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Appendix B
List of Abbreviations

To conserve space and improve readability, abbreviations have been used in this report. Each abbreviation has been spelled out in the text the first time in each section it is used. Subsequent usage of the term is usually identified by its abbreviation. The abbreviations used in this report are listed in the table below.

Abbreviation	Description
° F	degrees Fahrenheit
AB	Assembly Bill
acre-ft	Acre Feet
acre-ft/yr	acre feet per year
ACWA	Association of California Water Agencies
BMWD	Berrenda Mesa Water District
CEQA	California Environmental Quality Act
cfs	Cubic Feet per Second
CII	Commercial, industrial and institutional
CIMIS	California Irrigation Management Information System
Coachella	City of Coachella
COG	Council of Governments
CRA	Colorado River Aqueduct
CRWUA	Colorado River Water Users Association
CVAG	Coachella Valley Association of Governments
CVSC	Coachella Valley Stormwater Channel
CVWD	Coachella Valley Water District
CVWMP	Coachella Valley Water Management Plan
DBCP	Dibromochloropropane
DHS	California Department of Health Services
DLR	Detection Limit for Purposes of Reporting
DMM	Demand Management Measure
DWA	Desert Water Agency
DWR	California Department of Water Resources
DYY	Dry Year Yield
EDU	Equivalent dwelling unit
ET	Evapotranspiration
ETo	Reference Evapotranspiration
EWA	Environmental Water Account
EWU	Estimated Water Use
ft MSL	Feet above mean sea level
GIS	Geographical information system
gpd	Gallons per day
gpd/meter	Gallons per day per meter
gpm	Gallons per minute
HCF	Hundreds of Cubic Feet
IAEIS	Implementation Agreement Environmental Impact Statement
ID-1	Improvement District No. 1

Abbreviation	Description
IID	Imperial Irrigation District
inches/year	inches per year
Indio	City of Indio
IOP	Inadvertent Overrun and Payback Policy
MCL	Maximum Containment Level
Metropolitan	Metropolitan Water District of Southern California
mg/L	milligrams per liter
mgd	Million Gallon per Day
MOU	Memorandum of Understanding
mph	Miles per hour
MSL	Mean Sea Level
MTBE	methyl tertiary-butyl ether
MWA	Maximum Water Allowance
MWH	Montgomery Watson Harza
Myoma	Myoma Dunes Mutual Water Company
NCEA	National Conference for Environmental Assessment
NDEP	Nevada Division of Environmental Protection
NPDES	National Pollination Discharge Elimination System
OEHHA	Office of Environmental Health Hazard Assessment
PCE	Tetrachloroethene
PEIR	Program Environmental Impact Report
PF	Plant Water Use Factors
PHG	Public Health Goal
QSA	Quantification Settlement Agreement
RCRA	Resource Conservation and Recovery Act
Reclamation	U.S. Bureau of Reclamation
RfD	recommended reference dose
RW	Recycled Water
RWQCB	Regional Water Quality Control Board
SB	Senate Bill
SCAG	Southern California Association of Governments
SNWA	Southern Nevada Water Authority
SWP	State Water Project
TDS	Total Dissolved Solids
THM	total trihalomethanes
TLBWSD	Tulare Lake Basin Water Storage District
TMDL	Total Maximum Daily Load
ULFT	Ultra Low Flush Toilet
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UWMP	Urban Water Management Plan
UWMPA	Urban Water Management Plan Act
VOC	Volatile organic compound
WRP	Wastewater Reclamation Plant
µg/L	micrograms per liter

Appendix C
UWMP Law

Established: AB 797, Klehs, 1983
Amended: AB 2661, Klehs, 1990
AB 11X, Filante, 1991
AB 1869, Speier, 1991
AB 892, Frazee, 1993
SB 1017, McCorquodale, 1994
AB 2853, Cortese, 1994
AB 1845, Cortese, 1995
SB 1011, Polanco, 1995
AB 2552, Bates, 2000
SB 553, Kelley, 2000
SB 610, Costa, 2001
AB 901, Daucher, 2001
SB 672, Machado, 2001
SB 1348, Brulte, 2002
SB 1384, Costa, 2002
SB 1518, Torlakson, 2002
AB 105, Wiggins, 2004
SB 318, Alpert, 2004

CALIFORNIA WATER CODE DIVISION 6
PART 2.6. URBAN WATER MANAGEMENT PLANNING

CHAPTER 1. GENERAL DECLARATION AND POLICY

10610. This part shall be known and may be cited as the "Urban Water Management Planning Act."

10610.2. (a) The Legislature finds and declares all of the following:

(1) The waters of the state are a limited and renewable resource subject to ever-increasing demands.

(2) The conservation and efficient use of urban water supplies are of statewide concern; however, the planning for that use and the implementation of those plans can best be accomplished at the local level.

(3) A long-term, reliable supply of water is essential to protect the productivity of California's businesses and economic climate.

(4) As part of its long-range planning activities, every urban water supplier should make every effort to ensure the appropriate level of reliability in

its water service sufficient to meet the needs of its various categories of customers during normal, dry, and multiple dry water years.

(5) Public health issues have been raised over a number of contaminants that have been identified in certain local and imported water supplies.

(6) Implementing effective water management strategies, including groundwater storage projects and recycled water projects, may require specific water quality and salinity targets for meeting groundwater basins water quality objectives and promoting beneficial use of recycled water.

(7) Water quality regulations are becoming an increasingly important factor in water agencies' selection of raw water sources, treatment alternatives, and modifications to existing treatment facilities.

(8) Changes in drinking water quality standards may also impact the usefulness of water supplies and may ultimately impact supply reliability.

(9) The quality of source supplies can have a significant impact on water management strategies and supply reliability.

(b) This part is intended to provide assistance to water agencies in carrying out their long-term resource planning responsibilities to ensure adequate water supplies to meet existing and future demands for water.

10610.4. The Legislature finds and declares that it is the policy of the state as follows:

(a) The management of urban water demands and efficient use of water shall be actively pursued to protect both the people of the state and their water resources.

(b) The management of urban water demands and efficient use of urban water supplies shall be a guiding criterion in public decisions.

(c) Urban water suppliers shall be required to develop water management plans to actively pursue the efficient use of available supplies.

CHAPTER 2. DEFINITIONS

10611. Unless the context otherwise requires, the definitions of this chapter govern the construction of this part.

10611.5. "Demand management" means those water conservation measures, programs, and incentives that prevent the waste of water and promote the reasonable and efficient use and reuse of available supplies.

10612. "Customer" means a purchaser of water from a water supplier who uses the water for municipal purposes, including residential, commercial, governmental, and industrial uses.

10613. "Efficient use" means those management measures that result in the most effective use of water so as to prevent its waste or unreasonable use or unreasonable method of use.

10614. "Person" means any individual, firm, association, organization, partnership, business, trust, corporation, company, public agency, or any agency of such an entity.

10615. "Plan" means an urban water management plan prepared pursuant to this part. A plan shall describe and evaluate sources of supply, reasonable and practical efficient uses, reclamation and demand management activities. The components of the plan may vary according to an individual community or area's characteristics and its capabilities to efficiently use and conserve water. The plan shall address measures for residential, commercial, governmental, and industrial water demand management as set forth in Article 2 (commencing with Section 10630) of Chapter 3. In addition, a strategy and time schedule for implementation shall be included in the plan.

10616. "Public agency" means any board, commission, county, city and county, city, regional agency, district, or other public entity.

10616.5. "Recycled water" means the reclamation and reuse of wastewater for beneficial use.

10617. "Urban water supplier" means a supplier, either publicly or privately owned, providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually. An urban water supplier includes a supplier or contractor for water, regardless of the basis of right, which distributes or sells for ultimate resale to customers. This part applies only to water supplied from public water systems subject to Chapter 4 (commencing with Section 116275) of Part 12 of Division 104 of the Health and Safety Code.

CHAPTER 3. URBAN WATER MANAGEMENT PLANS
Article 1. General Provisions

10620.

(a) Every urban water supplier shall prepare and adopt an urban water management plan in the manner set forth in Article 3 (commencing with Section 10640).

(b) Every person that becomes an urban water supplier shall adopt an urban water management plan within one year after it has become an urban water supplier.

(c) An urban water supplier indirectly providing water shall not include planning elements in its water management plan as provided in Article 2 (commencing with Section 10630) that would be applicable to urban water suppliers or public agencies directly providing water, or to their customers, without the consent of those suppliers or public agencies.

(d)

(1) An urban water supplier may satisfy the requirements of this part by participation in areawide, regional, watershed, or basinwide urban water management planning where those plans will reduce preparation costs and contribute to the achievement of conservation and efficient water use.

(2) Each urban water supplier shall coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.

(e) The urban water supplier may prepare the plan with its own staff, by contract, or in cooperation with other governmental agencies.

(f) An urban water supplier shall describe in the plan water management tools and options used by that entity that will maximize resources and minimize the need to import water from other regions.

10621.

(a) Each urban water supplier shall update its plan at least once every five years on or before December 31, in years ending in five and zero.

(b) Every urban water supplier required to prepare a plan pursuant to this part shall notify any city or county within which the supplier provides water supplies that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan. The urban water supplier may consult with, and obtain comments from, any city or county that receives notice pursuant to this subdivision.

(c) The amendments to, or changes in, the plan shall be adopted and filed in the manner set forth in Article 3 (commencing with Section 10640).

Article 2. Contents of Plans

10630. It is the intention of the Legislature, in enacting this part, to permit levels of water management planning commensurate with the numbers of customers served and the volume of water supplied.

10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:

(a) Describe the service area of the supplier, including current and projected population, climate, and other demographic factors affecting the supplier's water management planning. The projected population estimates shall be based upon data from the state, regional, or local service agency population projections within the service area of the urban water supplier and shall be in five-year increments to 20 years or as far as data is available.

(b) Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments described in subdivision (a). If groundwater is identified as an existing or planned source of water available to the supplier, all of the following information shall be included in the plan:

(1) A copy of any groundwater management plan adopted by the urban water supplier, including plans adopted pursuant to Part 2.75 (commencing with Section 10750), or any other specific authorization for groundwater management.

(2) A description of any groundwater basin or basins from which the urban water supplier pumps groundwater. For those basins for which a court or the board has adjudicated the rights to pump groundwater, a copy of the order or decree adopted by the court or the board and a description of the amount of groundwater the urban water supplier has the legal right to pump under the order or decree.

For basins that have not been adjudicated, information as to whether the department has identified the basin or basins as overdrafted or has projected that the basin will become overdrafted if present management conditions continue, in the most current official departmental bulletin that characterizes the condition of the groundwater basin, and a detailed description of the efforts being undertaken by the urban water supplier to eliminate the long-term overdraft condition.

(3) A detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(4) A detailed description and analysis of the amount and location of groundwater that is projected to be pumped by the urban water supplier. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(c) Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage, to the extent practicable, and provide data for each of the following:

(1) An average water year.
(2) A single dry water year.
(3) Multiple dry water years.

For any water source that may not be available at a consistent level of use, given specific legal, environmental, water quality, or climatic factors, describe plans to supplement or replace that source with alternative sources or water demand management measures, to the extent practicable.

(d) Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.

(e)

(1) Quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, identifying the uses among water use sectors including, but not necessarily limited to, all of the following uses:

(A) Single-family residential.
(B) Multifamily.
(C) Commercial.
(D) Industrial.
(E) Institutional and governmental.
(F) Landscape.
(G) Sales to other agencies.
(H) Saline water intrusion barriers, groundwater recharge, or conjunctive use, or any combination thereof.
(I) Agricultural.

(2) The water use projections shall be in the same five-year increments described in subdivision (a).

(f) Provide a description of the supplier's water demand management measures. This description shall include all of the following:

(1) A description of each water demand management measure that is currently being implemented, or scheduled for implementation, including the steps necessary to implement any proposed measures, including, but not limited to, all of the following:

(A) Water survey programs for single-family residential and multifamily residential customers.

(B) Residential plumbing retrofit.

(C) System water audits, leak detection, and repair.

(D) Metering with commodity rates for all new connections and retrofit of existing connections.

(E) Large landscape conservation programs and incentives.

(F) High-efficiency washing machine rebate programs.

(G) Public information programs.

(H) School education programs.

(I) Conservation programs for commercial, industrial, and institutional accounts.

(J) Wholesale agency programs.

(K) Conservation pricing.

(L) Water conservation coordinator.

(M) Water waste prohibition.

(N) Residential ultra-low-flush toilet replacement programs.

(2) A schedule of implementation for all water demand management measures proposed or described in the plan.

(3) A description of the methods, if any, that the supplier will use to evaluate the effectiveness of water demand management measures implemented or described under the plan.

(4) An estimate, if available, of existing conservation savings on water use within the supplier's service area, and the effect of the savings on the supplier's ability to further reduce demand.

(g) An evaluation of each water demand management measure listed in paragraph (1) of subdivision (f) that is not currently being implemented or scheduled for implementation. In the course of the evaluation, first consideration shall be given to water demand management measures, or combination of measures, that offer lower incremental costs than expanded or additional water supplies. This evaluation shall do all of the following:

(1) Take into account economic and noneconomic factors, including environmental, social, health, customer impact, and technological factors.

(2) Include a cost-benefit analysis, identifying total benefits and total costs.

(3) Include a description of funding available to implement any planned water supply project that would provide water at a higher unit cost.

(4) Include a description of the water supplier's legal authority to implement the measure and efforts to work with other relevant agencies to ensure the implementation of the measure and to share the cost of implementation.

(h) Include a description of all water supply projects and water supply programs that may be undertaken by the urban water supplier to meet the total projected water use as established pursuant to subdivision (a) of Section 10635. The urban water supplier shall include a detailed description of expected future projects and programs, other than the demand management programs identified pursuant to paragraph (1) of subdivision (f), that the urban water supplier may implement to increase the amount of the water supply available to the urban water supplier in average, single-dry, and multiple-dry water years. The description shall identify specific projects and include a description of the increase in water supply that is expected to be available from each project. The description shall include an estimate with regard to the implementation timeline for each project or program.

(i) Describe the opportunities for development of desalinated water, including, but not limited to, ocean water, brackish water, and groundwater, as a long-term supply.

(j) Urban water suppliers that are members of the California Urban Water Conservation Council and submit annual reports to that council

in accordance with the ‘‘Memorandum of Understanding Regarding Urban Water Conservation in California,’’ dated September 1991, may submit the annual reports identifying water demand management measures currently being implemented, or scheduled for implementation, to satisfy the requirements of subdivisions (f) and (g).

(k) Urban water suppliers that rely upon a wholesale agency for a source of water, shall provide the wholesale agency with water use projections from that agency for that source of water in five-year increments to 20 years or as far as data is available. The wholesale agency shall provide information to the urban water supplier for inclusion in the urban water supplier’s plan that identifies and quantifies, to the extent practicable, the existing and planned sources of water as required by subdivision (b), available from the wholesale agency to the urban water supplier over the same five-year increments, and during various water-year types in accordance with subdivision (c). An urban water supplier may rely upon water supply information provided by the wholesale agency in fulfilling the plan informational requirements of subdivisions (b) and (c), including, but not limited to, ocean water, brackish water, and groundwater, as a long-term supply.

10631.5. The department shall take into consideration whether the urban water supplier is implementing or scheduled for implementation, the water demand management activities that the urban water supplier identified in its urban water management plan, pursuant to Section 10631, in evaluating applications for grants and loans made available pursuant to Section 79163. The urban water supplier may submit to the department copies of its annual reports and other relevant documents to assist the department in determining whether the urban water supplier is implementing or scheduling the implementation of water demand management activities.

10632. The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplier:

(a) Stages of action to be undertaken by the urban water supplier in response to water supply shortages, including up to a 50 percent reduction in water supply, and an outline of specific water supply conditions which are applicable to each stage.

(b) An estimate of the minimum water supply available during each of the next three water years based on the driest three-year historic sequence for the agency's water supply.

(c) Actions to be undertaken by the urban water supplier to prepare for, and implement during, a catastrophic interruption of water supplies including,

but not limited to, a regional power outage, an earthquake, or other disaster.

(d) Additional, mandatory prohibitions against specific water use practices during water shortages, including, but not limited to, prohibiting the use of potable water for street cleaning.

(e) Consumption reduction methods in the most restrictive stages. Each urban water supplier may use any type of consumption reduction methods in its water shortage contingency analysis that would reduce water use, are appropriate for its area, and have the ability to achieve a water use reduction consistent with up to a 50 percent reduction in water supply.

(f) Penalties or charges for excessive use, where applicable.

(g) An analysis of the impacts of each of the actions and conditions described in subdivisions (a) to (f), inclusive, on the revenues and expenditures of the urban water supplier, and proposed measures to overcome those impacts, such as the development of reserves and rate adjustments.

(h) A draft water shortage contingency resolution or ordinance.

(i) A mechanism for determining actual reductions in water use pursuant to the urban water shortage contingency analysis.

10633. The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. The preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area, and shall include all of the following:

(a) A description of the wastewater collection and treatment systems in the supplier's service area, including a quantification of the amount of wastewater collected and treated and the methods of wastewater disposal.

(b) A description of the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.

(c) A description of the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use.

(d) A description and quantification of the potential uses of recycled water, including, but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse, groundwater recharge, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses.

(e) The projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected pursuant to this subdivision.

(f) A description of actions, including financial incentives, which may be taken to encourage the use of recycled water, and the projected results of these actions in terms of acre-feet of recycled water used per year.

(g) A plan for optimizing the use of recycled water in the supplier's service area, including actions to facilitate the installation of dual distribution systems, to promote recirculating uses, to facilitate the increased use of treated wastewater that meets recycled water standards, and to overcome any obstacles to achieving that increased use.

10634. The plan shall include information, to the extent practicable, relating to the quality of existing sources of water available to the supplier over the same five-year increments as described in subdivision (a) of Section 10631, and the manner in which water quality affects water management strategies and supply reliability.

Article 2.5 Water Service Reliability

10635.

(a) Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and multiple dry water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.

(b) The urban water supplier shall provide that portion of its urban water management plan prepared pursuant to this article to any city or county within which it provides water supplies no later than 60 days after the submission of its urban water management plan.

(c) Nothing in this article is intended to create a right or entitlement to water service or any specific level of water service.

(d) Nothing in this article is intended to change existing law concerning an urban water supplier's obligation to provide water service to its existing customers or to any potential future customers.

Articl 3. Adoption and Implementation of Plans

10640. Every urban water supplier required to prepare a plan pursuant to this part shall prepare its plan pursuant to Article 2 (commencing with Section 10630).

The supplier shall likewise periodically review the plan as required by Section 10621, and any amendments or changes required as a result of that review shall be adopted pursuant to this article.

10641. An urban water supplier required to prepare a plan may consult with, and obtain comments from, any public agency or state agency or any person who has special expertise with respect to water demand management methods and techniques.

10642. Each urban water supplier shall encourage the active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan. Prior to adopting a plan, the urban water supplier shall make the plan available for public inspection and shall hold a public hearing thereon. Prior to the hearing, notice of the time and place of hearing shall be published within the jurisdiction of the publicly owned water supplier pursuant to Section 6066 of the Government Code. The urban water supplier shall provide notice of the time and place of hearing to any city or county within which the supplier provides water supplies. A privately owned water supplier shall provide an equivalent notice within its service area. After the hearing, the plan shall be adopted as prepared or as modified after the hearing.

10643. An urban water supplier shall implement its plan adopted pursuant to this chapter in accordance with the schedule set forth in its plan.

10644.

(a) An urban water supplier shall file with the department and any city or county within which the supplier provides water supplies a copy of its plan no later than 30 days after adoption. Copies of amendments or changes to the

plans shall be filed with the department and any city or county within which the supplier provides water supplies within 30 days after adoption.

(b) The department shall prepare and submit to the Legislature, on or before December 31, in the years ending in six and one, a report summarizing the status of the plans adopted pursuant to this part. The report prepared by the department shall identify the outstanding elements of the individual plans. The department shall provide a copy of the report to each urban water supplier that has filed its plan with the department. The department shall also prepare reports and provide data for any legislative hearings designed to consider the effectiveness of plans submitted pursuant to this part.

10645. Not later than 30 days after filing a copy of its plan with the department, the urban water supplier and the department shall make the plan available for public review during normal business hours.

CHAPTER 4. MISCELLANEOUS PROVISIONS

10650. Any actions or proceedings to attack, review, set aside, void, or annul the acts or decisions of an urban water supplier on the grounds of noncompliance with this part shall be commenced as follows:

(a) An action or proceeding alleging failure to adopt a plan shall be commenced within 18 months after that adoption is required by this part.

(b) Any action or proceeding alleging that a plan, or action taken pursuant to the plan, does not comply with this part shall be commenced within 90 days after filing of the plan or amendment thereto pursuant to Section 10644 or the taking of that action.

10651. In any action or proceeding to attack, review, set aside, void, or annul a plan, or an action taken pursuant to the plan by an urban water supplier on the grounds of noncompliance with this part, the inquiry shall extend only to whether there was a prejudicial abuse of discretion. Abuse of discretion is established if the supplier has not proceeded in a manner required by law or if the action by the water supplier is not supported by substantial evidence.

10652. The California Environmental Quality Act (Division 13 (commencing with Section 21000) of the Public Resources Code) does not apply to the preparation and adoption of plans pursuant to this part or to the implementation of actions taken pursuant to Section 10632. Nothing in this part shall be interpreted as exempting from the California Environmental Quality Act any project that would significantly affect water supplies for fish and wildlife, or any project for implementation of the plan, other than projects implementing Section 10632, or any project for expanded or additional water supplies.

10653. The adoption of a plan shall satisfy any requirements of state law, regulation, or order, including those of the State Water Resources Control Board and the Public Utilities Commission, for the preparation of water management plans or conservation plans; provided, that if the State Water Resources Control Board or the Public Utilities Commission requires additional information concerning water conservation to implement its existing authority, nothing in this part shall be deemed to limit the board or the commission in obtaining that information. The requirements of this part shall be satisfied by any urban water demand management plan prepared to meet federal laws or regulations after the effective date of this part, and which substantially meets the requirements of this part, or by any existing urban water management plan which includes the contents of a plan required under this part.

10654. An urban water supplier may recover in its rates the costs incurred in preparing its plan and implementing the reasonable water conservation measures included in the plan. Any best water management practice that is included in the plan that is identified in the "Memorandum of Understanding Regarding Urban Water Conservation in California" is deemed to be reasonable for the purposes of this section.

10655. If any provision of this part or the application thereof to any person or circumstances is held invalid, that invalidity shall not affect other provisions or applications of this part which can be given effect without the invalid provision or application thereof, and to this end the provisions of this part are severable.

10656. An urban water supplier that does not prepare, adopt, and submit its urban water management plan to the department in accordance with this part, is ineligible to receive funding pursuant to Division 24 (commencing with Section 78500) or Division 26 (commencing with Section 79000), or receive drought assistance from the state until the urban water management plan is submitted pursuant to this article.

10657.

(a) The department shall take into consideration whether the urban water supplier has submitted an updated urban water management plan that is consistent with Section 10631, as amended by the act that adds this section, in determining whether the urban water supplier is eligible for funds made available pursuant to any program administered by the department.

(b) This section shall remain in effect only until January 1, 2006, and as of that date is repealed, unless a later enacted statute, that is enacted before January 1, 2006, deletes or extends that date.

Appendix D
Resolution of Adoption

RESOLUTION OF THE BOARD OF DIRECTORS OF
COACHELLA VALLEY WATER DISTRICT

RESOLUTION NO. 2005-250

BE IT RESOLVED by the Board of Directors of the Coachella Valley Water District assembled in regular meeting this 13th day of December, 2005, that after making the draft plan available to the public and following a public hearing as required by the Urban Water Management Planning Act, it hereby adopts the Coachella Valley Water District Urban Water Management Plan dated December 2005, prepared by MWH Americas, Inc.

* * * * * * * * * * *

STATE OF CALIFORNIA)
COACHELLA VALLEY WATER DISTRICT) ss.
OFFICE OF THE SECRETARY)

I, JULIA FERNANDEZ, Secretary of the Board of Directors of the Coachella Valley Water District, DO HEREBY CERTIFY that the foregoing is a full, true and correct copy of Resolution No. 2005-250 adopted by the Board of Directors of said District at a regular meeting thereof duly held and convened on the 13th day of December, 2005, at which meeting a quorum of said Board was present and acting throughout.

Dated this 13th day of December, 2005.

(SEAL)

Julia Fernández
Board Secretary

AFFIDAVIT OF PUBLICATION
(2015.5 C.C.P.)

STATE OF CALIFORNIA

County of Imperial

I am a resident of the County aforesaid; I am over the age of eighteen years, and not a party to or interested in the above entitled matter. I am the principal clerk* of the printer of the

IMPERIAL VALLEY PRESS

a newspaper of general circulation, printed and published daily in the City of El Centro, County of Imperial and which newspaper has been adjudged a newspaper of general circulation by the Superior Court of the County of Imperial, State of California, under the date of October 9, 1951, Case Number 26775; that the notice, of which the annexed is a printed copy, has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to-wit:

Nov 29

Dec 6

all in the year 20 05.

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

Justin Cey
SIGNATURE

* Printer, Foreman of the Printer, or Principal Clerk of the Printer

Date 12-6 2005
at El Centro, California.

This space is for the County Clerk's Filing Stamp:

Proof of Publication of:

NOTICE OF PUBLIC HEARING

Notice is hereby given, pursuant to Government Code Section 6066 and California Water Code Section 10642, that a public hearing will be held by the Board of Directors of the Coachella Valley Water District (District) at the District's office in Coachella on December 13, 2005, at 9:00 a.m. in the Forbes Auditorium, 85-995 Avenue 52, Coachella, California.

The purpose of the hearing is for the District to receive comments from the public regarding the Coachella Valley Water District Urban Water Management Plan.

A copy of the report entitled "Draft Coachella Valley Water District Urban Water Management Plan" is available for inspection at the District's office located at 85-995 Avenue 52, Coachella, and at the District's Palm Desert office located at 75-525 Hovley Lane East, Palm Desert. Additional information may also be obtained by calling Carrie Oliphant, Principal Domestic Water Engineer, at extension 2268, during regular working hours.

Date: November 29, 2005.

/s/ Julia Fernandez
Julia Fernandez
Board Secretary

L700 N29,D6

RECEIVED
DEC 9 2005
C.V.W.D

PROOF OF PUBLICATION
(2015.5.C.C.P)

This is space for County Clerk's Filing Stamp

STATE OF CALIFORNIA
County of Riverside

I am a citizen of the United States and a resident of the County aforesaid; I am over the age of eighteen years, and not a party to or interested in the above-entitled matter. I am the principal clerk of a printer of the, DESERT SUN PUBLISHING COMPANY a newspaper of general circulation, printed and published in the city of Palm Springs, County of Riverside, and which newspaper has been adjudged a newspaper of general circulation by the Superior Court of the County of Riverside, State of California under the date of March 24, 1988. Case Number 191236; that the notice, of which the annexed is a printed copy (set in type not smaller than non pariel, has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to wit:

November 29th, December 6th, 2005

All in the year 2005

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

Dated at Palm Springs, California this -----6th, ---- day of--------- December ----------, 2005

Signature

Proof of Publication of

NOTICE OF PUBLIC HEARING

Notice is hereby given, pursuant to Government Code Section 6066 and California Water Code Section 10642, that a public hearing will be held by the Board of Directors of the Coachella Valley Water District (District) at the District's office in Coachella on December 13, 2005, at 9:00 a.m. in the Forbes Auditorium, 85-995 Avenue 52, Coachella, California.

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Date: November 29, 2005.

/s/ Julia Fernandez_____Julia Fernandez
Board Secretary

Appendix E
Water Demand Projections and 2004 Demands

E.1 WATER DEMANDS PROJECTION METHODOLOGY

Multiple data inputs were used to project future water demands. GIS (geographic information systems) was utilized to integrate these data inputs for all areas within the CVWD service area as shown in **Figure 2-8 in Section 2**.

E.1.1 Cities and Census Tracts

First, cities and census tracts were overlayed on top of each other, resulting in 162 "polygons" with distinct values for their city and census tract[1]. This data is important because Southern California Association of Governments (SCAG) projections for households, employment and population (referred to hereafter as "growth factors") are assigned to each city and census tract combination. For example, **Table E-1** shows growth factors of households, employment and population for census tract 44914 in years 2005 and 2010. Thus, the growth factors for Palm Desert in Census Tract 44914 are 3,496 households, 7,555 population and 1,722 employed.

Table E-1
Growth Factors of Census Tract 44914

City	Census Tract	2005			2010		
		Households	Population	Employment	Households	Population	Employment
Palm Desert	44914	3,496	7,555	1,722	3,496	7,558	2,185
Rancho Mirage	44914	1,021	2,043	948	1,230	2,290	1,102

Thus, Palm Desert in Census Tract 44914 and Rancho Mirage in Census Tract 44914 are in the same census tract but have different growth factors.

E.1.2 Land Uses

The next map layer overlayed was land use. Land use determines the specific growth factor used for projecting demands. Land use is also important because it was assumed that each land use grows independently of all other land uses (i.e., commercial land uses in La Quinta grow independently of low density residential land uses in La Quinta). Overlaying land uses onto the cities/census tract map resulted in 769 polygons. As mentioned previously, growth factors were assigned to land use that would most accurately match growth within that land use. The land use/growth factor assignments are given in **Table E-2**.

[1] All unincorporated areas were assigned "unincorporated" as the city name

Table E-2
Land Uses and Growth factors

Land Use	Growth factor
Low Density Residential (0-2 du/acre)	Households
Residential (2-8 du/acre)	Households
Residential(8+ du/acre)	Households
Mobile Home/Trailer Parks	Households
Hotels and Motels	Employment
Business	Employment
Commercial	Employment
Public Agency	Population
Irrigated Open Space	Households
Non-Irrigated Open Space	No Growth
Native American	No Growth
Agriculture	No Growth
Golf Courses	Households

E.1.3 Pressure Zones

Next, a map of pressure zones was overlayed which resulted in 1,609 total polygons. The pressure zone data was used to organize water demand projections by pressure zone or cost center.

E.1.4 Parcels

After pressure zones were overlayed, parcel data, which specified nonvacant and vacant parcels were overlayed resulting in 162,360 polygons. Since growth in water meters was assumed to grow solely in vacant land, parcel data was used to determine where and how much growth could occur in a given area (see sample calculation later in this section).

E.1.5 Tributary Areas

Next, a tributary area map was overlayed which resulted in 165,286 polygons. Tributary areas were needed to determine wastewater flow projections for each CVWD water reclamation plant. Thus, after all overlays were complete, all locations within the CVWD service area were assigned a city, census tract, land use, pressure zone[2], parcel data and tributary area[3]. In order to simplify model calculations, the 165,286 polygons were aggregated to 3,322 polygons. This aggregation, known as "dissolving", was based on the city, census tract, land use, pressure zone, parcel and tributary area data of each polygon. In other words, all nonvacant, commercial polygons with the same city, census tract, land use, pressure zone, and tributary area were aggregated into one single polygon. Similarly, all vacant, commercial polygons with the same

[2] Similar to cities, areas within the CVWD service area that did not fall within a pressure zone were labeled "unincorporated" for their pressure zone name

[3] Areas that did not fall within a tributary area were labeled "unincorporated" for their tributary area name

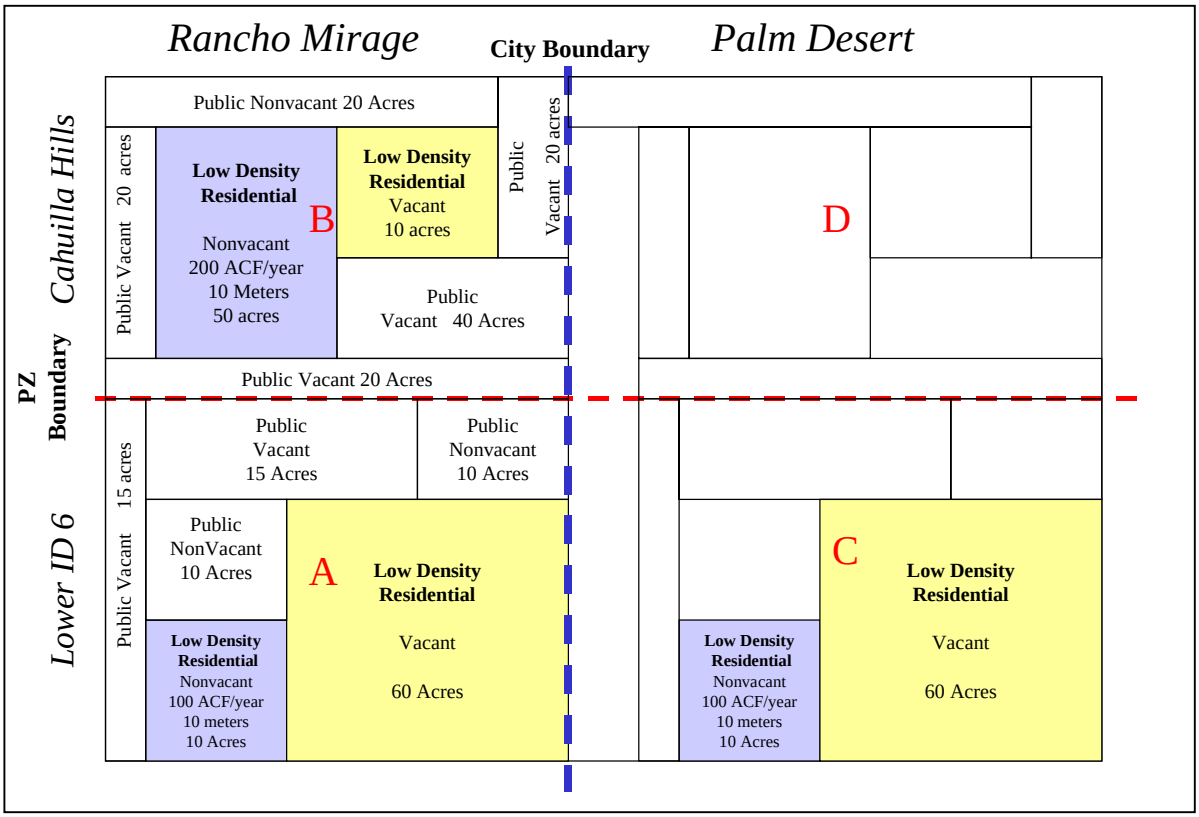
city, census tract, land use, pressure zone, and tributary area were aggregated into another polygon.

Polygons were then joined with CVWD 2004 billing data to show water and wastewater usage throughout the CVWD service area. 2004 billing data contained account numbers, annual water usage, annual wastewater usage, number of water meters and number of wastewater meters. AutoCAD plat sheets, developed by MWH, provided a precise geographical location for every account number. Matching account numbers from the billing data with the account numbers on the plat sheets provided a geographic point for more than 95% of all CVWD accounts. The result of integrating this data was a map that showed water usage in acre-ft/year for all areas within the CVWD service area in 2004. Overlaying boundaries beforehand allowed greater flexibility in presenting water usage data. Water usage data could be shown by pressure zone, tributary area, land use, city, census tract, nonvacant land or vacant land.

E.2 WATER DEMAND PROJECTIONS: SAMPLE CALCULATION

The following sample calculation will demonstrate how 2004 water demands were projected to future years. Imagine a fictitious census tract, census tract 45113, as shown in **Figure E-1**. The census tract is split by a boundary that separates the cities of Rancho Mirage and Palm Desert. The census tract is further split by another boundary that separates the pressure zones of Cahuilla Hills and Lower ID 6. These boundaries create 4 polygons. Polygon A in the Southwest, Polygon B in the Northwest, Polygon C in the Southeast and Polygon D in the Northeast.

Figure E-1
Census Tract 45113 Layout



For illustrative purposes, the sample calculation will restrict itself to low density residential land uses, although the same process can be repeated for all other land uses. In Polygons A and B (Rancho Mirage/Census Tract 45113) the vacant land area, nonvacant land area and water usage data for nonvacant, low density residential uses are shown. Calculation of future water demand involved the following steps:

1) Identify the Growth factor for each Land Use

Referring to **Table E-2** low density residential land uses is assigned the "Households" growth factor. Let's assume that the growth factors for Polygons A and B are the following:

Table E-3
Households for Rancho Mirage/Census Tract 45113

Year	2004	2010	2015	2020	2025	2030
Households	1,000	1,050	1,200	1,500	1,600	1,700

2) Calculate the Growth factor at "Buildout" for the <u>City/Census Tract</u>

The growth factor at Buildout is calculated using the following equation.

$$GF_{buildout} = GF_{2004} * (\frac{Total_Area_{city/CT}}{Nonvacant_Area_{city/CT}})$$

$GF_{buildout}$ = Growth factor (Households) at buildout
GF_{2004} = Growth factor (Households) in 2004
$Total_Area_{city/CT}$ = Total area within the City/Census Tract
$Nonvacant_Area_{city/CT}$ = Nonvacant area for all land uses within the City/Census tract

Thus, buildout is reached when the growth factor per vacant acre in equals the growth factor per nonvacant acre in 2004 (i.e. when the 2004 nonvacant growth factor density equals total growth factor density).

The following calculation applies:

Nonvacant Area = 20 + 50 + 10 + 10 + 10 = 100 acres
Vacant Area = 20 + 10 + 40 + 20 + 20 + 15 + 5 + 70 = 200 acres
Total Area = Nonvacant + Vacant = 100 + 200 = 300 acres

$$GV_{buildout} = 1{,}000_households * (\frac{300_acres}{100_acres}) = 3{,}000 \text{ households}$$

3) Calculate Total Meters at Buildout for each land use within each Polygon

The total meters at buildout is calculated using the following equation:

$$Meter_{buildout} = Meter_{2004} * (\frac{Total_LU_Area_{polygon}}{Nonvacant_LU_Area_{polygon}})$$

where:

Meter $_{buildout}$ = Total water meters for a given land use within a polygon at buildout
Meter $_{2004}$ = Total water meters for a given land use within a polygon in 2004
Total_LU_Area $_{polygon}$ = Total area for a given land use within a polygon
Nonvacant_LU_Area $_{polygon}$ = Total nonvacant area for a given land use within a polygon

Thus, buildout is reached when the number of meters per total acre is equal to the number of meters per nonvacant acre in 2004 (i.e. when the meter density of the total area of the polygon equals the nonvacant meter density). For low density residential land uses in polygon A, the following calculation applies:

$$Meter_{buildout} = 10_meters * (\frac{70_acres}{10_acres}) = 70 \text{ meters}$$

4) Calculate Additional Meters in all future years for each land use within each Polygon

Figure E-2 shows Households vs. Time for Rancho Mirage/Census Tract 45113 and Meters vs. Time for low density residential areas in Polygon A. Total households and total meters at buildout are shown on the far right of the figure. There are 2,000 additional households and 60 additional meters from 2004 to buildout. Assuming that the number of meters in non-vacant areas remain constant in future years, the growth of meters in vacant areas increases proportionately to the growth of growth factors in vacant areas. Thus, at 2020, when 500 additional households represent 500/2000 = 25% to buildout at the city/census tract scale, there will be 15 additional meters because (25%)(60 meters) = 15 additional meters at 25% of meter buildout at the polygon scale.

The following equation was used to calculate additional meters

$$\frac{Meter_{additional}}{Meter_{buildout} - Meter_{2004}} = \frac{GF_{additional}}{GF_{buildout} - GF_{2004}}$$

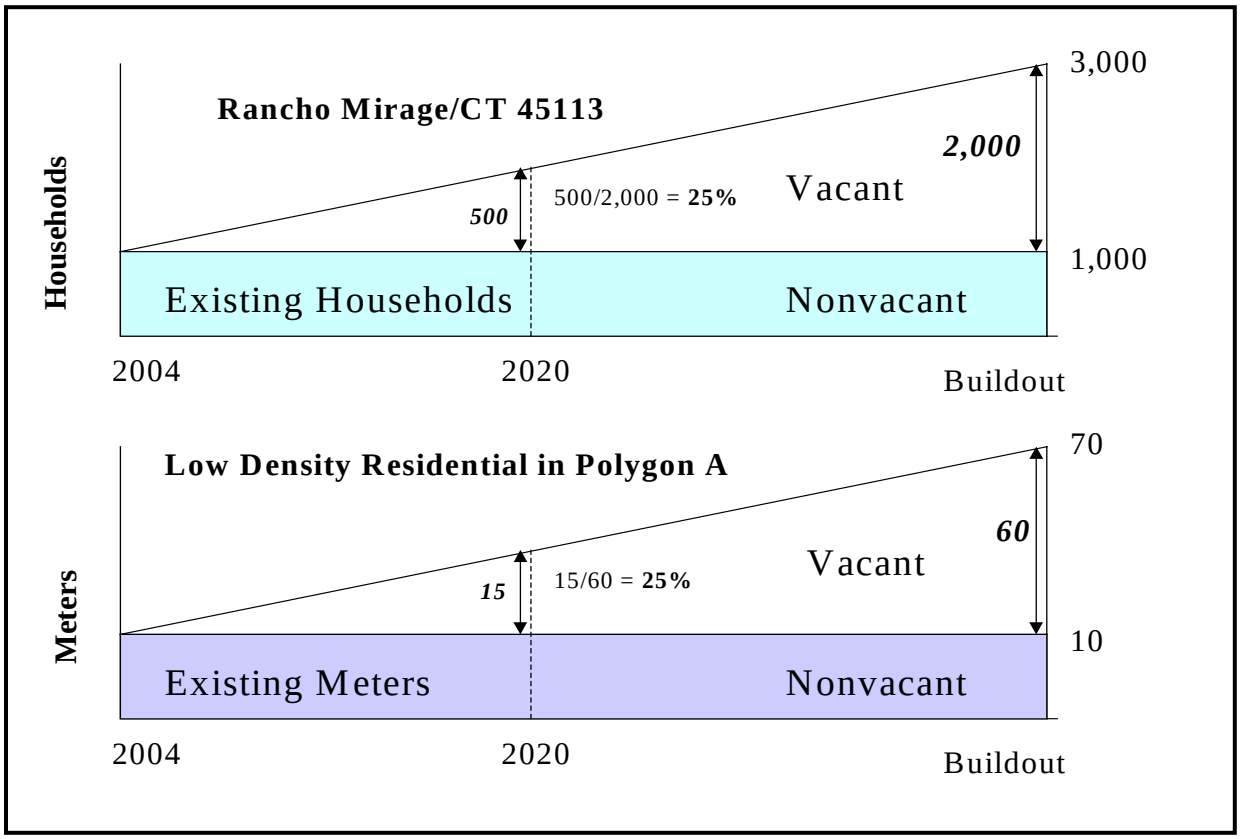
$$\frac{Meter_{additional}}{70_meters - 10_meters} = \frac{500_households}{3000_households - 1000_households}$$

$$Meter_{additional} = 15 \text{ meters}$$

where:

$GF_{additional}$ = number of households added from 2004 to 2020
$Meter_{additional}$ = number of meters added from 2004 to 2020

Figure E-2
Polygon A



5) Calculate Water Use/Meter for each land use within each <u>Polygon</u>

Water Usage/Meter is assumed to be constant for all future times for each land use within each polygon. For meters in the low density residential areas in polygon A, the water usage per meters is always equal to (100 Acre-ft/year)/(10 meters) = 10 Acre-ft/year/meter.

6) Calculate Annual Water usage and Total number of meters for each land use within each <u>Polygon</u>

The total number of meters and the annual water usage for year 2020 is shown as follows.

$$Meter_{2020} = Meters_{2004} + Meters_{additional} = 10_meters + 15_meters = 25 \text{ meters}$$

$$Water_Usage_{2020} = Meters_{2020} * (\frac{Water_Usage_{2004}}{Meters_{2004}}) = 25_meters * \frac{100_Acre-ft/year}{10_meters} = 250$$

Comparing these results to Polygon B demonstrates how the planning model captures localized differences in water usage. Polygon B has the same growth factor (households) and has a buildout of 3,000 households. But all other calculations are different for year 2020 as shown in the calculations in **Figure E-3**.

Figure E-3
Polygon B Calculations

$$Meter_{buildout} = 10_meters * (\frac{60_acres}{50_acres}) = 12 \text{ meters}$$

$$\frac{Meter_{additional}}{12_meters - 10_meters} = \frac{500_households}{3000_households - 1000_households}$$

$$Meter_{additional} = 0.5 \approx 1 \text{ meter}$$

$$(\frac{Water_Usage_{2004}}{Meter_{2004}}) = \frac{200_Acre-ft/year}{10_meters} = 20 \text{ Acre-ft/year/meter}$$

$$Meter_{2020} = Meter_{2004} + Meter_{additional} = 10_meters + 1_meter = 11 \text{ meters}$$

$$Water_Usage_{2020} = 11_meters * \frac{200_Acre-ft/year}{10_meters} = 220 \text{ Acre-ft/year}$$

Although Polygon B has a higher water usage/acre of land than Polygon A, the low area of vacant land for growth means that it will have a lower annual water usage than Polygon A in 2020. In another case, the low density residential land uses in Polygon C may have the same nonvacant area, vacant areas, number of meters and water usage as Polygon A. But the future water demand will be different because the growth factor will increase at a different rate for Palm Desert/Census Tract 45113 than for Rancho Mirage/Census Tract 45113.

E.3 EXISTING WATER DEMANDS

Figure E-4 through **E-14** below are a graphic summary of 2004 water demands based on CVWD billing data. Consumption is given in hundreds of cubic-feet (HCF)/year.

Figure E-4: 2004 Billed Consumption by Meter Address - Class 1 Customers

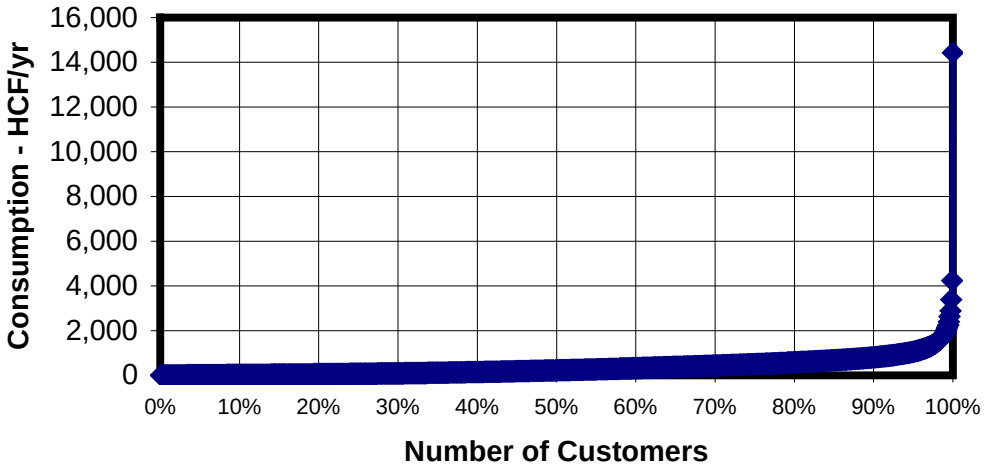


Figure E-5: 2004 Billed Consumption by Meter Address - Class 2 Customers

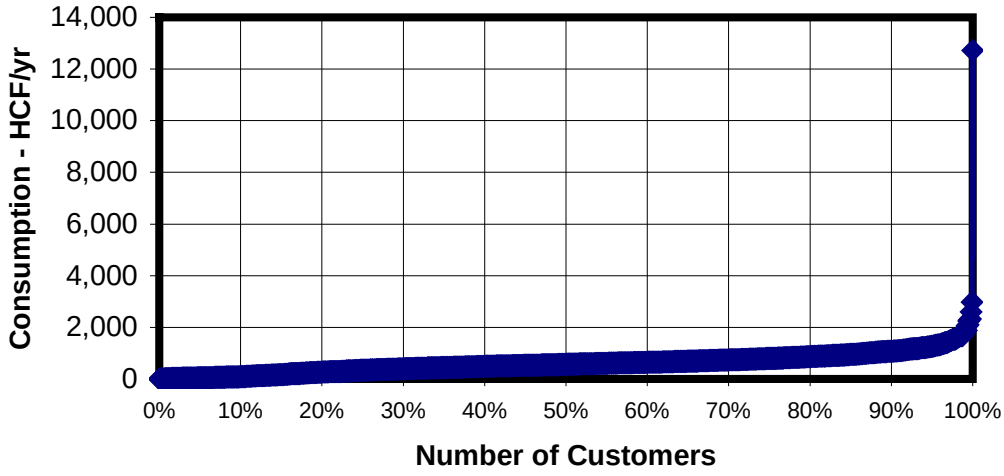


Figure E-6: 2004 Billed Consumption by Meter Address - Class 3 Customers

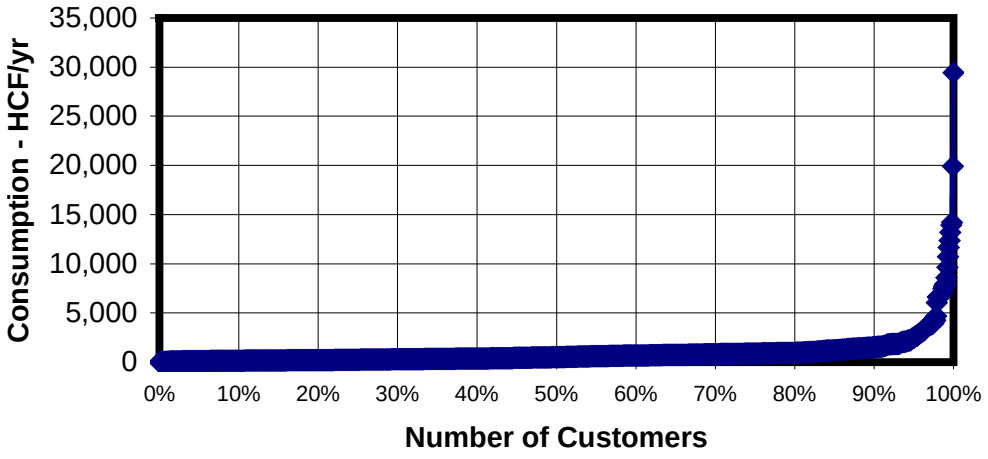
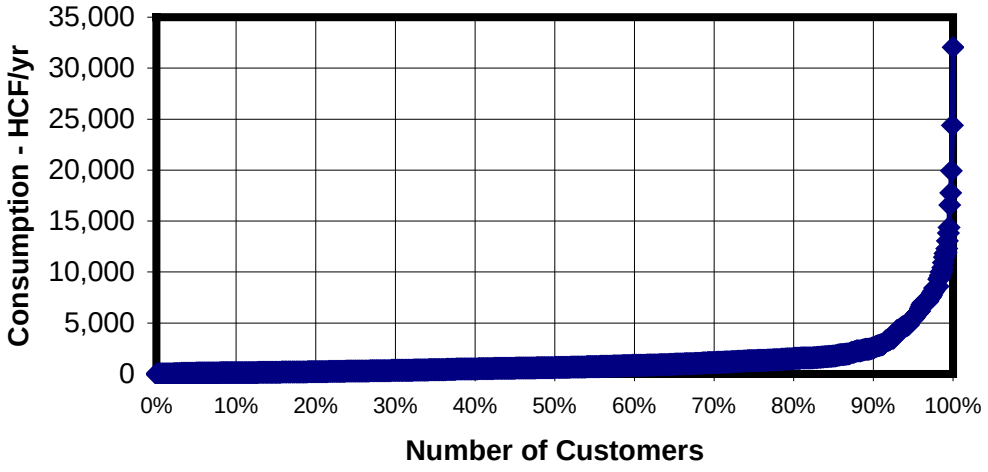


Figure E-7: 2004 Billed Consumption by Meter Address - Class 4 Customers



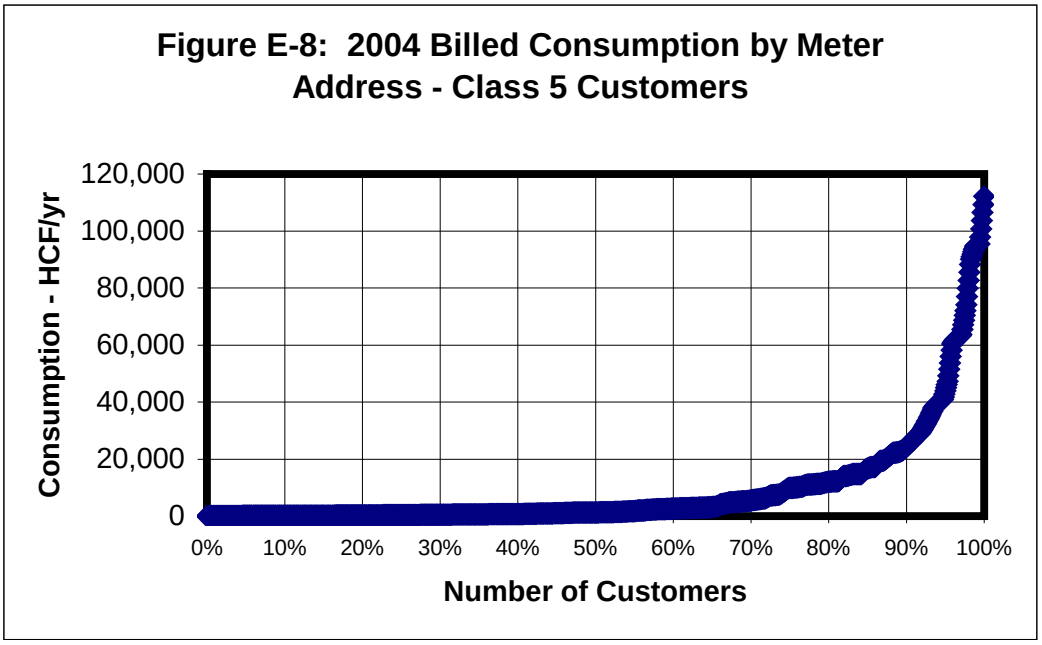


Figure E-8: 2004 Billed Consumption by Meter Address - Class 5 Customers
Consumption - HCF/yr
120,000
100,000
80,000
60,000
40,000
20,000
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Number of Customers

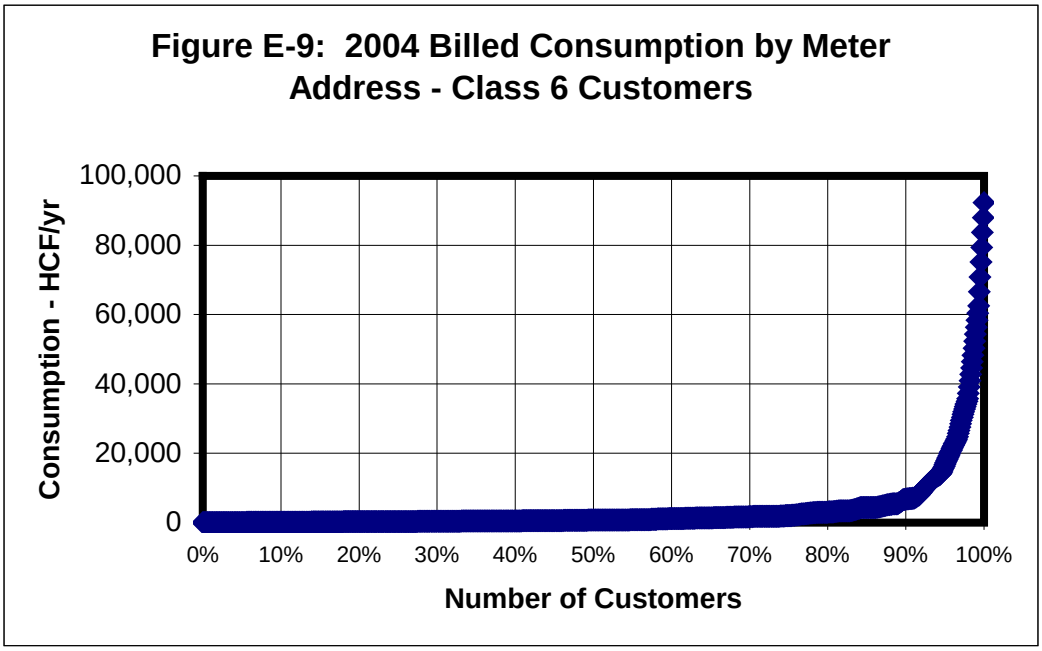


Figure E-9: 2004 Billed Consumption by Meter Address - Class 6 Customers
Consumption - HCF/yr
100,000
80,000
60,000
40,000
20,000
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Number of Customers

Figure E-10: 2004 Billed Consumption by Meter Address - Class 7 Customers

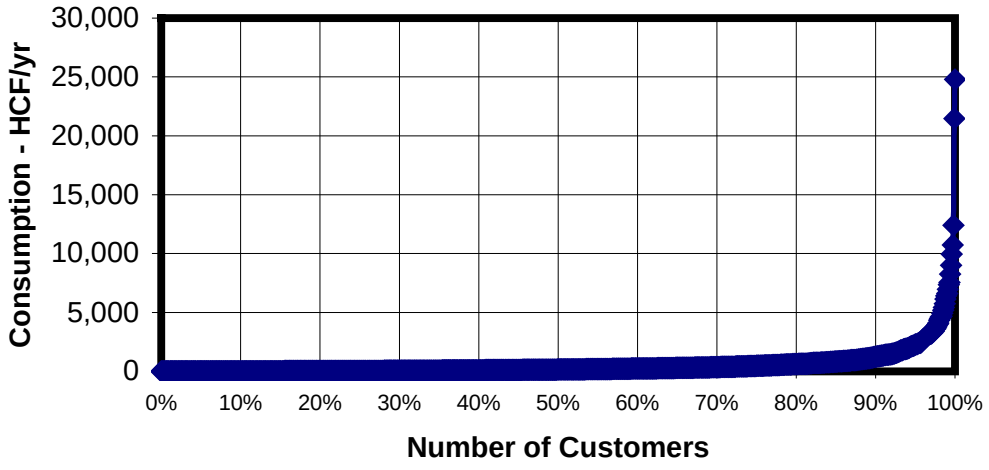


Figure E-11: 2004 Billed Consumption by Meter Address - Class 8 Customers

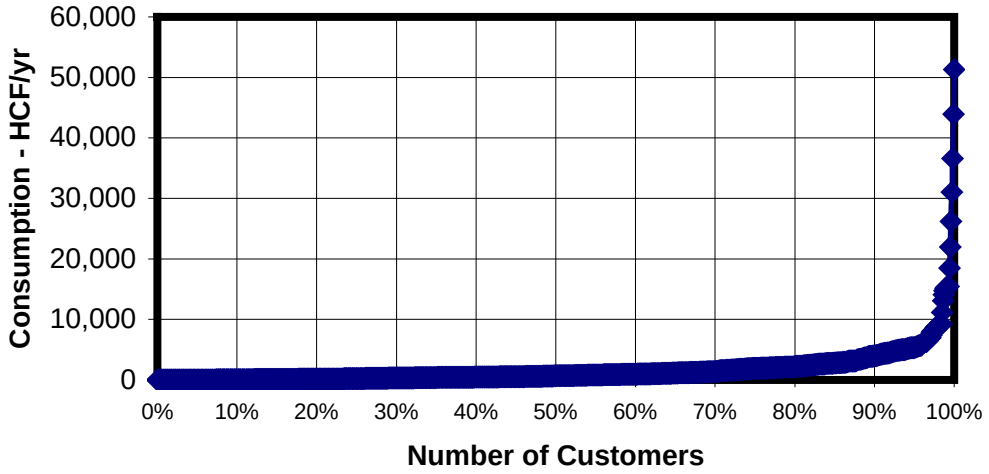


Figure E-12: 2004 Billed Consumption by Meter Address - Class 10 Customers

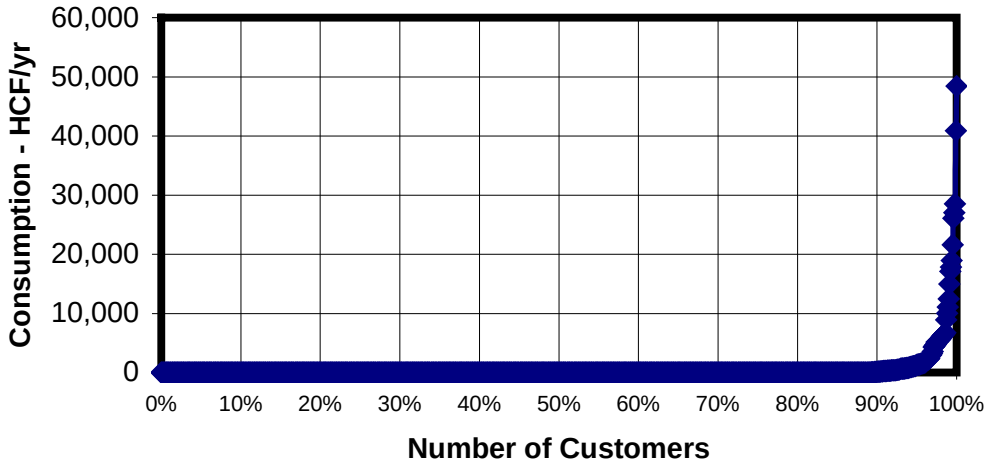


Figure E-13: 2004 Billed Consumption by Meter Address - Class 11 Customers

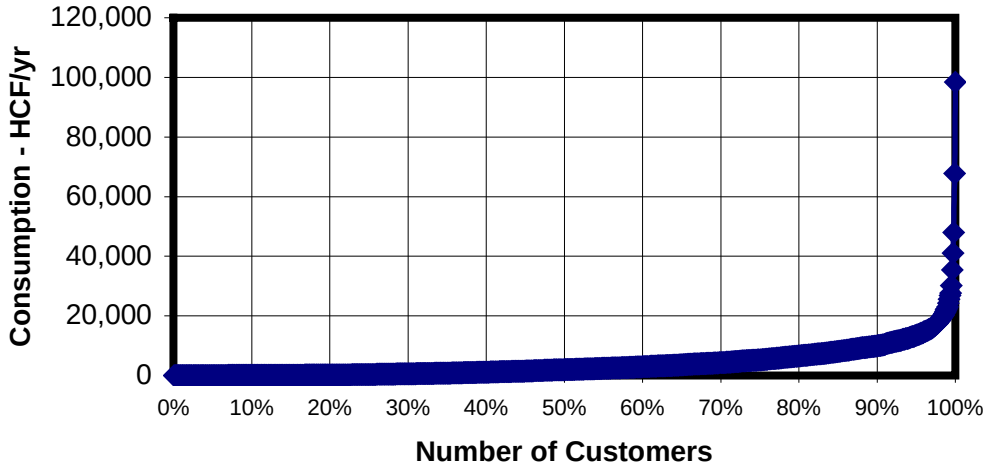


Figure E-14: 2004 Billed Consumption by Meter Address - Class 18 Customers

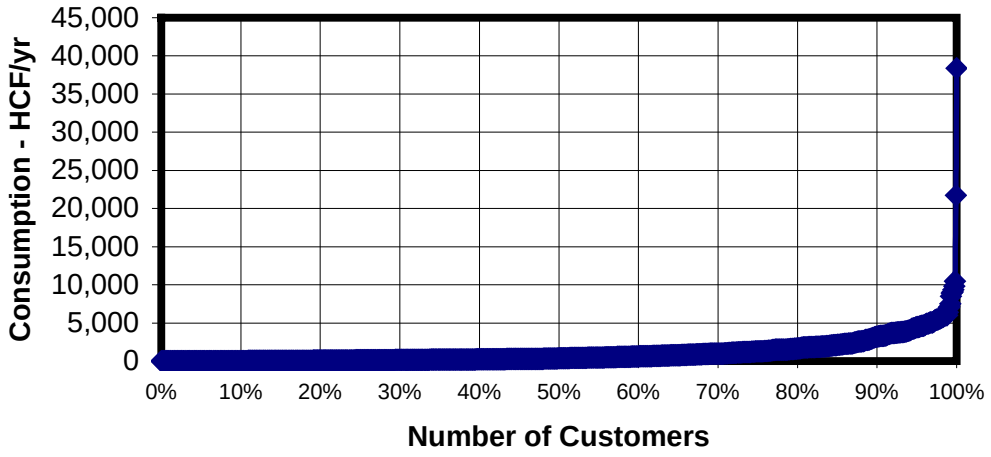
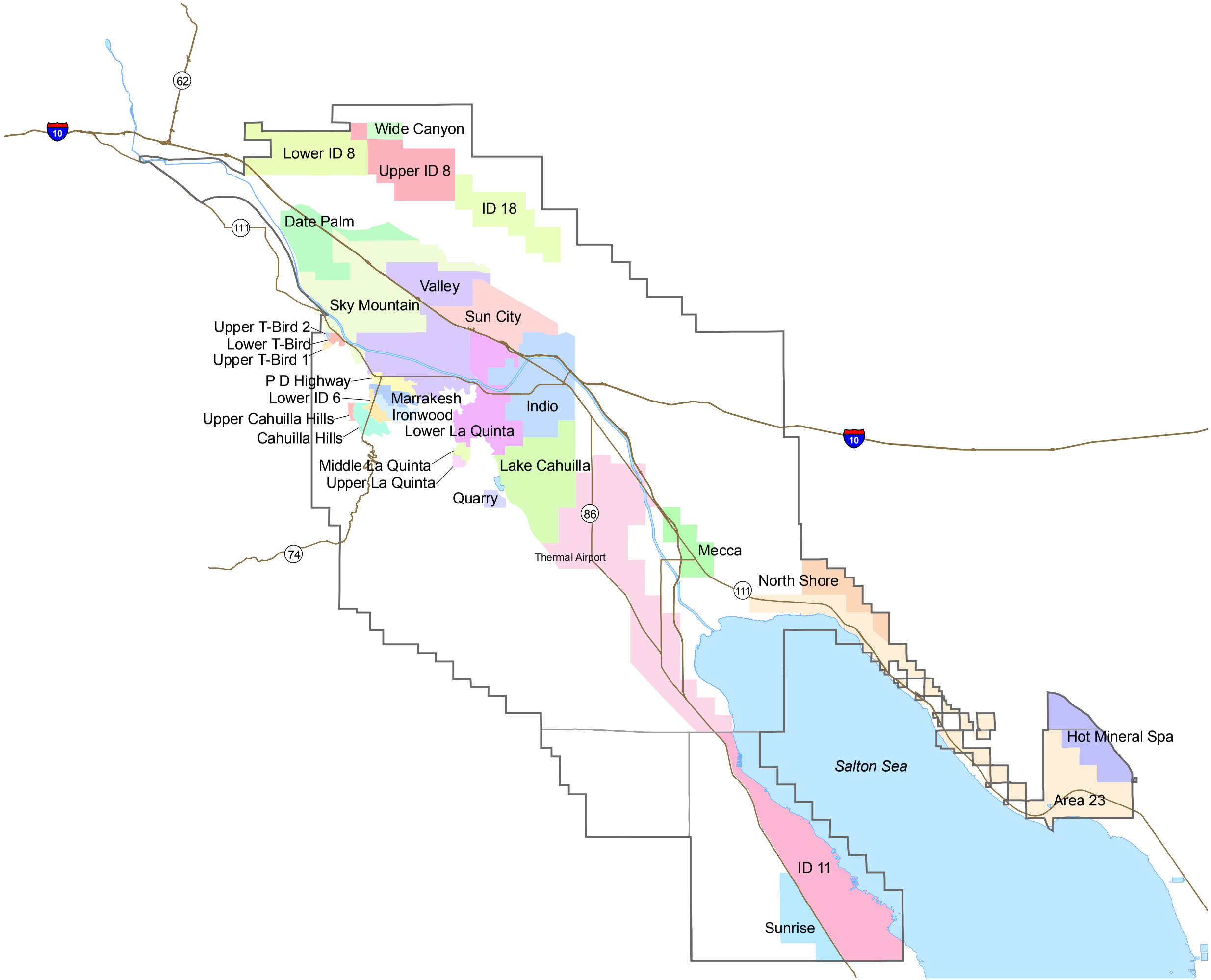


Table E-4
Projected Water Consumption by Pressure Zone

Pressure Zone	Consumption (acre-ft/yr)					
	2005	2010	2015	2020	2025	2030
Area 23(1)	1,243	1,382	1,597	1,811	1,932	2,053
Cahuilla Hills	1,234	1,343	1,346	1,352	1,357	1,363
Date Palm	17,426	19,921	23,695	26,846	28,728	30,124
Hot Mineral Spa	NA	NA	NA	NA	NA	NA
ID 11(1)	1,836	2,507	3,652	4,796	5,994	7,192
ID 18	7	51	94	144	185	226
Indio	2,714	2,828	2,997	3,077	3,121	3,167
Ironwood	3,387	3,887	4,019	4,022	4,024	4,026
Lake Cahuilla	4,760	5,674	5,917	6,089	6,208	6,301
Lower ID 6	1,710	1,918	1,966	2,032	2,053	2,075
Lower ID 8	206	383	974	1,651	2,394	3,134
Lower La Quinta	15,735	17,351	18,378	19,008	19,448	19,632
Lower T-Bird	1,123	1,177	1,226	1,273	1,302	1,332
Marrakesh	4,262	4,621	4,686	4,717	4,743	4,768
Mecca	946	1,150	1,468	1,735	1,943	2,037
Middle La Quinta	1,607	1,621	1,673	1,710	1,722	1,722
North Shore	4	34	87	148	197	246
P D Highway	4,336	4,908	5,047	5,064	5,073	5,080
Quarry	247	464	567	569	570	572
Sky Mountain	29,050	32,800	37,824	41,678	45,075	46,750
Sun City	3,712	4,369	5,135	5,855	5,989	6,117
Thermal Airport	771	2,822	3,470	4,142	4,951	5,576
Upper Cahuilla Hills	108	184	184	184	184	184
Upper ID 8	82	252	835	1,512	2,265	3,014
Upper La Quinta	495	501	523	538	543	543
Upper T-Bird 1	1	8	14	20	24	28
Upper T-Bird 2	8	8	8	9	9	9
Valley	30,345	34,524	37,050	38,410	39,451	40,138
Wide Canyon	0	0	0	0	0	0
Not in PZ	2,887	7,124	9,675	12,244	14,198	16,000
Grand Total	**130,242**	153,813	174,105	190,632	203,683	213,408

(1): 2004 water deliveries was taken from Carollo Engineers. Water Supply Feasibility Evaluation for ID 11 and Area 23. Water Demand projections. Technical Memorandum No. 1. 2005.



Legend

- CVWD Boundary
- County Border
- Waterbodies
- Highways

N

MWH

0 1.5 3 6 9 Miles

Figure E-15
Pressure Zones

Table E-5
Projected Water Consumption by City

City	Consumption (acre-ft/yr)					
	2005	2010	2015	2020	2025	2030
Bermuda Dunes	2,710	2,861	3,242	3,312	3,327	3,335
Cathedral City	20,048	23,283	26,996	29,741	31,358	32,587
Coachella	112	595	1,257	1,908	2,557	3,206
Indian Wells	9,142	10,546	11,355	11,481	11,558	11,566
Indio	1,116	1,334	1,395	1,418	1,444	1,465
La Quinta	21,177	23,848	24,778	25,440	25,912	26,111
Mecca	904	1,039	1,228	1,430	1,579	1,620
Palm Desert	35,406	39,425	40,369	41,307	42,164	42,983
Rancho Mirage	23,232	25,876	29,135	31,624	32,929	33,572
Thousand Palms	2,122	2,543	3,915	5,138	6,555	6,697
Unincorporated	14,272	22,461	30,433	37,830	44,300	50,266
Grand Total	130,241	153,811	174,103	190,630	203,682	213,406

Appendix F
Water Management Plan
Executive Summary

INTRODUCTION

Water resources management in the arid west involves many challenges. Droughts, limited supplies, increasing demands, water quality degradation - all of these factors must be taken into consideration to provide a safe and reliable water supply for the Coachella Valley. The Coachella Valley Water District (CVWD or District) is developing a comprehensive Water Management Plan (Plan) that will assure adequate quantities of safe, high-quality water supply for the Coachella Valley well into this century.

As part of the planning process, alternatives have been formulated, and a preferred alternative has been identified. Public comment will be solicited on the Plan in the form of public forums and workshops which will invite input from the general public, taxpayers, water users, local governments, tribal interests, federal and state agencies, and other Colorado River water users.

The Coachella Valley

For purposes of this Water Management Plan, the Coachella Valley is divided into the Upper Valley and the Lower Valley. Generally, the Upper Valley is a resort/recreation-based economy developed on groundwater while the Lower Valley is an agricultural-based economy with access to Colorado River water imported via the Coachella Canal. Geographically, the Lower Valley is southeast of a line extending from Washington Street and Point Happy northeast to the Indio Hills near Jefferson Street, and the Upper Valley is northwest of this line (**Figure A**).

The Coachella Valley's groundwater basin can be described as a giant tilted bathtub full of sand, with the high end at the northwest edge of the valley near Whitewater and the low end at the Salton Sea. Water placed on the ground surface in the Upper Valley will percolate through the sand directly into the groundwater aquifer. However in the Lower Valley, several impervious clay layers lie between the ground surface and the main groundwater aquifer. Water applied to the surface in the Lower Valley does not easily reach the lower groundwater aquifers due to these impervious clay layers. The only natural outlet for water in the Coachella Valley is through subsurface outflow to the Salton Sea. A profile of the Coachella Valley groundwater basin in provided in **Figure B**.

Historical Water Management

Water management in the Coachella Valley began as early as 1915 when, with groundwater levels falling, the need for a supplemental water source was recognized in order for the Coachella Valley to continue to flourish. The Coachella Valley Stormwater District was formed in 1915

followed by formation of CVWD in January 1918. In 1918, a contract had been awarded for construction of spreading facilities in the Whitewater River northwest of Palm Springs.

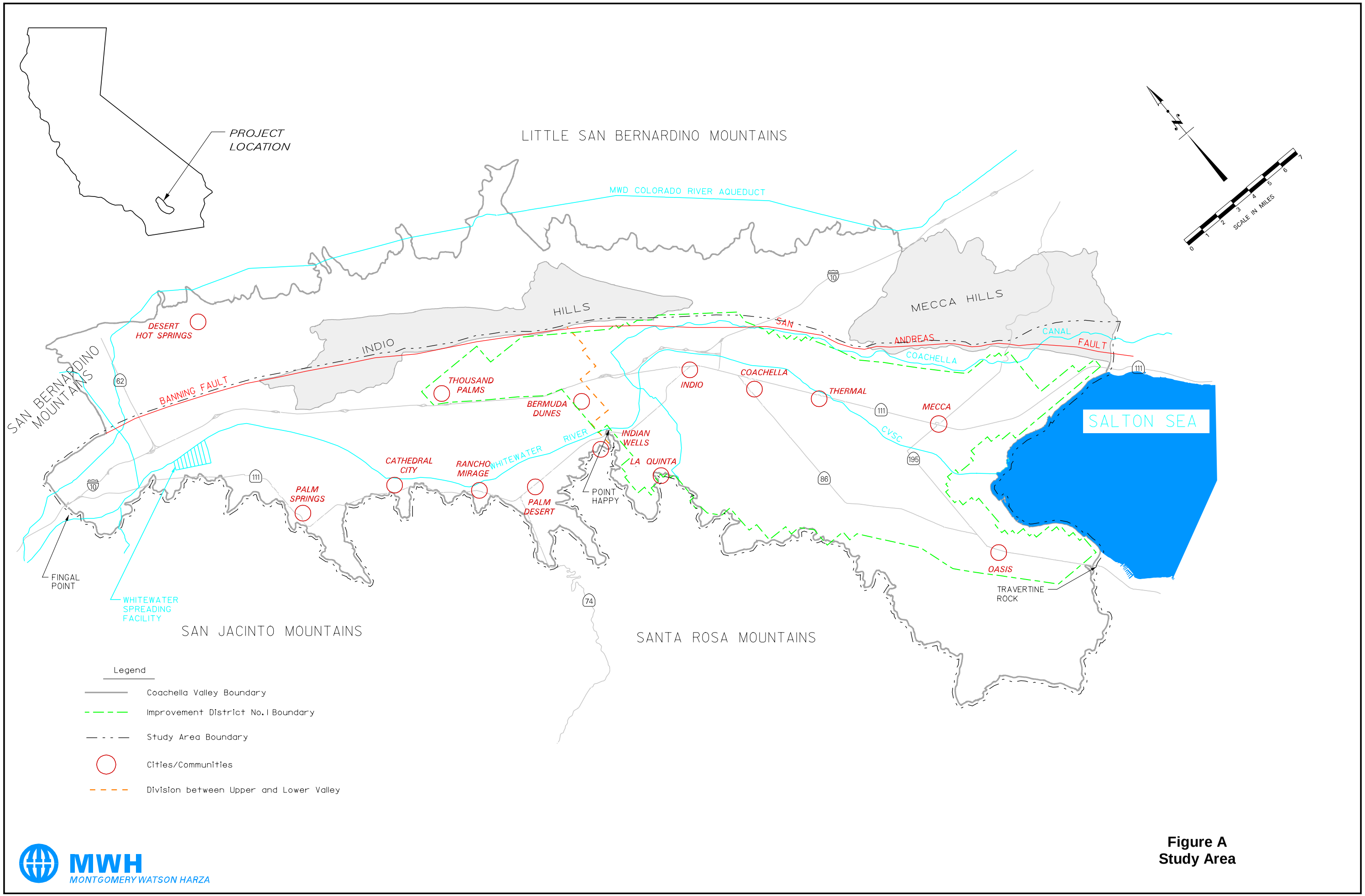
During the next 16 years, District activities focused on obtaining imported Colorado River water. In 1934, negotiations with the federal government were completed, and plans were in place for the construction of the Coachella Branch of the All American Canal. Construction of the Canal began in 1938, was interrupted by World War II, and was finally completed with the first deliveries of imported Colorado River water to area growers in 1949. The impact of imported water on the Coachella Valley was almost immediate. By the early 1960s, water levels in the Lower Valley had returned to their historical highs.

Although groundwater levels in the Lower Valley had stabilized, water levels in the Upper Valley continued to decline. In 1963, the District and Desert Water Agency (DWA) entered into contracts with the State of California for entitlements to State Water Project (SWP) water. To avoid the estimated $150 million cost of constructing an aqueduct to bring SWP water directly to the Coachella Valley, the District and the DWA entered into an agreement with The Metropolitan Water District of Southern California (Metropolitan) to exchange Colorado River water for SWP water.

Starting in 1973, the District and DWA began exchanging their annual SWP entitlement of 61,200 acre-ft with Metropolitan to recharge Upper Valley groundwater supplies at the Whitewater Spreading Facility. CVWD, DWA, and Metropolitan also signed an advance delivery agreement in 1984 that allows Metropolitan to store additional SWP water in wet years. By 1999, the spreading facility had percolated in excess of 1.7 million acre-ft of Colorado River water exchanged for SWP water.

Water levels in the Lower Valley remained relatively stable until the 1980s when they once again began to decline. Groundwater demand had once again exceeded supply, resulting in groundwater level decreases of 60 feet or more in some parts of the Lower Valley. Because groundwater recharge in the Lower Valley is complicated by the existence of relatively impervious clay layers in the Valley floor, the District began looking for sites sufficiently far away from the main clay layer to allow groundwater recharge. In 1995, the District began operating the Dike No. 4 pilot recharge facility (located on the west side of the Lower Valley), which has successfully demonstrated that Lower Valley groundwater recharge is possible. The facility was expanded in 1998 in order to determine the ultimate recharge capacity of a facility at this location. Assuming favorable results, it may be possible to recharge as much as 30,000 to 60,000 acre-ft/yr at this location.

Recycled water has been a priority water management practice in the Coachella Valley for many years. The first permit to use recycled water for golf course irrigation in the Coachella Valley was issued by the Regional Water Quality Control Board to the Palm Desert Country Club in 1965. Today, the District and the DWA provide more than 8,000 acre-ft of recycled water each year for golf course and greenbelt irrigation purposes from four wastewater treatment facilities.



MWH
MONTGOMERY WATSON HARZA

Figure A
Study Area

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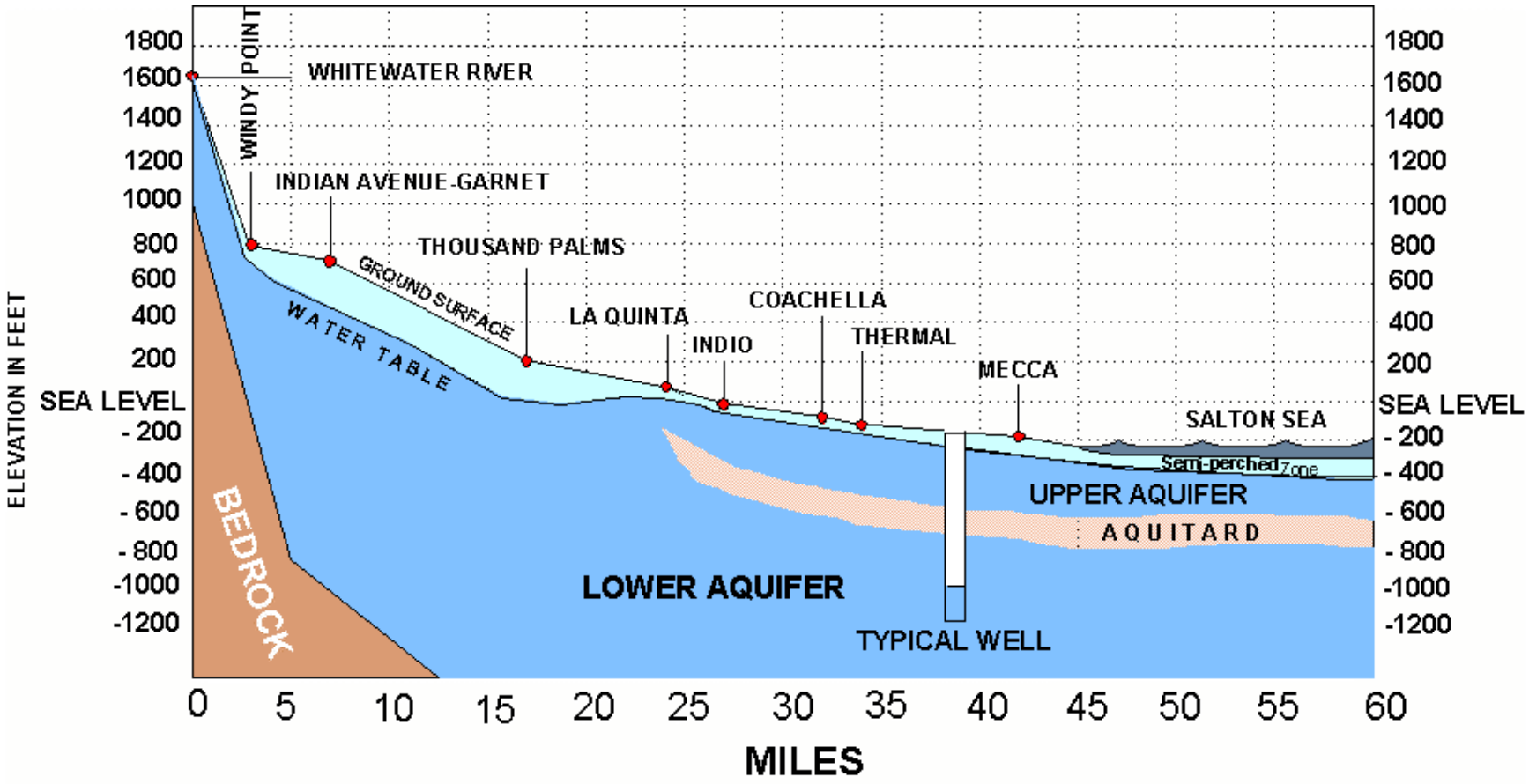


Figure B Coachella Valley Groundwater Basin Profile

Water conservation is also a key ingredient for managing water demands in the Coachella Valley. Water efficient methods such as drip irrigation have changed the face of farming in the Coachella Valley. The District continually educates Valley residents in water-efficient landscaping techniques, works with local farmers to ensure reasonable beneficial use of irrigation water, and provides in-school visits to more than 21,000 children a year, educating them about water conservation, water value, and aquatic safety.

Sources of Water Supply

Water in the Upper Valley is supplied by several sources including groundwater, surface water (local streams), Canal water, and recycled water (see **Figure C**). Lower Valley sources consist primarily of canal water and groundwater with a very small amount of recycled fish farm effluent for agricultural uses (see **Figure D**). Canal water refers to Colorado River water supplied via the Coachella Branch of the All American Canal. The service area for canal water delivery under the District's contract with the U.S. Bureau of Reclamation is defined as Improvement District No. 1 (ID-1).

Figure C
Upper Valley Supplies

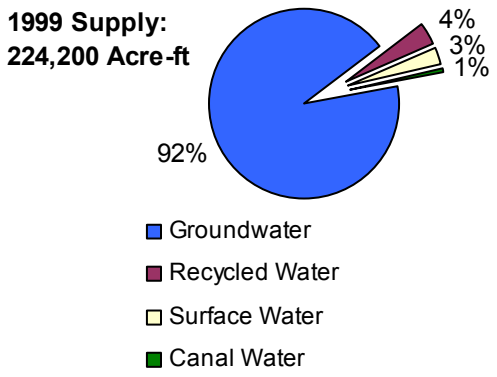
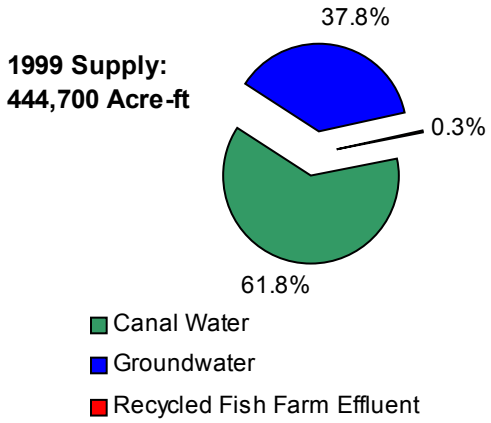


Figure D
Lower Valley Supplies



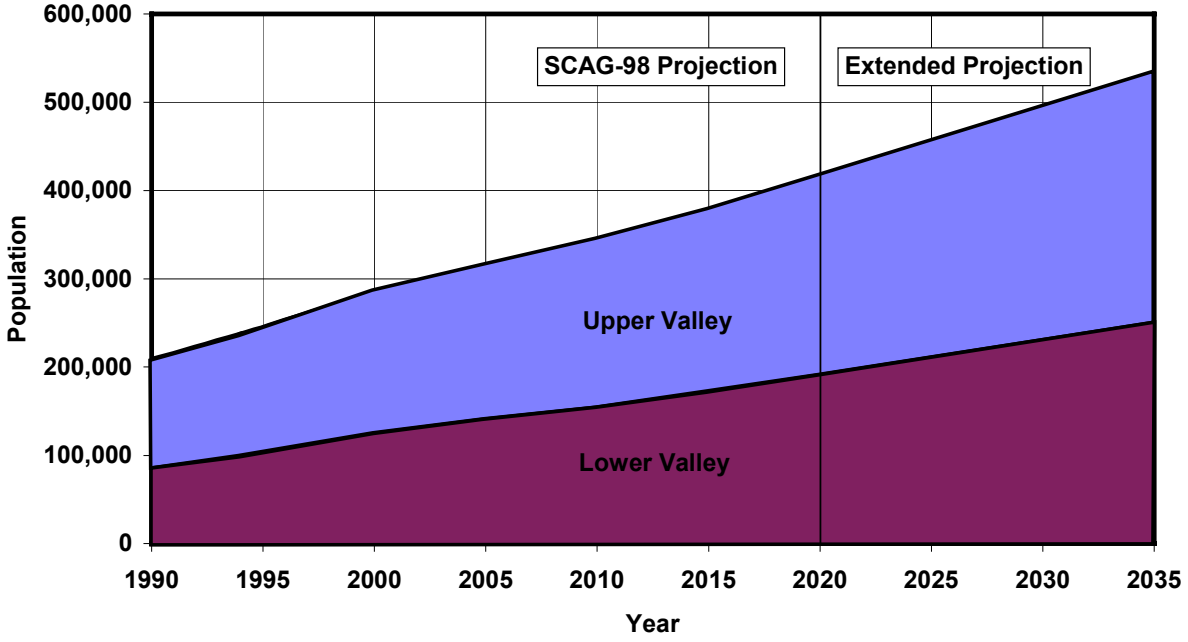
Growing Demands

Demands for water in the Coachella Valley are divided between urban uses (municipal and domestic, industrial, and golf courses) and agricultural uses (crop irrigation, fish farming, greenhouses, and duck clubs). Municipal and domestic demands are expected to increase at a faster rate than agricultural demands primarily due to population growth. Coachella Valley's population within the study area is projected to increase from 285,000 in 2000 to 414,000 in 2020, and to 529,000 in 2035, a growth of 31 percent and 46 percent, respectively (see **Figure E**). Growth will be more rapid in the Lower Valley, where population is projected to nearly double by 2035. Population growth in the Upper Valley is expected to be 76 percent.

The total water demand in 1999 was approximately 669,000 acre-ft/yr, of which 310,000 acre-ft/yr (46 percent) was for urban uses and 359,000 acre-ft/yr (54 percent) was for agricultural uses.

By the year 2035, the total demand is anticipated to be approximately 891,000 acre-ft/yr, an increase of 25 percent. Urban uses represent about 514,000 acre-ft/yr (58 percent) of the future demand while agricultural uses represent the remaining 377,000 acre-ft/yr (41 percent).

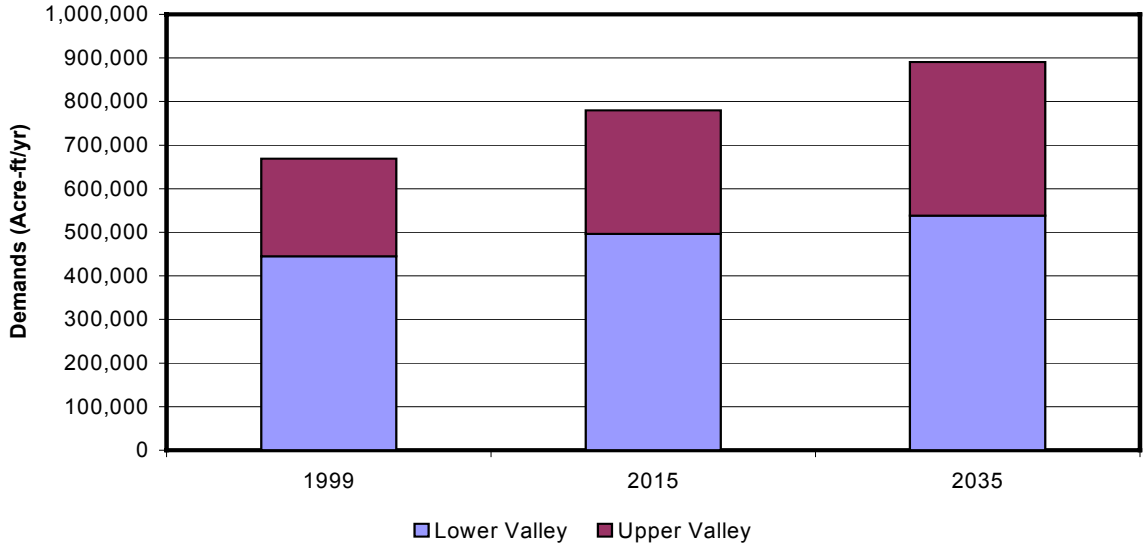
Figure E
Coachella Valley Population



Upper Valley Demands

Upper Valley demand is projected to increase 36 percent from 224,200 acre-ft/yr in 1999 to 352,300 acre-ft/yr in 2035 (see **Figure F**) due to population growth and increased golf course use.

Figure F
Coachella Valley Demands



Lower Valley Demands

Lower Valley demand is projected to increase 17 percent from 444,700 acre-ft/yr in 1999 to 538,300 acre-ft/yr in 2035 (see Figure F) due to population growth and increased golf course use as well as some additional agricultural use.

Current Condition of Coachella Valley Groundwater Basin

Since the early part of this century, the Coachella Valley has been dependent on groundwater as a source of supply. The demand for groundwater has annually exceeded the limited natural recharge of the groundwater basin. The condition of a groundwater basin in which the outflows (demands) exceed the inflows (supplies) to the groundwater basin is called "*overdraft"*.

The State of California Department of Water Resources Bulletin 160-93 describes *overdraft* as follows:

> "Where the groundwater extraction is in excess of inflow to the groundwater basin over a period of time, the difference provides an estimate of overdraft. Such a period of time must be long enough to produce a record that, when averaged, approximates the long-term average hydrologic conditions for the basin."

Bulletin 118-80 defines "overdraft as the condition of a groundwater basin where the amount of water extracted exceeds the amount of groundwater recharging the basin over a period of time." It also defines "critical condition of overdraft" as water management practices that "would probably result in significant adverse overdraft-related environmental, social, or economic effect." Water quality degradation and land subsidence are given examples of two such adverse effects.

This overdraft condition or "mining" of the groundwater has caused groundwater levels to decrease more than 60 feet in portions of the Lower Valley and raised concerns about water quality degradation and land subsidence. Groundwater levels in the Upper Valley have also decreased substantially, except in the areas near the Whitewater Spreading Facility where artificial recharge has successfully raised water levels.

Continued overdraft will have serious consequences for the Coachella Valley. The immediate and direct effect will be increased groundwater pumping costs for all water users. Wells will have to be deepened, larger pumps will have to be installed, and energy costs will increase as the pump lifts increase. Eventually, the need for deeper wells and larger pumps will have an adverse impact on agriculture and will increase the cost of water for municipalities, resorts, homes, and businesses. Continued decline of groundwater levels could result in a substantial and possibly irreversible degradation of water quality in the groundwater basin.

Continued overdraft also increases the possibility of land subsidence within the Valley. As groundwater is removed, the dewatered soil begins to compress from the weight of the ground above, causing subsidence. Subsidence can cause ground fissures and damage to buildings, homes, sidewalks, streets, and buried pipelines - all of the structures that make the Valley livable. Recent studies indicate that as much as 7 centimeters of subsidence occurred in the Palm Desert area between 1996 and 1998.

The calculation of an annual value of overdraft that accounts for all of the components of overdraft is difficult. One method of estimating the overdraft is to look at the net annual change in freshwater storage in the basin. Change in freshwater storage is the difference between the inflows and outflows of the basin, excluding the inflows of poor-quality water (irrigation return flows and Salton Sea water) which are induced by the overdraft. By excluding these inflows, a more accurate approximation of actual annual overdraft is possible. In 1999, the change in freshwater storage in the Coachella Valley is estimated to be 136,700 acre-ft/yr. The cumulative change in freshwater storage from 1936 to 1999 is estimated to be nearly 4.8 million acre-ft i.e., 4.8 million acre-ft of freshwater was withdrawn from the basin and not replaced. Using freshwater storage as an indicator of overdraft does not account for all aspects of overdraft such as subsidence and other water quality, environmental, social, and economic effects.

Action Required by Coachella Valley Water District

It is clear that the continued decline of groundwater levels and overdraft is unacceptable. The District is charged with providing a reliable, safe water supply to its area of the Valley now and in the future. In order to fulfill its obligations to Valley residents, the District must take action to prevent continuing decline of groundwater levels and degradation of water quality. A comprehensive water management plan will guide the District in its efforts to prevent groundwater level decline, protect water quality, prevent subsidence, and expand its water conservation programs.

WATER MANAGEMENT PLAN PROCESS

To meet its responsibilities for ensuring that there are adequate water supplies in the future, the District initiated a planning process in the early 1990s. The process initially addressed the Lower Valley, but was expanded to include the entire Coachella Valley in 1995. This Plan is the product of that process.

Goals and Objectives

The goal of the Water Management Plan is to assure adequate quantities of safe, high-quality water at the lowest cost to Coachella Valley water users. To meet this goal, four objectives have been identified:

1. eliminate groundwater overdraft and its associated adverse impacts, including:
    - groundwater storage reductions,
    - declining groundwater levels,
    - land subsidence, and
    - water quality degradation,
2. maximize conjunctive use opportunities,
3. minimize adverse economic impacts to Coachella Valley water users, and
4. minimize environmental impacts.

Formulation of Plan Alternatives

The District staff and consultants conducted several brainstorming sessions to identify potential water management elements for inclusion in the Plan. Potential elements were considered without regard to cost, potential environmental impact, technical feasibility, or other considerations. Additional input was obtained through public meetings with local Indian tribes, state and federal agencies, regional and local governments, other interested and affected parties, and the public at large resulting in additional potential management elements for consideration. A detailed description of the element screening and alternative formulation process is contained in **Appendix B**.

Potential management elements were subsequently organized into six categories: pumping restrictions, demand reduction , local water sources, imported water sources, water management actions, and water quality approaches. Each of the potential management elements was rated based on the element's ability to reduce overdraft, technical feasibility, potential environmental impacts, costs, legal and regulatory factors, and regional economic impacts. Based on these ratings, numerous potential elements were eliminated from further consideration.

The remaining "short-listed" elements were organized into the following conceptual management alternatives:

- No Project,
- Pumping Restrictions,
- Demand Management,
- Groundwater Recharge,
- Source Substitution, and
- Combinations of the above.

With the exception of the No Project alternative, which is required under the California Environmental Quality Act (CEQA), a preliminary evaluation of each alternative was performed to determine which alternatives should be formally considered and evaluated in the Plan. The evaluation process involved technical analyses coupled with professional judgement and experience. The following four proposed alternative management scenarios were selected for evaluation within the Plan.

Alternative 1 – No Project

The No Project Alternative, would involve continuation of current water management actions by the District which include:

- groundwater recharge in the Upper Valley at historical average rates (approximately 50,000 acre-ft/yr),
- supplying Canal water to existing golf courses and agricultural users,
- supplying Canal water to all new agricultural users and new golf courses within ID-1,
- supplying excess recycled wastewater effluent beyond percolation capacity from the Palm Springs Wastewater Reclamation Plant (WRP-10) to area golf courses, and
- domestic, golf course, and agricultural water conservation at current levels.

Alternative 2 – Pumping Restriction by Adjudication

Alternative 2 assumes court-ordered restrictions imposed through a process in which the water rights of the basin are allotted to individual groundwater pumpers. Court-ordered restrictions would likely require groundwater pumping be reduced throughout the Coachella Valley to the point where basin inflows and outflows balance. This balance point, also known as perennial yield, is the amount of groundwater that can be pumped each year without adversely depleting the basin, lowering long-term groundwater levels, or degrading water quality. The exact limit of individual well pumpage is determined in the adjudication process.

Since overdraft exists in both the Upper and Lower Valleys, any adjudication will necessarily apply to both areas. The overdrafts in the Upper and Lower Valleys are different; thus the pumping reductions associated with the adjudication could be computed separately for each portion of the Valley. In order to accommodate the perennial yield of the basin, Upper Valley

pumping would have to be reduced by approximately 35 percent while in the Lower Valley pumping would have to be reduced by approximately 75 percent.

Alternative 3 – Management of Demand and Maximization of Local Resources

Alternative 3 focuses on maximizing the use of available local water resources and managing water demand while maintaining imported water usage at approximately current levels. Demand would be managed, to the extent practical, by maximizing water conservation for both urban and agricultural uses. Local resources would be maximized by the increased use of recycled water. The primary features of Alternative 3 include:

- implementation of extensive water conservation measures for urban water use,
- reduction of non-agricultural irrigation demand through mandatory xeriscaping for new residential, commercial, and golf course properties,
- increased conservation by agricultural water users through the use of more efficient irrigation technology and application methods,
- increasing recycled water use by Upper and Lower Valley golf courses, homeowner associations, and agricultural users, and
- fixing imported water supplies at historical levels.

Alternative 4 – Combination Alternative

Alternative 4 engages elements within three basic water management categories: conservation, groundwater recharge, and source substitution. The most feasible and cost effective management elements are combined to form an alternative that incorporates the following:

- urban, golf course, and agricultural conservation measures.
- groundwater recharge in the Upper and Lower Valleys.
- numerous source substitution elements including
- Canal water to agricultural groundwater users within ID-1,
- Canal water for golf course irrigation within ID-1,
- additional recycled water to Upper Valley golf courses,
- desalted agricultural drain water for agricultural irrigation outside ID-1,
- recycled water for agricultural irrigation in Lower Valley,
- treated Canal water for urban uses within ID-1,
- direct delivery of SWP exchange water for Upper Valley golf course irrigation.

EVALUATION OF ALTERNATIVES

Each proposed alternative was evaluated against a set of specific criteria based on the goals and objectives of the Plan. The evaluation criteria are the foundation of the overall evaluation process used to select the preferred alternative. The evaluation process and criteria are described below.

Evaluation Process

The evaluation process involved technical analyses, application of the evaluation criteria, professional judgment, and experience. To assist in the evaluation process, the District developed a three-dimensional groundwater model (model) for the Coachella Valley. The model provides a consistent, scientific basis for identifying the impacts of the proposed management alternatives on groundwater basin storage, groundwater levels, land subsidence, and water quality. A brief description of the model is provided in **Appendix C**.

Another important technical evaluation tool was an economic evaluation of the four management alternatives. The purpose of this evaluation was to provide a comparative economic and financial evaluation among the four alternatives within the Coachella Valley as a whole. The evaluation provided a reconnaissance level, order of magnitude comparison of the economic and financial effects of each alternative. In general, the evaluation of economic and financial effects focused on year 2015, to provide an assessment of near-term impacts, and 2035, to allow assessment of longer-term impacts.

Evaluation Criteria

The following criteria, reflecting the goals and objectives of the Plan, were used to evaluate each alternative:

The ability to eliminate groundwater overdraft and associated adverse impacts, including:

1. decreasing groundwater basin storage,
    - declining groundwater levels,
    - land subsidence,
    - water quality degradation,
2. The ability to maximize conjunctive use opportunities.
3. The ability to minimize adverse economic impacts to Coachella Valley water users.
4. The ability to minimize environmental impacts.

A brief description of the specific methodology used with each evaluation criterion is discussed below.

Criterion 1: Eliminate Overdraft and Associated Adverse Impacts

The elimination of the groundwater basin overdraft and the associated adverse impacts are primary goals of the Plan. The inflows to the groundwater basin must meet or exceed the outflows (an increase in groundwater storage) in order to eliminate the overdraft. Groundwater levels must be stabilized at levels that will prevent land subsidence and water quality degradation.

Changes in Groundwater Basin Storage. Change in groundwater basin storage is evaluated in terms of the change in total storage and the change in freshwater storage. For each alternative, the model-predicted future (2035) groundwater inflows and outflows for both the Upper and Lower Valley are compared. The changes in both total and freshwater storage are then determined using these estimates. For Alternative 2, the change in total storage is used to represent the perennial yield of the groundwater basin. The change in freshwater storage is used to estimate the groundwater overdraft.

Groundwater Levels. As groundwater levels decline due to reductions in groundwater storage, the potential for associated adverse impacts such as land subsidence and water quality degradation increases significantly. The changes in Upper and Lower Valley groundwater levels from 1999 to 2035, as predicted by the model, are compared.

Land Subsidence. A recent USGS study of land subsidence in the Lower Valley indicated that land subsidence resulting from groundwater pumping may have occurred since the early 1990s, when groundwater levels began declining below previously recorded lows in 1949. To evaluate the potential for land subsidence, the model-predicted 2035 groundwater levels for each alternative are compared to the 1999 groundwater levels. If the 2035 groundwater levels are below the 1999 levels, the potential for land subsidence is likely to increase. Conversely, if the 2035 groundwater levels are above the 1999 levels, the potential for land subsidence is reduced.

Water Quality Degradation. Water quality degradation is a serious adverse impact of overdraft. In particular, declining water levels and decreased drain flows allow the migration of poor-quality water into the underlying aquifer units of the basin and prevent the removal of applied salts from leaving the basin through the drains. To evaluate the potential for water quality degradation, the projected salt balance in 2015 and 2035 is compared to current conditions.

Criterion 2: Maximize Conjunctive Use Opportunities

Each alternative is evaluated based on the alternative's ability to maximize conjunctive use opportunities. Conjunctive use of surface and groundwater may be defined as an integrated plan that capitalizes on the combination of available surface and groundwater resources in order to achieve a reliable long-term water supply. When surface water i.e., SWP exchange water, Canal water, recycled water, or surplus Colorado River water, is available, surface water is utilized to the maximum extent possible. Surface water not used directly is also recharged to augment groundwater storage. Conversely, when surface supplies are limited, surface water resources may be supplemented by pumping groundwater.

The conjunctive use potential of each alternative is evaluated based on its ability to:

1. store available surface water supplies,
2. extract stored water, and
3. utilize alternate sources of supply in-lieu of groundwater.

Criterion 3: Minimize Economic Impacts

This criterion provides a comparative evaluation of the economic and financial impacts associated with the Plan alternatives. The evaluation is based on a reconnaissance-level economic and financial analysis. The economic impact analysis of each alternative considers six economic factors:

- economic sustainability,
- economic development,
- regional economic activity measures,
- economic and financial risks,
- direct costs, and
- indirect costs or savings.

Economic sustainability, economic development, and regional economic impact assessments are made by comparing the projected economic conditions in the Coachella Valley and conditions that could occur under each Plan alternative.

Criterion 4: Minimize Environmental Impacts

The District has prepared a Program Environmental Impact Report (PEIR) to fully assess the potential environmental impacts of each alternative and to develop feasible mitigation measures to minimize those effects. The PEIR summarizes the results of technical and environmental analyses and stakeholder input regarding the Plan alternatives. In addition to the criteria on groundwater effects and water supply, the PEIR evaluates the following factors:

- surface water resources (Coachella Canal, Coachella Valley Stormwater Channel, agricultural drains, and Salton Sea),
- energy use (pumping),
- land use (crop patterns, water use patterns, golf course operations, etc.),
- population/housing
- geology/soils/seismicity (liquefaction and subsidence),
- Indian trust assets,

- Public health and safety/hazardous materials
- aesthetics and recreation,
- air quality,
- noise,
- cultural resources (archaeological and historic), and
- sensitive aquatic, riparian, and terrestrial species and habitats (agricultural drains, uplands, Salton Sea, and Coachella Canal).

Evaluation Results

The evaluation results relative to each criterion are discussed below.

Criterion 1: Eliminate Overdraft and Associated Adverse Impacts

Changes in Groundwater Basin Storage. With respect to the change in total groundwater basin storage in 2035, Alternatives 2 and 4 would result in positive changes in 2035. However, Alternative 4 is the only alternative that would result in a cumulative increase in total storage over the planning period (1999 to 2035). With respect to the change in freshwater storage in 2035, only Alternative 4 will completely eliminate the overdraft throughout the Valley. Additional pumping restrictions under Alternative 2 would be necessary to eliminate the overdraft in the Lower Valley.

Declining Groundwater Levels. Within the Upper Valley, Alternative 4 would minimize the decline in groundwater levels from 1999 to 2035. Alternatives 2 and 4 would increase groundwater levels throughout the Lower Valley with Alternative 4 resulting in the greatest overall increase.

Land Subsidence. Subsidence normally occurs in aquifers with thick clay layers that can compress when dewatered. The Upper Valley consists predominantly of sandy soils with relatively thin clay layers. There appears to be minimal increased potential for land subsidence in the Upper Valley because the aquitard separating the Upper and Lower Aquifers is thin or absent in much of the Upper Valley (such as Palm Springs and North Palm Springs). Except for the southern portion of the Upper Valley, the model-predicted 2035 groundwater levels under Alternatives 2 and 4 throughout the Valley are higher than the 1999 levels. Water levels throughout the Lower Valley were projected to be higher than 1999 with these alternatives. Therefore, Alternatives 2 and 4 would best minimize the potential for land subsidence.

Water Quality Degradation. The current net salt addition in the Coachella Valley is 265,000 tons per year. By 2035, Alternative 1 would result in the highest rate of salt addition to the Coachella Valley of 504,000 tons per year—a dramatic increase compared to 1999 conditions. The net salt addition in 2035 would decrease compared to current conditions under Alternative 2 (68,000 tons per year) and Alternative 4 (155,000 tons per year) with Alternative 2 best minimizing the water quality degradation.

Criterion 2: Maximize Conjunctive Use Opportunities

With regards to the ability to store and extract surface water supplies, all four alternatives received "excellent" rankings in the Upper Valley due to the presence of the Whitewater Spreading Facility and continued use of wells for water supply. In the Lower Valley, Alternative 4 received a "good" ranking regarding the ability to store and extract water while Alternatives 1, 2, and 3 each received "poor" rankings due to the lack of groundwater recharge under these alternatives.

The ability to utilize alternate supply sources evaluated in-lieu use and direct recharge use. Three primary alternate sources of supply for in-lieu use are recycled water, Canal water, and SWP exchange water. Due to the ability to utilize each of these three alternate sources, Alternative 4 received an "excellent" ranking for recycled in-lieu use. Alternative 4 received a similar "excellent" ranking regarding the in-lieu use of Canal water as an alternate supply source. In-lieu use of Canal water under the other alternatives is minimal. SWP exchange water is utilized as an alternate supply source only under Alternative 4, where exchange water would be delivered to Upper Valley golf courses in-lieu of groundwater. Alternative 4 received an "excellent" ranking regarding the use of SWP exchange water.

Under Alternatives 1, 2, and 3, the ability to utilize alternate sources of supply for direct recharge use is limited to the continuation of Upper Valley recharge at the Whitewater River spreading facility. These alternatives received rankings of "fair" since no increased Upper Valley recharge is included. Only Alternative 4 would utilize Canal water as an alternate supply source for direct recharge in the Lower Valley and, therefore, received an "excellent" ranking.

Overall, Alternative 4 received the highest ranking regarding the ability to maximize conjunctive use opportunities.

Criterion 3: Minimize Economic Impacts

By 2035, reductions in groundwater supplies available for crop production and golf courses under Alternative 2 would likely diminish crop revenues and visitor spending in the Coachella Valley by more than $200 million per year compared to 2000 demand levels, more than $500 million per year compare to 2015 demand projections, and by more than $700 million compared to 2035 demand projections. About 3,000 jobs linked to agriculture and tourism would be lost compared to 2000, more than 6,600 would be lost compared to 2015, and more than 8,200 jobs could be lost compared to 2035 projections. In addition, reductions in groundwater supplies for municipal and domestic use would support 89,000 fewer permanent residents in 2000 and 32,000 fewer seasonal residents than live in the Valley today.

Long-term water quality degradation under Alternatives 1 and 3 also has adverse economic consequences. Higher plumbing and equipment replacement costs, lower crop yields, and the expense of various treatment or filtering devices would be incurred due to degradation of water quality.

Alternative 4 would provide overall economic sustainability, maintain currently projected economic development, minimize impacts to the regional economy, and would not result in increased economic and financial risks to the Valley. Alternative 4 would best minimize the economic impacts to Valley water users due to lower net costs.

Criterion 4: Minimize Environmental Impacts

Based upon a comparison of Plan alternatives with respect to several environmental factors, Alternative 4 would have the greatest beneficial effect on Coachella Valley water supplies and is the overall environmentally superior alternative. Alternative 4 best meets project objectives by combining environmental benefits and minimizing impacts. Alternative 4 eliminates overdraft, creating stable water levels in the Upper Valley and increasing water levels in the Lower Valley. Subsidence potential halts and energy use for groundwater pumping is also minimized. In addition, Alternative 4 also provides the least adverse impacts to surface water, groundwater, biological and human resources.

Under Alternative 4, agricultural drain/CVSC flows are projected to return to approximately mid-1970s levels, compared to a decrease under Alternative 1 – No Project and smaller increases with other alternatives. As a result of the increased drain flows, Alternative 4 will decrease the net salt increase rate in the groundwater basin relative to 1999 conditions. However, in some areas, particularly around the recharge basins, a secondary water quality objective for TDS could be exceeded. Therefore, the desalination alternative may provide additional groundwater quality benefits. However, this variation of the Alternative 4 would have many more adverse impacts.

Selection of Preferred Alternative

As previously stated, the goal of the Water Management Plan is to assure adequate quantities of safe, high-quality water at the lowest cost to Coachella Valley water users. Implementation of Alternatives 1, 2, and 3 would result in significant adverse economic impacts to the Coachella Valley. These alternatives would not sustain long-term economic viability, they would add considerable financial risk, they would curtail economic development, and they would not sustain the economy of the Coachella Valley. When the economic costs of these impacts are considered, the net costs of Alternatives 1, 2, and 3 would be extremely high. The social, economic, and environmental impacts of these alternatives would also make them undesirable.

Alternative 2 shows positive impacts in terms of change in groundwater storage, increased groundwater levels, and decreased potential for land subsidence and water quality degradation. However, the near-term economic consequences of Alternative 2 would be severe. The benefits of Alternative 2 would be equally achievable under Alternative 4 without the severe adverse economic impacts to the Valley. From among Alternatives 1, 2, 3, and 4, the alternative(s) that best meets each evaluation criterion are summarized in **Table 1**.

Table 1
Summary of Evaluation Results – Alternatives 1, 2, 3, and 4

Evaluation Criteria	Preferred Alternative(s)			
	1	2	3	4
1. Eliminate overdraft				♦
a Change in groundwater storage				
• Total change in storage				♦
• Change in freshwater storage				♦
b Declining groundwater levels		♦		♦
c Land subsidence		♦		♦
d Water quality degradation		♦		
2. Maximize Conjunctive Use Opportunities				♦
3. Minimize Economic Impacts				
Economic sustainability, economic development, economic and financial risk, and regional economy				♦
Net cost				♦
4. Minimize Environmental Impacts				♦

"♦" denotes a relatively superior alternative - multiple dots denote equally superior alternatives

The evaluation results indicate that Alternative 4 would best:

- maximize the increase in total storage,
- eliminate groundwater overdraft throughout the Valley,
- minimize the decline of groundwater levels in the Upper Valley while increasing groundwater levels throughout the Lower Valley,
- minimize the potential for land subsidence,
- maximize conjunctive use opportunities,
- minimize the economic impacts to Valley water users, and
- minimize the environmental impacts.

Based on these results, Alternative 4 best meets the objectives of the Plan.

IMPLEMENTATION OF THE PREFERRED ALTERNATIVE

The preferred alternative includes water conservation, groundwater recharge, and source substitution management elements. Implementation of the preferred alternative will require numerous decisions regarding the priorities for implementation, the financing mechanisms for various elements of the plan, potential cooperative agreements with other agencies, and balancing needs with available resources. A significant activity in decision-making and implementation is

coordination and consultation with other governing agencies and tribal interests. The District cannot, nor should it, attempt to unilaterally implement water management activities that are within the purview of local or other governments. This coordinating effort will be a major focus of implementation. Detailed implementation plans will be developed by the District for each water management category following completion of the Water Management Plan. The preferred alternative includes water conservation, groundwater recharge, and source substitution management elements. The general locations of these elements are shown in **Figure G**. The implementation strategies within each water management category are discussed below.

Water Conservation

Conservation measures can be applied to all water uses; however, in the Coachella Valley, the primary focus of water conservation is on municipal, agricultural irrigation, golf course irrigation and fish farm uses. As shown in **Table 2**, water conservation measures are expected to decrease total water demand by approximately seven percent by 2015.

This level of reduction will be maintained through the remainder of the planning period. By 2035, water conservation is expected to further reduce demands.

Table 2
Minimum Water Conservation Assumptions for the Preferred Alternative

Water Use Category	Minimum Conservation Goal (Reduction from No Project Demand)
Municipal	10 percent by 2010
Golf Courses	
Existing in 1999	5 percent by 2010
Built after 1999 [1]	Case-by-Case
Industrial	Case-by-Case
Crop Irrigation	7 percent by 2015
Fish Farms	Case-by-Case
Duck Clubs	Case-by-Case
Greenhouses	Case-by-Case
Total Demand	**7 percent**

1 Future golf courses are assumed to implement water conservation measures under No Project

Municipal Conservation

Under the preferred alternative, the District will revise and update the urban water management plan submitted to the California Department of Water Resources (DWR). The goal will be to further reduce urban water demand by a minimum of 10 percent by 2010 and maintain this level of reduction throughout the planning period without producing dramatic lifestyle changes on the part of those conserving. In the future, as total demand increases, the volume of water conserved will increase.

During revision of the urban water management plan, various existing and new water conservation measures will be evaluated including:

- Water Efficient Landscaping – maintaining water-efficient urban and residential landscaping and irrigation systems, optimizing existing systems, improving the overall efficiency of local water use, developing and enforcing water efficient landscape ordinances.
- Water Efficient Plumbing – retrofitting indoor plumbing with ultra-low flush toilets and low-flow showerheads, encouraging development of local ordinances requiring retrofitting as a condition of sale of a property, installing water efficient plumbing in all new buildings.
- Tiered or Seasonal Water Pricing – revising the District's water pricing structure to a tiered or increased block-rate structure that will encourage water conservation by increasing the price of water either year-around or seasonally as usage increases.
- Public information and education programs – promoting the importance of water conservation efforts within the schools and to the general public.
- Alternate Water Supplies – requiring the use of alternate water supplies (such as recycled or Canal water) for urban irrigation purposes where available.
- Municipal Development Policies – working with municipalities, counties, and other agencies to incorporate specific policies regarding water conservation measures into future general plan updates and development policies.
- Conservation Coordinator – designating a full-time position and support staff as required to coordinate and develop water conservation plans.
- Maximum Allowable Water Allowance – establish new and enforce existing annual Maximum Applied Water Allowances for parks, playgrounds, sports fields, school yards, and other recreational areas.

Agricultural Conservation

As presented in Table 2, the goal is to reduce agricultural demand for crop irrigation by approximately 7 percent by 2015. This corresponds to an increase in irrigation efficiency from 70 to 75 percent. Conservation would be maintained at this level for the remainder of the planning period. The District will prepare an agricultural water conservation plan to develop and evaluate specific existing and new agricultural conservation measures including:

- Efficient Irrigation Practices – working with Valley growers to ensure that the most up-to-date irrigation practices are being employed, converting from furrow irrigation to drip irrigation, refining existing drip irrigation management and design to improve distribution uniformity such as buried drip systems, installation of pressure compensating emitters, and including more emitters per line.

- On-farm Water Audits – reviewing individual grower's water use practices on a field-by-field basis and evaluating the unique characteristics of each field and crop type. Confidential reports will be made to each grower indicating the general efficiency of each field and containing recommendations for improved efficiency.

Golf Course Conservation

Golf course conservation is expected to reduce the water demand of existing golf courses by at least 5 percent by 2010 and maintain that level throughout the planning period. The District will prepare a golf course water conservation plan to develop and evaluate specific existing and new golf course conservation measures including:

- Efficient Irrigation Practices-promoting the use of more efficient irrigation techniques, such as improved sprinkler layouts, computer-based irrigation systems and ET-based irrigation scheduling.
- Golf Course Turf Restrictions-establishing criteria in a local ordinance to specify the maximum allowable irrigated area for golf courses. Such an ordinance would restrict the placement of turf grass on the tees, greens, and small portions of the fairways.
- Maximum Allowable Water Allowance-enforce existing annual Maximum Applied Water Allowances for newly installed and rehabilitated landscapes. Establish annual Maximum Applied Water Allowances for golf courses.

District Operating Policies

In addition, the District is in the process of reviewing its operating policies. The purpose of this review is to identify CVWD operating policies that (1) result in additional water savings or (2) make the use of Canal water more attractive to groundwater users.

Evaluation of Water Conservation Programs

The District's water conservation programs will be evaluated to determine the effectiveness of voluntary programs with recommendations for improvement in specific areas, such as public education, ordinances, etc. Based on the evaluation results, additional conservation measures will be considered.

Additional Water Supplies

In addition to water conservation, the District and DWA will need to obtain additional water supplies to eliminate current and future overdraft. Evaluation of many potential alternative supplies has identified four sources that will be augmented as part of the preferred alternative. These sources are the Colorado River, State Water Project, Whitewater River and recycled water. The steps to be taken to augment these supplies are discussed below.

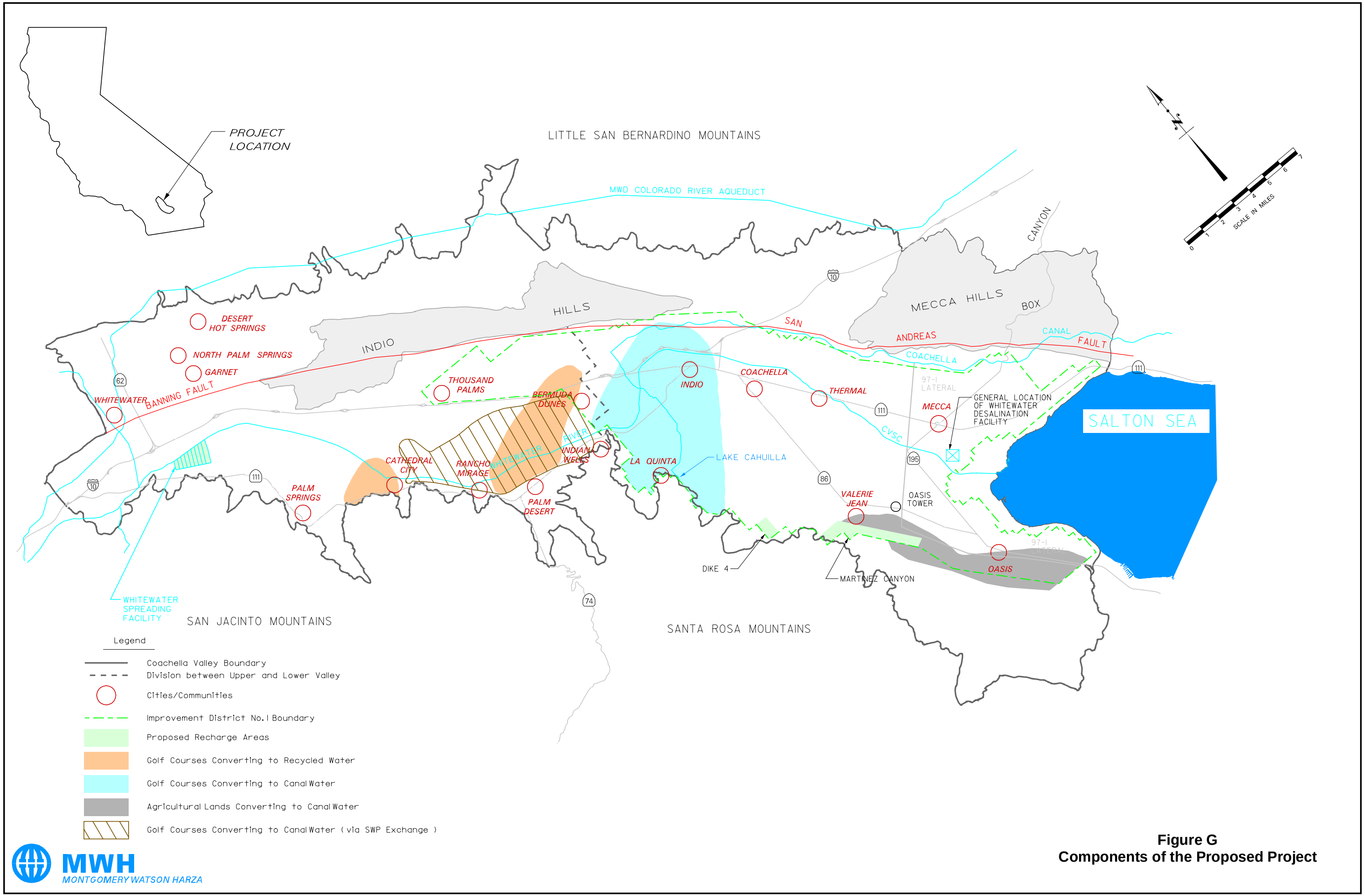


Figure G
Components of the Proposed Project

Colorado River Water

In October 1999, CVWD, IID and Metropolitan reached agreement on the "key terms" that will be necessary elements in a formal Quantification Settlement Agreement (QSA) regarding a division and quantification of their respective shares of Colorado River water. The detailed QSA document is being prepared for review and, pending completion of all required environmental reviews, formal approval by the three agencies' Boards. The intent of this agreement is to quantify the rights of each agency and allow the transfer of water between willing buyers and sellers. The Quantification Settlement includes:

- Capping IID and CVWD Priority 3 water,
- Modification to the 1988 IID/Metropolitan Water Conservation Agreement,
- Amendment to the 1989 Metropolitan/IID/CVWD/PVID Approval Agreement and transferring 20,000 acre-ft/yr to CVWD,
- Conservation and transfer of 200,000 acre-ft/yr from IID to SDCWA,
- Exchange Agreement between SDCWA and Metropolitan,
- Conservation and transfer of 100,000 acre-ft/yr from IID to CVWD,
- Lining the All-American Canal and the Coachella Canal and transfer of conserved water to Metropolitan less 16,000 acre-ft/yr for the San Luis Rey Indian Water Rights Settlement,
- Sharing obligations to provide 14,500 acre-ft/yr from IID and CVWD for miscellaneous present perfected rights,
- Transferring 35,000 acre-ft/yr of SWP water from Metropolitan to CVWD,
- Quantification of surplus water available under Priority 6 and 7,
- Sharing of shortages between CVWD and IID when there is less than 3.85 million acre-ft/yr available to Priorities 1, 2, 3a and 3b,
- Various conditions precedents for approval of the final agreement,
- The term of the QSA is 75 years.

Under the Quantification Settlement Agreement, CVWD's consumptive use entitlement under its share of the Priority 3 allotment is capped at 330,000 acre-ft/yr at Imperial Dam for the quantification period, less an amount of water equal to that conserved by CVWD for the benefit of others as identified in the QSA and subject to adjustments as provided in the Inadvertent Overrun and Payback Policy (IOP). CVWD agrees to forbear use of up to 3,000 acre-ft/yr to satisfy the present perfected rights (PPRs) of miscellaneous and Indian rights holders. CVWD also agrees to reduce its diversion by 26,000 acre-ft/yr due to lining the Coachella Canal. Metropolitan will provide 20,000 acre-ft/yr to CVWD at Imperial Dam under the 1989 Approval Agreement for the 1988 Metropolitan/IID Water Conservation Agreement. CVWD has the option to purchase water from IID in two phases of 50,000 acre-ft/yr each. This water would be made available by the implementation of water conservation measures by IID which are financed

by the payments for water by CVWD. The first phase would be available beginning in 2007 and the second phase would be available beginning in 2017. Under the terms of the settlement agreement, CVWD may acquire the water in increments of 5,000 acre-ft/yr, reaching full entitlement by 2033. CVWD may acquire the water at rates of 3,000 acre-ft/yr and 4,000 acre-ft/yr given one year's notice to IID. Metropolitan will transfer 35,000 acre-ft/yr of its SWP entitlement to CVWD on a permanent basis. CVWD, IID and Metropolitan have agreed to provide 16,000 acre-ft/yr of water from the lining of the All-American and Coachella Canals as part of the San Luis Rey settlement. During wet years, CVWD will also have access to 119,000 acre-ft/yr of Priority 6 water after Metropolitan and IID have received 38,000 acre-ft/yr and 63,000 acre-ft/yr, respectively.

If there is less than 3.85 million acre-ft/yr available to Priorities 1, 2, 3a, and 3b, the deficiency is borne by CVWD and IID. CVWD and IID shall negotiate a consensual sharing of the shortfall. In the event that a consensual resolution cannot be reached, either CVWD or IID may commence litigation to resolve the allocation of the shortfall. During the litigation process, the shortfall shall be provisionally allocated 75 percent to IID and 25 percent to CVWD until IID is reduced to its PPR, after which all remaining shortfalls would be borne entirely by CVWD. If IID were reduced to its PPR, water transfers under the QSA would be suspended.

An inadvertent overrun is defined as Colorado River water that is diverted, pumped or received by an entitlement holder in excess of the water user's entitlement for that year beyond the control of the water user. The IOP establishes a policy to identify and account for inadvertent overruns and define subsequent payback provisions. The IOP limits CVWD to a maximum overrun of approximately 10 percent of its normal year entitlement. Depending on the water level in Lake Mead, the overrun must be paid back within one to three years using water management measures over and above the normal consumptive use of water. If CVWD is charged with an inadvertent overrun, the District plans to reduce its use of Colorado River water for groundwater recharge. The IOP states that overruns are forgiven in the event of a flood control or space building release from Lake Mead.

When all water transfers have been completed, CVWD will have a total diversion of 456,000 acre-ft/yr at Imperial Dam as shown in **Table 3**. After deducting conveyance losses, about 441,000 acre-ft/yr will be available for use in the Valley. The build-up curve for Colorado River water to CVWD under the agreement will impact the timing of the various projects to be implemented under the Water Management Plan.

The preferred alternative includes delivery of 441,000 acre-ft/yr of Canal water provided under the Quantification Settlement Agreement by 2033 and remaining at that level through 2035. Approximately 361,000 acre-ft/yr of this amount will be supplied directly to existing and future users in the Valley. Of this amount, about 83,000 acre-ft/yr will replace groundwater pumping (source substitution). The remaining 80,000 acre-ft/yr will be used for groundwater recharge. The Quantification Settlement provides the mechanism for obtaining the additional Colorado River supply needed to implement the Water Management Plan. The projects required to use Canal water are discussed later in this section.

Table 3
CVWD Deliveries Under Quantification Settlement Agreement

Component	Amount – acre-ft/yr
Base Allotment	330,000
1988 MWD/IID Approval Agreement	20,000
Coachella Canal Lining (to Metropolitan)	-26,000
To Miscellaneous/Indian PPRs	-3,000
IID/CVWD First Transfer	50,000
IID/CVWD Second Transfer	50,000
Metropolitan SWP Transfer	35,000
Total Diversion at Imperial Dam	**456,000**
Less Conveyance Losses[1]	-15,000
Total Deliveries to CVWD	**441,000**

Although the Water Management Plan has been designed to coincide with the terms of the Quantification Settlement, CVWD intends to proceed with the Plan regardless of the outcome of quantification. If the Settlement Agreement is not executed, CVWD would seek other sources of water to eliminate overdraft and to meet the needs of the Valley. Since the District would be constrained by the existing Colorado River allocations, its use of Colorado River water would be within the 3.85 million acre-ft/yr allocation to the first three priorities. The District would attempt to obtain some or all of the water required through transfer of conserved water from IID.

Exchange Water

CVWD and DWA currently have contracts with the State of California for a combined entitlement of 61,200 acre-ft/yr of SWP water. Reliability studies performed by DWR indicate this SWP entitlement can provide an average supply of about 50,000 acre-ft/yr. In 1996, CVWD and DWA recognized the need for additional imported water in order to eliminate groundwater overdraft. Since then, the two districts have purchased additional Pool A, Pool B, and interruptible water from the SWP resulting in average deliveries of 119,000 acre-ft/yr. These additional supplies are not expected to be available in the future and cannot be relied upon to provide a reliable long-term source of water to the Coachella Valley.

Under the preferred alternative, CVWD and DWA would maintain their recent (1996-1999) level of SWP water usage (excluding the 35,000 acre-ft/yr SWP transfer under the Quantification Settlement) at 140,000 acre-ft/yr. However, the CVWD and DWA would partially replace the purchase of Pool A, Pool B and interruptible water with additional entitlement water or other water transfers. This would maintain the approximate amount of recharge since 1996 into the future. This additional supply would be obtained by acquiring additional long-term entitlements from other SWP contractors, by purchasing surplus SWP water on a year-to-year basis, other water transfers or a combination of the three.

SWP Transfer Project. Metropolitan historically has not made full use of its SWP entitlement in normal and wet years. However, in the future, Metropolitan's use of SWP water is projected to increase to meet increasing demands and for storage purposes. Water would be stored in wet

years for withdrawal in dry years. Under the SWP Transfer Project, CVWD and DWA would acquire 100,000 acre-ft/yr of Metropolitan's State Water Project entitlement as a permanent transfer. The entitlement would be exchanged for Colorado River water and either recharged at the existing Whitewater River Spreading Basins or delivered via the Coachella Canal for irrigation purposes in the Palm Desert-Rancho Mirage area of the Upper Valley. CVWD and DWA would assume all costs associated with this entitlement except as described below. This entitlement transfer would partially offset the current CVWD and DWA practice of acquiring interruptible SWP water from other SWP contractors when it is available. Completion of this transfer would provide CVWD and DWA with a combined SWP entitlement of 161,200 acre-ft/yr, exclusive of the 35,000 acre-ft/yr transferred as part of the QSA.

Future Water Acquisitions. During wet years, CVWD and DWA would continue their current practice of purchasing Pool A, Pool B and interruptible water, as available from other SWP contractors. Since the availability of this water is expected to decline in the future, CVWD and DWA would seek to acquire additional water supplies, as they become available. These supplies could include SWP entitlements, other water transfers or participation in out-of-basin water development projects. In addition, CVWD and DWA would evaluate the purchase of water during dry years from programs like the Governor's Drought Water Bank based on supply availability and costs. The goal of these purchases and acquisitions is to achieve the proposed long-term average deliveries of 140,000 acre-ft/yr. With implementation of the proposed SWP Transfer Project, CVWD and DWA would need to acquire sufficient water to provide an additional average supply of 40,000 acre-ft/yr. Acquisition of additional permanent water supplies would be subject to separate CEQA documentation when such acquisition is identified. However, the impacts of using the water are covered in this PEIR.

SWP exchange water obtained from Metropolitan under the Quantification Settlement will be delivered via the Coachella Canal for agricultural irrigation purposes in the Lower Valley.

Recycled Water

There are two principal potential sources of recycled water in the Coachella Valley, desalinated agricultural drainage water and treated municipal wastewater effluent. Of these treated municipal effluent is currently being used for golf course and park irrigation in portions of the Coachella Valley. In addition, fish farm effluent is available in certain localized areas of the Lower Valley.

Treated Municipal Effluent. There are seven wastewater plants located in the Coachella Valley. The cities of Coachella and Palm Springs and the Valley Sanitary District (VSD) each operate water reclamation plants (WRP). CVWD operated four plants designated WRP-4, WRP-7, WRP-9 and WRP-10. Water is recycled from each plant except for the Coachella and WRP-4 facilities. These three plants (VSD, Coachella, and WRP-4 discharge effluent to the CVSC. The other facilities discharge to percolation ponds when the demand for recycled water is low in winter months. Use of recycled water effluent is assumed to increase by about 14,000 acre-ft/yr in the absence of the Water Management Plan as growth occurs in the Valley.

The use of recycled water will increase an additional 16,000 acre-ft/yr compared to No Project conditions. The proposed uses for recycled water are discussed in the following section.

Desalinated Agricultural Drain Water. In 1997, the District filed an application with the State Water Resources Control Board to appropriate all waters in the CVSC (up to a maximum of 150 cfs) draining from lands irrigated in ID-1. The application was submitted with the intent to retain local control of local water resources. Initial diversions must take place by 2013, building up to full diversion in 2063.

Up to 11,000 acre-ft/yr of agricultural drain water will be desalted to a quality equivalent to Canal water and delivered for irrigation use. Approximately 13.6 million gallons per day (mgd) of drain water would be diverted and filtered prior to desalination. The desalination facility would have a 10-mgd capacity that will produce about 7.5-mgd of product water. Approximately 3.5 mgd of the flow would be bypassed and blended with the product water to produce the desired quality. Delivery of this water would begin at a rate of about 4,000 acre-ft/yr and reaches 11,000 acre-ft/yr in approximately fifteen years. The preferred alternative does not identify specific users for this water since the product water would be delivered to the District's Canal water distribution system. Because the CVSC contains water of wastewater origin, this supply is not suitable for potable uses even if treated. Therefore, it will be likely be delivered to the 97-1 Lateral, where the downstream demand is for agricultural irrigation. Since this water is non-federal, it is not subject to the contractual restrictions regarding use of Canal water within the ID-1 service area. The District anticipates that an equal amount of Canal water can be delivered to golf courses or the portion of the Oasis system outside ID-1. Preliminary discussion with USBR officials indicated that such an exchange of water might be feasible. No specific location for the plant has been identified.

The Coachella Canal and its distribution system were constructed by and are owned by the federal government for the purpose of delivering Colorado River water for irrigation and domestic use in the ID-1 service area. Colorado River water is federal water that by contract cannot be used outside ID-1. Since the reclaimed agricultural drainage water is non-federal, it is not subject to the contractual restrictions regarding use of Canal water within the ID-1 service area. The District anticipates that an equal amount of Canal water can be delivered to golf courses or the portion of the Oasis area located outside ID-1. Preliminary discussions with Bureau officials indicated that such an exchange of treated, reclaimed drain water might be feasible. CVWD would obtain approval from the Bureau, if required, prior to conveying this water in the distribution system or delivering it outside of ID-1.

The treatment process would produce about 2.6 mgd of filter backwash and brine waste. Preliminary studies have considered both on-site and off-site evaporation ponds for brine disposal. On-site evaporation ponds would require about 530 acres of surface area due to the relatively low TDS of the brine. Alternatively, the brine could be conveyed to the Salton Sea either in the CVSC or a parallel brine outfall. Evaporation ponds located near the sea could remove an equivalent amount of salt by evaporating Salton Sea water. Approximately 110 acres of ponds would be required in this case. Decisions on the method of brine disposal will be addressed as project implementation proceeds.

Fish Farm Effluent. Recycled fish farm effluent from fish farms in the Lower Valley is currently reused for fish farms, duck clubs and agricultural irrigation. This reuse is projected to continue into the future.

Source Substitution

Source substitution is the delivery of an alternate source of water to users currently pumping groundwater. This approach is frequently referred to as *in-lieu* delivery where other water sources are delivered in place (or *in-lieu*) of groundwater use. The substitution of an alternate water source reduces groundwater extraction and allows the groundwater to remain in storage, thus reducing overdraft. Alternative sources of water include: recycled water from WRP-7, WRP-9, WRP-10 or City of Palm Springs WRP; Canal water, desalinated agricultural drainage water, or SWP Exchange water delivered through the Coachella Canal.

Source substitution projects under the preferred alternative include the following:

- Conversion of existing and future golf courses in the Lower Valley from groundwater to Canal water,
- Conversion of existing and future golf courses in the Upper Valley from groundwater to recycled water,
- Conversion of existing and future golf courses in the Upper Valley from groundwater to SWP Exchange water,
- Conversion of agricultural irrigation from groundwater to Canal water, primarily in the Oasis area, and
- Conversion of municipal use from groundwater to treated Canal water in ID-1

Specific details on each of these projects are presented below. The timing for the various projects is dependent on the available water supplies and the economics of the various projects. Therefore, the implementation schedules presented are generalized.

Conversion of Lower Valley Golf Courses

Canal water use will be expanded to serve additional golf courses within ID-1. Existing golf courses within ID-1 that use groundwater will be supplied with Canal water. The District will develop a program to convert existing courses from groundwater to Canal water. Many of the existing golf courses within ID-1 have Canal water connections but are not making full use of the water. The District will also work with the courses currently using both groundwater and Canal water to maximize their Canal water use. Because of the availability of desalinated Whitewater River water, the preferred alternative also includes conversion of several Lower Valley golf courses that are located outside ID-1.

Since the Canal water distribution system is currently in place, the facilities required to serve golf courses located inside ID-1 are generally expected to be minimal. Some new pipelines and pumping facilities may be required to convey desalinated Whitewater River water that is

exchanged for Canal water to courses located outside ID-1. Conversion of golf courses is expected to reduce groundwater pumping by about 14,000 acre-ft/yr over the next 10 to 15 years.

Upper Valley Golf Course Conversion to Recycled Water

The preferred alternative includes increased use of recycled water, primarily for golf course irrigation in the Upper Valley. Water from wastewater treatment plants in the Upper Valley is currently either recycled for golf courses or municipal irrigation or disposed by percolation/evaporation ponds located at each facility.

Recycling water for irrigation does have other benefits that favor recycled use over percolation. Because recycled water has a high nutrient (i.e., nitrogen) load, long-term percolation could eventually lead to degradation of the groundwater supply. Direct use of recycled water for irrigation removes these nutrients - use of nitrogen-rich recycled water for irrigation lowers the amount of inorganic fertilizers needed on golf courses and other landscaped areas, thus reducing the nitrogen loading on the entire basin. One difficulty in recycling sewage effluent for irrigation purposes involves fluctuations in supply and demand. Flows to Valley treatment plants are generally higher in the winter months when irrigation demands are at their lowest, and flows are conversely lower when demand is highest.

In the Upper Valley, recycled water use for golf course and park irrigation will be expanded in areas adjacent to treatment plants where it is most cost-effective. The preferred alternative anticipates about 8,000 acre-ft/yr more recycled water use than the No Project conditions. The facilities required to expand the recycled water systems are expected to include pipelines and pump stations.

Conversion of Upper Valley Golf Courses to SWP Exchange Water

There are a number of golf courses in the Rancho Mirage-Palm Desert-Indian Wells area that pump groundwater for irrigation. This area has experienced a steady decline in groundwater levels over the past 50 years or more. Recent information indicates that there is an increased risk of land subsidence if water levels continue to decline. Therefore, conversion of the golf courses in this area to imported or recycled water is a high priority for the District.

Since this area is outside the ID-1 service area, it is not eligible for Canal water delivery. However, the District could redirect a portion of its SWP entitlement to this area. Conveyance options include the construction of over 20 miles of pipelines from the Whitewater turnouts, over 12 miles of pipelines from the Metropolitan aqueduct at Fan Canyon (east of Dillon Road) or by taking delivery through the Coachella Canal. The latter option would be similar to the proposed conveyance of desalinated Whitewater River water in the Canal delivery system. The Coachella Canal conveyance option was chosen as it involves the least amount of conveyance facilities to bring imported water to the Rancho Mirage-Palm Desert-Indian Wells area.

This project will require construction of over 30 miles of pipelines, two major pumping stations and delivery connections to each course. The project to convert the Upper Valley golf courses is

expected to be implemented in phases beginning in the late 2000s and finishing in the mid 2010s. Approximately 37,000 acre-ft/yr of groundwater pumping would be eliminated by this project.

Conversion of Existing Lower Valley Agriculture

Agricultural users within the ID-1 service area that currently pump groundwater would also be converted to Canal water under the preferred alternative. In that portion of ID-1 where the Canal water distribution system currently exists, the Plan includes conversion of agricultural users from groundwater to Canal water by the mid-2010s. Because most of these users have existing connections to the District's Canal water distribution system, these conversions would require minimal infrastructure modifications. For drip irrigation use, farmers would probably need to install a small storage reservoir, a booster pump and a pressure sand filtration unit to remove suspended solids that may clog the emitters. The cost of these facilities are borne by the farmer but typically are offset by a cost savings compared to pumping groundwater. Since Canal water has a higher salinity than groundwater, periodic soil leaching is required to flush out accumulated salt. The additional demand for leaching is incorporated into the water demand estimates. CVWD has prepared a manual to guide farmers in the conversion from groundwater to Canal water (Olson, 1996).

Agricultural users located in the unserved area of ID-1 (other than the Oasis area) are proposed to convert from groundwater to Canal water in the late-2020s. Since these users do not currently have access to the distribution system, some new conveyance facilities would be required. The amount of Canal water delivered to agricultural users within ID-1 is expected to increase 30,000 acre-ft/yr by 2035.

Up to 8,000 acre-ft/yr of recycled effluent from CVWD's WRP-4 facility would also be delivered to Lower Valley agricultural and golf course users by 2035. Water could be delivered directly to users or delivered through the Canal water distribution system. This element of the Plan also includes upgrading WRP-4 to tertiary treatment. The Plan does not include the use of water from the Valley Sanitary District and City of Coachella wastewater plants, as these plants are not controlled by CVWD. Recycled water from these two plants could be used in the future.

Oasis Area Agricultural Conversion

The preferred alternative proposes the extension of the Canal water distribution system to serve all acreage in the Oasis area from the Riverside County line northerly to Avenue 66. Studies conducted for CVWD indicate this project could supply Canal water to about 6,700 acres of land located within ID-1 and about 2,200 acres outside ID-1 (Summers Engineering, 1996). The Oasis Conversion Project involves construction of over 20 miles of pipelines, two pumping stations, two small regulating reservoirs and miscellaneous facilities to convey Canal water to this area from the vicinity of the 97-1 Lateral.

Since portions of the Oasis area are outside ID-1, only non-federal water could be served to these users. CVWD proposes to use desalted agricultural drainage water and recycled water for this use. Desalinated agricultural drainage water and recycled municipal effluent would be pumped into the 97.1 Lateral for conveyance to the Oasis area. The District would track the amount of

desalinated agricultural drainage water and recycled water conveyed in the system and serve a like amount to users outside ID-1. Facilities to serve water to this portion of the Oasis area are expected to include two pumping stations, about six miles of pipeline and other appurtenant facilities. CVWD would obtain Bureau approval of this concept prior to conveying desalinated agricultural drainage in the distribution system.

The ID-1 portion of the Oasis area is expected to convert to Canal water by the mid-2020s. The portion of the Oasis area outside ID-1 will be completed in the late-2020s. Because detailed engineering studies have not been conducted, separate environmental documents will be prepared for this project prior to its implementation.

Conversion of Municipal Use to Canal Water

Approximately 30 percent of the municipal demand in the Lower Valley would receive Canal water. The facilities required for this conversion would include the construction of one or more potable water treatment plants having a total capacity of at least 30 mgd. Other facilities would include pipelines to convey water from the Canal to the filtration plants, pipelines, pumping stations and reservoirs to deliver water from the filtration plants to the existing municipal water systems. Total municipal usage of treated Canal water is estimated to be about 32,000 acre-ft/yr. These facilities are projected to be phased in during the late 2020s and early 2030s.

Groundwater Recharge

Groundwater recharge is an important management element. Overall, groundwater recharge under the preferred alternative will increase above No Project. Recharge activities in the Upper and Lower Valley are described below.

Upper Valley

CVWD and DWA would recharge up to an average of 103,000 acre-ft/yr of SWP water at the Whitewater Spreading Facility. As with the current operation, SWP water would be exchanged for Colorado River water with Metropolitan. No capital improvements would be required at the Whitewater facility.

Lower Valley

Under the preferred alternative, approximately 80,000 acre-ft/yr of Coachella Canal water will be recharged in the Lower Valley. This amount will be phased in over time at recharge facilities anticipated to be near Dike No. 4 and in the Martinez Canyon area.

Dike No. 4: Although it may be possible to recharge in the range of 30,000 to 60,000 acre-ft/yr at the Dike No. 4 location, the Plan assumes an average recharge rate of approximately 40,000 acre-ft/yr. The Dike No. 4 recharge facility would be constructed within three to four years. The facility would include approximately 240 acres of recharge ponds along with a pumping station and over two miles of pipeline to convey water from Lake Cahuilla to the site. This recharge

project will be subjected to separate environmental review when the project is more thoroughly defined.

Martinez Canyon: CVWD has evaluated other potential recharge sites in the Lower Valley including the Martinez Canyon area along the western margin the Valley. The Martinez Canyon recharge facility is expected to be operational by the mid-2010s and would be at full capacity by the mid-2020s. The basins could be constructed in phases to match the availability of Canal water. An average recharge rate of approximately 40,000 acre-ft/yr is assumed. The facility is expected to include approximately 240 acres of recharge basins, a pumping station and about three miles of pipeline to convey water from the Oasis Tower to the site. This recharge project will be subjected to separate environmental review when the project is more thoroughly defined. The District plans to conduct a demonstration recharge study on District-owned land on the alluvial fan to determine the feasibility of a large scale facility.

Groundwater Monitoring Program

As the Plan is implemented, the District's ongoing groundwater monitoring program will play an integral role in the District's understanding of the basin's response to different plan elements. The effectiveness of the Plan will be measured against its impacts on groundwater levels, water quality, and subsidence potential. In addition to continuation of the CVWD/USGS land subsidence studies, additional monitoring wells will be constructed as part of the program. Data collected through the monitoring program will enable the District to accurately assess individual plan elements and their effectiveness in meeting the goals of the Plan.

Cooperative Agreements with Other Agencies

The District, DWA, and Metropolitan have historically worked together on programs which are mutually beneficial to all three agencies. The exchange program at the Whitewater Spreading Facility and the advance delivery program are two such examples. Several other programs, which would provide benefits to both the Coachella Valley and to Metropolitan, are currently being studied. These programs are designed to provide the Coachella Valley with a firm long-term water supply and to provide Metropolitan with the dry-year supplies needed to serve its member agencies. Projects currently under consideration include:

- transfer of a portion of Metropolitan's SWP entitlement to DWA and the District and
- implementation of a conjunctive use program with Metropolitan to store surplus water in the Valley's groundwater basin during wet periods to be recovered during drought periods.

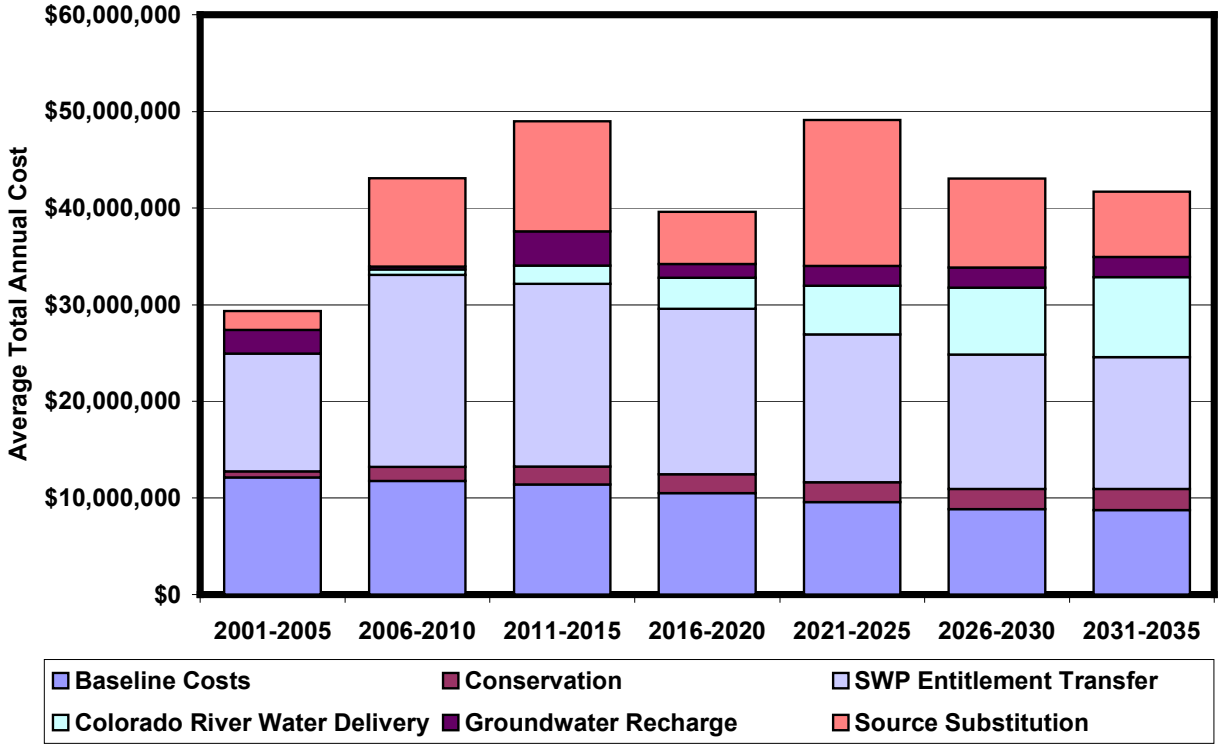
Implementation Costs

Each management category-conservation, groundwater recharge, and source substitution-will have specific implementation costs in addition to the baseline costs associated with the No Project alternative. The baseline costs include existing water conservation activities, existing delivery of recycled water to Upper Valley golf courses, and the continued purchase of existing

SWP entitlements for Upper Valley groundwater recharge. In order to spread these implementation costs over the entire planning period, assumptions were made regarding the initiation of certain management elements within each category. Conservation activities primarily involve costs associated with additional manpower, which are included as an operation and maintenance (O&M) cost. The costs associated with groundwater recharge and source substitution activities include both capital and O&M costs.

The average annual implementation costs for the preferred alternative throughout the planning period are illustrated in **Figure H**. The total capital cost associated with groundwater recharge and source substitution elements in the preferred alternative is estimated at $180 million. The average annual costs for each category include capital costs, depreciation of the capital investment over time, and O&M costs (fixed and variable).

Figure H
Estimated Total Annual Implementation Cost for the Preferred Alternative



Financing Mechanisms

Several financing mechanisms are available to provide funding for the Plan including:

- water rates,
- replenishment assessments,
- assessment districts,

- general property taxes,
- financing by agencies outside the District,
- grants, and
- developer fees.

It is not possible at this time to predict the specific financing mechanisms that will be applied to each of the elements of the preferred alternative. Funding will likely be through a combination of mechanisms that best meet the needs of the Valley's water users. As appropriate, public input regarding financing options may be sought as specific items are proposed or constructed.

Effects on Water User Groups

Until such time as specific financing mechanisms are determined, it is not possible to determine the exact economic impact on different types of user groups. **Table 4** shows the possible economic effects on several different types of user groups within the Coachella Valley.

Table 4
Economic Effects on Water User Groups

Water User Group	Range of Effects
Domestic Water Users (District Wide)	$0.05 to $0.20 per hundred cubic feet
Canal Water Users (Lower Valley only)	$0 to $5 per acre foot
Lower Valley Groundwater Users	$10 to $40 per acre foot
Upper Valley Groundwater Users	$0 to $25 per acre foot
Property Owners	$0 to $0.02 per $100 taxable value
Developer Fees	$0 to $2,000 per unit

CONCLUSIONS

The Coachella Valley Water Management Plan's goal is to assure adequate quantities of safe, high-quality water at the lowest cost to District water users. If the Plan is to succeed, it must be a living document that is flexible and can be adapted to meet the changing needs of the Coachella Valley. As management elements are set in place, and results of implementation strategies are quantified, the Plan will be periodically evaluated to determine how well it is meeting the needs of the Valley, to consider new information and opportunities, and if needed to make appropriate adjustments. Along with the Plan, a Program Environmental Impact Report (PEIR) was prepared that fully discusses the social and environmental impacts of the preferred alternative. The CVWD Board certified the PEIR in October 2002.

Public forums and workshops were conducted to obtain input from the general public, taxpayers, water users, local governments, tribal interests, federal and state agencies, and other Colorado

River water users. Based on the results of the public review of the Plan and PEIR, the CVWD Board adopted the Plan in October 2002.

Actions needed to ensure that the preferred alternative meets the objectives of the Plan require commitment, consensus, and cooperation from all water users in the Valley. The success of past water management efforts, coupled with implementation of the recommendations in the Coachella Valley Water Management Plan, will allow the Coachella Valley to sustain its vibrant economy and move into the new century with a reliable, affordable, and stable water supply.

Appendix G
CVWD Landscape Irrigation Ordinance (#1032)

ORDINANCE NO. 1302

0585.09

AN ORDINANCE OF THE COACHELLA VALLEY WATER DISTRICT ESTABLISHING VALLEY-WIDE WATER EFFICIENT LANDSCAPING MODEL ORDINANCE

Sections:

0.00.010 Purpose and intent.

0.00.020 Definitions.

0.00.030 Provisions for new or rehabilitated landscapes.

0.00.040 Provisions for existing landscapes.

0.10.050 Fees for initial review and program monitoring.

0.10.060 Appeals.

0.00.010 Purpose and intent.

A. The purpose of this ordinance is to establish effective water efficient landscape requirements for newly installed and rehabilitated landscapes. It is also the intent of this ordinance to implement the requirements of the State of California Water Conservation in Landscaping Act, Statutes of 1990, Chapter 1145 (AB 325).

B. It is the intent of the District to promote water conservation through climate appropriate plant material and efficient irrigation as well as to create a District "Lush and Efficient" landscape theme through enhancing and improving the physical and natural environment.

0.00.020 Definitions.

The words used in this chapter have the meanings set forth below:

A. "Anti-drain valve" or "check valve" means a valve located under a sprinkler head to hold water in the system so it minimizes drainage from the lower elevation sprinkler heads.

B. "Application rate" means the depth of water applied to a given area, usually measured in inches per hour. Also known as precipitation rate (sprinklers) or emission rate (drippers/microsprayers) in gallons per hour.

C. "Applied water" means the portion of water supplied by the irrigation system to the landscape.

D. "Automatic controller" means a mechanical or solid-state timer, capable of operating valve stations to set the days and length of time of a water application.

E. "Backflow prevention device" means a safety device used to prevent pollution or contamination of the water supply due to the reverse flow of water from the irrigation system.

F. "Conversion faction (0.62)" means a number that converts the maximum applied water allowance from acre-inches per acre per year to gallons per square foot per year. The conversion factor is calculated as follows:

(325,851 gallons/43,560 square feet)/12 inches = (0.62)

325,851 gallons	= one acre-foot
43,560 square feet	= one acre
12 inches	= one foot

To convert gallons per year to 100 cubic feet per year, the common billing unit for water, divide gallons per year by 748. (748 gallons = 100 cubic feet)

G. "Ecological restoration project" means a project where the site is intentionally altered to establish a defined, indigenous, historic ecosystem.

H. "Effective precipitation" or "usable rainfall" means the portion of total natural precipitation that is used by the plants. Precipitation is not a reliable source of water in the desert.

I. "Emitter" means drip irrigation fittings that deliver water slowly from the system to the soil.

J. "Established landscape" means the point at which plants in the landscape have developed roots into the soil adjacent to the root ball.

K. "Establishment period" means the first year after installing the plant in the landscape.

L. "Estimated annual applied water use" means the portion of the estimated annual total water use that is derived from applied water. The estimated annual applied water use shall not exceed the maximum applied water allowance.

M. "Estimated total water use" means the annual total amount of water estimated to be needed to keep the plants in the landscaped area healthy. It is based upon such

factors as the local evapotranspiration rate, the size of the landscaped area, the types of plants, and the efficiency of the irrigation system.

N. "ET adjustment factor" means a factor of 0.6 that, when applied to reference evapotranspiration, adjusts for plant factors and irrigation efficiency, two major influences upon the amount of water that needs to be applied to the landscape. A combined plant mix with a site-wide average 0.45 is the basis of the plant factor portion of this calculation. The irrigation efficiency for purposes of the ET adjustment factor is 0.75. Therefore, the ET adjustment factor (0.6) = (0.45/0.75).

O. "Evapotranspiration" means the quantity of water evaporated from adjacent soil surfaces and transpired by plants during a specific time.

P. "Flow rate" means the rate at which water flows through pipes and valves (gallons per minute or cubic feet per second).

Q. "Hydrozone" means a portion of the landscaped area having plants with similar water needs that are served by a valve or set of valves with the same schedule. A hydrozone may be irrigated or nonirrigated. For example, a naturalized area planted with native vegetation that will not need supplemental irrigation once established is a nonirrigated hydrozone.

R. "Infiltration rate" means the rate of water entry into the soil expressed as a depth of water per unit of time (inches per hour).

S. "Irrigation efficiency" means the measurement of the amount of water beneficially used divided by the amount of water applied. Irrigation efficiency is derived from measurements and estimates of irrigation system characteristics and management practices. The minimum irrigation efficiency for purposes of this chapter is 0.75. Greater irrigation efficiency can be expected from well-designed and maintained systems.

T. "Landscape irrigation audit" means a process to perform site inspections, evaluate irrigation systems, and develop efficient irrigation schedules.

U. "Landscaped area" means the entire parcel less the building footprint, driveways, nonirrigated portions of parking lots, hardscapes such as decks and patios, and other nonporous areas. Water features are included in the calculation of the landscaped area.

V. "Lateral line" means the water delivery pipeline that supplies water to the emitters or sprinklers from the valve.

W. "Main line" means the pressurized pipeline that delivers water from the water meter to the valve or outlet.

X. "Service line" means the pressurized pipeline that delivers water from the water source to the water meter.

Y. "Maximum applied water allowance" means for design purposes, the upper limit of annual applied water for the established landscaped area. It is based upon the area's reference evapotranspiration, the ET adjustment factor, and the size of the landscaped area. The estimated applied water use shall not exceed the maximum applied water allowance.

Z. "Mined-land reclamation projects" means any surface mining operation with a reclamation plan approved in accordance with the Surface Mining and Reclamation Act of 1975.

AA. "Mulch" means any material such as gravel, small rocks, pebbles, decorative sand, decomposed granite, bark, straw or other material left loose and applied to the soil surface for the beneficial purpose of reducing evaporation.

BB. "Operating pressure" means the manufacturer's recommended pressure at which a system of sprinklers, bubblers, drippers or microsprayers is designed to operate.

CC "Overhead sprinkler irrigation systems" means those with high flow rates (pop-ups, impulse sprinklers, rotors, etc.).

DD. "Overspray" means the water which is delivered beyond the landscaped area, wetting pavements, walks, structures, or other nonlandscaped areas.

EE. "Plant factor" means a factor that when multiplied by reference evapotranspiration, estimates the amount of water used by plants. For purposes of this ordinance, the average plant factor of very low water using plants ranges from 0.01 to 0.10, for low water using plants the range is 0.10 to 0.35, for moderate water using plants the range is 0.35 to 0.60 and for high water using plants, the range is 0.60 to 0.90.

FF. "Rain sensing device" means a system which automatically shuts off the irrigation system when it rains.

GG. "Record drawing" or "as-builts" means a set of reproducible drawings which show significant changes in the work made during construction which are usually based on drawings marked up in the field and other data furnished by the contractor.

HH. "Recreational area" means areas of active play or recreation such as sports fields, school yards, picnic grounds, or other areas with intense foot traffic.

II. "Recycled water," "reclaimed water" or "treated sewage effluent water" means treated or recycled waste water of a quality suitable for nonpotable uses such as landscape irrigation; not intended for human consumption.

JJ. "Reference evapotranspiration" or "ETo" means a standard measurement of environmental parameters which affect the water use of plants. ETo is given in inches per day, month, or year, and is an estimate of the evapotranspiration of a large field of cool-season grass that is well watered. Reference evapotranspiration is used as a basis of determining the maximum applied water allowances so that regional differences in climate can be accommodated. For purposes of this ordinance, CVWD Dwg. No. 29523 will be used for ETo zone.

KK. "Rehabilitated landscape" means any relandscaping project whose choice of new plant material and/or new irrigation system components is such that the calculation of the site's estimated water use will be significantly changed. The new estimated water use calculation must not exceed the maximum applied water allowance calculated for the site using a 0.6 ET adjustment factor.

LL. "Runoff" means water which is not absorbed by the soil or landscape to which it is applied and flows from the planted area. For example, runoff may result from water that is applied at too great a rate (application rate exceeds infiltration rate), when there is a severe slope or when water is misapplied to hardscapes.

MM. "Soil moisture sensing device" means a device that measures the amount of water in the soil.

NN. "Soil texture" means the classification of soil based on the percentage of sand, silt and clay in the soil.

OO. "Sprinkler head" means a device which sprays water through a nozzle.

PP. "Static water pressure" means the pipeline pressure when water is not flowing.

QQ. "Station" means an area served by one valve or by a set of valves that operates simultaneously.

RR. "Turf" means a surface layer of earth containing mowed grass with its roots. Perennial and Annual Ryegrass are cool season grasses. Hybrid and common Bermuda grass, are warm season grasses.

SS. "Valve" means a device used to control the flow of water in the irrigation system.

TT. "Water Conservation Concept Statement" means a one-page checklist and a narrative summary of the project.

UU. "Water Feature" means any water applied to the landscape for non-irrigation decorative purposes. Fountains, streams, ponds and lakes are considered water features. Water features use more water than efficiently irrigated turfgrass and are assigned a plant factor value of 1.1 for a stationary body of water and 1.2 for a moving body of water.

VV. "Recreational Turfgrass" means turfgrass that serves as a playing surface for sports and recreational activities. Athletic fields, golf courses, parks and school playgrounds are all examples of areas hosting recreational turfgrass.

WW. "Recreational Turfgrass ET adjustment factor" means a factor of 0.82 that, when applied to reference evapotranspiration, adjusts for the additional stress of high traffic on recreational turfgrass and the higher irrigation efficiencies of long range rotary sprinklers. These are the two major influences upon the amount of water that needs to be applied to a recreational landscape. A mixed cool/warm season turfgrass with a seasonal average of 0.7 is the basis of the plant factor portion of this calculation. The irrigation efficiency of long range sprinklers for purposes of the ET adjustment factor is 0.85. Therefore, the ET adjustment factor is 0.82 = 0.7/0.85.

0.00.030 Provisions for new or rehabilitated landscapes.

A. Applicability.

1. Except as provided in subsection (A)(3) of this section, this section shall apply to:

   a. All new and rehabilitated landscaping for private, public, recreational, commercial and governmental development projects that require a permit; and

   b. Developer-installed landscaping in single-family tracts and multifamily projects.

2. Projects subject to this section shall conform to the provisions in this section.

3. This section shall <u>not</u> apply to:

   a. Resident home owner-provided landscaping at single-family residences.

B. Landscape Documentation Package.

4. Each landscape documentation package shall include the following elements, which are described in subsection C of this section.

   a. Water conservation concept statement;

   b. Calculation of the maximum applied water allowance;

   c. Calculation of the estimated applied water use;

   d. Calculation of the estimated total water use;

   e. Landscape design plan;

   f. Irrigation design plan;

   g. Grading design plan;

   h Soil analysis (optional);

   i. Certificate of substantial completion. (To be submitted by certified landscape designer, auditor or landscape architect after installation of the project.)

5. Three copies of the landscape documentation package conforming to this chapter shall be submitted to the District. No permit shall be issued until the District reviews and approves the landscape documentation package.

6. A copy of the approved landscape documentation package shall be provided to the property owner or site manager along with the record drawings and any other information normally forwarded to the property owner or site manager.

7. Upon completion of construction, a copy of the water conservation concept statement and the certificate of substantial completion shall be sent by the project manager to the water management specialist of the water district and city/county having jurisdiction.

C. Elements of Landscape Documentation Package.

1. Water Conservation Concept Statement. Each landscape documentation package shall include a cover sheet, referred to as the water conservation statement similar to the following example. It serves as a checklist to verify that the elements of the landscape documentation package have been completed and has a narrative summary of the project.

SAMPLE WATER CONSERVATION CONCEPT STATEMENT

Project Site: _____ Case Number:_____

Project Location:_____

Landscape Architect/Irrigation Designer/Contractor:_____

Included in this project submittal package are:
(Check to indicate completion)

____ 1. Maximum Annual Applied Water Allowance:
Conventional Landscape: _____ 100 cubic feet/year
+ Recreational Turfgrass Landscape: _____ 100 cubic feet/year(if applicable)
Total Maximum Annual Applied Water Allowance: _____ 100 cubic feet/year

____ 2. Estimated Annual Applied Water Use by Hydrozone:
Turfgrass: _____ 100 cubic feet/year
Recreational Turfgrass: _____ 100 cubic feet/year
Annuals/Groundcovers:_____100 cubic feet/year
Exotic Trees/Shrubs _____ 100 cubic feet/year
Desert Plants: _____ 100 cubic feet/year
Water features: _____ 100 cubic feet/year
Other _____: _____ 100 cubic feet/year

____ 3. Estimated Annual Total Water Use:
_____ 100 cubic feet/year

____ 4. Landscape Design Plan

____ 5. Irrigation Design Plan

____ 6. Grading Design Plan

____ 7. Soil Chemical Analysis (optional)

Description of Project:

(Briefly describe the planning and design actions that are intended to achieve conservation and efficiency in water use.)

_____

_____

_____

_____

Date:_____ Prepared by:_____

1. The Annual Maximum Applied Water Allowance.

a. A project's annual maximum applied water allowance shall be calculated using the following formula:

MAWA = (ETo) (0.6) (LA) (0.62) where:

MAWA = Maximum applied water allowance (gallons per year)

ETo = Reference evapotranspiration (ie 75.0 inches per year)

0.6 = ET adjustment factor

LA = Landscaped area (square feet)

0.62 = Conversion factor (to gallons per square foot)

b. An example calculation of the annual maximum applied water allowance is:

Project site: Landscape area of fifty thousand square feet in Zone #3a of the Coachella Valley ETo Map.

MAWA = (ETo) (.6) (LA) (.62)

= (75.0 inches) (.6) (50,000 square feet) (.62)

Maximum applied water allowance = 1,395,000 gallons per year, 1,865 hundred-cubic-feet per year(billing units), 4.28 Acre Feet/Acre per year or 51.4" of water per year.

2. Estimated Annual Applied Water Use.

a. The annual estimated applied water use shall not exceed the annual maximum applied water allowance.

b. A calculation of the estimated annual applied water use shall be submitted with the landscape documentation package.

c. The estimated annual total water use for each hydrozone is calculated from the following formula:

EWU (hydrozones) = $\frac{\text{(ETo) (PF) (HA) (.62)/748}}{\text{(IE)}}$

(in 100 cubic feet)

EWU (hydrozone) = Estimated water use (gallons per year)

ETo = Reference evapotranspiration (ie. ETo Zone 3a = 75.00 inches per year)

PF = Plant factor (see definitions)

HA = Hydrozone area (square feet)

(.62) = Conversion factor

(IE) = Irrigation efficiency (see definitions)

748 = Conversion to billing units (100 cubic feet)

3. Estimated Annual Total Water Use. A calculation of the estimated annual total hydrozone water use shall be submitted with the landscape documentation package. The estimated annual total water use for the entire landscaped area equals the sum of the estimated annual water use (EWU) of all hydrozones in that landscaped area.

4. Landscape Design Plan. A landscape design plan meeting the following requirements shall be submitted as part of the landscape documentation package.

   A. Plant Selection and Grouping.

      i. Any plants may be used in the landscape, providing the estimated annual applied water use recommended does not exceed the maximum annual applied water allowance and that the plants meet the specifications set forth in (ii), (iii) and (iv).

      ii. Plants having similar water use shall be grouped together in distinct hydrozones.

      iii. Plants shall be selected appropriately based upon their adaptability to the climate, geologic, and topographical conditions of the site. Protection and preservation of native species and natural areas is encouraged. The planting of trees is encouraged whenever it is consistent with the other provisions of this chapter.

      iv. Fire prevention needs shall be addressed in areas that are fire prone. Information about fire prone areas and appropriate landscaping for fire safety is available from the fire marshal.

   B. Water Features.

      i. Recirculating water shall be used for decorative water features.

   C. Landscape Design Plan Specifications. The landscape design plan shall be drawn on project base sheets at a scale that accurately and clearly identifies:

      i. Designation of hydrozones;

      ii. Landscape materials, trees, shrubs, groundcover, turf and other vegetation.

      Planting symbols shall be clearly drawn and plants labeled by botanical name, common name, water use classification, container size, spacing and quantities of each group of plants indicated;

      iii. Property lines and street names;

      iv. Streets, driveways, walkways and other paved areas;

      v. Pools, ponds, water features, fences and retaining walls;

      vi. Existing and proposed buildings and structures including elevation, if applicable;

      vii. Location of all overhead and underground utilities.

      viii. Natural features including but not limited to rock outcroppings, existing trees and shrubs that will remain;

      ix. Tree staking, plant installation, soil preparation details, and any other applicable planting and installation details;

x. A calculation of the total landscaped area;

xi. Designation of recreational areas.

5. Irrigation Design Plan. An irrigation design plan meeting the following conditions shall be submitted as part of the landscape documentation package.

A. Irrigation Design Criteria.

i. Runoff and Overspray. Soil types and infiltration rate shall be considered when designing irrigation systems. All irrigation systems shall be designed to avoid runoff, low-head drainage, overspray, or other similar conditions where water flows onto adjacent property, nonirrigated areas, walks, roadways or structures. Proper irrigation equipment and schedules, including features such as repeat cycles, shall be used to closely match application rates to infiltration rates therefore minimizing runoff.

Special attention shall be given to avoid runoff on slopes and to avoid overspray in planting areas with a width less than ten feet.

No overhead sprinkler irrigation systems shall be installed in median strips or islands

ii. Irrigation Efficiency. For the purpose of determining the maximum applied water allowance, irrigation efficiency is assumed to be 0.75. Mixed irrigation system types shall be designed, maintained and managed to meet or exceed an average of 0.75 efficiency.

iii. Equipment.

(A) Water Meters. Separate landscape water meters shall be installed for all projects except for single-family homes or any project with a landscaped area of less than twenty five hundred square feet.

(B) Controllers. Automatic control systems (solar or electric) shall be required for all irrigation systems and must be able to accommodate all aspects of the design. Mechanical irrigation controllers are prohibited.

(C) Valves. Plants which require different amounts of water shall be irrigated by separate valves. If one valve is used for a given area, only plants with similar water use shall be used in that area.

(D) Anti-drain (check) valves shall be installed in strategic points to prevent low-head drainage.

(E) Sprinkler Heads. Heads shall have application rates appropriate to the plant water use requirements within each control valve circuit. Sprinkler heads shall be selected for proper area coverage, application rate, matched precipitation rate nozzles, operating pressure, adjustment capability and ease of maintenance.

(F) Scheduling Aids: Soil Moisture Sensing Devices. It is required that soil moisture sensing devices be installed on all turfgrass sites exceeding 1.0 acres(43,560 square feet) of planted area.

(G) Scheduling Aids: ETo Controllers. It is recommended that ETo controllers be considered for installation on all sites.

(H) Equipment in Publicly Maintained Areas. Irrigation equipment in areas which may or will be maintained by the District shall conform to specifications of the District.

(I) Emitters. Emitters shall have application rates appropriate to the plant water use requirements within each control valve circuit. Emitters shall be selected for specific area coverage (individual plants), application rates, operating pressure, adjustment capability and ease of maintenance.

B. Recycled Water.

i. The installation of recycled water irrigation systems (dual distribution systems) shall be required to allow for the current and future use of recycled water, unless a written exemption has been granted as described in the following subsection ii.

ii. Irrigation systems shall make use of recycled water unless a written exemption has been granted by the District, stating that recycled water meeting all health standards is not available and will not be available in the foreseeable future.

iii. Recycled water irrigation systems shall be designed and operated in accordance with all local and state codes and be applicable to all of the provisions of this ordinance.

C. Irrigation Design Plan Specifications. Irrigation systems shall be designed to be consistent with hydrozones. The irrigation design plan shall be drawn on project base sheets. It shall be separate from, but use the same format as, the landscape design plan. The scale shall be the same as that used for the landscape design plan. The irrigation design plan shall accurately and clearly identify:

i. Location and size of separate water meters for the landscape;

ii. Location, type, and size of all components of the irrigation system, including automatic controllers, main and lateral lines, valves, sprinkler heads, moisture sensing devices, rain switches, quick couplers, and backflow prevention devices;

iii. Static water pressure at the point of connection to the water supply;

iv. Flow rate (gallons per minute), application rate (inches per hour), and design operating pressure (psi) for each station;

v. Recycled water irrigation systems.

6. Grading Design Plan. Grading design plans satisfying the city/county grading ordinance and the following conditions shall be submitted as part of the landscape documentation package.

A. A grading design plan shall be drawn on project base sheets. It shall be separate from but use the same format as the landscape design plan.

B. The grading design plan shall indicate finished configurations and elevations of the landscaped area, including the height of graded slopes, drainage patterns, pad elevations, and finish grade.

7. Soil Analysis.

   A. A soil analysis satisfying the following conditions should be submitted as part of the landscape documentation package:

      i. Determination of soil texture, indicating the available water holding capacity.

      ii. An approximate soil infiltration rate (either) measured or derived from soil texture/infiltration rate tables. A range of infiltration rates shall be noted where appropriate.

      iii. Measure of pH and total soluble salts.

8. Certification.

   A. A licensed landscape architect, designer of record or designated District staff shall conduct a final field observation and shall provide a certificate of substantial completion to the District. The certificate shall specifically indicate that plants were installed as specified, that the irrigation system was installed as designed, and that an irrigation audit has been performed, along with a list of any observed deficiencies.

   B. Certification shall be accomplished by completing a certificate of substantial completion and delivering it to the District, to the retail water supplier, and to the owner of record. A sample of such a form, which shall be provided by the District is:

EXAMPLE CERTIFICATE OF SUBSTANTIAL COMPLETION

Project Site: _____ Project Number:_____

Project Location:_____

Preliminary Project Documentation Submitted: (Check indicating submittal)

____ 1. Total Maximum Applied Water Allowance:
____ (100 cubic feet per year)

____ 2. Estimated Applied Water Use by Hydrozone:
Turfgrass: _____ 100 cubic feet/year
Recreational Turfgrass: _____ 100 cubic feet/year
Annuals/Groundcovers:_____100 cubic feet/year
Exotic Trees/Shrubs: _____ 100 cubic feet/year
Desert Plants: _____ 100 cubic feet/year
Water features: _____ 100 cubic feet/year
Other _____: _____ 100 cubic feet/year

____ 3. Estimated Total Water Use:
____ (100 cubic feet per year)

____ 4. Landscape Design Plan

____ 5. Irrigation Design Plan

____ 6. Grading Design Plan

____ 7. Soil Analysis (optional)

Post-Installation Inspection: (Check indicating substantial completion)

____ A. Plants installed as specified

____ B. Irrigation system installed as designed
_____ dual distribution system for recycled water
_____ minimum run-off or overspray

____ Project submittal package and a copy of this certification has been provided to owner/manager and local water agency.

EXAMPLE CERTIFICATE OF SUBSTANTIAL COMPLETION (Page No. 2)

Comments:

_____

_____

_____

_____

_____

_____

I/we certify that work has been installed in accordance with the contract documents:

_____

Contractor Signature Date State License Number

I/we certify that based upon periodic site observations, the work has been substantially completed in accordance with the Water Efficient Landscape Ordinance and that the landscape planting and irrigation installation conform with the approved plans and specifications.

_____

Landscape Architect or Designer of Record or Designated District Staff Signature Date State License Number

I/we certify that I/we have received all of the contract documents and that it is our responsibility to see that the project is maintained in accordance with the contract documents.

_____

Owner Signature Date

D. Public Education.

a. The landscape architect will provide a site-specific landscape irrigation package for the homeowner or irrigation system operator. The package will include a set of drawings, a recommended monthly irrigation schedule and a recommended irrigation system maintenance schedule.

b. Irrigation Schedules. Irrigation schedules satisfying the following conditions shall be submitted as part of the landscape irrigation package:

i. An annual irrigation program with monthly irrigation schedules shall be required for the plant establishment period, for the established landscape, and for any temporarily irrigated areas. The irrigation schedule shall:

(A) Include run time (in minutes per cycle), suggested number of cycles per day, and frequency of irrigation for the station; and

(B) Provide the amount of applied water (in hundred cubic feet) recommended on a monthly and annual basis.

(C) Whenever possible, irrigation scheduling shall incorporate the use of evapotranspiration data such as those from the California Irrigation Management Information System (CIMIS) weather stations to apply the appropriate levels of water for different climates.

(D) Whenever possible, landscape irrigation shall be scheduled between 10:00 p.m. and 5:00 a.m. to avoid irrigating during times of high wind or high temperature.

c. Maintenance Schedules. A regular maintenance schedule satisfying the following conditions shall be submitted as part of the landscape documentation package:

i. Landscapes shall be maintained to ensure water efficiency. A regular maintenance schedule shall include but not be limited to checking, adjusting, cleaning and repairing equipment; resetting the automatic controller, aerating and dethatching turf areas; replenishing mulch; fertilizing; pruning; and weeding in all landscaped areas.

ii. Repair of irrigation equipment shall be done with the originally specified materials or their approved equivalents.

0.00.040 Provisions for audits.

A. Water Management. All landscaped areas covered by this ordinance which exceed 1.0 acre (43,560 square feet), including golf courses, green belts, common areas, multifamily housing, schools, businesses, public works, parks, and cemeteries may be subject to a landscape irrigation audit at the discretion of the water purveyor if the water purveyor has determined that the annual maximum applied water allowance has been exceeded for a minimum of 2 consecutive years. At a minimum, the audit shall be conducted by a certified landscape irrigation auditor and shall be in accordance with the California Landscape Irrigation Auditor Handbook, the entire document which is hereby incorporated by reference. (See Landscape Irrigation Audit Handbook, Department of Water Resources, Water Conservation Office (June, 1990, Version 5.5.)

B. Water Waste Prevention. Water waste resulting from inefficient landscape irrigation including run-off, low-head drainage, overspray, or other similar conditions where water flows onto adjacent property, nonirrigated areas, walks, roadways, or structures shall be prohibited. All broken heads and pipes must be repaired within 72 hours of notification. Penalties for violation of these prohibitions shall be established.

0.00.050 Fees for initial review and program monitoring(Optional).

The following fees are deemed necessary to review landscape documentation packages and monitor landscape irrigation audits and shall be imposed on the subject applicant, property owner or designee.

A. A landscape documentation package review fee will be due at the time initial project application submission to the District.

B. The Board of Directors, by resolution, shall establish the amount of the above fees in accordance with applicable law.

0.00.060 Appeals.

Decisions made by the Water Management Supervisor or Service Director may be appealed by an applicant, property owner(s), or designee(s) of any applicable project to the General Manager and thereafter the Board of Directors by an application in writing to the General Manager and Secretary of the Board of Directors, respectively, within fifteen days from the date of notification of decision.

REPEALS:

This ordinance will become effective on June 1, 2003. All plans approved on or after June 1, 2003, are subject to the provisions of this ordinance.

All other ordinances or parts of ordinances in conflict with the provisions of this Ordinance, are hereby expressly repealed.

ADOPTED this 25th day of March, 2003.

/s/ John W. McFadden
President

I, the undersigned Secretary of the Coachella Valley Water District, do hereby certify that the foregoing is a true and correct copy of Ordinance No. 1302 of said District introduced and passed at meeting of said Board held March 25, 2003, and that said Ordinance was passed by the following vote:

Ayes: Five

Directors: Larson, Codekas, Nelson, Kitahara, McFadden

Noes: None

I further certify that said Ordinance was thereupon signed by the President of the Board of Directors of said District.

Julia Fernández
Secretary

(SEAL)