WATER MANAGEMENT PLAN FOR ALTA IRRIGATION DISTRICT

For Submission to
Agricultural Water Management
Council

Volume 1 of 2

Attachment E.3a

ALTA IRRIGATION DISTRICT

AGRICULTRAL WATER MANAGEMENT PLAN

TWO-YEAR PROGRESS REPORT

September 17, 2003*

Prepared In Accordance with

MEMORANDUM OF UNDERSTANDING
November 13, 1996

Regarding

AGRICULTURAL WATER SUPPLIERS
EFFICIENT WATER MANAGEMENT PRACTICES
ACT of 1990 AB 3616

* Submitted July 13, 1999

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I. EXECUTIVE SUMMARY

On July 13, 1999, Alta Irrigation District submitted its Water Management Plan ("Plan") to the Agricultural Water Management Council ("AWMC). The Plan was prepared in accordance with procedures established by the Memorandum of Understanding ("MOU") regarding Efficient Water Management Practices ("EWMP") by Agricultural Water Suppliers in California (November 13, 1996). Alta Irrigation District's Plan was endorsed on September 15, 2001. It is the intent for the agency having an endorsed Plan to file a biennial report with the AWMC, unless the AWMC requests an interim report. Listed below is a summary of projects that have been implement or continue to be implemented by Alta Irrigation District consistent with the Plan and the EWMP:

- **Regulation Basins:** To reduce spill and increase operational efficiency, Alta Irrigation District has invested in several basins to collect spill water that can then be reallocated on a measured basis to fill water orders.

- **Water Recharge Basins:** Appropriate locations for recharge basins are reviewed and depending upon site availability and proximity to existing District facilities, successful locations are developed into recharge basins. Furthermore, Alta Irrigation District has several grant and loan proposals currently being considered for funding under Proposition 13.

- **In-Lieu Recharge:** Alta Irrigation District's groundwater is significantly influenced by recharge from open canals.

- **Incentive Pricing:** To minimize the variability of water pricing and encourage use of surface water, when available, a per acre charge is levied to all parcels within the District. In September of 2000, a water surcharge based on volumetric measurements at the turnout was initiated in addition to the per acre charge.

- **Water Measurement:** Water is measured by means of a submerged orifice or a cumulative flow meter.

- **Automation of Canal Controls:** Subject to funding, it is the intent to initiate automatic SCADA controls.

- **Facilitate Use of Recycled Water:** Alta Irrigation District is reviewing proposals to use treated waste water within its system.

- **Groundwater Management Plan:** Alta Irrigation District did adopt a Groundwater Management Plan in August 14, 1994. The Groundwater Management Plan does encompass by memorandum of understanding the incorporated cities of Reedley and Dinuba, and the unincorporated communities of Cutler and Orosi.

- **Surface and Groundwater Studies:** Several extensive studies have been completed to better understand the relationship between groundwater and surface water. In May of 2003, Alta Irrigation District in conjunction with Fresno Irrigation District, Consolidated Irrigation District and Kings River Conservation District in coordination with California Department of Water Resources and prepared by WRIME Consulting, developed a Basin Assessment Report ("BAR"). The intent of the BAR is to evaluate and develop water conservation projects on a regional basis.

- **Water Use Efficiency:** Alta Irrigation District has encouraged and enrolled landowners in a water efficiency review program developed and operated by the Kings River Conservation District to review irrigation efficiency of on-farm water delivery systems.

- **Water Transfers:** Alta Irrigation District has facilitated inter-district, intra-district water transfers and water banking with other districts.

II. WATER MANAGEMENT PLAN IMPLEMENTATION ASSESSMENT

The Alta Irrigation District Plan was developed consistent with the requirements established under the MOU. Section 4 of the MOU states that each signatory water supplier will develop a WMP and take reasonable steps to implement such WMP. Since the endorsement of the Alta Irrigation District Plan by the AWMC on January 25, 2001, Alta Irrigation District has complied with the provisions and intent of the MOU and is committed to the implementation of the EWMPs. The EWMPs are grouped under three lists as shown below:

- **List A – Generally Applicable Efficient Water Management Practices:**
  All agricultural water suppliers must implement these practices who signed the MOU and who have committed to comply with its requirements.

- **List B – Conditionally Applicable Efficient Water Management Practices:** These practices must be implemented by all agricultural water suppliers unless the supplier can demonstrate that such implementation is consistent with the exemption criteria described in the MOU. A water supplier may not implement these practices if the net benefit analysis is not economically beneficial, the practice will create negative environmental or third party impacts, the practice is infeasible with current technology or prevailing local conditions, funds are not reasonably expected to be available, or the practice is demonstrably inappropriate. The water supplier must conduct a Net Benefit Analysis evaluation consistent with the requirements of the MOU for each of the List B practices to determine the implementation applicability.

- **List C – Other Efficient Water Management Practices:** Water measurement and pricing.

A. Findings

Alta Irrigation District diverts water from the Kings River to agricultural water users in Tulare, Fresno and Kings Counties. Initially water was diverted as a private company, i.e., the 76 Land and Water Company, in December of 1883. On August 14, 1888, an election was held to form the Alta Irrigation District, a public irrigation district. Currently, Alta Irrigation District's Service Area encompasses 129,300 acres (see table 1).

TABLE 1

Crop Water Needs, 1996

Crop	Acres	Crop Needs
Alfalfa	7895	33699
Apples	946	3431
Apricots	681	2470
Citrus	8816	32154
Corn	4230	9846
Cotton	6599	15716
Grains	1370	2312
Grapes	20652	54855
Melons	156	164
Nectarine	15872	57416
Nuts	1433	5315
Peaches	10665	38580
Irrigated Pasture	2526	8377
Plums	11602	42215
Pomegranates	373	1324
Olives	1025	3639
Vegetables	1747	3678
Misc.	3233	10209
Idle Land	9930	5461
Building Sites	5842	9221
Dry Pasture	376	207
Towns and Roads	13331	21041
Total	129300	361330

B. Progress

Several projects have been funded and implemented by Alta Irrigation District since the original Plan was submitted in July 1999. For example, Alta Irrigation District in conjunction with Fresno Irrigation District and Consolidated Irrigation District formulated a regional aquatic pesticide monitoring program for Copper Sulfate; Continual effort to upgrade measurement of turnouts and automatic check structures, ITRC Flap gates – currently 15 are in use. Since July of 1999, Alta Irrigation District has also implemented other water conservation projects targeting improved water measurement and drainage issues for a total cost of $65,149.14.

Below is a List A, B and C EWMPs, a description of each EWMP, the category of each EWMP and a discussion on the progress and implementation level of each EWMP.

List A – Generally Applicable EWMPs:

EWMP 1 – Prepare and adopt a Water Management Plan – Mandatory: The Water Management Plan was adopted by the Alta Irrigation District Board of Directors on August 14, 1994 and submitted to the AWMC on July 13, 1999. The AWMC adopted the Plan on September 25, 2001. The first progress report is due two years subsequent to the adoption of the Plan. An updated Plan will be due to the AWMC in 2006.

EWMP 2 – Designate a Water Conservation Coordinator – Mandatory: Alta Irrigation District Water Conservation Coordinator was appointed on September 12, 1997.

EWMP 3 – Support the availability of water management services to water users – Mandatory: Alta Irrigation District has a cooperative arrangement with the Kings River Conservation District to: perform on-farm irrigation, pump test evaluation and drainage system evaluation; irrigation scheduling; and crop evapotranspiration information. Furthermore, Alta Irrigation District monitors surface water, groundwater, drainage water quality data along with supporting local education programs, i.e., holding landowner workshops and sending out public newsletters.

EWMP 4 – Where appropriate, improve communication and cooperation among water suppliers, water users and other agencies – Mandatory: Alta Irrigation District currently is associated with the following organizations: Association of California Water Agencies, Kings River Water Association, Kings River Conservation District, Agricultural Water Management Council and the United States Army Corps of Engineers.

EWMP 5 – Evaluate the need, if any, for changes in policies of the institutions to which the water supplier is subject – Mandatory: Alta Irrigation District, Consolidated Irrigation District and Fresno Irrigation District signed an internal agreement on Tuesday, June 15, 1999, which will allow better cooperation and transfer of water between the three districts. Alta Irrigation District, Consolidated Irrigation District, Fresno Irrigation District and Kings River Conservation District in conjunction with the Department of Water Resources signed an Integrated Storage Investigation of water resources.

EWMP 6 – Evaluate and improve efficiencies of water suppliers' pumps – Mandatory: Alta Irrigation District does evaluate and test the pumps it owns and operates on an annual or periodic basis.

List B – Conditionally Applicable Efficient Water Management Practices

EWMP 1 – Facilitate Alternate Land Use: Change is typically a conversion from agriculture to an urban type of use, i.e. residential, commercial or industrial.

EWMP 2 – Facilitate Use of Available Recycled Water: Alta Irrigation District does consider request to use recycled water.

EWMP 3 – Facilitate Financial Assistance: Currently Alta Irrigation District does not selectively administer financial assistance.

EWMP 4 – Facilitate Voluntary Water Transfers: Alta Irrigation District does facilitate inter-district and intra-district water transfers.

EWMP 5 – Line and Pipe Ditches and Canals: Notwithstanding areas having operational and maintenance issues that may warrant lining and pipeline projects, most of Alta Irrigation District's canals aren't lined or piped due to the benefits of in-lieu recharge.

EWMP 6 – Increase Water Ordering and Delivery Flexibility: Water orders are processed in a timely basis subject to travel distances, water supply and system capabilities. By increasing its inner-district storage capacity with re-regulation reservoirs, Alta Irrigation district has enhanced and improved its water delivery flexibility.

EWMP 7 – Construct and Operate Tail water and Spill Recovery System: Spill water is collected by means of reservoirs and reused.

EWMP 8 – Optimize Conjunctive Use: The principal intent of Alta Irrigation District's Groundwater Management Plan is to support the conjunctive use of groundwater and surface water in management of the Alta Irrigation District's water resources.

EWMP 9 – Automate Canal Structures: Due to funding limitations, Alta Irrigation District has not implemented automated (SCADA) monitoring and flow control stations. However, 15 ITRC flap gates have been built, installed and are currently in use in controlling upstream head.

List C – Other Efficient Water Management Practices

EWMP 1 – Water Measurement and Water Use Update: Alta Irrigation District measures water into its system by means of an automated head gate. Water is diverted to approximately 4000 turnouts using either a submerged orifices or cumulative flow meters. Due to increasing the volumetric surcharge based on water measured to landowners, the accuracy and inspection of measurement devices has become a higher priority for maintenance activities.

EWMP 2 – Pricing and Incentives: Annually the Alta Irrigation District Board of Directors establish an allocation formula based on the estimated water supply. Currently, there is a per acre charge and a volumetric surcharge based on the measured flow to a landowner. Due to Proposition 218, all future increases will be borne by increasing the water surcharge thus impacting those landowners utilizing surface deliveries. The establishment of a volumetric water surcharge has enhanced water accountability thus having a positive effect on water conservation.

III. IMPLEMENTATION FACTORS

A. Findings

Alta Irrigation District has fulfilled all of the obligations associated with the MOU. All the Generally Applicable EWMPs have been fulfilled (List A); All of the Conditionally EWMPs have been considered and implemented where feasible, according to MOU; and additional efforts not quantified by means of a economic analysis to improve water conservation practices. For example, better communication between landowners and ditchtenders to aid in water control practices that results in water conservation.

B. Additional Expenditures

A regional water management plan for aquatic herbicides, e.g., Copper Sulfate, has implemented a monitoring and testing program with the annual cost being a total of $13,605 as part of an interim NPDES Permit. The current budget includes 5 additional ITRC flap gates comprising $7,420, water measurement improvements $24,000, several lining and pipeline projects for areas incurring drainage issues $13,195 and a Geographic Information System (GIS) update $6,000.

C. Comments

Alta Irrigation District will continue to comply with the requirements of the MOU and the Alta Irrigation District Plan.

D. Variations from Plan Implementation

The Plan will be implemented as stated, except for canal automation due to budgetary limitations.

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FOR

ALTA IRRIGATION DISTRICT

For Submission to

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INTRODUCTION

The amount of surface water Alta Irrigation District receives varies significantly on an annual basis. Two main factors govern Alta's annual water supply, namely: the annual snow pack within the Kings River drainage basin and a complex set of agreements between the 28 water rights holders on the Kings River. The numerical table in Appendix A summarizes these agreements.

A detailed water balance was prepared for the sample year 1996 (Tables 1-8, Appendix B). Due to the variability of the surface water supply, the shifting cropping patterns and the overdrafted groundwater conditions a more general water balance was prepared to reflect the time period from 1960-1998 (Table 9, Appendix B). Annual average values from the general water balance are summarized in the following table:

Inflows			
	Kings River Diversion	165,100	acre-feet
	Precipitation	11.4	inches
	Up Slope Drainage	10,300	acre-feet
Outflows			
	Crop Water Needs	322,200	acre-feet
	Conveyance Evaporation	1,300	acre-feet
	Conveyance Spill	5,700	acre-feet
	Riparian Vegetation Use	400	acre-feet
	Farm Tailwater	5,900	acre-feet
Groundwater Pumpage		221,700	acre-feet

Included in this water balance is an estimate of the groundwater pumped within the Alta's boundaries by the District's water users and others. Estimated groundwater pumping is 221,700 acre-feet annually. With surface water deliveries averaging only 165,100 acre-feet, the reliance on groundwater and the need for conjunctive use programs become obvious.

I. EXISTING CONDITIONS

A. History and Size:

The Kings River water was first diverted to the Alta area in the early 1880's by private land companies. The Alta Irrigation District (AID) was created in 1888 by the local landowners to help ensure a reliable and equitable source of irrigation water. A pre-1914 water right for diversion of the Kings River is the source of the district's water *(KRCD, 1991).*

Alta encompasses 129,300 acres of land *(KRCD, 1999).* In 1997, 109,879 acres were irrigated, and in 1995, 109,751 acres were irrigated *(Alta 1995 and 1997).* The irrigated acreage for the two years just cited are close to the same which means the irrigated area did not change significantly. Therefore, the 1997 value can be used to represent the current irrigated acreage.

There is a general shift in cropping pattern from field and row crops to permanent crops. Also, as the population increases, more land is being converted from agriculture to urban. The following chart shows the acreage of each of the major crops and its percentage of the total agriculture acreage.

Table 1 - Top Agricultural Land Uses by Area for 1976, 1986, and 1996

Crop type	1976 acres	% of Acreage	1986 acres	% of Acreage	1996 acres	% of Acreage
Grapes	25,880	23%	26,214	23%	20,652	19%
Nectarines	8,619	8%	11,092	10%	15,872	14%
Non-Irrigated Ag	17,115	15%	16,086	14%	12,456	11%
Plums	7,578	7%	13,486	12%	11,602	11%
Peaches	5,818	5%	8,429	8%	10,665	10%
Misc. Crops	7,483	7%	7,377	7%	9,594	9%
Citrus	6,621	6%	6,054	5%	8,816	8%
Alfalfa	9,357	8%	6,145	5%	7,895	7%
Cotton	9,847	9%	7,469	7%	6,599	6%
Corn	1,675	1%	6,327	6%	4,230	4%
Grains	13,257	12%	3,051	3%	1,370	1%
Totals	113,250		111,730		109,751	

B. Location and Facilities

The Alta Irrigation District is located on the east side of San Joaquin Valley southeast of the city of Fresno. The district has land in three counties including 33,000 acres in southeast Fresno County, 3,700 acres in the northeast part of Kings County, and the rest in northern Tulare County *(KRCD, 1991)*. The district is bounded roughly by the Kings River on the west and the Sierra Nevada Foothills on the east (see Appendix C) *(KRCD, 1992)*.

According to the Alta Irrigation District Surface Water Study carried out by the Kings River Conservation District (KRCD), Alta's water conveyance and delivery system have the properties described in Table 2.

Table 2 - Existing Water Delivery Structures in Alta Irrigation District

Miles of unlined - canal	Miles lined - canal	Miles piped
245.7	7.6	63.5

Alta owns or leases eight recharge basins. Four of the recharge basins totaling 134 acres, double as regulating reservoirs. Detailed locations and descriptions of these basins are in Section II.E.3.

Alta has 11 spill points where operational spill can leave the Districts' boundaries. During the period from 1988 through 1998 an annual average spill volume of 1,500 acre-feet was spilled. During the recent past, all spill points have had spill recovery basins constructed at the tailends of the 11 canals. An example system would be the Clough Spill. At the end of the Clough Ditch there has been constructed a 20-acre catch basin to collect the majority of spill water. From this basin surrounding landowners have privately operated lift pumps to utilize the collected spill.

Alta's delivery system is classified as arranged demand. Alta operates a 16 to 20 day water cycle with landowners requesting deliveries on a need-be basis per an allocation formula. The Board of Directors would set the Allocation Formula which can be adjusted by a Board decision. Typically, water requests require 24 to 48 hours notice to turn-on or turn-off water deliveries.

The ditchtenders would coordinate water requests and set delivery times. Some operational constraints for Alta include limited upstream storage and an annual fluctuating water supply. The delivery system and operational constraints are not expected to materially change in the next five years.

C. Terrain and Soils

The district is composed primarily of alluvial fans sloping to the southwest with elevations ranging from 425 feet at the northern point to 270 feet in the southwest corner *(KRCD, 1991)*. The geology of the Alta area is typical of the east side of the San Joaquin Valley. Alta's surface topography is fairly flat with exception of the depressions of the Kings River and smaller streams and the protrusion of Smith Mountain *(KRCD, 1992)*.

While the basic topography is advantageous to the operation of a gravity supply system, it has minimal impacts on currently available on-farm irrigation systems.

Alta's soils vary from heavy clays near its eastern boundary to course sands near the Kings River. Numerous small streams meandered through the Alta area prior to agriculture. The presence of the large flows of the Kings River and the lesser flows of the intermittent streams has resulted in interwoven unconsolidated alluvial fans through most of Alta. Multiple layers of varying textured material has resulted in vertical heterogeneity *(KRCD, 1992)*. The Natural Resource Conservation Service (formerly the U.S.D.A. Soil Conservation Service *(SCS)*) has mapped the soil in and around Alta and classified them for their use in agriculture and for their effect on storm runoff *(SCS, 1940; SCS, 1971)*. Within the Alta boundary there are approximately 90 different named soils. There are four separate soil surveys that have to be consulted to determine the soils in all of Alta. One of these surveys, the Western Tulare County Soil Survey, was completed in the 1930s. The generalized soil series names can not be used because the 1930 survey has different naming method and not enough detail to match the names used with the other more recent surveys. Since the area in the old survey encompasses over half of Alta's total acreage, a different approach had to be taken in quantifying the percentages of the various soils. Therefore, the texture of the soils was used rather than a name when categorizing soils in Alta. The table below shows the estimated acreage of each soil texture along with the effects on water operations and management.

Table 3 - Soil Types and the Effects on Irrigation Management

Soil Texture	Estimated Acreage	Effect on Irrigation Management
Sandy loam/Loamy sand	90,510	Best soils from a water management perspective
Loam	25,860	Some infiltration problems due to low Ec water
Clay loam/clay	12,930	Slow infiltration rates, potential for water logging

Soil problems in Alta cause some limitations to water application and management. Some of the acreage in Alta suffers from more than one problem. Also, due to the low electrical conductivity (Ec) of the irrigation source water, only the sandy soils with high to excessive infiltration rates are capable of maintaining infiltration rates without problems.

Table 4 - Soil Problems and the Effects on Irrigation Management

Soil Problem	Estimated Acreage	Effect on Irrigation Management
Sandy Soil	25,860	Excessive drainage, low Water Holding Capacity
Clay Soil	12,930	Slow infiltration rates, Potential for water logging
Water Infiltration	103,440	Slow infiltration rates due to low Ec in Irrigation Water
Hard Pan	25,860	Water logging, limited root zone

D. Climate

In general Alta's summers are hot and dry, and the winters are mild with some precipitation. There are no significant microclimates within Alta. Average monthly precipitation along with the average, maximum and minimum monthly temperatures are shown in the following table. The average annual rainfall measured over a thirty-year span (1961-1990) is 11 inches/year. The average temperature taken at the Fresno Airport, is 63°F (1961-1990).

Table 5 - 30-year Averages Precipitation and Temperatures by Month (1961-1990)

	Precip. (inches)	Avg Temp. (°F)	Max Temp. (°F)	Min Temp. (°F)
JAN	2.10	44.7	53.2	37.6
FEB	1.87	50.5	61.0	41.2
MAR	1.93	54.7	65.8	44.3
APR	0.97	60.8	73.7	48.4
MAY	0.29	69.0	83.0	54.7
JUN	0.14	76.7	91.4	61.3
JULY	0.01	82.2	97.4	66.2
AUG	0.05	80.1	95.3	65.0
SEPT	0.24	74.0	89.2	60.1
OCT	0.58	64.4	79.0	51.9
NOV	1.45	52.6	63.9	42.8
DEC	1.38	44.6	53.1	37.4
ANNUAL	11.0	62.9	75.5	50.9

E. Operating Rules and Regulations

On March 9, 1990, Alta adopted a revised version of its "Rules and Regulations" (Alta, 1990). The goals and objectives of the "Rules and Regulations" are to clarify the obligations and procedures of Alta distributing surface water equitably to landowners within its boundaries. For example, the "Rules and Regulations" specify that Alta will develop an allocation formula for the distribution of surface water to landowners, clarify the process of requesting and the duration of deliveries, transfers in points of delivery within Alta, clarify use and maintenance of private laterals, and the importance of being efficient with surface water deliveries.

As a condition of receiving surface water, landowners' use of surface water may be refused if surface water is not used efficiently due to inadequate land preparation, inadequate privately owned facilities, carelessness or other form of improper use. If notice of a defective facility, i.e., pipeline leak(s) or canal leak(s), is reported on private laterals (canals or pipelines), landowners serviced by such lateral will be notified by mail and surface water service terminated if the defective facility is not repaired within a stated time frame.

F. Water Delivery Measurement

In 1981, Alta Irrigation District adopted standard "Methods and Devices" as a revision of its former water measurement manual (Alta, 1981). The principal methods of measurement within Alta are submerged orifices (1-foot, 2-foot, 3-foot, 3.5-foot, 4-foot, 4.5-foot, 6-foot, 16-foot), parshall flumes (4-foot, 8-foot, 10-foot, 15-foot), cumulative flow meters (8-inch to 12-inch diameter), and canals rated by current meter.

Alta has in excess of 4,000 surface water delivery locations within its system. All delivery locations are measured at least once per day using submerged orifices and cumulative flow meters. Surface water delivery measurements per parcel are stored within computer files. All surface water must be ordered at least 24 to 48 hours in advance of expected delivery to water delivery location. Alta's delivery from the Kings River to its farthest reach is over 30 miles, principally, by gravity through open canals.

Alta evaluates its water orders to turn water on or off every day at 8:00 a.m. and 3:00 p.m. Thereafter, water changes are balanced per each water lateral and necessary adjustments are made.

G. Water Billing

Annually, Alta reviews and adopts a resolution fixing charges for the district. All parcels within Alta are charged as an incident of property ownership. Parcels within urban areas are charged per city lot a fixed water charge based upon the general benefit of surface water. Rural parcels are categorized into entitlement areas (100%, 75%, 50%, 25% and groundwater only) based upon historical use. In addition, rural parcels are also charged a supplemental groundwater charge due to the active and in-lieu recharge provided by Alta.

Urban charges within incorporated cities for parcels less than one acre in size are collected by the city for Alta by incorporating Alta's water charge with the city's enterprise billing, i.e., trash, water and sewer. Within unincorporated urban areas, Alta provides for direct billing of parcels less than one acre. In rural areas, Alta provides for direct billing for all parcels.

The justification for charging based upon property ownership is that all parcels benefit from surface water being delivered within a defined region similar to a benefit assessment. However, parcels utilizing the surface water are paying most of the total annual water charge. In Alta's case, the cost for its water is minimal due to its long-standing pre-1914 appropriative water rights and a debt free distribution system. The water charge is based upon the maintenance of the distribution system and the cost to deliver water to a farmer's turnout.

The concern with charging for surface water based upon volumetric measurements of surface water used is that the cost of surface water could be greater than the cost to pump groundwater. The quantity of surface water is predominately based upon the snowpack of the watersheds of the middle and south forks of the Kings River. The snowpack of the Kings River's watershed is cyclical with wet and dry years, which would mean radical annual adjustments in the cost of surface water versus a fixed rate for the cost to pump groundwater (DWR, 1999). The result could seriously diminish the successful conjunctive use program of utilizing surface water when possible and using groundwater only when necessary to supplement crop requirements. Alta has a long-term average annual groundwater overdraft of approximately 25,000 acre-feet (Appendix D). With the recent passage of Proposition 218, Alta is evaluating using volumetric measurement for water used as a surcharge in addition to its existing water charges for any cost increases.

Alta currently bills all landowners within the district for the benefit of bringing in surface water. A flat-rate water charge is levied as an incident of property ownership. Excepting incorporated and unincorporated urban areas, rate schedules reflect the entitlement of surface water and a groundwater component. Urban areas pay a minimum cost per parcel.

In the future, Alta has adopted a policy to incorporate a volumetric pricing component which will be in addition to the flat-rate water charge per parcel (see appendix E). Starting in 1999, all water charges will include the amount of water used during the current water season.

H. Water Shortage Allocation Policies

During years of below normal snowpack, Alta's Board of Directors generally lower the water allocation formula to allow water deliveries to be prorated in an equitable manner. For example, in average water years, the standard allocation formula would be four days per twenty acres diverting one cubic-foot per second per water delivery turnout. If the district incurred a fifty percent (50%) water year, Alta could reduce the allocation formula to two days per twenty acres utilizing one cubic-foot per second per water delivery turnout. In dry water years, it is important that surface water be utilized to the fullest extent possible to help relieve the accelerated level of groundwater pumping. As a result, Alta does not increase the price of water during dry years.

As part of Alta's Groundwater Management Plan adopted under AB 3030 (Alta, 1994), under Item V. ACTION ITEMS, A.13, Redistribution of Surface Water, this provision allows Alta to deliver surface water to areas based upon groundwater conditions. This provision is important in extended drought periods whereby groundwater supplies in the easterly portion of Alta become depleted and such area is almost entirely planted to high value permanent crops.

II. WATER RESOURCES INVENTORY

A. Surface Water Supply

Due to the fact that Alta's primary source of surface water is variable from year to year, diversions to water users is in relation to the Kings River's snowpack and storage levels in Pine Flat Reservoir. In evaluating diversions from Alta's Headgate for the prior thirty-eight years (see Table 9 in Appendix B). The average flow per year measured into the Alta's Headgate is 165,078 acre-feet. However, the most water diverted in said thirty-eight year period is 283,718 acre-feet; the least water diverted is 38,721 acre-feet. Except for extremely dry years, Alta delivers surface water to approximately 85,000 acres per water year.

B. Groundwater Supply

The alluvial fans have created an effective aquifer system that has yielded large quantities of groundwater to pumping and has demonstrated the ability to recharge through active and passive means. Recharge occurs through stream beds, lateral inflow from east of the district, direct precipitation, spreading basins, canal seepage, and deep percolation of irrigation water. The Kings River provides recharge only in years when the surrounding water table is low. In many years, groundwater *accretion (movement of groundwater from the aquifer to the river)* increases the flow of the Kings River along Alta's boundary *(KRCD, 1992).*

The basin underlying the Alta Irrigation District is an unconfined aquifer. This aquifer is named the Kings Basin and described as being "subject to critical overdraft" in bulletin 118-80 from the Department of Water Resources. The Kings Basin underlies all of Alta and also several of the surrounding irrigation districts. The base of the aquifer is a consolidated pre-Tertiary granite basement complex that yields very little groundwater. This complex is tapped by wells only on the far eastern edge of the district *(KRCD, 1992).*

Pumping yield varies significantly throughout Alta. Near the foothills, where the depth to bedrock is small, the volume of water yielded by aquifers is extremely limited. Alta's east side growers have experienced declining well yields during most extended drought periods due to the small depth to bedrock. When regional groundwater levels are low, groundwater may become unavailable to growers on the eastern edge. In the western and southwestern portions of the district the aquifer is thicker, approaching 6,000 feet *(KRCD, 1992).*

The groundwater elevation in Alta has fluctuated widely in the past. In the early 1900's the water table sometimes approached the ground surface. After the advent of the vertical turbine pump in the 1930's, the district experienced a shift in cropping pattern toward more permanent crops that required more quantity and a more reliable supply of water. The increase in water demands and pumping have led to a long-term groundwater overdraft. During periods of drought, large decline of the water table is experienced. During wet periods, the water table recovers to some extent. Due to the size of the aquifer and the fact that groundwater pumping is not regulated, it is not possible to quantify the safe yield from the Kings Basin. However, using the data from groundwater level readings, it can be determined that the levels of the groundwater are dropping *(KRCD, 1992).*

The major inflows to the Alta Irrigation District are surface diversion, effective rainfall, and subsurface flow. Surface entitlement is 165,000 ac-ft/year on average, and the average effective rainfall is 66,100 ac-ft. Generally the subsurface inflow exceeds its outflow to cause an average net increase of 25,406 ac-ft/year *(KRCD, 1992).* Annual total water demand is 361,330 acre-feet. This means growers must rely on a secondary source for irrigation water even in average years. The difference is typically made up by pumping the groundwater *(KRCD, 1992*).

A study of thirty-eight years of groundwater data was performed. The overdraft was found to be 25,000 acre-feet (Appendix D). Although the volume of groundwater lying between Alta's water table and bedrock may be several million acre-feet, much of that would not be economical to pump because of extreme depth below the ground surface *(KRCD, 1992).*

Urban growth may help reduce Alta's overdraft, but at the same time it could create significant localized problems in the vicinity of urban areas due to concentrated continuous pumping and lack of groundwater recharge.

Conjunctive Use-

According to the Memorandum of Understanding regarding Efficient Water Management Practices by Agricultural Water Suppliers in California, conjunctive use is defined as:

> The planned management of two or more water resources in order to accomplish the greatest long-term net water management benefit. One goal of conjunctive use is to balance recharge and extraction of groundwater over a given time interval, within the limits of acceptable change in the groundwater reservoir, and maximize the beneficial use of water from two or more available water supplies. Correction of existing long-term overdraft is not a prerequisite to a conjunctive use program.

Since the Alta Irrigation District does not own or manage any wells, it only has the one source of water. Therefore, it cannot perform a conjunctive use program as defined above by alternating between two sources. However, Alta is committed to facilitating conjunctive use by the growers to the maximum extent possible. *In lieu*, active, and passive recharge methods are enacted to alleviate some of the pressure on the groundwater resources. Recharge methods are described in Section II.E.5. Groundwater Recharge.

The way that Alta applies a conjunctive use program is to encourage the growers to draw upon the diverted surface water before pumping the groundwater. This *in lieu* method is supported by Alta's current pricing and regulations. Alta bases its water prices on property ownership (see Section I.G. on Water Billing). If charging were according to the volume of water available, there would radical annual adjustments in price. In a dry year the price of surface water could be more than the price to pump the water. Farmers, in this case, would pump groundwater rather than using their surface allotment. This would cause an excessive draw on the groundwater supply and undermine the conjunctive use program.

C. Other Water Supplies

Alta utilizes no other supplies other than its pre-1914 water rights on the Kings River; however, Alta is physically connected to the Friant Kern Canal as part of the federal government's Central Valley Project. Historically speaking, Alta has not taken water (Class 215) from the Friant Kern Canal for over twenty years, and maintains no Class I or Class II contracts therefrom.

D. Source Water Quality Monitoring Practices

Electrical conductivity of the source water is measured by KRCD at the United States Army Corps of Engineers bridge below Pine Flat Dam on the Kings River using a continually recording data logger.

Table 6 - Surface Water Quality Analysis

Analyses Performed	Concentrations Range	Concentrations Average	Frequency
Electrical Conductivity	.01 - .07 ds/m	.03 ds/m	15 min. interval

Alta's Groundwater Management Plan, Article III Water Quality, Section (c) Water Quality Requirements/objectives, sets up the process to test and monitor groundwater for DBCP and Nitrates (Alta, 1994). It is the intent to secure information for an extended period of time from sufficient locations within Alta to evaluate trends in wet years versus dry years. This program is a cooperative effort by and between Alta Irrigation District, City of Reedley, City of Dinuba, and the unincorporated communities of Cutler and Orosi.

E. Water Uses Within Alta's Service Area

1. Agricultural

The beneficial use was calculated for Alta. Beneficial use includes evapotranspiration (E_t), leaching requirements (LR), and water used for cultural practices such as frost control, preparation for fertilization, pre-season, and post-harvest irrigation. This report focused on E_t, LR, and frost protection for permanent crops (categorized under cultural practices). The values for the main crops are shown in the table included with this section. The beneficial use is 330,900 ac-ft/year of which 224,341 ac-ft/year (66%) is for permanent crops (Table 7). The beneficial use for leaching is 13,178 ac-ft/year.

These values did not take into account any irrigation efficiency. Therefore, more water would need to be diverted or pumped to satisfy the inefficiencies of the individual irrigation systems. A discussion on improving the irrigation efficiency is included in Section II.E.3. Groundwater Recharge.

2. Municipal and Industrial

Alta does not supply surface water to municipal and industrial users. These uses rely solely on groundwater which in turn affects the net water supply for the entire groundwater basin.

Table 7 - Beneficial Use for Agriculture

Crop Water Use 1996	Area (acres)	Etc (inch/year)	ETc Water Use (ac-ft/year)	Leaching Req. (ac-ft/year)	Cultural Practices (ac-ft/year)	Total Water Use (ac-ft/year)
Grapes	20,652	28.0	48,188	2,536	4,130	54,996
Nectarines	15,872	39.2	51,849	2,393	3,174	57,532
Plums	11,602	39.2	37,900	1,995	2,320	42,326
Peaches	10,665	39.2	34,839	1,608	2,133	38,658
Idle Land	9,930	6.6	5,462	0	0	5,462
Citrus	8,816	36.1	26,521	1,224	4,408	32,403
Alfalfa	7,895	49.3	32,435	1,264	0	33,750
Cotton	6,599	28.3	15,563	153	0	15,717
Corn	4,230	26.7	9,412	434	0	9,867
Misc. Crops	3,233	36.0	9,699	510	0	10,092
Perm. Pasture	2,526	38.8	8,167	209	0	8,499
Vegetables	1,747	24.0	3,494	184	0	3,802
Nuts	1,433	40.0	4,777	251	287	5,329
Grains	1,370	20.0	2,283	29	0	2,313
Olives	1,025	39.2	3,348	86	205	3,739
Apples	946	39.2	3,090	152	189	3,451
Apricots	681	39.2	2,225	109	136	2,476
Pomegranates	373	39.2	1,218	31	75	1,361
Melons	156	12.0	156	8	0	166
Total	**109,751**	**32.9**	**300,630**	**13,178**	**17,100**	**330,900**

3. Groundwater Recharge

Passive Recharge

Alta's delivery system is a very effective passive recharge facility. A model of the district's groundwater system was created by KRCD. The model indicates that 25% of Alta's surface water is recharged in any given year. The Kings River channel is an integral part of Alta's recharge ability. During dry years, the water table drops to a level that allows the Kings to infuse large quantities of water into district aquifers. During wet years, the River provides a safety valve that helps to prevent the water table from inundating Alta's growers *(KRCD, 1992).* Two other forms of passive recharge are inefficiency in irrigation and unlined canals.

The results of the Alta groundwater model performed by the KRCD suggest that a widespread increase in irrigation efficiency would have little effect on Alta's groundwater quantity. Localized differences in the water table are a likely result of the lack of recharge from deep percolation that results from improved irrigation. An increase in irrigation efficiency does, however, have the potential for improving the long-term quality of Alta's groundwater. By reducing deep percolation, the amount of groundwater degradation caused by excessive nutrient and agricultural chemical leaching would be significantly reduced. An increase in irrigation efficiency would also greatly reduce the energy consumption of the region by reducing groundwater pumping requirements *(KRCD, 1992).*

Also, according to the groundwater model, lining all of the canals would have a negligible effect on groundwater levels. The result is not unexpected considering that regardless of canal seepage, the total volume of water that enters and exits Alta remains the same. Widespread canal lining would, however, result in an average reduction of groundwater pumping of about 40,000 ac-ft/year. This reduction is based on the assumption that the water conserved through lining could be held in storage and delivered to growers at a later date. This assumption was not confirmed. It is possible that lack of upstream storage could result in a reduction of Alta's water diversion in wet years. If this were the case then canal lining could result in lower groundwater levels *(KRCD, 1992).*

Active Recharge

Along with passive recharge, the district also practices means of active recharge. The district owns and operates several recharge basins which are used in their artificial groundwater recharge program. Descriptions of those recharge basins are as follows:

1. Five-acre basin, known as Meek Ponding Basin, in the southwest quarter of Section 1, T16S, R23E. This basin was formerly a county owned borrow pit, but since 1978, it has been used exclusively for recharge.
2. Sixty-three-acre basin, known as London Ponding Basin, was formerly a county-owned borrow pit in the northeast quarter of Section 2, T17S, R23E. Since 1980 the basin has been used as a balancing reservoir, recently utilizing pumps for the district's irrigation distribution system and as a recharge basin when water is available.
3. Fifteen-acre site in the northwest quarter of Section 36, T16S, R24E, is used exclusively as a recharge basin.
4. Five-acre basin, known as Traver Pond (also known as Jost Ponding Basin), completed in February of 1989 in the northeast quarter of Section 13, T17S, R22E. This basin is used primarily to capture and percolate water from the Traver Canal that would otherwise be dumped into the Kings River. Also, adjacent farmers may pump directly from the reservoir in lieu of pumping from the underground.

In addition to the recharge basins, the district also owns approximately 80 percent of Wahtoke Lake, a twenty-acre reservoir located outside the district but abutting its boundary at the junction of Wahtoke Creek and the Alta Canal in the eastern half of Section 30, T14S, R24E. Since 1900, this lake has been used as a combination balancing reservoir and recharge basin.

The district also operates two leased recharge sites as follows:

1. A fifteen-acre basin, known as Bowen Ponding Basin, in the southeast quarter of Section 27, T17S, R23E. Since 1973, this basin has been used exclusively as a recharge basin.
2. A five-acre basin, known as Harder Pond, near the center of Section 6, T17S, R23E. Since 1983, this basin has been used as a combination balancing reservoir and recharge basin.

In addition to seven sites already in operation, the district has constructed the Button Ponding Basin, a forty-six acre site in the southeast quarter of Section 1, T17S, R24E, which is used as a regulation basin.

Sources of water for the district's recharge program are flood releases in the Kings River, floods in the local area, and operational spills. The attached Artificial Groundwater Recharge Report shows the locations of the recharge reservoirs.

Although there is no monitoring of the amount of water delivered to each of the existing recharge basins. The district has monitored the groundwater level since 1921 by the annual measurement of the depth to ground water in irrigation wells. The average annual depth to groundwater is shown on the hydrograph in (see Appendix F). At the present time, 130 wells are included in the program. Ideally, the district tries to monitor one well per section of land. As of March 1996, the average depth to groundwater in the district was 47 feet (*KRCD, 1999*).

III. EXISTING WATER CONSERVATION PRACTICES

A. Regulation Basins

Alta has construction two re-regulation basins: the Button Ponding Basin Project in 1990 and the London Ponding Basin Project in 1996. The Button Ponding Ponding Basin Project involved the purchase of irrigated farmland and construction of levees and excavated cells for water storage. The inflow and outflow is gravity flow. The London Ponding Basin Project involved the construction of a pump station to transport water stored in the London Ponding Basin approximately one mile east to a feeder canal for water deliveries. Both projects serve approximately 6,000 acres.

B. Water Recharge Basins

Historically, Alta has reviewed potential recharge locations within the district boundaries. In locations where sand has been removed from surface locations for road purposes, Alta has purchased or leased such locations for water recharge: Meek Pond, Harder Pond, Boone Pond, and Traver Pond.

C. In-Lieu Recharge

Alta's groundwater recharge is significantly influenced by recharge from open canals. On an average basis, approximately twenty-three percent of Alta's Headgate diversion is attributed to seepage.

D. Incentive Pricing

To enhance Alta's conjunctive use program, water is billed on a flat rate per acre. The intent is to reduce water cost by sharing the benefit of delivering surface water with all landowners within the district. The per acre pricing results in no fluctuation in price between wet and dry years allowing surface water to be cost effective with groundwater when available.

E. Water Measurement

Alta measures all turnouts by means of a cumulative flowmeter or a calibrated differential head submerged orifice. Most of the 4,000 turnouts are the submerged orifice type; with measurements principally used for allocation purposes.

F. Automation of Canal Controls

Alta did computerize its Headgate in 1987. Alta is currently in the process of updating the Headgate computer controls; which will allow off-site control of Headgate diversions.

G. Facilitate Use of Recycled Water

The Cities of Dinuba and Reedley have held discussions pertaining to utilizing Alta's distribution system for effluent disposal. Alta has agreed to review proposals to address issues from both cities.

H. Groundwater Management Plan

Alta's Groundwater Management Plan was adopted on August 14, 1994. The intent of the Plan is to evaluate groundwater quality and quantity issues.

I. Surface and Groundwater Studies

KRCD prepared surface and groundwater studies in 1991-92. Such information was developed to substantiate Alta's Groundwater Management Plan and evaluate existing and future water conservation practices.

J. Consultation with Landowners on Water Efficiency

Since 1990, Alta and KRCD have cooperated in a program to evaluate on-farm water use efficiency. The intent of the program is to review existing on-farm water delivery systems and to inform landowners of options that may be available.

K. Water Transfers

Historically, Alta has been involved in inter-district and intra-district transfers. During successive dry years, Alta has facilitated water transfers of surface water between landowners with and without adequate groundwater. Alta has also initiated water banking arrangements between other water districts.

IV. SUMMARY AND DISCUSSION OF EFFICIENT WATER MANAGEMENT PRACTICES

Table 8 - Summary of Net Benefit Analysis

1.	Facilitate Alternate Land Use	Satisfactorily Implemented, Demonstrably Inappropriate and Technically Infeasible
2.	Facilitate Use of Available Recycled Water	Technically Infeasible
3.	Facilitate Financial Assistance	Not Implemented
4.	Facilitate Voluntary Water Transfers	Satisfactorily Implemented
5.	Line or Pipe Ditches/Canals	Satisfactorily Implemented and Demonstrably Inappropriate
6.	Increase Water Ordering/Delivery Flexibility	Demonstrably Inappropriate and Technically Infeasible
7.	Construct/Operate Tailwater and Spill Recovery System	Satisfactorily Implemented, Demonstrably Inappropriate and Technically Infeasible
8.	Optimize Conjunctive Use	Satisfactorily Implemented
9.	Automate Canal Structures	Accepted
10.	Water Measurement Water Use Update	Not Implemented, Inadequate B/C Ratio
11.	Pricing and Incentives	Not Implemented, Inadequate B/C Ratio

EWMP 1 - Alta land use is primarily permanent crops which precludes flexibility in land use changes. It may be prudent to inform areas which may become deficient in groundwater in future water-short years to be aware of conservation measures which may beneficially impact their area. The complete net benefit analysis can be found in Appendix G.

EWMP 2 - There is interest in Alta to work with urban areas to recycle treated effluent. However, effluent is to be treated to an appropriate level to mitigate crop impacts, groundwater quality impacts and physical impacts to Alta's facilities. At this time, effluent recycling is conceptually being discussed as possible future water supply for groundwater recharge and crop production; however, the cost to provide the higher level of treatment is not economically feasible. The complete net benefit analysis can be found in Appendix H.

EWMP 3 - Alta may have the legal authority to initiate on-farm conservation programs with low interest loans. It is the direction of the current Board to not offer limited economic programs to selected landowners. The concern is that on-farm improvements may enhance property values or provide an economic competitive advantage in a manner which is not equitable to all landowners. The complete net benefit analysis can be found in Appendix I.

EWMP 4 - Alta does facilitate and approve all inter-district water transfers and would facilitate intra-district water transfers. The complete net benefit analysis can be found in Appendix J.

EWMP 5 - Due to the fact that Alta has a useable groundwater table and is a water deficient area, the unlined canals provide effective recharge. In critically dry years, it would be preferable to have lined canals due to the limited supply and incidental recharge from unlined canals. As a result, canals are lined only in areas where they create operational or maintenance concerns. The complete net benefit analysis can be found in Appendix K.

EWMP 6 - Alta operates a modified demand system for water orders and delivery. Landowners place water orders on a request basis and Alta responds in a time period dependent upon system limitations, i.e., system capacities, water supply and water travel distances. The complete net benefit analysis can be found in Appendix L.

EWMP 7 - Alta has ponding basins on most of its terminal facilities thus limiting spill from district, excepting flood releases. With the limited spill, there is not an economic benefit to proceed with this EWMP. Currently, Alta requires on-farm tailwater to be reused on-site. The complete net benefit analysis can be found in Appendix M.

EWMP 8 - The whole premise of Alta's Groundwater Management Plan is to provide a surface water supply to supplement groundwater. It is the intent of Alta to keep surface water priced so as to encourage use when available, and to utilize groundwater when necessary for the evaporation/transpiration requirements of crop demands. It is the conclusion of this report that this EWMP is satisfactorily implemented. The complete net benefit analysis can be found in Appendix N.

EWMP 9 - Due to the fact that much of the Alta's delivery system is more than one hundred years old, necessitates updates in automation and controls. Alta currently is implementing a plan to review, monitor and institute canal automation on its major facilities. Furthermore, Alta is evaluating a means to physically stabilize water levels on medium to small laterals. The complete net benefit analysis can be found in Appendix O.

EWMP 10 - Currently, Alta has 4,000 measured turnouts receiving water based on incidental measurements. Furthermore, Alta requires cumulative flow meters on all pipeline projects. Due to the fact that it is the intent of Alta to keep available surface water priced low enough to discourage groundwater pumping in moderate to wet years, the cost of installing and maintaining cumulative flow meters throughout the District is prohibitive. The complete net benefit analysis can be found in Appendix P.

EWMP 11 - Alta's surface and groundwater is utilized conjunctively to provide for evaporation/transpiration crop requirements. To increase the price of surface water would result in higher groundwater pumping in moderate to wet years thus resulting in a premature lowering of the groundwater table. The complete net benefit analysis can be found in Appendix Q.

V. COMPLIANCE PROVISIONS

A Prepare and Adopt a Water Management Plan Using as a Guideline Exhibit B of this Memorandum of Understanding for Agricultural Water Suppliers

Alta signed a resolution to develop a Water Management Plan within two years of the effective date of signing the MOU. Alta's effective date for signing the MOU was July 16, 1997. As a result, Alta will submit a Water Management Plan on or before July 16, 1999. Alta's Board of Directors adopted this Water Management Plan by Resolution at their regularly scheduled public board meeting on June 11, 1999. An executed copy of the Resolution can be found in Appendix R.

B. Designate a Water Conservation Coordinator

On September 12, 1997, Alta authorized General Manager Chris M. Kapheim to assume the responsibility of Water Conservation Coordinator as required under the AB 3616 MOU Regarding Efficient Water Management Practices by Agricultural Water Suppliers in California.

C. Support the Availability of Water Management Services to Water Users

Alta currently has a cooperative arrangement with the Kings River Conservation District to (i) perform on-farm irrigation, pump test evaluation and drainage system evaluation and (ii) Normal year and real-time irrigation scheduling and crop evapotranspiration information. Alta currently monitors surface water, groundwater and drainage water quality data. Groundwater testing is performed on an annual basis on a representative basis throughout the district; surface and drainage water is tested on an incidental basis. Alta has supported local education programs with farmers by means of holding workshops and sending out newsletters.

D. Where Appropriate, Improve Communication and Cooperation Among Water Suppliers, Water Users, and Other Agencies

Alta currently is associated with the following water organizations:

A. Association of California Water Agencies

B. Kings River Water Association

C. Kings River Conservation District

D. Agricultural Water Management Council

E. California Farm Water Coalition

F. United States Army Corps of Engineers

Alta is currently evaluating whether to install a web site to facilitate the dissemination of information to water users and other water agencies.

E. Evaluate the Need, if any, for Changes in Policies of the Institutions to Which the Water Supplier is Subject

Alta, Consolidated Irrigation District, and Fresno Irrigation District signed an internal agreement on Tuesday, June 15, 1999, which will allow better cooperation and transfer of water between the three districts. On a long-term basis, Alta is evaluating programs that can increase its water supply during dry years utilizing water banking opportunities.

F. Evaluate and Improve Efficiencies of Water Suppliers' Pumps

Alta does evaluate and test the pumps it owns and operates on an annual basis.

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APPENDIX A

Alta Irrigation District Monthly Diversion Schedule for the Kings River

APPENDIX B

Alta Irrigation District Monthly Water Balance

APPENDIX C

Alta Irrigation District Location and Distribution System Maps

APPENDIX D

Water Supply vs. Groundwater Storage

APPENDIX E

Rules and Regulations for Implementing Surcharge

APPENDIX F

Alta Irrigation District Groundwater Hydrograph (1925-1997)

APPENDIX G

EWMP #1: Facilitate Alternate Land Use

APPENDIX H

EWMP #2: Facilitate Use of Available Recycled Water

APPENDIX I

EWMP #3: Facilitate Financial Assistance

APPENDIX J

EWMP #4: Facilitate Voluntary Water Transfers

APPENDIX K

EWMP #5: Line or Pipe Ditches/Canals

APPENDIX L

EWMP #6: Increase Water Ordering/Delivery Flexibility

APPENDIX M

EWMP #7: Construct/Operate Tailwater and Spill Recovery System

APPENDIX N

EWMP #8: Optimize Conjunctive Use

APPENDIX O

EWMP #9: Automate Canal Structures

APPENDIX P

EWMP #10: Water Measurement/Water Use Update

APPENDIX Q

EWMP #11: Pricing and Incentives

APPENDIX R

Resolution Adopting Water Management Plan

A

APPENDIX A

Alta Irrigation District Monthly Diversion Schedule for the Kings River

Alta Irrigation District surface water entitlement from the Kings River. All values in cubic feet per second. To use table, take the daily flow rate in the Kings River at Piedra and move to the column of the corrisponding month. The resulting flow rate is what Alta ID is entiteled to use for that flow rate and month.
Example: River at Piedra is 4500 cfs in May, Alta can divert 900 cfs.

River at Piedra	January	February	March	April	May	June	July	August	September	October	November	December
100												
200												
300										100		
400										200	70	
450											120	
500										300	170	
600										400	200	
700										470	300	
800										475	400	
900										475	400	
1000										475	400	
1100										475	450	15
1200										475	465	31
1300										475	479	47
1400										485	493	61
1500										500	506	70
1600		50								514	515	79
1700		100							80	529	524	89
1800	7	150							180	542	533	98
1900	14	200							230	551	541	108
2000	18	200							285	559	550	117
2100	23	202							385	568	559	128
2200	27	211							485	577	569	139
2300	32	219		50	50	50	50		585	585	579	150
2400	36	224	100	150	150	150	150		600	594	589	161
2500	40	230	200	250	250	225	225		614	604	600	172
2600	45	235	200	250	250	250	250		628	615	610	183
2700	51	241	200	250	250	250	250		641	625	620	194
2800	56	246	200	250	250	250	250		650	635	630	205
2900	61	251	300	350	350	350	350	16	659	645	640	216
3000	66	258	300	350	350	350	350	32	668	655	651	227
3100	71	264	400	450	450	450	450	48	676	666	661	237
3200	77	271	400	450	450	450	450	64	685	676	669	246
3300	84	277	500	450	450	450	450	73	694	686	678	255
3400	90	284	500	550	550	550	550	81	704	696	687	265
3500	97	290	500	550	600	600	600	89	714	705	695	274
3600	104	296	500	650	700	700	700	101	724	713	704	283
3700	111	303	500	700	750	750	750	116	735	722	713	293
3800	119	309	500	700	750	750	750	132	745	731	722	302
3900	132	315	500	750	800	800	800	148	755	740	730	312
4000	148	321	500	800	800	800	850	165	765	748	739	321
4100	165	326	531	900	900	900	900	186	775	757	748	329
4200	182	332	559	900	900	900	950	206	786	766	755	337
4300	199	337	577	900	900	900	950	226	796	774	762	345
4400	216	342	595	900	900	900	950	245	804	783	770	353
4500	236	348	614	900	900	900	950	247	813	791	777	361
4600	261	353	632	900	900	900	950	256	822	798	784	369
4700	290	359	650	900	900	900	950	264	830	805	791	377
4800	324	364	669	900	900	900	950	273	839	812	799	388
4900	366	369	690	900	900	900	950	282	848	820	806	399
5000	416	374	712	1000	1000	1000	1000	290	857	827	813	410
5100	466	379	734	1000	1000	1000	1000	299	865	834	821	420
5200	502	383	755	1000	1000	1025	1025	308	874	842	827	430
5300	510	387	777	1000	1000	1025	1025	316	883	849	834	439
5400	517	392	799	1050	1000	1025	1040	325	890	856	840	449
5500	524	396	820	1050	1000	1025	1040	334	897	863	847	459
5600	531	401	842	1050	1000	1025	1050	342	904	869	853	469
5700	537	405	863	1050	1000	1025	1050	351	912	876	860	479
5800	544	410	885	1050	1000	1025	1050	360	919	882	866	489
5900	550	414	903	1050	1000	1025	1050	369	926	889	873	498
6000	557	419	922	1050	1000	1025	1050	377	934	895	879	508
6100	563	423	940	1050	1100	1025	1050	385	941	902	886	518
6200	570	427	940	1050	1100	1025	1050	392	948	908	892	528
6300	576	431	940	1050	1100	1100	1050	399	956	915	899	537
6400	583	435	940	1053	1100	1100	1050	406	962	921	905	549
6500	589	439	940	1063	1100	1100	1050	414	969	928	912	560
6600	596	443	940	1077	1100	1100	1050	421	975	934	918	571
6700	602	447	940	1091	1100	1100	1050	428	982	941	925	582
6800	609	451	940	1105	1100	1100	1050	436	988	947	931	593
6900	615	455	940	1119	1100	1100	1050	443	995	954	938	608
7000	622	460	940	1133	1100	1100	1050	450	1001	960	944	627
7100	628	464	940	1147	1100	1100	1055	457	1008	967	951	627
7200	635	468	940	1160	1100	1100	1061	463	1014	973	957	627
7300	641	472	943	1175	1100	1175	1066	470	1021	980	962	627
7400	648	476	950	1188	1100	1175	1071	476	1027	986	968	627
7500	654	480	958	1202	1200	1200	1076	483	1034	992	974	627
7600	660	484	965	1215	1200	1200	1081	489	1040	998	980	627
7700	666	488	972	1228	1200	1200	1086	496	1047	1003	986	627
7800	672	494	979	1240	1200	1200	1092	502	1053	1009	991	627
7900	677	500	986	1253	1200	1200	1097	509	1060	1015	997	627
8000	683	506	992	1266	1200	1200	1102	515	1066	1021	1003	627
8100	689	512	999	1278	1200	1200	1105	522	1073	1027	1009	627
8200	695	518	1005	1291	1200	1200	1108	528	1079	1033	1015	627
8300	701	524	1012	1304	1200	1200	1111	535	1086	1038	1020	627
8400	706	530	1018	1317	1200	1200	1114	541	1092	1044	1026	627
8500	712	535	1025	1329	1200	1200	1117	548	1097	1050	1032	627
8600	718	541	1031	1340	1200	1200	1120	554	1103	1056	1038	627
8700	724	547	1038	1351	1200	1200	1123	560	1109	1061	1044	627
8800	730	553	1044	1362	1200	1200	1126	565	1115	1067	1049	627
8900	735	559	1051	1373	1200	1200	1129	571	1120	1073	1055	627
9000	741	565	1057	1383	1200	1200	1132	577	1126	1079	1061	627
9100	747	571	1064	1394	1200	1218	1134	583	1132	1085	1067	627

Alta Irrigation District surface water entitlement from the Kings River. All values in cubic feet per second. To use table, take the daily flow rate in the Kings River at Piedra and move to the column of the corrisponding month. The resulting flow rate is what Alta ID is entiteled to use for that flow rate and month.
Example: River at Piedra is 4500 cfs in May, Alta can divert 900 cfs.

River at Piedra	January	February	March	April	May	June	July	August	September	October	November	December
9200	753	577	1070	1404	1200	1235	1137	588	1138	1091	1073	627
9300	759	583	1077	1414	1200	1253	1140	594	1144	1096	1078	627
9400	764	589	1083	1425	1200	1271	1143	600	1150	1102	1084	627
9450					1200							
9500	770	595	1090	1435	1203	1288	1146	606	1155	1108	1090	627
9600	776	601	1096	1445	1212	1306	1150	612	1161	1114	1096	627
9700	782	607	1103	1454	1222	1324	1153	617	1167	1119	1101	627
9800	788	614	1109	1464	1231	1342	1156	623	1173	1125	1106	627
9900	793	620	1115	1473	1241	1359	1160	629	1178	1131	1111	627
10000	799	626	1121	1482	1250	1377	1164	635	1184	1136	1116	628
10100	804	632	1127	1492	1260	1395	1169	641	1190	1141	1121	633
10200	809	638	1132	1502	1270	1412	1173	646	1196	1146	1126	639
10300	815	644	1138	1512	1279	1430	1178	652	1202	1152	1131	644
10400	820	650	1144	1521	1289	1448	1184	658	1208	1157	1136	649
10500	825	656	1150	1531	1299	1466	1194	664	1213	1162	1142	654
10600	830	661	1156	1541	1308	1483	1203	670	1219	1167	1147	660
10650						1492						
10700	835	666	1161	1551	1318	1496	1213	675	1225	1172	1152	666
10800	840	672	1167	1561	1327	1505	1222	681	1231	1177	1158	671
10900	845	678	1173	1571	1337	1514	1231	687	1236	1182	1164	677
11000	850	685	1179	1583	1347	1523	1240	693	1241	1188	1170	683
11100	856	691	1185	1595	1356	1531	1254	698	1246	1194	1176	14.50%
11200	862	698	1190	1600	1365	1539	1269	703	1251	1200	14.50%	
11300	868	704	1196	1600	1369	1547	1203	708	1256	1205		
11400	873	712	1202	1600	1373	1555	1293	713	1261	1211		
11500	879	720	1208	1600	1378	1563	1296	718	1266	14.50%		
11600	14.50%	729	1214	1600	1382	1574	1302	724	1272			
11700		737	1219	1600	1386	1584	1308	730	1277			
11800		746	1225	1600	1392	1595	1315	736	1282			
11900		755	1231	1600	1398	1605	1321	742	1288			
12000		766	1237	1600	1404	1616	1327	747	1293			
12100		780	1243	1600	1410	1626	1333	752	1299			
12200		796	1248	1600	1417	1637	1339	757	1305			
12300		813	1254	1600	1423	1648	1344	763	1311			
12400		830	1259	1600	1429	1658	1350	768	14.50%			
12500		847	1264	1600	1435	1669	1356	773				
12600		864	1270	1600	1441	1680	1362	779				
12700		881	1275	1600	1447	1690	1368	785				
12800		898	1280	1600	1453	1702	1373	791				
12900		915	1285	1600	1464	1711	1379	14.50%				
13000		939	1290	1600	1475	1712	1385					
13100		966	1295	1600	1484	1712	1391					
13200		993	1300	1600	1494	1712	1397					
13300		1020	1305	1600	1504	1712	1402					
13400		1047	1311	1605	1514	1712	1408					
13500		1075	1317	1611	1523	1712	1414					
13600		1102	1323	1617	1533	1712	1420					
13700		1129	1328	1623	1542	1712	1426					
13800		1156	1334	1628	1552	1712	1431					
13900		1185	14.50%	1634	1562	1712	1437					
14000		1223		1640	1572	1712	1443					
14100		1250		1646	1581	1712	1448					
14200		1250		1652	1591	1712	1453					
14300		1250		1657	1601	1712	1458					
14400		1252		1663	1611	1712	1463					
14500		1259		1669	1620	1712	1468					
14600		14.50%		1674	1630	1712	1474					
14700				1679	1639	1712	1479					
14800				1684	1649	1712	1484					
14900				1689	1659	1712	1489					
15000				1694	1669	1712	1494					
15100				1700	1680	1718	1500					
15200				1705	1680	1724	1506					
15300				1710	1680	1729	1511					
15400				1715	1680	1735	1517					
15500				1720	1680	1741	1523					
15600				1725	1680	1746	1529					
15625				1727	1680							
15700				14.50%	1680	1751	1536					
15775							1539					
15800					1680	1756	14.50%					
15900					1680	1761						
16000					1680	1766						
16100					1685	1772						
16200					1690	1777						
16300					1695	1782						
16400					1700	1787						
16500					1705	1792						
16600					1711	1798						
16700					1717	1804						
16800					1723	1810						
16850						1814						
16900					1729	14.50%						
17000					1734							
					14.50%							

B

APPENDIX B

Alta Irrigation District Monthly Water Balance

Alta Water Management Plan Water Balance

Table 1: 1996 Surface Water Supply(including wheeled water)

Month	USBR Contract acre-feet	State Project acre-feet	Kings River acre-feet	Up-Slope Drainage acre-feet	Total acre-feet
January	0	0	0	594	594
February	0	0	0	594	594
March	0	0	0	891	891
April	0	0	23643	891	24534
May	0	0	48990	1188	50178
June	0	0	53212	1782	54994
July	0	0	50630	1782	52412
August	0	0	44161	1782	45943
September	0	0	141	1188	1329
October	0	0	0	891	891
November	0	0	0	594	594
December	0	0	0	594	594
Total	0	0	220777	12771	233548

Table 2: Groundwater Pumping Estimates from Kings Groundwater Basin

Year	Pumped by District acre-feet	Pumped by Growers acre-feet
1996	0	186,618

Table 3: 1996 Surface Water Supplies

Month	Surface Water (Table 1) acre-feet	Total Precipitation acre-feet	Reclaimed Water Imported acre-feet	Other Controlled Surface Inflows acre-feet	Total acre-feet
January	594	20,904	0	0	21,498
February	594	35,989	0	0	36,583
March	891	20,149	0	0	21,040
April	24,534	8,189	0	0	32,723
May	50,178	3,232	0	0	53,411
June	54,994	0	0	0	54,994
July	52,412	0	0	0	52,412
August	45,943	0	0	0	45,943
September	1,329	0	0	0	1,329
October	891	22,412	0	0	23,303
November	594	16,163	0	0	16,757
December	594	46,656	0	0	47,250
Total	233,548	173,693	0	0	407,241

Notes:
Surface Water Diversion from 1996 KRWA watermaster report.
Precipitation reading taken from gauge at District's office in Dinuba, CA.

Table 4: 1996 Conveyance System Losses

Conveyance System	Length miles	Seepage acre-feet	Evaporation acre-feet	Operational Spill acre-feet	Total acre-feet
Unlined Canal	246	50,489	1,713	2,782	54,985
Lined Canal	8	51	53	0	104
Pipe Line	64	459	0	0	459
Total	317	50,999	1,766	2,782	55,547

Notes:
See 1991 Alta Irrigation District Surface Water Study for derivation of losses.

Table 5: 1996 Crop Water Needs

Crop	Area acres	Leaf out or Plant month	Leaf Drop or Harvest month	Crop ET AF/acre	Leaching Requirement AF/acre	ET from Cultural Practice AF/acre	Crop Water Needs acre-feet
Alfalfa	7,895	1	12	4.1	0.2		33,699
Apples	946	3	11	3.3	0.2	0.2	3,431
Apricots	681	3	11	3.3	0.2	0.2	2,470
Citrus	8,816	1	12	3.0	0.1	0.5	32,154
Corn	4,230	4	9	2.2	0.1		9,846
Cotton	6,599	4	10	2.4	0.0		15,716
Grains	1,370	12	6	1.7	0.0		2,312
Grapes	20,652	3	10	2.3	0.1	0.2	54,855
Melons	156	6	9	1.0	0.1		164
Nectarines	15,872	3	11	3.3	0.2	0.2	57,416
Nuts	1,433	3	11	3.3	0.2	0.2	5,315
Peaches	10,665	3	11	3.3	0.2	0.2	38,580
Permanent Pastur	2,526	1	12	3.2	0.1		8,377
Plums	11,602	3	11	3.3	0.2	0.2	42,215
Pomegranates	373	3	11	3.3	0.1	0.2	1,324
Olives	1,025	1	12	3.3	0.1	0.2	3,639
Vegetables	1,747	any time	any time	2.0	0.1		3,678
Misc.	3,233			3.0	0.2		10,209
Idle Land	9,930	na	na	0.6			5,461
Building Sites	5,842	na	na	1.6	na	na	9,221
Dry Pasture	376	na	na	0.6	na	na	207
Towns and Roads	13,331	na	na	1.6	na	na	21,041
Total	129,300						361,330

Notes:

Crop ETc from KRCD AgWater Technical Memorandum.

Crop acreage from 1995 Alta crop surveys.

Leaching volumes assume ECw 50% surface water @ 0.15 dS/M and 50% groundwater @ 0.6dS/M.

Leaching calculations use ECe yield reduction thresholds from UCCE Agricultural Salinity and Drainage Handbook.

Table 6: 1996 Overall Water Budget

INFLOWS				
Total water supply	from Table 3		407,241	acre-feet
Subsurface lateral inflow	estimate	(plus)	69,275	acre-feet
OUTFLOWS				
Crop ET	from Table 5	(minus)	331,094	acre-feet
ET from cultural practices	from Table 5	(minus)	17,058	acre-feet
Conveyance system and reservoir evaporation	from Table 4	(minus)	1,766	acre-feet
Conveyance system spills leaving district	from Table 4	(minus)	2,782	acre-feet
Consumptive use by riparian vegetation	estimate	(minus)	1,766	acre-feet
On-farm drains/spill leaving district	estimate	(minus)	5,940	acre-feet
Other uncontrolled surface outflows	estimate	(minus)	5,000	acre-feet
Environmental consumptive use	estimate	(minus)	0	acre-feet
Water exchanges, transfers, or wheeled water	estimate	(plus or minus)	0	acre-feet
Subsurface lateral outflow	estimate	(minus)	43,869	acre-feet
BALANCE TERM				
Change in Groundwater Storage(positive indicates increase)	calculated	**(equals)**	**67,241**	**acre-feet**

Notes:
Subsurface inflow and outflow from Alta Groundwater Study (KRCD 1992).
Consumptive use by riparian veg is 0.8% of headgate diversion (KRCD 1991)
Spills from farm leaving district estimated at 20 cfs for 5 months.
Uncontrolled flows would be Cottonwood, Sand and Watoke Creeks.

Table 7: 1996 Irrigation Water Losses (some of which may be conservable)

Tailwater (from Table 6)	5,940	
District Spills (from Table 4)	2,782	
Total of Potential Conservable Surface Water	**8,722**	
Irrigated Acres (from Table 5)	109,751	
Irrigated Acres over perched water table	0	
Irrigated Acres over saline sink	0	
Portion of Irrigation deep percolation/Conveyance seepage flowing to perched water table	0	
Portion of Irrigation deep percolation/Conveyance seepage flowing to saline sink	0	
Total acre-feet irrigation water flowing to a perched water table or saline sink	**0**	
Net loss of groundwater (rain+irrigation)=lateral outflow-lateral inflow+change in GW storage	**67,241**	(positive indicates gain)

Table 8: Annual Water Quantities Delivered Under Each Right or Contract

Calendar Year	USBR acre-feet	USBR (class II) acre-feet	SWP (contract) acre-feet	Kings River acre-feet	Total acre-feet	Percent Water Year
1960	0	0	0	71,097	71,097	43%
1961	0	0	0	46,225	46,225	28%
1962	0	0	0	234,915	234,915	142%
1963	0	0	0	213,984	213,984	130%
1964	0	0	0	125,753	125,753	76%
1965	0	0	0	239,182	239,182	145%
1966	0	0	0	154,001	154,001	93%
1967	0	0	0	282,759	282,759	171%
1968	0	0	0	93,322	93,322	57%
1969	0	0	0	283,718	283,718	172%
1970	0	0	0	143,746	143,746	87%
1971	0	0	0	138,093	138,093	84%
1972	0	0	0	86,773	86,773	53%
1973	0	0	0	224,259	224,259	136%
1974	0	0	0	220,041	220,041	133%
1975	0	0	0	184,034	184,034	111%
1976	0	0	0	43,381	43,381	26%
1977	0	0	0	38,765	38,765	23%
1978	0	0	0	246,204	246,204	149%
1979	0	0	0	181,996	181,996	110%
1980	0	0	0	253,269	253,269	153%
1981	0	0	0	145,581	145,581	88%
1982	0	0	0	253,400	253,400	154%
1983	0	0	0	205,445	205,445	124%
1984	0	0	0	212,941	212,941	129%
1985	0	0	0	170,826	170,826	103%
1986	0	0	0	227,763	227,763	138%
1987	0	0	0	121,270	121,270	73%
1988	0	0	0	59,339	59,339	36%
1989	0	0	0	89,807	89,807	54%
1990	0	0	0	58,284	58,284	35%
1991	0	0	0	107,229	107,229	65%
1992	0	0	0	66,816	66,816	40%
1993	0	0	0	248,042	248,042	150%
1994	0	0	0	122,707	122,707	74%
1995	0	0	0	236,068	236,068	143%
1996	0	0	0	220,777	220,777	134%
1997	0	0	0	214,341	214,341	130%
1998	0	0	0	171,876	171,876	104%
Total	0	0	0	6,438,029	6,438,029	
Average	0	0	0	165,078	165,078	

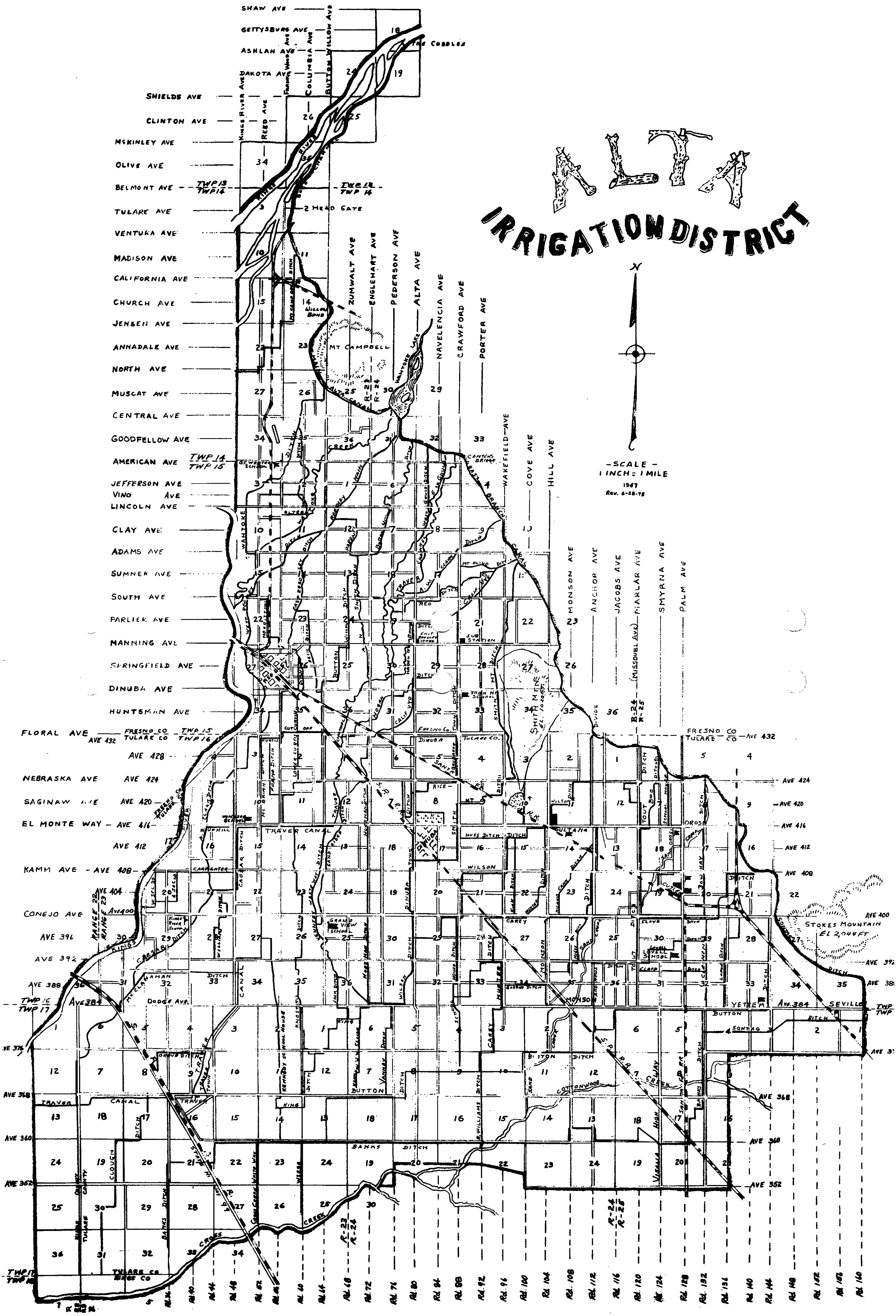
Table 9: Alta Irrigation District Annual Water Balance

	Inflows						Outflows						Calculated
Year	Kings Rive Diversion acre-feet	Percent Water Year	Rainfall Inches	Rainfall acre-feet	Up Slope Drainage acre-feet	Subsurface Inflow acre-feet	Crop Water Needs acre-feet	Conveyanc Evaporation acre-feet	Spill acre-feet	Use by Riparian Vegetatio acre-feet	Farm Tailwater acre-feet	Subsurface Outflow acre-feet	Groundwater Pumpage by Customer acre-feet
1960	71,097	43%	8.96	96,544	6,176	69,275	289,637	569	320	178	5,940	43,869	260,168
1961	46,225	28%	6.88	74,132	5,081	41,878	289,637	370	208	116	5,940	48,943	290,127
1962	234,915	142%	10.41	112,168	13,394	50,521	289,637	1,879	12,920	587	5,940	32,391	140,700
1963	213,984	130%	15.18	163,565	12,472	44,799	293,963	1,712	11,769	535	5,940	56,565	135,134
1964	125,753	76%	8.99	96,867	8,584	52,521	298,289	1,006	566	314	5,940	40,154	229,610
1965	239,182	145%	9.99	107,642	13,582	58,829	293,379	1,913	13,155	598	5,940	43,513	144,638
1966	154,001	93%	7.02	75,641	9,829	45,195	288,469	1,232	693	385	5,940	42,020	206,649
1967	282,759	171%	12.14	130,809	15,502	65,696	292,841	2,262	15,552	707	5,940	23,435	101,726
1968	93,322	57%	9.64	103,871	7,156	41,559	297,214	747	420	233	5,940	29,047	249,217
1969	283,718	172%	19.96	215,069	15,544	66,071	303,696	2,270	15,604	709	5,940	30,148	72,490
1970	143,746	87%	10.98	118,309	9,377	29,634	310,178	1,150	647	359	5,940	38,555	220,183
1971	138,093	84%	7.3	78,658	9,128	59,254	309,901	1,105	621	345	5,940	29,784	243,925
1972	86,773	53%	6.76	72,839	6,867	54,865	309,624	694	390	217	5,940	23,118	285,184
1973	224,259	136%	15.35	165,396	12,924	87,451	316,085	1,794	12,334	561	5,940	68,029	154,642
1974	220,041	133%	10.39	111,952	12,739	108,693	322,547	1,760	12,102	550	5,940	43,872	192,409
1975	184,034	111%	7.32	78,873	11,152	80,586	323,074	1,472	10,122	460	5,940	47,806	234,938
1976	43,381	26%	10.91	117,555	4,955	83,363	323,601	347	195	108	5,940	74,688	313,014
1977	38,765	23%	7.87	84,799	4,752	111,508	323,773	310	174	97	5,940	69,216	333,087
1978	246,204	149%	19.82	213,561	13,891	95,873	323,945	1,970	13,541	616	5,940	43,990	124,946
1979	181,996	110%	10.61	114,323	11,062	80,935	324,061	1,456	10,010	455	5,940	42,403	219,881
1980	253,269	153%	9.43	101,608	14,203	98,476	324,178	2,026	13,930	633	5,940	40,939	176,244
1981	145,581	88%	12.37	133,287	9,458	77,928	325,851	1,165	655	364	5,940	38,001	230,903
1982	253,400	154%	19.09	205,695	14,208	86,065	327,524	2,027	13,937	634	5,940	33,565	128,291
1983	205,445	124%	20.34	219,163	12,096	69,888	330,250	1,644	11,299	514	5,940	30,507	158,701
1984	212,941	129%	7.4	79,735	12,426	75,539	332,977	1,704	11,712	532	5,940	55,167	226,549
1985	170,826	103%	8.1	87,277	10,570	52,004	332,115	1,367	9,395	427	5,940	45,557	251,328
1986	227,763	138%	11.75	126,606	13,079	57,927	331,253	1,822	12,527	569	5,940	53,195	190,531
1987	121,270	73%	11.72	126,283	8,387	54,954	332,808	970	546	303	5,940	54,159	261,431
1988	59,339	36%	11.18	120,465	5,658	56,523	334,364	475	267	148	5,940	52,721	312,981
1989	89,807	54%	6.47	69,714	7,001	96,030	337,375	718	404	225	5,940	37,187	319,148
1990	58,284	35%	7.38	79,520	5,612	93,672	340,387	466	262	146	5,940	47,383	341,778
1991	107,229	65%	10.52	113,353	7,768	69,275	343,399	858	483	268	5,940	43,869	291,722
1992	66,816	40%	12.54	135,119	5,988	69,275	346,411	535	301	167	5,940	43,869	315,076
1993	248,042	150%	13.12	141,368	13,972	69,275	349,423	1,984	3,125	620	5,940	43,869	181,080
1994	122,707	74%	9.9	106,672	8,450	69,275	348,788	982	552	307	5,940	43,869	290,127
1995	236,068	143%	15.17	163,457	13,445	69,275	348,152	1,889	2,974	590	5,940	43,869	177,379
1996	220,777	134%	16.12	173,693	12,771	69,275	350,514	1,766	2,782	552	5,940	43,869	186,618
1997	214,341	130%	8.3	89,433	12,487	69,275	352,875	1,715	2,701	536	5,940	43,869	236,501
1998	171,876	104%	17.76	191,364	10,617	69,275	352,875	1,375	2,166	430	5,940	43,869	217,210
Average	[illegible]5,078	100%	11.41	122,984	10,317	69,275	322,181	1,321	5,676	413	5,940	43,869	221,699

C

APPENDIX C

Alta Irrigation District Location and Distribution System Maps



ALTA
IRRIGATION DISTRICT
N
-SCALE-
1 INCH = 1 MILE
1967
Rev. 6-28-78
SHAW AVE
GETTYSBURG AVE
ASHLAN AVE
DAKOTA AVE
SHIELDS AVE
CLINTON AVE
McKINLEY AVE
OLIVE AVE
BELMONT AVE
TULARE AVE
VENTURA AVE
MADISON AVE
CALIFORNIA AVE
CHURCH AVE
JENSEN AVE
ANNADALE AVE
NORTH AVE
MUSCAT AVE
CENTRAL AVE
GOODFELLOW AVE
AMERICAN AVE
JEFFERSON AVE
VINO AVE
LINCOLN AVE
CLAY AVE
ADAMS AVE
SUMNER AVE
SOUTH AVE
PARLIER AVE
MANNING AVE
SPRINGFIELD AVE
DINUBA AVE
HUNTSMAN AVE
FLORAL AVE
NEBRASKA AVE
SAGINAW AVE
EL MONTE WAY
KAMM AVE
CONEJO AVE
TWP 13
TWP 14
TWP 15
TWP 16
TWP 17
RANGE 22
RANGE 23
KINGS RIVER AVE
REED AVE
COLUMBIA AVE
BUTTON WILLOW AVE
ZUMWALT AVE
ENGLEHART AVE
PEDERSON AVE
ALTA AVE
NAVELENCIA AVE
CRAWFORD AVE
PORTER AVE
WAKEFIELD AVE
COVE AVE
HILL AVE
MONSON AVE
ANCHOR AVE
JACOBS AVE
MARLAR AVE
(MISSOURI AVE)
SMYRNA AVE
PALM AVE
THE COBBLES
KINGS RIVER
HEAD GATE
MT CAMPBELL
WAHTOKE LAKE
R-23
R-24
R-25
ALTA CANAL
CANTUA BRIDGE
EAST BRANCH CANAL
TRAVER CANAL
SUB STATION
SMITH MTN
FRESNO CO
TULARE CO
AVE 432
AVE 428
AVE 424
AVE 420
AVE 416
AVE 412
AVE 408
AVE 404
AVE 400
AVE 396
AVE 392
AVE 388
AVE 384
AVE 376
AVE 368
AVE 360
AVE 352
SULTANA
OROSI
CUTLER
YETTEM
SEVILLE
MONSON
TRAVER
DINUBA
Stokes Mountain
EL 2,044 FT
BUTTON DITCH
BANKS DITCH
COTTONWOOD
CROSS CREEK
CAMERON CREEK
WILSON
CAREY
SONTAG
KING
TULARE CO
KINGS CO
Rd 36
Rd 40
Rd 44
Rd 48
Rd 52
Rd 56
Rd 60
Rd 64
Rd 68
Rd 72
Rd 76
Rd 80
Rd 84
Rd 88
Rd 92
Rd 96
Rd 100
Rd 104
Rd 108
Rd 112
Rd 116
Rd 120
Rd 124
Rd 128
Rd 132
Rd 136
Rd 140
Rd 144
Rd 148
Rd 152
Rd 156
Rd 160

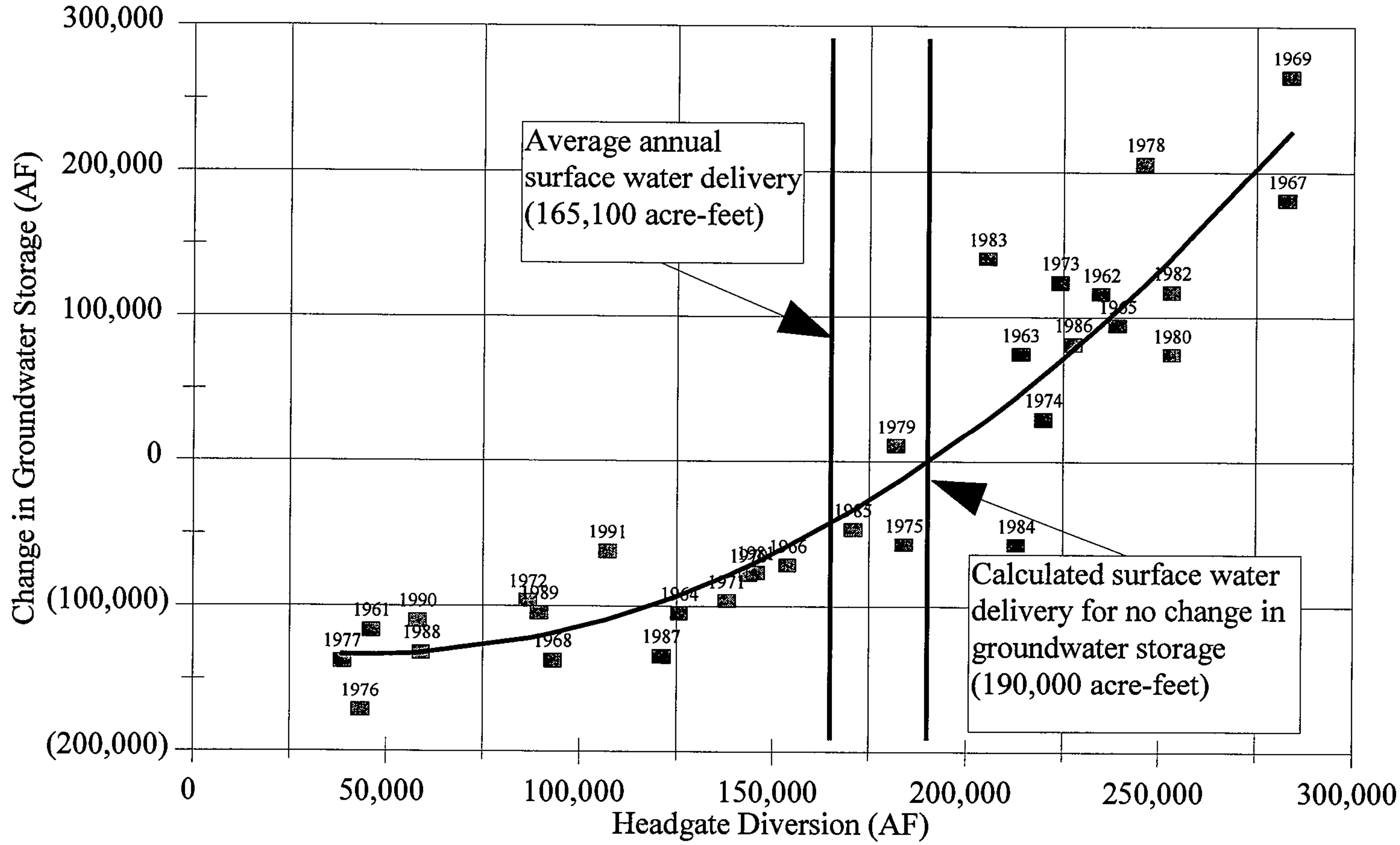
D

APPENDIX D

Water Supply vs. Groundwater Storage

Water Supply vs. Groundwater Storage

1960 through 1990



Data from Alta Groundwater Study (KRCD, 1992)

E

APPENDIX E

Rules and Regulations for Implementing Surcharge

RULES AND REGULATIONS
For
IMPLEMENTING SURCHARGE

1. Alta shall conduct a hearing upon the proposed fee or charge not less than 45 days after mailing the notice of the proposed fee or charge to the record owners of each identified parcel upon which the fee or charge is proposed for imposition. Such notice shall state the amount of the proposed fee or charge, the basis upon which the amount of the proposed fee or charge was calculated, the reason for the fee or charge, together with the date, time and location of a public hearing on the proposed fee or charge. At the public hearing, Alta shall consider all protests against the proposed fee or charge. If written protests against the proposed fee or charge are presented by a majority of owners of the identified parcels, Alta shall not impose the fee or charge.

2. Water measurements shall be taken at least once per day by the ditchtender. Only Alta approved measurement devices will be utilized for water surcharge calculations.

3. The ditchtender will determine when to measure a water take-out.

4. At the September budget meeting the Alta Board of Directors will determine if there is a need to implement the surcharge based on expected income and expenses.

5. All ditchtender measurements will be final unless appealed to the Board of Directors at the annual August Board of Equalization Meeting, or as determined by the Board of Directors.

6. If implemented, the surcharge will be based on the measured volume of water delivered during the preceding water year to a particular parcel multiplied by the determined cost per acre-foot.

7. Bills for levying water charges are mailed in October and are due by November 20 and delinquent by December 20 on each respective year.

8. Processing delinquent surcharge parcels:

   A. The surcharge will not be considered a lien on property; but rather a user fee for providing a specific service/commodity.

   B. If a parcel doesn't pay the surcharge prior to the date of delinquency, all water deliveries to that parcel will be terminated until bill is paid including a delinquency charge equal to 10% of the delinquent surcharge.

   C. All parcels that are delinquent in their surcharge payments will receive written notice on or before February 1 of the following year.

   D. On private community laterals, water will continue to be delivered to non-delinquent parcels, but delinquent parcels will be denied water service. Prior to beginning water deliveries, all landowners on such private community laterals shall receive notice of delinquent parcels.

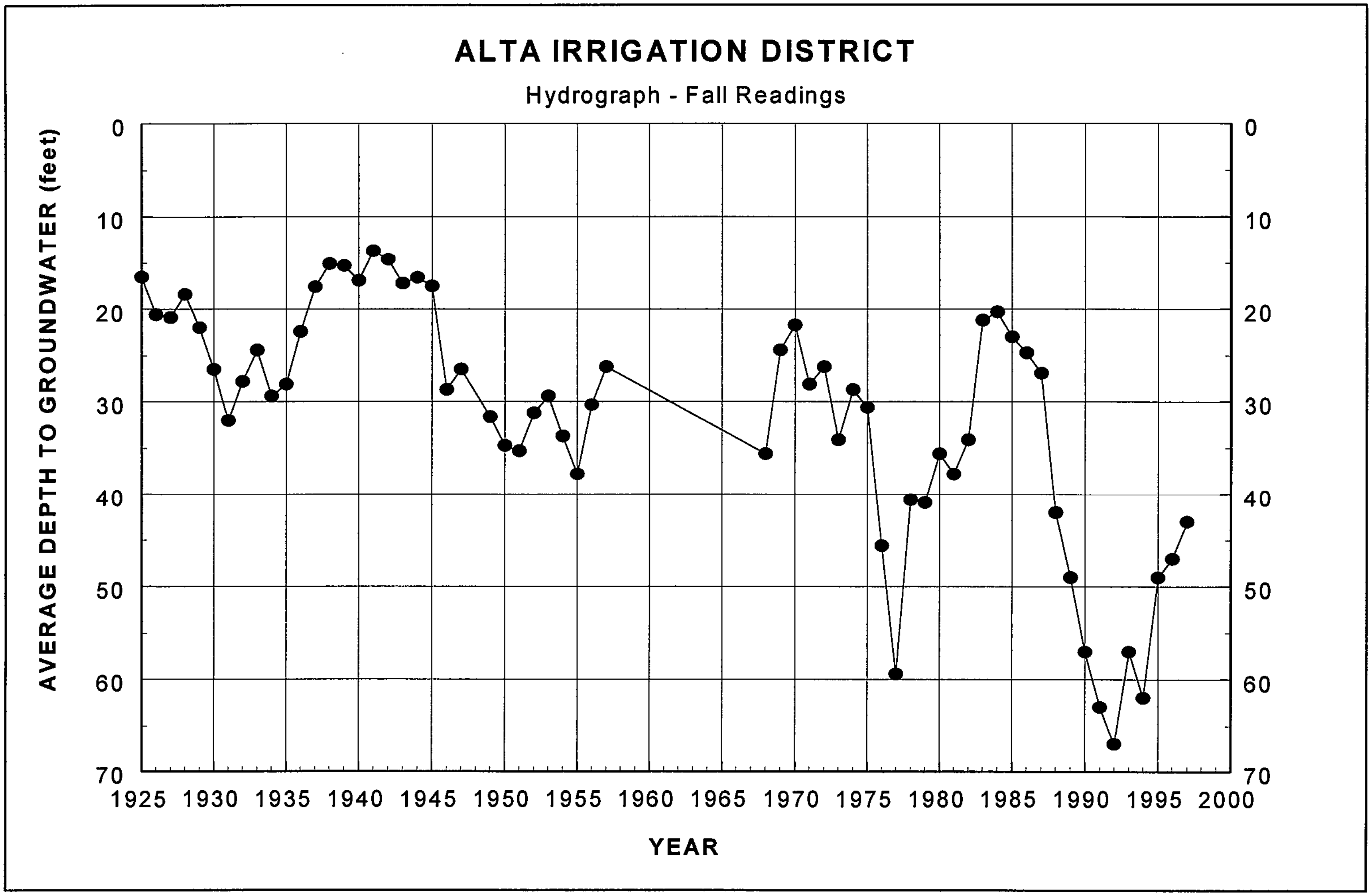
   E. All gates (except for private community laterals) on parcels delinquent in surcharge payment will be noticed and locked until all charges are paid in full.

   F. Title companies who have offices in Fresno, Tulare and Kings Counties will be notified of parcels sixty (60) days delinquent in surcharge payments.

F

APPENDIX F

Alta Irrigation District Groundwater Hydrograph (1925-1997)



From Artificial Groundwater Recharge in the Kings River Service Area, KRCD, 1999

G

APPENDIX G

EWMP #1: Facilitate Alternate Land Use

Memorandum of Understanding Regarding Efficient Water Management Practices by Agricultural Water Suppliers in California

Efficient Water Management Practice (EWMP)
1. Facilitate Alternate Land Use

The Excel Version
prepared by Division of Planning and Local Assistance
Department of Water Resources
October 21, 1998

EWMP 1. Facilitate Alternate Land Use

PREVIEW / REVIEW

Part 1 Information to Determine if Detailed Analysis is Required

Question	A	*(Is EWMP satisfactorily implemented?)*	Yes
Question	B	*(Is EWMP demonstrably inappropriate?)*	Yes
Question	C	*(Is EWMP technically infeasible?)*	Yes

Part 2 Detailed Analysis for EWMPs 1, 2, 3, and 4

Question	A	*(Does EWMP impact other EWMPs?)*	No
Question	B	*(Does supplier have legal authority?)*	Yes
Question	C	*(Has supplier been approached?)*	No
Question	D	*(Would supplier take active role?)*	No
Question	E	*(Does supplier have funding?)*	No
Question	F	*(Can supplier provide incentives?)*	No
Question	G	*(Can supplier secure loans?)*	Yes

Part 3 General Information for Detailed Analysis
(not applicable)

Part 4 Environmental, Third Party, and Indirect Economic Analysis
(not applicable)

Part 5 Economic Analysis
(not applicable)

Part 6 Financial Analysis
(not applicable)

Part 7 Summary of Analysis

Accept EWMP?	No

EWMP 1. Facilitate Alternate Land Use

Part 1. Information to Determine if Detailed Analysis Is Required

A. Is this EWMP being implemented at a satisfactory level?

◉ Yes ○ No

Details:

Due to the fact that drainage issues are not prevalent, this EWMP is not warranted (see KRCD, 1992).

B. Is this EWMP demonstrably inappropriate for implementation by the water supplier?

◉ Yes ○ No

Details:

Due to the fact that drainage issues are not prevalent, this EWMP is not warranted (see KRCD, 1992).

C. Is this EWMP technically infeasible given current technology or prevailing local conditions?

◉ Yes ○ No

Details:

Due to the fact that drainage issues are not prevalent, this EWMP is not warranted (see KRCD, 1992).

EWMP 1. Facilitate Alternate Land Use

Part 2. Detailed Analysis

A. Does this EWMP impact any of the other EWMPs on List B and/or List C?

○ Yes ◉ No

B. Does the water supplier have the legal authority to implement this EWMP?

◉ Yes ○ No

C. Has the water supplier approached or been approached by any customers or other entities concerning the potential for implementing this EWMP?

○ Yes ◉ No

D. If the water supplier were to be approached with a proposal endorsed by water users, would the water supplier be willing to take an active role in facilitating this request?

○ Yes ◉ No

Discussion:

Due to the fact that there is no prevalent drainage issue, it would be redundant to facilitate this request.

E. Does the water supplier have adequate funding sources, or could funds reasonably be made available to implement this EWMP?

○ Yes ◉ No

Discussion:

Due to fact that the District does not have a prevalent drainage issue, it would not be prudent to setforth extensive reserves to address this issue.

F. Could the water supplier provide any incentives to customers for this EWMP?

○ Yes ◉ No

Discussion:

Due to the fact that the District does not have a prevalent drainage issue, it would not be in the District's best interest to provide incentives with this issue.

G. Does the water supplier have the ability to secure and/or administer low-interest loans for customers?

◉ Yes ○ No

Discussion:

The District may have the ability and legal authority to develop a process to secure low interest loans for the District which could then be utilized for the District's customers. But, it is the direction of the Board to not offer limited economic programs to selected land owners. The concern is that on-farm improvements may enhance property values or provide an economic competitive advantage in a manner which is not equitable to all landowners.

EWMP 1. Facilitate Alternate Land Use

Part 7. Summary of Analysis

Initial Evaluation Table (from Part 1)

Is this EWMP ...	**Yes**	**No**
A. fully implemented?	X	
B. demonstrably inappropriate?	X	
C. technically infeasible?	X	

Decision about this EWMP

	Yes	**No**
Is this EWMP accepted?	○	◉

Discussion:
Please provide here and in the WMP a discussion of why this EWMP is accepted or rejected for implementation. Please include a discussion of estimated water savings, environmental effects, third-party effects, etc. for this EWMP.

Due to the fact that the District does not have a prevalent drainage issue, it would be inappropriate to accept this EWMP.

EWMP
1. Facilitate Alternate Land Use
2. Facilitate Use of Available Recycled Water
3. Facilitate Financial Assistance
4. Facilitate Voluntary Water Transfers
5. Line or Pipe Ditches/Canals
6. Increase Water Ordering/Delivering Flexibility
7. Construct/Operate Tailwater and Spill Recovery System
8. Optimize Conjunctive Use
9. Automate Canal Structures
10. Water Measurement/Water Use Update
11. Pricing and Incentives

APPENDIX H

EWMP #2: Facilitate Use of Available Recycled Water

Memorandum of Understanding Regarding Efficient Water Management Practices by Agricultural Water Suppliers in California

Efficient Water Management Practice (EWMP)
2. Facilitate Use of Available Recycled Water

The Excel Version
prepared by Division of Planning and Local Assistance
Department of Water Resources
October 21, 1998

EWMP 2. Facilitate Use of Available Recycled Water

PREVIEW / REVIEW

Part 1 Information to Determine if Detailed Analysis is Required

Question	**A**	*(Is EWMP satisfactorily implemented?)*	**No**
Question	**B**	*(Is EWMP demonstrably inappropriate?)*	**No**
Question	**C**	*(Is EWMP technically infeasible?)*	**Yes**

Part 2 Detailed Analysis for EWMPs 1, 2, 3, and 4

Question	**A**	*(Does EWMP impact other EWMPs?)*	**No**
Question	**B**	*(Does supplier have legal authority?)*	**Yes**
Question	**C**	*(Has supplier been approached?)*	**Yes**
Question	**D**	*(Would supplier take active role?)*	**Yes**
Question	**E**	*(Does supplier have funding?)*	**No**
Question	**F**	*(Can supplier provide incentives?)*	**Yes**
Question	**G**	*(Can supplier secure loans?)*	**Yes**

Part 3 General Information for Detailed Analysis
(not applicable)

Part 4 Environmental, Third Party, and Indirect Economic Analysis
(not applicable)

Part 5 Economic Analysis
(not applicable)

Part 6 Financial Analysis
(not applicable)

Part 7 Summary of Analysis

Accept EWMP? No

EWMP 2. Facilitate Use of Available Recycled Water

Part 1. Information to Determine if Detailed Analysis Is Required

A. Is this EWMP being implemented at a satisfactory level?

○ Yes ◉ No

B. Is this EWMP demonstrably inappropriate for implementation by the water supplier?

○ Yes ◉ No

C. Is this EWMP technically infeasible given current technology or prevailing local conditions?

◉ Yes ○ No

Details:

The current level of treatment is not compliance with tertiary treatment and disinfection standards. Due to the various types of crops, including leafy vegetable crops, and possible human contact with canal water, the above level of treatment is required. Existing level of treatment does not allow current sources of reclaimed water to be intermixed into District's delivery facilities. On going discussions are taking place to utilize this resource in the future, but the costs are still to great to make implementation economic.

EWMP 2. Facilitate Use of Available Recycled Water

Part 2. Detailed Analysis

A. Does this EWMP impact any of the other EWMPs on List B and/or List C?

○ Yes ◉ No

B. Does the water supplier have the legal authority to implement this EWMP?

◉ Yes ○ No

C. Has the water supplier approached or been approached by any customers or other entities concerning the potential for implementing this EWMP?

◉ Yes ○ No

Discussion:

The City of Dinuba and the City of Reedley have inquired as to working on a joint-use arrangement pertaining to wastewater disposal. The District is considering their request at this time.

D. If the water supplier were to be approached with a proposal endorsed by water users, would the water supplier be willing to take an active role in facilitating this request?

◉ Yes ○ No

Discussion:

Water would need to be treated to tertiary treatment level with disinfection, and heavy metals would need to be separated out.

E. Does the water supplier have adequate funding sources, or could funds reasonably be made available to implement this EWMP?

○ Yes ◉ No

Discussion:

Generator of wastewater and landowners would pay for the funding to implement the utilization of wastewater.

F. Could the water supplier provide any incentives to customers for this EWMP?

◉ Yes ○ No

Discussion:

The District could coordinate the delivery of wastewater to landowners.

G. Does the water supplier have the ability to secure and/or administer low-interest loans for customers?

◉ Yes ○ No

Discussion:

The District may have the ability and legal authority to develop a process to secure low interest loans for the District which could then be utilized for the District's customers. But, it is the direction of the Board to not offer limited economic programs to selected land owners. The concern is that on-farm improvements may enhance property values or provide an economic competitive advantage in a manner which is not equitable to all landowners.

EWMP 2. Facilitate Use of Available Recycled Water

Part 7. Summary of Analysis

Initial Evaluation Table (from Part 1)

Is this EWMP ...	Yes	No
A. fully implemented?		X
B. demonstrably inappropriate?		X
C. technically infeasible?	X	

Decision about this EWMP

	Yes	No
Is this EWMP accepted?	○	◉

Discussion:

Please provide here and in the WMP a discussion of why this EWMP is accepted or rejected for implementation. Please include a discussion of estimated water savings, environmental effects, third-party effects, etc. for this EWMP.

The wastewater would need to meet tertiary treatment level with disinfection to eliminate concerns to certain agricultural crops and human contact. All costs associated with this wastewater process would be borne by the generator of the waterwater and/or the land receiving the wastewater.

EWMP
1. Facilitate Alternate Land Use
2. Facilitate Use of Available Recycled Water
3. Facilitate Financial Assistance
4. Facilitate Voluntary Water Transfers
5. Line or Pipe Ditches/Canals
6. Increase Water Ordering/Delivering Flexibility
7. Construct/Operate Tailwater and Spill Recovery System
8. Optimize Conjunctive Use
9. Automate Canal Structures
10. Water Measurement/Water Use Update
11. Pricing and Incentives

APPENDIX I

EWMP #3: Facilitate Financial Assistance

Memorandum of Understanding Regarding Efficient Water Management Practices by Agricultural Water Suppliers in California

Efficient Water Management Practice (EWMP)
3. Facilitate Financial Assistance

The Excel Version
prepared by Division of Planning and Local Assistance
Department of Water Resources
October 21, 1998

EWMP 3. Facilitate Financial Assistance

PREVIEW / REVIEW

Part 1 Information to Determine if Detailed Analysis is Required

Question	A	*(Is EWMP satisfactorily implemented?)*	No
Question	B	*(Is EWMP demonstrably inappropriate?)*	No
Question	C	*(Is EWMP technically infeasible?)*	No

Part 2 Detailed Analysis for EWMPs 1, 2, 3, and 4

Question	A	*(Does EWMP impact other EWMPs?)*	No
Question	B	*(Does supplier have legal authority?)*	Yes
Question	C	*(Has supplier been approached?)*	No
Question	D	*(Would supplier take active role?)*	Yes
Question	E	*(Does supplier have funding?)*	Yes
Question	F	*(Can supplier provide incentives?)*	No
Question	G	*(Can supplier secure loans?)*	Yes

Part 3 General Information for Detailed Analysis
(not applicable)

Part 4 Environmental, Third Party, and Indirect Economic Analysis
(not applicable)

Part 5 Economic Analysis
(not applicable)

Part 6 Financial Analysis
(not applicable)

Part 7 Summary of Analysis

Accept EWMP? No

EWMP 3. Facilitate Financial Assistance

Part 1. Information to Determine if Detailed Analysis Is Required

A. Is this EWMP being implemented at a satisfactory level?

○ Yes ◉ No

B. Is this EWMP demonstrably inappropriate for implementation by the water supplier?

○ Yes ◉ No

C. Is this EWMP technically infeasible given current technology or prevailing local conditions?

○ Yes ◉ No

EWMP 3. Facilitate Financial Assistance

Part 2. Detailed Analysis

A. Does this EWMP impact any of the other EWMPs on List B and/or List C?

○ Yes ◉ No

B. Does the water supplier have the legal authority to implement this EWMP?

◉ Yes ○ No

C. Has the water supplier approached or been approached by any customers or other entities concerning the potential for implementing this EWMP?

○ Yes ◉ No

D. If the water supplier were to be approached with a proposal endorsed by water users, would the water supplier be willing to take an active role in facilitating this request?

◉ Yes ○ No

Discussion:

The District would put together a resource directly which would offer various financial options.

E. Does the water supplier have adequate funding sources, or could funds reasonably be made available to implement this EWMP?

◉ Yes ○ No

Discussion:

The District could find adequate funding for the developemant of a resource directory but, would not have the resource needed to implement a capital improvement program.

F. Could the water supplier provide any incentives to customers for this EWMP?

○ Yes ◉ No

Discussion:

The incentive to improve would need to come from the growers improved financial bottom line through irrigation management.

G. Does the water supplier have the ability to secure and/or administer low-interest loans for customers?

◉ Yes ○ No

Discussion:

The District may have legal authority to secure and/or administer low interest loans for customers but, it is the direction of the Board to not offer limited economic programs to selected land owners. The concern is that on-farm improvements may enhance property values or provide an economic competitive advantage in a manner which is not equitable to all landowners.

EWMP 3. Facilitate Financial Assistance

Part 7. Summary of Analysis

Initial Evaluation Table (from Part 1)

Is this EWMP ...	Yes	No
A. fully implemented?		X
B. demonstrably inappropriate?		X
C. technically infeasible?		X

Decision about this EWMP

	Yes	No
Is this EWMP accepted?	○	◉

Discussion:
Please provide here and in the WMP a discussion of why this EWMP is accepted or rejected for implementation. Please include a discussion of estimated water savings, environmental effects, third-party effects, etc. for this EWMP.

Neutral to negative impact on District's water supply; neutral to positive impact growers economic bottom line. Neutral impact on environmental effect and third party impacts. Alta may have the legal authority to initiate on-farm conservation programs with low interest loans. It is the direction of the current Board to not offer limited economic program to selected landowners. The concern is that on-farm improvements may enhance property values or provide an economic competative advantage in a manner which is not equitable to all landowners.

EWMP
1. Facilitate Alternate Land Use
2. Facilitate Use of Available Recycled Water
3. Facilitate Financial Assistance
4. Facilitate Voluntary Water Transfers
5. Line or Pipe Ditches/Canals
6. Increase Water Ordering/Delivering Flexibility
7. Construct/Operate Tailwater and Spill Recovery System
8. Optimize Conjunctive Use
9. Automate Canal Structures
10. Water Measurement/Water Use Update
11. Pricing and Incentives

APPENDIX J

EWMP #4: Facilitate Voluntary Water Transfers

Memorandum of Understanding Regarding Efficient Water Management Practices by Agricultural Water Suppliers in California

Efficient Water Management Practice (EWMP)
4. Facilitate Voluntary Water Transfers

The Excel Version
prepared by Division of Planning and Local Assistance
Department of Water Resources
October 21, 1998

EWMP 4. Facilitate Voluntary Water Transfers

PREVIEW / REVIEW

Part 1 Information to Determine if Detailed Analysis is Required

Question	A	*(Is EWMP satisfactorily implemented?)*	Yes
Question	B	*(Is EWMP demonstrably inappropriate?)*	No
Question	C	*(Is EWMP technically infeasible?)*	No

Part 2 Detailed Analysis for EWMPs 1, 2, 3, and 4

Question	A	*(Does EWMP impact other EWMPs?)*	Yes
Question	B	*(Does supplier have legal authority?)*	Yes
Question	C	*(Has supplier been approached?)*	Yes
Question	D	*(Would supplier take active role?)*	Yes
Question	E	*(Does supplier have funding?)*	No
Question	F	*(Can supplier provide incentives?)*	Yes
Question	G	*(Can supplier secure loans?)*	No

Part 3 General Information for Detailed Analysis
(not applicable)

Part 4 Environmental, Third Party, and Indirect Economic Analysis
(not applicable)

Part 5 Economic Analysis
(not applicable)

Part 6 Financial Analysis
(not applicable)

Part 7 Summary of Analysis

Accept EWMP? Yes

EWMP 4. Facilitate Voluntary Water Transfers

Part 1. Information to Determine if Detailed Analysis Is Required

A. Is this EWMP being implemented at a satisfactory level?

◉ Yes	○ No

Details:

Currently, the District performs voluntary water transfers between different districts within the Kings River Service Area (i.e., intra-association water transfers) and transfers from outside the Kings River Service Area to within the Kings River Service Area (i.e., inter-association agreement) and internal transfers (i.e., transfers within a District's boundary).

B. Is this EWMP demonstrably inappropriate for implementation by the water supplier?

○ Yes	◉ No

C. Is this EWMP technically infeasible given current technology or prevailing local conditions?

○ Yes	◉ No

EWMP 4. Facilitate Voluntary Water Transfers

Part 2. Detailed Analysis

A. Does this EWMP impact any of the other EWMPs on List B and/or List C?

◉ Yes ○ No

Discussion:

The impacts of water transfers would affect conjunctive use and pricing of water. For example, surface water that is transferred outside of the District's boundary in an overdrafted basin would exacerbate declining groundwater levels. In circumstances that would necessitate the importation of higher priced surface water would increase the melded price to all landowners.

B. Does the water supplier have the legal authority to implement this EWMP?

◉ Yes ○ No

C. Has the water supplier approached or been approached by any customers or other entities concerning the potential for implementing this EWMP?

◉ Yes ○ No

Discussion:

The District has imported emergency water from the State Water Bank on one occasion as an emergency water supply to a particular grower.

D. If the water supplier were to be approached with a proposal endorsed by water users, would the water supplier be willing to take an active role in facilitating this request?

◉ Yes ○ No

Discussion:

The District has facilitated inter-assocation, intra-association and internal transfers.

E. Does the water supplier have adequate funding sources, or could funds reasonably be made available to implement this EWMP?

○ Yes	◉ No

Discussion:

The District has no reserve funding for water transfers. It would take an election by the electorate to secure additional funding.

F. Could the water supplier provide any incentives to customers for this EWMP?

◉ Yes	○ No

Discussion:

The District does approve and administer internal transfers and would facilitate water transfers from an outside source to within the District's boundary.

G. Does the water supplier have the ability to secure and/or administer low-interest loans for customers?

○ Yes	◉ No

Discussion:

The District does not have the legal authority to secure and administer low interest loans for customers on an individual basis; however, the District could secure funding for District purposes. It is the direction of the current Board to not offer limited economic program to selected landowners. The concern is that on-farm improvements may enhance property values or provide an economic competative advantage in a manner which is not equitable to all landowners.

EWMP 4. Facilitate Voluntary Water Transfers

Part 7. Summary of Analysis

Initial Evaluation Table (from Part 1)

Is this EWMP ...	Yes	No
A. fully implemented?	X	
B. demonstrably inappropriate?		X
C. technically infeasible?		X

Decision about this EWMP

	Yes	No
Is this EWMP accepted?	◉	○

Discussion:
Please provide here and in the WMP a discussion of why this EWMP is accepted or rejected for implementation. Please include a discussion of estimated water savings, environmental effects, third-party effects, etc. for this EWMP.

The District would conditionally accept this EWMP. The District would accept this EWMP upon the premise that the District review and take action on all internal, inter-association and intra-association transfers which in most cases mitigate lack of required water in dry years. There would be insignificant environmental effects, third-party effects and water savings.

EWMP
1. Facilitate Alternate Land Use
2. Facilitate Use of Available Recycled Water
3. Facilitate Financial Assistance
4. Facilitate Voluntary Water Transfers
5. Line or Pipe Ditches/Canals
6. Increase Water Ordering/Delivering Flexibility
7. Construct/Operate Tailwater and Spill Recovery System
8. Optimize Conjunctive Use
9. Automate Canal Structures
10. Water Measurement/Water Use Update
11. Pricing and Incentives

K

APPENDIX K

EWMP #5: Line or Pipe Ditches/Canals

Memorandum of Understanding
Regarding
Efficient Water Management Practices
by Agricultural Water Suppliers
in California

Efficient Water Management Practice (EWMP)
5. Line or Pipe Ditches/Canals

The Excel Version
prepared by Division of Planning and Local Assistance
Department of Water Resources
October 21, 1998

EWMP 5. Line or Pipe Ditches/Canals

PREVIEW - REVIEW

Part 1 Information to Determine if Detailed Analysis is Required

Question A	*(Is EWMP satisfactorily implemented?)*	Yes
Question B	*(Is EWMP demonstrably inappropriate?)*	Yes
Question C	*(Is EWMP technically infeasible?)*	No

Part 2 Detailed Analysis for EWMPs 1, 2, 3, and 4 (not applicable)

Part 3 General Information for Detailed Analysis

Question A	*(Does EWMP impact other EWMPs?)*	Yes
Question B	*(Matrix information about seepage flows)*	n/a
Question C	*(Was EWMP considered along with others?)*	No

Part 4 Environmental, Third Party, and Indirect Economic Analysis

Environmental Effects

Question A	*(On source of supply)*	Negative
Question B	*(On groundwater levels)*	Negative
Question C	*(On shallow groundwater)*	Insignificant
Question D	*(On instream flows)*	Insignificant
Question E	*(On drain flows)*	Insignificant
Question F	*(On herbicide/pesticide use)*	Beneficial
Question G	*(On soil erosion)*	Insignificant
Question H	*(On field burning/fugitive dust)*	Insignificant
Question I	*(On energy use)*	Insignificant
Question J1	*(On vernal pools and swales)*	Insignificant
Question J2	*(On riparian habitats)*	Insignificant
Question J3	*(On open water bodies)*	Insignificant
Question J4	*(On marshes)*	Insignificant

Third-Party Effects

EWMP 5. Line or Pipe Ditches/Canals

Question A	*(On groundwater levels)*	**Negative**
Question B	*(On instream flows)*	**Insignificant**
Question C	*(On drain flows)*	**Insignificant**
Question D	*(On herbicide/pesticide use)*	**Beneficial**
Question E	*(On wind/water soil erosion)*	**Insignificant**

Indirect Economic Effects

Question A	*(On local economies via farm operations)*	**Negative**
Question B	*(On farmers' purchases of crop inputs)*	**Negative**
Question C	*(On hiring of local farm workers)*	**Insignificant**
Question D	*(On local processing of farm produce)*	**Insignificant**

Part 5 Economic Analysis

Question A	*(Estimated annual conserved water)*	**28700** af
Question B	*(Would EWMP result in capital costs?)*	**Yes**
Question C	*(Would EWMP reduce water purchases?)*	**No**
Question D	*(Would EWMP delay future projects?)*	**No**
Question E	*(Would EWMP increase water sales?)*	**No**

Part 6 Financial Analysis

Adequate funding available? — **No**

Part 7 Summary of Analysis

Benefit-Cost Ratio — **0.04**

Accept EWMP? — **No**

EWMP 5. Line or Pipe Ditches/Canals

Part 1. Information to Determine if Detailed Analysis Is Required

A. Is this EWMP being implemented at a satisfactory level?

◉ Yes ○ No

Details:

Canals are lined when circumstances require necessary improvements: seepage detrimental to crops due to liability reasons, urban encroachment and enhance liability thereto, and reduces maintenance where required. District requires open canals for recharge purposes, especially on average and above water years to facilitate its conjunctive use program. (See attached reports:KRCD 1992 and Alta 1994)

B. Is this EWMP demonstrably inappropriate for implementation by the water supplier?

◉ Yes ○ No

Details:

Canal seepage is a key component of the District's conjunctive use program.

C. Is this EWMP technically infeasible given current technology or prevailing local conditions?

○ Yes ◉ No

EWMP 5. Line or Pipe Ditches/Canals

Part 3. General Information for Detailed Analysis

A. Does this EWMP impact any of the other EWMPs on List B and/or List C?

◉ Yes ○ No

Discussion:

The conjunctive use EWMP is negatively impacted by lining. The pricing EWMP would be impacted by the need to generate sufficient funds to undertake a major financial project such as this.

B. Complete a matrix and attach a description of how seepage flows were determined.

(The matrix is on the next page.)

Discussion:

Seepage rates were determined by detailed analysis described in the Alta Irrigation District Surface Water Study. In summary ponded canal section were tested by soil type for unit infiltration rates. These rates were then applied to the surveyed crossed section of the District's distribution system.

C. Was this EWMP considered in coordination with any other EWMPs or other neighboring water suppliers?

○ Yes ◉ No

EWMP 5. Line or Pipe Ditches/Canals

Part 3. General Information for Detailed Analysis

Matrix about Seepage Flows

Estimated length of canals, ditches in service area (miles)	**317**
Ditches/canals currently unlined (miles)	**246**
Ditches/canals currently lined (miles)	**8**
Pipelines in service area (miles)	**64**
Potential average seepage flows from unlined ditches/canals (ac-ft/yr)	**38,300**
Potential average recovered seepage flows from unlined ditches/canals (ac-ft/yr)	**28,700**
Estimated average seepage flows which exit and are lost to service area (ac-ft/yr)	**1,000**
Estimated average seepage flows which exit and are lost to the basin (ac-ft/yr)	**0**
Estimated average seepage flows which exit and are lost to the saline sink (ac-ft/yr)	**0**

EWMP 5. Line or Pipe Ditches/Canals

Part 4. Environmental, Third-Party, & Indirect Economic Analysis

Environmental Effects

A. Source of Supply

Will implementation of the EWMP result in reduced water demand in the water supplier's service area?

○ Yes ◉ No ○ Unknown

What will be the potential impact?

○ Beneficial ◉ Negative ○ Insignificant ○ Indeterminate

B. Confined/Unconfined Ground Water Levels

Are there any habitats in the water service area that are supported/supplied by the existing groundwater levels?

○ Yes ◉ No ○ Unknown

What will be the potential impact?

○ Beneficial ◉ Negative ○ Insignificant ○ Indeterminate

Discussion:

Reduced seepage rates will reduce the gross water supply available to the District. With a reduces water supply the groundwater overdraft will be increase. Detailed analysis of this scenario are documented in the Alta Irrigation District Groundwater Study (KRCD, 1991).

C. Shallow Groundwater

Is the water supplier located in an area where shallow groundwater and/or water quality problems (i.e. salinity, selenium) limit the use of land and/or drainage water?

○ Yes ◉ No ○ Unknown

○ Yes	◉ No	○ Unknown

What will be the potential impact?

○ Beneficial	○ Negative	◉ Insignificant	○ Indeterminate

D. Instream Flows

Does the water supplier's distribution system contribute to flows in any other water courses?

◉ Yes	○ No	○ Unknown

Will implementation of the EWMP affect flows to any other water courses?

○ Yes	◉ No	○ Neither	○ Unknown

What will be the potential impact?

○ Beneficial	○ Negative	◉ Insignificant	○ Indeterminate

E. Drain Flows

Does the water supplier's service area have drains that supply or support habitat?

○ Yes	◉ No	○ Unknown

What will be the potential impact?

○ Beneficial	○ Negative	◉ Insignificant	○ Indeterminate

F. Fertilizer/Herbicide/Pesticide Use

Are pesticides/herbicides used to control vegetative growth or burrowing along ditches/canals?

◉ Yes	○ No

Will pesticide/herbicide use by the water supplier along ditches/canals be decreased or increased as a result of piping or lining?

○ Increase	◉ Decrease	○ Neither	○ Unknown

What will be the potential impact?

◉ Beneficial ○ Negative ○ Insignificant ○ Indeterminate

Discussion

In canal sections that are piped or lined there is deceased maintenance activities by the District. This would result in fewer applications of herbicide in the canal right of ways by the District.

G. Soil Erosion

Will implementation of the EWMP reduce the current amount of soil erosion in the water supplier service area?

○ Yes ◉ No ○ Unknown

What will be the potential impact?

○ Beneficial ○ Negative ◉ Insignificant ○ Indeterminate

H. Field Burning and/or Fugitive Dust

Is vegetation removed from canal banks by burning?

○ Yes ◉ No

What will be the potential impact?

○ Beneficial ○ Negative ◉ Insignificant ○ Indeterminate

I. Energy Use

Would this EWMP increase or decrease energy use (e.g. pump use, canal structure controls, etc.)?

○ Decrease ○ Increase ◉ Neither ○ Unknown

What will be the potential impact?

○ Beneficial ○ Negative ◉ Insignificant ○ Indeterminate

J. Habitat Effect

Do ditches/canals that might be considered for lining/piping supply or support any of the following habitats?

(1) Vernal pools and swales

○ Yes	◉ No

What will be the potential impact?

○ Beneficial	○ Negative	◉ Insignificant	○ Indeterminate

(2) Riparian

○ Yes	◉ No

What will be the potential impact?

○ Beneficial	○ Negative	◉ Insignificant	○ Indeterminate

(3) Open water bodies

○ Yes	◉ No

What will be the potential impact?

○ Beneficial	○ Negative	◉ Insignificant	○ Indeterminate

(4) Marshes (permanent or seasonal)

○ Yes	◉ No

What will be the potential impact?

○ Beneficial	○ Negative	◉ Insignificant	○ Indeterminate

EWMP 5. Line or Pipe Ditches/Canals

Part 4. Environmental, Third-Party, & Indirect Economic Analysis (continued)

Third-Party Effects

A. Confined/Unconfined Ground Water Levels

Will implementation of the EWMP affect groundwater elevations?

◉ Yes	○ No	○ Unknown

What will be the potential impact?

○ Beneficial	◉ Negative	○ Insignificant	○ Indeterminate

Discussion:

Reduced seepage rates will reduce the gross water supply available to the District. With a reduces water supply the groundwater overdraft will be increase. Detailed analysis of this scenario is documented in the Alta Irrigation District Groundwater Study (KRCD, 1992). With falling water tables there is an increase in energy costs per unit of water due to the increased lift. Other costs associated with falling water tables include the cost of new wells, new pumps and reconditioning old well and pumps.

B. Instream Flows

Do the water supplier's distribution flows contribute to any natural streams?

◉ Yes	○ No	○ Unknown

Will implementation of the EWMP decrease or increase instream flows to any streams that supply or support any third-party?

○ Increase	○ Decrease	◉ Neither	○ Unknown

What will be the potential impact?

○ Beneficial	○ Negative	◉ Insignificant	○ Indeterminate

C. Drain Flows

Do drain flows supply or support any third-party user?

○ Yes	◉ No

What will be the potential impact?

○ Beneficial	○ Negative	◉ Insignificant	○ Indeterminate

D. Herbicide/Pesticide Use

Are pesticides/herbicides used to control vegetative growth or burrowing along distribution system banks?

◉ Yes	○ No

Does water that flows through water supplier ditches and canals continue on to third-party users (such as M&I)?

○ Yes	◉ No

What will be the potential impact?

◉ Beneficial	○ Negative	○ Insignificant	○ Indeterminate

Discussion:

Reduced herbicide applications would further reduce the chances of undesirable chemical making their way into the environment.

E. Wind/Water Soil Erosion

Will implementation of the EWMP reduce the current amount of soil erosion in the water supplier service area?

○ Yes	◉ No	○ Unknown

What will be the potential impact?

○ Beneficial	○ Negative	◉ Insignificant	○ Indeterminate

EWMP 5. Line or Pipe Ditches/Canals

Part 4. Environmental, Third-Party, & Indirect Economic Analysis (continued)

Indirect Economic Effects

A. Effects on local economies

Will the EWMP affect local economies through changes in on-farm operations (indirect economic effects)?

(●) Yes ( ) No ( ) Unknown

What will be the potential impact?

( ) Beneficial (●) Negative ( ) Insignificant ( ) Indeterminate

Discussion:

Reduced seepage rates will reduce the gross water supply available to the District. With a reduces water supply the groundwater overdraft will be increase. Detailed analysis of this scenario is documented in the Alta Irrigation District Groundwater Study (KRCD, 1992). With falling water tables there is an increase in energy costs per unit of water due to the increased lift. Other costs associated with falling water tables include the cost of new wells, new pumps and reconditioning old well and pumps.

The cost for this additional burden would need to be paid for through either reduced purchases or increased product prices.

B. Effects on farmers' purchases of crop inputs

Will practices associated with implementation of the EWMP increase or decrease farmers' purchases of crop inputs such as seed, fertilizer, irrigation equipment, etc.?

(●) Increase ( ) Decrease ( ) Neither ( ) Unknown

What will be the potential impact?

( ) Beneficial (●) Negative ( ) Insignificant ( ) Indeterminate

C. Effects on local employment

Will practices associated with implementation of the EWMP increase or decrease the hiring of local (county) farm workers?

○ Increase	○ Decrease	◉ Neither	○ Unknown

What will be the potential impact?

○ Beneficial	○ Negative	◉ Insignificant	○ Indeterminate

D. Effects on local processing of farm produce

Will practices associated with implementation of the EWMP increase or decrease the local (county) processing of farm produce (examples-canning of nuts, fruits, and vegetables; milk production supported by cows/pasture; etc.?

○ Increase	○ Decrease	◉ Neither	○ Unknown

What will be the potential impact?

○ Beneficial	○ Negative	◉ Insignificant	○ Indeterminate

EWMP 5. Line or Pipe Ditches/Canals

Part 4. Tables of Effects Summary

Table 2. Potential Environmental Effects Summary

Section	Evaluated Component	Beneficial	Negative	Insignificant	Indeterminate
A	Source of supply		X		
B	Confined/Unconfined Groundwater Levels		X		
C	Shallow Groundwater Elevations			X	
D	Instream Flows			X	
E	Drain Flows			X	
F	Fertilizer / Herbicide / Pesticide Use	X			
G	Soil Erosion			X	
H	Field Burning and Fugitive Dust			X	
I	Energy Use			X	
J1	Vernal Pools and Swales			X	
J2	Riparian Habitat			X	
J3	Open Water Bodies			X	
J4	Marshes (permanent or seasonal)			X	

EWMP 5. Line or Pipe Ditches/Canals

Part 4. Tables of Effects Summary

Table 3. Potential Third-Party Effects Summary

Section	Evaluated Component	Beneficial	Negative	Insignificant	Indeterminate
A	Confined/Unconfined Groundwater Levels		X		
B	Instream Flows			X	
C	Drain Flows			X	
D	Fertilizer / Herbicide / Pesticide Use	X			
E	Win/Water Soil Erosion			X	

Table 4. Indirect Economic Effects Summary

Section	Evaluated Component	Beneficial	Negative	Insignificant	Indeterminate
B	Farm Inputs		X		
C	Local farm Labor			X	
D	Processing of Farm Products			X	

EWMP 5. Line or Pipe Ditches/Canals

Part 5. Economic Analysis

A. How much water (in acre-feet) is estimated to be conserved annually as a result of the EWMP?

28,700

In the box below please discuss your assumptions and methodology for deriving this estimate.

Estimated from the Alta Irrigation District Surface Water Study (KRCD,1991) through the reduction in infiltration rates the seepage rate would be reduced by approximately 75 percent.

B. Does the EWMP result in water supplier capital costs and/or annual operation and maintenance costs?

◉ Yes ○ No ○ Unknown

C. Would the EWMP reduce current water supplier water purchases, water diversions, and/or groundwater pumping?

○ Yes ◉ No ○ Unknown

D. Would the EWMP delay or eliminate the need to complete future water supply augmentation and/or distribution projects?

○ Yes ◉ No ○ Unknown

E. Would the EWMP result in additional sales of water supplies to existing customers, new customers, and/or other agencies?

○ Yes ◉ No ○ Unknown

Which alternative is to be selected as benefit measure? Please explain in the box below.

Source Avoided. Water not delivered by the District would be reallocated to other units on the Kings River.

EWMP 5. Line or Pipe Ditches/Canals

Part 5. Economic Analysis (Worksheets)

Worksheet 1. EWMP Water Supplier Effects

Estimated amount of water conserved annually: **28,700** acre-feet

EWMP 5. Line or Pipe Ditches/Canals

Part 5. Economic Analysis (Worksheets)

Worksheet 2. EWMP Water Supplier Costs

Worksheet 2a. EWMP Water Supplier Capital Costs

Complete the following worksheet for EWMP capital costs.

Capital Cost Category	Item	Cost	Contingency Cost		Subtotal
			Percent	Dollars	
(a)	(b)	(c)	(d)	(e)	(f)
				(c x d)	(c + e)
Planning	Engineering 3% of const.	2,910,600	15%	436,590	3,347,190
Land			15%		
			15%		
Structure	Construction 75 $/ft	97,020,000	15%	14,553,000	111,573,000
			15%		
Equipment			15%		
			15%		
Mitigation	500 $/mile	122,500	15%	18,375	140,875
Other			15%		
Subtotal Capital Costs					115,061,065
Deduct Expected Salvage Value after		25	years		0
Total Capital Costs					115,061,065
Capital Recovery Factor @		6%	25	years	0.0782
Annual Capital Costs (Total Capital Costs x Capital Recovery Factor)					9,000,850

EWMP 5. Line or Pipe Ditches/Canals

Part 5. Economic Analysis (Worksheets)

Worksheet 2b. EWMP Water Supplier Annual O&M Costs

Complete the following worksheet for EWMP annual O&M costs:

Annual Operating Costs	Annual Maintenance Costs	Other Annual Costs [1]	Total Annual O & M Costs
(a)	(b)	(c)	(d)
			(a + b + c)
50,000	50,000	0	100,000

[1] Other annual costs not included in O&M, such as annual environmental mitigation costs.

EWMP 5. Line or Pipe Ditches/Canals

Part 5. Economic Analysis (Worksheets)

Worksheet 2c. EWMP Water Supplier Costs/af Summary

Annual Capital Costs	**Annual O&M Costs**	**Total Annual Costs**	**Annual Conserved Water (af)**	**Cost/af**
(a)	(b)	(c)	(d)	(e)
		(a + b)		(c / d)
9,000,850	**100,000**	**9,100,850**	**28,700**	**317**

Worksheet 3. EWMP Water Supplier Benefits

Worksheet 3a. EWMP Water Supplier Avoided Costs--Current Sources

Complete the following worksheet for current source of supply that would be avoided with the implementation of the EWMP.

Source of Supply Avoided	Amount of Water (af)	Annual O&M Costs ($/af)	Sources to Be Used as Benefit Measure
(a)	(b)	(c)	(d)
Kings River Water	28,700	12	

Part 5. Economic Analysis (Worksheets)

Worksheet 3b. EWMP Water Supplier Avoided Costs--Future Sources

Complete the following worksheet for future sources eliminated or delayed because of implementation of the EWMP.

Alternative	**Total Capital Costs**	**Capital Recovery Factor**[1]	**Annual Capital Costs**	**Annual O&M Costs**	**Total Annual Costs**	**Annual Yield (af)**	**Cost/af**
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
			(b x c)		(d + e)		(f / g)
		0.0782					

[1] For a period of 25 years and 6% discount rate.

Part 5. Economic Analysis (Worksheets)

Worksheet 3c. Water Supplier Revenue Effects

Complete the following worksheet:

Parties Purchasing Conserved Water	Amount of Water (af)	Selling Price ($/af)	Expected Frequency of Sales (%) [1]	Expected Selling Price ($/af)	Option Fee ($/af)	Total Selling Price ($/af)
(a)	(b)	(c)	(d)	(e)	(f)	(g)
				(c x d)		(e + f)
	28,700					

[1] During a 25-year analysis period, how many years are water sales expected to occur? For example, water sales to farmers might be expected to occur 90% of the years, whereas the frequency to other agencies might be 50% of the years.

[2] Option fees are paid by a contracting agency to a selling agency to maintain the right of the contracting agency to buy water whenever needed. Although the water may not be purchased every year, the fee is usually paid every year.

EWMP 5. Line or Pipe Ditches/Canals

Part 5. Economic Analysis (Worksheets)

Worksheet 4. EWMP Water Supplier Benefit/Costs Ratio

Benefits and Costs	
EWMP Benefits ($/af)	**12**
EWMP Costs ($/af)	**317**
Benefit/Cost Ratio	**0.04**

EWMP 5. Line or Pipe Ditches/Canals

Part 6. EWMP Financial Analysis

A water supplier may claim an exemption if:

"Adequate funds (including funds from other beneficiaries of the plan) are not available, and cannot reasonably be expected to be made available, for implementation of the EWMP during the term of the plan." (MOU, Section 4.02)

If the water supplier is claiming an exemption based upon the lack of available funding, please discuss the reasons for this finding. Please include a copy of your latest financial statement and a list of other potential plan beneficiaries who have been contacted.

BC ratio is inadequate for implementation.

EWMP 5. Line or Pipe Ditches/Canals

Part 7. Summary of Analysis

Initial Evaluation Table (from Part 1)

EWMP	Yes	No
Fully implemented?	X	
Demonstrably Inappropriate?	X	
Technically Infeasible?		X

EWMP 5. Line or Pipe Ditches/Canals

Part 7. Summary of Analysis

Potential Environmental Effects Summary Table (from Part 4)

Section	Evaluated Component	Beneficial	Negative	Insignificant	Indeterminate
A	Source of supply		X		
B	Confined/Unconfined Groundwater Levels		X		
C	Shallow Groundwater Elevations				
D	Instream Flows			X	
E	Drain Flows			X	
F	Fertilizer / Herbicide / Pesticide Use	X		X	
G	Soil Erosion				
H	Field Burning and Fugitive Dust			X	
I	Energy Use			X	
J1	Vernal Pools and Swales			X	
J2	Riparian Habitat			X	
J3	Open Water Bodies			X	
J4	Marshes (permanent or seasonal)			X	

EWMP 5. Line or Pipe Ditches/Canals

Part 7. Summary of Analysis

Potential Third-Party Effects Summary Table (from Part 4)

Section	Evaluated Component	Beneficial	Negative	Insignificant	Indeterminate
A	Confined/Unconfined Groundwater Levels		X		
B	Instream Flows			X	
C	Drain Flows			X	
D	Fertilizer / Herbicide / Pesticide Use	X			
E	Wind/Water Soil Erosion			X	

Indirect Economic Effects Summary Table (from Part 4)

Section	Evaluated Component	Beneficial	Negative	Insignificant	Indeterminate
B	Farm Inputs		X		
C	Local farm Labor			X	
D	Processing of Farm Products			X	

EWMP 5. Line or Pipe Ditches/Canals

Part 7. Summary of Analysis

EWMP Economic Analysis (from Part 5)

Water Supplier B/C Ratio	**0.04**

EWMP Financial Analysis (from Part 6)

	Yes	No
Can adequate funding be expected to be made available?	○	◉

Decision about EWMP

	Yes	No
Is this EWMP accepted?	○	◉

EWMP 5. Line or Pipe Ditches/Canals

Part 7. Summary of Analysis

Discussion:

Please provide here and in the WMP a discussion of why the EWMP is accepted or rejected for implementation. Please include a discussion of estimated water savings, environmental effects, third-party effects, etc. for this EWMP.

This EWMP is rejected on several accounts. The first is canal seepage is an essential component of the District's conjunctive use program. The second is the BC ratio is 0.04 which is cost prohibitive to the District. The estimated amount of water that could potentially be conserved is 28,700 acre -feet. In order to implement lining, the district would need to have additional surface water storage capacity. The additional storage would be used to deliver the conserved water during the later portion of the irrigation season. The additional cost burden to the water user for no net improvement in the overall water supply in an overdrafted groundwater basin has no merit.

EWMP
1. Facilitate Alternate Land Use
2. Facilitate Use of Available Recycled Water
3. Facilitate Financial Assistance
4. Facilitate Voluntary Water Transfers
5. Line or Pipe Ditches/Canals
6. Increase Water Ordering/Delivering Flexibility
7. Construct/Operate Tailwater and Spill Recovery System
8. Optimize Conjunctive Use
9. Automate Canal Structures
10. Water Measurement/Water Use Update
11. Pricing and Incentives

L

APPENDIX L

EWMP #6: Increase Water Ordering/Delivery Flexibility

Memorandum of Understanding Regarding Efficient Water Management Practices by Agricultural Water Suppliers in California

Efficient Water Management Practice (EWMP)
6. Increase Water Ordering/Delivering Flexibility

The Excel Version
prepared by Division of Planning and Local Assistance
Department of Water Resources
October 21, 1998

EWMP 6. Increase Water Ordering/Delivering Flexibility

PREVIEW - REVIEW

Part 1 Information to Determine if Detailed Analysis is Required

Question A	*(Is EWMP satisfactorily implemented?)*	No
Question B	*(Is EWMP demonstrably inappropriate?)*	Yes
Question C	*(Is EWMP technically infeasible?)*	Yes

Part 2 Detailed Analysis for EWMPs 1, 2, 3, and 4 (not applicable)

Part 3 General Information for Detailed Analysis

Question A	*(Does EWMP impact other EWMPs?)*	No
Question B	*(Description of facilities and components)*	n/a
Question C	*(Was EWMP considered along with others?)*	No

Part 4 Environmental, Third Party, and Indirect Economic Analysis

Environmental Effects

Question A	*(On source of supply)*	Insignificant
Question B	*(On groundwater levels)*	Insignificant
Question C	*(On shallow groundwater)*	Insignificant
Question D	*(On instream flows)*	Insignificant
Question E	*(On drain flows)*	Insignificant
Question F	*(On herbicide/pesticide use)*	n/a
Question G	*(On soil erosion)*	Insignificant
Question H	*(On field burning/fugitive dust)*	n/a
Question I	*(On energy use)*	Insignificant
Question J	*(On habitats)*	n/a

EWMP 6. Increase Water Ordering/Delivering Flexibility

Third-Party Effects

Question A	*(On groundwater levels)*	**Insignificant**
Question B	*(On instream flows)*	**Insignificant**
Question C	*(On drain flows)*	**Insignificant**
Question D	*(On herbicide/pesticide use)*	**n/a**
Question E	*(On wind/water soil erosion)*	**Insignificant**

Indirect Economic Effects

Question A	*(On local economies via farm operations)*	**Insignificant**
Question B	*(On farmers' purchases of crop inputs)*	**Insignificant**
Question C	*(On hiring of local farm workers)*	**Insignificant**
Question D	*(On local processing of farm produce)*	**Insignificant**

Part 5 Economic Analysis

Question A	*(Estimated annual conserved water)*		**af**
Question B	*(Would EWMP result in capital costs?)*		
Question C	*(Would EWMP reduce water purchases?)*		
Question D	*(Would EWMP delay future projects?)*		
Question E	*(Would EWMP increase water sales?)*		

Part 6 Financial Analysis

Adequate funding available?

Part 7 Summary of Analysis

Benefit-Cost Ratio

Accept EWMP?

EWMP 6. Increase Water Ordering/Delivering Flexibility

Part 1. Information to Determine if Detailed Analysis Is Required

A. Is this EWMP being implemented at a satisfactory level?

○ Yes ◉ No

B. Is this EWMP demonstrably inappropriate for implementation by the water supplier?

◉ Yes ○ No

Details:

Alta does not have a sufficient water supply to meet all water demands. Even in the wettest year supplemental groundwater pumping is required by the water users. This conjunction with a gravity designed open canal system with limitations in capacity and travel time, create a combination of factors making implementing a full demand system inappropriate for the District.

C. Is this EWMP technically infeasible given current technology or prevailing local conditions?

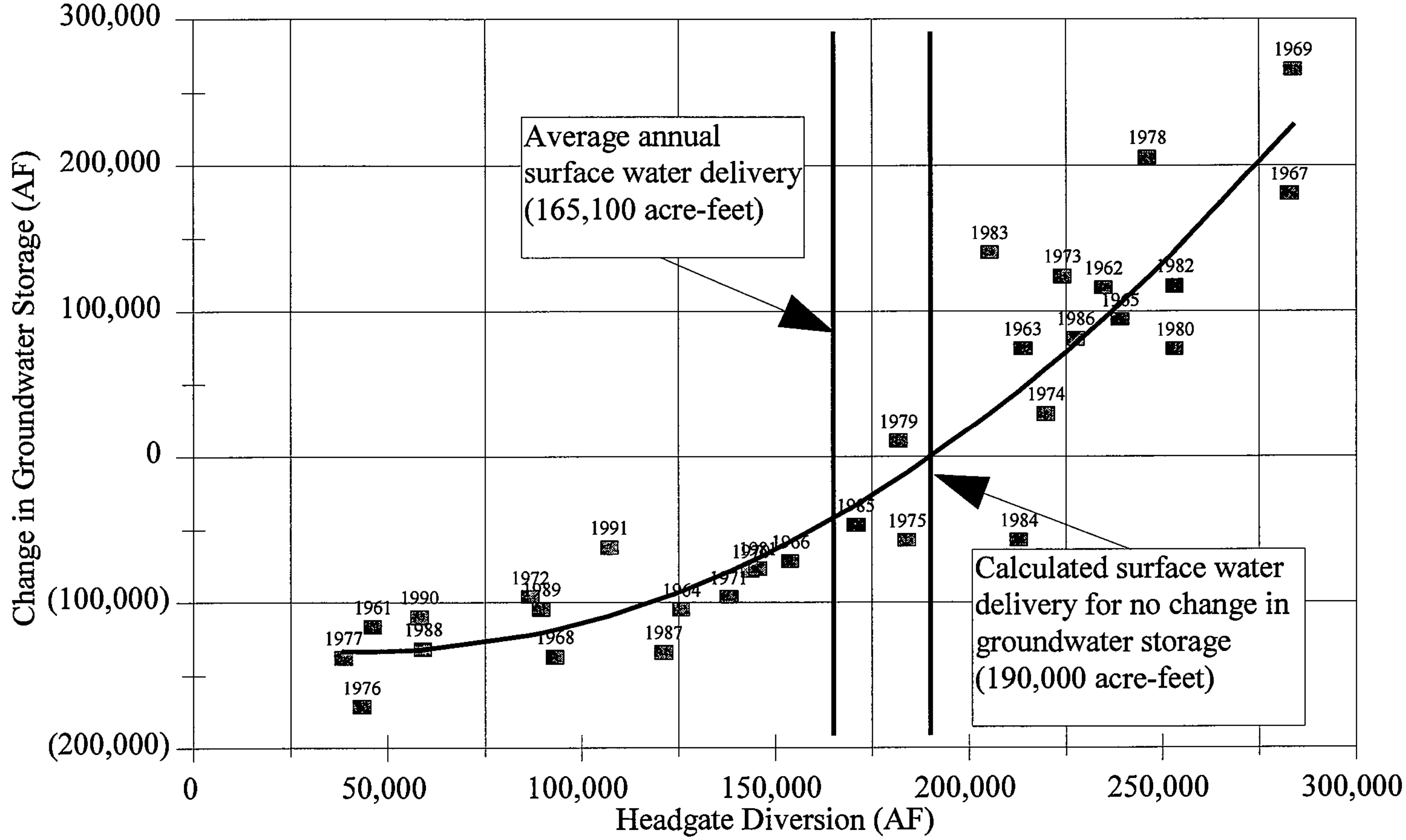
◉ Yes ○ No

Details:

The District would need to deliver at least 190,000 acre-feet of surface water on an annual basis to maintain groundwater levels (see enclosed graph or Appendix D) under current cropping patterns and land use. The average surface water delivery is approximately 165,000 acre-feet per year (see Table 9 in Appendix B).

Water Supply vs. Groundwater Storage

1960 through 1990



Data from Alta Groundwater Study (KRCD, 1992)

EWMP 6. Increase Water Ordering/Delivering Flexibility

Part 3. General Information for Detailed Analysis

A. Does this EWMP impact any of the other EWMPs on List B and/or List C?

○ Yes ◉ No

B. Please attach a description of any additional facilities and/or components that may be needed to increase operational flexibility and how quickly a supplier can go from receiving an order to delivering an order. Include in this description: any facilities that may need to be installed to increase flexibility; how quickly a supplier can go from receiving an order to delivering an order; estimated project life span; estimated potential annual water savings; and how those savings were estimated. Also briefly discuss whether other variations of the project were considered.

Discussion:

The District operates on a delayed ordering system: landowners currently are required to allow at least 48 hours from the time order is placed and accepted to receive water at the turnout. The District has recently constructed several regulating basins which allows water to be delivered with less notice.

C. Was this EWMP considered in coordination with any other EWMPs or other neighboring water suppliers?

○ Yes ◉ No

EWMP 6. Increase Water Ordering/Delivering Flexibility

Part 4. Environmental, Third-Party, & Indirect Economic Analysis

Environmental Effects

A. Source of Supply

Will implementation of the EWMP result in reduced water demand in the water supplier's service area?

○ Yes ◉ No ○ Unknown

What will be the potential impact?

○ Beneficial ○ Negative ◉ Insignificant ○ Indeterminate

B. Confined/Unconfined Ground Water Levels

Are there any habitats in the water service area that are supported/supplied by the existing groundwater levels?

○ Yes ◉ No ○ Unknown

What will be the potential impact?

○ Beneficial ○ Negative ◉ Insignificant ○ Indeterminate

Discussion:

Alta does not have any portion of the District underlain with shallow groundwater levels of less than five feet depth to groundwater (KRCD, 1997). There are no known habitats that are supported by groundwater within the District.

C. Shallow Groundwater

Is the water supplier located in an area where shallow groundwater and/or water quality problems (i.e. salinity, selenium) limit the use of land and/or drainage water?

○ Yes ◉ No ○ Unknown

Yes	No	Unknown

What will be the potential impact?

○ Beneficial ○ Negative ◉ Insignificant ○ Indeterminate

D. Instream Flows

Does the water supplier's distribution system contribute to flows in any other water courses?

◉ Yes ○ No ○ Unknown

Will implementation of the EWMP affect flows to any other water courses?

○ Yes ◉ No ○ Neither ○ Unknown

What will be the potential impact?

○ Beneficial ○ Negative ◉ Insignificant ○ Indeterminate

E. Drain Flows

Does the water supplier's service area have drains that supply or support habitat?

○ Yes ◉ No ○ Unknown

What will be the potential impact?

○ Beneficial ○ Negative ◉ Insignificant ○ Indeterminate

F. Fertilizer/Herbicide/Pesticide Use

(not applicable)

G. Soil Erosion

Will implementation of the EWMP reduce the current amount of soil erosion in the water supplier service area?

○ Yes ◉ No ○ Unknown

What will be the potential impact?

○ Beneficial ○ Negative ◉ Insignificant ○ Indeterminate

○ Beneficial ○ Negative ○ Insignificant ○ Indeterminate

H. Field Burning and/or Fugitive Dust

(not applicable)

I. Energy Use

Would this EWMP increase or decrease energy use (e.g. pump use, canal structure controls, etc.)?

○ Decrease ○ Increase ◉ Neither ○ Unknown

What will be the potential impact?

○ Beneficial ○ Negative ◉ Insignificant ○ Indeterminate

J. Habitat Effect

(not applicable)

EWMP 6. Increase Water Ordering/Delivering Flexibility

Part 4. Environmental, Third-Party, & Indirect Economic Analysis (continued)

Third-Party Effects

A. Confined/Unconfined Ground Water Levels

Will implementation of the EWMP affect groundwater elevations?

○ Yes ◉ No ○ Unknown

What will be the potential impact?

○ Beneficial ○ Negative ◉ Insignificant ○ Indeterminate

Discussion:

Increasing water ordering and delivery flexibility would have no net increase in the gross water supply. Without a net increase in the deliverd water to the District there will be not change in the current condition that would impact groundwater levels in Alta.

B. Instream Flows

Do the water supplier's distribution flows contribute to any natural streams?

◉ Yes ○ No ○ Unknown

Will implementation of the EWMP decrease or increase instream flows to any streams that supply or support any third-party?

○ Increase ○ Decrease ◉ Neither ○ Unknown

What will be the potential impact?

○ Beneficial ○ Negative ◉ Insignificant ○ Indeterminate

C. Drain Flows

Do drain flows supply or support any third-party user?

○ Yes ◉ No

What will be the potential impact?

○ Beneficial	○ Negative	◉ Insignificant	○ Indeterminate

D. Herbicide/Pesticide Use
(not applicable)

E. Wind/Water Soil Erosion
Will implementation of the EWMP reduce the current amount of soil erosion in the water supplier service area?

○ Yes	◉ No	○ Unknown

What will be the potential impact?

○ Beneficial	○ Negative	◉ Insignificant	○ Indeterminate

EWMP 6. Increase Water Ordering/Delivering Flexibility

Part 4. Environmental, Third-Party, & Indirect Economic Analysis (continued)

Indirect Economic Effects

A. Effects on local economies

Will the EWMP affect local economies through changes in on-farm operations (indirect economic effects)?

○ Yes	◉ No	○ Unknown

What will be the potential impact?

○ Beneficial	○ Negative	◉ Insignificant	○ Indeterminate

B. Effects on farmers' purchases of crop inputs

Will practices associated with implementation of the EWMP increase or decrease farmers' purchases of crop inputs such as seed, fertilizer, irrigation equipment, etc.?

○ Increase	○ Decrease	◉ Neither	○ Unknown

What will be the potential impact?

○ Beneficial	○ Negative	◉ Insignificant	○ Indeterminate

C. Effects on local employment

Will practices associated with implementation of the EWMP increase or decrease the hiring of local (county) farm workers?

○ Increase	○ Decrease	◉ Neither	○ Unknown

What will be the potential impact?

○ Beneficial	○ Negative	◉ Insignificant	○ Indeterminate

D. Effects on local processing of farm produce

Will practices associated with implementation of the EWMP increase or decrease the local (county) processing of farm produce (examples-canning of nuts, fruits, and vegetables; milk production supported by cows/pasture; etc.?

○ Increase	○ Decrease	◉ Neither	○ Unknown

What will be the potential impact?

○ Beneficial	○ Negative	◉ Insignificant	○ Indeterminate

EWMP 6. Increase Water Ordering/Delivering Flexibility

Part 4. Tables of Effects Summary

Table 2. Potential Environmental Effects Summary

Section	Evaluated Component	Beneficial	Negative	Insignificant	Indeterminate
A	Source of supply			X	
B	Confined/Unconfined Groundwater Levels			X	
C	Shallow Groundwater Elevations			X	
D	Instream Flows			X	
E	Drain Flows			X	
F	Fertilizer / Herbicide / Pesticide Use				
G	Soil Erosion			X	
H	Field Burning and Fugitive Dust				
I	Energy Use			X	
J1	Vernal Pools and Swales				
J2	Riparian Habitat				
J3	Open Water Bodies				
J4	Marshes (permanent or seasonal)				

EWMP 6. Increase Water Ordering/Delivering Flexibility

Part 4. Tables of Effects Summary

Table 3. Potential Third-Party Effects Summary

Section	Evaluated Component	Beneficial	Negative	Insignificant	Indeterminate
A	Confined/Unconfined Groundwater Levels			X	
B	Instream Flows			X	
C	Drain Flows			X	
D	Fertilizer / Herbicide / Pesticide Use				
E	Win/Water Soil Erosion			X	

Table 4. Indirect Economic Effects Summary

Section	Evaluated Component	Beneficial	Negative	Insignificant	Indeterminate
B	Farm Inputs			X	
C	Local farm Labor			X	
D	Processing of Farm Products			X	

EWMP
1. Facilitate Alternate Land Use
2. Facilitate Use of Available Recycled Water
3. Facilitate Financial Assistance
4. Facilitate Voluntary Water Transfers
5. Line or Pipe Ditches/Canals
6. Increase Water Ordering/Delivering Flexibility
7. Construct/Operate Tailwater and Spill Recovery System
8. Optimize Conjunctive Use
9. Automate Canal Structures
10. Water Measurement/Water Use Update
11. Pricing and Incentives

M

APPENDIX M

EWMP #7: Construct/Operate Tailwater and Spill Recovery System

Memorandum of Understanding
Regarding
Efficient Water Management Practices
by Agricultural Water Suppliers
in California

Efficient Water Management Practice (EWMP)

7. Construct/Operate Tailwater and Spill Recovery System

The Excel Version

prepared by Division of Planning and Local Assistance

Department of Water Resources

October 21, 1998

EWMP 7. Construct/Operate Tailwater and Spill Recovery System

PREVIEW - REVIEW

Part 1 Information to Determine if Detailed Analysis is Required

Question A	*(Is EWMP satisfactorily implemented?)*	**Yes**
Question B	*(Is EWMP demonstrably inappropriate?)*	**Yes**
Question C	*(Is EWMP technically infeasible?)*	**Yes**

Part 2 Detailed Analysis for EWMPs 1, 2, 3, and 4 (not applicable)

Part 3 General Information for Detailed Analysis

Question A	*(Does EWMP impact other EWMPs?)*	**No**
Question B	*(Matrix information about seepage losses)*	**n/a**
Question C	*(Matrix information about spill water quality)*	**n/a**
Question D	*(Description of potential water reuse system)*	**n/a**
Question E	*(Was EWMP considered along with others?)*	**No**

Part 4 Environmental, Third Party, and Indirect Economic Analysis

Environmental Effects

Question A	*(On source of supply)*	**Insignificant**
Question B	*(On groundwater levels)*	**Insignificant**
Question C	*(On shallow groundwater)*	**Insignificant**
Question D	*(On instream flows)*	**Insignificant**
Question E	*(On drain flows)*	**Insignificant**
Question F	*(On herbicide/pesticide use)*	**n/a**
Question G	*(On soil erosion)*	**Insignificant**
Question H	*(On field burning/fugitive dust)*	**n/a**
Question I	*(On energy use)*	**Insignificant**
Question J	*(On habitats)*	**n/a**

Third-Party Effects

EWMP 7. Construct/Operate Tailwater and Spill Recovery System

Question A	*(On groundwater levels)*	**Insignificant**
Question B	*(On instream flows)*	**Insignificant**
Question C	*(On drain flows)*	**Insignificant**
Question D	*(On herbicide/pesticide use)*	**n/a**
Question E	*(On wind/water soil erosion)*	**Insignificant**

Indirect Economic Effects

Question A	*(On local economies via farm operations)*	**Insignificant**
Question B	*(On farmers' purchases of crop inputs)*	**Insignificant**
Question C	*(On hiring of local farm workers)*	**Insignificant**
Question D	*(On local processing of farm produce)*	**Insignificant**

Part 5 Economic Analysis

Question A	*(Estimated annual conserved water)*	**af**
Question B	*(Would EWMP result in capital costs?)*	
Question C	*(Would EWMP reduce water purchases?)*	
Question D	*(Would EWMP delay future projects?)*	
Question E	*(Would EWMP increase water sales?)*	

Part 6 Financial Analysis

Adequate funding available?

Part 7 Summary of Analysis

Benefit-Cost Ratio

Accept EWMP?

EWMP 7. Construct/Operate Tailwater and Spill Recovery System

Part 1. Information to Determine if Detailed Analysis Is Required

A. Is this EWMP being implemented at a satisfactory level?

◉ Yes ○ No

Details:

Alta has 11 spill points where operational spill can leave the Districts' boundaries. During the period from 1988 through 1998 an annual average spill volume of 1500 acre feet was spilled. During the recent past all spill points have had spill recovery basins constructed at the tailends of the 11 canals. An example system would be the Clough Spill. At the end of the Clough Ditch a 20 acre catch basin has been constructed to collect the majority of spill water. From this basin surrounding land owners have privately operated lift pumps to utilize the collected spill.

As can be seen in the attached table spill from the Clough has been reduced from 1600 acre-feet in 1984 to 150 acre-feet in 1996. Further reduction in spills would begin to affect the level of service to water users just up stream of the recovery basins.

B. Is this EWMP demonstrably inappropriate for implementation by the water supplier?

◉ Yes ○ No

Details:

Same as above.

C. Is this EWMP technically infeasible given current technology or prevailing local conditions?

◉ Yes ○ No

Details:

Spill recovery programs have been implemented on all spill points. Further reduction in spill is foreseen to negatively impact the level of service at the lower portions of the canals.

Operational Spill in Alta ID (Note: Spill volumes decrease due to improved spill recovery programs.)

	1984 (Wet Year)		1990 (Dry Year)		1996 (Wet Year) w/ improvements	
Spill Location	cfs	acre-feet	cfs	acre-feet	cfs	acre-feet
Cross Creek Waste Way	6.0	1,916			1.5	454
Traver Canal	5.5	1,756			1.5	454
West Section 20	0.5	160	0.5	48	0.5	151
Clough	5.0	1,597			0.5	151
Lyndecker	5.0	1,597			0.0	0
Wahtoke Ditch	0.5	160	0.5	48	0.5	151
Mt. Campbell	1.0	319	1.0	95	1.0	303
Banks	1.8	559			0.4	121
Orosi School House	0.8	240	0.8	71	0.8	227
Button	7.5	2,395			1.5	454
East Branch	3.0	958			1.0	303
Total		11,657		261		2,772

diversion	212941	58284	220777
spill as % of diversion	5.47%	0.45%	1.26%

EWMP 7. Construct/Operate Tailwater and Spill Recovery System

Part 3. General Information for Detailed Analysis

A. Does this EWMP impact any of the other EWMPs on List B and/or List C?

○ Yes ◉ No

B. Complete a matrix and attach a description of how spill and seepage losses were determined (e.g., consultant report, field study, water budget).

(The matrix is on the next page.)

Discussion:

Operational spill estimates were calculated in the Alta Surface Water Study(KRCD, 91). Updated numbers reflecting system improvements were calculated using the same criteria as in the earlier mentioned study.

C. If available, provide information on the average spill/tailwater/drainage water quality leaving the service area in the following matrix.

(The matrix is on the next page.)

D. Please attach a description of the potential spill/tailwater reuse system. Include in this description: number and types of recovery pumps to be used; expected capacity of the recovery system (cfs or gpm); estimated project life span; estimated potential annual water recovery (acre-feet); and how those recoveries were estimated and method of estimation. Also briefly discuss whether other variations of the projects were considered.

Spill recovery systems are placed at the end of all canals that spill out of the District.

E. Was this EWMP considered in coordination with any other EWMPs or other neighboring water suppliers?

○ Yes ◉ No

EWMP 7. Construct/Operate Tailwater and Spill Recovery System

Part 3. General Information for Detailed Analysis

Question B (Matrix about Spill and Seepage Losses)
(If unavailable, indicate "unknown" in the matrix.)

Estimated average amount of spill/tailwater produced (ac-ft/yr)	**1,500**
Quantity of average spill/tailwater/drainage released from service area (ac-ft/yr)	**1,500**

Question C (Matrix about Spill/Tailwater/Drainage Water Quality Leaving the Service Area)

Constituent	**Concentrations**
Total Dissolved Solids/EC	
Selenium (if applicable)	
Boron (if applicable)	
Other constituents of concern that may be detrimental for soil or crop production:	

EWMP 7. Construct/Operate Tailwater and Spill Recovery System

Part 4. Environmental, Third-Party, & Indirect Economic Analysis

Environmental Effects

A. Source of Supply

Will implementation of the EWMP result in reduced water demand in the water supplier's service area?

○ Yes ◉ No ○ Unknown

What will be the potential impact?

○ Beneficial ○ Negative ◉ Insignificant ○ Indeterminate

B. Confined/Unconfined Ground Water Levels

Are there any habitats in the water service area that are supported/supplied by the existing groundwater levels?

○ Yes ◉ No ○ Unknown

What will be the potential impact?

○ Beneficial ○ Negative ◉ Insignificant ○ Indeterminate

Discussion:

Alta does not have any portion of the District underlain with shallow groundwater levels of less than five feet depth to groundwater (KRCD, 1997). There are no known habitats that are supported by groundwater within the District.

C. Shallow Groundwater

Is the water supplier located in an area where shallow groundwater and/or water quality problems (i.e. salinity, selenium) limit the use of land and/or drainage water?

○ Yes ◉ No ○ Unknown

Yes No Unknown

What will be the potential impact?

○ Beneficial ○ Negative ◉ Insignificant ○ Indeterminate

D. Instream Flows

Does the water supplier's distribution system contribute to flows in any other water courses?

◉ Yes ○ No ○ Unknown

Will implementation of the EWMP affect flows to any other water courses?

○ Yes ◉ No ○ Neither ○ Unknown

What will be the potential impact?

○ Beneficial ○ Negative ◉ Insignificant ○ Indeterminate

E. Drain Flows

Does the water supplier's service area have drains that supply or support habitat?

○ Yes ◉ No ○ Unknown

What will be the potential impact?

○ Beneficial ○ Negative ◉ Insignificant ○ Indeterminate

F. Fertilizer/Herbicide/Pesticide Use

(not applicable)

G. Soil Erosion

Will implementation of the EWMP reduce the current amount of soil erosion in the water supplier service area?

○ Yes ◉ No ○ Unknown

What will be the potential impact?

○ Beneficial ○ Negative ◉ Insignificant ○ Indeterminate

○ Beneficial	○ Negative	○ Insignificant	○ Indeterminate

H. Field Burning and/or Fugitive Dust

(not applicable)

I. Energy Use

Would this EWMP increase or decrease energy use (e.g. pump use, canal structure controls, etc.)?

○ Decrease	○ Increase	◉ Neither	○ Unknown

What will be the potential impact?

○ Beneficial	○ Negative	◉ Insignificant	○ Indeterminate

J. Habitat Effect

(not applicable)

EWMP 7. Construct/Operate Tailwater and Spill Recovery System

Part 4. Environmental, Third-Party, & Indirect Economic Analysis (continued)

Third-Party Effects

A. Confined/Unconfined Ground Water Levels

Will implementation of the EWMP affect groundwater elevations?

○ Yes ◉ No ○ Unknown

What will be the potential impact?

○ Beneficial ○ Negative ◉ Insignificant ○ Indeterminate

Discussion:

Current average annual spill is 1500 acre-feet. This amount if entirely recovered is less than six percent annual groundwater overdraft seen in the District.

B. Instream Flows

Do the water supplier's distribution flows contribute to any natural streams?

◉ Yes ○ No ○ Unknown

Will implementation of the EWMP decrease or increase instream flows to any streams that supply or support any third-party?

○ Increase ○ Decrease ◉ Neither ○ Unknown

What will be the potential impact?

○ Beneficial ○ Negative ◉ Insignificant ○ Indeterminate

C. Drain Flows

Do drain flows supply or support any third-party user?

○ Yes ◉ No

What will be the potential impact?

○ Beneficial	○ Negative	◉ Insignificant	○ Indeterminate

D. Herbicide/Pesticide Use
(not applicable)

E. Wind/Water Soil Erosion
Will implementation of the EWMP reduce the current amount of soil erosion in the water supplier service area?

○ Yes	◉ No	○ Unknown

What will be the potential impact?

○ Beneficial	○ Negative	◉ Insignificant	○ Indeterminate

EWMP 7. Construct/Operate Tailwater and Spill Recovery System

Part 4. Environmental, Third-Party, & Indirect Economic Analysis (continued)

Indirect Economic Effects

A. Effects on local economies

Will the EWMP affect local economies through changes in on-farm operations (indirect economic effects)?

○ Yes ◉ No ○ Unknown

What will be the potential impact?

○ Beneficial ○ Negative ◉ Insignificant ○ Indeterminate

B. Effects on farmers' purchases of crop inputs

Will practices associated with implementation of the EWMP increase or decrease farmers' purchases of crop inputs such as seed, fertilizer, irrigation equipment, etc.?

○ Increase ○ Decrease ◉ Neither ○ Unknown

What will be the potential impact?

○ Beneficial ○ Negative ◉ Insignificant ○ Indeterminate

C. Effects on local employment

Will practices associated with implementation of the EWMP increase or decrease the hiring of local (county) farm workers?

○ Increase ○ Decrease ◉ Neither ○ Unknown

What will be the potential impact?

○ Beneficial ○ Negative ◉ Insignificant ○ Indeterminate

D. Effects on local processing of farm produce

Will practices associated with implementation of the EWMP increase or decrease the local (county) processing of farm produce (examples-canning of nuts, fruits, and vegetables; milk production supported by cows/pasture; etc.?

- ○ Increase
- ○ Decrease
- ◉ Neither
- ○ Unknown

What will be the potential impact?

- ○ Beneficial
- ○ Negative
- ◉ Insignificant
- ○ Indeterminate

Table 2. Potential Environmental Effects Summary

Section	Evaluated Component	Beneficial	Negative	Insignificant	Indeterminate
A	Source of supply			X	
B	Confined/Unconfined Groundwater Levels			X	
C	Shallow Groundwater Elevations			X	
D	Instream Flows			X	
E	Drain Flows			X	
F	Fertilizer / Herbicide / Pesticide Use				
G	Soil Erosion			X	
H	Field Burning and Fugitive Dust				
I	Energy Use			X	
J1	Vernal Pools and Swales				
J2	Riparian Habitat				
J3	Open Water Bodies				
J4	Marshes (permanent or seasonal)				

Part 4. Tables of Effects Summary

Table 3. Potential Third-Party Effects Summary

Section	Evaluated Component	Beneficial	Negative	Insignificant	Indeterminate
A	Confined/Unconfined Groundwater Levels			X	
B	Instream Flows			X	
C	Drain Flows			X	
D	Fertilizer / Herbicide / Pesticide Use				
E	Win/Water Soil Erosion			X	

Table 4. Indirect Economic Effects Summary

Section	Evaluated Component	Beneficial	Negative	Insignificant	Indeterminate
B	Farm Inputs			X	
C	Local farm Labor			X	
D	Processing of Farm Products			X	

EWMP
1. Facilitate Alternate Land Use
2. Facilitate Use of Available Recycled Water
3. Facilitate Financial Assistance
4. Facilitate Voluntary Water Transfers
5. Line or Pipe Ditches/Canals
6. Increase Water Ordering/Delivering Flexibility
7. Construct/Operate Tailwater and Spill Recovery System
8. Optimize Conjunctive Use
9. Automate Canal Structures
10. Water Measurement/Water Use Update
11. Pricing and Incentives

N

APPENDIX N

EWMP #8: Optimize Conjunctive Use

Memorandum of Understanding Regarding Efficient Water Management Practices by Agricultural Water Suppliers in California

Efficient Water Management Practice (EWMP)
8. Optimize Conjunctive Use

The Excel Version
prepared by Division of Planning and Local Assistance
Department of Water Resources
October 21, 1998

EWMP 8. Optimize Conjunctive Use

IEW - REVIEW

Part 1 Information to Determine if Detailed Analysis is Required

Question A *(Is EWMP satisfactorily implemented?)*	**Yes**
Question B *(Is EWMP demonstrably inappropriate?)*	**No**
Question C *(Is EWMP technically infeasible?)*	**No**

Part 2 Detailed Analysis for EWMPs 1, 2, 3, and 4 (not applicable)

Part 3 General Information for Detailed Analysis

Question A *(Does EWMP impact other EWMPs?)*	**No**
Question B *(Matrix information about water supply)*	**n/a**
Question C *(Description of programs)*	**n/a**

Part 4 Environmental, Third Party, and Indirect Economic Analysis

Environmental Effects

Question A *(On source of supply)*	**Insignificant**
Question B *(On groundwater levels)*	**Insignificant**
Question C *(On shallow groundwater)*	**Insignificant**
Question D *(On instream flows)*	**Insignificant**
Question E *(On drain flows)*	**Insignificant**
Question F *(On herbicide/pesticide use)*	**n/a**
Question G *(On soil erosion)*	**Insignificant**
Question H *(On field burning/fugitive dust)*	**n/a**
Question I *(On energy use)*	**Insignificant**
Question J *(On habitats)*	**n/a**

EWMP 8. Optimize Conjunctive Use

Third-Party Effects

Question A *(On groundwater levels)*	**Insignificant**
Question B *(On instream flows)*	**Insignificant**
Question C *(On drain flows)*	**Insignificant**
Question D *(On herbicide/pesticide use)*	**n/a**
Question E *(On wind/water soil erosion)*	**Insignificant**

Indirect Economic Effects

Question A *(On local economies via farm operations)*	**Insignificant**
Question B *(On farmers' purchases of crop inputs)*	**Insignificant**
Question C *(On hiring of local farm workers)*	**Insignificant**
Question D *(On local processing of farm produce)*	**Insignificant**

Part 5 Economic Analysis

Question A *(Estimated annual conserved water)*		**af**
Question B *(Would EWMP result in capital costs?)*		
Question C *(Would EWMP reduce water purchases?)*		
Question D *(Would EWMP delay future projects?)*		
Question E *(Would EWMP increase water sales?)*		

Part 6 Financial Analysis

Adequate funding available?

Part 7 Summary of Analysis

Benefit-Cost Ratio

Accept EWMP?

EWMP 8. Optimize Conjunctive Use

Part 1. Information to Determine if Detailed Analysis Is Required

A. Is this EWMP being implemented at a satisfactory level?

◉ Yes	○ No

Details:

Alta's Groundwater Management Plan (Alta, 1994) is predicated upon conjunctive use. Based upon historical deliveries, Alta has been able to deliver only a portion of the crop requirement with surface water supplies (KRCD, 1991).

B. Is this EWMP demonstrably inappropriate for implementation by the water supplier?

○ Yes	◉ No

C. Is this EWMP technically infeasible given current technology or prevailing local conditions?

○ Yes	◉ No

EWMP 8. Optimize Conjunctive Use

Part 3. General Information for Detailed Analysis

A. Does this EWMP impact any of the other EWMPs on List B and/or List C?

○ Yes ◉ No

B. Please provide estimates in the following matrix.

(The matrix is on the next page.)

C. The goal of this EWMP is to optimize conjunctive use for the water supplier. It is understood that to optimize conjunctive use, components will vary drastically in any given year in order to most efficiently use available supplies. With this in mind, please attach a description of the current program (if any) and the proposed program. Include specifics when permanent facilities (e.g. ponding basins, regulatory reservoirs, etc.) or the equipment (e.g. extraction wells) would be needed.
Otherwise, briefly discuss the following: method of conjunctive use (e.g. direct recharge, in-lieu exchanges with other suppliers, incidental recharge through overapplication of applied water, or a combination), location of permanent facilities or equipment to be installed for the program, estimated life span of facilities and equipment, estimated potential annual water savings and method of estimated savings, and potential sources of surface water to be used for recharge within and outside of the water supplier's service area. Additionally, please discuss whether possible conjunctive use opportunities with other water suppliers were considered.

Discussion:

All recharge facilities are listed in Artificial Groundwater Recharge in the Kings River Service Area (KRCD, 1999). Incidental recharge of 45,600 acre feet occuring annually along its 360 miles of unlined irrigation canals (KRCD, 1991). Alta has utilized bankng opportunities with Consolidated Irrigation District due Alta's limited recharge capability and Consolidated's 1,251 acres of recharge basins (KRCD, 1999). Due to groundwater hydrology limiting direct recharge potential in the easterly portion of Alta, water banking options will be evaluated for enhancement of water deliveries in dry years by depositing water in wet years to Consolidated's ponding basins. If the lining option was to be implemented to a significant level, incidental recharge would be impacted.

EWMP 8. Optimize Conjunctive Use

Part 3. General Information for Detailed Analysis

Question B (Matrix about Water Supply)

Ground water pumping in average supply year (ac-ft/yr)	**221,700.00**
Maximum ground water pumping capability (ac-ft/yr)	**333,107.00**
Surface water deliveries in normal year (ac-ft/yr)	**165,100.00**
Surface water deliveries in deficit year (ac-f/yr)	**38,721.00**

EWMP 8. Optimize Conjunctive Use

Part 4. Environmental, Third-Party, & Indirect Economic Analysis

Environmental Effects

A. Source of Supply

Will implementation of the EWMP result in reduced water demand in the water supplier's service area?

○ Yes ◉ No ○ Unknown

What will be the potential impact?

○ Beneficial ○ Negative ◉ Insignificant ○ Indeterminate

B. Confined/Unconfined Ground Water Levels

Are there any habitats in the water service area that are supported/supplied by the existing groundwater levels?

○ Yes ◉ No ○ Unknown

What will be the potential impact?

○ Beneficial ○ Negative ◉ Insignificant ○ Indeterminate

Discussion:

Alta does not have any portion of the District underlain with shallow groundwater levels of less than five feet depth to groundwater (KRCD, 1997). There are no known habitats that are supported by groundwater within the District.

C. Shallow Groundwater

Is the water supplier located in an area where shallow groundwater and/or water quality problems (i.e. salinity, selenium) limit the use of land and/or drainage water?

○ Yes ◉ No ○ Unknown

Yes No Unknown

What will be the potential impact?

○ Beneficial	○ Negative	◉ Insignificant	○ Indeterminate

D. Instream Flows

Does the water supplier's distribution system contribute to flows in any other water courses?

◉ Yes	○ No	○ Unknown

Will implementation of the EWMP affect flows to any other water courses?

○ Yes	◉ No	○ Neither	○ Unknown

What will be the potential impact?

○ Beneficial	○ Negative	◉ Insignificant	○ Indeterminate

E. Drain Flows

Does the water supplier's service area have drains that supply or support habitat?

○ Yes	◉ No	○ Unknown

What will be the potential impact?

○ Beneficial	○ Negative	◉ Insignificant	○ Indeterminate

F. Fertilizer/Herbicide/Pesticide Use

(not applicable)

G. Soil Erosion

Will implementation of the EWMP reduce the current amount of soil erosion in the water supplier service area?

○ Yes	◉ No	○ Unknown

What will be the potential impact?

○ Beneficial	○ Negative	◉ Insignificant	○ Indeterminate

H. Field Burning and/or Fugitive Dust

(not applicable)

I. Energy Use

Would this EWMP increase or decrease energy use (e.g. pump use, canal structure controls, etc.)?

○ Decrease	○ Increase	◉ Neither	○ Unknown

What will be the potential impact?

○ Beneficial	○ Negative	◉ Insignificant	○ Indeterminate

J. Habitat Effect

(not applicable)

EWMP 8. Optimize Conjunctive Use

Part 4. Environmental, Third-Party, & Indirect Economic Analysis (continued)

Third-Party Effects

A. Confined/Unconfined Ground Water Levels

Will implementation of the EWMP affect groundwater elevations?

○ Yes ◉ No ○ Unknown

What will be the potential impact?

○ Beneficial ○ Negative ◉ Insignificant ○ Indeterminate

Discussion:

Alta's current program is entirely based on conjunctive use. With or without implementation of this EWMP there will be no change to Alta's water balance, therefore the impacts to groundwater levels would be insignificant.

B. Instream Flows

Do the water supplier's distribution flows contribute to any natural streams?

◉ Yes ○ No ○ Unknown

Will implementation of the EWMP decrease or increase instream flows to any streams that supply or support any third-party?

○ Increase ○ Decrease ◉ Neither ○ Unknown

What will be the potential impact?

○ Beneficial ○ Negative ◉ Insignificant ○ Indeterminate

C. Drain Flows

Do drain flows supply or support any third-party user?

○ Yes ◉ No

What will be the potential impact?

○ Beneficial ○ Negative ◉ Insignificant ○ Indeterminate

D. Herbicide/Pesticide Use
(not applicable)

E. Wind/Water Soil Erosion
Will implementation of the EWMP reduce the current amount of soil erosion in the water supplier service area?

○ Yes ◉ No ○ Unknown

What will be the potential impact?

○ Beneficial ○ Negative ◉ Insignificant ○ Indeterminate

EWMP 8. Optimize Conjunctive Use

Part 4. Environmental, Third-Party, & Indirect Economic Analysis (continued)

Indirect Economic Effects

A. Effects on local economies

Will the EWMP affect local economies through changes in on-farm operations (indirect economic effects)?

○ Yes ◉ No ○ Unknown

What will be the potential impact?

○ Beneficial ○ Negative ◉ Insignificant ○ Indeterminate

B. Effects on farmers' purchases of crop inputs

Will practices associated with implementation of the EWMP increase or decrease farmers' purchases of crop inputs such as seed, fertilizer, irrigation equipment, etc.?

○ Increase ○ Decrease ◉ Neither ○ Unknown

What will be the potential impact?

○ Beneficial ○ Negative ◉ Insignificant ○ Indeterminate

C. Effects on local employment

Will practices associated with implementation of the EWMP increase or decrease the hiring of local (county) farm workers?

○ Increase ○ Decrease ◉ Neither ○ Unknown

What will be the potential impact?

○ Beneficial ○ Negative ◉ Insignificant ○ Indeterminate

D. Effects on local processing of farm produce

Will practices associated with implementation of the EWMP increase or decrease the local (county) processing of farm produce (examples-canning of nuts, fruits, and vegetables; milk production supported by cows/pasture; etc.?

○ Increase	○ Decrease	◉ Neither	○ Unknown

What will be the potential impact?

○ Beneficial	○ Negative	◉ Insignificant	○ Indeterminate

EWMP 8. Optimize Conjunctive Use

Part 4. Tables of Effects Summary

Table 2. Potential Environmental Effects Summary

Section	Evaluated Component	Beneficial	Negative	Insignificant	Indeterminate
A	Source of supply			X	
B	Confined/Unconfined Groundwater Levels			X	
C	Shallow Groundwater Elevations			X	
D	Instream Flows			X	
E	Drain Flows			X	
F	Fertilizer / Herbicide / Pesticide Use				
G	Soil Erosion			X	
H	Field Burning and Fugitive Dust				
I	Energy Use			X	
J1	Vernal Pools and Swales				
J2	Riparian Habitat				
J3	Open Water Bodies				
J4	Marshes (permanent or seasonal)				

EWMP 8. Optimize Conjunctive Use

Part 4. Tables of Effects Summary

Table 3. Potential Third-Party Effects Summary

Section	Evaluated Component	Beneficial	Negative	Insignificant	Indeterminate
A	Confined/Unconfined Groundwater Levels			X	
B	Instream Flows			X	
C	Drain Flows			X	
D	Fertilizer / Herbicide / Pesticide Use				
E	Win/Water Soil Erosion			X	

Table 4. Indirect Economic Effects Summary

Section	Evaluated Component	Beneficial	Negative	Insignificant	Indeterminate
B	Farm Inputs			X	
C	Local farm Labor			X	
D	Processing of Farm Products			X	

EWMP
1. Facilitate Alternate Land Use
2. Facilitate Use of Available Recycled Water
3. Facilitate Financial Assistance
4. Facilitate Voluntary Water Transfers
5. Line or Pipe Ditches/Canals
6. Increase Water Ordering/Delivering Flexibility
7. Construct/Operate Tailwater and Spill Recovery System
8. Optimize Conjunctive Use
9. Automate Canal Structures
10. Water Measurement/Water Use Update
11. Pricing and Incentives

APPENDIX O

EWMP #9: Automate Canal Structures

Memorandum of Understanding Regarding Efficient Water Management Practices by Agricultural Water Suppliers in California

Efficient Water Management Practice (EWMP)
9. Automate Canal Structures

The Excel Version
prepared by Division of Planning and Local Assistance
Department of Water Resources
October 21, 1998

EWMP 9. Automate Canal Structures

PREVIEW - REVIEW

Part 1 Information to Determine if Detailed Analysis is Required

Question A *(Is EWMP satisfactorily implemented?)*	**No**
Question B *(Is EWMP demonstrably inappropriate?)*	**No**
Question C *(Is EWMP technically infeasible?)*	**No**

Part 2 Detailed Analysis for EWMPs 1, 2, 3, and 4 (not applicable)

Part 3 General Information for Detailed Analysis

Question A *(Does EWMP impact other EWMPs?)*	**Yes**
Question B *(Matrix information about distribution)*	**n/a**
Question C *(Description of potential canal system)*	**n/a**
Question D *(Was EWMP considered along with others?)*	**Yes**

Part 4 Environmental, Third Party, and Indirect Economic Analysis

Environmental Effects

Question A *(On source of supply)*	**Insignificant**
Question B *(On groundwater levels)*	**Insignificant**
Question C *(On shallow groundwater)*	**n/a**
Question D *(On instream flows)*	**Insignificant**
Question E *(On drain flows)*	**Insignificant**
Question F *(On herbicide/pesticide use)*	**n/a**
Question G *(On soil erosion)*	**Indeterminate**
Question H *(On field burning/fugitive dust)*	**n/a**
Question I *(On energy use)*	**Insignificant**
Question J *(On habitats)*	**n/a**

EWMP 9. Automate Canal Structures

Third-Party Effects

Question A	*(On groundwater levels)*	**Insignificant**
Question B	*(On instream flows)*	**Insignificant**
Question C	*(On drain flows)*	**Negative**
Question D	*(On herbicide/pesticide use)*	**n/a**
Question E	*(On wind/water soil erosion)*	**Insignificant**

Indirect Economic Effects

Question A	*(On local economies via farm operations)*	**Insignificant**
Question B	*(On farmers' purchases of crop inputs)*	**Insignificant**
Question C	*(On hiring of local farm workers)*	**Insignificant**
Question D	*(On local processing of farm produce)*	**Insignificant**

Part 5 Economic Analysis

Question A	*(Estimated annual conserved water)*	**750**	**af**
Question B	*(Would EWMP result in capital costs?)*	**Yes**	
Question C	*(Would EWMP reduce water purchases?)*	**Yes**	
Question D	*(Would EWMP delay future projects?)*	**No**	
Question E	*(Would EWMP increase water sales?)*	**No**	

Part 6 Financial Analysis

Adequate funding available? **Yes**

Part 7 Summary of Analysis

Benefit-Cost Ratio **0.16**

Accept EWMP? **Yes**

EWMP 9. Automate Canal Structures

Part 1. Information to Determine if Detailed Analysis Is Required

A. Is this EWMP being implemented at a satisfactory level?

○ Yes ◉ No

B. Is this EWMP demonstrably inappropriate for implementation by the water supplier?

○ Yes ◉ No

C. Is this EWMP technically infeasible given current technology or prevailing local conditions?

○ Yes ◉ No

EWMP 9. Automate Canal Structures

Part 3. General Information for Detailed Analysis

A. Does this EWMP impact any of the other EWMPs on List B and/or List C?

◉ Yes ○ No

Discussion:

Implementation of this EWMP should increase water ordering/delivery flexibility (EWMP 6), increase accuracy of water measurements (EWMP 10) and, pricing would need to be increased to pay for the capital costs related to the improvements (EWMP 11).

B. Please complete the following matrix.

(The matrix is on the next page.)

C. Please attach a description of the potential automated canal structure system. Include in this description: number and types of canal structures to be used; estimated project life span; estimated potential annual water savings (acre feet); and how those savings were estimated. Also briefly discuss whether other variations of the project were considered.

10 major structures, numerous minor control structures

D. Was this EWMP considered in coordination with any other EWMPs or other neighboring water suppliers?

◉ Yes ○ No

Discussion:

Pricing EWMP 11(payment for improved facilities), EWMP 6 (flexibility of ordering and delivery to water users).

EWMP 9. Automate Canal Structures

Part 3. General Information for Detailed Analysis

Question B (Matrix about Automated Locations)

Number of locations within the distribution system which are automated	**1**
Estimate the number of locations within the distribution system which could potentially be automated	**10**

EWMP 9. Automate Canal Structures

Part 4. Environmental, Third-Party, & Indirect Economic Analysis

Environmental Effects

A. Source of Supply

Will implementation of the EWMP result in reduced water demand in the water supplier's service area?

○ Yes ◉ No ○ Unknown

What will be the potential impact?

○ Beneficial ○ Negative ◉ Insignificant ○ Indeterminate

B. Confined/Unconfined Ground Water Levels

Are there any habitats in the water service area that are supported/supplied by the existing groundwater levels?

○ Yes ◉ No ○ Unknown

What will be the potential impact?

○ Beneficial ○ Negative ◉ Insignificant ○ Indeterminate

Discussion:

Alta does not have any portion of the District underlain with shallow groundwater levels of less than five feet depth to groundwater (KRCD, 1997). There are no known habitats that are supported by groundwater within the District.

C. Shallow Groundwater

(not applicable)

D. Instream Flows

Does the water supplier's distribution system contribute to flows in any other water courses?

◉ Yes	○ No	○ Unknown

Will implementation of the EWMP affect flows to any other water courses?

○ Yes	◉ No	○ Neither	○ Unknown

What will be the potential impact?

○ Beneficial	○ Negative	◉ Insignificant	○ Indeterminate

E. Drain Flows

Does the water supplier's service area have drains that supply or support habitat?

○ Yes	◉ No	○ Unknown

What will be the potential impact?

○ Beneficial	○ Negative	◉ Insignificant	○ Indeterminate

F. Fertilizer/Herbicide/Pesticide Use

(not applicable)

G. Soil Erosion

Will implementation of the EWMP reduce the current amount of soil erosion in the water supplier service area?

○ Yes	◉ No	○ Unknown

What will be the potential impact?

○ Beneficial	○ Negative	○ Insignificant	◉ Indeterminate

H. Field Burning and/or Fugitive Dust

(not applicable)

I. Energy Use

Would this EWMP increase or decrease energy use (e.g. pump use, canal structure controls, etc.)?

○ Decrease	○ Increase	◉ Neither	○ Unknown

○ Decrease	○ Increase	◉ Neither	○ Unknown

What will be the potential impact?

○ Beneficial	○ Negative	◉ Insignificant	○ Indeterminate

J. Habitat Effect

(not applicable)

EWMP 9. Automate Canal Structures

Part 4. Environmental, Third-Party, & Indirect Economic Analysis (continued)

Third-Party Effects

A. Confined/Unconfined Ground Water Levels

Will implementation of the EWMP affect groundwater elevations?

○ Yes ◉ No ○ Unknown

What will be the potential impact?

○ Beneficial ○ Negative ◉ Insignificant ○ Indeterminate

Discussion:

Automation of canal structures should have minimal impact on the net water supply for the District. Therefore, impacts to current groundwater conditions should be insignificant.

B. Instream Flows

Do the water supplier's distribution flows contribute to any natural streams?

◉ Yes ○ No ○ Unknown

Will implementation of the EWMP decrease or increase instream flows to any streams that supply or support any third-party?

○ Increase ○ Decrease ◉ Neither ○ Unknown

What will be the potential impact?

○ Beneficial ○ Negative ◉ Insignificant ○ Indeterminate

C. Drain Flows

Do drain flows supply or support any third-party user?

◉ Yes ○ No

Do you anticipate that drain water conditions will be affected as a result of implementation of the EWMP?

◉ Yes	○ No	○ Unknown

What will be the potential impact?

○ Beneficial	◉ Negative	○ Insignificant	○ Indeterminate

Discussion:

Canal automation should improve water deliveries resulting in less drain water to the lower portions of the District. Therefore, the users of incidental drain flows would receive lower flows.

D. Herbicide/Pesticide Use

(not applicable)

E. Wind/Water Soil Erosion

Will implementation of the EWMP reduce the current amount of soil erosion in the water supplier service area?

○ Yes	◉ No	○ Unknown

What will be the potential impact?

○ Beneficial	○ Negative	◉ Insignificant	○ Indeterminate

EWMP 9. Automate Canal Structures

Part 4. Environmental, Third-Party, & Indirect Economic Analysis (continued)

Indirect Economic Effects

A. Effects on local economies

Will the EWMP affect local economies through changes in on-farm operations (indirect economic effects)?

○ Yes ◉ No ○ Unknown

What will be the potential impact?

○ Beneficial ○ Negative ◉ Insignificant ○ Indeterminate

B. Effects on farmers' purchases of crop inputs

Will practices associated with implementation of the EWMP increase or decrease farmers' purchases of crop inputs such as seed, fertilizer, irrigation equipment, etc.?

○ Increase ○ Decrease ◉ Neither ○ Unknown

What will be the potential impact?

○ Beneficial ○ Negative ◉ Insignificant ○ Indeterminate

C. Effects on local employment

Will practices associated with implementation of the EWMP increase or decrease the hiring of local (county) farm workers?

○ Increase ○ Decrease ◉ Neither ○ Unknown

What will be the potential impact?

○ Beneficial ○ Negative ◉ Insignificant ○ Indeterminate

D. Effects on local processing of farm produce

Will practices associated with implementation of the EWMP increase or decrease the local (county) processing of farm produce (examples-canning of nuts, fruits, and vegetables; milk production supported by cows/pasture; etc.?

○ Increase	○ Decrease	◉ Neither	○ Unknown

What will be the potential impact?

○ Beneficial	○ Negative	◉ Insignificant	○ Indeterminate

EWMP 9. Automate Canal Structures

Part 4. Tables of Effects Summary

Table 2. Potential Environmental Effects Summary

Section	Evaluated Component	Beneficial	Negative	Insignificant	Indeterminate
A	Source of supply			X	
B	Confined/Unconfined Groundwater Levels			X	
C	Shallow Groundwater Elevations				
D	Instream Flows			X	
E	Drain Flows			X	
F	Fertilizer / Herbicide / Pesticide Use				
G	Soil Erosion				X
H	Field Burning and Fugitive Dust				
I	Energy Use			X	
J1	Vernal Pools and Swales				
J2	Riparian Habitat				
J3	Open Water Bodies				
J4	Marshes (permanent or seasonal)				

EWMP 9. Automate Canal Structures

Part 4. Tables of Effects Summary

Table 3. Potential Third-Party Effects Summary

Section	Evaluated Component	Beneficial	Negative	Insignificant	Indeterminate
A	Confined/Unconfined Groundwater Levels			X	
B	Instream Flows			X	
C	Drain Flows		X		
D	Fertilizer / Herbicide / Pesticide Use				
E	Win/Water Soil Erosion			X	

Table 4. Indirect Economic Effects Summary

Section	Evaluated Component	Beneficial	Negative	Insignificant	Indeterminate
B	Farm Inputs			X	
C	Local farm Labor			X	
D	Processing of Farm Products			X	

EWMP 9. Automate Canal Structures

Part 5. Economic Analysis

A. How much water (in acre-feet) is estimated to be conserved annually as a result of the EWMP?

750

In the box below please discuss your assumptions and methodology for deriving this estimate.

50% reduction of the average spill volume for past 10 years. (Appendix B, Table 9)

B. Does the EWMP result in water supplier capital costs and/or annual operation and maintenance costs?

◉ Yes ○ No ○ Unknown

C. Would the EWMP reduce current water supplier water purchases, water diversions, and/or groundwater pumping?

◉ Yes ○ No ○ Unknown

D. Would the EWMP delay or eliminate the need to complete future water supply augmentation and/or distribution projects?

○ Yes ◉ No ○ Unknown

E. Would the EWMP result in additional sales of water supplies to existing customers, new customers, and/or other agencies?

○ Yes ◉ No ○ Unknown

○ Yes   ◉ No   ○ Unknown

Which alternative is to be selected as benefit measure? Please explain in the box below.

Least cost alternative due to insufficient supply.

EWMP 9. Automate Canal Structures

Part 5. Economic Analysis (Worksheets)

Worksheet 1. EWMP Water Supplier Effects

Estimated amount of water conserved annually: 750 acre-feet

EWMP 9. Automate Canal Structures

Part 5. Economic Analysis (Worksheets)

Worksheet 2. EWMP Water Supplier Costs

Worksheet 2a. EWMP Water Supplier Capital Costs

Complete the following worksheet for EWMP capital costs.

Capital Cost Category	Item	Cost	Contingency Cost		Subtotal
			Percent	Dollars	
(a)	(b)	(c)	(d)	(e)	(f)
				(c x d)	(c + e)
Planning	engineering	**20,000**	**15%**	**3,000**	**23,000**
Land			**15%**		
			15%		
Structure	10 Major structures	**400,000**	**15%**	**60,000**	**460,000**
	20 Minor structures	**100,000**	**15%**	**15,000**	**115,000**
Equipment	computer equipment	**20,000**	**15%**	**3,000**	**23,000**
			15%		
Mitigation			**15%**		
Other			**15%**		
Subtotal Capital Costs					**621,000**
Deduct Expected Salvage Value after		**25**	years		**0**
Total Capital Costs					**621,000**
Capital Recovery Factor @		**6%**	**25**	years	**0.0782**
Annual Capital Costs (Total Capital Costs x Capital Recovery Factor)					**48,579**

EWMP 9. Automate Canal Structures

Part 5. Economic Analysis (Worksheets)

Worksheet 2b. EWMP Water Supplier Annual O&M Costs

Complete the following worksheet for EWMP annual O&M costs:

Annual Operating Costs	**Annual Maintenance Costs**	**Other Annual Costs [1]**	**Total Annual O & M Costs**
(a)	(b)	(c)	(d)
			(a + b + c)
2,500	**3,000**	**500**	**6,000**

[1] Other annual costs not included in O&M, such as annual environmental mitigation costs.

EWMP 9. Automate Canal Structures

Part 5. Economic Analysis (Worksheets)

Worksheet 2c. EWMP Water Supplier Costs/af Summary

Annual Capital Costs	Annual O&M Costs	Total Annual Costs	Annual Conserved Water (af)	Cost/af
(a)	(b)	(c)	(d)	(e)
		(a + b)		(c / d)
48,579	**6,000**	**54,579**	**750**	**73**

EWMP 9. Automate Canal Structures

Part 5. Economic Analysis (Worksheets)

Worksheet 3. EWMP Water Supplier Benefits

Worksheet 3a. EWMP Water Supplier Avoided Costs--Current Sources

Complete the following worksheet for current sources of supply that would be avoided with the implementation of the EWMP.

Sources of Supply Avoided	**Amount of Water (af)**	**Annual O&M Costs ($/af)**	**Sources to Used as Benefit Measure**
(a)	(b)	(c)	(d)
Kings River	**750**	**12**	

EWMP 9. Automate Canal Structures

Part 5. Economic Analysis (Worksheets)

Worksheet 3b. EWMP Water Supplier Avoided Costs--Future Sources

Complete the following worksheet for future sources eliminated or delayed because of implementation of the EWMP.

Alternative	**Total Capital Costs**	**Capital Recovery Factor** [1]	**Annual Capital Costs**	**Annual O&M Costs**	**Total Annual Costs**	**Annual Yield**	**Cost/af**
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
			(b x c)		(d + e)		(f / g)
		0.0782					

[1] For a period of 25 years and 6% discount rate.

Worksheet 3c. Water Supplier Revenue Effects

Complete the following worksheet:

Parties Purchasing Conserved Water	Amount of Water (af)	Selling Price ($/af)	Expected Frequency of Sales (%) [1]	Expected Selling Price ($/af)	Option Fee ($/af)	Total Selling Price ($/af)
(a)	(b)	(c)	(d)	(e)	(f)	(g)
				(c x d)		(e + f)
	750		100%		0	

[1] During a 25-year analysis period, how many years are water sales expected to occur? For example, water sales to farmers might be expected to occur 90% of the years, whereas the frequency to other agencies might be 50% of the years,

[2] Option fees are paid by a contracting agency to a selling agency to maintain the right of the contracting agency to buy water whenever needed.. Although the water may not be purchased every year, the fee is usually paid every year.

EWMP 9. Automate Canal Structures

Part 5. Economic Analysis (Worksheets)

Worksheet 4. EWMP Water Supplier Benefits/Costs Ratio

Benefits and Costs	
EWMP Benefits ($/af)	**12**
EWMP Costs ($/af)	**73**
Benefit/Cost Ratio	**0.16**

EWMP 9. Automate Canal Structures

Part 6. EWMP Financial Analysis

A water supplier may claim an exemption if:

"Adequate funds (including funds from other beneficiaries of the plan) are not available, and cannot reasonably be expected to be made available, for implementation of the EWMP during the term of the plan." (MOU, Section 4.02)

If the water supplier is claiming an exemption based upon the lack of available funding, please discuss the reasons for this finding. Please include a copy of your latest financial statement and a list of other potential plan beneficiaries who have been contacted.

No financing exemption being claimed

EWMP 9. Automate Canal Structures

Part 7. Summary of Analysis

Initial Evaluation Table (from Part 1)

EWMP	Yes	No
Fully implemented?		**X**
Demonstrably Inappropriate?		**X**
Technically Infeasible?		**X**

EWMP 9. Automate Canal Structures

Part 7. Summary of Analysis

Potential Environmental Effects Summary Table (from Part 4)

Section	Evaluated Component	Beneficial	Negative	Insignificant	Indeterminate
A	Source of supply			X	
B	Confined/Unconfined Groundwater Levels			X	
C	Shallow Groundwater Elevations				
D	Instream Flows			X	
E	Drain Flows			X	
F	Fertilizer / Herbicide / Pesticide Use				
G	Soil Erosion				X
H	Field Burning and Fugitive Dust				
I	Energy Use			X	
J1	Vernal Pools and Swales				
J2	Riparian Habitat				
J3	Open Water Bodies				
J4	Marshes (permanent or seasonal)				

EWMP 9. Automate Canal Structures

Part 7. Summary of Analysis

Potential Third-Party Effects Summary Table (from Part 4)

Section	Evaluated Component	Beneficial	Negative	Insignificant	Indeterminate
A	Confined/Unconfined Groundwater Levels			X	
B	Instream Flows			X	
C	Drain Flows		X		
D	Fertilizer / Herbicide / Pesticide Use				
E	Wind/Water Soil Erosion			X	

Indirect Economic Effects Summary Table (from Part 4)

Section	Evaluated Component	Beneficial	Negative	Insignificant	Indeterminate
B	Farm Inputs			X	
C	Local farm Labor			X	
D	Processing of Farm Products			X	

EWMP 9. Automate Canal Structures

Part 7. Summary of Analysis

EWMP Economic Analysis (from Part 5)

Water Supplier B/C Ratio	**0.16**

EWMP Financial Analysis (from Part 6)

	Yes	**No**
Can adequate funding be expected to be made available?	◉	○

Decision about EWMP

	Yes	**No**
Is this EWMP accepted?	◉	○

EWMP 9. Automate Canal Structures

Part 7. Summary of Analysis

Discussion:

Please provide here and in the WMP a discussion of why the EWMP is accepted or rejected for implementation. Please include a discussion of estimated water savings, environmental effects, third-party effects, etc. for this EWMP.

EWMP would be accepted due to improved service to landowners, reduced labor and the value of water for outside purchase.

EWMP
1. Facilitate Alternate Land Use
2. Facilitate Use of Available Recycled Water
3. Facilitate Financial Assistance
4. Facilitate Voluntary Water Transfers
5. Line or Pipe Ditches/Canals
6. Increase Water Ordering/Delivering Flexibility
7. Construct/Operate Tailwater and Spill Recovery System
8. Optimize Conjunctive Use
9. Automate Canal Structures
10. Water Measurement/Water Use Update
11. Pricing and Incentives

P

APPENDIX P

EWMP #10: Water Measurement/Water Use Update

Memorandum of Understanding Regarding Efficient Water Management Practices by Agricultural Water Suppliers in California

Efficient Water Management Practice (EWMP)
10. Water Measurement/Water Use Update

The Excel Version
prepared by Division of Planning and Local Assistance
Department of Water Resources
October 21, 1998

EWMP 10. Water Measurement/Water Use Update

PREVIEW - REVIEW

Part 1 Information to Determine if Detailed Analysis is Required (not applicable)

Part 2 Detailed Analysis for EWMPs 1, 2, 3, and 4 (not applicable)

Part 3 General Information for Detailed Analysis

Question A	*(Does EWMP impact other EWMPs?)*	**Yes**
Question B	*(Description of calculation practices)*	**n/a**
Question C	*(Was EWMP considered along with others?)*	**Yes**

Part 4 Environmental, Third Party, and Indirect Economic Analysis

Environmental Effects

Question A	*(On source of supply)*	**Insignificant**
Question B	*(On groundwater levels)*	**Insignificant**
Question C	*(On shallow groundwater)*	**Insignificant**
Question D	*(On instream flows)*	**Insignificant**
Question E	*(On drain flows)*	**Insignificant**
Question F	*(On herbicide/pesticide use)*	**n/a**
Question G	*(On soil erosion)*	**Insignificant**
Question H	*(On field burning/fugitive dust)*	**n/a**
Question I	*(On energy use)*	**Insignificant**
Question J	*(On habitats)*	**n/a**

EWMP 10. Water Measurement/Water Use Update

Third-Party Effects

Question A *(On groundwater levels)*	**Insignificant**
Question B *(On instream flows)*	**Insignificant**
Question C *(On drain flows)*	**Insignificant**
Question D *(On herbicide/pesticide use)*	**n/a**
Question E *(On wind/water soil erosion)*	**Insignificant**

Indirect Economic Effects

Question A *(On local economies via farm operations)*	**Insignificant**
Question B *(On farmers' purchases of crop inputs)*	**Insignificant**
Question C *(On hiring of local farm workers)*	**Insignificant**
Question D *(On local processing of farm produce)*	**Insignificant**

Part 5 Economic Analysis

Question A *(Estimated annual conserved water)*	**750**	**af**
Question B *(Would EWMP result in capital costs?)*	**Yes**	
Question C *(Would EWMP reduce water purchases?)*	**Yes**	
Question D *(Would EWMP delay future projects?)*	**No**	
Question E *(Would EWMP increase water sales?)*	**No**	

Part 6 Financial Analysis

Adequate funding available? **No**

Part 7 Summary of Analysis

Benefit-Cost Ratio **0.01**

Accept EWMP? **No**

EWMP 10. Water Measurement/Water Use Update

Part 3. General Information for Detailed Analysis

A. Does this EWMP impact any of the other EWMPs on List B and/or List C?

◉ Yes ○ No

Discussion:

EWMP 11: There would be increased a cost associated with acquisition and installation of the meters for measurement. These additional cost would need to be passed along to the water users through increased billing.

B. Please describe the current and/or proposed water measurement/calculation practices. The description should include measurement/calculation of volume of water delivered within a reasonable range of accuracy. The description may be based on deliveries to individual water users or other reasonable measurement options

Discussion:

Alta has approximately 4000 farm turnouts. Most turnouts are submerged vertical orifices based on a differential head through a known opening using a calibration curve. It is the Alta's policy to install cumulative flow meters on all new pipeline projects, or to encourage landowners to install cumulative flow meters. In addition Alta utilizes undershot gates, overflow weirs, Parshall Flumes, and a computerized Headgate. The Headgate maintains a measured flow based on the actual flow through eleven (11) gate openings (KRCD, 1991).

C. Was this EWMP considered in coordination with any other EWMPs or other neighboring water suppliers?

◉ Yes ○ No

Discussion:

Automated canal structures (EWMP 9) and pricing and incentives (EWMP 11).

EWMP 10. Water Measurement/Water Use Update

Part 4. Environmental, Third-Party, & Indirect Economic Analysis

Environmental Effects

A. Source of Supply

Will implementation of the EWMP result in reduced water demand in the water supplier's service area?

○ Yes ◉ No ○ Unknown

What will be the potential impact?

○ Beneficial ○ Negative ◉ Insignificant ○ Indeterminate

B. Confined/Unconfined Ground Water Levels

Are there any habitats in the water service area that are supported/supplied by the existing groundwater levels?

○ Yes ◉ No ○ Unknown

What will be the potential impact?

○ Beneficial ○ Negative ◉ Insignificant ○ Indeterminate

Discussion:

Alta does not have any portion of the District underlain with shallow groundwater levels of less than five feet depth to groundwater (KRCD, 1997). There are no known habitats that are supported by groundwater within the District.

C. Shallow Groundwater

Is the water supplier located in an area where shallow groundwater and/or water quality problems (i.e. salinity, selenium) limit the use of land and/or drainage water?

○ Yes ◉ No ○ Unknown

Yes	No	Unknown

What will be the potential impact?

○ Beneficial	○ Negative	◉ Insignificant	○ Indeterminate

D. Instream Flows

Does the water supplier's distribution system contribute to flows in any other water courses?

◉ Yes	○ No	○ Unknown

Will implementation of the EWMP affect flows to any other water courses?

○ Yes	◉ No	○ Neither	○ Unknown

What will be the potential impact?

○ Beneficial	○ Negative	◉ Insignificant	○ Indeterminate

E. Drain Flows

Does the water supplier's service area have drains that supply or support habitat?

○ Yes	◉ No	○ Unknown

What will be the potential impact?

○ Beneficial	○ Negative	◉ Insignificant	○ Indeterminate

F. Fertilizer/Herbicide/Pesticide Use

(not applicable)

G. Soil Erosion

Will implementation of the EWMP reduce the current amount of soil erosion in the water supplier service area?

○ Yes	◉ No	○ Unknown

What will be the potential impact?

○ Beneficial	○ Negative	◉ Insignificant	○ Indeterminate

H. Field Burning and/or Fugitive Dust

(not applicable)

I. Energy Use

Would this EWMP increase or decrease energy use (e.g. pump use, canal structure controls, etc.)?

○ Decrease	○ Increase	◉ Neither	○ Unknown

What will be the potential impact?

○ Beneficial	○ Negative	◉ Insignificant	○ Indeterminate

J. Habitat Effect
(not applicable)

EWMP 10. Water Measurement/Water Use Update

Part 4. Environmental, Third-Party, & Indirect Economic Analysis (continued)

Third-Party Effects

A. Confined/Unconfined Ground Water Levels

Will implementation of the EWMP affect groundwater elevations?

○ Yes ◉ No ○ Unknown

What will be the potential impact?

○ Beneficial ○ Negative ◉ Insignificant ○ Indeterminate

Discussion:

Crop ET won't change and surface water supply is considerably less than ET

B. Instream Flows

Do the water supplier's distribution flows contribute to any natural streams?

◉ Yes ○ No ○ Unknown

Will implementation of the EWMP decrease or increase instream flows to any streams that supply or support any third-party?

○ Increase ○ Decrease ◉ Neither ○ Unknown

What will be the potential impact?

○ Beneficial ○ Negative ◉ Insignificant ○ Indeterminate

C. Drain Flows

Do drain flows supply or support any third-party user?

○ Yes ◉ No

What will be the potential impact?

○ Beneficial ○ Negative ◉ Insignificant ○ Indeterminate

◡ Beneficial	◡ Negative	◡ Insignificant	◡ Indeterminate

D. Herbicide/Pesticide Use
(not applicable)

E. Wind/Water Soil Erosion
Will implementation of the EWMP reduce the current amount of soil erosion in the water supplier service area?

○ Yes	◉ No	○ Unknown

What will be the potential impact?

○ Beneficial	○ Negative	◉ Insignificant	○ Indeterminate

EWMP 10. Water Measurement/Water Use Update

Part 4. Environmental, Third-Party, & Indirect Economic Analysis (continued)

Indirect Economic Effects

A. Effects on local economies

Will the EWMP affect local economies through changes in on-farm operations (indirect economic effects)?

○ Yes	◉ No	○ Unknown

What will be the potential impact?

○ Beneficial	○ Negative	◉ Insignificant	○ Indeterminate

B. Effects on farmers' purchases of crop inputs

Will practices associated with implementation of the EWMP increase or decrease farmers' purchases of crop inputs such as seed, fertilizer, irrigation equipment, etc.?

○ Increase	○ Decrease	◉ Neither	○ Unknown

What will be the potential impact?

○ Beneficial	○ Negative	◉ Insignificant	○ Indeterminate

C. Effects on local employment

Will practices associated with implementation of the EWMP increase or decrease the hiring of local (county) farm workers?

○ Increase	○ Decrease	◉ Neither	○ Unknown

What will be the potential impact?

○ Beneficial	○ Negative	◉ Insignificant	○ Indeterminate

D. Effects on local processing of farm produce

Will practices associated with implementation of the EWMP increase or decrease the local (county) processing of farm produce (examples-canning of nuts, fruits, and vegetables; milk production supported by cows/pasture; etc.?

○ Increase	○ Decrease	◉ Neither	○ Unknown

What will be the potential impact?

○ Beneficial	○ Negative	◉ Insignificant	○ Indeterminate

Part 4. Tables of Effects Summary

Table 2. Potential Environmental Effects Summary

Section	Evaluated Component	Beneficial	Negative	Insignificant	Indeterminate
A	Source of supply			X	
B	Confined/Unconfined Groundwater Levels			X	
C	Shallow Groundwater Elevations			X	
D	Instream Flows			X	
E	Drain Flows			X	
F	Fertilizer / Herbicide / Pesticide Use				
G	Soil Erosion			X	
H	Field Burning and Fugitive Dust				
I	Energy Use			X	
J1	Vernal Pools and Swales				
J2	Riparian Habitat				
J3	Open Water Bodies				
J4	Marshes (permanent or seasonal)				

Part 4. Tables of Effects Summary

Table 3. Potential Third-Party Effects Summary

Section	Evaluated Component	Beneficial	Negative	Insignificant	Indeterminate
A	Confined/Unconfined Groundwater Levels			X	
B	Instream Flows			X	
C	Drain Flows			X	
D	Fertilizer / Herbicide / Pesticide Use				
E	Win/Water Soil Erosion			X	

Table 4. Indirect Economic Effects Summary

Section	Evaluated Component	Beneficial	Negative	Insignificant	Indeterminate
B	Farm Inputs			X	
C	Local farm Labor			X	
D	Processing of Farm Products			X	

EWMP 10. Water Measurement/Water Use Update

Part 5. Economic Analysis

A. How much water (in acre-feet) is estimated to be conserved annually as a result of the EWMP?

750

In the box below please discuss your assumptions and methodology for deriving this estimate.

50% reduction of the average spill volume for past 10 years. (Appendix B, Table 9)

B. Does the EWMP result in water supplier capital costs and/or annual operation and maintenance costs?

◉ Yes ○ No ○ Unknown

C. Would the EWMP reduce current water supplier water purchases, water diversions, and/or groundwater pumping?

◉ Yes ○ No ○ Unknown

D. Would the EWMP delay or eliminate the need to complete future water supply augmentation and/or distribution projects?

○ Yes ◉ No ○ Unknown

E. Would the EWMP result in additional sales of water supplies to existing customers, new customers, and/or other agencies?

○ Yes	◉ No	○ Unknown

Which alternative is to be selected as benefit measure? Please explain in the box below.

Use least cost alternative due to insufficient surface water supplies.

EWMP 10. Water Measurement/Water Use Update

Part 5. Economic Analysis (Worksheets)

Worksheet 1. EWMP Water Supplier Effects

Estimated amount of water conserved annually: 750 acre-feet

Part 5. Economic Analysis (Worksheets)

Worksheet 2. EWMP Water Supplier Costs

Worksheet 2a. EWMP Water Supplier Capital Costs

Complete the following worksheet for EWMP capital costs.

Capital Cost Category	Item	Cost	Contingency Cost		Subtotal
			Percent	Dollars	
(a)	(b)	(c)	(d)	(e)	(f)
				(c x d)	(c + e)
Planning	Engineering $200 per turno	800,000	15%	120,000	920,000
Land			15%		
			15%		
Structure	turnout modifications at $5	2,000,000	15%	300,000	2,300,000
			15%		
Equipment	4000 meters	8,000,000	15%	1,200,000	9,200,000
			15%		
Mitigation			15%		
Other	Misc. supply and support	300,000	15%	45,000	345,000
Subtotal Capital Costs					12,765,000
Deduct Expected Salvage Value after		25	years		0
Total Capital Costs					12,765,000
Capital Recovery Factor @		6%	25	years	0.0782
Annual Capital Costs (Total Capital Costs x Capital Recovery Factor)					998,564

EWMP 10. Water Measurement/Water Use Update

Part 5. Economic Analysis (Worksheets)

Worksheet 2b. EWMP Water Supplier Annual O&M Costs

Complete the following worksheet for EWMP annual O&M costs:

Annual Operating Costs	Annual Maintenance Costs	Other Annual Costs [1]	Total Annual O & M Costs
(a)	(b)	(c)	(d)
			(a + b + c)
45,696	**62,073**	**0**	**107,769**

[1] Other annual costs not included in O&M, such as annual environmental mitigation costs.

EWMP 10. Water Measurement/Water Use Update

Part 5. Economic Analysis (Worksheets)

Worksheet 2c. EWMP Water Supplier Costs/af Summary

Annual Capital Costs	Annual O&M Costs	Total Annual Costs	Annual Conserved Water (af)	Cost/af
(a)	(b)	(c)	(d)	(e)
		(a + b)		(c / d)
998,564	107,769	1,106,333	750	1,475

EWMP 10. Water Measurement/Water Use Update

Part 5. Economic Analysis (Worksheets)

Worksheet 3. EWMP Water Supplier Benefits

Worksheet 3a. EWMP Water Supplier Avoided Costs--Current Sources

Complete the following worksheet for current sources of supply that would be avoided with the implementation of the EWMP.

Sources of Supply Avoided	**Amount of Water (af)**	**Annual O&M Costs ($/af)**	**Sources to Used as Benefit Measure**
(a)	(b)	(c)	(d)
Reduced spill	**750**	**12**	

Worksheet 3b. EWMP Water Supplier Avoided Costs--Future Sources

Complete the following worksheet for future sources eliminated or delayed because of implementation of the EWMP.

Alternative	Total Capital Costs	Capital Recovery Factor[1]	Annual Capital Costs	Annual O&M Costs	Total Annual Costs	Annual Yield	Cost/af
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
			(b x c)		(d + e)		(f / g)
		0.0782					

[1] For a period of 25 years and 6% discount rate.

Part 5. Economic Analysis (Worksheets)

Worksheet 3c. Water Supplier Revenue Effects

Complete the following worksheet:

Parties Purchasing Conserved Water	Amount of Water (af)	Selling Price ($/af)	Expected Frequency of Sales (%) [1]	Expected Selling Price ($/af)	Option Fee ($/af)	Total Selling Price ($/af)
(a)	(b)	(c)	(d)	(e)	(f)	(g)
				(c x d)		(e + f)
	750		**100%**		**0**	

[1] During a 25-year analysis period, how many years are water sales expected to occur? For example, water sales to farmers might be expected to occur 90% of the years, whereas the frequency to other agencies might be 50% of the years,

[2] Option fees are paid by a contracting agency to a selling agency to maintain the right of the contracting agency to buy water whenever needed.. Although the water may not be purchased every year, the fee is usually paid every year.

EWMP 10. Water Measurement/Water Use Update

Part 5. Economic Analysis (Worksheets)

Worksheet 4. EWMP Water Supplier Benefits/Costs Ratio

Benefits and Costs	
EWMP Benefits ($/af)	**12**
EWMP Costs ($/af)	**1,475**
Benefit/Cost Ratio	**0.01**

EWMP 10. Water Measurement/Water Use Update

Part 6. EWMP Financial Analysis

A water supplier may claim an exemption if:

"Adequate funds (including funds from other beneficiaries of the plan) are not available, and cannot reasonably be expected to be made available, for implementation of the EWMP during the term of the plan." (MOU, Section 4.02)

If the water supplier is claiming an exemption based upon the lack of available funding, please discuss the reasons for this finding. Please include a copy of your latest financial statement and a list of other potential plan beneficiaries who have been contacted.

Inadequate B/C ratio to support expenditures necessary for EWMP

EWMP 10. Water Measurement/Water Use Update

Part 7. Summary of Analysis

EWMP 10. Water Measurement/Water Use Update

Part 7. Summary of Analysis

Potential Environmental Effects Summary Table (from Part 4)

Section	Evaluated Component	Beneficial	Negative	Insignificant	Indeterminate
A	Source of supply			X	
B	Confined/Unconfined Groundwater Levels			X	
C	Shallow Groundwater Elevations			X	
D	Instream Flows			X	
E	Drain Flows			X	
F	Fertilizer / Herbicide / Pesticide Use				
G	Soil Erosion			X	
H	Field Burning and Fugitive Dust				
I	Energy Use			X	
J1	Vernal Pools and Swales				
J2	Riparian Habitat				
J3	Open Water Bodies				
J4	Marshes (permanent or seasonal)				

EWMP 10. Water Measurement/Water Use Update

Part 7. Summary of Analysis

Potential Third-Party Effects Summary Table (from Part 4)

Section	Evaluated Component	Beneficial	Negative	Insignificant	Indeterminate
A	Confined/Unconfined Groundwater Levels			X	
B	Instream Flows			X	
C	Drain Flows			X	
D	Fertilizer / Herbicide / Pesticide Use				
E	Wind/Water Soil Erosion			X	

Indirect Economic Effects Summary Table (from Part 4)

Section	Evaluated Component	Beneficial	Negative	Insignificant	Indeterminate
B	Farm Inputs			X	
C	Local farm Labor			X	
D	Processing of Farm Products			X	

EWMP 10. Water Measurement/Water Use Update

Part 7. Summary of Analysis

EWMP Economic Analysis (from Part 5)

Water Supplier B/C Ratio	**0.01**

EWMP Financial Analysis (from Part 6)

	Yes	**No**
Can adequate funding be expected to be made available?	○	◉

Decision about EWMP

	Yes	**No**
Is this EWMP accepted?	○	◉

EWMP 10. Water Measurement/Water Use Update

Part 7. Summary of Analysis

Discussion:

Please provide here and in the WMP a discussion of why the EWMP is accepted or rejected for implementation. Please include a discussion of estimated water savings, environmental effects, third-party effects, etc. for this EWMP.

Due to the inadequate B/C ratio and conserved water, this EWMP is inappropriate for implementation. There would be no significant environmental effects or third-party effects.

EWMP
1. Facilitate Alternate Land Use
2. Facilitate Use of Available Recycled Water
3. Facilitate Financial Assistance
4. Facilitate Voluntary Water Transfers
5. Line or Pipe Ditches/Canals
6. Increase Water Ordering/Delivering Flexibility
7. Construct/Operate Tailwater and Spill Recovery System
8. Optimize Conjunctive Use
9. Automate Canal Structures
10. Water Measurement/Water Use Update
11. Pricing and Incentives

Q

APPENDIX Q

EWMP #11: Pricing and Incentives

Memorandum of Understanding Regarding Efficient Water Management Practices by Agricultural Water Suppliers in California

Efficient Water Management Practice (EWMP)
11. Pricing and Incentives

The Excel Version
prepared by Division of Planning and Local Assistance
Department of Water Resources
October 21, 1998

EWMP 11. Pricing and Incentives

PREVIEW - REVIEW

Part 1 Information to Determine if Detailed Analysis is Required (not applicable)

Part 2 Detailed Analysis for EWMPs 1, 2, 3, and 4 (not applicable)

Part 3 General Information for Detailed Analysis

Question	**A**	*(Description of objective)*	**n/a**
Question	**Ba1**	*(Was tiered water pricing considered?)*	**No**
Question	**Ba2**	*(Was wet vs. dry year pricing considered?)*	**No**
Question	**Ba3**	*(Was uniform block pricing considered?)*	**No**
Question	**Ba4**	*(Was other pricing considered?)*	**Yes**
Question	**Bb1**	*(Was buy-back program considered?)*	**No**
Question	**Bb2**	*(Was low interest loans considered?)*	**No**
Question	**Bb3**	*(Was cost sharing considered?)*	**No**
Question	**C**	*(Does EWMP impact other EWMPs?)*	**Yes**
Question	**D**	*(Was EWMP considered along with others?)*	**No**

Part 4 Environmental, Third Party, and Indirect Economic Analysis

Environmental Effects

Question	**A**	*(On source of supply)*	**Negative**
Question	**B**	*(On groundwater levels)*	**Insignificant**
Question	**C**	*(On shallow groundwater)*	**Insignificant**
Question	**D**	*(On instream flows)*	**Insignificant**
Question	**E**	*(On drain flows)*	**Insignificant**
Question	**F**	*(On herbicide/pesticide use)*	**n/a**
Question	**G**	*(On soil erosion)*	**Insignificant**
Question	**H**	*(On field burning/fugitive dust)*	**n/a**
Question	**I**	*(On energy use)*	**Negative**
Question	**J**	*(On habitats)*	**n/a**

EWMP 11. Pricing and Incentives

Third-Party Effects

Question A	*(On groundwater levels)*	**Negative**
Question B	*(On instream flows)*	**Insignificant**
Question C	*(On drain flows)*	**Negative**
Question D	*(On herbicide/pesticide use)*	**n/a**
Question E	*(On wind/water soil erosion)*	**Insignificant**

Indirect Economic Effects

Question A	*(On local economies via farm operations)*	**Negative**
Question B	*(On farmers' purchases of crop inputs)*	**Negative**
Question C	*(On hiring of local farm workers)*	**Negative**
Question D	*(On local processing of farm produce)*	**Insignificant**

Part 5 Economic Analysis

Question A	*(Estimated annual conserved water)*	**-877**	**af**
Question B	*(Would EWMP result in capital costs?)*	**No**	
Question C	*(Would EWMP reduce water purchases?)*	**Yes**	
Question D	*(Would EWMP delay future projects?)*	**No**	
Question E	*(Would EWMP increase water sales?)*	**No**	

Part 6 Financial Analysis

Adequate funding available? **No**

Part 7 Summary of Analysis

Benefit-Cost Ratio **-0.35**

Accept EWMP? **No**

EWMP 11. Pricing and Incentives

Part 3. General Information for Detailed Analysis

For a pricing structure to be considered an EWMP, it must encourage the more efficient use of water.

A. Specific Objectives
A clearly defined, specific objective must be established before a pricing incentive procedure is implemented. Please describe the objective.

To maximize the amount of surface water brought into the District, thereby minimizing the amount of groundwater pumped.

B. Practices
Please identify those pricing and other incentives practices the supplier is considering and those that are currently in place as identified in the EWMP. Has the water supplier considered the following practices?

(a) Pricing

(1) Tiered water pricing (increasing block rates)

○ Yes ◉ No

Discussion:

Insufficient water supply and tiered water pricing would exacerbate groundwater pumping

This practice can set higher prices to penalize users who apply greater amounts of water than is required for crop ET, leaching requirements, and other beneficial uses. Caution must be used to prevent the substitution of groundwater for surface water unless that is the stated objective.

(2) Wet vs. dry year pricing structure

○ Yes ◉ No

Discussion:

Part 3. General Information for Detailed Analysis

O & M cost are similar in wet and dry years. As part of the conjunctive use program there is a need to discourage use of groundwater in wet years. The fixed price per acre encourages Alta's conjunctive use program, I.e., water cost is paid by all landowners thus lowering the cost per acre foot and encouraging use of surface water in relation to groundwater.

(3) Uniform block pricing

○ Yes ◉ No

Discussion:

Same as above

(4) Other

◉ Yes ○ No

Discussion:

Per acre charge as an incident of property ownership with a utility surcharge based upon volumetric measurements of delivered water. The volumetric surcharge provides funding in circumstances where landowners receive water amounts exceeding their prorata entitlement.

(b) Other incentives

(1) Supplier buy-back program

○ Yes ◉ No

Discussion:

Insufficient supply to support current ET levels. Water users must pump groundwater to meet ET even in the wettest years.

If a supplier buys water back from growers, the growers should not substitute groundwater for surface water unless that is an intended purpose.

(2) Low interest loans

○ Yes ◉ No

Discussion:

Same as above

Part 3. General Information for Detailed Analysis

(3) Cost sharing for on-farm improvements

○ Yes ◉ No

Discussion:

Water costs insignificant in terms of permanent crop production

C. Does this EWMP impact any of the other EWMPs?

◉ Yes ○ No

Discussion:

EWMP 10, EWMP 6, & EWMP 8

D. Was this EWMP considered in coordination with any other EWMPs or other neighboring water suppliers?

○ Yes ◉ No

EWMP 11. Pricing and Incentives

Part 4. Environmental, Third-Party, & Indirect Economic Analysis

Environmental Effects

A. Source of Supply

Will implementation of the EWMP result in reduced water demand in the water supplier's service area?

◉ Yes	○ No	○ Unknown

What will be the potential impact?

○ Beneficial	◉ Negative	○ Insignificant	○ Indeterminate

Discussion:

The water lost as a result of implementing this EWMP would be reallocated to other water suppliers.

B. Confined/Unconfined Ground Water Levels

Are there any habitats in the water service area that are supported/supplied by the existing groundwater levels?

○ Yes	◉ No	○ Unknown

What will be the potential impact?

○ Beneficial	○ Negative	◉ Insignificant	○ Indeterminate

Discussion:

Alta does not have any portion of the District underlain with shallow groundwater levels of less than five feet depth to groundwater (KRCD, 1997). There are no known habitats that are supported by groundwater within the District.

C. Shallow Groundwater

Is the water supplier located in an area where shallow groundwater and/or water quality problems (i.e. salinity, selenium) limit the use of land and/or drainage water?

○ Yes	◉ No	○ Unknown

What will be the potential impact?

○ Beneficial	○ Negative	◉ Insignificant	○ Indeterminate

D. Instream Flows

Does the water supplier's distribution system contribute to flows in any other water courses?

◉ Yes	○ No	○ Unknown

Will implementation of the EWMP affect flows to any other water courses?

○ Yes	◉ No	○ Neither	○ Unknown

What will be the potential impact?

○ Beneficial	○ Negative	◉ Insignificant	○ Indeterminate

E. Drain Flows

Does the water supplier's service area have drains that supply or support habitat?

○ Yes	◉ No	○ Unknown

What will be the potential impact?

○ Beneficial	○ Negative	◉ Insignificant	○ Indeterminate

F. Fertilizer/Herbicide/Pesticide Use

(not applicable)

G. Soil Erosion

Will implementation of the EWMP reduce the current amount of soil erosion in the water supplier service area?

○ Yes	◉ No	○ Unknown

What will be the potential impact?

○ Beneficial	○ Negative	◉ Insignificant	○ Indeterminate

H. Field Burning and/or Fugitive Dust

(not applicable)

I. Energy Use

Would this EWMP increase or decrease energy use (e.g. pump use, canal structure controls, etc.)?

○ Decrease	◉ Increase	○ Neither	○ Unknown

What will be the potential impact?

○ Beneficial	◉ Negative	○ Insignificant	○ Indeterminate

J. Habitat Effect
(not applicable)

EWMP 11. Pricing and Incentives

Part 4. Environmental, Third-Party, & Indirect Economic Analysis (continued)

Third-Party Effects

A. Confined/Unconfined Ground Water Levels

Will implementation of the EWMP affect groundwater elevations?

◉ Yes   ○ No   ○ Unknown

What will be the potential impact?

○ Beneficial   ◉ Negative   ○ Insignificant   ○ Indeterminate

Discussion:

Groundwater levels would decrease with increased pumping, additional costs to third party users.

B. Instream Flows

Do the water supplier's distribution flows contribute to any natural streams?

◉ Yes   ○ No   ○ Unknown

Will implementation of the EWMP decrease or increase instream flows to any streams that supply or support any third-party?

○ Increase   ○ Decrease   ◉ Neither   ○ Unknown

What will be the potential impact?

○ Beneficial   ○ Negative   ◉ Insignificant   ○ Indeterminate

C. Drain Flows

Do drain flows supply or support any third-party user?

◉ Yes   ○ No

Do you anticipate that drain water conditions will be affected as a result of implementation of the EWMP?

(●) Yes	○ No	○ Unknown

What will be the potential impact?

○ Beneficial	(●) Negative	○ Insignificant	○ Indeterminate

Discussion:

Implementation Would not affect water quality but would reduce quantity.

D. Herbicide/Pesticide Use

(not applicable)

E. Wind/Water Soil Erosion

Will implementation of the EWMP reduce the current amount of soil erosion in the water supplier service area?

○ Yes	(●) No	○ Unknown

What will be the potential impact?

○ Beneficial	○ Negative	(●) Insignificant	○ Indeterminate

EWMP 11. Pricing and Incentives

Part 4. Environmental, Third-Party, & Indirect Economic Analysis (continued)

Indirect Economic Effects

A. Effects on local economies

Will the EWMP affect local economies through changes in on-farm operations (indirect economic effects)?

◉ Yes	○ No	○ Unknown

What will be the potential impact?

○ Beneficial	◉ Negative	○ Insignificant	○ Indeterminate

Discussion:

Increased groundwater pumping increases water users average water costs.

B. Effects on farmers' purchases of crop inputs

Will practices associated with implementation of the EWMP increase or decrease farmers' purchases of crop inputs such as seed, fertilizer, irrigation equipment, etc.?

◉ Increase	○ Decrease	○ Neither	○ Unknown

What will be the potential impact?

○ Beneficial	◉ Negative	○ Insignificant	○ Indeterminate

C. Effects on local employment

Will practices associated with implementation of the EWMP increase or decrease the hiring of local (county) farm workers?

○ Increase	◉ Decrease	○ Neither	○ Unknown

What will be the potential impact?

○ Beneficial	◉ Negative	○ Insignificant	○ Indeterminate

D. Effects on local processing of farm produce

Will practices associated with implementation of the EWMP increase or decrease the local (county) processing of farm produce (examples-canning of nuts, fruits, and vegetables; milk production supported by cows/pasture; etc.?

○ Increase	○ Decrease	◉ Neither	○ Unknown

What will be the potential impact?

○ Beneficial	○ Negative	◉ Insignificant	○ Indeterminate

EWMP 11. Pricing and Incentives

Part 4. Tables of Effects Summary

Table 2. Potential Environmental Effects Summary

Section	Evaluated Component	Beneficial	Negative	Insignificant	Indeterminate
A	Source of supply		X		
B	Confined/Unconfined Groundwater Levels			X	
C	Shallow Groundwater Elevations			X	
D	Instream Flows			X	
E	Drain Flows			X	
F	Fertilizer / Herbicide / Pesticide Use				
G	Soil Erosion			X	
H	Field Burning and Fugitive Dust				
I	Energy Use		X		
J1	Vernal Pools and Swales				
J2	Riparian Habitat				
J3	Open Water Bodies				
J4	Marshes (permanent or seasonal)				

EWMP 11. Pricing and Incentives

Part 4. Tables of Effects Summary

Table 3. Potential Third-Party Effects Summary

Section	Evaluated Component	Beneficial	Negative	Insignificant	Indeterminate
A	Confined/Unconfined Groundwater Levels		X		
B	Instream Flows			X	
C	Drain Flows		X		
D	Fertilizer / Herbicide / Pesticide Use				
E	Win/Water Soil Erosion			X	

Table 4. Indirect Economic Effects Summary

Section	Evaluated Component	Beneficial	Negative	Insignificant	Indeterminate
B	Farm Inputs		X		
C	Local farm Labor		X		
D	Processing of Farm Products			X	

EWMP 11. Pricing and Incentives

Part 5. Economic Analysis

A. How much water (in acre-feet) is estimated to be conserved annually as a result of the EWMP?

-877

In the box below please discuss your assumptions and methodology for deriving this estimate.

Gross volume of surface water will need to be brought into the District irrespective of pricing due to the area being in overdraft; however, the District would loose water due to lower water user demand and inadequate storage in the reservoir.

The assumption of a loss of surface water to Alta is based on the volume of water lost since 1968. That volume is expressed in the attached table. How this water is lost is, once the Districts' share of Pine Flat Reservoir is full any water exceeding their allocated storage space is placed at "Top of Schedule" and is reallocated to the other water rights holders on the Kings River.

B. Does the EWMP result in water supplier capital costs and/or annual operation and maintenance costs?

○ Yes ◉ No ○ Unknown

Discussion:

No change in distribution (O & M) costs with increased pricing.

C. Would the EWMP reduce current water supplier water purchases, water diversions, and/or groundwater pumping?

◉ Yes ○ No ○ Unknown

D. Would the EWMP delay or eliminate the need to complete future water supply augmentation and/or distribution projects?

○ Yes ◉ No ○ Unknown

E. Would the EWMP result in additional sales of water supplies to existing customers, new customers, and/or other agencies?

○ Yes ◉ No ○ Unknown

Which alternative is to be selected as benefit measure? Please explain in the box below.

Least cost alternative due to insufficient surface supplies

Top of Schedule Water for Alta ID

Year		Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	August	Sept
1967 1968	Vacant Space (AF)												
	Top of Schedule (AF												
1968 1969	Vacant Space (AF)				53047								
	Top of Schedule (AF				3253								
1969 1970	Vacant Space (AF)												
	Top of Schedule (AF												
1970 1971	Vacant Space (AF)												
	Top of Schedule (AF												
1971 1972	Vacant Space (AF)												
	Top of Schedule (AF												
1972 1973	Vacant Space (AF)							84429	50243	14633			
	Top of Schedule (AF							1012	1485	12920			
1973 1974	Vacant Space (AF)				72895								
	Top of Schedule (AF				6								
1974 1975	Vacant Space (AF)									43386			
	Top of Schedule (AF									4800			
1975 1976	Vacant Space (AF)												
	Top of Schedule (AF												
1976 1977	Vacant Space (AF)												
	Top of Schedule (AF												
1977 1978	Vacant Space (AF)					96516	72032				7820	8348	38814
	Top of Schedule (AF					18	42				155	613	4540
1978 1979	Vacant Space (AF)									9540			
	Top of Schedule (AF									99			
1979 1980	Vacant Space (AF)				51981					10750	3575	5829	
	Top of Schedule (AF				5219					49	54	79	
1980 1981	Vacant Space (AF)									-3			
	Top of Schedule (AF									-545			
1981 1982	Vacant Space (AF)							10730		2846			
	Top of Schedule (AF							12		149			
1982 1983	Vacant Space (AF)		21941									1991	
	Top of Schedule (AF		83									301	
1983 1984	Vacant Space (AF)								4420	-3			
	Top of Schedule (AF								272	-450			
1984 1985	Vacant Space (AF)								-3	-3			
	Top of Schedule (AF								-14402	-305			
1985 1986	Vacant Space (AF)					38273				-3	-3		
	Top of Schedule (AF					4893				-6494	-6566		
1986 1987	Vacant Space (AF)												
	Top of Schedule (AF												
1987 1988	Vacant Space (AF)												
	Top of Schedule (AF												
1988 1989	Vacant Space (AF)												
	Top of Schedule (AF												
1989 1990	Vacant Space (AF)												
	Top of Schedule (AF												
1990 1991	Vacant Space (AF)												
	Top of Schedule (AF												
1991 1992	Vacant Space (AF)												
	Top of Schedule (AF												
1992 1993	Vacant Space (AF)									-3	-3		
	Top of Schedule (AF									-1686	-1014		
1993 1994	Vacant Space (AF)												
	Top of Schedule (AF												
1994 1995	Vacant Space (AF)						37592				6489	6878	
	Top of Schedule (AF						693				16	236	
1995 1996	Vacant Space (AF)					60859	43329		4085				
	Top of Schedule (AF					24	61		8				
1996 1997	Vacant Space (AF)			51130	10613				6848				
	Top of Schedule (AF			93	16992				12				

Shaded areas represents month with flood releases orderd by the US Army Corps of Engineers.

Data from KRWA 1/12/99

Total net	26,727
Total lost	(26,297)
Total gained	53,024
Annual lost	(877)

EWMP 11. Pricing and Incentives

Part 5. Economic Analysis (Worksheets)

Worksheet 1. EWMP Water Supplier Effects

Estimated amount of water conserved annually: -877 acre foot

Worksheet 2. EWMP Water Supplier Costs

Worksheet 2a. EWMP Water Supplier Capital Costs

Complete the following worksheet for EWMP capital costs.

Capital Cost Category	Item	Cost	Contingency Cost		Subtotal
			Percent	Dollars	
(a)	(b)	(c)	(d)	(e)	(f)
				(c x d)	(c + e)
Planning		10,000	15%	1,500	11,500
Land			15%		
			15%		
Structure			15%		
			15%		
Equipment			15%		
			15%		
Mitigation			15%		
Other			15%		
Subtotal Capital Costs					11,500
Deduct Expected Salvage Value after		25	years		0
Total Capital Costs					11,500
Capital Recovery Factor @		6%	25	years	0.0782
Annual Capital Costs (Total Capital Costs x Capital Recovery Factor)					900

EWMP 11. Pricing and Incentives

Part 5. Economic Analysis (Worksheets)

Worksheet 2b. EWMP Water Supplier Annual O&M Costs

Complete the following worksheet for EWMP annual O&M costs:

Annual Operating Costs	Annual Maintenance Costs	Other Annual Costs [1]	Total Annual O & M Costs
(a)	(b)	(c)	(d)
			(a + b + c)
3,000	**24,000**	**0**	**27,000**

[1] Other annual costs not included in O&M, such as annual environmental mitigation costs.

EWMP 11. Pricing and Incentives

Part 5. Economic Analysis (Worksheets)

Worksheet 2c. EWMP Water Supplier Costs/af Summary

Annual Capital Costs	Annual O&M Costs	Total Annual Costs	Annual Conserved Water (af)	Cost/af
(a)	(b)	(c)	(d)	(e)
		(a + b)		(c / d)
900	**27,000**	**27,900**	**(877)**	**(32)**

Part 5. Economic Analysis (Worksheets)

Worksheet 3. EWMP Water Supplier Benefits

Worksheet 3a. EWMP Water Supplier Avoided Costs--Current Sources

Complete the following worksheet for current sources of supply that would be avoided with the implementation of the EWMP.

Sources of Supply Avoided	Amount of Water (af)	Annual O&M Costs ($/af)	Sources to Used as Benefit Measure
(a)	(b)	(c)	(d)
grower groundwater	(877)	11	

EWMP 11. Pricing and Incentives

Part 5. Economic Analysis (Worksheets)

Worksheet 3b. EWMP Water Supplier Avoided Costs--Future Sources

Complete the following worksheet for future sources eliminated or delayed because of implementation of the EWMP.

Alternative	Total Capital Costs	Capital Recovery Factor[1]	Annual Capital Costs	Annual O&M Costs	Total Annual Costs	Annual Yield	Cost/af
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
			(b x c)		(d + e)		(f / g)
		0.0782					

[1] For a period of 25 years and 6% discount rate.

EWMP 11. Pricing and Incentives

Part 5. Economic Analysis (Worksheets)

Worksheet 3c. Water Supplier Revenue Effects

Complete the following worksheet:

Parties Purchasing Conserved Water	Amount of Water (af)	Selling Price ($/af)	Expected Frequency of Sales (%) [1]	Expected Selling Price ($/af)	Option Fee ($/af)	Total Selling Price ($/af)
(a)	(b)	(c)	(d)	(e)	(f)	(g)
				(c x d)		(e + f)
	(877)		100%		0	

[1] During a 25-year analysis period, how many years are water sales expected to occur? For example, water sales to farmers might be expected to occur 90% of the years, whereas the frequency to other agencies might be 50% of the years,

[2] Option fees are paid by a contracting agency to a selling agency to maintain the right of the contracting agency to buy water whenever needed.. Although the water may not be purchased every year, the fee is usually paid every year.

EWMP 11. Pricing and Incentives

Part 5. Economic Analysis (Worksheets)

Worksheet 4. EWMP Water Supplier Benefits/Costs Ratio

Benefits and Costs	
EWMP Benefits ($/af)	**11**
EWMP Costs ($/af)	**(32)**
Benefit/Cost Ratio	**(0.35)**

EWMP 11. Pricing and Incentives

Part 6. EWMP Financial Analysis

A water supplier may claim an exemption if:

"Adequate funds (including funds from other beneficiaries of the plan) are not available, and cannot reasonably be expected to be made available, for implementation of the EWMP during the term of the plan." (MOU, Section 4.02)

If the water supplier is claiming an exemption based upon the lack of available funding, please discuss the reasons for this finding. Please include a copy of your latest financial statement and a list of other potential plan beneficiaries who have been contacted.

Inadequate B/C ratio to support required funding of EWMP

EWMP 11. Pricing and Incentives

Part 7. Summary of Analysis

EWMP 11. Pricing and Incentives

Part 7. Summary of Analysis

Potential Environmental Effects Summary Table (from Part 4)

Section	Evaluated Component	Beneficial	Negative	Insignificant	Indeterminate
A	Source of supply		X		
B	Confined/Unconfined Groundwater Levels			X	
C	Shallow Groundwater Elevations			X	
D	Instream Flows			X	
E	Drain Flows			X	
F	Fertilizer / Herbicide / Pesticide Use				
G	Soil Erosion			X	
H	Field Burning and Fugitive Dust				
I	Energy Use		X		
J1	Vernal Pools and Swales				
J2	Riparian Habitat				
J3	Open Water Bodies				
J4	Marshes (permanent or seasonal)				

EWMP 11. Pricing and Incentives

Part 7. Summary of Analysis

Potential Third-Party Effects Summary Table (from Part 4)

Section	Evaluated Component	Beneficial	Negative	Insignificant	Indeterminate
A	Confined/Unconfined Groundwater Levels		X		
B	Instream Flows			X	
C	Drain Flows		X		
D	Fertilizer / Herbicide / Pesticide Use				
E	Wind/Water Soil Erosion			X	

Indirect Economic Effects Summary Table (from Part 4)

Section	Evaluated Component	Beneficial	Negative	Insignificant	Indeterminate
B	Farm Inputs		X		
C	Local farm Labor		X		
D	Processing of Farm Products			X	

EWMP 11. Pricing and Incentives

Part 7. Summary of Analysis

EWMP Economic Analysis (from Part 5)

Water Supplier B/C Ratio	**(0.35)**

EWMP Financial Analysis (from Part 6)

	Yes	**No**
Can adequate funding be expected to be made available?	○	◉

Decision about EWMP

	Yes	**No**
Is this EWMP accepted?	○	◉

EWMP 11. Pricing and Incentives

Part 7. Summary of Analysis

Discussion:

Please provide here and in the WMP a discussion of why the EWMP is accepted or rejected for implementation. Please include a discussion of estimated water savings, environmental effects, third-party effects, etc. for this EWMP.

Negative B/C ratio from an already overdrafted District potentially receiving less water by increasing prices thereby lessoning demand.

EWMP
1. Facilitate Alternate Land Use
2. Facilitate Use of Available Recycled Water
3. Facilitate Financial Assistance
4. Facilitate Voluntary Water Transfers
5. Line or Pipe Ditches/Canals
6. Increase Water Ordering/Delivering Flexibility
7. Construct/Operate Tailwater and Spill Recovery System
8. Optimize Conjunctive Use
9. Automate Canal Structures
10. Water Measurement/Water Use Update
11. Pricing and Incentives

R

APPENDIX R

Resolution Adopting Water Management Plan

RESOLUTION OF THE BOARD OF DIRECTORS OF ALTA IRRIGATION DISTRICT TO APPROVE A WATER CONSERVATION PLAN DEVELOPED UNDER THE AB 3616 MEMORANDUM OF UNDERSTANDING

WHEREAS, Alta Irrigation District did notice at a regularly scheduled public board meeting its intent to review and take action on Alta's Water Conservation Plan;

WHEREAS, Alta Irrigation District's historical water deliveries are based upon a conjunctive use program whereby surface water and groundwater are required to supply required crop requirements;

WHEREAS, within Alta Irrigation District there is an overdrafted groundwater basin thereby necessitating water conservation measures;

WHEREAS, cropping patterns within Alta Irrigation District are predominantly high value permanent crops, i.e., nectarines, peaches, plums and grapes, making land fallowing or alternative crop uses impractical;

NOW, THEREFORE, BE IT RESOLVED, at a regularly scheduled board meeting held on June 11, 1999, Alta Irrigation District did consider and approve the Water Conservation Plan developed under the AB 3616 Memorandum of Understanding negotiated between agricultural water purveyors and environmental interest groups. By taking this action, it is Alta Irrigation District's intent to demonstrate its long-term commitment to water conservation;

NOW, THEREFORE, BE IT FURTHER RESOLVED, that Alta Irrigation District did approve the Water Conservation Plan on **June 11, 1999**, as submitted, by the following vote:

> **Motion:** Belknap **Second:** Wileman
> **Ayes**: Belknap, Powell, Marshall, Waldner, Wileman
> **Nays:** None **Abstain:** None
> **Absent**: Agrifoglio, Warkentin

I, **Chris M. Kapheim**, Secretary to the Board of Directors of **Alta Irrigation District**, hereby certify that the foregoing resolution was duly passed and adopted by said Board at a regular meeting thereof duly called and held on June 11, 1999.

Chris M. Kapheim

Chris M. Kapheim, Secretary