**2004 Water Use Efficiency Grant Proposal**

**for the**

**Deer Creek Agricultural Water Use Efficiency Program**

# Near-term System Improvements Project

**Submitted by**
**Deer Creek Irrigation District**
**in association with**
**Stanford Vina Ranch Irrigation Company**

To the
California Department of Water Resources

Pursuant to the

Final 2004 Water Use Efficiency Proposal Solicitation Package

## Section A:
**Agricultural and Urban Water Use Efficiency Implementation Projects**

**January 2005**

# Notes to Reviewers

The following notes are provided to reviewers to assist in their navigation of the document and evaluation of the materials submitted:

1) The major sections of the proposal and all of the attachments referred to from the body of the proposal are separated with labeled, tabbed dividers.

2) All text is presented in 12-point font. To the extent possible, tabular information was also presented in 12-point font; however, exceptions were made in some cases to allow related information to be presented on one page rather that divided into two or more pages

3) Tables and figures are presented following the page on which they are first referenced.

4) Benefits and costs are presented in one consolidated section (Section IX).

5) Additional information referenced from the main proposal sections is included in 12 Attachments, designated A through L.

6) The page count for the complete proposal, Sections I through IX, is tabulated below for convenient reference. The count does not include the proposal cover, table of contents, divider pages, these "Notes to Reviewers", Figure 2 (folded in pocket at rear of report) nor Tables C-1 through C-3 and C-5 through C-8 in Section IX. (Note: By telephone consultation on January 5, 2005, at 3:25 PM, Debra Gonzales stated that the C-series of tables would not be included in the page count.)

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# Abbreviations

| | |
|---|---|
| AWMC | Agricultural Water Management Council |
| CBDA | California Bay-Delta Authority |
| CEQA | California Environment Quality Act |
| DCFEP | Deer Creek Flow Enhancement Program |
| DCID | Deer Creek Irrigation District |
| DCWC | Deer Creek Watershed Conservancy |
| DCWEP | Deer Creek Water Exchange Program |
| DFG | California Department of Fish and Game |
| DWR | California Department of Water Resources |
| EWP | Environmental Water Program |
| FWS | United States Fish and Wildlife Service |
| IID-MWD | Imperial Irrigation District and Metropolitan Water District of Southern California |
| MOU | Memorandum of Understanding |
| NEPA | National Environmental Policy Act of 1969 |
| PLC | Programmable Logic Controller |
| PSP | Proposal Solicitation Package |
| ROW | rights-of way |
| SCADA | Supervisory Control and Data Acquisition |
| SVRIC | Stanford Vina Ranch Irrigation Company |

# I. 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 Practices, # 5 and #9
   - ☐ (c) implementation of other projects to meet California Bay-Delta Program objectives, Targeted Benefit # 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): Deer Creek Irrigation District, in association with Stanford Vina Ranch Irrigation Company
4. Project Title: Deer Creek Agricultural Water Use Efficiency Program Near-term System Improvements Project
5. Person authorized to sign and submit proposal and contract:

| | |
|---|---|
| Name, title | John Edson, DCID President |
| Mailing address | P.O. Box 156 |
| | Vina, CA 96092 |
| Telephone | (530) 839-2365 |
| Fax. | None |
| E-mail | edsonappraisals@sbcglobal.net |

6. Contact person (if different):

| | |
|---|---|
| Name, title. | Same as above |
| Mailing address. | |
| Telephone | |
| Fax. | |
| E-mail | |

7. Funds requested (dollar amount): $1,230,218
*(from Table C-8, column II)*

8. Applicant funds pledged (dollar amount): $0 (applicant qualifies as disadvantaged)

9. Total project costs (dollar amount): $1,230,218
*(from Table C-1, column II, row I)*

10. 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, provide information that the project in addition to Bay-Delta benefits meets one of the following conditions: board transferable benefits, overcome implementation barriers, or accelerate implementation)*

- ☐ (a) yes
- ☑ (b) no

11. Is your project required by regulation, law or contract

if no, your project is eligible
if yes, the project is eligible if it is not currently requires

- ☐ (a) yes
- ☑ (b) no

*Provide a description of the regulation, law or contract and explanation of why the Project is not currently required*

12. Duration of project (month/year to month/year): Dec 2005 to Dec 2007

13. State Assembly District where the project is to be conducted: Assembly District 2

14. State Senate District where the project is to be conducted: Senate District 4

15. Congressional district(s) where the project is to be conducted: 2nd District

16. County where the project is to be conducted: Tehama

17. Location of project (longitude and latitude) 122º 03'west longitude 39º 56' north latitude

18. How many service connections in your service area (urban)? Not Applicable

19. How many acre-feet of water per year does your agency serve? DCID 11,500 AF/yr SVRIC 23,000 AF/yr

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, $31,307 annual median household income
- ☐ (b) no

Statewide median household income = $47,323
80% of statewide = $37,858
(See Section VI)

## 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 | John W Edson<br>Name and title<br>Pres DCID | 12-13-04<br>Date |

# III. Statement of Work, Section 1: Relevance and Importance

## *Introduction*

Working together pursuant to the terms of a memorandum of understanding (MOU), Deer Creek Irrigation District (DCID) and Stanford Vina Ranch Irrigation Company (SVRIC), are submitting two grant applications under the Final 2004 Water Use Efficiency Proposal Solicitation Package (PSP). One application is being submitted under Section A for implementation of near-term distribution system improvements that are urgently needed and would provide immediate Bay-Delta benefits; the second proposal is being submitted under Section B to conduct a feasibility investigation of long-term irrigation distribution system improvements that would further increase Bay-Delta benefits. While the greatest benefit to the Bay-Delta would result from approval of both the Section A and Section B applications, approval of only one of the applications will not jeopardize the viability or ability to conduct the other. This section discussing the relevance and importance of the projects is the same in both applications.

DCID and SVRIC are located on the east side of the Sacramento River, approximately midway between Chico and Red Bluff (Figure 1). The small, unincorporated town of Vina is located within the SVRIC service area boundary.

## *Project Goals & Objectives*

The fundamental goal of implementing water use efficiency improvements to the DCID and SVRIC distribution systems is to enable the two entities to participate meaningfully and effectively in ongoing, cooperative efforts to increase Deer Creek instream flows during critical fish migration periods. At the same time, these improvements will help to ensure local water supply reliability and could lead to improved irrigation service to landowners. In pursuit of these goals, the entities have established two fundamental objectives:

- Construct appropriate, cost-effective water use efficiency improvements to provide the ability to better manage and control Deer Creek water diversion and distribution systems
- Develop operations criteria and practices, based on sound science and appropriate monitoring, that contribute to improvement of Deer Creek fish transportation issues, on a cooperative, voluntary basis.

The proposed Section A and Section B projects would contribute directly to achievement of these goals and objectives.

## *Project Need*

Declining populations of several anadromous fish species have led to the 1999 State and Federal listing of spring-run Chinook salmon (Oncorhynchus tshawytscha) as a threatened species, the 2000 Federal listing of steelhead trout (Oncorhynchus mykiss) as a threatened species, and the 1999 State listing of the fall-run and late-fall run Chinook salmon as species of concern. Deer Creek represents one of the State's largest undammed watersheds in the Sacramento River Basin and is widely regarded as having unique habitat features that make it an important resource for recovery of anadromous fish in the Basin. Increasing Deer Creek flows during critical periods of fish passage is that primary need.

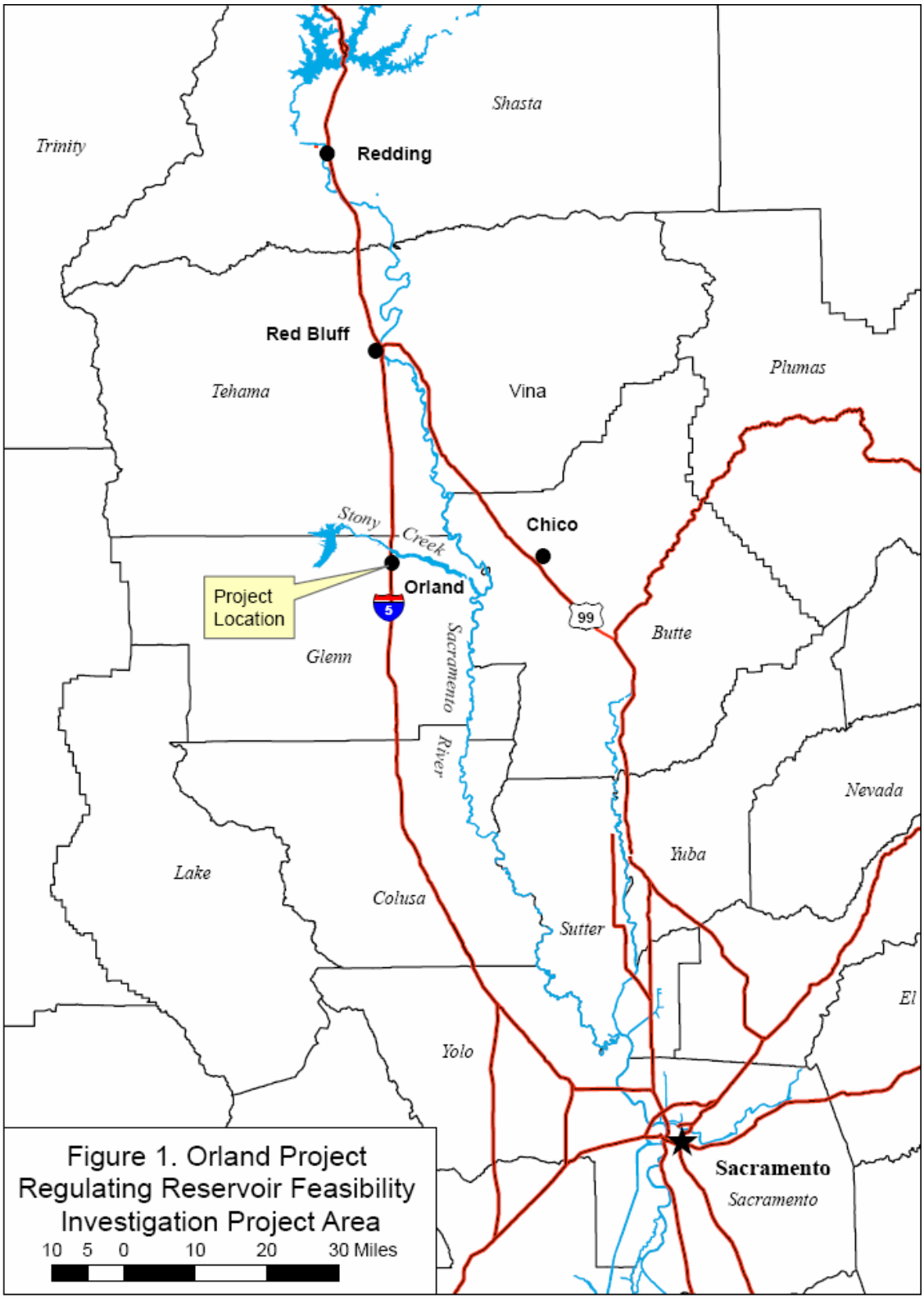



Figure 1. Orland Project Regulating Reservoir Feasibility Investigation Project Area

Of primary concern are irrigation diversions that reduce flows in the Deer Creek, making passage difficult for fish during late spring and fall, critical periods of in-migration for spawning as well as out-migration. Over the years, voluntary actions by diverters on Deer Creek have provided for pulsing of flows during critical periods, demonstrating the willingness of local water users to adjust water management practices to achieve ecosystem benefits. However, the DCID and SVRIC diversion and distribution systems are old and limit the degree to which fish-friendly practices can be implemented. The proposed Section A and Section B water use efficiency projects would contribute to the ability integrate instream flow management with irrigation operations.

## *Conceptual Framework - Deer Creek Flow Enhancement Program*

In an effort to provide local assistance to the Deer Creek water right holders, the California Department of Water Resources (DWR) has developed a conceptual framework for a Deer Creek Flow Enhancement Program (DCFEP). This framework is designed to fulfill the water needs of local agricultural and domestic water users, while achieving the fisheries flow objectives in Deer Creek. The framework has four components that will be designed to work together to provide the water to achieve targeted fish flows.

- Efficiency improvements to the DCID and SVRIC distribution systems
- Supplemental water supply development
- Compensation for DCID and SVRIC
- Adaptive management and monitoring programs

The proposed Section A and Section B projects are in integral component of the DCFEP, which is described in detail in Attachment A.

## *Relationship Between DCID and SVRIC*

Consistent with their cooperative participation in the development of the DCFEP, DCID and SVRIC are working to coordinate the planning and implementation of water use efficiency improvement to be made to their respective systems. The two entities have formalized their relationship in the MOU (Attachment B). According to the MOU, DCID will act as lead agency for purposes of contracting with DWR, if either or both proposals are funded. Thus DCID will administer the grant contracts, pursuant to decisions made jointly by a simple majority of the combined Boards of both entities, consistent with the terms of the DWR grant agreement.

## *Relationship Between the Section A and Section B Grant Proposals*

Reconnaissance-level water conservation investigations have been completed for both the DCID and SVRIC systems (Attachments C and D). These investigations have confirmed the potential to improve water use efficiency through system improvements and identified the general types of improvements that are needed. Building on these reconnaissance investigations, the entities have developed preliminary plans and specifications for specific near-term improvements that are urgently needed and would contribute immediately to achieving Bay-Delta benefits. They are applying for funding under Section A for funds to implement these near-term improvements. An important factor in selecting near-term improvements in that they be compatible with the improvements to be identified in the long-term plan.

DCID and SVRIC are also applying for Section B funding to develop coordinated, comprehensive water use efficiency programs through a Long-term System Improvements Feasibility Investigation. The

Feasibility Investigation would be an intensive program to provide definitive estimates of additional amounts of water that could be conserved, and to develop feasibility-level plans and cost estimates for further system improvements that are needed to achieve the targeted levels of diversion reduction under the DCFEP.

## *Linkage with California Bay-Delta Authority Targeted Benefits*

The California Bay-Delta Authority (CBDA) Water Use Efficiency Program has established two targeted benefits for Deer Creek. ***Targeted Benefit 10*** is to increase streamflow in Deer Creek from October through June to improve habitat for anadromous fish. ***Targeted Benefit 16*** is to reduce water temperatures in Deer Creek to achieve temperatures conducive to all life stages of anadromous fish. Although CBDA has not expressed these targeted benefits in terms of quantifiable objectives, a minimum Deer Creek flow of 50 cfs has been tentatively adopted as a target minimum instream flow for planning purposes among the agencies and entities engaged in the cooperative efforts to provide fish transportation flows. This target flow will be evaluated as monitoring programs are developed under an adaptive management approach.

Both the Section A (Near-term System Improvements Project) and Section B (Long-term System Improvement Feasibility Investigation) projects contribute directly to the accomplishment of Targeted Benefits 10 and 16. The Section A project will implement selected system improvements that will enable DCID and SVRIC to reduce diversions during critical fish migration periods. Increased instream flows will result in lower water temperatures than would otherwise occur. However, the Section A improvements will realize only a portion of the potential diversion reduction that is ultimately possible through system efficiency improvements. The Section B project will identify an integrated package of system improvements that could be implemented to complement the Section A facilities and realize the remaining targeted diversion reduction.

## *"Phase 8" (Sacramento Valley Water Management Program)*

DCID is among the more than 40 signatories to the Short-term Settlement Agreement and proposed a project under the Short-term Sacramento Valley Water Management Program to contribute up to 1,000 AF to the targeted project capacity of 185,000 AF. The DCID project was based on constructing one groundwater well with 1,500 gpm capacity. Water produced from the well would be used for local water supply, enabling DCID to reduce Deer Creek diversions by an equivalent volume during critical fish passage periods. Although intended primarily as an instream flow project, the project would also produce flow that otherwise would not contribute to Delta outflow, and therefore was accepted into the Short-term Program. The water use efficiency improvements being pursued under the Section A and Section B projects would work in conjunction with flow augmentation to produce local instream and regional water supply benefits.

# IV. Statement of Work, Section 2: Technical/Scientific Merit, Feasibility

## *DCID and SVRIC Distribution System Descriptions*

The layout of the DCID and SVRIC distribution systems is illustrated in Figure 2 (located in the pocket at the back of this document). Photographs of key operations sites within each system are attached to this report (Attachment E) and serve as a useful reference for readers not familiar with the area and small scale of the system facilities. As described later in this section, most but not all of these sites would receive improvements under the proposed Near-term System Improvements Project.

The DCID Diversion Dam is located approximately 10 river miles above the Deer Creek confluence with the Sacramento River. It is an old concrete structure that has vertical I-beams that serve as check board slots. The I-beams and boards are installed each spring as flows recede and are removed each fall before winter rains and runoff occur. Diversions into the Main Canal (on the south side of the creek) are controlled by a concrete heading structure with two 48-inch vertical slide gates, downstream of which is a fish screen operated by the California Department of Fish and Game (DFG). About one-quarter mile downstream, Main Canal flow is measured by a Parshall flume that was recently constructed by the DWR. Maximum diversion capacity is about 40 cfs.

The DCID Main Canal carries flows for about three miles with no turnouts. It then divides into the North and South Main Canals, respectively, at a key operations point known as the Main Canal "Y". The existing division structure and associated Parshall flumes (one on the north and another on the south) at this location are in poor condition and do not provide reliable flow measurement. The North Main Canal runs westward more or less adjacent to Deer Creek. System operators report that seepage losses along this reach are high, a finding that was confirmed by seepage tests conducted in fall 2004. The South Main runs alternately west and south for approximately 4 miles beyond the "Y".

The SVRIC Diversion Dam[1] is located about 6 miles downstream of the DCID Diversion Dam and 4 miles upstream of the Deer Creek confluence with the Sacramento River. It is a concrete gravity structure with a fixed crest elevation and fish ladder located on the right abutment. Diversions are made into the SVRIC North and South Main Canals, which are separate systems serving SVRIC lands on the north and south sides of Deer Creek, respectively. Diversions into the SVRIC South Canal are controlled by a headwall structure with two 48-inch vertical slide gates and measured by a sharp-crested weir; maximum capacity is approximately 54 cfs. Diversions into the North Canal are controlled by a headwall structure with two 36-inch vertical slide gates. There is no measurement at the north diversion, although flows can be estimated about one-quarter mile downstream where the North Main divides into the Hill and Rumiano Ditches. The maximum North Main capacity is approximately 24 cfs.

The SVRIC South Main Canal runs southwesterly approximately 1.6 miles and discharges into Pinky's Box, where flow is divided into three separate systems: the Washington Ditch, the "Old" Pipeline System and the "New" Pipeline System. Between Deer Creek and Pinky's Box, the South Main crosses Delaney

[1] SVRIC also owns and operates the Cone-Kimball Diversion and Dam and Ditch. No improvements are planned for the Cone-Kimball system at this time, so it is not discussed here. However, it is anticipated that improvements will be made to the Cone-Kimball system pursuant to the long-term feasibility investigation.

and China Sloughs. The Delaney Slough crossing is facilitated by a low check dam in the slough that allows slough flows to be diverted into the South Main Canal or passed downstream; excess canal flow can also be discharged into the slough if needed. The crossing at China Slough is made with on old, elevated timber flume that leaks and is prone to failure due to structural deterioration. The flume discharges into Pinky's Box immediately after crossing the China Slough.

Pinky's Box is a key operations point because the water level in the box provides an indication of whether sufficient flow is available to meet demands in the three downstream systems. Excess flow at Pinky's Box spills into China Slough.

With respect to the proposed Section A Near-term System Improvements Project, there are several important characteristics of the DCID and SVRIC distribution systems that must be understood. First is that the diversion dams, which is where system flows are controlled, are remote and difficult to access, involving passage through private property, rough roads and locked gates. Second is that there is no formal system for water ordering and delivery; instead, water is passed from one user to the next in a rotational sequence. When any user's turn occurs, he may or may not be ready or able to use the entire flow. Finally, there are few reliable measurement points in the systems, so operation is not precise. To compensate for these conditions and to ensure that supply shortages are minimized, operators typically divert as much water as the system will carry (subject to supply limitations) and spill any water that is excess to customers' needs. This operation approach maximizes Deer Creek diversion requirements.

Most of the canals in both systems have been concrete-lined to reduce seepage losses. However, most of the lining is decades old, cracked and has lost most of its original effectiveness. Consequently, seepage losses are high, which further increases diversion requirements. The objective of efficiency improvements is to reduce seepage and spillage losses.

Attachments C and D provide additional information about the features and characteristics of the DCID and SVRIC systems, respectively.

## *Methods & Procedures*

The proposed implementation project involves the application of proven technologies and standard engineering practices to improve the efficiency of the DCID and SVRIC irrigation distribution systems. The major thrust of the project is to reduce system spillage through the use of Supervisory Control and Data Acquisition (SCADA) technology, together with improved water measurement and control structures, which will provide system operators with real-time information about flows, water levels and spillage from the system and the ability to remotely control Deer Creek diversions accordingly. SCADA, or "system automation", is an Efficient Water Management Practice that is recognized and promoted by the Agricultural Water Management Council (AWMC).

The DCID and SVRIC SCADA systems will each include a mobile base station that can be set up in the ditchtender's vehicle or at his home. The DCID system will include two remote sites: the main canal diversion headgates and the Main Canal "Y", where it divides into its North and South branches. The SVRIC system will include four remote sites: the North Main Canal diversion headgates, the South Main Canal diversion headgates, The North Canal "Y" and Pinky's Box (which controls the headgates to three sub-portions of the system). Automation of Pinky's Box will include replacement of the box structure itself and replacement of the existing elevated flume with a buried inverted siphon under China Slough. Line-of-

site, high frequency radios will be used to communicate between the mobile base station and the remote operations sites.

In addition to the SCADA facilities employed to reduce system spillage, one segment of the DCID North Canal will be replaced with pipeline to reduce seepage losses. Seepage tests performed on this reach confirm that seepage losses are high. Canal lining/pipelining is also an Efficient Water Management Practice that is recognized and promoted by the AWMC.

The various sites within each system that would receive efficiency improvements under the proposed Section A project are listed in Table 1. For each site, the existing features and functions are described along with a summary of the proposed improvements. Additional information about the SCADA equipment and site improvements is provided later in this section. Again, all of these improvements would be made using proven technologies and standard engineering practices. There are no speculative or experimental aspects to this project.

## *Implementation Approach*

DCID and the SVRIC are very small organizations, each having one staff person who operates and maintains the irrigation distribution system under direction of a 5-person Board of Directors. Neither organization has the staff nor institutional capacity to implement the proposed Section A project. Therefore, the project will be implemented with contract services, including a registered Civil Engineer who will provide engineering and project management services, and qualified contractors to construct project facilities. The Civil Engineer/Project Manager will work under the direction of a joint board of directors comprised of all five directors from both boards.

This implementation approach is reflected in the project scope (see Task Descriptions, following) and estimates of project costs presented later in this section.

## *Task Descriptions*

The task and subtasks that would be performed for the Section A Near-term System Improvements Implementation Project are described briefly in the following sections. In addition to the tasks typically associated with facilities construction, work is included for on-call technical support, outreach and public involvement. These complementary tasks are critically important for a number of reasons, the main one being that the project will introduce relatively advanced (although proven) technology to traditional operations that have not changed appreciably in the past 50 years. Technical support and training will be an important aspect of ensuring that the intended benefits are actually achieved. Additionally, a monitoring and assessment task is included, as stipulated in the PSP, so that the project's effects are adequately measured and documented.

Detailed task descriptions are included in Attachment F, including identification of project deliverables.

### Task 1 – Establish Easements and ROW

It is anticipated that most of the improvements to be constructed under this project can be placed within existing DCID and SVRIC rights-of way (ROW) and that construction access can be acquired though temporary easements. The one known exception is the DCID North Canal Pipeline, for which portions of the existing ROW will be abandoned and new ROW established. Existing DCID and SVRIC easements and

**Table 1. Summary of Site Features, Functions and Proposed Improvements**

| Site Number/Name | Existing Features | Control/Function | Proposed Improvements |
|---|---|---|---|
| **Deer Creek Irrigation District Sites** | | | |
| DC-1<br>Main Canal Diversion | B. Main canal headgates (two 48-inch vertical slide gates in concrete headwall) | Controls rate of diversion from creek. Maximum discharge = 40 cfs +/- | Remove and replace existing vertical slide gates with new gates with motorized gear reduction operators; equip site with solar power source; install SCADA for remote monitoring and control; control gate to hold constant flow at Parshall Flume located 0.25-mile downstream. |
| | D. Parshall flume (about 0.25-mile downstream from headgates) | Measures flow in Main Canal | Develop rating by stream gauging; use measurement to control vertical slides gates at diversion to hold constant flow as set by operator. |
| DC-2<br>Main Canal "Y" | A. Grade board controlled flow division structure | Divides main canal flow into north and south main canals. | Remove and replace existing structure. New structure to have long-crested water level control on South Main and vertical slide gate control on North Main. Vertical slide gate equipped with SCADA for remote monitoring and control; control gate to hold constant flow at new weir downstream. |
| | B. Parshall flume on North Main downstream of division structure | Measures flow into North Main Canal. (Note: improperly constructed; does not operate correctly.) | Existing flume does not function correctly; remove and replace with broad-crested weir. Equip with SCADA for remote monitoring of flow and control of North Main Canal headgate. |
| | C. Parshall flume on South Main downstream of division structure. | Measures flow into South Main Canal. (Note: improperly constructed; does not operate correctly.) | Existing flume does not function correctly; remove and replace with broad-crested flume (broad-crested weir). Equip with SCADA for remote monitoring of flow. |
| DC-6<br>North Main Canal Lining Replacement | A. Existing concrete-lined reaches of North Main Canal | Lining originally intended to reduce seepage losses from canal; however, lining is 30-40 years old and severely deteriorated. Ponding tests in Fall 2004 indicate that canal has high seepage loss. | Abandon approx. 1,500 feet of existing concrete lining; remove and dispose of existing in non-sensitive areas; leave intact in sensitive areas. Install 1,500 feet of new 24-inch, 100 psi PIP pipeline. |
| DC-7<br>Mobile Base Station | A. None; no SCADA at present. | Remotely monitor conditions at operational sites; change set points in PLC for local automatic control. | Radio, notebook computer and software to be installed at DCID ditchtenders vehicle. |
| **Stanford Vina Ranch Irrigation Company Sites** | | | |
| SV-1<br>South Main Canal Diversion | C. South Main Canal headgates (two 48-inch vertical slide gates in concrete headwall) | Controls rate of diversion from creek. Maximum historical discharge = 53 cfs +/- | Remove and replace existing vertical slide gates with new gates with motorized gear reduction operators; equip site with SCADA for remote monitoring and control; control to hold constant flow at sharp-crested weir immediately downstream. (AC power at site.) |

**Table 1. Summary of Site Features, Functions and Proposed Improvements**

| Site Number/Name | Existing Features | Control/Function | Proposed Improvements |
|---|---|---|---|
| | D. South Main Canal sharp-crested weir | Measures and records flow into South Canal. | Check stage-discharge rating; install water level sensor and connect to South Main diversion SCADA system (AC power at site.) |
| SV-2<br>North Main Canal Diversion | A. North Main Canal headgates (two 36-inch vertical slide gates) in bridge crossing structure | Controls rate of diversion from creek (except under low creek flow conditions, when hydraulic control is by the creek bed configuration). Maximum discharge = 18 cfs +/- | Remove and replace existing vertical slide gates with new gates with motorized gear reduction operators; equip site with SCADA for remote monitoring and control. (AC power at site.) |
| | None; does not exist | Measure North Main Canal Diversion | Gradient too flat for critical flow measurement device or BCW; install ultrasonic meter downstream of DFG fish screen, possibly including construction of concrete-lined section to enhance meter performance; connect to SCADA site at North Canal headgates |
| SV-3<br>North Main Canal "Y" (Hill Ditch Heading) | A. Concrete check/drop with turnout to right | Divides North Main flow into Rumiano Ditch (west) and Hill Ditch (north). Structure checks water surface elevation up to allow diversion into Hill Ditch, which is very flat. Flow continuing to west in Rumiano Ditch drops about 4 feet. | Demolish existing structure. Replace with long-crested weir on Rumiano branch and vertical slide gate control on Hill branch. Install motorized gear reduction operator on Hill Ditch. Install PLC and control headgate to hold target flow in Hill Ditch based on downstream broad-crested weir. Install solar power supply system at site. |
| | B. Hill Ditch Parshall flume | Measures flow into Hill Ditch. Flume structure has failed and is completely submerged. | Demolish existing Parshall Flume. Replace with broad-crested weir; use weir measurments to control Hill Ditch headgate/flow. |
| SV-6<br>South Main Canal Division Box | A. Concrete division box (Pinky's Box) | Serves as forebay for division of water to three subsystems: Steven's Ditch, Old Pipeline and New Pipeline; for pumped delivery to one landowner; and for spilling excess flow into China Slough. | Remove existing concrete structure; construct new structure equipped with SCADA and measurement capability at inlets to three subsystems and provisions for rejecting all water as spillage to China Slough. |
| | B. Existing elevated timber-truss flume over China Slough | Flume conveys the South Main Canal flow over China Slough to Pinky's Box. | Existing flume is roughly 50 years old. Flume lining leaks and timber trusses are rotting and prone to fail. Demolish existing flume and replace with 54-inch diameter reinforced concrete pipe inverted siphon under China Slough. |
| SV-7<br>Mobile Base Station | A. None; no SCADA at present. | Remotely monitor conditions at operational sites; change set points in PLC for local automatic control. | Radio, notebook computer and software to be installed at DCID ditchtenders vehicle. |

Terms and definitions:

PLC = programmable logic controller

ROW will be researched and sites where new ROW will be needed will be identified. DCID and SVRIC representatives will make contacts as needed with involved landowners.

## Task 2 – Prepare Final Designs, Specifications & Contract Documents

Preliminary plans and specifications of project features are presented in this proposal. While conceptually complete and adequate for estimation of project costs, additional effort is needed to complete final designs and prepare construction documents. That work would be performed under this task by a registered civil engineer.

## Task 3 – Conduct Project Bidding

It is anticipated that the project will be contracted in two bid packages, one for construction of structures and a second contract for the provision and installation of the SCADA equipment and related gates, operators and solar/AC power supply systems. Thus two bid packages will be prepared in Task 2; work under this task would involve advertising the bids, responding to questions during bidding, comparing and evaluating bids and awarding contracts based in the least cost, responsive bid. All applicable State requirements would be observed.

## Task 4 – Construct Structures (Bid Package 1)

Task 4 would involve the actual construction of the Bid Package 1 facilities by the selected contractor, under the supervision of a registered civil engineer (see Task 6).

## Task 5 – Procure and Install SCADA Equipment (Bid Package 2)

Task 5 would involve the actual procurement and installation of SCADA and related equipment as specified in Bid Package 2, under the supervision of a registered civil engineer (see Task 6).

## Task 6 – Provide Engineering Services During Construction

A registered civil engineer will provide the following services during construction: answer contractor questions, review shop drawings, inspect materials and work, record photographs of construction, verify completion, approve payments and track any design changes made during construction. The engineer will prepare as-built drawings at the completion of construction.

## Task 7 – Provide SCADA Training, Troubleshooting & On-call Support

While SCADA is considered a proven technology and has been successfully applied to monitoring and control of irrigation distribution systems for nearly 20 years, it nevertheless represents a major technological advance for DCID and SVRIC. Based on experience with introducing SCADA technology to other small irrigation operations, it is anticipated that substantial support will be needed during the first year to ensure that the technology is successfully assimilated and becomes self-sustaining and effective. As part of its contract, the SCADA installer (Bid Package 2 contractor) will be required to provide training and troubleshooting services.

Under a separate contract, the SCADA installer (Bid Package 2 contractor) or Engineer will provide on-call technical support relative to operation and maintenance of the SCADA system. This support will cover any hardware problems that may be encountered and software support, including modifications to screens that the operators might find useful.

### Task 8 – Conduct Project Monitoring & Assessment

Monitoring and assessment measures are an integral component of this project to document the water savings actually accomplished by the proposed improvements. With respect to spillage reduction targeted by the SCADA improvements, this will involve monitoring of pre-project spillage at selected sites (see below) during 2006. Monitoring will be continued in 2007 through 2011, after the SCADA improvements have been implemented. After any normalization that may be appropriate to make the measured 2006 and 2007 records typical of long-term conditions, the difference between the two will provide a good indication of the effects of the SCADA improvements on spillage.

With respect to seepage, sufficient pre-project seepage tests have been performed on the lateral reaches that will be lined to yield verification-quality seepage reduction estimates. Thus, the estimates of seepage reduction presented in this application (see Benefits) represent the final estimate of water savings, and no further monitoring work is proposed.

### Task 9 – Conduct Outreach & Community Involvement

It is expected that community involvement will focus primarily on the DCID and SVRIC Boards and interested landowners and agency representatives, while overall progress and any decisions or outcomes with implication to other program elements would be disseminated to a larger group for informational purposes. Three formal public meetings have been identified thus far to support the project: (1) a kick-off meeting to inform stakeholders about the grant award and provide specific information about the scope and schedule for the project; (2) a design pre-meeting to ensure that landowner concerns are addressed in the facilities designs, and (3) a design review and construction notification meeting to inform landowners of construction impacts and coordinate access to the various construction sites. Additional informal meetings will be held as needed to keep landowners informed of design and construction progress. (See Section VII for additional discussion of outreach.)

### Task 10 – Provide Project Management & Administration

Project management and administration will be provided by the registered civil engineer working in cooperation with a local project coordinator designated by the DCID and SVRIC Boards. They will be responsible for ensuring the smooth, timely completion of work, documenting the project's accomplishments and communicating progress and implementation issues, if any, to DWR. This will include preparation of all reports required under the grant agreement, including quarterly progress reports, the comprehensive final report and review and submittal of all technical documents prepared.

## *Implementation Schedule & Deliverables*

DCID and SVRIC will be prepared to initiate work upon signing of a Grant Agreement (assumed to be December 2005, according to the PSP) and to complete the project within a period of 25 months (by December 2007). During the first year, pre-project spillage records will be collected at selected sites to provide the basis for quantifying the reduction in canal spillage (see Task 8). Simultaneously, all of the necessary work will be conducted to prepare final designs and select contractors for project construction.

Contracts with construction contractors would be signed by September 30, 2006, and construction initiated immediately thereafter. All construction will be completed by March 30, 2007, in time for startup, training and troubleshooting during the 2007 irrigation season. Flow monitoring would be continued through 2011 to provide the post-project record of spillage.

The schedule for each task is depicted in Figure 3, along with the dates for completion of project deliverables, including the quarterly fiscal/programmatic reports required by DWR, construction contract documents, as-built records, a monitoring and assessment technical memorandum, and the comprehensive final project report (draft and final).

## *Estimated Project Costs*

The estimated cost to implement the Near-term System Improvements Project is $1,230,218. A breakdown of costs by task and by category is presented in Table 2. Direct costs include the two construction contracts that will be used to construct project facilities and buy and install related equipment and instrumentation. Together the construction contracts amount to nearly $841,000 (see Tasks 4 and 5, Table 2), or 68% of the total project cost of $1,230,218, which includes various cost contingencies.

Labor costs are associated with engineering and project management services that would be provided by the registered civil engineer according to the tasks outlined above. Labor costs total to $246,630, or 20% of the total project cost. This includes overseeing installation and operation of the flow monitoring sites identified in Task 8 for project monitoring and assessment. Other direct costs and cost contingencies account for 12% of the project cost.

A detailed cost breakdown by subtask provided in Attachment F. Projects costs are discussed further in Section IX.

## *Preliminary Plans and Specifications, Engineer's Construction Costs Estimate and Certification Statements*

Under the proposed Section A implementation project, a total of 16 operations sites would receive efficiency improvements, including seven sites within the DCID distribution system and nine sites within the SVRIC system. Included in this count are two mobile base operations stations, one for each operation. The locations of the sites are illustrated on Figure 2 and the improvements that would be made at each site are summarized in Table 1.

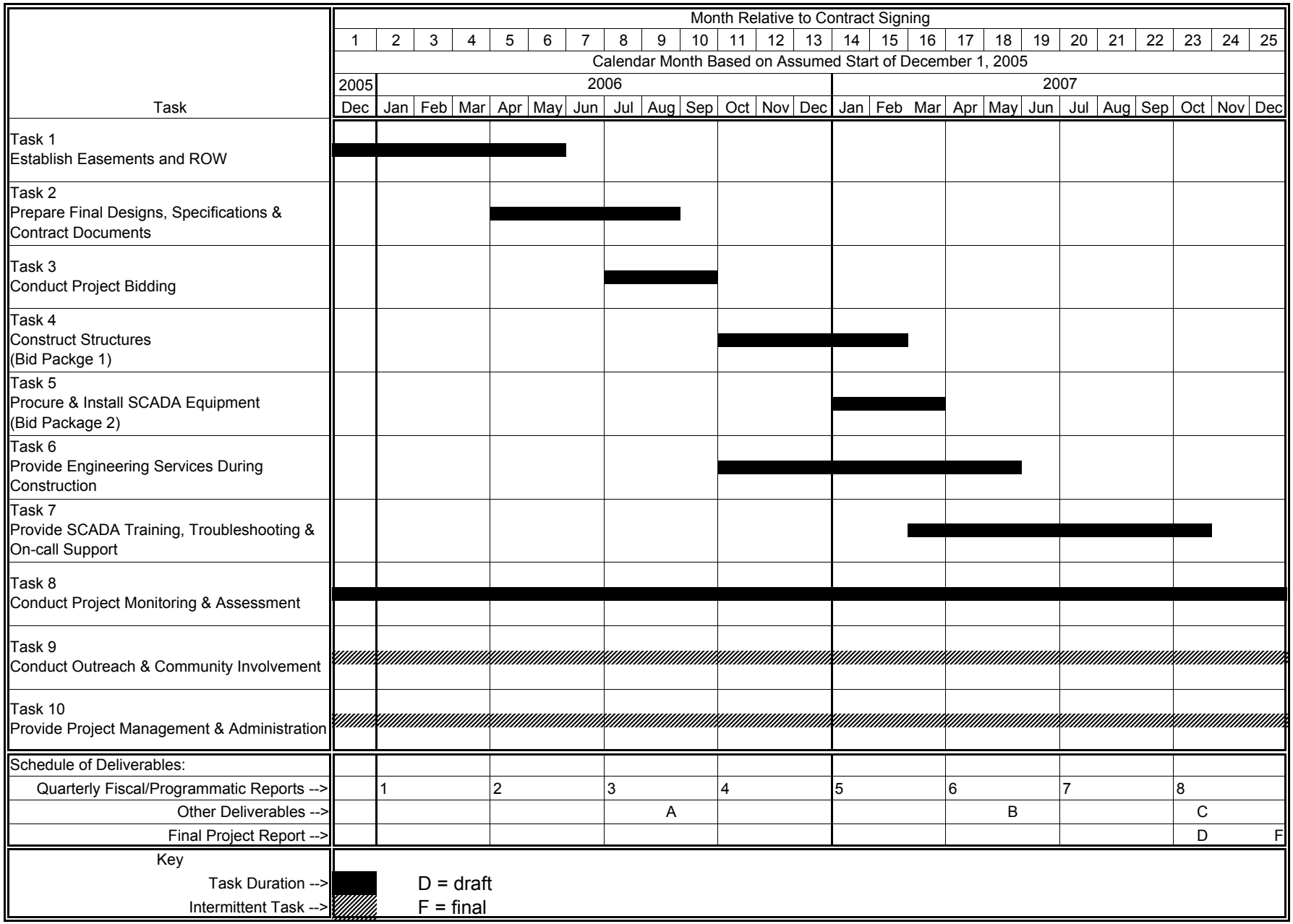
Preliminary plans and specifications are presented in Attachment G for each of the following categories:

- SCADA System & Components
- Irrigation Control Structures
- Water Control Gates
- Conveyance Pipeline
- China Slough Inverted Siphon

## *Environmental Documentation*

As previously described (see Section III), the Section A and Section B water use efficiency projects being proposed by DCID and SVRIC would be implemented in the context of a broader, integrated program to improve fish passage conditions in Deer Creek. Other program components include groundwater development for water supply augmentation, payments to DCID and SVRIC to offset increased operations

## Figure 3. Proposed Schedule for Near-term System Improvements Project (Section A)




Definition of Deliverables: A = Contract Documents; B = Construction Report (Tech Memo); C = Monitoring and Assessment Report (Tech Memo)

**Table 2. Cost Summary by Task**

| | Labor Costs | | | | | | Direct Costs | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Labor Hours by Staff Level | | | | | | Cost Item | | | | | |
| | Project Manager/ Principal Engineer | Senior Professional Engineer | Professional Engineer/ GIS Specialist | Staff Engineer/ Surveyor | Project Assistant/ Secretarial | **Labor Costs Subtotal ($)** | Vehicle | Computer | Communications | Miscellaneous/ Other | **Direct Costs Subtotal ($)** | **Total Cost ($)** |
| | Hourly Rates[1] | | | | | | (miles@) | (hours@) | | | | |
| Project Task | $150 | $120 | $96 | $80 | $45 | | $0.40 | $7.00 | at cost | at cost | | |
| Task 1 -- Establish Easements & ROW | 4 | 16 | 0 | 80 | 32 | **$10,360** | 600 | 79 | $99 | $20,000 | **$20,893** | **$31,253** |
| Task 2 -- Prepare Final Designs, Specs & Contract Documents | 16 | 84 | 184 | 184 | 72 | **$48,104** | 1,000 | 324 | $405 | $4,000 | **$7,073** | **$55,177** |
| Task 3 -- Conduct Project Bidding | 4 | 16 | 8 | 0 | 16 | **$4,008** | 120 | 26 | $33 | $500 | **$766** | **$4,774** |
| Task 4 -- Construct Structures (Bid Package 1) | Note: construction costs formulated separately; see Attachment G ------> | | | | | | | | | | **$272,380** | **$272,380** |
| Task 5 -- Procure & Install SCADA Equip. (Bid Package 2) | Note: construction costs formulated separately; see Attachment G ------> | | | | | | | | | | **$568,360** | **$568,360** |
| Task 6 -- Provide Engineering Services During Const. | 24 | 80 | 120 | 40 | 24 | **$29,000** | 3,360 | 173 | $216 | $250 | **$3,020** | **$32,020** |
| Task 7 -- Provide SCADA Training, Troubleshooting, etc. | 0 | 80 | 0 | 0 | 0 | **$9,600** | 600 | 48 | $60 | $150 | **$786** | **$10,386** |
| Task 8 -- Conduct Project Monitoring & Assessment | 24 | 96 | 108 | 144 | 128 | **$42,768** | 2,880 | 300 | $375 | $150 | **$3,777** | **$46,545** |
| 9 -- Conduct Outreach & Community Involvement | 56 | 0 | 56 | 0 | 0 | **$13,776** | 240 | 67 | $84 | $500 | **$1,150** | **$14,926** |
| 10 -- Provide Project Management and Administration | 372 | 16 | 144 | 80 | 246 | **$89,014** | 1,200 | 515 | $644 | $550 | **$5,277** | **$94,291** |
| Totals | 500 | 388 | 620 | 528 | 518 | **$246,630** | 10,000 | 1,532 | $1,916 | $26,100 | **$883,482** | **$1,130,100** |
| **Total project cost including contingencies (see Section IX, Table C-1) ----->** | | | | | | | | | | | | **$1,230,218** |

Notes:
[1] Hourly rates are forward priced to Calendar Year 2005

and maintenance costs and an adaptive monitoring and management program. It is recognized that a programmatic environmental document is needed to address potential environmental impacts.

It is anticipated that both State and federal funding will be involved with implementing the program components described above and that a programmatic document will provide specific coverage for actions funded through the 2004 WUE PSP projects and programmatic coverage for the overall program. The programmatic document is expected to be completed as a joint effort between the DWR and the United States Fish and Wildlife Service (FWS) with costs shared by the agencies. During a site visit in December 2004, environmental compliance staff from both DWR and FWS agreed that the appropriate level of NEPA/CEQA compliance for the program would be an Environmental Assessment/Initial Study. The EA/IS is expected to be complete by December 2005, coincident with the start of the proposed project.

Based on the site inspections conducted in December 2004, an Environmental Compliance Work Plan for the Deer Creek Water Use Efficiency Program has been prepared (see Attachment H). That program addresses CEQA, NEPA and permitting requirements, and includes a preliminary environmental checklist.

# V. Statement of Work, Section 3: Monitoring and Assessment

Monitoring and assessment are integral to this project, so that the effects of the proposed water use efficiency measures and overall project cost-effectiveness can be established with sufficient reliability. Task 8 in the preceding section describes the work that would be performed to carry out the monitoring and assessment work. The paragraphs below elaborate on the task descriptions and the underlying monitoring and assessment strategy and approach.

## *Pre-project Conditions and Data Baselines*

The limited historical flow data that DCID and SVRIC have collected concentrates on diversions from Deer Creek. While this data is useful for some purposes, it provides no information about water distribution within or losses from the systems. There is no record of historical spillage; therefore, spillage must be measured before the water use efficiency (SCADA) improvements are implemented. This will be done in 2006. Because spillage is a dynamic loss (one dependent on operator behavior, as compared to canal seepage, which depends on the system, not the operator), and therefore could vary from year to year, several years of pre-project data would ideally be collected. However, in the case of the DCID and SVRIC systems in particular, there is reason to believe that the systems are operated in essentially the same manner from year to year, so that spillage might not be as variable as it tends to be in other irrigation systems. Consequently, one year of spillage data combined with other information is considered, sufficient to develop reasonable estimates of long-term spillage volumes.

The 2006 monitoring efforts will concentrate on the identified locations where spillage is known to occur, although the system will be inspected and operators interviewed to be sure that spillage sites are not overlooked. As identified in the detailed Task 8 description (See Attachment F), five spillage sites have been identified where discharges would be affected by the proposed near-term improvements; two within the DCID system and three within the SVRIC system. (Note: there are other spillage sites within each system where spillage occurs; however, they would probably not be affected by the proposed near-term improvements. These other spillage sites, along with other key sites, would be monitored under the companion Section B proposal if it is approved.)

## *Post-project Conditions*

Spillage monitoring will be continued in 2007 and beyond to support the five annual benefit/cost re-evaluations specified in the PSP. This will provide a record of spillage with the efficiency improvements in place. (Construction is scheduled for fall 2006/winter 2007). Considering that the effectiveness of the proposed SCADA improvements depends somewhat upon operator skill and learning, a multi-year record is preferable to capture initial and ultimate project performance. Thus, monitoring will be continued through at least 2011 to capture this transition period and to provide the basis for the annual updates of project benefit/cost.

## *Normalization & Estimating Project Effectiveness*

As indicated above, spillage tends to be variable over time and from year to year. However, there are indications that the DCID and SVRIC system are operated in the same way from year to year, with the objective of maximizing diversions. Thus, for these systems, spillage might not be as variable as compared to other systems. Nevertheless, effort will put into understanding the nature and variability of system operations from year to year, and from that understanding, applying adjustments to the 2006 records to

represent other conditions. It is likely that the primary influence on spillage is variability in water supply reliability from year to year. Streamflow and diversion records will be assembled and analyzed to determine whether a relationship between water supply and spillage can be inferred. This relationship could be used to normalize relatively short pre- and post-project spillage records to develop long-term characterizations of with- and without-project spillage patterns. The project's effectiveness in terms of spillage reduction will be based on the difference between the estimated long-term without- and with-project spillage volumes.

## *Anticipated Accuracy & Confidence Levels*

It is anticipated that spillage can be measured with an error of ± 7% at the 95% confidence level. The level of confidence that can be associated with the computed spillage reductions (without-project minus with-project spillage volumes) will depend on the magnitude of the difference in relation to the probable measurement error; the larger the difference for any given probable measurement error, the higher the level of confidence. Confidence levels will be analyzed and reported once the flow data are collected and the computations of water savings are performed.

## *Information Dissemination & 5-year Benefit:Cost Updates*

All of the data, analysis and results of the Monitoring and Assessment effort (Task 8) will be documented in a brief technical memorandum, and made accessible to DWR and others in hard and electronic formats. This will include all raw and quality controlled data in standard database or spreadsheet formats. The grant applicants understand that they will be asked to update reports of project benefits and costs annually for a period of 5 years following completion of the project.

## *Monitoring Methodologies*

Conventional, proven methodologies will be used to measure, record and quality-control all targeted spillage flows. This will include use of standard measurement structures where possible, with a preference for broad-crested and sharp-crested weirs as primary flow measurement devices. Non-standard structures might also be employed, provided that reliable stage-discharge functions can be developed through current metering.

Because spillage tends to be highly variable with time, frequent observations are needed to compute reliable spillage volumes. Flow monitoring studies on other irrigation systems indicate that several measurements are required daily to adequately capture the variability in flow inherent to irrigation operations, especially spillage. The plan is to automate data recording at standard intervals of about 15 minutes, and in no case more than hourly. Sites will be visited weekly or biweekly to check for proper flow conditions and to swap out data loggers.

## *Monitoring and Evaluation Plan Costs*

The cost for carrying out the monitoring activity under Task 8 is estimated to be $46,545, which covers establishment, operation and maintenance of the spillage flow measurement sites for 2006 and 2007. This is about 4% of the total project costs. It is assumed that monitoring beyond 2007, as needed to support the five annual updates will be covered by other funds or by ordinary DCID and SVRIC O&M budgets.

# VI. Qualifications of the Applicants and Cooperators

DCID is the applicant for this grant proposal and is cooperating with the SVRIC for implementation of the proposed Feasibility Investigation. The provisions of the cooperative agreement between the two entities are expressed in a Memorandum of Understanding that has been officially endorsed by both Boards of Directors. The MOU is attached to this application for convenient reference (Attachment B).

## *Role of External Cooperators*

DCID and SVRIC are both very small organizations, each with one employee who operates and maintains the distribution system. Seasonal labor is hired as needed for certain maintenance tasks. The entities have engaged Davids Engineering to provide consulting engineering services and plan to use Davids Engineering to manage and execute the implementation project, subject to the direction of the joint Boards.

Grant Davids would serve as Project Manager, reporting directly to the joint Boards. Mr. Davids is a registered civil and agricultural engineer in California with nearly 30 years of experience in irrigation and water resources planning and engineering. Among his qualifications are more than 12 years of extensive service to the IID-MWD water conservation program, which concentrated on verification of water savings achieved by various water conservation measures, including canal lining, system automation and regulating reservoirs. Mr. Davids' resume is attached to this proposal for convenience reference (Attachment I).

Both DCID and SVRIC have established cooperative working relationships with representatives of DWR's Northern District over the past several years. Similarly, trusted relationships have been forged with representatives of DFG and the CBDA Environmental Water Program. It is expected that these relationships will be maintained and will continue to provide benefit to the direction and execution of the Feasibility Investigation.

## *Previous WUE Grant Experience*

Neither DCID nor SVRIC has participated in a previous water use efficiency grant projects.

## *Disadvantaged Community Status*

The project area is located in rural Tehama County, approximately midway between Chico and Red Bluff. The unincorporated town of Vina (estimated pop. 250) lies within the study area. The most current census statistics available for Tehama County are for 2002, at which time the median household income in the County was reported to be $31,307. In the same year, the California statewide median household income was reported to be $47,323. Tehama County qualifies as a disadvantaged community, since its median household income is less than 80% of the statewide median household of $37,858 ($47,323 x 0.8 = $37,858). The official U.S. Census Bureau references reporting these figures are attached to this application (Attachment J).

# VII. Outreach, Community Involvement and Acceptance

## *Introduction*

DCID and SVRIC have been actively engaged in outreach and community involvement activities since 1994 in connection with ongoing efforts to improve fish passage issues in Deer Creek, including the Deer Creek Water Exchange Program (DCWEP) and 2003 Pilot Water Exchange Program. These efforts have been inclusive and transparent and have worked to gain wide support for Deer Creek initiatives. Outreach and community involvement for the proposed Section A project would be conducted within this broader context. It is expected that community involvement would focus primarily on the DCID and SVRIC Boards, interested and impacted landowners and selected agency representatives. Project progress and events or findings with implication to other program elements would be disseminated to a larger group for informational purposes.

Ongoing outreach activities are described below, along with additional discussion of planned community outreach and information dissemination activities described earlier in the project tasks (Section IV). The broad local support that has been cultivated for the proposed project is also discussed, including reference to letters of support received from a variety of agencies. Finally, some of the benefits that would result from the project are discussed.

## *Ongoing Public Outreach and Community Involvement*

Since 1994, DCID and SVRIC have worked cooperatively with DWR and DFG to look at agricultural water use efficiency improvements as part of the DCWEP, a set of activities designed to increase transportation flows for spring-run salmon in Deer Creek. Since that time, DCID and SVRIC have conducted outreach and worked cooperatively at local and regional levels. In 2002-03 DCID participated in drilling a deep aquifer production well and operating the well during the 2003 Deer Creek Water Exchange Pilot Program. Public outreach for the Pilot Program was conducted by forming a Water Advisory Committee comprised of all interested stakeholders and agency representatives and conducting monthly meetings with internet posting of program results.

Subsequent to the Pilot Program, DCID and SVRIC have continued to participate in outreach activities and have helped to develop community support of ongoing efforts to develop a DCFEP. The draft concept paper describing the Program (see Attachment A) represents a collaborative effort between the DCID, SVRIC, Deer Creek Watershed Conservancy (DCWC), DWR, DFG, Tehama County, and the FWS. A major element of the conceptual Program is agricultural water use efficiency improvements to the DCID and SVRIC distribution systems.

In 2003, Environmental Water Program (EWP) and DWR representatives held meetings with key individuals, groups and local agencies within the Deer Creek watershed to inform them of the ongoing fishery enhancement efforts that would incorporate water use efficiency, groundwater exchange and compensation for bypassed water. The meetings were carried out in an open and transparent process. Stakeholders were notified via mail and email of local team meetings at a minimum of two weeks prior to each meeting, and provided with meeting agendas and minutes from the previous meeting. Documentation of meeting dates and attendance lists are provided in Attachment K.

## *Community Involvement & Information Dissemination Plan*

It is expected that community involvement will focus primarily on the DCID and SVRIC Boards and interested landowners and agency representatives, while overall progress and any decisions or outcomes with implications to other program elements would be disseminated to a larger group for informational purposes. The extensive mailing and e-mail lists (see Attachment K) that have been compiled since 1994 will be used for this purpose. The Project Manager will continue to engage interested individuals and entities throughout the course of the project.

Three formal public meetings have been identified thus far to support the design and construction activities: (1) a kick-off meeting to inform stakeholders about the grant award and provide specific information about the scope and schedule for the project; (2) a design pre-meeting to ensure that landowner concerns are addressed in the facilities designs, and (3) a design review and construction notification meeting to inform landowners of construction impacts and coordinate access to the various construction sites. Informal meetings will be held as needed to keep landowners informed of design and construction progress.

## *Support for the Project/ Letters of Support*

Broad support has been generated for the Near-term System Improvements Project through ongoing outreach and community involvement. This support is manifest in the DCID-SVRIC MOU (Attachment B) and the letters of support provided by local, regional, state and federal organizations including DFG, Tehama County, DCWC, NCWA, The Nature Conservancy and FWS (Attachment K). The vast majority of local stakeholders recognize the social and economic benefits to be realized from making their systems more efficient and improving Deer Creek fish flows. As information has been disseminated throughout the community and meetings have been conducted regarding flow enhancement initiatives on Deer Creek, a small minority of stakeholders has expressed concerns about how participation with state programs by either the DCID, SVRIC or individual water right holders could threaten existing water rights and erode local control. These concerns will continue to be addressed. It is expected that these fringes of opposition will persist but will not impact the implementation of this project or the broader, on-going efforts to improve Deer Creek fish passage conditions.

## *Estimated Benefits*

Issues concerning Deer Creek fish flows have created significant concern among local landowners regarding implications to the farming economy and water rights. Resolution of these issues through cooperative means, such as by implementing the proposed water use efficiency improvements and making voluntary diversion reductions at critical times, will provide a significant, enduring benefit to the community, in terms of improved social conditions.

Additionally, the proposed water use efficiency improvements will thrust DCID and SVRIC toward modernized irrigation system operations and maintenance practices, including training in the use of SCADA technology. These benefits will also be lasting.

Finally, the construction activities associated with the project will provide temporary stimulus to the local economy. The construction value is estimated to be about $900,000.

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# VIII. Innovation

There are a number of features of the DCID and SVRIC Section A and Section B proposals, and the broader, ongoing efforts to improve fish passage conditions in Deer Creek, that demonstrate innovation and serve as a model for how to approach complex resource management issues. Two of these features, one managerial and another technical, are discussed below. These features apply to both the Section A and Section B proposals being submitted by DCID in association with SVRIC.

## *Local Leadership/Regional Resources*

The most highly-vested stakeholders involved with the solution to fish transportation issues in Deer Creek are the long-term water rights holders in DCID and SVRIC. These rights for irrigation and stock water use are the economic and social foundation of the local community. Recognizing that a top-down, prescriptive problem-solving approach would be polarizing and would appear as a threat to local water rights, the agencies have allowed and encouraged local leadership in the formulation of solutions and in reaching out to affected and interested parties. This was not a natural role for local interests, but over time the entities, Board members and certain landowners have asserted leadership and taken on increasing responsibility for overall direction. Agency staff should be recognized for encouraging and fostering local leadership, while bringing the resources of their agencies to bear on problem solving. Addressing complex resource management issues calls for cooperation among local landowners, water right holders and interest groups and state and federal agencies. All of the individuals, entities and agencies that are engaged in efforts to improve conditions in Deer Creek are cooperating on a voluntary basis.

## *Verification-based Planning Approach*

The technical methodologies featured in both the Section A and Section B proposals embrace a technique called "verification-based planning" for modernization of irrigation systems. This is an emerging technique that fuses traditional infrastructure planning with principles of water conservation verification, resulting in reliable estimates of water savings (or, more generally, flow path changes) along with irrigation system upgrades. While verification-based planning is conceptually simple, awareness of the methodology is limited, its application is challenging and there are few cases worldwide where it has been systematically applied and demonstrated[2]. Impediments typically include the extra cost and time needed to adequately establish pre-project conditions through flow measurement and related analytical work.

Verification-based planning directly addresses a major challenge in accomplishing water use efficiency objectives through incentive-driven programs, which is to establish a uniform basis for comparing the costs and benefits of alternative water use efficiency "investment" options, and selecting the most cost-effective projects with confidence that predicted benefits will actually be achieved. The scopes of work for both the Section A and Section B proposals embrace verification-based planning in the context of generating water to increase instream flows in Deer Creek during critical fish transportation periods. In addition, verification-based planning provided a factual basis for alleviating local concerns about water supply reliability and for confirming public benefits.

[2] Verification-based planning is an outgrowth of the techniques that were developed for quantifying water savings associated with the 1988 Imperial Irrigation District/Metropolitan Water District water conservation and transfer agreement. It was further developed in relation to water conservation planning in Egypt during the 1990's and was systematically applied for purposes of irrigation system modernization in Benton Irrigation District, Yakima Basin, Washington.

# IX. Benefits & Costs

## *Overview*

The proposed distribution system improvements will reduce losses from the DCID and SVRIC distribution systems. Specifically, SCADA (system automation) improvements will be made to both systems to reduce system spillage. The automation facilities will allow system operators to remotely control the Deer Creek diversions and key flow division structures. This will enable operators to divert from Deer Creek only the amount of water needed and route diverted flows to locations where they can be used most effectively. These are not complete systems covering all operations sites; rather they are initial, backbone automation systems that could be expanded later, based on additional investigation and planning. Therefore, they will accomplish only a portion of the potential spillage reduction.

In addition to the SCADA improvements, a specific reach of the DCID North Main Canal would be replaced with pipeline to eliminate existing seepage losses. This would further contribute to the ability to reduce diversions into the DCID system.

Initial estimates of spillage have been developed for the SVRIC system based on the rapid appraisal of water conservation opportunities completed in 2004 (see Attachment D). These estimates were conducted at the reconnaissance level, but nevertheless provide a basis for estimating potential spillage reduction benefits associated with the SCADA improvements.

Site-specific seepage tests were performed in fall 2004 on the reach of the DCID North Main Canal identified for pipeline replacement. This reach has for years been regarded by operators and landowners as a problem reach, due to high seepage losses and the problems caused by seepage to surrounding orchards.

Estimates of spillage and seepage reduction are presented in the following sections. This is followed by discussion of how the proposed project could provide benefits to both local water supply reliability and the Bay-Delta system.

## *Spillage and Spillage Reduction Estimates*

The rapid appraisal of water conservation opportunities prepared for SVRIC (Attachment D) employed a water balance analysis of the SVRIC system and irrigated lands to derive estimates of system losses for normal year and dry year conditions. Because there are no historical records of seepage or spillage, these estimates were based on water balance closure calculations and various assumptions. They therefore are not sufficiently reliable to serve as verification-quality estimates, but nevertheless provide the best available estimates of system spillage.

A rapid appraisal was also completed for the DCID system, but no quantitative estimates of system losses were provided. However, the DCID and SVRIC systems are remarkably similar in how they are operated and it is reasonable, as a first approximation, to assume that spillage from the DCID system is about the same percentage of diversion as for SVRIC. Thus, since DCID diversions are roughly one-half the SVRIC diversions, DCID spillage is assumed to be one-half of the amount estimated for SVRIC. Based on this rationale, the estimated monthly spillage rates and volumes for the two operations are as summarized in Table 3.

Table 3. Monthly Spillage Rates and Annual Volumes for Normal and Dry Year Conditions (from water balance analysis, rounded to whole cfs and nearest 100 af)

| Month | Normal Year Conditions (cfs) | | | Dry Year Conditions (cfs) | | |
|---|---|---|---|---|---|---|
| | SVRIC | DCID | Total | SVRIC | DCID | Total |
| April | 9 | 4 | 13 | 7 | 3 | 10 |
| May | 15 | 7 | 22 | 12 | 6 | 18 |
| June | 18 | 9 | 27 | 15 | 7 | 22 |
| July | 11 | 6 | 17 | 10 | 5 | 15 |
| August | 7 | 4 | 11 | 7 | 4 | 11 |
| September | 10 | 5 | 15 | 8 | 4 | 12 |
| October | 0 | 0 | 0 | 1 | 0 | 1 |
| Annual Volume (AF) | 3,500 | 1,800 | 5,300 | 2,800 | 1,400 | 4,200 |

At this juncture, it is a matter of professional judgment how much of the existing spillage could be eliminated with the proposed SCADA system. A conservatively low estimate, however, is that one-third of the existing spillage volume could be eliminated with the proposed near-term improvements.

## *DCID North Main Canal Seepage Tests and Estimates*

Ponding tests were conducted in the fall of 2004 to provide information about a specific reach of the DCID North Main that has long been considered to have high seepage, and where seepage is believed to cause damage to neighboring orchards. The reach is approximately 1,500 long in total, and was divided into three sub-reaches for testing purposes, based on the presence/condition of the lining and wetted perimeter.

The results of the seepage tests are presented below (Table 4). The seepage rates fall in the relative order expected, ranging from a low of 0.21 $ft^3/ft^2$/day for Reach 1, up to 1.52 $ft^3/ft^2$/day for Reach 3. The calculated daily seepage volume for the entire reach is 19,702 $ft^3$, which translates to an instantaneous rate of 0.23 cfs and an annual volume of just about 100 AF. The proposed pipeline that would replace this reach of the North Main is expected to have no seepage loss at all; thus the potential savings are the same as the seepage estimates.

Table 4. DCID North Main Canal Seepage Test Results and Seepage Estimates

| Parameter | Subreach 1 | Subreach 2 | Subreach 3 | Totals |
|---|---|---|---|---|
| Existing ditch length (ft) | 300 | 300 | 900 | 1,500 |
| Existing ditch wetted perimeter (ft) | 4.4 | 5.8 | 13.5 | N/A |
| Existing seepage coefficient ($ft^3/ft^2$/day) | 0.21 | 0.55 | 1.52 | N/A |
| Total wetted area ($ft^2$) | 1,320 | 1,740 | 12,150 | 15,210 |
| Daily seepage volume ($ft^3$) | 277.2 | 957 | 18,468 | 19,702 |
| Average seepage rate (cfs) | | | | 0.23 |
| Seepage duration (days) | | | | 215 |
| Seasonal seepage volume (acre-feet/season) | | | | 100 |

The seepage test records and results are presented in Attachment L.

## *Potential Benefits to Local Water Supply Reliability and the Bay-Delta System*

The operational concept that is taking shape between DCID, SVRIC and the agencies is that the water savings achieved by the proposed SCADA and pipeline improvements would be used to augment Deer Creek instream flows at times needed for fish, or to improve local water supply reliability at times when additional fish flows are not needed. Fortunately, the timing works out so that both kinds of benefits are possible. Critical upstream migration periods are generally April through June, when the water savings would be left instream without decreasing the volume of water ordinarily delivered to farms. Later in the season (July through September), when creek flows fall off, the savings would be used to augment deliveries to farms and would reduce the amount of groundwater pumping that is needed.

The benefits that could accrue to instream flows are substantial; however, the benefits to landowners are questionable. This is because the additional surface water deliveries would not generate a larger total water supply, they merely allow relaxation of groundwater pumping. Since the cost of pumping is generally very affordable, the water use efficiency improvements alone probably do not provide a net benefit to landowners, except for those with little or no access to groundwater.

Table 5 summarizes the water savings by month, for normal and dry years, that could be accomplished with the proposed near-term improvements. These estimates are based on the SCADA improvements being used to reduce spillage losses by one-third, as noted above, and the pipeline replacement reducing diversions by 0.2 cfs. These savings are significant relative to the targeted instream flow objective of 50 cfs.

Table 5. Estimated Water Savings of Near-term System Improvements

| Month | Normal Year Conditions (cfs) | | | Dry Year Conditions (cfs) | | |
|---|---|---|---|---|---|---|
| | Spillage | Seepage | Total | SVRIC | DCID | Total |
| April | 4 | 0.2 | 4.2 | 3 | 0.2 | 3.2 |
| May | 6 | 0.2 | 6.2 | 5 | 0.2 | 5.2 |
| June | 8 | 0.2 | 8.2 | 6 | 0.2 | 6.2 |
| July | 5 | 0.2 | 5.2 | 4 | 0.2 | 4.2 |
| August | 3 | 0.2 | 3.2 | 3 | 0.2 | 3.2 |
| September | 4 | 0.2 | 4.2 | 4 | 0.2 | 4.2 |
| October | 0 | 0.2 | 0.2 | 0 | 0.2 | 0.2 |
| Annual Volume (AF) | 1,800 | 100 | 1,900 | 1,400 | 100 | 1,500 |

## *Costs and Benefits Tables*

Completed Tables C-1 through C-3 and C-5 through C-8 from the PSP are presented and discussed in this section.

### Table C-1

Estimates of project costs were developed around the tasks presented in Section IV (see Table 2), including construction costs that are associated with Tasks 4 and 5, the two bid packages that would be contracted for project construction. Task 4 and 5 budgets are based on the engineer's estimate of construction cost.

The costs presented in Table 2 were cross-referenced with the cost categories used in Table C-1. The costs associated with Bid Package 1 (Task 4, Construct Structures) were assigned to Item (j) Construction and costs associated with Bid Package 2 (Task 5, Procure and Install SCADA Equipment) were assigned to

**Applicant:** **Deer Creek Irrigation District (Section A)**

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

**Section A projects must complete Life of investment, column VII and Capital Recovery Factor Column VIII. Do not use 0.**

## Table C-1: Project Costs (Budget) in Dollars)

| | Category (I) | Project Costs $ (II) | Contingency % (ex. 5 or 10) (III) | Project Cost + Contingency $ (IV) | Applicant Share $ (V) | State Share Grant $ (VI) | Life of investment (years) (VII | Capital Recovery Factor (VIII) | Annualized Costs $ (IX) |
|---|---|---|---|---|---|---|---|---|---|
| | Administration[1] | | | | | | | | |
| | Salaries, wages | $0 | 0 | $0 | $0 | $0 | 0 | 0.0000 | $0 |
| | Fringe benefits | $0 | 0 | $0 | $0 | $0 | 0 | 0.0000 | $0 |
| | Supplies | $0 | 0 | $0 | $0 | $0 | 0 | 0.0000 | $0 |
| | Equipment | $0 | 0 | $0 | $0 | $0 | 0 | 0.0000 | $0 |
| | Consulting services | $70,351 | 5 | $73,869 | $0 | $73,869 | 50 | 0.0634 | $4,683 |
| | Travel | $0 | 0 | $0 | $0 | $0 | 0 | 0.0000 | $0 |
| | Other | $0 | 0 | $0 | $0 | $0 | 0 | 0.0000 | $0 |
| (a ) | Total Administration Costs | $70,351 | | $73,869 | $0 | $73,869 | | | $4,683 |
| (b) | Planning/Design/Engineering | $59,951 | 5 | $62,948 | $0 | $62,948 | 50 | 0.0634 | $3,991 |
| (c) | Equipment Purchases/Rentals/Rebates/Vouchers | $0 | 0 | $0 | $0 | $0 | 0 | 0.0000 | $0 |
| (d) | Materials/Installation/Implementation | $568,360 | 10 | $625,196 | $0 | $625,196 | 20 | 0.0872 | $54,517 |
| (e) | Implementation Verification | $32,020 | 5 | $33,621 | $0 | $33,621 | 50 | 0.0634 | $2,132 |
| (f) | Project Legal/License Fees | $0 | 0 | $0 | $0 | $0 | 0 | 0.0000 | $0 |
| (g) | Structures | $0 | 0 | $0 | $0 | $0 | 0 | 0.0000 | $0 |
| (h) | Land Purchase/Easement | $31,253 | 10 | $34,379 | $0 | $34,379 | 50 | 0.0634 | $2,180 |
| (i) | Environmental Compliance/Mitigation/Enhancement | $0 | 0 | $0 | $0 | $0 | 0 | 0.0000 | $0 |
| (j) | Construction | $272,380 | 10 | $299,618 | $0 | $299,618 | 50 | 0.0634 | $18,996 |
| (k) | Other (Specify): Training /Outreach | $25,312 | 5 | $26,578 | $0 | $26,578 | 50 | 0.0634 | $1,685 |
| (l) | Monitoring and Assessment | $46,545 | 5 | $48,872 | $0 | $48,872 | 50 | 0.0634 | $3,099 |
| (m) | Report Preparation | $23,940 | 5 | $25,137 | $0 | $25,137 | 50 | 0.0634 | $1,594 |
| (n) | **TOTAL** | $1,130,112 | | $1,230,218 | $0 | $1,230,218 | | | $92,875 |
| (o) | Cost Share -Percentage | | | | 0 | 100 | | | |

1- excludes administration O&M.

Item (d) Materials/Installation/Implementation. Non-construction costs were assigned to cost items according to task functions, including: administrative consulting services, planning/design/engineering, implementation/verification, land purchase/easement, monitoring and assessment and report preparation. Training and outreach costs were assigned to the other cost category.

A contingency of 10% was assigned to Item (d) Materials/Installation/Implementation, Item (h) Land Purchase/Easement and Item (j) Construction. A contingency of 5% was assigned to all other items. This escalated the total project cost from $1,130,112 to $1,230,218.

The applicant's cost share was specified to be zero for all cost items, since the applicant qualifies as "disadvantaged" under the PSP criteria. This is discussed further under Table C-5.

The investment life was assumed to be 50 years for all cost categories except Item (d), which includes all of the SCADA equipment and was assigned a life of 20 years based on experience with similar systems. The resulting annualized capital cost of the project is $92,875.

## Tables C-2 and C-3

Based on experience with other similar projects, the annual operations and maintenance costs were estimated to be 3% and 2% respectively of the capital cost of the facilities. The capital cost of facilities is $924,814, the sum of Items (d) and (j), including their 10% contingencies. Together with annualized capital costs, the total annual project cost is estimated to be $139,116.

## Table C-5

The project is specifically designed to enable DCID and SVRIC to reduce Deer Creek diversions in the April-June period for upstream migration of salmon and in October for downstream migration. Thus, the project will provide immediate and direct benefits to the Bay-Delta. (Note: accomplishing these benefits relies in the near-term on the continued cooperation of DCID and SVRIC to voluntarily reduce diversions in consultation with fisheries experts. In the long term, it is anticipated that a formal agreement will be negotiated among the local entities and agencies.)

Based on the estimates presented previously, the potential instream flow benefits to Deer Creek range between 4.2 and 8.2 cfs in normal years and between 3.2 and 6.2 cfs in dry years. The potential annual volume of reduced diversion is 1,900 AF in normal years and 1,500 AF in dry years. These estimates indicate that the proposed near-term improvements would make a substantial contribution toward achieving the interim instream flow target of 50 cfs, but by themselves do not offer a complete solution. This is why the initial system efficiency improvements would need to be expanded and combined with groundwater development to achieve the targeted flow regimes.

The local benefits of the project are shown to be zero. This is because the project, if operated for the benefit of fish as planned, is expected to decrease irrigation water supply in the spring and increase water supply in the summer. The net effect is assumed to be negligible on annual water supply. Additionally, the project will serve a disadvantaged community (see Section VI), so a local cost share is therefore not required.

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

| Operations (1) (I) | Maintenance (II) | Other (III) | Total (IV) (I + II + II) |
|---|---|---|---|
| $27,744 | $18,496 | $0 | $46,241 |

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

## Table C-3: Total Annual Project Costs

| Annual Project Costs (1) (I) | Annual O&M Costs (2) (II) | Total Annual Project Costs (III) (I + II) |
|---|---|---|
| $92,875 | $46,241 | $139,116 |

(1) From Table C-1, row ( n) column (IX)
(2) From Table C-2, column ( IV)

**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 | Increased instream flows and improved flow timing in Deer Creek for improved upstream and downstream migration of salmon. Reduced water temperatures due to increased instream flows and decreased irrigation return flows. | April through June for upstream migration and isolated 1- to 2-week periods in October for downstream migration in the lower 10 miles of Deer Creek. | Annual cost calculations based on a 50-year project life; however, benefits would likely become permanent as a component of the Deer Creek Watershed Environmental Flow Augmentation Program. | Direct; project contributes directly and immediately toward accomplishment of Targeted Benefits 10, addressing instream flows and temperatures in lower Deer Creek. | Instream flow in Deer Creek:<br>April - June: 4.2 to 8.2 cfs (normal year); 3.2 - 6.2 (dry year)<br><br>Annual savings:<br>1,900 AF (normal year); 1,500 AF (dry year) |
| Local | None. | The system efficiency improvements will enable reduced diversions during critical salmon migration periods, and increased deliveries to farmers during non-critical periods. Overall, the net effect on annual local water supply will be negligable, despite redistribution within the irrigation season. Therefore no local benefit is claimed. | Not applicable. | **Not applicable.** | 0 |

[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.

## Tables C-6, C-7 and C-8

The annual local benefits of the project, in terms of water, energy and labor costs, are shown to be zero. In fact, the proposed water use efficiency improvements are expected to result in net increases in O&M costs, and therefore higher water costs, for both DCID and SVRIC, relative to the existing and likely future conditions. This is why one of the DCFEP elements involves provision of revenues to offset these higher costs. These arrangements remain to be worked out.

## *Cost-Benefit Indexes*

It is useful to express the project's costs and benefits in terms of indexes to enable comparisons with other projects. In terms of water savings, the annual project costs can be expressed per acre-foot of water not diverted (or saved). Using a total annual project cost of $139,116 and the estimated annual water savings presented in Table 5 (1,900 and 1,500 AF/yr in normal and dry years, respectively), the unit cost of savings is $73/AF in normal years and $93/AF in dry years. It is recognized that these indexes ignore the consideration of "new water"; however, the values demonstrate that the diversion reductions are accomplished at very competitive cost, relative to other similar projects.

Another way to view the project is in terms of unit cost of instream flow contribution. In this regard, several factors need to be considered beyond the increment of instream flow provided. Some of the considerations are as follows:

- The *length of the stream* reach that is benefited. All other factors equal, the longer the stream receiving the instream flow, the greater the benefit.
- The *relative magnitude of the contribution* compared to the targeted instream flows (or quantifiable objective). For example, a contribution of 10 cfs toward a goal of 20 cfs might be more valuable than a contribution of 20 cfs toward a goal of 200 cfs.
- The *relative importance of the stream* compared to other streams needing increased instream flows. This is clearly a subjective decision that should be made by experienced fisheries experts.
- The *frequency of the benefit.* All other factors equal, a project that contributes instream flows more often during times of critical need is more valuable than one that contributes less frequently.

It is not appropriate for the applicant to conduct this evaluation; however, the information presented in this application, including its attachments, enables the evaluators to do so. We are confident that the opportunity to invest in this project, and its potential benefits to Deer Creek, will rank high among the alternatives available to the CBDA.

If there is any additional information required to conduct a fair evaluation, please do not hesitate to contact the person designated in the Project Information Form (Section I). Thank you.

**Applicant:** **Deer Creek Irrigation District (Section A)**

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

| ANNUAL LOCAL BENEFITS | ANNUAL QUANTITY | MEASUREMENT | ANNUAL MONETARY BENEFITS |
|---|---|---|---|
| (a) Avoided Water Supply Costs (Current or Future Source) | 0 | | $0 |
| (b) Avoided Energy Costs | 0 | | $0 |
| (c ) Avoided Waste Water Treatment Costs | 0 | | $0 |
| (d) Avoided Labor Costs | 0 | | $0 |
| (e) Other (describe) | 0 | | $0 |
| (f) Total [(a) + (b) + (c) + (d) + (e) ] | | | $0 |

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

| | | |
|---|---|---|
| (a) Total Annual Monetary Benefits [(Table C-6, row (f)] | | $0 |
| (b) Total Annual Project Costs (Table C-3, column III) | | $139,116 |

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

| | |
|---|---|
| Applicant's cost share %: (from Table C-1, row o, column V) | **0** |
| Describe how the cost share (based on relative balance between Bay-Delta and Local Benefits) is derived. (See Section A-7 for description.) | |
| Provide Description in a narrative form. | |