



MODESTO IRRIGATION DISTRICT

**2004 Water Use Efficiency
PROPOSAL SOLICITATION PACKAGE
APPLICATION**

Section A: Agricultural Water Use Efficiency Implementation Project

**Prepared by Modesto Irrigation District In Accordance with the
Final 2004 Water Use Efficiency PSP
Dated November 15, 2004**

**Submitted to the California Department of Water Resources
January 10, 2005**

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APPENDIX A: 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, # **List B, EWMP 3, 6, and 8; List C EWMP 1**

(c) implementation of other projects to meet California Bay-Delta Program objectives, Targeted Benefit # if applicable: among others **114, 117, 122, and 126**

(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):

Modesto Irrigation District

4. Project Title:

Water Conservation Ditch & Pipeline Replacement

5. Person authorized to sign and submit proposal and contract:

Name, title **Allen Short, General Manager**

Mailing address **PO Box 4060**

Modesto, CA 95352

Telephone **209-526-7405**

Fax. **209-526-7315**

E-mail **allens@mid.org**

6. Contact person (if different):

Name, title. **Joseph Lima, Water Use Mgr**

Mailing address. **PO Box 4060**

Modesto, CA 95352

Telephone **209-526-7562**
 Fax **209-526-7352**
 E-mail **joel@mid.org**

7. Funds requested (dollar amount): **\$500,000**
(from Table C-1, column VI)
8. Applicant funds pledged (dollar amount): **\$529,400**
(from Table C-1, column IV, row n)
9. Total project costs (dollar amount): **\$1,029,400**
(from Table C-1, column IV, row n)
10. Percent of State share requested (%): **49%**
(from Table C-1)
11. Percent of local share as match (%): **51%**
(from Table C-1)
12. Is your project locally cost effective?
Locally cost effective means that the benefits to an entity (whether in dollar terms or qualitatively) of implementing a program exceed the costs of that program within the boundaries of that entity.
(If yes, project is not eligible) (a) yes (b) no
13. Is your project required by regulation, law or contract? If no, your project your project is eligible. (a) yes (b) no
14. Duration of project (month/year to month/year): **June 2005 to May 2008**
15. State Assembly District where the project is to be conducted: **25th and 26th**
16. State Senate District where the project is to be conducted: **12th and 14th**
17. Congressional district(s) where the project is to be conducted: **18th**
18. County where the project is to be conducted: **Stanislaus**
19. Location of project (longitude and latitude) **Within 40 miles of N 37° 38' 35" and W 121° 00 10**
20. How many service connections in your service area (urban)? **N/A**
21. How many acre-feet of water per year does your agency serve? **300,000**

22. Type of applicant (select one):

- (a) City
- (b) County
- (c) City and County
- (d) Joint Powers Authority
- (e) **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 _____

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

(Provide supporting documentation.)

- (a) yes, _____ median household income
- (b) **no**

2004 Water Use Efficiency Proposal Solicitation Package

APPENDIX B: 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

Allen Short, General Manager
Name and title

Date

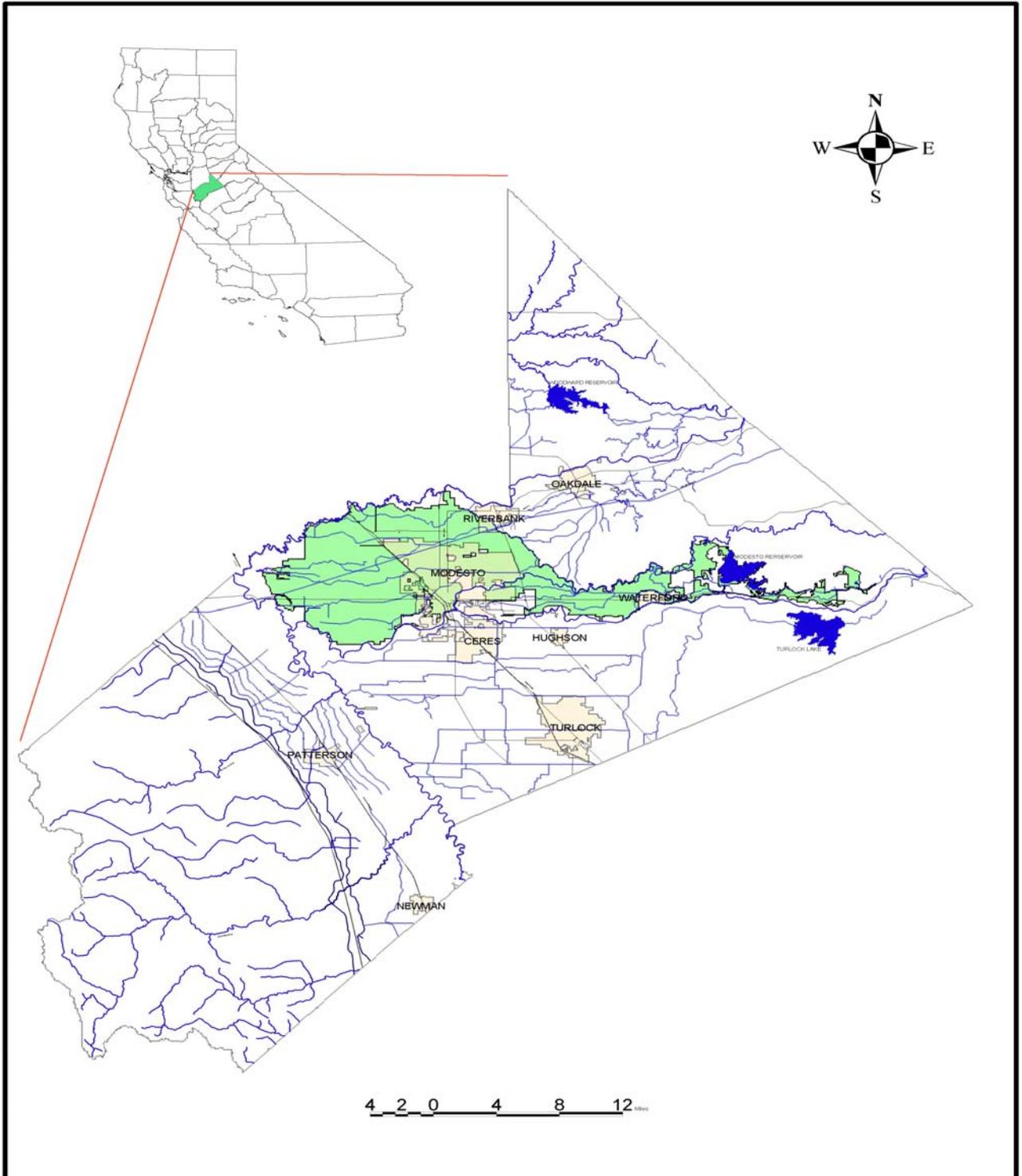
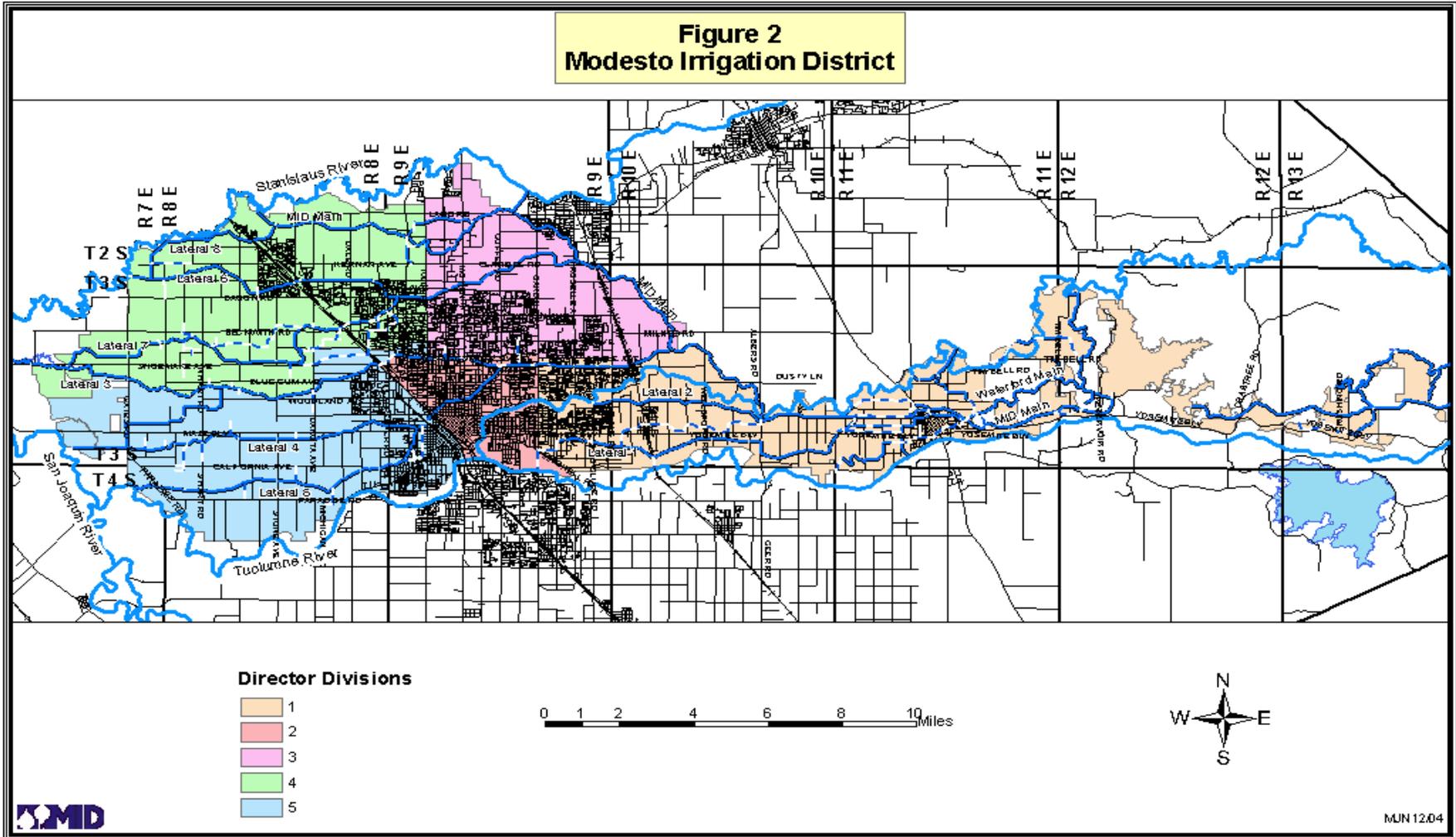


Figure 1: Map Showing Footprint of MID Relative to Stanislaus County



Statement Regarding Modesto Irrigation District (District)

Modesto Irrigation District (District) was organized on July 23, 1887 pursuant to the Irrigation District Law of the State of California, Division 11, commencing with Section 20500 of the California Water Code. The District was the second irrigation district organized under the Water Code. With most of irrigated land located east and west of the City of Modesto, the District delivers irrigation water to approximately 60,000 acres growing a variety of permanent and annual crops (See Figures 1 and 2). The District is requesting CALFED funds to continue with a ditch and cast-in-place pipeline replacement project and associated facilities.

A-15c. Statement of Work, Section 1: Relevance and Importance

Consistency with CALFED Record of Decision:

This project is consistent with the CALFED Record of Decision (ROD) goals and objectives and will contribute to Bay Delta direct and indirect benefits. This project is also consistent with the District's Agricultural Water Management Plan - Efficient Water Management Practices (EWMPs) as endorsed by the Agricultural Water Management Council on January 17, 2001. Implementation of this project will facilitate the on-farm installation of efficient irrigation systems. Listed below are some CALFED Quantifiable Objectives (QO's) benefits that are possible with the implementation of this project:

- Enhancement of the water quality in the CALFED Bay/Delta Estuary
- Potential reduction of irrigation return flows to the Tuolumne, Stanislaus, and San Joaquin Rivers
- Potential reduction of water diversions from the Tuolumne River
- Increase in the amount of water flowing in certain paths of the Tuolumne River
- Enhancement of the water quality in the Tuolumne, Stanislaus, and San Joaquin Rivers

The District service area is within CALFED's Sub-Region 11. The ditch and pipeline replacement projects will contribute to WUE program QO's of sub-region 11 by potentially reducing the upper Tuolumne River diversions and reducing river return flows. As stated in the project objective, this is accomplished when the farmers convert the method of water application from flood to the more efficient low-pressure irrigation systems. When the conversion is realized, the water use efficiency of the on-farm irrigation system has the potential to be much greater. For example, the irrigation water application efficiency may increase from 65 to 85% when flood irrigation is converted to low-pressure irrigation systems. Assuming a crop water consumption of 31.0 inches per acre, 42.0 inches of water per acre would have to be delivered to meet the crops water needs using flood irrigation. If, on the other hand, the water application for the same crop would be applied through a low-pressure system at 85% water application efficiency, then the water delivered would be 35.5 inches per acre. Assuming these

conservative conditions, 6.5 inches or 0.54 ac-ft/acre/year of water would not have to be delivered to the farm as a result of the conversion.

If less water is delivered and applied to the land, less water will be diverted from rivers and streams. Therefore, more water would be available for on-stream purposes and one or more of CALFED's QO's will be achieved. With irrigation systems that offer greater potential to apply only the crop water needs, less water is applied to the land. A conversion from flood to low pressure irrigation system also reduces the potential for surface water runoff from the irrigated fields. This reduction in runoff will potentially increase the water quality returned to rivers and streams and CALFED QO 121 (Water Quality) will also benefit. The greater use of efficient irrigation systems have a positive impact in reducing river water diversions, increase water quality, and minimize the volume of agricultural water return flows to the rivers and streams. (CALFED quantifiable objective 113)

Consistency with the MID Water Management Plan EWMP's:

This project funding request is consistent with the voluntary requirements of the Efficient Water Management Practices (EWMPs) by Agricultural Water Suppliers listed in the Memorandum of Understanding (MOU) of the Agricultural Water Management Council (Council). On April 29, 1997, the District signed the MOU and on January 17, 2001, the Agricultural Water Management Council endorsed the District's Water Management Plan (Plan) as the Council's first endorsed plan. The Plan identifies the replacement of ditches and concrete cast-in-place pipelines as an Efficient Water Management Practice that will increase water delivery reliability and flexibility to the growers. The District's Plan was the first such plan endorsed by the Council. The Plan is on file with California Department of Water Resources and the Council. The following are a few EWMP's being implemented by the District and consistent with the requirements of this application:

- Facilitate the finance of capital improvements for on-farm irrigation systems
- Line or pipe ditches and canals
- Increase flexibility in water orders and delivery to water users
- Optimize conjunctive use of surface and groundwater
- Automate canal structures

Goals: The goal of this project is to upgrade existing water conveyance and delivery systems that lead to increased on-farm water use efficiency. By increasing the on-farm water use efficiency within the District, local, state and federal benefits can be realized. The state benefit is consistent with the Bay-Delta quantifiable objectives. This can be accomplished by replacing existing ditches and cast-in-place pipelines with plastic pipelines. By replacing the existing ditches and the deteriorating cast-in-place pipelines with new pipelines, the water conveyance and delivery system will significantly improve water flexibility and reliability to the water users. This greater flexibility and reliability facilitates the conversion of on-farm water application systems from the less efficient flood irrigation to the more efficient low-pressure drip and micro sprinklers.

Farmers/landowners (farmers and landowners may be used in this application together or separately) will not convert to the low-pressure irrigation systems if the water conveyance and delivery system is not reliable and if it does not have the flexibility to make irrigation water available when needed. The existing ditches and cast-in-place pipeline systems, in most cases, will meet the water needs of flood irrigation but will not meet the needs of low-pressure irrigation systems. Flood and low-pressure irrigation systems water requirements are incompatible when the source of water is simultaneously being provided from cast-in-place pipelines or ditches.

Objectives: The objective of this project is to have irrigation water available to the farmers when crops need it, at the designed flow of the low-pressure irrigation system, and for the required amount of time. When these needs are met, farmers will generally make the capital investment necessary to upgrade the on-farm system from flood to the more efficient low-pressure irrigation systems. The irrigation water conveyance and delivery system is a critical component of the equation to have water available when needed, with the right flow, and for the required amount of time. Farmers will not convert from flood to the more efficient low-pressure irrigation systems unless they are confident that they will have a reliable and flexible water supply. Thus, this project is designed to contribute to the cost of replacing and upgrading existing water conveyance and delivery systems that give farmers irrigation water reliability and flexibility. Once this is accomplished, farmers will invest in on-farm irrigation systems that are more efficient.

A-15d. Statement of Work, Section 2: Technical/Scientific Merit

This project has the technical and scientific merit to meet the goals and objectives of the CALFED program quantifiable objectives. When farmers/landowners have reliable and flexible irrigation water delivery, in most cases, they will make the necessary investments to modernize their on-farm irrigation systems. When a conversion from flood to the more efficient low-pressure irrigation system is made, the benefits accrue to the farmer, the district, the local community, and the state and federal governments. Detailed benefits to various parties is discussed in Sections A-15c and A-15i.

Methods: The District delivers water to approximately 2,800 farmers/landowners and 60,000 acres with an average irrigated parcel of twenty acres. The typical farmer/landowner within the District does not rely on farming as the sole source of household revenue. Farming operations with less than twenty acres may grow fruits and vegetables for the family with a portion sold to supplement the household income. As discussed earlier, District and state funds will be made available to the farmers/landowners as a matching grant for qualifying projects. The farmers will have to contribute a minimum of 25% of the project cost. The District and Bay Delta will contribute the remainder. Therefore, a grant of \$500,000 from the Bay Delta would generate over a million dollars in water conservation projects. If the funds are approved by DWR, the District will advertise the conservation incentive program through the District periodic newsletter, farmer/landowner meetings, and through local newspapers.

Procedures: As individuals or as a party (a party refers to water delivery systems serving more than one farmer/landowner), landowners contact the District with a request to replace a ditch or pipeline. Once received, the District will review the request, study the project feasibility, and perform a preliminary design evaluation. (In addition to the monetary contribution, there are additional in-kind services provided by the District: See Table C-1) The District will then recommend to the landowner a qualified contractor who will perform the final design and perform the work. The District reviews the contractor's final design, monitors the work progress, and signs-off on the project completion for consistency with the design. All of these services to individuals or party projects are free to landowners and are included in the District in-kind services.

Past experience suggests that farmers/landowners will not invest in new water conveyance facilities unless at least 50% of the project cost is contributed from an outside funding source. Even with this level of funding, many farmers still opt to keep the flood irrigation system and not convert to low-pressure irrigation systems. In some instances, farmers/landowners will forego the District's surface water in favor of groundwater. Neither of these options is to Bay Delta's or District's benefit. If growers opt not to take action, the land will continue to be irrigated with the less efficient flood irrigation system. If growers convert to potentially more efficient irrigation systems, but opt for groundwater for the water supply, the option for conjunctive use of surface and groundwater during wet and dry years is decreased. With additional Bay Delta funding to augment the District's budget, the contribution to upgrade and replace water conveyance and delivery systems would be increased from 50% up to 75% of the farmer's total cost. For example, if an individual project costs \$20,000, the Bay Delta would contribute \$9,800 (49%), the farmer would contribute at least \$5,000 (25%), and the District would contribute up to \$5,200 (26%). The farmers/landowners incentive to participate increases considerably with the additional funding.

Equipment and Facilities: Since construction is performed through contractors, no District equipment is used in the implementation of the projects. The facilities may be the property of the landowners and/or the District. For example, a pipeline project may include a private ditch that encroaches into District property. Facilities such as sidegate valves and/or water measurement devices may be on District property.

Tasks list and schedules: It is anticipated that the agreement between the grant recipients and DWR will be for a minimum period of three years. Even though, there are a large number of landowners waiting for funding, the District will not perform the preliminary investigative work until funding for the grant application has been approved and an agreement has been signed. If funds are available by mid-2005, individual projects would be completed by the mid-2008. During the 2003 and 2004 water conservation incentive phase, a total of 39,000 feet of pipeline were installed for thirty-three landowner projects and at a cost of \$822,000. If the District receives a grant of \$500,000, over \$1.0 million would be available for water conservation conveyance pipelines and associated facilities. Assuming a 15% percent project cost increase over the 2003/2004 project phase, \$1.0 million would buy 46,000 feet of installed pipelines for forty individual projects. (Exhibit A represents a typical project schedule for 2002/2003 Irrigation Incentive Program)

Environmental Documentation: If the grant is approved, there could be up to forty individual projects and up to forty-six thousand feet of ditches and concrete cast-in-place pipelines replaced with plastic or reinforced concrete pipelines and associated facilities. Most of the ditches and pipelines being replaced are currently being used for the conveyance of water from the District canal system to the on-farm irrigation systems. These facilities are only used during the summer irrigation season. The proposed replacements and associated facilities will perform the same water conveyance functions as the current system except with greater reliability and flexibility. The water conveyance systems will supply the water needs of crops and other farming activities. If the current on-farm irrigation system is converted from flood to drip or sprinklers, a small impact to the water delivery management may occur. No known outside environmental, social and economic impacts are anticipated. Therefore, no impacts requiring compliance with CEQA, or other environmental regulation is expected. Further, there are no local, county, or federal permits required for this project other than those required by the District for impacts on its water conveyance and delivery system management. The District mitigates the impacts of individual projects any time such projects may impact the services provided to its farmers/landowners.

A-15e. Statement of Work, Section 3 - Monitoring and Assessment

Monitoring and Assessment: In general, the project success will be subject to grower participation. If growers take advantage of the funding, the on-farm water delivery system will have the reliability and flexibility required for on-demand water deliveries. With this capability, the grower can request and use MID surface water for pressurized micro irrigation systems. If growers participate in this project and install or continue to use more efficient irrigation systems, CALFED's and MID's objectives will be achieved. Current CALFED Quantifiable Objectives (QO's) specify net water quality benefits when conversion from flood to micro irrigation systems take place.

- The basic assumption with this project is that landowners will use surface water as the primary source of supply and that landowners will install or continue to use more efficient micro irrigation systems. Based on results of past years, landowners who replace the conveyance water delivery system will use surface water as the primary source of supply. In most cases, the landowner will either immediately or within a few years convert the irrigation system from flood to micro irrigation.
- It is the intent of the District to begin the process of monitoring and collecting data on the irrigation management practices of the landowners who participate in this project.
- With the data collected, the District will establish how the projected goal and objective assumptions are being met. For example, how much of the land benefiting from this project is actually using surface water and using micro irrigation systems.

- The data collected will also establish external factor trends. For example, with the ability to have reliable and flexible water delivery, will the landowner convert the irrigation system and modify the cropping mix? (i.e. from annual to permanent crops)
- The data will be collected and stored by the District. The data will be made available to DWR and other public agencies.
- The costs associated with implementation and monitoring of the project will also be collected. The cost/benefit analysis using actual and assumed data will be re-evaluated annually for at least five years after the completion of the project.

A-15f. Qualifications of the Applicant and Cooperators

Modesto Irrigation District has the resources, expertise, and motivation to complete this project consistent with the requirements of the Water Use Efficiency Proposal Solicitation Package. Joseph Lima will be the project manager. William Ketscher with assistance from David Bakker will be the project engineers and coordinators (See Exhibits x through z).

The farmers/landowners who participate in this project will be the main cooperators and ultimate beneficiaries. Based on past participation, it is expected that up to forty farmer/landowners will be participating in this project. As mentioned earlier, the cooperators (farmers/landowners) will be responsible for at least 25% of the project cost, the District will contribute up to 26%, and the grant, if awarded, the other 49%.

In 2001, the District was the recipient of SB 23 water use efficiency grant (MID/DWR Contract Number 460000-1613 dated June 15, 2001) for two hundred seventy-four thousand dollars (\$274,000). The program funded with the grant was very successful. Thirty-three landowners participated in the installation of 33 individual water projects replacing ditches and cast-in-place concrete pipelines. Several of these individual projects led to the subsequent installation of micro irrigation systems or made it possible for the landowner to revert from groundwater to surface water as the source of supply for existing system.

A-15g. Outreach, Community Involvement and Acceptance

The District has implemented these types of projects in the past. As in past experience, this project is expected to be very popular with farmers/landowners. Many landowners have already inquired on the availability of funding and are in close contact with the District on funding availability. If this proposal is selected, the District will contact the farmers/landowners through various outreach programs such as annual and other special meetings, periodic newsletters, and through various employee/landowner contacts and network. The implementation of this project will not have any known adverse impacts. Consequently, no third party or other negative impacts or opposition are anticipated. It is estimated that forty growers/landowners will directly benefit from

this project. Additionally, local jobs will be created as a result of the construction projects generated and materials supplied.

A- 15h. Innovation

The San Joaquin River area is one of the most mature agricultural areas in the state. The three oldest irrigation districts in California were organized in this area in the late 1800's. Most of the districts in this area have similar operation and landowner characteristics. Most of the districts in this area employ gravity water delivery systems similar to those in use at Modesto Irrigation District. Most serve a large number of landowners farming small land parcels. Therefore, elements of this proposal can be applied to other irrigation districts in the San Joaquin and Sacramento River areas. Local, state, and CALFED benefits in other irrigation districts should be consistent with those being highlighted in this proposal.

A-15i. Benefits and Costs

Bay Delta Benefits: This project is consistent with the CALFED Record of Decision (ROD) goals and objectives and will contribute to Bay Delta direct and indirect benefits. Listed below are potential Bay Delta benefits resulting from the implementation of this project:

- Enhancement of the water quality in the Bay Delta Estuary
- Reduction of irrigation return flows to the Tuolumne, Stanislaus, and San Joaquin Rivers
- Reduction of water diversions from the Tuolumne River
- Increase in the amount of water flowing in certain paths of the Tuolumne River and out through the Delta
- Enhancement of the water quality in the Tuolumne, Stanislaus, and San Joaquin Rivers

As stated in the project objective, these benefits will accrue when farmers convert the method of water application from flood to the more efficient low-pressure irrigation systems. When a conversion is realized, the water use efficiency of the on-farm irrigation system has the potential to be much greater. For example, the irrigation water application efficiency may increase from 65 to 85% when flood irrigation is converted to low-pressure irrigation systems. Assuming a crop water consumption of 31 inches per acre, 42.0 inches of water per acre would have to be delivered to meet the crops water needs using flood irrigation. If, on the other hand, the water application for the same crop would be applied through a low-pressure system at 85% water application efficiency, then the water delivered would be 35.5 inches. Assuming these conditions, 6.5 inches or 0.54 ac-ft/acre/year of water would not have to be delivered to the farm as a result of the conversion.

If less water is delivered and applied to the land, less water will be diverted from rivers and streams. Therefore, more water may be available for on-stream purposes and the Bay Delta solution area. With irrigation systems that offer greater potential to apply only

the crop water needs, less water is applied to the land. A conversion from flood to low pressure irrigation system also reduces the potential for surface water runoff from the irrigated fields. This reduction in runoff will potentially increase the water quality returned to rivers and streams and the Bay Delta. The greater use of efficient irrigation systems have a positive impact in reducing river water diversions, increase water quality, and minimize the volume of agricultural water return flows to the rivers and streams.

Local Benefits: Local benefits will mostly accrue to the local farmers/landowners and to the local economy. These are some of the benefits:

- Farmers will have a flexible and reliable surface water supply
- Farmers will be able to convert from flood to low-pressure (drip and microsprinklers) irrigation systems
- Farmers will have the opportunity to use high quality canal surface water supply
- Farmers do not have to rely on the use of expensive lower quality groundwater
- Local jobs will be created for project construction and due to increased labor to operate and maintain the new irrigation systems
- Local vendors will also benefit due to increased equipment and material sales
- The District will be able to manage its water conjunctively by having greater flexibility to supply its customers with surface or groundwater
- In the longer-term, the District could benefit by being able to manage water deliveries more efficiently

In the early 1990's, the District recognized that some local farmers were switching from surface water to groundwater for their crop water needs. The farmers were opting to use groundwater especially when they were converting from flood to low-pressure irrigation systems. Groundwater was being used because it was available when they wanted it, gave them the exact amount of flow, and they could use it without restrictions. On the other hand, the District supplied surface water was delivered once every week to two weeks and the water conveyance and delivery system occasionally broke down. The ditches and cast-in-place pipelines from the District's canals to the farmers pumping stations were inflexible and unreliable.

In an effort to reverse this trend, the District initiated an incentive program to replace the water conveyance ditches and old cast-in-place pipelines. With this application, the District is asking for CALFED funding to continue with this program. With the implementation of this program, farmers will have greater water delivery flexibility and reliability. Consequently, they will have the ability to convert from flood to low pressure (drip and microsprinklers) irrigation systems and for continuing to use high quality and relatively inexpensive surface water. If this project is implemented, it is estimated that 1,900 acres of land will be converted from flood to low pressure irrigation systems for an estimated savings of 1,030 acre-feet of water per year

Regional Benefits: The continuing implementation of this project will contribute to the following regional benefits:

- By minimizing agricultural groundwater use, enhance the domestic groundwater supply of the local communities
- Minimize the impact to the groundwater supply of the rural population
- Maintain the surface/ground water balance of the basin and increase the ability to use water conjunctively

The City of Modesto, surrounding communities, and rural populations depend on groundwater for most of their domestic water needs. The farmers' use of groundwater rather than surface water to irrigate the crops adversely impacts the groundwater table. With this project the farmers will use surface water rather than groundwater which has the potential to help recharge the groundwater. When farmers rely on groundwater for irrigation, there is the potential that the current surface/groundwater balance will be disrupted and the current conjunctive water use effort will become less effective.

State Benefits: State benefits include the accomplishment of CALFED Record of Decision (ROD) objectives:

- Some of the CALFED ROD objectives would be met
- On-stream water would be of higher quality
- Conjunctive use options would be optimized
- The amount of water in certain paths of the Tuolumne River would increase

The state benefits when the CALFED ROD objectives and recommendations are implemented. Some of those objectives and recommendations are based on on-farm cultural practices that contribute to stream water quality. When farmers opt to use groundwater rather than surface water as the primary source of irrigation water, the opportunity to use water conjunctively is diminished. The ideal conjunctive use program takes advantage of surface water during wetter years, when it is available, and increases groundwater use during drier years when surface water is less available. When the efficiency of water application is increased the volume of water diverted for irrigation is decreased. If diversions are decreased, the volume of water left in the streams is increased. Therefore, the volume and quality of water in certain paths of the rivers and the Bay Delta are enhanced.

Federal Benefits: The benefits to the federal government are similar to those of the state. A greater volume of higher quality of water will benefit the federal water system and contribute to federal water quality objectives. This is especially true for the San Joaquin River which has been declared a water quality impaired river.

Exhibit A

IRRIGATION INCENTIVE PROGRAM 2002/2003

Landowner	Completion Date	Pipe Length (feet)	System Type	Irrigation Method	Acres	Crop	Total Project Cost
Gary Erickson	Nov-02	2,400	18" PVC	flood	30	pasture	\$ 33,303
Luchessa - Crow ID	Dec-02	1,500	30" PVC	micro	324	almonds/wal	\$ 74,322
Luchessa - pvt pipe	Dec-02	600	15"	micro	see above	almonds	\$ 5,347
Peder Hoy	Nov-02	200	27" PVC	flood	4	corn/oats	\$ 11,110
Daryl Hayes	Nov-02	4,654	12" & 15" PVC	micro	230	walnuts	\$ 51,270
Mapes Ranch	Dec-02	2,028	36" PVC	flood	162	pasture	\$ 116,579
Winters/Bowman	Jan-03	1360	18" PVC	micro	58	almonds	\$ 32,974
Art Bowman	Jan-03	1080	15" PVC	micro	58	almonds	\$ 12,774
Dale Bowman	Jan-03	840	12" PVC	micro	14	almonds	\$ 7,313
Salida Hulliing	Feb-03	2100	27" PVC	micro	20	almonds	\$ 58,208
Merlin Garber	Feb-03	1000	15" PVC	micro	39	almonds	\$ 26,574
Harry Belletto	Feb-03	50	gate & valve	flood	6.7	almonds	\$ 4,200
Cy Young	Dec-02	80	27" PVC	flood	52	almonds	\$ 8,260
Eric Rumble	Mar-03	pre-screen	pre-screen	micro	26	almonds	\$ 5,906
Hill Top Farms	Feb-03	0	Chain Screen	sprinklers	300	almonds	\$ 14,000
Steve Van Duyn	Feb-03	0	Automatic gate	drip / micro	60	almonds	\$ 15,000
Mark Giannini	Apr-03	140	24" PVC	micro	20	almonds	\$ 9,147
Ron Martella	Mar-03	1,170	24" & 27" PVC	flood	20	almonds	\$ 30,000
Tom Van Duyn	Feb-03	1000	15" PVC	micro	80	almonds	\$ 15,000
Declan Gowan	Feb-03	450	27" PVC	flood	108	almonds	\$ 20,000
Mark Royer	Feb-03	2000	18" & 24" PVC	micro	140	almonds	\$ 60,000
Jim Anderson	Feb-03	620	12" PVC	micro	6	almonds	\$ 7,500
Michael Rancg	May-03	960	24 ' PVC	Sprk/flood	40	Almonds	\$ 40,000
Total		24,232			1,778		\$ 658,787

Exhibit X

**JOSEPH M. LIMA
1022 Enslin Ave.
Modesto, CA 95350
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Email: joel@mid.org**

SUMMARY OF QUALIFICATIONS

- Water Management: over twenty-five (25) years of experience in the private and public sector.
- Supervisory Experience: over twenty (20) years of experience in supervising employees in the private and public sector.
- Irrigation Water: knowledgeable and experienced in water distribution and the application of water to crops.
- California Water Issues: understanding of federal, state, and local water issues and the impact of those issues on California water suppliers and users.
- Irrigation Water Issues: experience in agriculture water use and its affects on suppliers and irrigation water users.

EMPLOYMENT EXPERIENCE

1989-Present: MODESTO IRRIGATION DISTRICT, Modesto, CA 95352

1996-present: WATER USE MANAGER

Responsibilities include overseeing District's water conservation efforts, coordination of water use data and water supply management, and water billing services.

1992-1996: CHIEF- IRRIGATION OPERATIONS

Responsibilities included the administration and management of the Irrigation Operations Division including engineering, construction/maintenance, water delivery to irrigation customers, and technical/advisory support in water rights.

1989-1992: IRRIGATION MANAGER

Responsibilities included the administration and management of the Irrigation Services and the Construction/Maintenance Departments of the Irrigation Operations Division.

1973-89 SUPERIOR FARMING COMPANY (SFC), Bakersfield, CA 93312

1987-1989 DIRECTOR - CHILEAN PROJECT

Administered the protection of SFC's intellectual property in Chile.
Coordinated fruit exports to the United States.

1984-1987 DIRECTOR - MEDITERRANEAN AREA PROJECT

Administered the protection of SFC's intellectual property in Europe, Middle East, and North Africa – Contracted for the growing of SFC's patented fruit varieties in those areas.

1973-1984 MANAGEMENT and OPERATION – WATER SERVICES

Planning, directing, supervising and management of water services to over 40,000 acres of irrigation lands.

SFC INTERNATIONAL CONSULTANT

- 1980 PEOPLE'S REPUBLIC OF CHINA: Three-week trip with a team of experts studying the application of modern agricultural technology to China's farming practices.
- 1978 EGYPT: Two-week trip to study the feasibility of an agricultural development project to irrigate 20,000 acres in Wadi El Natrum.
- 1976 IRAN: One-year assignment advising the Iranian Ministry of Agriculture in the design and construction of low-pressure irrigation systems.
- 1976 USSR: One-week Moscow irrigation seminar on the applications of drip irrigation to Russia's farming operations.

EDUCATIONAL, PROFESSIONAL, AND COMMUNITY SERVICE

- B.S. in Agricultural Engineering from California Polytechnic State University, San Luis Obispo, CA -1973.
- California Water Plan: Member of Advisory Committee, 2002- Present
- Agricultural Water Management Council (AWMC): Director, 1998-present
- California Irrigation Institute (CII): Director, 1998-present: President 2003-2004
- Cal Poly Agricultural Engineering Department: Advisory Council 1992-1999: President, 1994 and 1998.
- Stanislaus County Civil Grand Jury: Two Terms – 1997/1998 and 1998/1999
- The Modesto Lions Club: Member, 1994 - Present: President, 2000/2001.
- Co-authored chapter, "Irrigation Scheduling" in Nakayama, F.S., and Bucks. D.A., eds., Trickle Irrigation for Crop Production, (college text) ASAE, St. Joseph, MI 1986.

Exhibit Y

William M. Ketscher
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EDUCATION

- B.S., Civil Engineering, University of California at Davis

REGISTRATION

- California, Civil Engineering, 1977, No. 27996

SUMMARY OF QUALIFICATIONS

- Engineering: over thirty (30) years of civil and irrigation engineering experience with Modesto Irrigation District.
- Supervisory and Management: over twenty (20) years of experience supervising engineering staff and managing an engineering department.
- Water Resources: over twenty-five (25) years experience with the reservoir and canal operations, and watershed hydrology.
- Irrigation Modernization: over thirty (30) years of experience in modernizing both District and on-farm irrigation facilities in order to improve overall water efficiency.
- California Water Issues: general knowledge of California water issues as they relate to local, State and Federal water supplies.

EMPLOYMENT EXPERIENCE

1974 - Present: Modesto Irrigation District, Modesto, CA

- 1995 - present: IRRIGATION ENGINEERING MANAGER
Responsible for managing the District's Civil Engineering Department. Work includes directing staff involved in engineering design, contracting and construction coordination of: District and on-farm water delivery facilities, the MID Domestic Water Treatment Plant, the District's power generation facilities, electrical transmission facilities and substation facilities. Directly responsible for providing structural inspections of District's dam facilities, coordination of reservoir operations with joint operating agencies, hydrologic monitoring of District's Tuolumne River watershed and providing technical support for District water rights.
- 1981 – 1995: SENIOR CIVIL ENGINEER

Responsible for civil engineering design and engineering staff supervision. Work includes design, contracting and construction monitoring of projects involving District irrigation canals, pipelines, pump facilities and electrical facilities and providing engineering design and technical support for on-farm irrigation delivery systems.

- 1974 – 1981: CIVIL ENGINEER
Responsible for civil engineering design of irrigation pipelines and control structures, canal flow measurement and flow monitoring, and automation of District's canal diversion structures.

SPECIFIC PROJECTS

- Provided engineering review and technical support in the preparation of the 1995 MID Irrigation Master Plan.
- Provided engineering design and construction coordination of the District's canal modernization projects identified in the 1995 Irrigation Master Plan Report.
- Provided engineering coordination and review of Brown and Caldwell's 1985 Main Canal Enlargement Study.
- Provided engineering review and technical support for the MID Main Canal Tunnel Project completed April 1988.
- Provided initial engineering selection and project oversight on behalf of MID for the James M. Montgomery's 1989 Modesto Surface Water Treatment Study.
- Provided engineering management over Imbsen and Associates 2003 Structural Evaluation of the Dry Creek Flume Structure.
- 1989- present: Responsible for the coordination, design, and construction of all irrigation projects funded through MID's 1989 Water Conservation Program.
- Provided engineering review and technical support for the Phase I Water Treatment Plant Project and the current Phase II Water Treatment Plant Expansion Study.

PROFESSIONAL AND COMMUNITY SERVICE

- Modesto Engineers Club
- Cub Scout Leader
- Representative on Modesto High School Agricultural Advisory Committee, 1997 - present
- Delta Tributary Agency Committee, Coordinator 1992 – 2000
- State Water Conservation Coalition Agricultural Conservation Task Force, 1990 – 1994

Exhibit Z

DAVID B. BAKKER, P.E.

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Modesto, CA 95358
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Email: daveb@mid.org

POSITION WATER RESOURCES SPECIALIST I

EDUCATION B.S., Mechanical Engineering, California State University, Long Beach
California Civil Engineer License #C 66234

Engineering coursework taken in fluid mechanics, surveying, structures, concrete design, thermodynamics, power plant design, and heat transfer. Additional coursework taken in hydraulics, concrete design, soils, pump design and GPS. Computer knowledge of Microsoft Office, Microsoft Access and AutoCAD.

EXPERIENCE **Engineering Technician I** (01/98 – 03/01) *Modesto Irrigation District; Modesto, CA*

Assisted senior engineers in designing and drawing plans for low head pipelines, pipeline control structures, and canal structures. Participated in a survey crew for canal, pipeline, construction, and water measurement surveys. Performed inspections of pipelines, canals, and control boxes.

Water Resource Specialist (03/01 - present) *Modesto Irrigation District; Modesto, CA*

Project leader and designer for low head cast-in-place (CIP), reinforced concrete pipe (RCP), polyvinyl chloride (PVC), and high density polyethylene (HDPE) pipelines systems and pipeline control structures in both agricultural and rural areas. Developed standards for pipeline construction, pipeline control structures, prescreening devices and irrigation pump systems. Provide special inspection of pipeline construction, pipeline control structures, canal control structures, canal control gates, diversion dam repair, culverts and simple span concrete bridges for both agricultural and urban development.

Maintain water accounting systems for the Tuolumne River Watershed and water diversions from the Don Pedro Reservoir between the Turlock Irrigation District and Modesto Irrigation District. Perform hydraulic analysis based on the Tuolumne Watershed and irrigation canal system for management decisions and legal issues concerning water rights on a local level. Generate and properly keep water records for the Tuolumne River Watershed, Don Pedro Reservoir and Modesto Irrigation District's canal systems. Design of substation foundations for

breakers, transformers, bus structures and transmission towers of new and existing electrical facilities.

Ranch Owner (4/98 - present) *Modesto, CA*

Manage all aspects of farming for 27 acres of almond trees. With duties including proper irrigation practice & scheduling, spraying applications, cultivating, and use of equipment.

ACTIVITIES Modesto Engineer Club Member (2001- present)

Modesto Engineering Club; Modesto, CA

Active organization created to promote engineering in Modesto, Ca and surrounding community.

Youth Group Leader (01/00 – present)

Modesto Christian Reformed Church; Modesto, CA

Christian high school organization created for community service, activities and moral growth.

Applicant: **MODESTO IRRIGATION DISTRICT**

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

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

	Qualitative Description - Required of all applicants ¹				Quantitative Benefits - where data are available ²
	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 ³ Indirect ⁴ or Both	Quantified Benefits (in-stream flow and timing, water quantity and water quality)
Bay Delta	See Application: Section A-15i Bay Delt Benefits	This project will benefit the Tuolumne, Stanislaus, San Joaquin Rivers and the Bay Delta. Water flow and quality improvements could occur at any time of year during the life of the project. (See Bay Delta Benefits Page 15)	25 Years	The Bay Delta will receive mostly direct benefits as a result of this project. Higher quality water not diverted to the canal system will flow into the rivers and the Bay Delta solution area. (See Bay Delta Benefits Page 15)	1,030 ac-ft/year
Local	See Application: Section A-15i Local Benefits	Once this project is implemented, local benefit accrues mostly to the farmers who will have water flexibility and reliability to install efficient irrigation systems. (See Local Benefits Page 16)	25 Years	Not applicable.	No realized current benefit

¹ The qualitative benefits should be provided in a narrative description. Use additional sheet.

² Direct benefits are project outcomes that contribute to a CALFED objective within the Bay-Delta system during the life of the project.

³ Indirect benefits are project outcomes that help to reduce dependency on the Bay-Delta system. Indirect benefits may be realized over time.

⁴ The project benefits that can be quantified (i.e. volume of water saved or mass of constituents reduced) should be provided.

