaluates the potential impacts of the Proposed Action on water resources. This evaluation includes an assessment of the direct, indirect, short-term, long-term, and cumulative effects of the Proposed Action on surface water and groundwater quality, flow patterns, flow rates, and flooding. The evaluation is based on available data relevant to the project area and regulatory information published by the San Diego Regional Water Quality Control Board (RWQCB) and other agencies. Discussions of the potential impacts on public water supply resources in the vicinity of the Proposed Action can be found in Section 3.14 (Public Services and Utilities for the Proposed Action) of this EIR/EIS.

3.17.1 Affected Environment

3.17.1.1 Environmental Setting

The following discussion describes the existing water resources conditions within the SV 100K study area, as well as consideration of regional water resources issues.

Hydrology

San Vicente Reservoir lies within the Fernbrook Hydrologic Subarea of the San Vicente Hydrologic Area of the San Diego Hydrologic Unit, as defined by the Comprehensive Water Quality Control Plan for the San Diego Region (Figure 3.17-1) (RWQCB, 1994). The San Diego Hydrologic Unit covers approximately 440 square miles. It is drained by the San Diego River and includes several reservoirs, such as Lake Murray, El Capitan, and Cuyamaca in addition to San Vicente Reservoir. Annual precipitation within the San Diego Hydrologic Unit ranges from about 11 inches at the coast to about 35 inches around Cuyamaca and El Capitan reservoirs (RWQCB, 1994).

The San Vicente Creek watershed (upstream of the dam) covers an area of approximately 74 square miles. The watershed includes several ephemeral drainages, including Padre Barona Creek in the east, San Vicente and West Branch creeks in the north, and Foster Creek in the northwest. The reservoir receives an average annual (natural) inflow of approximately 7,400 AF per year (Boyle, 2001); the rest is lost to evaporation and transpiration. The Water Authority is proposing to raise San Vicente Dam by up to an additional 117 feet, providing additional storage capacity for both imported water and local runoff. However, the City of San Diego will continue to own and operate the dam and reservoir once the dam raise is completed. The City of San Diego is entitled to divert and store local runoff into the reservoir through the use of their pueblo water rights. For a detailed discussion of these and other water rights, please refer to Section 1.8.1 (Water Rights and Permits) of this EIR/EIS.

San Vicente Creek continues south downstream of the existing dam to the San Diego River, which empties into the Pacific Ocean at Mission Bay. The City does not routinely release any water into San Vicente Creek (GEI, 2007c), although there have been occasional flows over the spillway when the reservoir level reached the spillway elevation. Major groundwater basins within the San Diego Hydrologic Unit include Mission, San Diego, Santee, El Cajon, and El Monte.

Metropolitan Water District Supplies

A small amount of local water is captured and stored in San Vicente Reservoir; however, the primary source for water stored in the reservoir consists of deliveries of untreated State Water Project (SWP) and Colorado River water supplies from the Metropolitan Water District of Southern California (MWD), of which the Water Authority is one of the ~~27~~ 26 member agencies. As San Diego has grown, the region has greatly relied on imported water supplies. In 2000, MWD supplied 83 percent of the water used in the San Diego region.

MWD's ability to provide reliable supplies, particularly in a dry year, is constrained by the availability of water in the SWP and the Colorado River. These supplies, in turn, are further constrained by the preferential entitlements of each of the member agencies. Under Section 135 of MWD's enacting legislation, each agency's preferential right to water is determined by a complex formula. Although MWD generally distributes water according to need, it is possible that at any time MWD could instead ~~choose to~~ allocate water according to these preferential rights, without regard to historic water use or dependence on MWD supplies. San Diego has generally been able to purchase supplies in excess of its preferential right. However, for planning purposes, the Water Authority must assume its annual MWD supply is limited to its preferential right to water under Section 135, which is ~~303,630~~ 378,580 AF annually.

Imperial Irrigation District Supplies

The reservoir also receives deliveries of Colorado River water supplies through the Colorado River Aqueduct under the terms of the Transfer Agreement with the Imperial Irrigation District (IID). This agreement was first signed in 1998, and was amended in 2003 following the signing of the Quantification Settlement Agreement (QSA), which resolved several long-standing disputes over priority and use of Colorado River water, and created the baseline for subsequent water transfers. Under the amended Water Authority-IID Transfer Agreement, the amount delivered to San Diego will increase annual from an initial delivery of 10,000 AF annually in 2003 to a maximum of 200,000 AF annually by 2021.

Other Imported Water Supplies

Lining portions of the Coachella and All-American Canals with concrete is another critical element of the QSA, and will conserve water lost due to seepage. The Water Authority will receive 77,700 AF of water annually for 110 years from the canal lining projects.

Local Supplies

Although the reservoir receives the majority of its water from the First Aqueduct, it also receives natural runoff from the San Vicente Watershed and local transfers from Sutherland Reservoir, which captures natural runoff from Santa Isabel Creek, and delivers water through the Sutherland-San Vicente Conduit.

Historically, San Vicente Reservoir has been used to store a substantial portion of the emergency water supply for the City of San Diego, and over the past 10 years has been maintained typically at 60,000 to 80,000 AF of storage (GEI, 2007c). Water is drafted from the reservoir through three 36-inch-diameter outlets, which discharge to San Diego Pipelines 1 (42.5-inch-diameter) and 2 (48-inch-diameter). Upon completion of the Proposed Action, draft capacity through the City's conveyance system to Alvarado Water Treatment Plant (WTP) will range from about 70 to 190 cfs depending on the reservoir level. In addition, the Water Authority will have the capacity to withdraw 444 cfs through the San Vicente Pump Station.

Water Quality

General

Water quality reflects the composition of water as affected by natural conditions and human activities, expressed in terms of measurable quantities and related to identified beneficial uses. Important aspects of water quality include the bacterial and viral safety of water used for drinking and bathing, and the suitability of water as habitat for aquatic wildlife including fish, plankton, and other organisms. For beneficial use, different water quality parameters are of potential concern. The RWQCB establishes beneficial uses and water quality objectives for coastal waters, inland surface waters, groundwater, and reservoirs. This information is found in the Water Quality Control Plan for the San Diego Region (Basin Plan), which was produced in 1994 and subject to various subsequent amendments.

A key indicator of water quality is total dissolved solids (TDS), or total mineral concentration. Ions such as magnesium, sodium, potassium, chloride, and sulfate are common components included in the TDS content of water. It is preferable that the TDS concentration of water for drinking purposes be less than or equal to 600 milligrams per liter (mg/l). Sedimentation, which adds soil particulates to water, increases turbidity and degrades the suitability of water for human uses and wildlife habitat.

San Vicente Reservoir

San Vicente Reservoir has been designated by the RWQCB (1994) as having the following beneficial uses:

- Municipal and domestic supply (MUN)
- Agricultural supply (AGR)

- Industrial service supply (IND)
- Industrial process supply (PROC)
- Contact water recreation (REC-1) -this is further defined as: fishing or boating permitted (including water-skiing), but other water contact recreational uses are prohibited
- Non-contact water recreation (REC-2)
- Warm freshwater habitat (WARM)
- Cold freshwater habitat (COLD)
- Wildlife habitat (WILD)

The Reservoir Management Team within the City of San Diego Drinking Water Quality Laboratory obtains samples from San Vicente Reservoir at a minimum of once a week. Samples are collected at several stations located throughout the reservoir. Water samples are analyzed for various parameters including, but not limited to, dissolved oxygen (DO), temperature, oxidation-reduction potential, coliform bacteria, and taste and odor compounds. DO and turbidity are also measured at various depths. In addition, a general mineral analysis is conducted monthly (Pasek, 2006).

Historically, concentrations of TDS and sulfates in San Vicente Reservoir have varied above and below the water quality objectives for these parameters, which are 300 mg/L and 250 mg/L, respectively (RWQCB, 1994). Figure 3.17-2 presents a bar chart of annual precipitation for San Vicente Reservoir for the period of 1943 to 2005. Annual concentrations of TDS and sulfates data from 1963 to 1993 were compared to annual rainfall data for the reservoir in the ESP EIR. In general, TDS concentrations are low in years in which there was above-average (more than 12 inches) rainfall and high in years of low rainfall. Concentrations of sulfates, however, are not as greatly affected by high or low rainfall amounts. During the period of 1998 to 2006, TDS ranged from 147 to 718 mg/l and sulfates ranged from 60 to 189 mg/l (City of San Diego, 2006).

Groundwater within the San Vicente Hydrologic Area has been designated by the RWQCB (RWQCB, 1994) as having the following beneficial uses: MUN and IND. Other water resources in the San Vicente Hydrologic Area include San Vicente Creek, Padre Barona Creek, and Foster Canyon. These resources have been designated by the RWQCB (1994) as having the following beneficial uses: MUN, AGR, IND, PROC, REC-1, REC-2, WARM, and WILD.

Limnology

General

Limnology is the study of inland waters (lakes and reservoirs) and the factors that influence the dynamics of those waters. Some of these factors are physical, including geography and climate; some are chemical; and other are directly related to biological functions, such as the decomposition of vegetation. These factors do not act independently, but instead act synergistically. For example, the amount of oxygen available to fish is dependent on wind, stratification, decomposition, temperature, and aquatic vegetation.

The water of a lake is divided into three regions through stratification: the epilimnion, the thermocline, and the hypolimnion. These regions, which are defined below, are not arbitrarily assigned to the lake but are dependent on physical processes. Lake waters are heated by the sun, but because of the physical properties of light and water, the water is not heated evenly. Stratification is the result of the surface waters receiving more heat than the deeper, bottom waters. The surface layer of warm water is called the epilimnion and the bottom layer of colder water is the hypolimnion. The area between these two layers is the thermocline, the depth at which the greatest vertical change in temperature occurs. These concepts are illustrated in Figure 3.17-3.

San Vicente Reservoir

San Vicente Reservoir is typical of reservoirs in San Diego County and is thermally stratified for the majority of the year. Water temperatures range from a minimum of approximately 54°F at the reservoir bottom to a summer high of almost 80°F at the reservoir surface. The epilimnion (surface layer) typically forms in March and increases in depth during the spring and summer. Dissolved oxygen within the hypolimnion (bottom layer) is depleted by June, and this layer remains anaerobic (without oxygen) until the next turnover. The depth of the thermocline (transition zone) can range from 15 feet in the spring to more than 60 feet in the fall, when surface water temperatures start to cool. San Vicente Reservoir is mildly eutrophic (experiences periodic blooms of algae above normal densities) based on nutrient concentrations and phytoplankton measurements (Boyle, 2001).

Aquatic Resources

The existing fish and aquatic vegetation communities at San Vicente Reservoir are important resources for recreational fishing, one of the primary activities at the lake. Fish and aquatic vegetation are discussed together because many life history requirements of fish are related to aquatic vegetation and both are dependent on, and influence, water quality. The aquatic vegetation community is also discussed in Section 3.6.1 (Biological Resources for the Proposed Action) of this EIR/EIS.

San Vicente Reservoir has limited amounts of aquatic vegetation because of its steep slopes and fluctuating water levels. The water level can fluctuate as much as 30 feet within a year. This creates a zone around the reservoir that is characterized by bare ground, boulders, and ruderal-weedy (pertaining to disturbed areas) species.

No native fish species are found within San Vicente Reservoir. Largemouth bass and catfish are popular warm-water recreational fish species at the reservoir. Other species, such as crappie, bluegill, and rainbow trout, are also sought by recreational anglers. Populations of coldwater species are maintained by stocking, and warm water species are generally maintained by reproduction. A complete species list is provided in Appendix C to this EIR/EIS.

When the reservoir is not thermally stratified, water temperature and DO concentrations are relatively homogenous throughout the water column. As the reservoir begins to stratify, fish that prefer warm water move to the surface layer, while fish that prefer colder water and can tolerate lower DO concentrations move to the bottom layer. Spawning fish (e.g., largemouth bass) that inhabit the surface layer are affected by fluctuations in water levels, which can expose their nests. Fish that inhabit the bottom layer are affected by the decrease in the amount of dissolved oxygen. As oxygen levels decrease, fish move towards the surface, balancing their temperatures tolerance with the need for oxygen.

3.17.1.2 Regulatory Setting

The following discussion addresses federal, state, and local regulations relevant to water resources issues of the Proposed Action.

Federal

Executive Order 11988 (Floodplain Management)

This order directs federal agencies to avoid, to the extent possible, the long- and short-term adverse impacts associated with occupancy and modification of floodplains.

Resource Conservation and Recovery Act (RCRA) of 1976

This act is the primary law regulating the handling of hazardous waste, which includes waste generated during environmental cleanup.

Safe Drinking Water Act (40 U.S.C. 100 et seq.)

This act sets limits on concentrations of pollutants in drinking water sources.

Federal Clean Water Act of 1972 (33 U.S.C. 1251 et seq.)

This act is the primary law regulating water quality.

Federal Endangered Species Act of 1973

This act is the primary law regulating protected aquatic species and habitats.

State

Porter-Cologne Water Quality Control Act of 1969

This act mandates that the waters of the State shall be protected and activities that may affect these waters regulated to attain the highest quality.

Public Health Guidelines for Recreational and Other Development at Reservoirs Used as Sources of Domestic Water Supply (California Department of Health 1974)

In accordance with these guidelines, refuse disposal and fish cleaning within 100 feet of the high waterline, vessels with toilets that empty into the water, and floating restaurants or other facilities requiring sewerage are prohibited at water supply reservoirs to protect the water quality.

California Water Code

This section of California Law governs California's water resources, including administration of water rights. According to the Water Code, "The water in California's streams and rivers belongs to the people of the state, but individuals may acquire the right to use the water under common and statutory law."

California Fish and Game Code

This section of California Law governs protection of the state's biological resources. In particular, Sections 5930 through 5948 concern protection of these resources in relation to construction and operation of dams.

Local

San Diego Regional Water Quality Plan (Basin Plan)

The state's water quality objectives, policies, and implementation strategies are administered by the RWQCB and detailed in the Basin Plan. These water quality policies consist of the following five statements:

- Water quality objectives, beneficial uses, and water quality control plans and policies adopted by the State Water Resources Control Board (SWRCB) and the RWQCBs shall be an integral part of the basis for water quality management.
- Water shall be reclaimed and reused to the maximum extent feasible.
- Point sources and non-point sources of pollution shall be controlled to protect designated beneficial uses of water.
- In-stream beneficial uses shall be maintained, and when practical, restored, and enhanced.
- A detailed and comprehensive knowledge of the beneficial uses, water quality objectives, and activities affecting water quality throughout the region shall be maintained.

Regional Water Facilities Master Plan

The Water Authority completed a *Regional Water Facilities Master Plan* (Master Plan) in December 2002. The Master Plan encompasses a region-wide planning effort, incorporating three interrelated components: water demands, water supplies, and facilities.

Urban Water Management Plan

The California Water Code requires all urban water suppliers in the state to prepare urban water management plans and update them every five years. These plans satisfy the requirements of the California Urban Water Management Plan Act of 1983, including amendments that have been made to the Act. The Water Authority's Draft *2005 Urban Water Management Plan* (UWMP) was prepared in compliance with the Act.

3.17.2 Project Design Features

General Conditions and Standard Specifications that will be included in the project construction documents to reduce water quality impacts associated with construction and operation of the Proposed Action are summarized in Section 1.9.9 (Introduction, Water Resources) of this EIR/EIS. In addition, the Proposed Action would include design features to minimize water quality impacts. These design and construction features could include, but would not be limited to, the following:

- A SWPPP will be implemented to reduce or eliminate pollutants during Proposed Action construction. The SWPPP will identify all pollutant sources, including sources of sediment, that may affect the quality of storm water discharges associated with construction activity (storm water discharges from the construction site); identify non-storm water discharges; identify structural and/or treatment control BMPs that are to be implemented in accordance with a time schedule to reduce or eliminate pollutants in storm water discharges and authorized non-storm water discharges from the construction site during construction; and develop a maintenance schedule for permanent or post-construction BMPs that will "to the maximum extent possible" reduce or eliminate pollutants after construction is completed.

  Detailed BMPs to prevent impacts on water quality will be included in the SWPPP. Standard industry measures include, but are not limited to, the following:

  - Storage of a minimal amount of hazardous materials on site and restriction of storage/use locations to areas at least 50 feet from storm drains and watercourses.
  - Use of covered and/or enclosed facilities for all hazardous materials storage.
  - Maintenance of accurate written inventories and labels for all stored hazardous materials.

  - Use of berms, ditches and/or impervious liners (or other applicable methods) in material storage and vehicle/equipment maintenance areas to provide a containment volume of 1.5 times the volume of stored/used materials to prevent discharge in the event of a spill.
  - On-site storage of absorbent and clean-up materials where they are readily accessible.
  - Proper location and maintenance of trash and wastewater facilities.
  - Posting of regulatory agency telephone numbers and a summary guide of clean-up procedures in a conspicuous location at or near the job site trailer.
  - Regular (at least weekly) monitoring and maintenance of hazardous material use/storage facilities and operations to ensure proper working order.
  - Implementation of a Storm Water Sampling and Analysis Strategy (SWSAS) program pursuant to regulatory guidelines.

- The grading/construction contractor will comply with the applicable NPDES General Groundwater Extraction and Waste Discharge Permit for disposal of extracted groundwater. While specific BMPs to address potential water quality concerns from disposal of extracted groundwater will be determined based on site-specific parameters, they will likely include the following types of standard industry measures:

  - Use of erosion prevention and sediment control devices for applicable conditions (e.g., when extracted groundwater is discharged onto graded or unstabilized areas).
  - Testing, filtering (e.g., with gravel and filter fabric media) and/or treating (e.g., by conveyance to a municipal wastewater treatment plant) of extracted groundwater prior to discharge, if required for NPDES permit conformance.
  - Removal of groundwater for treatment and disposal by a licensed operator, if required for NPDES permit conformance.

- The Water Authority will monitor wells in the area during pre-construction, construction, and post-construction (during the filling period) activities to evaluate the influence of the reservoir expansion on groundwater levels.

3.17.3 Direct and Indirect Effects

3.17.3.1 Thresholds of Significance

Thresholds used to evaluate potential impacts on water resources are based on applicable criteria in the State CEQA Guidelines (CCR §§15000-15387), Appendix G. A significant impact on water resources would occur if the Proposed Action would:

1. Violate any water quality standards or waste discharge requirements.

2. Substantially alter the existing drainage pattern of the site or area, in a manner that would result in substantial erosion or siltation on or off site.
3. Substantially alter the existing drainage pattern of the site or area, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding on or off site.
4. Place structures within a 100-year flood hazard area, which would impede or redirect flood flows.

3.17.3.2 Impact Analysis

Methodology

The Water Resources analysis provided in the ESP EIR/EIS was updated as necessary through discussions with appropriate agency staff, and research of engineering reports and agency websites.

Analysis

Threshold 1: Violate any water quality standards or waste discharge requirements

Changes in Reservoir Water Quality

The water quality objectives for the San Vicente Hydrologic Unit, including San Vicente Reservoir, are defined in the Basin Plan (RWQCB, 1994). The Proposed Action has the potential to change water quality through construction and operation activities, as well as through the drawdown and initial refilling of the reservoir. This can affect aquatic communities and the suitability of water in San Vicente Reservoir to meet the established water quality objectives and protect the defined beneficial uses. The water quality analysis below addresses impacts from changes in water levels, temperature, and dissolved oxygen.

Drawdown and Initial Filling

The Proposed Action would require a drawdown phase, when the water level would be lowered and remain lowered during construction of the outlet works and dam raise, and a filling phase, during which water would be reintroduced into the reservoir and the water level ultimately raised to the future planned operating levels. Drawdown is expected to require six months to one year. The water drawn from the reservoir would be conveyed through the existing distribution system to meet water demands. After drawdown and during dam raise construction, the water surface elevation would be at approximately 590 feet AMSL, with a volume of approximately 35,600 AF (GEI, 2007c).

The estimated time to fill the reservoir after the dam raise is constructed is expected to be between two and five years. The rate of reservoir filling would depend on the amount of inflow that occurs from available sources, including the amount of local runoff and availability of imported supplies. Because imported water is more likely to be available in the wet season (generally October through April), filling is expected to occur during these months. The average filling rate for a two-year period would be approximately 9,000 AF per month; for a five-year filling period the average rate would be 3,500 AF per month (GEI, 2007c).

The drawdown and refilling phases described above could change water quality; this may affect the suitability of water in San Vicente Reservoir to meet water quality objectives and protect beneficial uses. The analysis below addresses potential impacts on water quality in the reservoir due to the Proposed Action.

Reservoir Water Quality Impacts

Water quality issues discussed below are stratification, DO concentrations, total organic carbon (TOC), metals, algal blooms, water quality maintenance, and fisheries resources. The following water quality analyses and conclusions for the Proposed Action are similar to the analysis conducted for the ESP, with the exception of the discussions of THMs and metals.

Stratification. Water temperature may affect the growth and survival of aquatic life by establishing the degree of stratification and the depth of each layer (Figure 3.17-3). Storage volume, reservoir geometry, inflow water temperature, air temperature, water clarity, and wind influence water temperature. ~~The size of the deeper, colder water layer (hypolimnion) is dependent on the volume of water in the reservoir before stratification. The more water present, the larger the hypolimnion because of the greater amount of energy needed to heat the water. Therefore, the expanded San Vicente Reservoir (once filled) would have a larger hypolimnion. Greater water volumes also result in destratification (mixing) later in the year because more heat must be lost from the epilimnion and thermocline before temperatures equalize throughout the water column.~~ Based on water quality modeling for the expansion of San Vicente Reservoir, the structure and behavior of the reservoir (once expanded) are estimated to be similar to existing conditions although the deeper, colder water layer (hypolimnion) will be significantly deeper. The thickness of the epilimnion and the time of onset and duration of stratification of the expanded reservoir are predicted to be similar to current reservoir conditions based on water quality modeling simulations (Water Quality Assessment for San Vicente Reservoir Enlargement, prepared for GEI Consultants, Inc. by Flow Science Inc., October 2005).

*Construction Activities***.** Construction drawdown of San Vicente Reservoir would result in a proportionally larger surface layer of warm water (epilimnion) because the total volume of water in the reservoir would be less. During construction, when water volume is reduced through drawdown, higher water temperatures may occur. Deep water would still be common at the reservoir during the construction drawdown period because of the steep slopes, and water temperatures in these deeper layers are not expected to increase substantially.

Also during the drawdown, construction, and refilling periods, the reservoir could mix earlier in the year and destratification could last longer than it currently does because of the smaller water volume. However, these impacts would be temporary and only occur during construction drawdown, construction, and refilling periods. Therefore, water quality impacts on aquatic life due to stratification modification would be less than significant.

*Operation of the Reservoir***.** The reverse would be true during operations, when the reservoir would have a large amount of storage. The size of the new reservoir combined with the steep slopes would result in a greater thermal mass and a larger hypolimnion. Natural turnover might not occur on a yearly basis and the hypolimnion could have higher nutrient concentrations during tratification than it currently does. With a reduced frequency of natural turnover, nutrients could accumulate in the hypolimnion over longer periods. To counteract these effects, water management practices at the expanded reservoir would involve average annual removal and replacement of approximately 10 percent of the reservoir volume (i.e., turnover) to meet the TDS goal (refer to Water Quality Maintenance discussion below). These operation plans would maintain water quality within historical levels. Therefore, water quality impacts on aquatic life due to stratification changes of the expanded reservoir would be less than significant.

Dissolved Oxygen. DO concentrations indicate the amount of oxygen available to aquatic organisms. Low concentrations may inhibit growth and cause die-off of organisms. Hydrogen sulfide, a by-product of bacterial decomposition, is formed under anaerobic conditions and can adversely affect the growth and survival of aquatic organisms. In a stratified reservoir, the deeper water may no longer support aquatic organisms because of low oxygen and high hydrogen sulfide concentrations.

*Construction Activities***.** During construction of the Proposed Action, occurrences and duration of low DO and high hydrogen sulfide concentrations would decrease at San Vicente Reservoir because the volume of the hypolimnion would be relatively smaller during drawdown conditions. Therefore, water quality impacts due to a decrease in DO levels during drawdown of the reservoir would be less than significant.

*Operation of the Reservoir***.** When the reservoir would be expanded to the larger storage volume, occurrences and duration of low DO and high hydrogen sulfide concentrations could increase because the hypolimnion would be larger. To counteract these effects, water management practices at the expanded reservoir would involve average annual removal and replacement of approximately 10 percent of the reservoir volume (i.e., turnover) to meet the TDS goal (refer to Water Quality Maintenance discussion below). These operation plans would maintain water quality within historical levels.

Decomposing vegetation also contributes to a decline in DO levels because oxygen is consumed during decomposition. The Proposed Action would substantially increase the volume of water in the expanded reservoir, which would dilute the water quality impacts associated with low DO levels resulting from decaying vegetation. With the expanded water volume, and the dilution and mixing effects from reservoir turnover to meet the TDS goal (refer to Water Quality Maintenance discussion below), low DO levels are not expected to persist in the reservoir. Therefore, water quality impacts due to a decrease in DO levels in the expanded reservoir during operation would be less than significant.

Total Organic Carbon. Total organic carbon is a measure of natural organic compounds in the water, and occurs as a result of decomposition of organic materials. Water transported out of the reservoir for treatment and delivery to water supply customers would have the potential to have an elevated amount of TOC. It should be noted that water delivered to the San Vicente Reservoir contains a low level of TOCs, and TOC levels have not been a concern at the San Vicente Reservoir in the past.

*Construction Activities***.** San Vicente Reservoir water would be used as a source of water supply during construction. It may be used for roller-compacted concrete (RCC) mixing and/or used to control dust on site. San Vicente Reservoir TOC levels would not be degraded by these activities. Therefore, there would be no water quality impacts due to TOC levels during construction.

Operation of the Reservoir. During refilling of the expanded reservoir, inundation of vegetation that has become established above approximately 590 feet AMSL during the period for reservoir lowering and dam raise construction is not expected to result in a substantial increase in TOC levels due to the dilution effects related to the increased reservoir volume. In addition, the water delivered to the San Vicente Reservoir is expected to have a low level of TOCs, and normal operation of the reservoir is not expected to increase TOC levels. Therefore, water quality impacts due to the refilling of the expanded reservoir and operation of the reservoir would not result in increased TOCs and impacts would be less than significant.

Metals. Increased metals concentrations have been associated with sediment mobilization. Metals that have been bound to anaerobic sediments and rendered harmless may be released and changed to a toxic state in an oxidative environment. Depending on water levels, stratification and discharge regimes within the operating reservoir, metals that may be carried into the reservoir in runoff from the watershed may settle into submerged sediments below the water level. Exposure of these submerged sediments to the air would oxidize these and other pollutants and may cause their release into the environment.

*Construction Activities***.** Drawdown and construction activities at San Vicente Reservoir could mobilize sediments and cause an increase in metals concentrations in the overlying water. When the inundation area is kept exposed during construction drawdown and then re-flooded, metals that have been bound to anaerobic sediments could be released into the water. However, it is unlikely that substantial amounts of metals exist in these reservoir sediments. Therefore, water quality impacts due to the mobilization of metals in the reservoir sediments during construction of the Proposed Action would be less than significant.

*Operation of the Reservoir***.** The Proposed Action would substantially increase the volume of water in the expanded reservoir. With the expanded water volume and the dilution and mixing effects from reservoir turnover to meet the TDS goal (refer to Water Quality Maintenance discussion below), metals released from mobilized sediments are not expected to persist at concentrations that would significantly affect the water quality in the reservoir. Therefore, water quality impacts due to the mobilization of metals in the reservoir sediments during operation of the reservoir would be less than significant.

Algal Blooms. This condition occurs during turnover of warmer near-surface water with colder water in the hypolimnion, which could cause the release of nutrients (eutrophication).

*Construction Activities***.** Drawdown of the reservoir could result in an increase in the frequency and density of algal blooms. The release of nutrients during drawdown could result in increased occurrences of nuisance odors and decreased levels of dissolved oxygen in the water. However, any potential nuisance odors would be temporary. In addition, as stated above, occurrences and duration of low DO levels would decrease because the volume of the hypolimnion would be relatively smaller during drawdown conditions, and aquatic organism populations are not expected to be affected. Therefore, water quality impacts due to an increased frequency of algal blooms during drawdown of the reservoir would be less than significant.

*Operation of the Reservoir***.** Filling of the reservoir could result in an initial reduction of algae because of dilution; however, leaching of nutrients from previously exposed sediments could provide enough nutrients to sustain algal populations (Baxter, 1977). Water quality of a newly filled reservoir may initially be poor depending on materials leached from the soil, quality of imported water, runoff, and rainfall. In the long term, water quality in the reservoir is expected to return to historical levels. The expanded reservoir would be deep enough such that eutrophication would not cause an increase in water quality problems. Therefore, water quality impacts due to an increased frequency of algal blooms during operation of the reservoir would be less than significant.

Water Quality Maintenance. During operations, a long storage time for reservoir water would tend to degrade water quality, mainly because of evaporation (when water evaporates, salts are left behind, thereby increasing TDS in the remaining water). To reduce the potential effects, a portion of the stored water would be removed and replaced on a yearly basis (i.e., turnover). GEI (2007c) calculated the average annual amount of water that would be removed to maintain TDS concentrations within 100 mg/L of the TDS concentrations of the imported water supply (500 mg/L). Current water management practice at San Vicente Reservoir is to remove and replace approximately 39 percent of the volume on a yearly basis. GEI estimated that 10 percent of the expanded reservoir volume (if filled) would need to be removed and replaced annually (on average over the long term) to meet the TDS goal.[1] ~~These operation plans would maintain water quality within historical levels. Beneficial uses at San Vicente Reservoir would not be impaired in the long term. Therefore, water quality impacts due to water management practices associated with operation of the reservoir would be less than significant.~~ <u>Annual operation plans developed as part of the Reservoir Regulating Plan (refer to Section 2.2.3.2 for a description of the Reservoir Regulating Plan) will be developed that take into consideration the need to maintain acceptable water quality levels in the reservoir. In addition, a reservoir operating plan will be developed for the construction phase of the project, and this plan will address water quality issues associated with reservoir drawdown. A water quality assessment will be performed for the reservoir drawdown condition as part of development of the construction phase reservoir operating plan.</u>

Fisheries Resources. Impacts on fisheries resources are discussed in Section 3.6.3.2 (Biological Resources, Threshold 1) of this EIR/EIS. Impacts were found to be less than significant.

Changes in Surface Water Quality

Construction Activities

Dewatering would likely be required during construction of most of the Proposed Action components, including dam foundations and tunnel and trench pipelines. The quantity and quality of groundwater that would be removed and discharged would be determined during final design. Improper disposal of groundwater could cause impacts on downstream water quality.

[1] The minimum 10 percent turnover needed to maintain TDS goals for the expanded reservoir is included in the City's annual 39 percent turnover of their portion (90K AF) of the reservoir volume.

Grading and excavation activities associated with components constructed within or adjacent to drainage channels may alter the water quality of dry-weather downstream flows. Scour and erosion along the streambanks could occur if velocities of downstream flows are increased. As a result, downstream water flows could carry more sediment. In addition, disturbance of soils during construction, grading, quarry operations, and other earthwork would render previously vegetated areas susceptible to increased erosion. Increased sediment production resulting from construction of the raised dam, bypass pipeline, relocated marina, and other components of the Proposed Action may have the potential to cause effects that include the following:

- Sheet and rill erosion and associated deposition may cause undesirable changes in graded areas.
- Deposition of coarse-grained sediments may reduce flow capacity or completely plug natural or man-made channels, possible resulting in downstream flooding.
- Deposition of sediment in downstream drainages may cause ecological changes, affecting species composition and population densities. Sediment transported by runoff can gradually fill in adjacent drainages, some of which contain sensitive habitats such as freshwater marsh, and may smother other riparian habitats. However, some sediment deposition is required in high quality riparian habitats.
- Grading in the relocated marina area and potential quarry operations in this area may cause erosion and subsequent transport of sediment into the reservoir.

BMPs implemented as part of the Proposed Action (refer to project design features in Section 3.17.2 above) would prevent improper disposal of groundwater dewatering and would prevent downstream scour, erosion, and sedimentation from Proposed Action grading and excavation activities. No downstream water quality violations are anticipated with the Proposed Action. Therefore, impacts on downstream water quality due to construction activities associated with the Proposed Action would be less than significant.

Operation of the Reservoir

San Vicente Reservoir has spilled five times since it was constructed in 1943. The reservoir is currently filled with imported water supplies, rainfall and runoff, which results in a mixture of water flowing downstream during spillover. The expanded reservoir would be operated in a similar manner, and the resulting increase in storage capacity would produce 46 percent less flood flow than the existing reservoir (Parsons, 2005). As a result, water would still only flow over the spillway and into lower San Vicente Creek during very large and prolonged storm events and would continue to consist of a mixture of imported water, rainfall and runoff. Therefore, the quality of water flowing downstream in San Vicente Creek is not expected to change significantly, and any impacts on downstream water quality due to operation of the expanded reservoir would be less than significant.

The total sediment that would enter San Vicente Reservoir over a lifespan of 100 years was estimated to be approximately 4,800 AF. Expansion of San Vicente Reservoir would not cause a significant change to the amount of sediment that enters the reservoir from its 74-square-mile watershed. Provisions will be included in the dam design to accommodate the accumulation of sediment in the reservoir without impairing the functionality of the outlet works. Therefore, sedimentation impacts within the San Vicente Reservoir, and downstream of San Vicente Dam due to operation of the expanded reservoir, would be less than significant.

As with the ESP, the Helix Water District could receive water deliveries from Water Authority storage in San Vicente Reservoir via the Moreno-Lakeside Pipeline and San Vicente Pumping Facilities (refer to Section 2.2.3 [Alternatives Analyzed] of this EIR/EIS). Use of reservoir water may cause some change in the quality of delivered water to Helix at times; however, the Proposed Action is not expected to result in a significant water quality impact on the Helix Water District over the baseline established by the ESP. Therefore, impacts on the quality of water delivered from the San Vicente Reservoir to the Helix Water District during operation of the expanded reservoir would be less than significant.

Changes in Groundwater Quality

Raising the reservoir water surface elevation would increase the downward hydraulic gradient beneath the reservoir, which could increase seepage into the bedrock aquifer below the site. The seepage water would consist primarily of imported water (mixed with runoff). Given that the reservoir currently receives imported water, the enhanced recharge would not result in any substantial change in groundwater quality. Therefore, impacts on groundwater quality during operation of the expanded reservoir would be less than significant.

The result of the increased seepage or recharge would be a localized “mounding” effect superimposed on the groundwater table in the immediate vicinity of the reservoir. Because there are no known areas of contaminated soils or buried waste in the immediate area outside the reservoir, rising groundwater levels would not have an adverse impact on groundwater quality. Therefore, groundwater quality impacts due to localized groundwater mounding below the expanded reservoir would be less than significant.

The Proposed Action would not cause violations of water quality standards during construction of the dam or when the filling of the expanded reservoir is completed. With implementation of project design features, such as BMPs specified in the SWPPP, the Proposed Action would not degrade downstream water quality during construction and reservoir operations, and operation of the reservoir would not affect downstream water quality upon project completion. Therefore, impacts of the Proposed Action would be less than significant.

Threshold 2: Substantially alter the existing drainage pattern of the site or area, in a manner that would result in substantial erosion or siltation on or off site

The analysis of siltation effects from changes in flows is divided into two separate scenarios. The first scenario analyzes this impact with respect to the dam construction activities. The second scenario analyzes the impact with respect to projected Proposed Action reservoir operations.

During construction of the expanded dam and associated outlet works, the storage volume in San Vicente Reservoir would be decreased to approximately 35,600 AF (GEI, 2007c). The potential for downstream flows and siltation from flooding would be reduced during this time period. BMPs implemented as part of the Proposed Action (refer to project design features in Section 3.17.2 above) would prevent excavation and grading for other Proposed Action components, such as the dam construction zone, bypass pipeline, and relocated marina, from changing on-site flows and causing siltation.

Flows downstream of a reservoir are affected by spills and planned releases. The City of San Diego, which owns and operates San Vicente Reservoir, does not currently release water downstream. Water only flows over the spillway and into lower San Vicente Creek when the reservoir water levels exceed the spillway elevation. This only occurs when the reservoir is full and there is significant natural inflow, as during a large storm event. Water has spilled over the reservoir spillway five times since it was constructed. The first spill occurred in 1978 and released about 6,600 AF downstream. The largest spill in the last 60 years released approximately 32,100 AF downstream in 1980.

The current elevation of the spillway crest is 650 feet above mean sea level (AMSL) with a storage volume of 90,063 AF. In a typical year, the storage volume of the reservoir varies depending on the season, weather, projected water demands, and other operational factors in order to maximize storage while avoiding spills. During reservoir spillover, the water level is higher than the elevation of the spillway. Section 2.2.3 (Alternatives Analyzed) of this EIR/EIS describes anticipated operation of the water levels within the expanded reservoir. San Vicente Reservoir would continue to be operated to conserve water supply and avoid spills, and future operations are expected to further reduce the potential for spills. There would be no increase in downstream flows in San Vicente Creek compared to existing operations, and no increase in the potential for siltation resulting from changed flows, as the normal reservoir operations currently do not release water downstream of the dam. Therefore, downstream erosion and siltation impacts due to the operation of the Proposed Action would be less than significant.

Minimum stream flows that support biological communities and recharge groundwater downstream of the dam are derived from seasonal rainfall and runoff, not releases or spills from the reservoir. Inundating an additional 584 acres upstream of the dam as a result of the proposed reservoir expansion would not result in decreased recharge to the downstream alluvial aquifer. In addition, excavation in front of the existing dam would not have a significant effect on the water table in the Moreno Valley area. The Proposed Action would not cause a lowering of the groundwater table in the area, so downstream groundwater flow would not be affected. As a project design feature (refer to Section 3.17.2 above), monitoring of downstream wells would be conducted to ensure the Proposed Action does not impede downstream groundwater flows during and after construction. Therefore, surface and ground water flow impacts due to the construction and operation of the Proposed Action would be less than significant.

Construction and operation of the Proposed Action would not change surface flows and associated siltation effects or groundwater flows. Therefore, impacts of the Proposed Action would be less than significant.

Threshold 3: Substantially alter the existing drainage pattern of the site or area, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding on or off site

As noted above, the City of San Diego does not currently release water downstream from San Vicente Reservoir, although water has spilled five times in the last 60 years. The raised dam would increase the storage capacity in the reservoir, and reservoir operations are expected to further reduce the potential for overtopping of the spillway. Therefore, spills from flows in the surrounding watershed would be even less likely. In 2005, Parsons conducted hydrologic analysis which simulated 100-year storm flows overtopping the San Vicente Dam. Results determined that overtopping of the proposed San Vicente 100K Dam would produce 46 percent less flood flow than the existing reservoir. The proposed dam raise would create additional storage volume which would result in increased storm flow detention, ultimately reducing the 100-year storm flow rate (Parsons, 2005). The raised dam and expanded reservoir would not cause increased flooding downstream. The issue of flooding from a catastrophic dam failure, which would have an extremely low risk of occurrence, is addressed in Section 3.13 (Public Safety of the Proposed Action) of this EIR/EIS. As a result, any potential impacts would be less than significant.

The relocated marina would be larger than the existing marina, and provide more paved areas, which would increase runoff. However, flows would be routed to grassy swales or storm drainage facilities, with appropriate water quality protection devices, prior to discharge into the reservoir. There would be no downstream flooding due to storm runoff from the relocated/ expanded marina, and any impacts would be less than significant.

The Proposed Action would not change downstream flows upon completion. Therefore, impacts of the Proposed Action would be less than significant.

Threshold 4: Place structures within a 100-year flood hazard area, which would impede or redirect flood flows

According to FEMA floodplain maps, San Vicente Creek is within the 100-year floodplain; however, the Proposed Action would not result in placement of structures within the mapped floodplain area. In addition, the Proposed Action would not cause an increase in base flood elevations downstream of the dam. There would be no impact.

The Proposed Action would not place structures in the 100-year floodplain. Therefore, there would be no impact due to the Proposed Action.

3.17.3.3 Mitigation Measures

Impacts on water resources would be less than significant. Therefore, no mitigation measures are required.

3.17.3.4 Residual Impacts after Mitigation

No residual impacts would remain after implementation of the standard conditions and planned project design features listed above.

3.17.4 Cumulative Effects

3.17.4.1 Other CIP Projects

As described in Section 3.2 (Cumulative Projects for the Proposed Action) of this EIR/EIS, it was determined that the Slaughterhouse Terminal Reservoir would be the only CIP project with the potential to contribute cumulative impacts when combined with the Proposed Action since they are located within two miles of one another. The PEIR for the Regional Water Facilities Master Plan concluded that the Water Authority's water infrastructure projects would result in significant cumulative impacts on water quality from increased runoff when combined with the effects of other development projects within the same watershed. However, as with all Water Authority projects, construction of the Slaughterhouse Terminal Reservoir would be required to follow NPDES regulations to reduce impacts on local water resources. The above conclusions regarding cumulative water resources impacts for the CIP project described above are incorporated into the cumulative water resources analyses in Section 3.17.4.3 below.

3.17.4.2 ESP Projects

ESP projects in the vicinity of the Proposed Action that would contribute to cumulative impacts include the San Vicente Surge Control Facility, San Vicente Pipeline, and the San Vicente Pump Station. These ESP components would be required to follow NPDES regulations to protect local water resources. The ESP EIR/EIS determined that cumulative water resources impacts of the ESP would not be significant. The above conclusions regarding water resources impacts for the ESP projects are incorporated into the cumulative resources analyses in Section 3.17.4.3 below.

3.17.4.3 Other Planned Projects with CIP and ESP Projects

This section evaluates the cumulative water resources impacts of the Proposed Action when considered in conjunction with the other planned projects listed in Table 3.2-1, and incorporates the cumulative water resources impacts associated with the CIP and ESP projects described in the above sections. The following cumulative water resources analysis addresses each of the four significance thresholds listed in Section 3.17.3 above.

Cumulative Threshold 1: Violate any water quality standards or waste discharge requirements

The Proposed Action would not substantially degrade water quality within the San Vicente Reservoir or downstream of the Proposed Action during construction activities or operation of the reservoir. The Proposed Action would avoid violations in water quality standards and waste discharge requirements through the implementation of the General Conditions and Standard Specifications and the project design features described in Section 3.17.2 above. Therefore, the project's contribution would not be cumulatively considerable. The cumulative projects in the vicinity of the Proposed Action include five mining projects and a number of residential subdivisions (refer to Figure 3.2-1). In accordance with state and federal law, these cumulative projects and the CIP and ESP projects listed above would also be required to abide by water quality standards and waste discharge requirements in order to maintain downstream water quality. Regulations would require that each project implement a SWPPP and utilize construction (temporary) and post-construction (permanent) storm water BMPs. Therefore, short-term (construction related), and long-term (operational) cumulative water quality impacts due to the Proposed Action, when combined with water quality impacts from the CIP, ESP, and other planned cumulative projects listed in Table 3.2-1, would be less than significant.

Cumulative Threshold 2: Substantially alter the existing drainage pattern of the site or area, in a manner that would result in substantial erosion or siltation on or off site

With implementation of project design features such as BMPs specified in the SWPPP, construction of the Proposed Action would not change downstream surface water flows and associated siltation effects. Operation of the expanded reservoir would also not change downstream surface water and associated siltation effects. The Proposed Actions' effects would not be cumulatively considerable. The cumulative projects in the vicinity of the Proposed Action include five mining projects and a number of residential subdivisions (refer to Figure 3.2-1). In accordance with state and federal law, these cumulative projects and the CIP and ESP projects listed above, would also be required to implement a SWPPP and appropriate construction (temporary) and post-construction (permanent) storm water BMPs in order to avoid substantial erosion and siltation on or off site. Therefore, short-term (construction related), and long-term (operational), cumulative erosion and siltation impacts due to the Proposed Action, when combined with erosion and siltation impacts from the CIP, ESP, and other planned cumulative projects listed in Table 3.2-1, would be less than significant.

Cumulative Threshold 3: Substantially alter the existing drainage pattern of the site or area, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding on or off site

The City of San Diego does not currently release water downstream from San Vicente Reservoir, and the Proposed Action would not change downstream flows upon completion. The cumulative projects in the vicinity of the Proposed Action include five mining projects and a number of residential subdivisions (refer to Figure 3.2-1). The cumulative addition of impervious area in a watershed increases the rate and amount of surface runoff and could result in flooding.

However, the cumulative projects and the CIP and ESP projects listed above would be required to implement a SWPPP and appropriate temporary and permanent storm water BMPs to avoid runoff impacts downstream. Therefore, cumulative increases in the rate or amount of surface runoff as a result of the Proposed Action, when combined with increases in the rate or amount of surface runoff associated with the CIP, ESP, and other planned cumulative projects listed in Table 3.2-1, would not result in on- or off-site flooding, and impacts would be less than significant.

Cumulative Threshold 4: Place structures within a 100-year flood hazard area, which would impede or redirect flood flows

The Proposed Action would not place structures in the 100-year floodplain. Therefore, impacts due to the Proposed Action on flood flows as a result of placement of structures in a 100-year floodplain would not be cumulatively considerable. Therefore, there would be no cumulative impacts on flood flows due to the Proposed Action.

The Proposed Action would not violate any water quality standards or waste discharge requirements; substantially alter existing drainage pattern of the site or area in a manner that would result in substantial erosion or siltation on or off site, or substantially increase the rate or amount of runoff in a manner that would result in flooding on or off site; or place structures within a 100-year flood hazard area, which would impede or redirect flood flow. The Proposed Action would implement project design features that would reduce all impacts to below a level of significance. Therefore, short-term (construction related), and long-term (operational), cumulative water resources impacts due to the Proposed Action, when combined with water resources impacts of the Slaughterhouse Terminal Reservoir (CIP) project and the ESP projects associated with the San Vicente Reservoir and other cumulative projects listed in Table 3.2-1, would be less than significant.

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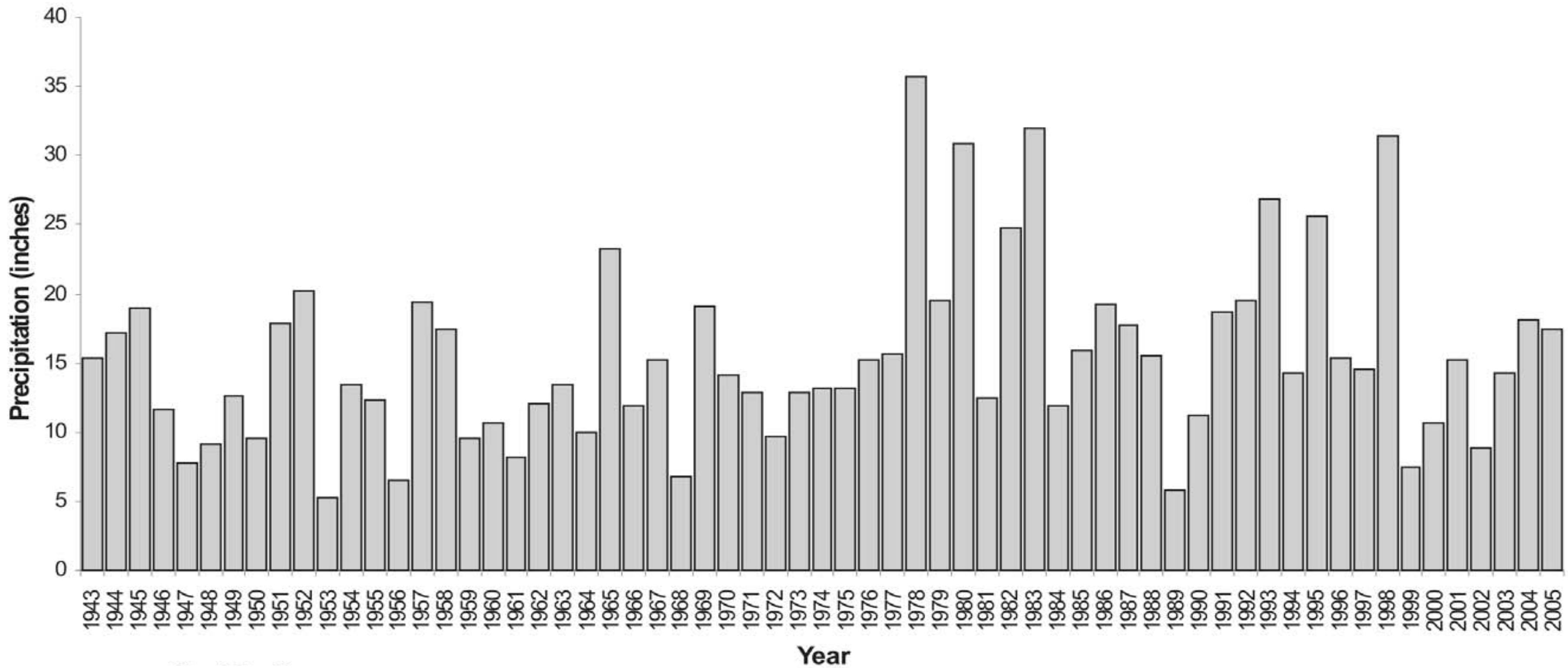
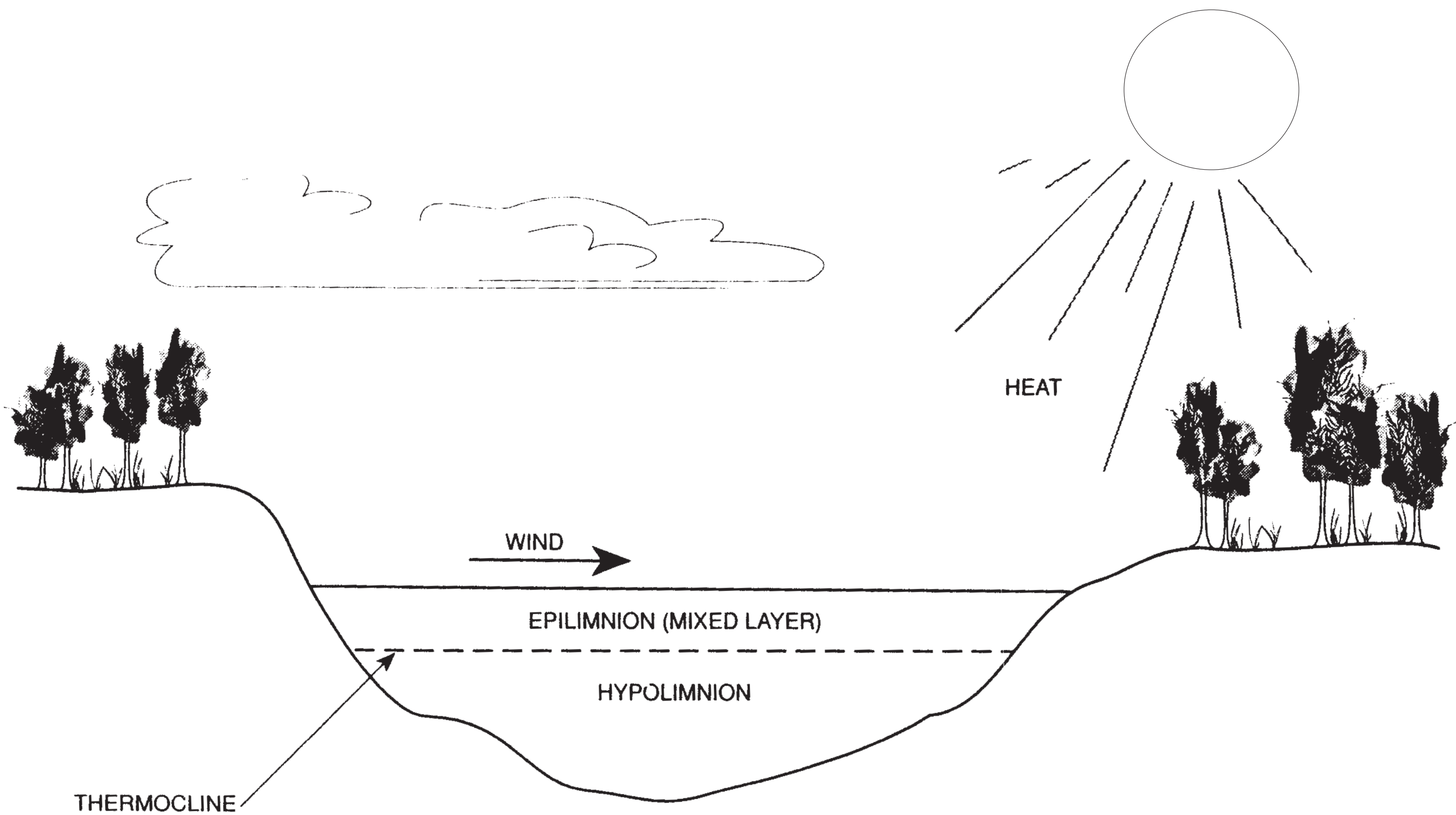
SAN VICENTE DRAINAGE AREA **FIGURE 3.17-1**



SOURCE: City of San Diego, 2006

ANNUAL PRECIPITATION AT SAN VICENTE RESERVOIR (1943-2005) **FIGURE 3.17-2**



SOURCE: ESP EIR, 1995

TYPICAL RESERVOIR STRATIFICATION **FIGURE 3.17-3**