



California Department of Water Resources  
2004 Water Use Efficiency Program  
Section B: Demonstration Project

## Lake Arrowhead Community Services District

Artificial Turf Technology Demonstration 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, # \_\_\_\_\_

(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 \_\_\_\_\_

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

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

(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:

Artificial Turf Technology Demonstration Project



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):  
*(from Table C-1, column VI)*

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\$138,760

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8. Applicant funds pledged (dollar amount):

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None; Section B Proposal

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9. Total project costs (dollar amount):  
*(from Table C-1, column IV, row n)*

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\$138,760

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<p>10. Percent of State share requested (%)  <i>(from Table C-1)</i></p>	<p>100%</p>
<p>11. Percent of local share as match (%)  <i>(from Table C-1)</i></p>	<p>0%</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 12/15</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.

(Provide supporting documentation.)

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



## 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 in 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**

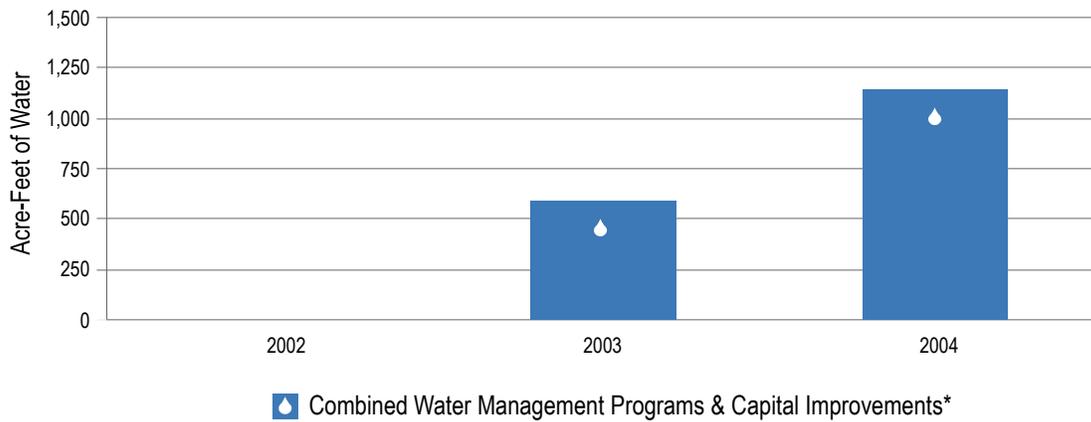
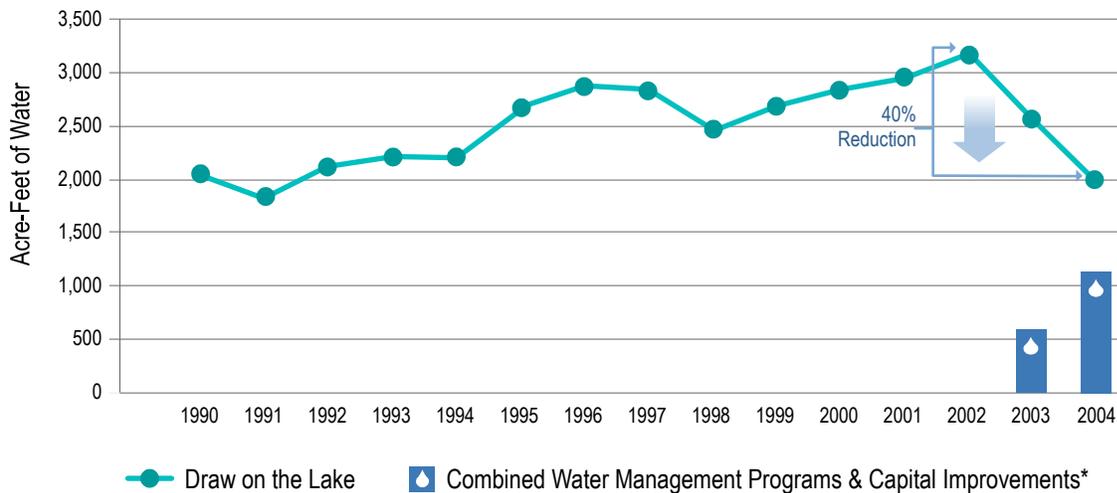


Figure 2, below, illustrates how combined District water management programs and projects have resulted in a 40% reduction (approximately 1,242 acre-feet) of annual draw since the 2002 base year.

**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

Effective June 1, 2004, the District enacted a mandatory water conservation policy that requires all customers to reduce their water usage by 25% from recorded 2002 usage. Since more than 50% of water is used for landscaping, the District has implemented various policies to assist customers in efficient irrigation of existing landscaping and aid them in meeting their reduction goals. Additionally, as part of its conservation policies enacted in 2003, the District has prohibited the installation of new turf grass. As a result, the District has received numerous customer inquiries regarding artificial turf grass.

The general goal of this water conservation project is to extend existing water supplies from Lake Arrowhead and help meet current water conservation program goals. Using less landscape irrigation water will benefit the Bay-Delta by eliminating or postponing the need for the District to purchase water from the State Water Project (SWP). SWP water purchases are part of future water conservation and supply alternatives as described in the District's 2003 Final Water Demand and Supply Report. As previously stated, the District is currently in the process of entering into an agreement to purchase SWP water.

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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.



The more specific goal of the Artificial Turf Technology Demonstration Project (Project) is to extend current and future supplies from Lake Arrowhead by conserving water using recent artificial turf technologies. Lake Arrowhead is the major source of water supply in the District service area. Water quality in the Lake will also be improved due to reduced runoff from landscape irrigation. Public education and involvement of customers will increase as the District increases outreach and marketing of the implemented technologies, such as artificial turf. By raising public awareness, customers may use this technology and replace existing landscape or redesign using a more efficient paradigm that promotes increased water conservation.

By demonstrating the technology in high profile areas such as the Lake Arrowhead Resort and Lake Arrowhead Village, maximum exposure of the technology to the public will be insured. Summer music concerts in the Village draw up to 5,000 people at times and much of the local and seasonal population will experience the artificial turf. Signs will be posted explaining the project and identifying key agencies involved such as the Department of Water Resources (DWR), CALFED, and the District. The objective of these efforts is to advertise this technology by letting people experience it visually or by walking and sitting on it during concerts and other seasonal events.

### 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 five 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.

These fires can also cause power outages that affect the clocks on many irrigation control boxes. Power outages are frequent in this region due to fires, high winds, and dead trees falling on power lines. When a power outage occurs and the power comes back on many of the control boxes default to the factory settings. The settings are usually for the irrigation systems to come back at least once an hour for 24 hours a day. Even if the customer is at the residence it may take them awhile to realize they are now over irrigating their property and using water inefficiently. The problem is exacerbated when the property owner is the seasonal type, and not monitoring the irrigation system for months at a time. Thousands of cubic feet of water can be wasted due to this phenomenon. A classic example is a seasonal customer complaining about a water bill for over \$10,000 because while he was living in his permanent residence, his Lake Arrowhead vacation home's system was severely over-watering the property landscape.



Problems such as this can be alleviated using artificial turf technology, which can largely reduce the amount of irrigation water applied to certain properties. A goal of this demonstration project is to help more local customers become aware of this technology and consider applying it to their own properties.

Due to drought and development, the District has begun a water conservation program that is targeting a reduction in water use of 750 AFY. As a part of this effort, the District performed a review of water consumption records that indicate a substantial increase in summer use over winter use, in some cases going up over 350 percent. Correlations between areas experiencing higher levels of water usage are areas that have extensive landscaping. The District has already identified the largest 10 percent of water users and has begun to contact them regarding the potential of developing individual conservation plans.

The District would rather increase local water supply through conservation programs such as using more artificial turf technology and other creative water management, as these methods are more economical and environmentally sound. By not having to rely heavily on SWP water purchases, the District will be adhering to the CALFED Record of Decision (ROD) helping to ensure high efficiency through these proposed and ongoing programs that benefit the District locally and the State water resources by reducing losses on the system and using incentive based action to maintain local flexibility of supplies.

#### 3.1.4 Plan Consistency

The District strives to manage its water resources wisely. The legal basis for the District's right to draw water from Lake Arrowhead to provide domestic water, is found on the Quitclaim Deed recorded October 10, 1975, Records of San Bernardino County, Book 8795, Page 1053 ff., citing a Deed from Lake Arrowhead Utility Company dated March 28, 1924, recorded on July 31, 1924 in Book 847, Page 176, Records of San Bernardino County. These documents have been interpreted so that the District has the rights to withdraw up to 4,000 gallons per minute on an average annual basis. In terms of annual production, this translates to 6,451 acre-feet per year. While the right exists for this level of diversion, the ability of the Lake to yield that much while protecting its recreational and community values must be considered.

Current water resource management revolves around the safe yield of the Lake. The lake is currently in an overdraft condition. The most recent year's data (2002 is used as the current baseline) indicates a consumption of approximately 3,150 AFY. This current demand combined with the annual evaporative losses creates a total demand on the lake that is greater than the last five years of precipitation has been able to meet.

In 2000, the District updated its Urban Water Management Plan (UWMP) along with implementing Ordinance No. 48 establishing water conservation requirements. Part of these updates and policy changes were to meet the challenges from the ongoing drought, and also meet future challenges for water resource management in general. The District is aware that water conservation and water use efficiency are management tools that will be a permanent part of its resource management strategy, and that



incorporating larger regional issues such as the CALFED Bay-Delta programs into the District's decision making process will create a more positive and far reaching management vision.

The District published their Final Water Demand Supply Report (WDSR) in 2003. Part of the report dealt exclusively with water demand management programs and projects. Some of these programs are water conservation type such as this Project. Technical and economic feasibility studies have been completed or are currently underway for many of the projects and programs planned. The Artificial Turf Demonstration Project is consistent with current water management and conservation planning for the District.

The District adopted Ordinance No. 61, which authorized a Supplemental Water Supply Fee and is in the process of purchasing State Water Project water from a local State Water Contractor. If needed, the purchases from CLAWA will begin in middle to late 2005. The SWP deliveries are more expensive than local water sources such as Lake Arrowhead. Therefore, SWP water will be used only when the safe yield of Lake Arrowhead is in danger of being surpassed due to factors such as drought, forest fires (for which Lake Arrowhead is a major source of water to combat fire), or other unforeseen natural or manmade events that negatively affect the Lake's safe yield.

This Project is consistent with these programs and plans and will help address some of the current water management issues such as water conservation and landscape design. The Project will be an implementation of Best Management Practices (BMP) executed by the District. BMPs are further described in Section 3.1.5, below.

### 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.

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. This proposal is designed to address these issues and raise public awareness of artificial turf technology as a means to promote efficient landscaping for current and future planning.

### 3.2 Technical/Scientific Merit, Feasibility

#### 3.2.1 Feasibility and Technical Adequacy

In June 2004, the District was first exposed to artificial turf technology when it was installed at a new local San Bernardino County fire station. The turf installed at this location is virtually indistinguishable from real grass. Impressed by the aesthetic quality and, most importantly, the water saving benefits of this technology, the District conducted extensive research as to the cost/benefits of artificial turf. Consequently, the District has elected to pursue the necessary funding to implement and promote an Artificial Turf Demonstration Program to educate District customers as to this attractive, viable, water-saving alternative to real grass while attaining substantial water savings at the turf installation locations involved.

The demonstration project proposed by the District will involve the installation of artificial turf technology at two locations in the Lake Arrowhead area: The Lake Arrowhead Village ("Village", 5,504 square feet), and the Lake Arrowhead Resort ("Resort", 7,500 square feet). The high-profile, high-visibility sites will ensure maximum exposure of the proposed program to the community. This exposure will be furthered via promotion in District newsletters, at District regular meetings and special events, and using banners at each of the sites that will give credit to DWR and CALFED for their assistance and provide advertising for the contractor awarded the bid for installation of the turf. The District will require bids from multiple contractors for the installation of the turf at each of these locations.

The Project proposed by the District will promote an attractive, low-maintenance, water-saving alternative to turf grass that is especially relevant to District customers during this time of enforced water reduction and prohibition of real turf grass installation. Over its lifespan, the proposed Project will conserve a substantial amount of water, aiding the District's efforts in reducing the draw on the lake. However, although possible cost-sharing scenarios have been discussed with the Village and the Resort, at this time the District does not have sufficient budget to implement the proposed Project. As such, the District is requesting sufficient grant funds for the purchase and installation of 13,004 square feet of artificial turf grass for the two proposed locations.



Artificial turf technology has evolved over the last 10 years. The current types available offer a wide variety of "looks" ranging from designs that look like a freshly mowed putting green to a more natural longer grass blade look. The turf allows for water to pass through the turf matrix or backing and percolate into the ground. The base surface that the turf is attached to is usually made of packed sand or decomposed granite. This base is usually rolled flat or level to mimic the natural topography. If natural soils in the area are slow draining, some designs include a network of drainage pipes underneath the turf/base structure to carry water away from the site into public drainage. The proposed Project will not need drainage pipes since the only water expected to encounter the turf is from precipitation in the form of snow and rain. The majority of expected precipitation will be absorbed into the soils with only minimal runoff during above average precipitation events. Recent studies on this type of turf technology reveal runoff is less than many natural turf sites due to less clogging caused by natural decay of turf and other natural process that create an impervious "mat" at the soil interface. Minimal maintenance of the artificial turf sites is expected and might require periodic cleaning of the site such as raking leaves or vacuuming areas free of litter and other detritus.

Below is an excerpt from a website managed by Steve Walker, President, ProGreen International, Inc. Arvada, CO. [www.progreen.com](http://www.progreen.com) 303-464-7888. Mr. Walker has been installing synthetic grass since 1987 and has witnessed the evolution of the technology. He states that opponents of synthetic grass are primarily concerned about aesthetic and safety issues such as property values, drainage, utility access, fading, and mold. He addresses each of these issues below.

- **Will Property Values Decrease?** If anything, we believe property values would increase due to lower water costs and the lack of sprinkler system maintenance. The only negative impact we have encountered is that synthetic grass remains green, even in the dead of winter (is that really bad?). However, a creative combination of xeriscaping and synthetic grass provides a more natural appearance.
- **Drainage Problems?** A common misconception is that the new synthetic grass is similar to household carpet. In fact, this intricate system involves properly constructing a sub-base, and utilizing turf with holes in the backing that is filled with sand and rubber granules. This system diverts the majority of water vertically, just like natural grass. The sand/rubber granules, which we call "infill," absorb and hold the water, which eventually drains through the holes and sub-base material. Some water will run off the top under heavy rains, just as natural grass or dirt would. Since water drains vertically, soil heating or organic loss is not an issue. Synthetic turf has a vertical drainage advantage over rock because the infill material (sand and rubber) absorbs and holds water, which allows for increased vertical drainage and evaporation.
- **Utility Access?** Some city officials are worried about the difficulty in gaining access for utility repair. It is not difficult to cut the material and roll the turf (with the infill) back, away from the utility repair area. When the utility repair has been made and the dirt is replaced and re-graded, the turf is simply rolled back and seamed. The seam is virtually invisible. If this repair were done on natural grass, sod would have to be replaced.



- **Fading?** We have been installing synthetic turf products in Denver since 1987 and have experienced very minimal fading. We estimate the yarn will fade two Pantone™ shades every 10 years. This is hardly discernable by the naked eye.
- **Mold?** Present day synthetic turf systems have been designed to eliminate mold as a problem. In fact, a natural grass system will support the growth of mold to a much greater degree.
- **Pets?** The same landscape grass we install in yards is the same as we sell for dog runs. Pet feces can be removed with a shovel, and urine washes through the system. It's really no different than natural grass.

Once educated with synthetic turf installation processes, doubts regarding synthetic grass should be alleviated. These statements made by Mr. Walker and by other sources researched during the planning of the proposed Project indicate that artificial or synthetic grass is a technology whose time has come.

### 3.2.2 Task List and Schedule

A Task List and Preliminary Schedule for this Project can be found in Table 2 of Appendix B.

#### Task 1: Project Administration

- 1.1 Preparing District Board items for Project approval
- 1.2 Environmental documentation compliance

#### Task 1 Deliverables

- Board Resolution to Proceed
- Proper environmental documentation (Notice of Exemption)

#### Task 2: Public Outreach and Communication

- 2.1 Public outreach and marketing

#### Task 2 Deliverables

- Marketing brochures explaining Project
- Update District web site describing Project and allowing public to view specifications and data about the status and performance of the demonstration project
- Articles to local media to advertise the Project and location
- Signage to advertise Project and identify assisting agencies

#### Task 3: Artificial Turf Purchase, Installation and Implementation

- 3.1 Procure a firm to supply and install artificial turf at the selected sites based on requests for proposal (RFP) responses



- 3.2 Install artificial turf at each site
- 3.3 Install signage at designated sites describing Project

#### Task 3 Deliverables

- Purchase agreement
- Installation schedule and participant database
- Installation report and site map

#### Task 4: Monitoring and Assessment

- 4.1 Draft monitoring criteria
- 4.2 Measuring success (data analysis)

#### Task 4 Deliverables

- Monitoring Plan
- Monitoring report with measurements of success. The report will be a section of the Task 5 Final Report.

#### Task 5: Project Reporting

- 5.1 Quarterly progress reports to DWR
- 5.2 Final project report detailing the installation, monitoring and assessment processes of the Project

#### Task 5 Deliverables:

- Quarterly progress reports submitted to DWR and customers including the Monitoring and Assessment components of cost/benefits that must be submitted for 5 years after Project funding.
- Final post-installation report submitted to DWR

#### 3.2.3 Preliminary Plans and Specifications and Certification Statements

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

#### 3.2.4 Environmental Documentation

A Notice of Exemption will be prepared and submitted to the California Office of Planning and Research and the County of San Bernardino.



Based on interpretation of Title 14, California Code of Regulations, Chapter 3: Guidelines for Implementation of the California Environmental Quality Act. Article 19 Categorical Exemptions, Sections 15300 to 15333; the following interpretation is cited as basis for considering this Project Categorically Exempt:

#### 15304. Minor Alterations to Land

Class 4 consists of minor public or private alterations in the condition of land, water, and/or vegetation which do not involve removal of healthy, mature, scenic trees except for forestry or agricultural purposes. Examples include, but are not limited to:

(b) New gardening or landscaping, including the replacement of existing conventional landscaping with water efficient or fire resistant landscaping.

### 3.3 Monitoring and Assessment

A Monitoring Plan will be drafted in order to standardize the collection of data and observations for the Project. Since the Project is a demonstration type using a static new technology, once the artificial turf is installed little or no operation and maintenance is required. Irrigation to the area will be turned off after pre-project conditions have been recorded. Major sections to be included in the Monitoring Plan are described below.

#### 3.3.1 Baseline Determination

Pre-Installation water meter readings data from each of the selected sites will be analyzed and stored in a Project database. At this stage of Project planning more study is being undertaken in order to develop a more precise strategy to quantify the amount of irrigated water that is currently being applied to the Project sites. This issue is further explained below in Monitoring Methodologies. Currently, estimated baseline water use is based on existing empirical water use calculations and attempts to quantify the baseline amount from the properties owners' water bills.

#### 3.3.2 Monitoring Methodologies

The District has performed pre-Project analysis to measure the potential savings of irrigated water. The District will address in the Monitoring Plan how to isolate the actual water savings to the Project area. Calculating theoretical savings was done using existing empirical formulas based on District conditions and historical water use patterns. However, calculating true water savings may be more difficult because the Project area's water is delivered to the property owners in one system. In other words, a concern is that the Project area property owners may keep using the same amount of water by simply using the water for different means in other parts of their property. The District is looking into methods to alleviate any confusion and additional outreach and communication will continue. One method is to extend the baseline determination to all parts of the property owner's water system and quantify each water use component and discuss with the property owners prior to implementing the monitoring plan.



The monitoring sites will be visited on a monthly basis to inspect the turf sites and monitor water use. Site observations will be manually written on approved field forms. The data will be entered into a database for storage and analysis.

### 3.3.3 Success Evaluation

In order to measure the success of the Project, quantitative and qualitative data analysis methods will be used. Data compiling and analyzing water use data to measure the success of the Project for selected areas where artificial turf was installed is the primary goal. Quantitative analysis of three monitored sites will include:

- 1) Amount of water conserved in the site areas will use comparisons of expected water use reduction compared to realized water use reduction.
- 2) An estimation of avoided runoff flow at the monitoring sites.

Data analysis will be incorporated into the Draft and Final Reports. Results of the analysis are expected to demonstrate a reduction in the irrigation water use. The reduction of runoff will be an indirect benefit by the artificial turf to the Bay-Delta system by reducing future demands for SWP purchases.

### 3.3.4 External Factors

As mentioned in the Monitoring Methodologies, the District is currently determining methods to alleviate erroneous data collection due to Project area property owners shifting water use patterns once they realize they are saving water by not irrigating the Project Area. Weather should not be a factor as the technology is resistant to cold and hot conditions.

### 3.3.5 Information Handling

All Project data will be stored via computer and backed up to the District's server. Reports to DWR and other interested parties can be delivered in either hard copy or electronic format. Project data and status information will be made available to the public through implementation methods presented in Task 2 Public Outreach and Communication.

### 3.3.6 Estimated Costs

It is estimated that drafting and formalizing the Monitoring and Assessment plan will cost on the order of \$2,000 dollars. This represents 40 hours of staff documentation preparation time at \$50 per hour. Remaining is approximately \$5,500 dollars available for site visits, data collection and assessment of Project success.



## 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 hyperlink to the District's website is: <http://www.lakearrowheadcsd.com/index.html>. This website 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. One such website link is the very informative 2003 District Water Demand and Supply (WDSF) Final Report. It is anticipated that the Project will follow the same procedure for public outreach and communication.

Since the Artificial Turf Project goals and objectives involve demonstrating new technology and attracting public interest, it is anticipated the public outreach program will be targeted to full-time residents, part-time residents, and tourists.

In preparing the WDSF, the District defined their public outreach program in the WDSF Section 7, Public Comments, and is 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

The first Patent for a domestic and outdoor artificial grass was registered in the US at the United States Patent Office on July 25 1976. It was registered by James M Faria and Robert T Wright for the Monsanto Company Inc. for a monofilament ribbon surface that would later become 'Astro Turf'.

The main outline of the patent was to produce a product to simulate grasses for a variety of leisure and sport uses. The early versions of the Astro Turf were produced to provide a decorative use but not to withstand outdoor sport and leisure use. Later versions of Astro Turf were designed to provide a weather resistant turf constructed from synthetic materials which is suitable for permanent outdoor use and capable of withstanding adverse weather conditions for several months with low degradations.

Besides a short product life span, other problems ranged from frequent, often serious, injuries to people playing, walking or running on the turf. Constant maintenance also proved costly. The artificial turf produced a hard, abrasive surface with an unnatural traction and was not pleasing as a lawn or natural setting. The artificial turf also had a tendency to expand and contract so it tore more easily than people had anticipated—especially with constant, rugged use.

In the last 20 years, the quality of the artificial grass has increased so significantly it is now possible to have artificial lawns that look just like a real lawn and require very little maintenance.

Present types of turf that the District is planning to purchase have polyethylene fibers and are manufactured to be strong, smooth, soft, and forgiving. The fibers contain ultra-violet protection to ensure longevity of use and are resistant to extreme temperatures. The fibers are tufted into a strong dimensionally stable backing. The finished surface looks like a well manicured, fresh, natural grass. A polyurethane coating provides a strong bind between the fiber and backing, ensuring longevity. The polyethylene fibers are surrounded by a "granulated crumb rubber infill" which meets specifications for size and cleanliness. This infill will never compact, and will remain resilient for the life of the lawn. The uniform infill sustains the consistency and stability of the playing surface.

By demonstrating this quality state of the artificial turf technology, there are direct benefits to the Bay-Delta in addition to the direct benefit of reduced water demand. If more people are exposed to this new technology then its use may spread statewide. The turf technology can reduce landscape runoff and improve water quality in aquifers and watersheds. Already in many southwestern states such as Arizona, Colorado, and Nevada, synthetic grass technology has saved millions of gallons of water annually.



## 7.0 Benefits and Costs

See Table C-1 of Appendix D for Project Costs.

### 7.1 Costs

Table C-1 of Appendix D shows the Project costs. Costs that have been included in the table are direct costs for labor and materials. The majority of the Project costs are for the purchase and installation of the artificial turf. At an estimated cost of \$8.50 per square foot of turf translates into a total request for funding of \$138,760. These costs may become lower as average installation cost per square foot based on bids (ranging from \$7.00 to \$10.00 per sq. ft.) from multiple contractors. The District will pursue the best technology for the lowest bid prior to Project implementation.

Other major costs the District is pursuing outside funding for will be labor costs associated with administrative tasks, monitoring and assessment, public outreach and report writing. The Project will have little operation and maintenance cost due to its static nature. Because this is a demonstration project the District would like to request 100% cost sharing by the State through Proposition 50 funding. This will extend the District water conservation budget to include more conservation project work and planning for the next fiscal year.

### 7.2 Benefits

#### Potential Water Use Efficiency Benefits and Information Gained

This Project has a direct benefit to the Bay-Delta. The anticipated water savings benefit of the proposed Project is considerable. Based on historical irrigation usage derived from evapotranspiration data, the District has estimated the yearly and long-term water savings that will result from replacement of each site's real grass with artificial turf. The District's Water Conservation Department has performed water savings and cost saving analysis, and the data from their findings is presented below in narrative and graphical formats.

Figure 3 of Appendix A illustrates the total estimated yearly water savings for each of the proposed sites. The combined total yearly water savings for the Project is an estimated 44,400 cubic feet (332,110 gallons or 1.02 AF).

Figure 4 of Appendix A illustrates the projected total estimated water savings for each of the three proposed sites for the 15-year life expectancy of the turf. The combined water savings for all three sites for the 15-year period is an estimated 666,000 cubic feet (4,981,680 gallons). This translates into approximately 15 AF of total water savings over the life of the program.



The anticipated water cost savings benefit for the proposed program is also significant. The District has calculated the estimated yearly and long-term water cost savings resulting from the water use reduction of the program:

Figure 5 of Appendix A illustrates the estimated yearly water cost savings for each of the proposed sites for the 15-year life expectancy of the turf, based on the District “tiered” rate structure and assuming a 3% rate increase per year. Total yearly cost savings for the sites range from \$2,965 in Year 1 to \$4,486 in Year 15.

Figure 6 of Appendix A illustrates the total estimated water cost savings for each of the proposed sites for the life expectancy of the turf. The combined water cost savings for the sites for the total 15-year period is an estimated \$55,161. This savings will recapture over one-third of the total cost of turf installation for the proposed sites. The District is confident that as the artificial turf industry becomes increasingly more competitive the average cost of installation will decrease over time. This will augment the water savings cost benefit of artificial turf while making it more accessible to the average District customer. It should also be noted that the District is poised to enter into a water purchasing agreement in the near future that would excise additional fees on District customers relative to water consumption. Since these fees would potentially increase the cost of water above and beyond the “tiered” rate structure used as the basis for the District’s water cost calculations, it is likely that the water cost savings attained by the proposed Project will actually be higher than estimated.

For the owners of the proposed sites, direct benefits of the proposed program include limited maintenance costs (compared to real turf grass), and most importantly, a dramatic reduction in irrigation water usage and expense, which will assist these customers in achieving their water reduction goals. For the Lake Arrowhead community, the proposed Project will guarantee the aesthetically pleasing quality of turf grass will be enjoyed by the community at the proposed locations for many years, regardless of future seasonal and environmental conditions.

#### Potential Benefits and Anticipated Information Gained Compared to Anticipated Costs

An estimated cost-to-benefit analysis was performed during the Project proposal. Using a 12-year life expectancy for the artificial turf technology and factoring in savings and benefits such as avoided energy, water treatment, and labor costs, the annual cost benefits are about \$12,500. The estimated annual Project costs are \$16,750. While not a locally cost efficient program at this time, it is anticipated the demonstration project will have other fringe benefits. Project benefits such as observing the technology over time to see if it stays aesthetically pleasing and draws public interest would be valuable. Training and hands on experience with artificial turf technology will help District staff become local experts and widen our knowledge base for customer support. In addition, if water pricing becomes higher due to future economic factors, this in-place technology may become more cost efficient and thus more water efficient increasing anticipated public demand.

Appendix C: DWR Benefit and Costs "C" Tables

Table C-1

**Applicant: Lake Arrowhead Community Service District**

Project Tasks  (I)	Project Costs  \$ (II)	Contingency % (ex. 5 or 10)  (III)	Project Cost + Contingency  \$ (IV)	Applicant Share  \$ (V)	State Share Grant  \$ (VI)
Administration <sup>1</sup>					
Board Items Preparaton and Submittal	\$4,000		\$4,000		\$4,000
Environmental Compliance	\$500		\$500		\$500
Supplies					
Equipment					
Consulting services					
Travel					
Other					
Total Administration Costs	\$4,500		\$4,500		\$4,500
Public Outreach and Communication	\$3,199		\$3,199		\$3,199
Artificial Turf Purchase & Installation	\$110,534	5	\$116,061		\$116,061
Monitoring and Assessment	\$7,500		\$7,500		\$7,500
Report Preparation	\$7,500		\$7,500		\$7,500
<b>TOTAL</b>	\$133,233		\$138,760		\$138,760
Cost Share -Percentage					100