

# INNOVATIVE IRRIGATION SAVING OUR DELTA - "I<sup>2</sup>SOD"

City of Pittsburg

## 2004 WATER USE EFFICIENCY

### Local and Regional Agricultural and Urban Water Use Efficiency Implementation Projects

#### Project Summary

The City of Pittsburg (City) is submitting this grant application for the purchase and installation of the EV2000 Central Control System with a series of Evolution DX2 ET Based Field Irrigation Controls that will transform the outdated irrigation systems of its large parks and medians via an automatic system of valve controllers at each site linked to a central computer system that will *maximize* irrigation use efficiency. The EV2000 system would automate 16 parks/facilities and 5 medians/right-of-ways (ROWS), covering 110 acres.

The goals and objectives of this project are to reduce water usage, increase in-stream flow in the Delta and improve water quality by reducing non-point source pollution runoff and salinity.

The City, as part of its matching contribution, has approval to complete two Capitol Improvement Projects (CIP) involving the renovation of 6 acres of medians and ROWs. The projects involve the replacement of leaking irrigation systems, installing the EV DX2 ET Based Field Irrigation Controllers and the planting of native and water use efficient plants. Installing the EV2000 system to monitor and maximized water usage in the targeted parks, medians and ROWs mentioned above and the CIP locations, the City expects to conserve a minimum of **178 AF or a 25 percent** reduction in water use, a *direct benefit to the Delta's in-stream flow*.

The Cost Benefit analysis indicates the City share of the project is 40 percent. However, this project has an immediate direct benefit once the equipment is install by reducing water from the South Delta Improvement Project Zone. The project also directly affects the Bay Delta with the reduction of non-point source pollution down the storm drain system. In addition, although the Life Expectancy of the Project is estimated at ten year, it is expected to go beyond twenty years saving irreplaceable water that can contribute as in-stream flow benefits or for water storage at Los Vaqueros Reservoir. Future advancement in irrigation technology will allow the EV2000 system to achieve this goal with simple software updates and minor system modifications.

In summary, the goals and objectives of the CALFED program are focused on reliable water supply through effective water use reduction efforts and improving water quality. The installation of the EV2000 system will meet these goals effectively. Therefore, whether in our City or in other landscaped areas throughout the state, achieving water use reduction and improving water quality can be accomplished by installing Innovative Irrigation to Save Our Delta. "I<sup>2</sup>SOD"

## A. Statement of Work: *Relevance and Importance*

### *Project Elements, Benefits, Goals and Objective*

The City of Pittsburg is considered the 'gateway to the Delta.' The City is located along New York Slough by the San Joaquin River and is a combination of heavy industrial, industrial, government and residential water customers. The City receives 93 percent of its water supply from the Delta via Contra Costa Water District which pumps water from the Delta at Rock Slough in Oakley. (See Map 1 & 2) Pittsburg used 10,020 AF of water in FY 2002-2003 and the City's parks and landscapes used approximately 1097 AF or 10 percent for 196 acres of parks, medians and ROWs.

The City of Pittsburg manually controls and modifies irrigation for all parks, medians and ROWs. This grant would allow for the automation of 62 percent of its irrigated landscape (See Appendix D) or 110 acres of targeted landscaped areas via radio signals and telephone lines to a central computer system. The City estimates the EV2000 automated system would reduce water usage in the targeted project locations from 712 AF to 534 AF, a minimum savings of **178 AF** or **25 percent**.

Presently, the City has no means to modify water usage for inclement weather or waterline breakage / damage except by using staff personnel to manually adjust the 37 irrigation system controls. To shut down the entire irrigation system in the City to adjust for inclement weather takes *four staff personnel one full day*. If a breakage occurs in a park, it may take a day or two to be shut off *unless* an observant resident calls in the problem sooner to standby personnel to shut down the water in that park until repairs can be made. An example of this; if a 4" line, pumping *500 gallons per minute* is *undetected for 16 hours*, the loss of water would be:

Water loss: 500 gal x 60 min x 16 hrs = 480,000 gallons = 1.47 AF  
Cost: 1.47 AF x \$ 916.00/AF(City cost) = \$1,349.00

The City grew approximately 3,636 in population from 1999 to 2003. This growth increased water demands with the addition of housing and 42.25 acres of new parks, medians and ROWs. To address the growth and addition of new landscaping, a means to standardize future irrigation installations needed to be accomplished with integration of the concept of water use efficiency.

In 2001, the Public Works Department Parks and Landscaping Division created *Irrigation Specifications* for the Planning and Engineering Departments to include as requirements to developers for all new parks, medians and ROW's as a measure to begin standardizing an irrigation system to reduce water usage. The *Irrigation Specifications* (See Appendix E) has standardized equipment and controllers as a means to modernize and standardize irrigation components with the goal to eventually be a citywide, fully automated irrigation system as part of the City's urban water management plans and best management practices for water use efficiencies for large landscapes. The standardized system the City has selected is the EV2000 Central Control System with DX2 ET Based Field Irrigation Controllers.

The irrigation systems installed since 2001 and the new ones under construction and to be constructed in the next five years will have these new standardized components. The grant would provide for the installation of equipment, controllers and transmitters in older parks, medians and ROWs to interface and meet the requirement of the new Irrigation Specifications which would allow for the complete automation of irrigation activities under *one central control system*. Installation of this central irrigation system would achieve the following goals:

- ❑ Reduce raw water draw from a critical Delta ecosystem and maintain water quality (salinity reduction)
- ❑ Control and reduce water usage through the use of water flow sensors and a central monitoring system increasing in-stream flow in the Delta
- ❑ Reduce pollutant loads into the Bay-Delta watershed from park irrigation overflows thereby preserving water quality (non-point source pollution)
- ❑ Implement Large Landscape Best Management Practices outlined in City's Urban Water Management Plan and MOU with CA Urban Water Conservation Council

**These goals can be achieved in approximately one-year after the award of contract with the installation of the automated high-tech EV2000 Central Automated Control System and irrigation system components.**

Water conservation and usage is also outlined in Contra Costa Water District's Urban Water Management Plan and is a main focus in the Best Management Practices outlined in the California Urban Water Conservation District which the City is a signatory on the Memorandum of Understanding. The installation of the EV2000 system would also meet the goals of these programs.

#### ***Statement of Critical Local, Regional, Bay-Delta State or Federal Water Issues***

The CAL FED Bay-Delta Program has a plan to address its four major objectives: Water Supply Reliability, Water Quality, Ecosystem Restoration, and Levee System Integrity. The City's "I<sup>2</sup>SOD" project will meet two of the program objectives and assist other agencies with other objectives. The two main objectives identified are Water Supply Reliability (Water Use Efficiency) and Water Quality.

The City's overall water usage is drawn from Rock Slough which is located in the South Delta Improvement Project Zone. By controlling the water usage and overflows from the City's parks and landscapes through a central automated irrigation system, an estimated reduction and management of 178 AF of water directly meets the objectives of water quality improvement projects per "Delta Improvements Package Implementation Plan Regarding CALFED Bay-Delta Program Activities in the Delta", dated August 12, 2004. In addition, the project assists with the proposed San Joaquin River Salinity Management Plan by reducing water drawn from South Delta Improvement Zone.

This project also addresses the critical need for metering urban customer deliveries as outlined in the California Bay-Delta Authority's document

“Implementation Approach for Agriculture and Urban Water Use Measurements Staff Proposal”, dated February 17, 2004. By installing the EV2000 central irrigation system, the system’s flow sensors monitor water flow conditions and track the volume/quantity of water to the central computer system for data collection and reporting.

**B. Statement of Work: *Technical/Scientific Merit, Feasibility Methods Procedures Equipment & Facilities***

The EV2000 System is an efficient high tech automated irrigation system that will assist with the goals of the CALFED Bay Delta Program and provide the City with undisputed results water, energy and labor reductions. Each identified park and median will be equipped with valves and flow sensors that will be connected to 34 satellite controllers. The satellite controllers can handle up to 48 solenoid valves that manage groups of sprinkler heads. The satellite controllers are linked via radio, phone or hard wire to a central control computer. The flow sensors monitors the flow of water through the systems, reporting how much water is moving through the pipes, and detecting any fluctuations in the water flow.

The central control computer operates two specialized program software, Evolution 2000 ET Basic and Advance Irrigation Management (AIM), that will monitor the water distribution to all the parks, medians and ROWs in the City. The system is preprogrammed with characteristics of the landscape to determine optimal irrigation needs. The AIM software uses data from the integrated weather station and analyzes water demand to distribute the water to different valves to conduct irrigation in the most efficient manner.

The weather station provides real time Evapotranspiration (ET) to .01 inch based on solar, wind, temperature and humidity. The weather station and satellite controllers are connected to the central computer system via radio, phone or hard wire. These communication components to connect these devices are the major capitol costs of the system. Green Tech provides a standard five-year warranty on all its products, provides technical expertise for system maximum efficiency and ongoing system training at no charge.

The equipment allows for high technology to control water usage in the City. Major features of the system include: rain and wind shutdown; flow sensor automatic shutoff; daily ET program adjustments, water volume measurements, and the capability to export data to Excel spreadsheets for years of comparative data.

**The installation of the EV2000 ET Basic and AIM software and the supporting system components can provide the power to shut down the City’s irrigation system to 16 parks/facilities and 5 medians/right-of-ways or 62 percent of the City’s irrigated landscaping in a matter of 15 seconds.**  
*This can save the loss and use of thousands of gallons of water from the Delta at a moments notice not possible at this time.*

To accomplish the automation of the City's manual irrigation system, a task list and schedule to award the contract, to install the components, to test the system, to train staff and track data is outlined in the Task List and Schedule in Table 1. It is estimated that the project will take approximately one-year to complete.

### ***Environmental Documentation***

In reviewing the California Environmental Protection Act (CEQA) requirements, the "I<sup>2</sup>SOD" project is defined as a 'project.' However, per the Guidelines under the Public Resources Code, projects that do not have a significant effect on the environment will be determined exempt from the provisions of CEQA. The "I<sup>2</sup>SOD" project will not have a significant environmental impact and therefore is classified as categorical exempt based on the activities to be performed. (See Appendix F, City of Pittsburg's Environmental Review Checklist) The "I<sup>2</sup>SOD" project will perform minor alterations of an existing public utility / facility and therefore, meets the environmental categorical exemption definition of Section 15301, Existing Facilities, under CEQA.

### **C. Statement of Work: *Monitoring and Assessment***

The Monitoring and Assessment of the "I<sup>2</sup>SOD" project is of major interest to the City. In a Staff Proposal by DWR on the "Implementation Approach for Agricultural and Urban Water Use Measurement" (February 17, 2004), staff outlines critical needs and identifies reporting of urban use and *metering* of urban customer deliveries in the "Proposed Approach for Urban Water Use" as means to retrieve data on water usage and water savings. Although this section of the report is primarily directed at water purveyors and the City is a water purveyor, the landscape division is a water customer and would be able to provide subsequent data for reporting with the installation of the EV2000 Central Control System and its extensive monitoring and data reporting capabilities. (See Appendix G and H) This would assist in compliance efforts of the proposed monthly data collection of the water purveyors water sources and customer deliveries since the City's landscape division accounts for now approximately ten percent of the City's overall usage.

Presently, only a 65 percent of the City's irrigated landscape is equipped with a means to measure water usage and not all of these meters are read and entered into a database on a regular basis. In preparation to implement the conditions of the grant, readings would be taken of the meters available in the identified project areas and entered into a separate database to develop a baseline of water usage. It would be anticipated to collect approximately four to six months of data to use as a comparison once the new technological innovative irrigation system is installed with flow sensors that read the velocity of the water flow, thus, measuring the total water volume flowing through each station in the system.

Initial setup of each station and staff training is essential to data collection and monitoring. At each station, the equipment, conduit and wiring will be installed to communicate with the central computer system software. Spray patterns will be adjusted and flow rates will be established at the various site locations and also entered into the central computer system. Once all the conditions are entered

along with constant information from the integrated weather station, each station will be monitored for greatest water efficiency. The system can also achieve a 30-40 percent reduction in energy use by identifying hydraulic and pump system constraints and 'stack the stations' to minimize watering windows and maximize pump efficiencies. This is the benefit of the Advanced Irrigation Management software which manages flow distribution, pump efficiency and system wide scheduling daily.

The EV 2000 system software algorithms recalculate all station runtimes whenever there are weather conditions changes including wind or rain conditions. The system has a complete report generation system that performs 24-hour diagnostic assessments of the system and can export this data into Excel spreadsheets. Reviewing this data will allow for making daily modifications to stations indicated by the centralized software system to ensure water use efficiency is being achieved and thus meeting the first goal and priority objectives, reducing the in-stream flow of raw water from the Delta. In addition, the system detects problems such as broken pipes or heads, stuck open valves and over watering thus preventing flooding and overflows of water into the storm drain systems carrying pollutants directly into the Delta. The system also monitors electrical field wiring and solenoid valves for failures.

Annual reports will be required for five years after the completion of the project. The data collection capability of the EV2000 system will allow for the collection of accurate flow data and *monitor it over years*. The City would be able to provide DWR comparative data over successive years. In addition, with the adoption of the Irrigation Specifications, new parks and landscape will be outfitted with this technology system adding new monitoring data to be shared. In the next five years with the expected expansion of the Urban Limit Line and the City is asking for an additional 1,812 acres in land, the new parks, medians and ROWs to be built will include the EV2000 system which will be able to be monitored and data inputted into the database for reporting purposes to DWR.

The EV2000 system software will monitor the stations and record data from the integrated monitoring controls. Once the system is installed, cost is relatively small. Besides day-to-day issues and standard maintenance costs, costs associated with the implementation of the monitoring and evaluation plan will be staff time and training to compile reports in EV2000 system and occasional site visit evaluations.

#### **D. Qualifications of the Applicants and Cooperators**

##### ***Summary of Skills and Qualifications***

Public Works Superintendent, Donald Buchanan, will acts as the Project Lead and will be directly involved in the contract and installation portions of the "I<sup>2</sup>SOD" Project.

Mr. Buchanan holds a Bachelors Degree in Recreation and Parks Administration and in 1991 was certified as a Master Gardener. He holds a pesticide Applicators License and has active membership with a number of horticulture, environmental

and parks associations. Acting supervisory capacity over Pittsburg's parks since 1979, Mr. Buchanan currently oversees a crew of 48 during the peak season and is responsible for developing and monitoring a budget in excess of \$3 million for landscape maintenance.

***External Cooperator***

Tony Yarish, District Manger for United Green Tech of Pacheco, CA, holds a C-27 license and is a member of the American Society of Irrigation Consultants. As a landscape and conservation consultant for this project, he has provided substantive technical assistance regarding the Rain Master EV 2000 Central Control Irrigation System. United Green has been in business for 15 years and has 40 employees.

Mr. Yarish will manage the installation project and oversee five years of system support after the equipment is operational. These services shall include: Strategic System Planning for efficiency; conservation and runoff reduction; on-site service on all equipment; computer support for system software and hardware training; installation of software upgrades; ongoing staff training as needed; notification and attendance for City personnel at annual regional training seminars to update, training, answer questions and network with other system users; technical support for the irrigation system.

Mr. Yarish and United Green Tech worked with the Solano County Water Agency (SCWA), recipients of the 2002 Water Use Efficiency Grant, on training staff and installing the EV2000 Central Control Systems in thirteen large public landscapes in Solano County.

**E. Outreach, Community Involvement and Acceptance**

The local watershed group, Partners for the Watershed, which the City is a member of, supports efforts to conserve water usage and water runoff with pollutants that would end up in the creeks and Delta. In addition, the Partners support the use of native, drought resistance plants. Water usage is a direct cost to the local taxpayer. Any cost savings to the community is unopposed in these fiscally challenging times as long as the parks and landscapes maintain their beauty.

Once the EV2000 system has been installed, the City will promote the "I<sup>2</sup>SOD" project to residents through water bill inserts with updates in year one and two on water savings based on data collected from the EV2000 system. In addition, City staff will make presentations to local community groups, such as Kiwanis, on the benefit of this project to the community and efforts they can make at home to reduce water use and prevent pollutants from going to the Delta. The City's website will have a link to information about the project and pictures with updates on water use.

One final component to promote the program will be going to elementary schools with a water conservation assembly. City staff has worked with Rock Steady Juggling on recycling assemblies and Rock Steady Juggling has an assembly

called “H<sub>2</sub>O Yeah!” which incorporates water conservation and storm drain pollution and prevention. (See Appendix I) The City would pay for assemblies for its eight (8) elementary schools and ask that the concept of the “I<sup>2</sup>SOD” project be incorporated into the message.

The Parks and Landscaping Division will train permanent staff (approximately 9 people) on the EV2000 system and its benefits as part of the City’s customer service training if inquiries are made of staff in the field.

#### **F. Innovation**

The “I<sup>2</sup>SOD” project will be utilizing innovative technology that can be used as a component of any state Urban Water Management Plans for Large Landscapes. The EV2000 Central Control System is a high-tech solution for managing irrigation systems. The wireless system of controllers with flow sensors connects to a central computer system that allows for optimum control of water use within a large, multi-location landscape system.

This “high-tech” irrigation system allows the user to manage multiple locations from one central computer system which can monitor and notify the user the right time, rate and amounts of water to apply at specific sites based on ET. In addition, the computerized technology can take immediate corrective action should problems arise such as a broken heads, pipes, main lines, stuck open valves, bad solenoids, shorted field wires or communication disruptions by shutting down water flow until identified repairs, indicated on the monitor, are repaired and resolved. The EV2000 System integrated AutoCAD options that can identify the precise locations of these problems requiring the corrective action.

The EV2000 System has interactive display of real-time showing measured electrical current or water flow of any station. This innovative high-tech system allows water savings to be achieved because irrigation schedules can be modified daily based on ET information received in the central control system from the integrated weather station and controllers. No longer will it take hours or days to locate and make repairs or modify watering schedules with a team of workers dispatched throughout the City to multiple locations to make the necessary corrective action. The innovative, high-tech solution will allow the City to become water use efficient, reduce dependency on the Bay Delta system and improve water quality with reduce run-off from landscapes because the City will be “watering by need – not by time.”

#### **G. Benefits and Costs**

The “I<sup>2</sup>SOD” project achieves *direct in-stream flow and timing, water quantity and water quality benefits to the Bay-Delta System*. To corroborate and validate the ‘direct benefits’ of the “I<sup>2</sup>SOD” project, the following qualitative descriptions and quantitative assessments are provided as support for the various Tables in Appendix C.

### **C-1: Project Costs**

The installation of the EV2000 System to interconnect 16 parks/facilities and 5 median/ROWs will be completed within a one-year period. To accomplish this, it will take a full-time permanent employee and one seasonal employee to prepare each site location.

*Salaries & Fringe Benefits:*                      \$ 17,725.00

Training is a major component in order to fully utilize the system. The only costs will be staff costs since United Green Tech will provide all the training at *no cost*.

*Training:*    \$ 3,174.30

Supplies to prepare each site location consist of wiring, PVC electrical conduit, electrical junction boxes, controller brackets and materials to build a controller pedestal such as concrete and framing.

*Supplies:*    \$ 672.00

Quarterly reporting will need to be prepared and submitted as part of the PSP and Contract Agreement. An Administrative Analysis III will prepare these reports.

*Report Preparation:*                                      \$ 1,213.44

These cost are outlined and broken down in Appendix J and K.

The cost of the EV2000 System is itemized in Appendix L, dated January 4, 2005. It is itemized by location the equipment costs and the cost of the consultant to assist with the final installation and programming. These costs are identified in Table C-1(c) and (d) respectively.

Other costs associated with the project include the assemblies at eight elementary schools estimated to be \$5,200.00.

The Life of the Investment will be calculated at ten years. This is based on other systems installed in other Cities where systems have been in operation for over fifteen years.

The City will be renovating 2 large median/ROW projects in FY2005/2006. (See Appendix M and N) The Capital Improvement Projects (CIP) will be funded through Redevelopment Funding. These projects will involve replacing old leaking irrigations lines, installing the Evolution DX2 ET Based Field Irrigation Controls, and replacing old landscaping with more water use efficient and native plants. This will involve close to *6 acres of medians and ROWs*.

It is estimated the cost to install the EV2000 in one year \$667,972.00. The City share of the project will be \$277,984.00.

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

The EV2000 will be covered by a five-year warranty on parts and labor. The Annual Operations and Maintenance Costs will not include other maintenance and labor activities for day-to-day operations such as broken mains and heads since it is not directly part of the EV2000 system to be installed. The EV2000 system is designed to be *low* maintenance once installed.

The annual operation of the EV2000 Central Control System will primarily involve the management of the central computer system at the base station. This would entail designated staff person(s) to monitor and manage the system daily for:

- Revised watering schedules to the system initial 37 controllers based on climate data collected from the weather station
- Responding to the systems alarms by dispatching maintenance personnel to water breaks, broken sprinkler heads, etc. at the designated locations.
- Print and distribute problem reports indication faulty wiring, solenoid malfunction, controller disruptions, etc.
- Assist developers as needed relative to responding questions and conducting system checks for new controller/system installations.

The required operation time will average one lead person, 10 hours per week for 10 months of the year estimated at \$18,080.00 per year.

The annual maintenance of the system components are included in the 5-year warranty offered. Therefore, no hardware replacement costs are expected unless the system is *adversely* impacted by an act of vandalism or nature so an estimated cost of these repairs is \$4,000.00. Following the completion of the warranty period, maintenance of the weather station and as needed repairs to the overall system will need to be included at an estimate of \$1,100.00 per year based on input from other organizations with an EV2000 system. Staff time to prepare yearly reporting for five years after the end of the project is estimated at \$303.36. (5 hours @ \$50.56)

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

The figures in this Table are the Total Annual Project Costs which are linked from Table C-1 and the Total Annual Operation and Maintenance Costs which is linked from Table C-2. The Total Annual Project Costs are \$116,746.00.

### **C-4: Capitol Recovery Factor**

United Green Tech has installed Rain Master irrigation systems that have been in operation for over fifteen years. Based on their experience and expertise on these systems, only software updates and minor maintenance have been required for their systems. The equipment has had virtually no operating failures and the system has a five-year warranty. Therefore, it will be estimated that the Life Expectancy of the Project to be ten years with a Capitol Recovery Factor of .1359.

### **C-5: Project Annual Physical Benefits**

The City of Pittsburg is located along New York Slough at the confluence of the Sacramento and San Joaquin Rivers between the Bay and the Delta. Therefore, all actions are direct benefits to the Bay-Delta and locally to the City of Pittsburg since the City is apart of the Delta's immediate watershed and relies on the attributes of the Delta (water quality and quantity) for its community. Any improvements to water quality and quantity are benefited by the Bay Delta as well as locally due to the City's proximity within the Bay-Delta.

#### **Description of physical benefits (in-stream flow and timing, water quantity and water quality) for: (Bay Delta & Local)**

The "I<sup>2</sup>SOD" project will have immediate results with quantity of water saved after installation of the EV2000 system. The City expects to contribute to water supply reliability by reducing its water use dependency by 178 AF providing more in-stream flow. Controlling water runoff and pollutants that go directly to the Delta will also be realized with the prevention of flooding thereby preserving water quality.

#### **Time pattern and Location of Benefit: (Bay Delta & Local)**

After the installation of the EV2000 system, immediately, better control of water usage will be achieved. The EV2000 system will analyze daily ET from the integrated weather station and modify irrigation patterns. During the summer, where typically water usage is higher, the present non-automated irrigation system is set for so many hours throughout the week. Adjustments are made only if absolutely required. The EV2000 system and software is designed for daily adjustments allowing for better utilization of night irrigation practices.

The water saved will benefit the South Project Zone Area (Rock Slough) by allowing water to remain in the Delta thereby assisting with reducing salinity levels by keeping the in-stream flow of more water. Even when at critical times of high salinity in the Delta, and water is drawn from the Los Vaqueros Reservoir, which will be expanded storage through the CALFED project, it is critical to use less water since it is only borrowed water from the Delta. Eventually, the reservoir will have to be replenished by rain and siphoned water from the Delta. The EV2000 system uses daily ET readings to make adjustments that will reduce water usage from the Delta and the water stored at Los Vaqueros Reservoir, an objective of CALFED.

#### **Project Life: Duration of Benefits: (Bay Delta & Local)**

It is estimated that Life Expectancy of the "I<sup>2</sup>SOD" Project to be ten years. However, other Rain Master irrigations systems have been in existence for over fifteen years. High tech irrigation will be critical in future water management efforts with the expected growth of the state to increase to 52 million people by the year 2020. Once a system of this nature is installed and all present and future sites synchronized with the same technology, the duration of benefits could exceed to over 20 years or more. The expected future advancement of irrigation technology with updated equipment and software will allow system modifications to be achievable. In addition, once water savings is achieved,

reverting back to a non-automated irrigation system will not be an option since water cost will continue to rise and water availability will decrease.

**State Why Project Bay Delta benefit is Direct, Indirect or Both: (Bay Delta)**

The installation of the EV2000 system will have immediate direct benefits contributing to the CALFED objectives within the Bay Delta system. Two of the objectives, Water Supply Reliability and Water Quality, are met succinctly as the innovative, water use efficient irrigation control system monitors the use of water and prevents non-point source pollutants from flooding, over-watering, and vandalism to enter the Delta. Also, the additional use of four vehicles, approximately 11 times a year (see C-6), contributing non-point source pollutants such as fuel, oil and metals on the roads and emissions into the air, will also be eliminated. Water savings will be realized after the installation of each irrigation control station, thereby preserving in-stream flow in the South Project Zone Area, reducing salinity and preserving water storage at Los Vaqueros Reservoir.

**Quantified Benefits (in-stream flow and timing, water quantity and water quality): (Bay Delta & Local)**

Presently, the parks and landscaping irrigation accounts for almost ten percent of the overall water usage by the City. If this central irrigation system is not installed, then the trend will continue with the addition of new parks and medians/ROWs.

It is estimated that approximately 6.167 AF of water is used per acre of parks with turf. The City will be adding in the next five years, at a minimum, an additional *26 acres of new parks at a use of 156 AF of water with the present irrigation system practices.* This would be added to the present total of *all irrigated landscape of 1097 AF for a total of 1123 AF.*

With the installation of the EV2000 system in these new parks and the identified target areas, the in-stream flow savings and water quantity would be:

	<b>Acres</b>	<b>Current AF Usage</b>
<i>New Parks (next 5 years)</i>	26	156
<i>Targeted Parks</i>	109.51	675.68
<i>Targeted Medians/ROWs</i>	6.03	37.21
<i>CIP Contribution</i>	5.93	36.59
<b>Total</b>	<b>141.44</b>	<b>905.48</b>

	<b>Water Use Reduction</b>	<b>Future AF Totals</b>
EV2000 Installation	25% - <b><u>226.37</u></b> AF	<b>679.11</b>
	30% - <b><u>271.64</u></b> AF	<b>633.84</b>

An audit was conducted by DWR on this type of irrigation system installed at the City of Davis. In the locations the system was installed, DWR and city staffs were estimating a 40 percent reduction in water usage. (See Appendix O) Preliminary results from the City of Benicia, one of the member cities in the

SCWA regional project in Solano County, has estimated a 25 percent reduction in water use in its first season of operation.

In examining issues pertaining to water quality, one of the main contributors by the City is flooding. Flooding will cause not only water lost affecting in-stream flow and ET but will cause non-point source pollution with pollutants from indirect sources such as parks and gutters (before street sweeping BMPs occur) to go down the storm drain system directly to the New York Slough in the Delta.

The City fertilizes turf areas 4 times per year, applying 5 tons per application for a total of 20 tons per year. The City, on average, experiences flooding incidents accordingly:

*Broken Lines* ~ 24 times per year

*Stuck Valves* ~ 40 times per year - almost weekly (common issue for all irrigation systems)

*Vandalism* ~ 25 incidents (approximately) last year – breaking into controllers allowing water to run continuously

The EV2000 system would prevent these incidents from occurring by the flow sensor detecting fluctuations in the water flow and the software system detecting irregularly timed irrigation thereby shutting off the water to the area. This would prevent these additional pollutants from going down the storm drain and into the Delta.

Other non-point source pollutants that will be reduced will be fuel and emissions. The additional vehicles required to adjust the present irrigation system during inclement weather periods will also be eliminated. These non-point sources included oil, fuel and metals from the vehicles as well as the emissions from these vehicles. Emissions will be also reduced with the estimated 30-40 percent reduction in energy use to operate the irrigation pump systems by the EV2000 AIM software 'stacking the stations' thereby, minimizing watering windows and maximizing pump efficiency. All in the spirit of 'Flex Your Power' and 'Flex Your Power at the Pump'.

### **C-6: Project Annual Local Monetary Benefits**

The "I<sup>2</sup>SOD" project after installation and training is complete is expected to reduce the inflow of water from the Delta via the Contra Costa Water District distribution system by a minimum of **25 percent for the first year**. It may be as high as 30 percent. Based on a factor of 25 percent, annual benefits are expected to be:

Water Supply Costs:	225 AF x \$475.77 = \$107,048.25
Electrical Supply:	225 AF x \$34.52 = \$7,767.00

The Labor and Other cost savings are based on the need for the timing on the controllers to be adjusted for fluctuations in weather conditions and degrees of ET. On average this occurs eleven times per year requiring four staff members eight hours to adjust all the controllers. With the EV2000 system and the

locations left requiring adjustments, it would take only one person approximately 5 hours. (See Appendix P for break down)

Labor Costs:	\$9,922.00
Other (Fuel, Insurance, Depreciation, etc):	737 miles x .405 = \$298.00

In addition, as part of the State of California's Flex Your Power and Flex Your Power at the Pump campaigns, it could be said these costs provide a *broader benefit* to DWR with the reduction of emissions from energy and fossil fuel which through transpiration and runoff contaminant the Bay-Delta with pollutants.

### **C-7: Project Local Monetary Benefits and Project Costs**

The Total Annual Monetary Benefits (Table C-6 - \$125,036.00) is greater than the Total Annual Project Costs (Table C-3 - \$116,746.00) by \$8,290.00. Although the Local Monetary Benefits exceed the Annual Project costs, the "I<sup>2</sup>SOD" project has *broad transferable benefits* since the water savings will not only benefit the City by preserving water supply reliability for its community it also provides the same benefits to other entities and wildlife in the Bay-Delta region. The "I<sup>2</sup>SOD" project cannot otherwise achieve these benefits to the Bay-Delta and meet CALFED goals unless it *overcomes implementation barriers* which is the necessary funding from the 2004 Water Use Efficiency PSP, made possible by the CALFED Program, Prop 50 funding to make this project a reality.

### **C-8: Applicant's Cost Share Description**

The *cost share for the City*, based on the data inputted into the Table C matrixes, is *40 percent*. The "I<sup>2</sup>SOD" project directly benefits the Bay-Delta more than it does locally since although the City is apart of the Delta and benefits, the direct savings benefits all users and wildlife that depend on the Bay-Delta.

The City of Pittsburg is located on the water between the Bay and Delta waterways. The City (residents, businesses, industry and government) is dependent on the water drawn from the Delta at Rock Slough. The parks and landscaping locations, at this time, account for approximately 10 percent (1097 AF) of the overall water used by the City, approximately 10,070 AF. New parks will be equipment with the EV DX2 ET based field controllers but if no central EV2000 system is installed, the equipment will not be utilized to it full capacity and design which is to reduce water usage and energy. Due to *extreme* budget constraints, other priorities for capitol improvement projects funding, and the financial strains and subsidy of the Lighting and Landscaping Assessment Districts, the cost to fund the "I<sup>2</sup>SOD" project *may never occur* unless support by outside funding such as provided by the DWR Water Use Efficiency Grant.

The "I<sup>2</sup>SOD" project *directly benefits* the CALFED program objectives for the Bay-Delta. This project will *reduce water use* and assist with the reliability of water supply with the EV2000 computer software and flow sensors constant monitoring of water and daily ET modifications from the integrated weather station. Other direct benefits to the Bay Delta from this project would be improving water quality with the reduction of the frequent non-point source pollution runoff caused by broken pipes/heads and vandalism. In addition, the

reduced dependency for water will increase in-stream flow in the South Delta Improvement Zone area reducing salinity and improving water quality. The installation of the EV 2000 system would also meet the goals and objectives of the CA Urban Water Conservation Council's Large Landscape Best Management Practices outlined in the Urban Water Management Plan.

## MAPS

- Map 1 - Contra Costa Water District Service Area
- Map 2 - Delta Map – Rock Slough Intake Identification

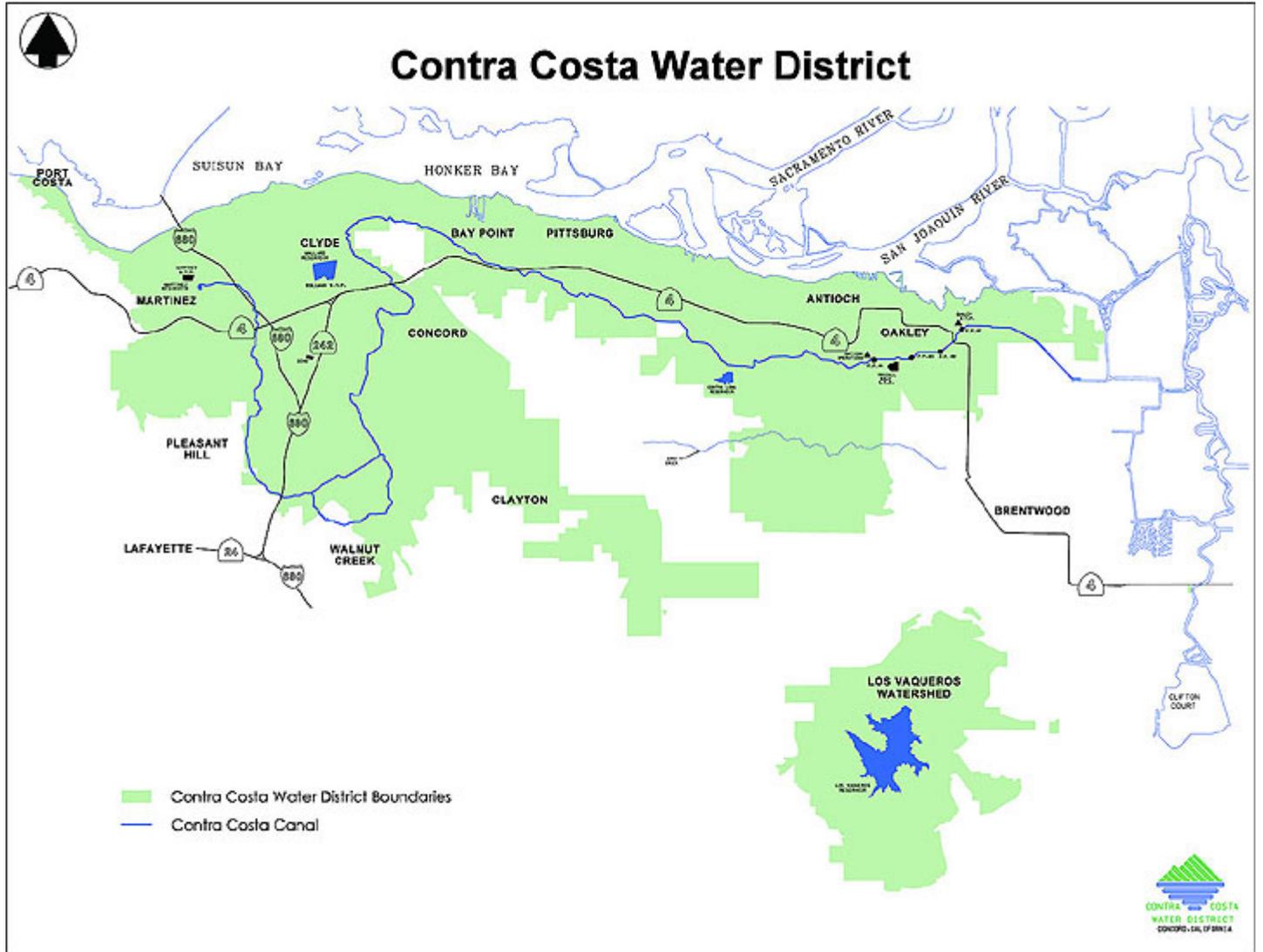
## TABLES

- Table 1 - Task List & Schedule

## APPENDIXES

- A. Project Information Form
- B. Signature Page
- C. Benefits and Costs
  - C-1: Project Costs
  - C-2: Annual Operations and Maintenance Costs
  - C-3: Total Annual Project Costs
  - C-4: Capitol Recovery Factor
  - C-5: Project Annual Physical Benefits
  - C-6: Project Annual Local Monetary Benefits
  - C-7: Project Local Monetary Benefits and Project Costs
  - C-8: Applicant's Cost Share Description
- D. Irrigation Placement Locations / Targeted Areas
- E. Irrigation Specifications
- F. City of Pittsburg's Environmental Review Checklist
- G. Rain Master Evolution System Central Synergy
- H. Rain Master "Evolution 2000" Reports
- I. Rock Steady Juggling "H<sub>2</sub>O Yeah!" Flyer
- J. Expense Itemization for Administration (Table C-1)
- K. Itemization of Labor / Supplies for Targeted Areas (Table C-1)
- L. United Green Tech EV2000 Central Control System Price Sheet
- M. City of Pittsburg Capital Improvement Project – Street Median Project
- N. City of Pittsburg Capital Improvement Project - Oakhills Project
- O. City of Davis Article – "New Water System Using 40% Less."
- P. Itemized Project Annual Local Monetary Benefits

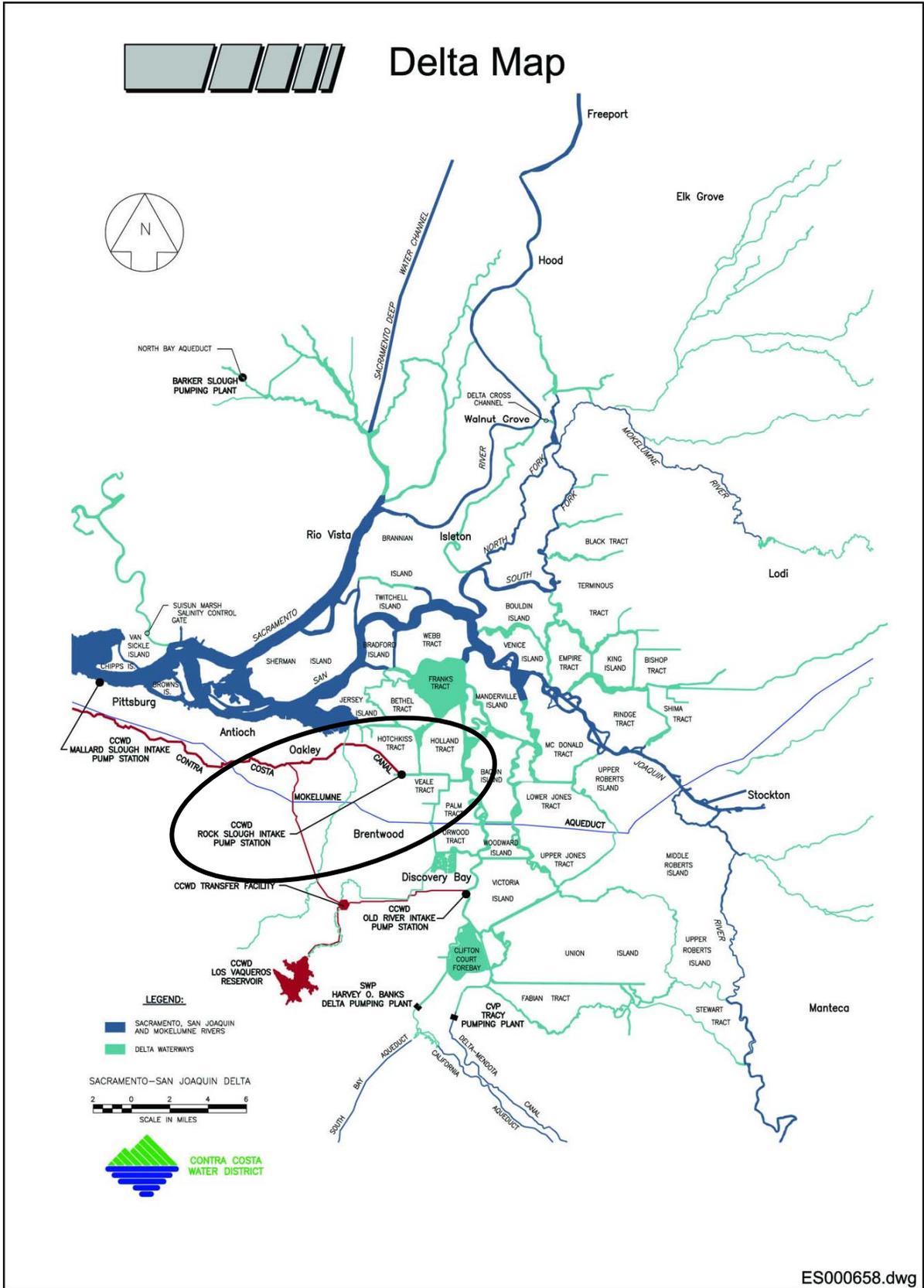
# MAP 1



# MAP 2



## Delta Map



**TABLE 1**  
**Innovative Irrigation Saving Our Delta - "I<sup>2</sup>SOD"**

**Task List & Schedule**

<b>Task</b>	<b>Deliverable Item(s)</b>	<b>Start Date</b>	<b>End Date</b>	<b>Projected Cost</b>
Contract Negotiations	Negotiate Contract with DWR	06/01/05	12/01/05	\$ 0
Contract Issuance	Contracts executed, projects begin	12/01/05	12/31/05	\$ 0
Project Implementation	Establish Purchase Order for Materials	01/01/06	01/31/06	\$ 0
Trenching & Wiring	City to begin trenching and wiring	02/01/06	08/01/06	\$18,379
Satellite Controllers & Flow Sensors	Begin installation	02/01/06	08/01/06	\$319,894
Central Computer System	Begin Installation & add station controls	03/01/06	09/01/06	\$13,791
Weather Station	Begin Installation and setup function	03/01/06	04/01/06	\$7,947
Base Radio Station, Antenna and Repeaters	Install Base radio station and repeater stations and submit application fee	03/01/06	08/01/09	\$26,885
Staff training	Train staff on computer system	03/01/06	06/01/06	\$1,998
Quarterly Report & Invoicing	Prepare and submit Quarterly report to DWR	01/01/06	04/15/06	\$ 303.36
Staff training	Train staff on equipment and system	08/01/06	09/01/06	\$1,176
Quarterly Report & Invoicing	Prepare and submit Quarterly report to DWR	01/01/06	04/15/06	\$ 303.36

**TABLE 1**  
**Innovative Irrigation Saving Our Delta - "I<sup>2</sup>SOD"**

**Task List & Schedule – Continued**

CIP Project- Street Medians	Rehabilitate medians & ROWs on Leland & Loveridge Rd	02/01/06 <i>May want to start earlier</i>	11/01/06	\$150,000
CIP Project- Oakhills	Rehabilitate medians & ROWs in Oakhills	02/01/06 <i>May want to start earlier</i>	12/01/06	\$100,000
Quarterly Report & Invoicing	Prepare and submit Quarterly report to DWR	04/15/06	07/15/06	\$ 303.36
School Water Conservation Assemblies	Perform "H <sup>2</sup> O Yeah!" assemblies in elementary schools	09/15/06	05/15/07	\$5,200.00
Quarterly Report, Invoicing & Year End Report	Prepare and submit Quarterly & Year end report to DWR	07/15/06	12/30/06	\$ 303.36
Year 1 Report	Prepare and submit required yearly update report	01/01/07	12/30/07	\$0
Year 2 Report		01/01/08	12/30/08	
Year 3 Report		01/01/09	12/30/09	
Year 4 Report		01/01/10	12/30/10	
Year 5 Report		01/01/11	12/30/11	

**Applicant: City of Pittsburg**

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 <sup>1</sup>								
	Salaries, wages (includes fringe benefits)	\$17,725	0	\$17,725	\$17,725	\$0	10	0.1359	\$2,409
	Fringe benefits	\$0	0	\$0	\$0	\$0	0	0.0000	\$0
	Supplies	\$672	0	\$672	\$672	\$0	10	0.1359	\$91
	Equipment	\$0	0	\$0	\$0	\$0	0	0.0000	\$0
	Consulting services	\$0	0	\$0	\$0	\$0	0	0.0000	\$0
	Travel	\$0	0	\$0	\$0	\$0	0	0.0000	\$0
	Other (Initial Training)	\$3,174	0	\$3,174	\$3,174	\$0	10	0.1359	\$431
(a)	Total Administration Costs	\$21,571		\$21,571	\$21,571	\$0			\$2,931
(b)	Planning/Design/Engineering	\$0	0	\$0	\$0	\$0	0	0.0000	\$0
(c)	Equipment Purchases/Rentals/Rebates/Vouchers	\$364,593	5	\$382,823	\$0	\$382,823	10	0.1359	\$52,026
(d)	Materials/Installation/Implementation	\$25,395	5	\$26,665	\$0	\$26,665	10	0.1359	\$3,624
(e)	Implementation Verification	\$0	0	\$0	\$0	\$0	0	0.0000	\$0
(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	\$0	0	\$0	\$0	\$0	0	0.0000	\$0
(i)	Environmental Compliance/Mitigation/Enhancement	\$250,000	0	\$250,000	\$250,000	\$0	10	0.1359	\$33,975
(j)	Construction	\$0	0	\$0	\$0	\$0	0	0.0000	\$0
(k)	Other (Specify)	\$5,200	0	\$5,200	\$5,200	\$0	10	0.1359	\$707
(l)	Monitoring and Assessment	\$0	0	\$0	\$0	\$0	0	0.0000	\$0
(m)	Report Preparation	\$1,213	0	\$1,213	\$1,213	\$0	0	0.0000	\$0
(n)	<b>TOTAL</b>	\$667,972		\$687,472	\$277,984	\$409,487			\$93,263
(o)	Cost Share -Percentage				40	60			

1- excludes administration O&M.

Applicant:

City of Pittsburgh

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

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

Operations (1) (I)	Maintenance (II)	Other (III)	Total (IV) (I + II + III)
\$18,080	\$4,000	\$1,403	\$23,483

(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)
\$93,263	\$23,483	\$116,746

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

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

**Table C- 4: Capital Recovery Table (1)**

Life of Project (in years)	Capital Recovery Factor
1	1.0600
2	0.5454
3	0.3741
4	0.2886
5	0.2374
6	0.2034
7	0.1791
8	0.1610
9	0.1470
10	0.1359
11	0.1268
12	0.1193
13	0.1130
14	0.1076
15	0.1030
16	0.0990
17	0.0954
18	0.0924
19	0.0896
20	0.0872
21	0.0850
22	0.0830
23	0.0813
24	0.0797
25	0.0782
26	0.0769
27	0.0757
28	0.0746
29	0.0736
30	0.0726
31	0.0718
32	0.0710
33	0.0703
34	0.0696
35	0.0690
36	0.0684
37	0.0679
38	0.0674
39	0.0669
40	0.0665
41	0.0661
42	0.0657
43	0.0653
44	0.0650
45	0.0647
46	0.0644
47	0.0641
48	0.0639
49	0.0637
50	0.0634

(1) Based on 6% discount rate.

Applicant:

**City of Pittsburg**

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

	Qualitative Description - Required of all applicants <sup>1</sup>				Quantitative Benefits - where data are available <sup>2</sup>
	Description of physical benefits (in-stream flow and timing, water quantity and water quality) for:	Time pattern and Location of Benefit	Project Life: Duration of Benefits	State Why Project Bay Delta benefit is Direct <sup>3</sup> Indirect <sup>4</sup> or Both	Quantified Benefits (in-stream flow and timing, water quantity and water quality)
Bay Delta	<b>Table C-5 Information - See Narrative and Data starting on page 8.</b>				0
Local				<b>Not applicable.</b>	

<sup>1</sup> The qualitative benefits should be provided in a narrative description. Use additional sheet.

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

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

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

Applicant:

City of Pittsburgh

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

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

<b>ANNUAL LOCAL BENEFITS</b>	<b>ANNUAL QUANTITY</b>	<b>UNIT OF MEASUREMENT</b>	<b>ANNUAL MONETARY BENEFITS</b>
(a) Avoided Water Supply Costs (Current or Future Source)	225	AF	\$107,048
(b) Avoided Energy Costs	225	AF	\$7,767
(c) Avoided Waste Water Treatment Costs	---	---	\$0
(d) Avoided Labor Costs	297	Hours	\$9,922
(e) Other (describe)	737	Miles	\$298
(f) Total [(a) + (b) + (c) + (d) + (e) ]			\$125,036

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

(a) Total Annual Monetary Benefits [(Table C-6, row (f))	\$125,036
(b) Total Annual Project Costs (Table C-3, column III)	\$116,746

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

Applicant's cost share %: (from Table C-1, row o, column V)	<b>40</b>
Describe how the cost share (based on relative balance between Bay-Delta and Local Benefits) is derived. (See Section A-7 for description.)	
Provide Description in a narrative form.	