Texas Water Development Board

SPRINGS HILL WSC

DWSRF GREEN PROJECT RESERVE BUSINESS CASE EVALUATION

STATE FISCAL YEAR 2012 INTENDED USE PLAN

PROJECT NUMBER 62532

COMMITMENT DATE: October 17, 2012

DATE OF LOAN CLOSING: May 2, 2013

GREEN ESTIMATE AT CLOSING: $1,293,000.00

Subsidy awarded for Green components, (if any)_____

TEXAS WATER DEVELOPMENT BOARD

Green Project Reserve

Green Project Information Worksheets

Drinking Water State Revolving Fund

Intended Use Plan

The Federal Appropriation Law for the current fiscal year Clean Water and Drinking Water State Revolving Fund programs contains the Green Project Reserve (GPR) requirement. The following Green Project Information Worksheets have been developed to assist TWDB Staff in verifying eligibility of potential GPR projects.

TWDB-0163
Revised 12/2/2010

TEXAS WATER DEVELOPMENT BOARD
DRINKING WATER STATE REVOLVING FUND (DWSRF)
GREEN PROJECT INFORMATION WORKSHEETS

PART I – GREEN PROJECT INFORMATION SUMMARY

Check all that apply and complete applicable worksheets:

Categorically Eligible

- ☐ Green Infrastructure $ _____
- ☐ Water Efficiency $ _____
- ☐ Energy Efficiency $ _____
- ☐ Environmentally Innovative $ _____

Business Case Eligible

- ☐ Green Infrastructure $ _____
- ☒ Water Efficiency $ 1,277,353
- ☐ Energy Efficiency $ _____
- ☐ Environmentally Innovative $ _____

Total Requested Green Amount $ 1,277,353

Total Requested Funding Amount $ _____

Type of Funding Requested:

- ☒ PAD (Planning, Acquisition, Design)
- ☒ C (Construction)

Completed by:

Name: Jeanne Schnuriger Title: General Manager

Signature: Jeanne Schnuriger Date: April 30, 2012

TEXAS WATER DEVELOPMENT BOARD
DRINKING WATER STATE REVOLVING FUND (DWSRF)
GREEN PROJECT INFORMATION WORKSHEETS

PART II - CATEGORICALLY ELIGIBLE

Complete this worksheet for projects being considered for the Green Project Reserve (GPR) as categorically eligible. Categorically eligible projects or project components are described in the following sections of the EPA GPR guidance (TWDB-0161):

Green Infrastructure	Part B, Section 1.2
Water Efficiency	Part B, Section 2.2
Energy Efficiency	Part B, Section 3.2
Environmentally Innovative	Part B, Section 4.2

Information provided on this worksheet should be of sufficient detail and should clearly demonstrate that the proposed improvements are consistent with EPA and TWDB GPR guidance for categorically eligible projects. Refer to **Error! Reference source not found.** for additional information.

Section 1 – General Project Information

Applicant: Springs Hill Water Supply Corporation PIF #: 9148

Project Name: Meter Replacement

Contact Name: Jeanne Schnuriger

Contact Phone and e-mail: 830-379-7683

Total Project Cost: $1,277,353 Green Amount: $1,277,353
(Categorically Eligible)

Brief Overall Project Description:

This project will alleviate the two largest factors in our high rate of water loss; Apparent Losses and Real Losses (as defined in 'Water Loss Audit Manual for Texas Utilities'). More specifically, random meter testing and thorough analysis of utility SCADA and meter system data reveal significant problems with customer meter accuracy and real losses in the water distribution network. Replacement of under-registering customer meters with current state-of-the-art automated meters will significantly reduce Apparent Losses while also enabling automated leak detection and customer notification. And acquisition of automated leak detection equipment will greatly enhance our ability to track down and eliminate leaks in our distribution network thereby reducing Real Losses.

Section 2 – Green Infrastructure

Proposed green infrastructure improvements such as pervious or porous pavement, bioretention, green roofs, rainwater harvesting, gray water use, xeriscape, landscape conversion programs and moisture and rain sensing irrigation equipment are considered categorically eligible for the GPR according to EPA GPR guidance (TWDB-0161) Part B, Section 1.2. List categorically eligible green infrastructure contained within the project in the table below. Also provide a detailed description of the proposed improvements. The detailed description should provide sufficient detail that clearly demonstrates that the proposed improvements are consistent with EPA GPR guidance (TWDB-0161).

Green Infrastructure Description	Project / Component Cost
Total:	

Detailed Description (attach additional pages if necessary):

Green amount associated with green infrastructure (categorically eligible): $ _____

Section 3 – Water Efficiency

Certain water efficiency improvements may be considered categorically eligible for the GPR. Refer to EPA and TWDB GPR guidance for a complete list and description of categorically eligible GPR Projects. A few common types of water efficiency projects that may be considered categorically eligible, such as certain water meter improvements and leak detection are listed below. Complete these sections of the worksheet as applicable. For any other water efficiency improvement being considered for categorical eligibility, complete Section 3.3.

Section 3.1 - Water Meters

Check all that apply:

- ☐ Installation of new water meters in area currently receiving unmetered water service (the following must be provided)
  - ☐ Attach copy of rate structure for area to be metered
- ☒ Replacement of existing broken/malfunctioning meters (the following must be provided)
  - ☒ Accuracy of meters being replaced 89%
  - ☒ Attach supporting documentation (meter accuracy tests, etc)
  - ☒ Provide description below of proposed meters to be installed
- ☐ Retrofitting of existing meters (the following must be provided)
  - ☐ Provide description below of reason for meter retrofit
  - ☐ Provide description below of proposed meter system and benefits, including description of features that will result in water loss reduction or promote water conservation

Describe proposed water meter improvements, include reason for project, description of proposed meters and features, resulting benefits, anticipated savings, etc. (attach additional pages if necessary):

The Springs Hill system has 6,977 total connections with meters ranging in age from 1 year old to more than 45 years old. These meters were purchased over the years from a variety of manufacturers. 3,529 units are auto-read and the remaining units are manual-read. Replacing under-registering and non-auto-read meters will provide the following benefits:

1) Reduction of Apparent Losses which will increase top-line revenue for the utility while simultaneously reducing overall Water Losses.
2) Full rollout of auto-read meters will enable all meters within each District Meter Area (DMA) to be read on the same day, thus facilitating correlation of aggregated customer meter data with SCADA main meter data, allowing for systematic identification of water loss levels within each DMA. This is a fundamental element of our leak detection and elimination strategy.
3) Auto-read will be a combination of AMI where radio transmitters on our elevated storage facilities can give us real time information and AMR for those unable to be read by the AMI technology.

The most likely under-registering meters are identified through a program of random meter testing and statistical analysis of meter history data and test results (see attached).

Green amount associated with water meters: $ 1,277,353
(Attach detailed cost estimate if necessary)

Section 3.2 – Leak Detection

Provide detailed description of leak detection equipment:

Under this project, Springs Hill's ability to detect leaks will be improved by enabling automated detection of leaks within the main distribution network and leaks on the customer-side of meters.

Full rollout of auto-read meters will enable faster data collection for processing by our statistical analysis software which detects leaks and automatically notifies utility staff and customers. This system also assists utility staff in identification of zones with the highest water loss. This system works by analyzing all customer meter and SCADA data and establishing a statistical usage profile for each meter and DMA. Taking into account seasonal and customer-level usage patterns, the system identifies usage spikes which are indicative of leaks on the customer-side of the meter. These spikes result in automated phone and email messages being sent to the customer. Customer-meter data is aggregated and compared to main-meter data from the SCADA system to enable DMA-level analysis of water losses which is used to identify the areas with the highest losses due to leakage.

Acquisition of leak sensor devices will enable utility staff to target those areas where leaks are suspected and pinpoint their location. Identifying and mitigating water leaks represents the single greatest supply-side opportunity for Springs Hill to maximize recovery of lost water, reduce associated pumping and treatment costs and improve operational efficiency. These state-of-the-art acoustic leak sensing devices actually "listen" to the distribution system and use a combination of acoustic sensor hardware and advanced data analysis software pinpoint the location of leaks in the distribution network.

Green amount associated with leak detection: $ _____

Section 3.3- Other Water Efficiency Improvements

Complete this section for water efficiency improvements other than those listed above. Provide reference to the applicable sections of the EPA GPR guidance (TWDB-0161) that demonstrate GPR eligibility. Provide a detailed description of the proposed water efficiency improvements of sufficient detail that clearly demonstrates that the proposed improvements are consistent with EPA GPR guidance (TWDB-0161).

Guidance Reference:

Detailed description of proposed water efficiency improvements (attach additional pages if necessary):

Green amount associated with water efficiency improvements: $ _____
(Attach detailed cost estimate if necessary)

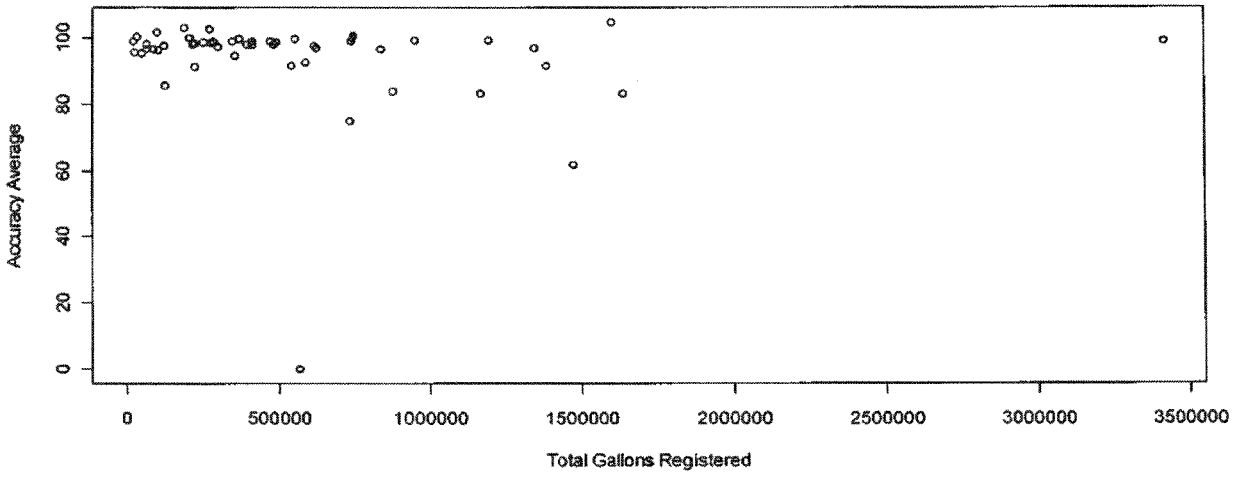
Meter Test Set #1 6/10/2011

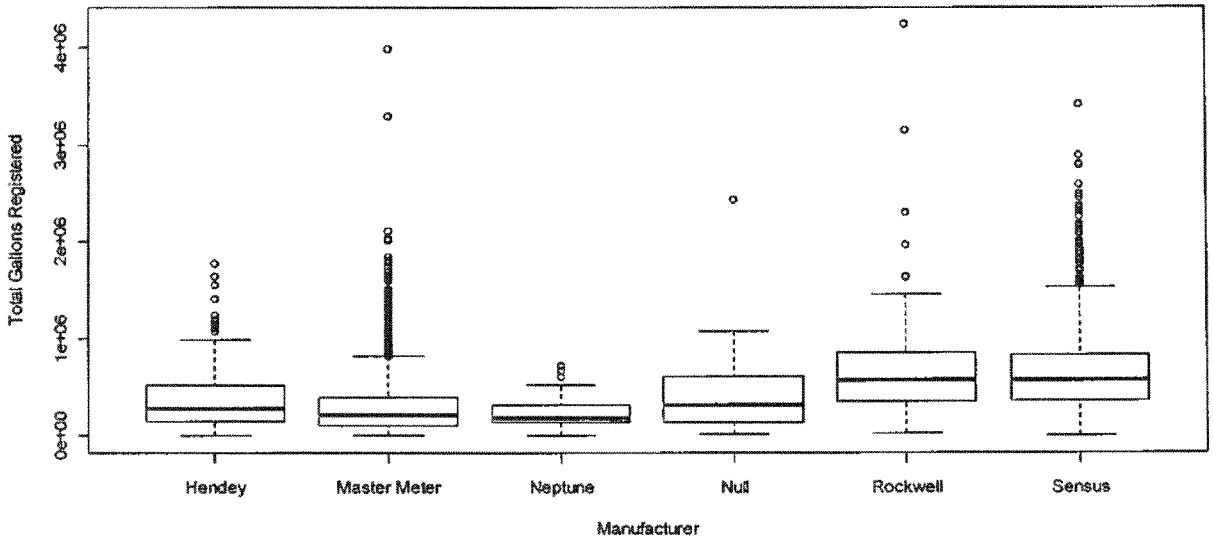
Selection Model: Random selection

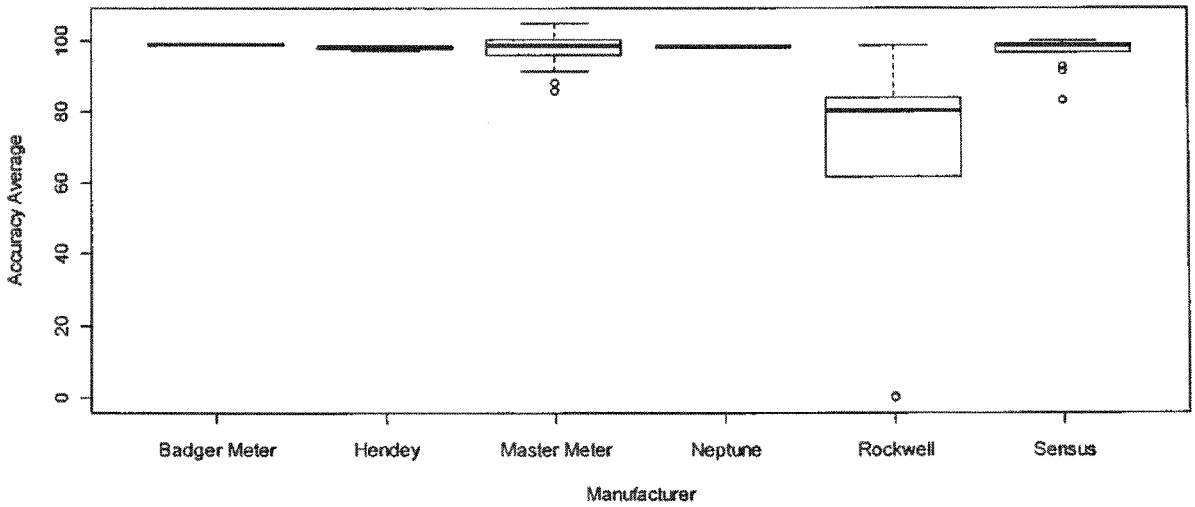
Meters were bench tested as prescribed in *AWWA M6, Water Meters -- Selection, Installation, Testing and Maintenance.*

Manufacturer	Serial Number	Size	Low %	Med %	High %	Ave %
Rockwell	22273071	3/4"	0	0	0	0.0
Rockwell	37428507	5/8"	48	57.2	96.4	61.7
Sensus	53080876	5/8"	0	98	98.1	83.3
Rockwell	20166274	5/8" X 3/4"	0	86.6	95.8	75.0
Sensus	49821287	5/8"	50	98.8	98.7	91.5
Master Meter	7296380	5/8"	98.8	94	97.7	95.3
Sensus	51669370	5/8"	98.4	99.1	98.2	98.9
Master Meter	7296435	5/8"	98	96	97.5	96.5
Master Meter	5801391	5/8" X 3/4"	97.4	97.9	97.4	97.8
Hendey	106267	5/8"	99.4	96	98.8	96.9
Master Meter	3656483	5/8"	92	98.8	99	97.8
Sensus	48499199	5/8"	90	99	98	97.5
Master Meter	5308261	5/8" X 3/4"	94	98.8	99	98.1
Hendey	106348	5/8"	90	99.6	99.2	98.1
Hendey	116040	5/8" X 3/4"	96.6	98.5	98.4	98.2
Master Meter	3689807	5/8" X 3/4"	100	99	100	99.3
Sensus	53276382	5/8" X 3/4"	96	99	99.1	98.6
Badger Meter	41709416	5/8"	98.9	99.4	98.2	99.2
Sensus	53080734	5/8"	102	98.2	96.2	98.5
Sensus	47989049	5/8" X 3/4"	99.6	98.8	98.8	98.9
Master Meter	4374402	5/8" X 3/4"	98.8	99.4	98.8	99.2
Master Meter	2828328	3/4"	102	99	97.8	99.3
Master Meter	4374976	3/4"	99	99.7	99.4	99.6
Rockwell	32800036	5/8"	0	0.4	0	0.3
Sensus	50678165	3/4"	96	99	98.5	98.5
Master Meter	7780032	5/8"	98.8	92	98.2	94.0
Master Meter	4188129	5/8"	100.4	100.3	99.4	100.2
Master Meter	4487016	5/8"	104	101.4	100.8	101.7
Master Meter	5146995	5/8"	99.4	104	99.2	102.6
Master Meter	3689798	5/8"	102	103.2	103	103.0
					Average:	**89%**

Meter Test Data Analysis







M & S

ENGINEERING, L.L.C.
Engineers, Planners, Surveyors

Green Business Case

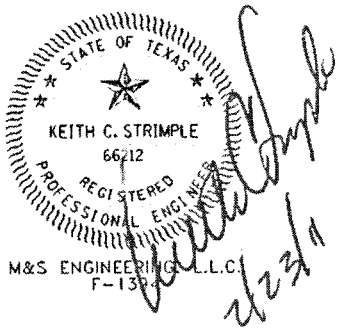
Prepared for

Springs Hill Water Supply Corporation
P.O. Box 29
Seguin, Texas 78155

Prepared By

M&S Engineering, LLC
6477 FM 311
P.O. Box 970
Spring Branch, Texas 78070

February, 2011



SUBMITTAL INFORMATION

This Business Case is being submitted by Springs Hill Water Supply Corporation (SHWSC) to the Texas Water Development Board for consideration as part of the Drinking Water State Revolving Fund Program. Basic information pertaining to SHWSC as well as the company which prepared this Business Case, M&S Engineering (M&S), is as follows:

Springs Hill Water Supply Corporation		Guadalupe County, Texas	
PWS ID Number		CCN Number	
0940022		10666	
Company Information		Engineer Information	
		Name of Firm	M&S Engineering LLC
Contact Person	Jeanne Schnuriger	Contact Person	Keith C. Strimple, P.E.
Title	General Manager	Title	Vice-President
Mailing Address	P.O. Box 29, Seguin, TX 78155	Mailing Address	P.O. Box 970, Spring Branch, TX 78070
Phone Number	(830) 379-7683	Phone Number	(830) 228-5446
Fax Number	(830) 379-0539	Fax Number	(830) 885-2170
Email Address	jeannes@springshill.org	Email Address	kstrimple@msengr.com

INTRODUCTION

SHWSC is requesting funding from the DWSRF in order to continue a pursuit which management set in motion at the end of 2008: to make SHWSC a regional leader in sustainable water production. Currently SHWSC is experiencing approximately 26.93% water loss in their distribution system; put another way, over a quarter of the water and the energy used to produce that water in their day to day operations is currently being wasted. This reality, brought on by an aged system tasked with supplying a very large geographical area, is severely hampering SHWSC's ability to maintain high levels of both water and energy efficiency.

Having exhaustively reviewed this problem and evaluated a variety of potential culprits SHWSC staff has determined that this excessively large water loss is due to two primary factors: leaking pipes and substantially malfunctioning water meters. Accordingly management instituted a replacement program, but this effort has become bogged down due to funding issues. In an effort to minimize both water waste and excess consumption, both of which are vital components of management's goal to be a local leader in both water efficiency and environmental sustainability, SHWSC wants to complete this effort as soon as possible. Accordingly SHWSC is seeking "green" funding through the Texas Water Development Board (TWDB) DWSRF program. The goal of this project is to cut down on the two problem areas described earlier: water waste and excess consumption. The proposed strategies for addressing these issues is first to be able to efficiently, quickly, and continuously locate water leaking within the water

distribution system so that it can be repaired as quickly as possible and secondly to obtain accurate water metering which will decrease excess consumption being caused by under-billed water sales. To put these strategies fully into action SHWSC wishes to complete the stalled effort to replace any meter over 8 years old with a Smart Meter and to purchase portable leak detection equipment. The Smart Meter is capable of informing both the customer and SHWSC when there is a leak at a connection and the proposed leak detection equipment is capable of "listening" to the system's pipes at night and determining, through excessive noise, probable leak locations. Together these tools should help SHWSC succeed in making their system more environmentally friendly through decreasing water waste from leaks and excess consumption from inaccurate and malfunctioning meters.

SYSTEM NARRATIVE

SHWSC service area is comprised of approximately 140,000 acres (218.75 square miles) and surrounds the City of Seguin; with boundaries on the north, to the New Braunfels city limits, on the south and east, the Gonzales County Line, and to the west the City of McQueeney city limits and the Green Valley Special Utility District's service area. SHWSC is partially located within the extra territorial jurisdiction (ETJ) of the City of Seguin and City of New Braunfels. The system was established in the early 1960s.

SHWSC currently serves a population of 22,500 people and has over 6,900 connections. The Texas Water Development Board (TWDB) has projected the population to reach 45,804 by the year 2050. Connections are likewise projected to reach 12,203. The prominent area of growth is in the northern service area along state highway (SH) 46 and northwest service area along Farm-to-Market (FM) 78 and the I10 corridor going east.

SHWSC obtains water from several sources. The corporation operates a 2.3 MGD conventional surface water treatment plant on Lake Placid. Canyon Regional Water Association (CRWA) provides an additional 1,925 acre feet of surface water per year. Groundwater is obtained from three wells operated and owned by SHWSC and located in the Carrizo Aquifer producing approximately 400 acre feet per year per well. An additional 100 acre feet of groundwater has been purchased from CRWA in the same area as our three wells. SHWSC has a contract to purchase 560 acre feet of groundwater from Seguin-Schertz used mainly when the Lake Placid treatment plant is off line.

The approximate distribution of SHWSC meters are as per the following tables:

Table 1: Water System Connections by Connection Type

Connection Type	Avg. Meter Size	Approx. Number of Connections
Residential	5/8" x 3/4"	6958
Commercial	1"	43

Table 2: Water System Connections by Meter Size

Meter Size	Approx. Number of Connections
5/8" x 3/4"	6813
3/4" x 3/4"	120
1"	48
1 1/2"	3
2"	10
3"	4
4"	1
6"	2

PROPOSED PROJECT

As was described in the in the introduction SHWSC is requesting funding for the tools and equipment necessary to complete a two-pronged approach to becoming a more sustainable water system as it relates to water loss and excessive consumption. Again, these two components are as follows:

1. Leak Detection – Obtain leak detection equipment that will allow for staff to efficiently, quickly and continuously repair leaks throughout the system thereby reducing water loss.
2. Meter Replacement – Replace all existing meters which are over 8 years old with a Smart Meter thereby reducing excessive consumption.

LEAK DETECTION

Both energy and money are wasted when treated water is lost due to any factor prior to a paying connection. While a small portion of unaccounted for water can be explained through flushing and fire fighting demands the vast majority of it must be attributed to water loss stemming from leaks. Studies have shown that on average water leaks of nominal size expel 6-8 gallons per

minute from the distribution system which can quickly come to represent a substantial cost to the water system. This issue is further compounded by the fact that the SHWSC system is located in an area made up of primarily sandy soils meaning that any leaking water is likely going to go down into the soil leaving no surface sign that a leak is present. In light of these facts being able to locate leaks in manners other than visually is vital for SHWSC if water conservation is to be practiced.

SHWSC is proposing to purchase portable acoustical leak detection equipment which would be systematically moved and temporarily installed throughout their distribution system. This equipment, through its ability to "listen" to the distribution system during low demand times, can detect and pinpoint the location of leaking water pipes. This is accomplished by the placement of portable data collectors on valves within the network. Data from these collectors would be transmitted via automated meter reading (AMR) equipment to SHWSC's computer system where a program would process the data and alert personnel when a probable leak is detected along with its approximate location. Once the general location is known staff would use additional noise detection equipment to pinpoint the exact location for repair.

The goal of this program would be to utilize the equipment described to systematically analyze the system. First areas where large leaks are suspected would be reviewed followed by less suspect locations until the whole system has been reviewed. It is anticipated that, once staff have become familiar with the operation and nuances of such a leak detection program that a sustainable procedure to analyze the entire system on a routine basis would be put in place. Such an analysis would enable staff to continuously monitor the system and hopefully detect leaks soon after they begin and thereby allow for water loss to be brought closer to acceptable levels (less than 10%).

METER REPLACEMENT

Meter replacement will assist SHWSC in becoming more sustainable in two primary ways:

1. Promote conservation on the part of the customer due to them receiving water bills which are more in line with their actual water usage.
2. Decrease the amount of unaccounted for water loss.

SHWSC currently has meters from a variety of manufacturers in their system. These include: Master, Hendy, Rockwell, Sensus and Neptune. The useful life specified for each of these meters is 20 years. 457 meters (approximately 7% of the total number of meters in the system) have exceeded this useful life maximum. Additionally, these manufacturers specify that they will warranty their meters up to 1,500,000 gallons. According to the following calculation, based on the recently calculated system specific value of 1 EDU equaling 248 GPD, this means

that the average meter in the SHWSC system will actually exceed its useful life after just under 17 years.

$$248\,GPD \times 30\frac{days}{month} \times 24\frac{months}{year} = 178{,}560\frac{gallons}{year}$$

$$1{,}150{,}000 gallons \div 178{,}560\frac{gallons}{year} \cong \mathbf{16.8\ years}$$

Over 30% of SHWSC meters are in the 11-20 year old range. Assuming that approximately 50% of those meters have exceeded their useful life as per the above calculation and taking into account the number of meters which are over 20 years old approximately 23% of the meters in the SHWSC have exceeded their useful life.

Dependable meters are a vital indirect water efficiency measure. As has been shown in the discussion above a larger amount of unaccounted for water loss is likely being caused by meters which have exceeded their useful life. SHWSC would like to replace these derelict meters with green automated meter reading (AMR) equipment. This sustainable technology allows for the monitoring of piping at the customer's residence or business for water loss. With the accurate reading provided by this equipment it is highly likely that many customers will see a tangible increase in their water bills due to being accurately billed for the true amount of water they have been consuming. This awareness has been shown in other places to result in customer participation in conservation at a much higher level than they had previously.

In addition the AMR devices come with a feature that will detect continual use of water, one of the surest signs of a leak at the customer's location. This feature will promote water efficiency and improve SHWSC's customer service. A small digital screen which automatically displays the real-time water use of a meter will be available for individual customers on a rotating basis. The ability to see whether their meter is active when it shouldn't be alerts a customer to a leak, and seeing in real time how much water they are using will promote water conservation and efficiency at the tap.

BENEFITS

Anticipated benefits which would be produced as a result of this project are as follows:

1. **Reduction in Unaccounted for Water**
   Between the water which will be conserved by the end users as a result of more accurate (and therefore higher) water bills coupled with the decrease in water lost as a result of customers being alerted to problems earlier a dramatic decrease in the amount of

unaccounted for water is possible. This could result in substantial savings in water production costs both in terms of raw water and treatment expenses.

2. **Increase in Revenue**
   Accurate meters will result in SHWSC being able to charge for water already being produced. Currently over one quarter of the water which SHWSC is already paying for and treating is being lost. Being able to charge for this product already being produced will result in a net increase of revenue without any additional treated water needing to be produced. In other words this increased revenue will not bring with it any increased costs. This additional income can be used by SHWSC to pursue additional green projects in accordance with management's plan for the future.

3. **Reduction in Water Production Energy Usage**
   Data on the energy usage from two of SHWSC's water production facilities are included in the table below. These facilities are a surface water treatment plant (SWTP) and a ground water treatment plant (GWTP). These two facilities account for approximately 80% of SHWSC's energy usage.

Table 5: Energy Usage

	SWTP Energy Consumption (kWh)	GWTP Energy Consumption (kWh)	Total Production Consumption (kWh)
January	38,960	89,460	128,420
February	24,480	99,040	123,520
March	10,720	79,560	90,280
April	2,560	84,500	87,060
May	32,400	94,700	127,100
June	38,880	100,320	139,200
July	46,320	107,040	153,360
August	40,000	107,060	147,060
September	33,120	103,180	136,300
October	37,520	110,760	148,280
November	37,040	101,060	138,100
December	33,920	100,120	134,040
Annual	375,920	1,176,800	1,552,720

These two facilities account for two thirds of the total water production in the system, accordingly, assuming uniform distribution of the loss, approximately 18% of the water produced at these two facilities is lost. Therefore, 18% of the energy used at these facilities is being wasted. Between the conservation that is anticipated as well as the direct decrease in water loss due to addressing leaks early it is anticipated that this

percentage could be reduced by up to two thirds. This would result in a reduction of up to 186,307 kWh annually for these two facilities.

4. **Reduction in Water Production Costs**
   The following table presents the water production costs for the two facilities described above over the same time frame.

Table 6: Water Production Costs

	SWTP Historical Cost	GWTP Historical Cost	Total Production Cost
January	$3,366.68	$7,514.02	$10,880.70
February	$2,283.24	$8,237.74	$10,520.98
March	$1,267.78	$6,774.26	$8,042.04
April	$601.66	$7,140.72	$7,742.38
May	$2,880.99	$7,892.45	$10,773.44
June	$3,468.87	$8,313.33	$11,782.20
July	$3,956.23	$8,838.86	$12,795.09
August	$4,100.20	$10,490.51	$14,590.71
September	$3,433.77	$10,126.92	$13,560.69
October	$3,820.52	$10,786.61	$14,607.13
November	$3,778.00	$9,886.74	$13,664.74
December	$3,492.63	$9,790.41	$13,283.04
Annual	$36,450.57	$105,792.57	$142,243.14

Taking into account the assumptions described above it is possible that up to $17,000 a year could be saved in water production alone.

5. **Reduction in Meter Reading Costs and Energy Consumption**
   The ability to automatically read meters will greatly decrease the cost to read the meters on a monthly basis and decrease the amount of energy used by the meter reading staff in driving throughout the system to obtain that information. Finally, it will increase efficiency as staff will be able to match meter reading output and input on the same day.

CONCLUSION

One hundred percent of the funds requested for the proposed project are eligible for grant funding through the TWDB DWSRF program.

1. The project meets the requirements, set forth by the EPA, to qualify as a Green Project and is therefore eligible for funding out of the Green Project Reserve. All of the savings associated with this project can be directly tied to water efficiency and energy efficiency.
2. No permits of any kind are required for this project.
3. As there is no construction there will be no adverse environmental impact.
4. The project is ready to proceed immediately.