



California Department of Water Resources  
2004 Water Use Efficiency Program  
Section A: Implementation Project

## **Lake Arrowhead Community Services District**

Evapotranspiration (ET) Controller Irrigation Technology Project

January 11, 2005



## 1.0 Project Information Form

### 2004 Water Use Efficiency Proposal Solicitation Package - Project Information Form

Applying for:

Urban

Agricultural

1. (Section A) Urban or Agricultural  
Water Use Efficiency  
Implementation Project

(a) implementation of Urban Best Management Practice, #  
Includes elements of BMP's 1, 5, & 7.

(b) implementation of Agricultural Efficient Water Management  
Practice, # \_\_\_\_\_

(c) implementation of other projects to meet California Bay-Delta  
Program objectives, Targeted Benefit # or Quantifiable Objective  
#, if applicable \_\_\_\_\_

2. (Section B) Urban or Agricultural  
Research and Development;  
Feasibility Studies, Pilot, or  
Demonstration Projects; Training,  
Education or Public Information;  
Technical Assistance

(d) Specify other: \_\_\_\_\_

(e) research and development, feasibility studies, pilot, or  
demonstration projects

(f) training, education or public information programs with  
statewide application

(g) technical assistance

(h) other

3. Principal applicant (Organization or  
affiliation):

Lake Arrowhead Community Services District

4. Project Title:

Evapotranspiration (ET) Controller Irrigation Technology Project



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5. Person authorized to sign and submit proposal and contract:	Name, title	Marvin Shaw General Manager
	Mailing address	PO Box 700 Lake Arrowhead, CA 92352
	Telephone	(909) 337-8555
	Fax.	(909) 337-3165
	E-mail	admin@lakearrowheadcsd.com

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6. Contact person (if different):	Name, title.	Marc Lippert Water Conservation Coordinator
	Mailing address.	PO Box 700 Lake Arrowhead, CA 92352
	Telephone	(909) 337-8555
	Fax.	(909) 337-3165
	E-mail	mlippert@lakearrowheadcsd.com

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7. Grant funds requested (dollar amount):	\$57,197.50
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*(from Table C-1, column VI)*

8. Applicant funds pledged (dollar amount):	\$57,197.50
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9. Total project costs (dollar amount):	\$114,395
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*(from Table C-1, column IV, row n)*



<p>10. Percent of State share requested (%)  <i>(from Table C-1)</i></p>	<p>50%</p>
<p>11. Percent of local share as match (%)  <i>(from Table C-1)</i></p>	<p>50%</p>
<p>12. Is your project locally cost effective?  <i>Locally cost effective means that the benefits to an entity (in dollar terms) of implementing a program exceed the costs of that program within the boundaries of that entity.</i>  <i>(If yes, provide information that the project in addition to Bay-Delta benefit meets one of the following conditions: broad transferable benefits, overcome implementation barriers, or accelerate implementation.)</i></p>	<p><input checked="" type="checkbox"/> (a) yes  <input type="checkbox"/> (b) no</p>
<p>11. Is your project required by regulation, law or contract?          If no, your project is eligible.          If yes, your project may be eligible only if there will be accelerated implementation to fulfill a future requirement and is not currently required.  <i>Provide a description of the regulation, law or contract and an explanation of why the project is not currently required.</i></p>	<p><input type="checkbox"/> (a) yes  <input checked="" type="checkbox"/> (b) no</p>
<p>12. Duration of project (month/year to month/year):</p>	<p>12/05 to 12/20</p>
<p>13. State Assembly District where the project is to be conducted:</p>	<p>59</p>
<p>14. State Senate District where the project is to be conducted:</p>	<p>31</p>
<p>15. Congressional district(s) where the project is to be conducted:</p>	<p>41</p>
<p>16. County where the project is to be conducted:</p>	<p>San Bernardino County</p>
<p>17. Location of project (longitude and latitude)</p>	<p>-117.19288          34.25196</p>
<p>18. How many service connections in your service area (urban)?</p>	<p>7,600</p>
<p>19. How many acre-feet of water per year does your agency serve?</p>	<p>3,150</p>



20. Type of applicant (select one):

- (a) City
- (b) County
- (c) City and County
- (d) Joint Powers Authority
- (e) Public Water District
- (f) Tribe
- (g) Non Profit Organization
- (h) University, College
- (i) State Agency
- (j) Federal Agency
- (k) Other
  - (i) Investor-Owned Utility
  - (ii) Incorporated Mutual Water Co.
  - (iii) Specify \_\_\_\_\_

21. Is applicant a disadvantaged community? If 'yes' include annual median household income.

- (a) yes, \_\_\_\_\_ median household income
- (b) no

(Provide supporting documentation.)



## 2.0 Signature Page

### 2004 Water Use Efficiency Proposal Solicitation Package Signature Page

By signing below, the official declares the following:

The truthfulness of all representations in the proposal;

The individual signing the form has the legal authority to submit the proposal on behalf of the applicant;

There is no pending litigation that may impact the financial condition of the applicant or its ability to complete the proposed project;

The individual signing the form read and understood the conflict of interest and confidentiality section and waives any and all rights to privacy and confidentiality of the proposal on behalf of the applicant;

The applicant will comply with all terms and conditions identified in this PSP if selected for funding; and

The applicant has legal authority to enter into a contract with the State.

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Name and Title



## 3.0 Statement of Work

### 3.1 Relevance and Importance

#### 3.1.1 Introduction

The Lake Arrowhead Community Services District (District) provides water and wastewater services to the community of Lake Arrowhead located in Township 2 North, Range 3 West in the San Bernardino National Forest, 28 miles north, northeast of the City of San Bernardino. The water service area covers approximately 4,900 acres and includes the geographic area known as Arrowhead (see **Appendix A, Figure 1: Location Map**). The District's certificated water and wastewater boundaries are shown on **Figure 2 of Appendix A**. The topography of the District's water service area consists of rugged, mountainous terrain with about 40% of the land having slopes with a greater than 30% grade. The surface is underlain by dense, fractured and jointed granite. The District maintains 18 water storage reservoirs, 9 pressure tanks, 19 water-pumping stations, and approximately 250 miles of water main lines.

The District's water service area has elevations ranging from 4,000 to 6,000 feet, with an average elevation of 5,500 feet. Data collected by National Weather Service Station #044671 at an elevation of 5,204 feet indicates that the average annual high and low temperatures since 1948 are 62.9 (F) and 40.4 (F), respectively. The average high and low temperatures for the month of July are 81.4 (F) and 56.3 (F), respectively, and the average high and low temperatures for the month of January are 45.5 (F) and 29.0 (F), respectively. Total annual precipitation for the area averages 41.6 inches. Ninety-seven percent of precipitation occurs between the months of November and April. Due to the elevation of the area, much of this precipitation is in the form of snow.

The District enjoys a favorable, steady small growth environment. The exact population of the District is difficult to estimate, as a large percentage of the homes in the area are part time residences. As a result, during seasonal and holiday periods the population in the area can increase significantly (this is particularly true during the summer months, especially summer holiday weekends). As such, it is estimated that the permanent population of the area is roughly 12,000 residents, with holiday weekend populations exceeding 30,000.

For the past six years, the Lake Arrowhead community has faced severe recurring drought conditions in addition to the ongoing bark beetle infestation that has affected the majority of the San Bernardino Mountains. These conditions have resulted in increased risk of catastrophic forest fire and have caused Lake Arrowhead, historically the community's sole source of potable drinking water, to decline to its lowest levels.

Faced with the impacts of these adverse conditions on the water supply, the District Board of Directors began in January 2003 to intensively scrutinize its water management practices and investigate the development of water supplies alternative to the lake. As a result of its investigations, in FY 2003/2004 the



District commissioned the Lake Arrowhead Community Services District Water Demand & Supply Final Report (WDSFR). This report identifies three milestones consisting of programs and capital improvement projects designed to reduce and ultimately eliminate reliance on the lake as the community's sole source of water supply. This does not mean that the District proposes to stop using lake water outright. During wet and normal conditions the District will continue to rely on the lake as a source of drinking water for the community, as it is the lowest cost, best quality and most reliable water supply available. However, during periods of drought it is the District's goal to supply water from alternative sources.

In July 2003 the District established the Stakeholders' Advisory Group (SAG) to obtain informed and balanced input from the Lake Arrowhead Community. The SAG reviewed the WDSFR and presented its findings and recommendations to the District Board of Directors. One of these recommendations called for the commissioning of a public opinion survey of District customers. The purpose of this survey was to learn, among other things, the general public's preferences regarding alternative water management solutions and their willingness to pay for such solutions. The final results of this survey are available for review at the District office or on the District's web site at <http://www.lakearrowheadcsd.com>.

On October 14, 2003, the Board (a) accepted as complete the WDSFR, (b) accepted the SAG recommendations and (c) authorized District staff to implement Milestone I and II programs and capital improvement projects. Below is a summary of the WDSFR Milestone I & II programs and projects the District has implemented or is in the process of implementing, as well as the estimated acre-feet per year ("AFY") savings for each. Upon completion, these programs and projects will reduce draw on the lake by approximately 48% or 1,517 AFY.

Milestone I Programs & Capital Improvements	Acre Feet Per Year
Treatment Plant Efficiency Improvements	150
Water Conservation	745
Groundwater Development, Phase I	150
CLAWA Supplemental Supply of SWP Water	745
<b>Total, Milestone I</b>	<b>1,107 (35%)</b>
Milestone II Programs & Capital Improvements	Acre Feet Per Year
Recycled Water Program, Phase I	200
Groundwater Development, Phase II	210
<b>Total, Milestone II</b>	<b>410 (13%)</b>
<b>Total, Milestones I &amp; II</b>	<b>1,517 (48%)</b>

Of special note is the proposed short-term (10-15 year) water purchase from the San Bernardino Valley Municipal Water District (SBVMWD), which will be treated and transported through the Crestline-Lake Arrowhead Water Agency (CLAWA) to supply up to 1,500 acre feet of water per year to District customers. This water purchase will occur during development of Milestone III projects. In addition, certain portions of



the “Arrowhead Woods” area overlap with the CLAWA service area and as a result, pay into the SWP and received SWP water at an estimated 62 AFY.

The District’s progress to date in implementing WDSFR Water Management Programs and Capital Improvements is summarized in Figure 1, below:

**Figure 1: Water Management Programs & Capital Improvements, Implementation to Date**

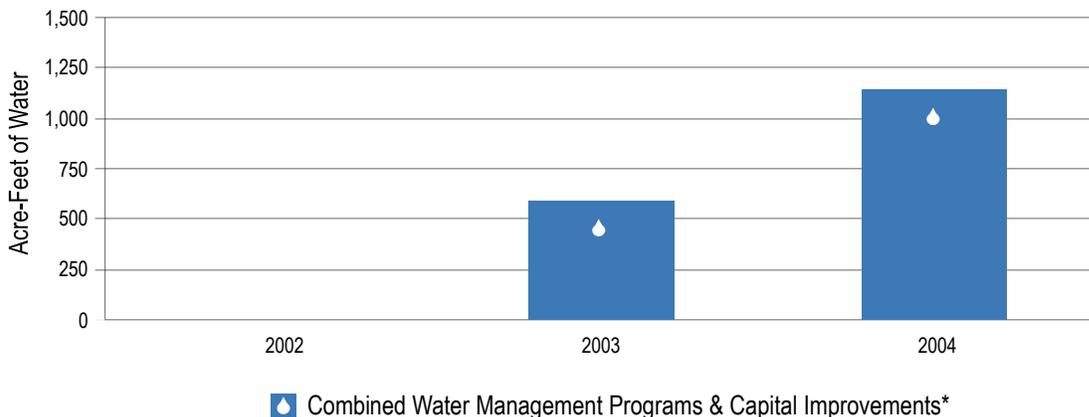
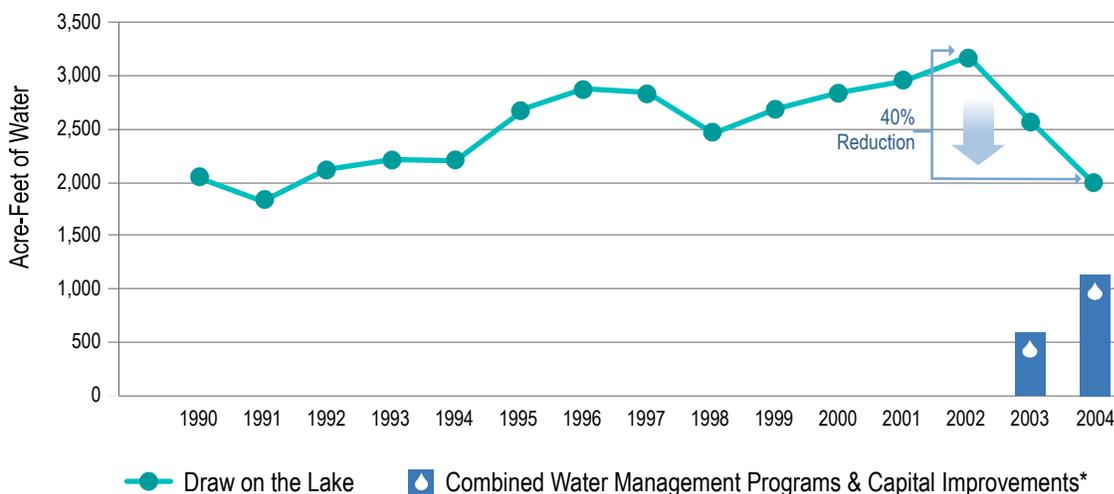


Figure 2, below, illustrates how combined District water management programs and projects have resulted in a 40% reduction (approximately 1,242 acre-feet) of annual draw since the 2002 base year.

**Figure 2: Impact of Water Management on Lake Use**



\* Collectively, WDSFR Milestone I & II Programs & Capital Improvement Projects (specifically, Water Conservation, CLAWA Supplemental Supply of SWP Water, and Groundwater Development Phases I & II).



At this time, the majority of District fees and charges are collected through the bi-monthly billing of customers. The total revenue from these fees and charges is not sufficient to fund the cost of a) the aforementioned SWP water purchase and (b) the planning and implementation of Milestone III capital improvement projects as described in the WDSFR. The District has therefore evaluated and initiated three additional sources of revenue to help fund its water management programs and capital improvements:

- First, the District has evaluated and subsequently adopted a proposal to collect a fee (proportionate to water consumption) from all water service customers through the San Bernardino County tax rolls to fund the SWP water purchase<sup>1</sup>. The District implemented the procedures for adoption of the proposed fee under Article 13D, Section 6 of the California Constitution (Proposition 218). On August 7, 2004, the District Board of Directors adopted the proposed fee, with only 900 (13%) of the affected customers protesting the fee.
- Second, the District has implemented a New Construction Supplemental Water Supply Fee for all new residential construction within the District water service area to pay for the development of water sources alternative to the lake for supply of water to new homes.
- Third, the District has adopted a policy that requires the developer of any proposed subdivision within the District's water service boundary to fund the development of a groundwater well or wells capable of producing a sustained water supply to offset the total water demand of the proposed subdivision. This policy a) prevents draw on the lake without prohibiting development of new subdivisions and b) funds the development of groundwater resources within the District.

### 3.1.2 Project Goals and Objectives

The two primary goals of the proposed Evapotranspiration (ET) Controller Technology Project (Project) are as follows:

- To aid the District in decreasing demand on Lake Arrowhead as a water source by reducing the amount of water used within the District for landscape irrigation. This reduction will directly benefit the Bay-Delta by eliminating or postponing the need for the District to purchase water from the State Water Project ("SWP"). As previously stated, the District is currently in the process of entering into an agreement to purchase SWP water. However, the District would prefer to maximize local water resources through conservation programs and creative water management, as these methods are more economical and environmentally sound. By reducing reliance on SWP water, the District will be in adherence to the CALFED Record of Decision (ROD) by maximizing water use efficiency to a) benefit the District locally and b) help preserve State water resources by reducing losses on the system and using incentive-based action to maintain local flexibility of supplies.

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<sup>1</sup> Pursuant to California Government Code Section 61621 et seq. and Health and Safety Code Section 5470 et seq., the District is authorized to prescribe and collect rates or other charges for the services and facilities furnished by it, and may elect to have such charges collected on the tax rolls.



- To assist District water customers (especially large landscape water users) in meeting the 25% water use reduction (from recorded 2002 usage) requirement established by the District's mandatory water conservation policy on June 1, 2004.

To achieve these goals, the proposed Project must meet the following two major objectives:

- The introduction of new landscape irrigation technology to both commercial and residential customers within the District, via the installation of 100 landscape irrigation "smart" ET Controllers on the properties of the largest irrigation customers throughout the District's service area. ET Controllers automatically adjust irrigation systems to operate based on existing real-time weather conditions, using data retrieved from local weather stations. This results in intelligent, efficient control of irrigation systems output and a reduction in irrigation runoff and water waste.
- The education of the public as to advances in irrigation technology and increase public awareness of the SWP as it relates to environmental resource conservation issues. This will be achieved by having District customers voluntarily take part in the Project and become responsible for the operation and maintenance of the ET controllers serving their properties.

### 3.1.3 Project Need

In a study from 2004 entitled "Lake Level Analysis" by Bookman-Edmonston, a long term safe perennial yield of the lake, based upon historic hydrology, was estimated at 1,500 acre-feet per year (AFY). This is the level that could be sustained without having an adverse effect on the lake level over the long term. In 2002, consumption reached an all-time high of 3,150 AFY. This current demand combined with the annual evaporative losses has created a total demand on the lake that is greater than the last six years of precipitation has been able to meet. To reduce this demand, the District is currently implementing the water management programs and projects described in the Water Demand and Supply Final Report (WDSFR). A critical component of reducing water demand in the area is the District's Water Conservation Program, which the District anticipates will reduce demand by approximately 745 AFY. As part of the District's Water Conservation Program, the implementation of ET Controllers is necessary in order to achieve this annual water savings.

As stated earlier, the District is moving forward to purchase water from the State Water Project (SWP). However, due to the cost of SWP water, it would be much more desirable for the District to reduce water demand through efficient management and conservation of its existing water resources and therefore eliminate reliance on SWP water (which would also reduce losses on the SWP system as a direct benefit to the Bay-Delta). As part of the District's Water Conservation Program, the proposed Project is needed to bring about this ideal situation.

Approximately 50 percent of the population in the District service area are considered part-time or vacation residents. Therefore, many residences are vacant throughout the year, and landscape irrigation is subsequently performed by automatic systems or landscape contractors. Automatic systems are unable to



intelligently adjust irrigation output to match current weather conditions and therefore can result in over-watering of landscapes, while landscape contractors often either do not have access to irrigation controllers or do not change irrigation patterns based on changes in the weather. In addition, the District has determined that many residents simply do not program their irrigation controllers properly, which also results in over-watering and, thus, water waste. The ET Controllers to be installed by the proposed Project are necessary to reduce these opportunities for human error and subsequent water waste by eliminating guesswork in irrigation system programming.

The over-watering of landscaping resulting from the factors discussed above often leads to urban runoff that ultimately makes its way into Lake Arrowhead. This runoff can potentially have an adverse affect on lake water quality. Therefore, the ET Controllers to be installed by the proposed Project are necessary to help reduce landscape over-watering and urban runoff, and protect the quality and clarity of the lake.

Millions of dead or dying trees resulting from the six-year drought coupled with bark beetle infestation have placed much of the San Bernardino National Forest in immediate danger of catastrophic forest fires. As a result, In April 2003 the State of California declared a state emergency in the area. Later that year, massive fires burned through the area, threatening thousands of residents and destroying hundreds of homes in the surrounding communities. Lake Arrowhead is one of the major sources of water used to combat such fires. The District's conservation efforts, including the proposed Project, are necessary for the protection of the lake if and when it is used for fire suppression.

### 3.1.4 Plan Consistency

In 1999, the District began a concerted Water Conservation Program as an implementation measure of the District's 2000 Urban Water Management Plan (UWMP) that was completed in keeping with the California Urban Water Management Planning Act, California Water Code Division 6, Part 2.6 Urban Water Management Planning. The District's Water Conservation Program facilitates all water conservation, demand reduction and water waste prevention efforts District-wide. As its main goal is to reduce water demand, the proposed Project is part of the District's Water Conservation Program and is thus consistent with overall implementation of the District's UWMP.

Effective June 1, 2004, the District enacted a Mandatory Water Conservation Policy that requires all water customers to reduce their water usage by 25% from recorded 2002 usage. The District has found that more than 50% of water is used for landscaping, and that there is a correlation between high levels of water usage and extensive landscaping. Therefore, the District has implemented various policies to assist customers in efficient irrigation of existing landscaping and aid them in meeting their reduction goals. The District has identified the top ten percent of water users and has begun to contact them regarding the potential of developing individual conservation plans. Implementation of the proposed Project will allow these customers to utilize ET Controller technology to efficiently control their irrigations systems, reduce water waste, and meet the Mandatory Water Conservation Policy reduction requirements.



In 2003, the District formalized the Final Water Demand and Supply Report (WDSFR). The WDSFR addresses the water demand management and supply issues facing the District, evaluates them, considers a variety of approaches and solutions, and provides an analysis of the benefits, drawbacks, and costs of each. The WDSFR, plus public comment, constitutes the basis on which the District Board of Directors makes decisions regarding approaches and solutions in implementing water demand management programs and projects, which include the District's Water Conservation Program. As its main goal is to reduce water demand, the proposed Project is part of the District's Water Conservation Program and is thus consistent with the WDSFR.

### 3.1.5 Implementation of Water Demand Management Activities

Demand Management refers to methods a water supplier may undertake to reduce demand on the water system. The Urban Water Management Planning Act (UWMPA) requires a description of fourteen specified Demand Management measures (known as the Best Management Practices or "BMP's") which are listed in the Memorandum of Understanding (MOU) Regarding Urban Water Conservation in California.

As a signatory to the water conservation MOU in California, the District has stated its intentions to pursue to the best of its ability the implementation of the Best Management Practices (BMPs). There are specific guidelines for implementing and measuring the effectiveness of each measures implementation, which is controlled by the statement, "at least as effective as." This gives District some flexibility to implement particular programs and request exemption from others in its annual filing of its BMP report to the California Urban Water Conservation Council (CUWCC).

The following list documents the implementation of the UWMPA BMP's by the District to date. Note that BMP's 6 and 8 are to be implemented this year (2005). BMP 10 is not applicable to the District.

- **BMP's 1 & 2: Residential Survey and Plumbing Retrofits.** District staff (with the support of an irrigation and landscape consultant) provide surveys and conservation kits to customers upon request. Staff has made an effort to target the highest 700 water consumers.
- **BMP 3: System Water Audits, Leak Detection and Repairs.** The District has created a Construction Department to replace all trouble areas within the water distribution system. In 2003 the District performed a water audit of the entire system.
- **BMP 4: Metering with Commodity Rates for All New Connections and Retrofit of Existing.** The entire District is metered and a tiered conservation rate schedule is in place that escalates with water use. Billing is performed on a bi-monthly basis.
- **BMP 5: Large Landscape Conservation Programs & Incentives.** The programs that were created for BMPs 1 & 2 also exist for BMP 5.
- **BMP 6: High Efficiency Washing Machine Rebates.** To be implemented in 2005.



- **BMP 7: Public Information Programs.** Newsletters, handouts, and other materials regarding water conservation activities are distributed to the public. A “Landscape Guide for Mountain Homes” has been produced and distributed to promote landscape awareness.
- **BMP 8: School Education.** To be implemented in 2005.
- **BMP 9: Conservation Programs for Commercial, Industrial, & Institutional (CII) Accounts.** The programs that were created for BMPs 1 & 2 also exist for BMP 9.
- **BMP 10: Wholesale Agency Assistance.** Not Applicable.
- **BMP 11: Conservation Pricing.** See BMP 4.
- **BMP 12: Conservation Coordinator.** There are currently two staff members designated as conservation coordinators.
- **BMP 13: Water Waste Prohibitions.** Established in the District Water Conservation Ordinance No. 48 and in subsequent drought declaration ordinances, specific water waste prohibitions have been set forth along with a penalty and enforcement structure.
- **BMP 14: Residential Ultra Low Flush Toilet (ULFT) Replacement Program.** The District established a ULFT exchange program in 2004. 1,000 high-flow toilets were replaced with ULFT's.

Implementation of these BMP's will conserve water and therefore reduce demand on Lake Arrowhead. While there will be costs to the District for implementation, savings will accrue to the District through lower pumping, treatment and wastewater disposal costs. Additional savings will accrue to District customers through lower energy use associated with low flow plumbing fixtures and installation of high-efficiency washing machines. The proposed Project will further the implementation of BMP's 5 and 7 by implementing ET Controllers for Large Landscape Conservation while educating the public as to ET Controller technology as part of the District's Water Conservation Programs.

Water conservation measures, which have been under implementation or recommended for implementation in 1999 under the Lake Arrowhead Community Services District Water Awareness Program can be found in Appendix C of the District's UWMP and are summarized in Table 1 of Appendix B in this proposal.

In addition to these BMP's, State law requires land use planning jurisdictions to enact a landscape water conservation ordinance consistent with the State Model Landscape Ordinance, that uses a water budget approach, or that has rules and regulations without tracking usage. The District lies within the jurisdiction of San Bernardino County, which maintains a landscape conservation ordinance. District Ordinance No. 48 provides requirements promoting efficient landscape design limits, irrigation hours, and specifies turf application limitations. The proposed Project will compliment the requirements set forth in Ordinance No. 48 by educating the public as to efficient landscape irrigation using ET Controller technology.



## 3.2 Technical/Scientific Merit, Feasibility

### 3.2.1 Feasibility and Technical Adequacy

The proposed Project involves the installation of 100 Evapotranspiration (ET) Controllers throughout the District. Evapotranspiration is the combination of two separate processes whereby water is lost from the soil surface to the air as water vapor or evaporation or used by plants and processed through the plants' metabolism and released to the atmosphere as a combination of carbon dioxide and water vapor, called transpiration. The evaporation and transpiration occur simultaneously and are measured as millimeters or inches of water used over a specific time period, hourly, daily, weekly, monthly or yearly. ET is calculated by measuring the energy from various sources that impact plant growth and water use by plants. These energy sources are solar radiation, wind, air temperature and humidity and are measured by various instruments on weather stations. ET is determined by using an actively growing reference crop, such as turf grass, that is well watered and managed. "Reference Evapotranspiration" or "ET<sub>o</sub>" is simply the amount of water needed in a year of average weather.

Local weather and climate information is transmitted to the ET Controller via pager technology from weather stations instructing how much water is needed for landscapes in the zone where the controller is installed. Recent studies from other areas have shown the use of ET Controllers can effectively reduce residential irrigation runoff and save as much as 37 gallons of water each day on a 1,200 square foot section of landscape. This translates to about a 33 percent water savings.

The proposed Project involves identifying and contacting the 100 largest irrigation customers with the greatest potential to achieve documented water reduction using ET Controller technology. These customers will be identified using existing historical metered water consumption data. Targeting by the District for participation in the program will be strategic in that the District will require a commitment on the part of the customer to operate the system properly after installation and assist with documentation of the water conservation savings. As numerous District customers have expressed interest in the use of ET Controller technology, the District anticipates little difficulty in identifying and recruiting the 100 customers necessary for implementation of the proposed Project. Once Project participants have been identified and have agreed to participation in the Project, trained technicians will set up appointments with the participants to install each of the 100 controllers. Prior to installation of the controllers, District staff will collect irrigation usage information for each controller site to be used for benchmarking purposes.

District staff will provide training to Project participants on the programming, usage, and maintenance of the controllers. Staff will also perform weekly controller maintenance as well as weekly recordation of irrigation usage data for each controller site. This will be compared to pre-installation irrigation usage data to determine water savings for each site resulting from controller use.

Water savings reports will be prepared by District staff and provided to site participants upon request. Water savings data for all 100 controller sites will be submitted to the DWR as part of required quarterly and annual Project fiscal and programmatic reports. The District estimates that the installation of 100



controllers could result in an average water savings of 160,000 gallons per year per site, or an overall saving of about 50 acre-feet per year (AFY). This savings is based on an assumed average landscape area of the 1 acre per customer, an annual application rate of 2 feet per year, and a 25 percent increase in irrigation efficiency for the top 100 customers participating in the program. An average estimated cost for purchase and installation of the ET smart controllers of approximately \$350 per site, results in a cost of \$750 per AF saved. The proposed Project would provide the District with about 7 percent of its water conservation goal of 750 AFY.

The public will be informed of the proposed Project as part of the District's existing Water Conservation Program events, in the District newsletter, and on the District's web site at <http://www.lakearrowheadcsd.com>.

### 3.2.2 Task List and Schedule

The following presents the Project Work Plan by task and deliverables. A detailed Project Budget and Schedule is included as Table 2 of Appendix B.

#### Task 1: Project Administration

- 1.1 Preparing District Board items for Project approval.
- 1.2 Grant administration management
- 1.3 Correspondence with DWR
- 1.4 Environmental compliance

#### Task 1 Deliverables

- District Board Approval Letter (Resolution)
- Proper correspondence
- Proper environmental documentation

#### Task 2: Public Outreach and Communication

- 2.1 Public outreach: Develop and mail Project invitation letters to the large landscape water customers.
- 2.2 Marketing: Update District website to include Program description, historical irrigation use data at selected sites, and current irrigation use data at selected sites during program.
- 2.3 Review and compile responses from customers and select customer sites to install ET controllers.
- 2.4 Select customers to participate in program

#### Task 2 Deliverables

- Project invitation letters
- Project brochures
- Mass mailings (newsletters)
- Update District's website with Project data



### Task 3: Site Evaluation

- 3.1 Evaluate landscape and water use histories of interested customers
- 3.2 Site descriptions of irrigation systems.

#### Task 3 Deliverables

- Site map with participant locations.
- Participant database

### Task 4: ET Irrigation Controller Purchasing

- 4.1 Purchase ET Controllers: Procure 100 ET Irrigation Controllers from the manufacturer for the duration of the installation period. A Request for Qualifications (RFQ) will be issued to find the most appropriate automated irrigation technology for the program and will include features that will maximize runoff reduction and potable water savings.

#### Task 4 Deliverables

- ET Irrigation Controllers Purchase Agreement

### Task 5: Implementation and Customer Service

- 5.1 Install ET Irrigation Controllers. Installation will also include an irrigation system evaluation and participant training on use of the controller. Participants will receive a comprehensive ET Irrigation Controller manual and a monthly landscape and irrigation system maintenance schedule listing activities to improve water conservation and reduce runoff. Participants will receive a pre-installation survey to complete and return at the time of installation.
- 5.2 Establish a schedule for ET Irrigation Controller installation and coordinate installation appointments between installers and program participants. Controller installation is anticipated to begin March 2006 and continue until June 2006.
- 5.3 Conduct training for customers: Training is essential for installation technicians to properly install and program the controllers to optimize reduction in runoff.
- 5.4 Respond to participating customers with technical issues regarding operation and maintenance of the ET controllers

#### Task 5 Deliverables:

- Installation Schedule
- Installation Report
- Customer Service Operating Procedure

### Task 6: Monitoring & Assessment & Measuring Success (Data Analysis)

- 6.1 Draft monitoring procedures
- 6.2 Pre-installation water use baseline determination



- 6.3 Compile and analyze data to measure the success of entire project for the Project area. Quantitative analysis of monitored sites will include:
- 6.3.1 Amount of water conserved in the monitoring site areas
  - 6.3.2 Avoided runoff flow at the monitoring sites
- 6.4 Incorporate data analysis a spreadsheet or database. Results of the analysis are expected to demonstrate a reduction in runoff and lower water usage.

**Task 6 Deliverables:**

- Monitoring Plan in report format
- Quantitative and Qualitative Data Analysis Report

**Task 7: Report Preparation & Delivery**

- 7.1 Final Report for DWR after installation and initial round of monitoring
- 7.2 Quarterly Reports for DWR

**Task 7 Deliverables:**

- Final Report for DWR after installation and initial round of monitoring
- Quarterly Reports for DWR for five years after project funding.

**3.2.3 Preliminary Plans and Specifications and Certification Statements**

The proposed Project is an Implementation Project; therefore, preliminary plans, specifications, and/or certification statements are not necessary.

**3.2.4 Environmental Documentation**

The proposed Project involves the introduction of new technology to existing irrigation infrastructure and is therefore considered Categorical Exempt under the California Environmental Quality Act (CEQA), based on the District's interpretation of Title 14, California Code of Regulations, Chapter 3: Guidelines for Implementation of the California Environmental Quality Act, Article 19 Categorical Exemptions, Section 1530.1:

**15301. Existing Facilities**

- (h) Maintenance of existing landscaping, native growth, and water supply reservoirs (excluding the use of pesticides , as defined in Section 12753, Division 7, Chapter 2, Food and Agricultural Code)

The District will prepare a Notice of Exemption for submittal to the California Office of Planning and Research and the County of San Bernardino.



### 3.3 Monitoring and Assessment

Monitoring of the proposed Project will involve weekly site visits by District staff to each of the 100 ET Controller installation sites for maintenance of the controllers and to gather irrigation event data. This data will be entered into existing District databases for storage and eventual comparison to pre-controller installation irrigation event data for the purpose of assessing water savings resulting from implementation of the controllers. The District will encourage installation site owners to actively participate in controller monitoring.

#### 3.3.1 Baseline Determination

The District will conduct pre-installation monitoring at each of the 100 ET Controller sites to establish baseline data. For assessment purposes, metered amounts of applied irrigation water will be compared to recorded metered amounts for the years prior to the installation of the ET Controllers.

#### 3.3.2 Monitoring Methodologies

The District will perform manual and/or mechanical observations and measurements of water use during irrigation events for all 100 installed ET Controllers. The monitoring sites will be visited on a weekly basis by District staff to record these measurements on approved field forms. Recorded data will be logged into existing District databases by District staff for storage and analysis.

#### 3.3.3 Success Evaluation

In order to measure the success of the entire project through quantitative and qualitative data analysis, irrigation water use data prior to implementation of the proposed Project and irrigation water use data during the monitoring period of the proposed Project will be compared and analyzed. Inferential statistics taken from the sites will be inclusive of the entire District area.

Compiling and analyzing irrigation water use data to measure the success of the entire proposed Project throughout the District will be an ongoing activity. Quantitative analysis will include: 1) level of participation in the program, 2) amount of water conserved in the monitoring site areas, 3) estimated avoided runoff flow at the monitoring sites, and 4) qualitative residential survey results at pre- and post-installation of the ET Controllers. This data will be incorporated in the data analysis included in the Draft and Final Reports. Results of the analysis are expected to demonstrate a reduction in both irrigation water use and runoff.

#### 3.3.4 External Factors

External weather factors will be controlled by California Irrigation Management Information System (CIMIS) weather stations communicating relevant weather changes to the installed ET Controllers. It is anticipated that customers participating in the program will not change their landscape planting patterns during the monitoring phase to ensure a static condition for monitoring and assessment purposes. Power outages



due to downed power lines resulting from fallen dead or dying trees (a common occurrence in the area) will not affect the controllers as they utilize a memory backup system.

### 3.3.5 Information Handling

All data gathered for the proposed Project will be stored in existing District databases that are currently utilized for billing, customer service and document control tasks. This data will be checked regularly for integrity and will be subject to strict data storage, manipulation and analysis standards. Any data deemed useful to the public will be made available at the District's web site at <http://www.lakearrowheadcsd.com>. Data reporting will be achieved via the reporting functions of the District's existing databases in conjunction with custom Microsoft Access and Excel queries and reports, as deemed necessary. Information pertaining to the locations and recorded irrigation amounts for each of the 100 controllers will also be added to the District's existing Geographic Information System (GIS).

### 3.3.6 Estimated Costs

The total estimated cost for implementation of the Monitoring and Evaluation Plan is \$23,000. This will include direct labor costs for "in-field" visits and data entry and analysis. No major indirect costs are anticipated at this time.



## 4.0 Qualifications of the Applicants and Cooperators

### 4.1 Resume of Project Manager

The resume of Project Manager Marc Lippert is included with this proposal (see Attachment A).

### 4.2 Role of External Cooperators

There are no external cooperators involved with the proposed Project.

### 4.3 Previous Water Use Efficiency Grant Project Experience

In 2003, the District was successful in obtaining a water use efficiency grant from the United States Bureau of Reclamation Authority (USBR) for ET Controller implementation. The success of this pilot project depended on the use of the District's Water Conservation Stakeholder Group, which consisted of members of the community, landscape, forestry and flood control professionals, conservation experts, District staff and consultants. For this pilot project, the District solicited participants from the District's top 10% of water use customers. These participants were responsible for the installation of the controllers using qualified installers, a list of which was provided to the participants. District staff then monitored the controllers and irrigation usage at each project site for four months to ensure settings were properly calibrated, making corrections where necessary.

The first year of this pilot project has recently been completed, and a report has been filed with the USBR identifying a total reduction in irrigation water usage of 33% for program participants. Marc Lippert, the District's Water Conservation Coordinator, was responsible for administration and monitoring of this pilot project.

### 4.4 Disadvantaged Community

The District does not meet the definition of a disadvantaged community.



## 5.0 Outreach, Community Involvement, and Acceptance

### 5.1 Public Outreach

The District remains committed to the public outreach process as fundamental to the decision making process for the development of future projects. The District has a website devoted to customers and the public. The District's web site can be found at <http://www.lakearrowheadcsd.com>. This web site has links to many topics such as current and proposed project information, customer FAQs, billing and payments, upcoming Request for Proposals, and also includes links to various District reports such as the very informative 2003 the District Water Demand and Supply Final Report (WDSFR).

The ET Controller Project has been discussed and reviewed by stakeholders and Project related data will be made available to the public. The Project data will be displayed via a link on the District website and articulated in monthly District newsletters for the customers. The Public Outreach methods used by the District and the current website as a public education tool are part of the District's template for future project planning. Public education is paramount in the District's decision making process. A well informed public will usually be more receptive and supportive to changes in their district.

The District has budgeted and is planning to implement the following example and methods for public outreach of the WDSF Final Report in order to inform and receive feedback from the public prior to implementing the Project.

The WDSF Final Report is an in-depth description of how the district is currently managing water resources. In preparing the WDSF Final Report, the District defined their public outreach program. In WDSF Section 7, titled Public Comments and condensed below. This section shows how the District's Board followed a schedule that included public workshops and four public Board meetings to review the alternatives and recommendations in the Draft Report and to obtain both comments and suggestions.

The District also provided all customers with a written summary of the Draft Report and published a summary in the local newspaper (Mountain News) prior to the workshop. In addition, the District reconvened the Stakeholder Advisory Group (SAG) to review the Draft Water Demand Management and Supply Report with their constituents.

The District also made copies of the Draft Report available to any interested member of the public either by providing them for review at District offices and in several other public locations or by providing, free of charge, a CD-ROM of the report upon request. The Draft Report was also posted on the District's website. Copies of the full report were made available for the cost of reproduction.



The Final Report summarizes all comments received as a part of the public process. It is organized into four sections:

- Results of the public workshop held August 28, 2003
- Summary and response to written public comments
- Summary and response to oral public comments made at District Board workshops and meetings
- Results of SAG meetings



## 6.0 Innovation

Using data from local weather stations, including two CIMIS stations that the District recently purchased, to control irrigation amounts on landscape is a relatively recent technology in water conservation. The CIMIS stations help the overall process by making the weather and climate measurements and communicating with the ET controllers. CIMIS is an acronym for California Irrigation Management Information System, a program unit in the Office of Water Use Efficiency (OWUE), Department of Water Resources (DWR). CIMIS is an integrated network of over 125 automated active weather stations located throughout California. Historical data is also available from an additional 61 inactive weather stations. These are weather stations that have been disconnected from the CIMIS network for various reasons. The numbers of active and inactive stations change with time as new stations are installed and existing stations disconnected.

By being able to regulate irrigation flow based on the current weather conditions the amount of runoff or wasted water is greatly reduced. Not only is there a monetary savings by using less water there is an environmental benefit due to less runoff. Most runoff captures fertilizers, pesticides, and other contaminants as it leaves the irrigated area and returns to the ecological system. In the District's service area the main area that receives the runoff is Lake Arrowhead. Water quality is diminished in the lake by irrigation runoff. By reducing irrigation runoff water quality is improved. There is an in-direct benefit of this new technology in that it can be used statewide to reduce landscape runoff and improve water quality in aquifers and watersheds.

By implementing this type of technology and educating our customers and the local public, along with displaying our results on the District's website, we hope to spread the word about this type of technology and hope other agencies and businesses will implement their own type of ET Controller programs. This will have an overall net positive benefit to the Bay-Delta system.



## 7.0 Benefits and Costs

Cost and Benefit tables are included in Tables C-1, C-2, C-3, C-5, C-6, C-7, and C-8 of Appendix C.

### 7.1 Narrative for Table C-1:

The District is requesting a 50% cost sharing from the State for the Project. This is because the Project seems to have local cost efficiency based on the cost benefit ratio (see Tables C-6, 7, and 8 of Appendix C).

The District is requesting a 50% cost sharing due to the significant amount of additional BMP projects the District has planned due to the drought and other immediate concerns for future water supplies. The District is moving forward in an expeditious and responsible manner to address water conservation issues. Based on the definition below from page 7 of the Final 2004 Water Use Efficiency PSP, 11/15/2004, we have interpreted that this Project is eligible for funding because of economic barriers to begin implementation.

"3. Proposed projects are either "locally cost effective" or "not locally cost effective". A project is locally cost effective if its local monetary benefits (include cost of avoided water supply, energy savings, labor savings, or other avoided costs or savings) are greater than or equal to its total cost. Conversely, a project is not locally cost effective if its local monetary benefits are less than its total cost. Applicants must declare whether the project is locally cost effective or not. In general, local water agencies will not implement projects they judge are not locally cost effective because doing so would not be in the best interest of their rate payers. This is true even when such investments are desirable from a statewide perspective. Therefore, state grant assistance for these projects is provided in cases where the project results in Bay-Delta benefits.

In general, locally cost effective projects are expected to be implemented without state funding because they represent a net economic gain for the implementing agency and in many cases local agencies are compelled to implement locally cost effective projects. For example, signatories of the California Urban Water Conservation Council Memorandum of Understanding have agreed to implement urban water conservation practices that are locally cost effective unless institutional or legal impediments prevent them from doing so. Therefore, state grant assistance may be provided to locally cost effective projects where there are significant Bay-Delta benefits.

4. Eligibility does not guarantee funding. An eligible project would be funded only after meeting other tests including whether the proposed Bay-Delta benefits are appropriate for the proposed level of state funding."

The District's interpretation is that because it is a signatory to the Urban Water Conservation Council Memorandum of Understanding, and has agreed to implement as many BMP's as fiscally and physically possible, and that Proposition 50 is of a temporal nature with the window for grant assistance funding closing in the near future, grant assistance may be provided to locally cost effective projects that show Bay-



Delta benefits. The District has been assured that this water use efficiency project of a Large Landscape nature meets the criteria of being beneficial to the Bay-Delta. Therefore, it is anticipated that the District will meet the criteria to be considered for up to 50% cost sharing.

The majority of Project costs listed in the Task List, Project Schedule, and Table C-1 of Appendix C are direct costs associated with labor and materials. Much of the indirect costs associated with this Project would be carried by the District since the costs would be essentially the same of the current District operation budget. Labor cost as mentioned in Table C-1 will be approximately \$66,000. The ET Controller System will cost \$43,000 of which some of this cost has installation labor costs included. Until the RFP and purchase agreement is finalized, the purchase and installation costs will be listed together. Once the ET system is installed, the majority of Project costs will be for implementation and customer service along with the monitoring and assessment processes.

## 7.2 Narrative for Table C-5:

As previously described, all water conserved by the District through the Project will have a direct benefit to the Bay-Delta as it will offset future water purchases from the SWP. This will create more quantity and extend State water supplies. It is estimated that installation of 100 ET smart controllers could result in an average water savings of 160,000 gallons per year per site, or an overall saving of about 50 AFY. These savings are based on an assumed average landscape area of the 1 acre per customer, an annual application rate of 2 feet per year, and a 25 percent increase in irrigation efficiency for the top 100 customers participating in the program. This benefit should begin to take affect in 2006 and continue during the life of the ET Controllers. If more are installed, the benefits will grow throughout time.

By comparing pre-Project water use billing data and post-Project billing data, it is anticipated a better understanding of local landscape water use efficiency will be gained. Problem areas or entities may be identified and targeted for future water conservation actions. Also a better understanding of any weather micro-climates that may occur in the service area will be defined based on responses from similar landscapes. Natural land use factors on irrigation use such as elevation, slope, and vegetation of an irrigated area may be better defined based on the changes in water use caused by the ET Controller systems.

## 7.3 Narrative for Tables C-6, 7, and 8.

Currently it is anticipated that the Project will be locally cost efficient based on the criteria in the DWR annualized costs and benefit analysis tables supplied with this Proposal Application (Tables C-6, 7, and 8 of Appendix C). Information and experience will be gained by District staff members as they work with the ET controllers and the CIMIS weather stations. District staff will become familiar with CIMIS and water use efficiency policies.



An average estimated cost for purchase and installation of the ET smart controllers of approximately \$350 per site, results in a cost of \$700 per AF saved. The proposed Project would provide the District with about 7 percent of its water conservation goal of 750 AFY.

Appendix C: DWR Benefit and Costs "C" Tables

Table C-1: ET Controller Project Costs

Category  (I)	Project Costs  \$ (II)	Contingency % (ex. 5 or 10)  (III)	Project Cost + Contingency  \$ (IV)	Applicant Share  \$ (V)	State Share Grant  \$ (VI)	Life of investment (years)  (VII)	Capital Recovery Factor  (VIII)	Annualized Costs  \$ (IX)
Administration <sup>1</sup>								
Salaries, wages	\$4,000		\$4,000	\$3,000	\$1,000	3	0.3741	\$1,496
Environmental Compliance	\$500		\$500	\$375	\$125	1	1.0600	\$530
Total Administration Costs	\$4,500		\$4,500	\$3,375	\$1,125		0.1193	\$1,496
Public Outreach and Communication	\$12,700		\$12,700	\$9,525	\$3,175	3	0.3741	\$4,751
Site Evaluations	\$8,000		\$8,000	\$6,000	\$2,000	1	1.0600	\$8,480
Purchase ET Controller Technology	\$43,000	10	\$47,300	\$35,475	\$11,825	12	0.1193	\$5,643
Implementation/Customer Service	\$16,000	5	\$16,800	\$12,600	\$4,200	3	0.3741	\$6,285
Monitoring and Assessment	\$23,000		\$23,000	\$17,250	\$5,750	3	0.3741	\$8,604
Report Preparation	\$2,100	5	\$2,205	\$1,654	\$551	3	0.3741	\$825
<b>TOTAL</b>	\$109,300		\$114,505	\$85,879	\$28,626			\$36,084
Cost Share -Percentage				75	25			

1- excludes administration O&M.

Tables C-2 & C-3

THE TABLES ARE FORMATTED WITH FORMULAS: FILL IN THE SHADED AREAS ONLY

**Table C-2: Annual Operations and Maintenance Costs**

Operations (1) (I)	Maintenance (II)	Other (III)	Total (IV) (I + II + III)
\$0	\$2,400	\$0	\$2,400

(1) Include annual O & M administration costs here.

**Table C-3: Total Annual Project Costs**

Annual Project Costs (1) (I)	Annual O&M Costs (2) (II)	Total Annual Project Costs (III) (I + II)
\$36,084	\$2,400	\$38,484

(1) From Table C-1, row ( n) column (IX)

(2) From Table C-2, column ( IV)

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Table C-5: Project Annual Physical Benefits (Quantitative and Qualitative Description of Benefits)

Applicant:	<b>LAKE ARROWHEAD COMMUNITY SERVICE DISTRICT</b>				
<b>THE TABLES ARE FORMATTED WITH FORMULAS: <u>FILL IN THE SHADED AREAS ONLY</u></b>					
<b>Table C-5 Project Annual Physical Benefits (Quantitative and Qualitative Description of Benefits)</b>					
	<b>Qualitative Description - Required of all applicants<sup>1</sup></b>				<b>Quantitative Benefits - where data are available <sup>2</sup></b>
	Description of physical benefits (in-stream flow and timing, water quantity and water quality) for:	Time pattern and Location of Benefit	Project Life: Duration of Benefits	State Why Project Bay Delta benefit is Direct <sup>3</sup> Indirect <sup>4</sup> or Both	Quantified Benefits (in-stream flow and timing, water quantity and water quality)
Bay Delta	SEE NARRATIVE	SEE NARRATIVE	15 PLUS YEARS	DIRECT (SEE NARRATIVE)	SEE NARRATIVE
Local	SEE NARRATIVE	SEE NARRATIVE	15 PLUS YEARS	<b>Not applicable.</b>	SEE NARRATIVE
<sup>1</sup> The qualitative benefits should be provided in a narrative description. Use additional sheet.					
<sup>2</sup> Direct benefits are project outcomes that contribute to a CALFED objective within the Bay-Delta system during the life of the project.					
<sup>3</sup> Indirect benefits are project outcomes that help to reduce dependency on the Bay-Delta system. Indirect benefits may be realized over time.					

Table C-6, C-7, and C-8

Applicant:

**LAKE ARROWHEAD COMMUNITY SERVICE DISTRICT**

THE TABLES ARE FORMATTED WITH FORMULAS: FILL IN THE SHADED AREAS ONLY

**Table C-6 Project Annual Local Monetary Benefits**

ANNUAL LOCAL BENEFITS	ANNUAL QUANTITY	UNIT OF MEASUREMENT	ANNUAL MONETARY BENEFITS
(a) Avoided Water Supply Costs (Current or Future Source)	50	ACRE FEET PER YEAR	\$125,000
(b) Avoided Energy Costs	9,375	KILOWATT HOUR	\$1,500
(c) Avoided Waste Water Treatment Costs	50	ACRE FEET PER YEAR	\$6,500
(d) Avoided Labor Costs	30	\$50/HOUR	\$1,500
(e) Other (describe)	0		\$0
(f) Total [(a) + (b) + (c) + (d) + (e) ]			\$134,500

**Table C-7 Project Local Monetary Benefits and Project Costs**

(a) Total Annual Monetary Benefits [(Table C-6, row (f))		\$134,500
(b) Total Annual Project Costs (Table C-3, column III)		\$38,484

**Table C-8 Applicant's Cost Share and Description**

Applicant's cost share %: (from Table C-1, row o, column V)	<b>75</b>
Describe how the cost share (based on relative balance between Bay-Delta and Local Benefits) is derived. (See Section A-7 for description.)	
Provide Description in a narrative form.	