WaterSMART

Water and Energy Efficiency Grants for FY 2020

Funding Opportunity Announcement No. BOR-DO-20-F001

Funding Group II

American Fork City Pressurized Irrigation Metering Project

American Fork, Utah

American Fork City (Applicant)
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October 3, 2019

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Technical Proposal and Evaluation Criteria

Executive Summary

The executive summary should include:

- *The date, applicant name, city, county, and state*
- *A one paragraph project summary that specifies the work proposed, including how funds will be used to accomplish specific project activities and briefly identifies how the proposed project contributes to accomplishing the goals of this FOA*
- *State the length of time and estimated completion date for the proposed project*
- *Whether or not the project is located on a Federal facility*

Date: Application due date is October 3, 2019

Applicant: American Fork City
American Fork, Utah, Utah

Project Title: American Fork City Pressurized Irrigation Metering Project

Project Summary:

American Fork City (City) is requesting funding to assist with the installation of flow measurement devices with automated metering infrastructure (AMI) for the businesses and homeowners on the City Pressurized Irrigation (PI) System. By installing smart water meters with the AMI technology, the City will be able to monitor, on a real-time basis, the flows in the PI system, allowing the City to bill each connection for the actual amount of water used. Since the PI system has been installed, the measured water through the mainline flow meter indicates little or no water conservation by individual residents throughout the city due to the lack of accountability regarding individual water consumption. Similar smart metering installations in northern Utah have shown 30 to 40 percent water savings when individuals have a clear understanding of the amount of water they use. A study by Colorado State University in 2003 indicated flat-rate users expend, on average, approximately 39 percent more water than metered users. It is anticipated that this project will conserve 20 percent or 597 acre-feet of water annually and contribute to the improved water management of 9,630 acre-feet annually. In addition, the City will likely experience energy savings by eliminating the need for supplementary pumping. The City is confident these conservation numbers will be realized after metering the PI system.

Approximate Length: 30 Months

Completion Date: December 2022

Federal Facility: The project is not located on a federal facility

Background Data

Applicant's Water Supply

As applicable, describe the source of water supply, the water rights involved, current water uses (e.g., agricultural, municipal, domestic, or industrial), the number of water users served, and the current and projected water demand. Also, identify potential shortfalls in water supply. If water is primarily used for irrigation, describe major crops and total acres served.

The current water system consists of the following elements:

Existing Pressurized Irrigation System

The existing American Fork City pressurized irrigation system includes sources, storage, water rights, and distribution piping. The current system includes approximately 7,500 Water users. The following sections describe the existing pressurized irrigation system components.

Pressurized Irrigation Sources

Table 1 shows the City existing pressurized irrigation sources and their capacity. Table 2 shows the current need versus supply. American Fork City currently has excess pressurized irrigation sources.

Table 1: Existing Pressurized Irrigation Sources

Water Source	Drought Year Flowrate Capacity (gpm)	Pressure Zone
Alpine Aqueduct	7,800	Upper Zone
American Fork River	1,651	Upper Zone
Culinary System Surplus	3,000	Upper Zone
Kelly Pasture Springs	535	Lower Zone
Murdock Canal	2,300	Lower Zone
Totals	**15,286**	

Table 2: Pressurized Irrigation Source Need Versus Supply

	Projected Need (gpm)	Potential Supply (gpm)	Excess/(Deficit)
Current	14,707	15,286	579

Pressurized Irrigation Storage

Table 3 shows the City's existing pressurized irrigation storage facilities and their capacity. Table 4 shows the current need versus supply. American Fork City currently has excess pressurized irrigation storage.

Table 3: Existing Pressurized Irrigation Storage

Tank	Capacity (gallons)	Zone
Upper Reservoir	4,887,432	Upper Zone
Lower Reservoir	8,145,720	Lower Zone
Total	13,033,152	

Table 4: Pressurized Irrigation Storage Need Versus Supply

	Projected Need (gallons)	Potential Supply (gallons)	Excess/(Deficit)
Current	4,707,770	13,033,152	8,325,382

Pressurized Irrigation Rights

Table 5 shows the City's existing pressurized irrigation water rights and or irrigation company shares and their drought year capacity. Table 6 shows the current need versus supply. American Fork City currently has adequate pressurized irrigation water rights.

Table 5: Existing Water Rights

Water Source	Drought Year Capacity (ac-ft)	Pressure Zone
American Fork Irrigation Company Shares	3,955	Upper Zone
Central Utah Project Water	2,095	Upper Zone
Highland Conservancy District Shares	600	Lower Zone
Provo River Water Users Association Shares	270	Lower Zone
American Fork City Misc Water Rights	200	Multiple
American Fork City Culinary Overflow Water Rights	2,000	Multiple
Totals	**9,120**	

Table 6: Pressurized Irrigation Water Right Need Versus Supply

	Projected Need (gpm)	Potential Supply (gpm)	Excess/(Deficit)
Current	8,356	9,120	764

Irrigated Acreage

Pressurized irrigation demands are generated from land use within the City. Residential irrigation demand is based on the zoning while commercial, industrial, and institutional are based on a typical average. Table 7 below shows the percentage of each parcel that is assumed irrigated for modeling and planning purposes. Values were determined by measuring a representative sample of each land use and typical values seen in surrounding communities.

Table 7: Irrigated Acreage by Land Use

Zoning or Land Use	Percent of Lot Irrigated	Typical Irrigated Acres
Design Commercial	17-24%	Site Specific
Design Industruial	11.00%	Site Specific
General Commercail	17.00%	Site Specific
Neighborhood Commercial	17.00%	Site Specific
Planned Community	32.00%	Site Specific
Professional Office	17.00%	Site Specific
Resort	56.00%	Site Specific
Shoreline Protection	56.00%	Site Specific
TOD	11-24%	Site Specific
Residential High Density	52.00%	0.24
Residential Low Density	63.00%	0.22
Residential Medium Density	56.00%	0.15
Residential Very Low Density	66.00%	0.15
Parks	95.00%	Site Specific
Schools	50.00%	Site Specific
Churches	30.00%	Site Specific

Irrigated acreage is anticipated to grow at the same rate as population. Table 8 also shows the projected growth in irrigated acreage.

Table 8: Population and Irrigated Acreage Projections

Year	Population	Growth Rate	Acres
2018	35,607	2.05%	2,089
2019	36,303	2.27%	2,116
2020	37,000	5.62%	2,142
2025	43,818	2.00%	2,395
2030	50,635	1.82%	2,634
2035	61,054	1.88%	2,980
2040	71,472	1.72%	3,307
2045	74,633	1.26%	3,402
2050	77,794	1.18%	3,496
2055	80,244	0.88%	3,568
2060	82,694	0.84%	3,639

Projected Pressurized Irrigation System Requirements

The projected population and LOS requirements were used to project the pressurized irrigation needs through the planning period. Using the projected ERCs, Table 9 shows the projected source, storage, and water right needs through the planning period.

Table 9: Projected Pressurized Irrigation Needs

Year	Acres	Flow Required (gpm)	Storage Volume Required (gallons)	Water Rights Required (ac-ft)
2018	2,089	14,707	4,707,770	8,356
2019	2,116	14,895	4,768,147	8,463
2020	2,142	15,083	4,828,124	8,570
2025	2,395	16,861	5,397,530	9,580
2030	2,634	18,546	5,936,919	10,538
2035	2,980	20,983	6,716,790	11,922
2040	3,307	23,278	7,451,624	13,226
2045	3,402	23,949	7,666,329	13,607
2050	3,496	24,610	7,877,919	13,983
2055	3,568	25,116	8,039,830	14,270
Buildout	3,639	25,616	8,200,044	14,555

Buildout Pressurized Irrigation Sources

Table 10 shows the anticipated sources at buildout. Table 11 shows the buildout need versus supply. It is projected that American Fork City will have adequate pressurized irrigation sources at buildout.

Table 10: Anticipated Sources at Buildout

Water Source	Drought Year Flowrate Capacity (gpm)	Pressure Zone
Alpine Aqueduct	7,800	Upper Zone
American Fork River	2,840	Upper Zone
Culinary System Surplus	0	Upper Zone
Kelly Pasture Springs	535	Lower Zone
Murdock Canal	2,300	Lower Zone
Mitchell Hollow	450	Lower Zone
Mill Lane Well	2,500	Lower Zone
Spring Creek	900	Lower Zone
6th East Well	2,150	Lower Zone
Southern Wells (3)	7,500	Lower Zone
Totals	**26,975**	

Table 11: Buildout Source Need Versus Supply

	Projected Need (gpm)	Potential Supply (gpm)	Excess/(Deficit)
Buildout	25,616	26,975	1,359

Buildout Pressurized Irrigation Storage

Table 12 shows the anticipated storage facilities at buildout. Table 13 shows the buildout need versus supply. It is projected that American Fork City will have adequate pressurized irrigation storage at buildout.

Table 12: Anticipated Storage at Buildout

Tank	Capacity (gallons)	Zone
Upper Reservoir	4,887,432	Upper Zone
Lower Reservoir	8,145,720	Lower Zone
Total	13,033,152	

Table 13: Buildout Storage Needs Versus Supply

	Projected Need (gallons)	Potential Supply (gallons)	Excess/(Deficit)
Buildout	8,200,044	13,033,152	4,833,108

Buildout Pressurized Irrigation Rights

Table 14 shows the anticipated water rights at buildout. Table 15 shows the buildout need versus supply. It is projected that American Fork City will have adequate pressurized irrigation water rights at buildout as developers are required to dedicate water rights to the City as a condition of development.

Table 14: Anticipated Water Rights at Buildout

Water Source	Drought Year Capacity (ac-ft)	Pressure Zone
American Fork Irrigation Company Shares	6,805	Upper Zone
Central Utah Project Water	2,095	Upper Zone
Highland Conservancy District Shares	600	Lower Zone
Provo River Water Users Association Shares	270	Lower Zone
American Fork City Water Rights	1,500	Multiple
American Fork City Culinary Overflow Water Rights	2,000	Multiple
Future Wells	7,500	Mill Ditch
TSSD Recycled Water	5,000	Aqueduct Low
Totals	**25,770**	

Table 15: Buildout Water Right Need Versus Supply

	Projected Need (gpm)	Potential Supply (gpm)	Excess/(Deficit)
Buildout	14,555	25,770	11,215

The PI system currently serves the lawns and gardens of residential homes and commercial businesses. The system has approximately 7500 connections. While demand fluctuates year to year, on average, the annual water delivery is approximately 9630 acre-feet. The City often has to pump water from their culinary wells to supplement the PI system during peak summer months. As demand increases over time, the PI water supply will continue to max out and additional strain will be placed on the culinary system as its water is diverted into the PI system.

Water Delivery System

Describe the applicant's water delivery system as appropriate. For agricultural systems, please include the miles of canals, miles of laterals, and existing irrigation improvements (e.g., type, miles, and acres). For municipal systems, please include the number of connections and/or number of water users served and any other relevant information describing the system.

American Fork City currently has approximately 124 Miles of pressurized irrigation pipes that distribute water throughout the City to approximately 7500 secondary water connections.

Hydropower or Energy Efficiency

If the application includes hydropower or energy efficiency elements, describe existing energy sources and current energy uses.

This project is not a hydropower project.

Prior Work with Reclamation

Identify any past working relationships with Reclamation. This should include the date(s), description of prior relationships with Reclamation, and a description of the project(s).

American Fork has not done any work with Reclamation in the history of the current Engineering staff.

Project Location

Provide detailed information on the proposed project location or project area including a map showing the specific geographic location. For example, {project name} is located in {state and county} approximately {distance} miles {direction, e.g. northeast} of {nearest town}. The project latitude is {##°##'N} and longitude is {###°##'W}.

American Fork City pressurized irrigation metering project is located in the State of Utah and in Utah County on the North side of town. The project latitude is 40°23'57.98"N and longitude is 111°48'9.65"W.

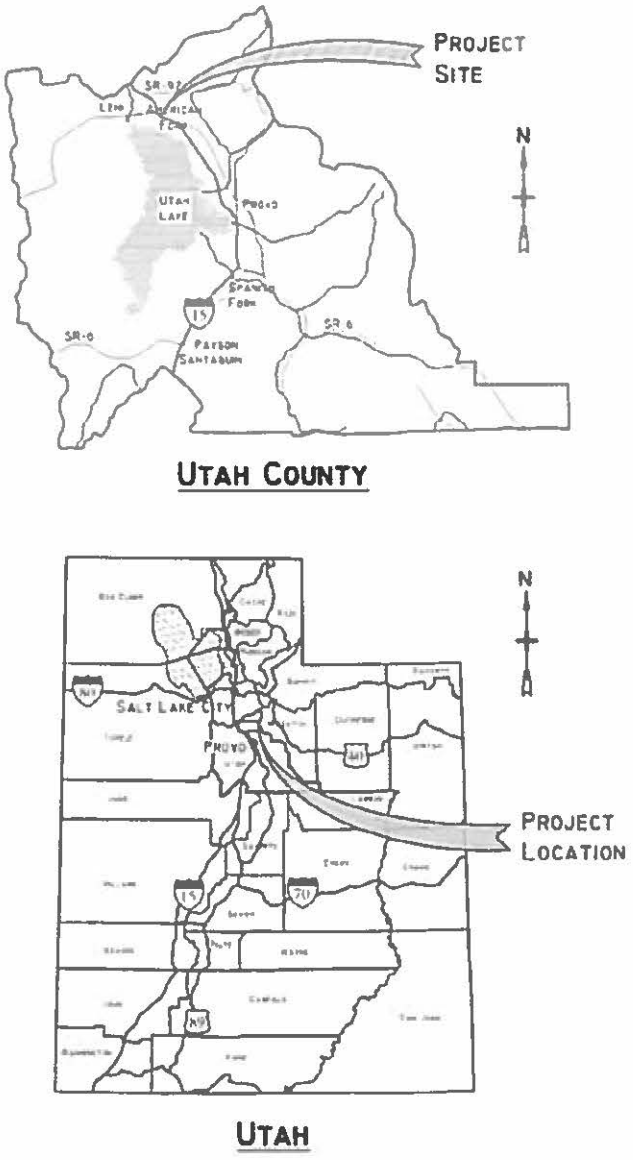


Figure 1: Project Location

Technical Project Description

The technical project description should describe the work in detail, including specific activities that will be accomplished. This description shall have sufficient detail to permit a comprehensive evaluation of the proposal. Please note, if the work for which you are requesting funding is a phase of a larger project, please only describe the work that is reflected in the budget and exclude description of other activities or components of the overall project.

If a grant from Reclamation is awarded, the City will utilize existing revenues and reserve funds to complete the metering project. Upon award, an engineering design report will be prepared to evaluate the best flow meter and AMI equipment options. All necessary permits will be obtained during this process. The City is tentatively looking at Badger E-Series meter with the iTron 100W communication module, but with the continually changing technological advancements in metering, an evaluation of the best possible equipment will be completed during the design phase of the project. An environmental and cultural review will be conducted by a registered environmental firm. Once environmental and cultural clearance is obtained, the engineering design and construction documents will be prepared. It is anticipated that all permitting, environmental and cultural clearances, and engineering design will be completed in late 2020 such that construction can begin in the early spring of 2021 and reach completion in December 2022. Installation of the flow meters must occur during the early spring and late fall in order to avoid impacting the irrigation season.

The proposed project will involve installing a smart meter on each existing city connection to the PI system. When the City constructed the PI system initially, the connection configuration was designed to accommodate a smart meter in the existing City-provided underground irrigation box. Figure 2 shows a typical meter installation. The design of the AMI equipment and the AMI-GIS link will be done by a professional engineering firm to ensure the system meets the needs and requirements of the City. All design drawings will be stamped by a professional engineer and be available for review by Reclamation upon request.

Once all connections have new meters installed, the City plans to begin charging users based on actual water use, as measured by the installed meters, using an incentive-based pricing water rate structure. The new rate structure will be designed to have the heaviest users paying incrementally more for their water. The City anticipates providing a monthly secondary water use report for individual users notifying them of their water usage and how it compares to their estimated need. The monthly report will be similar to the example report provided by Weber Basin Water Conservancy District (WBWCD) shown in Appendix F.

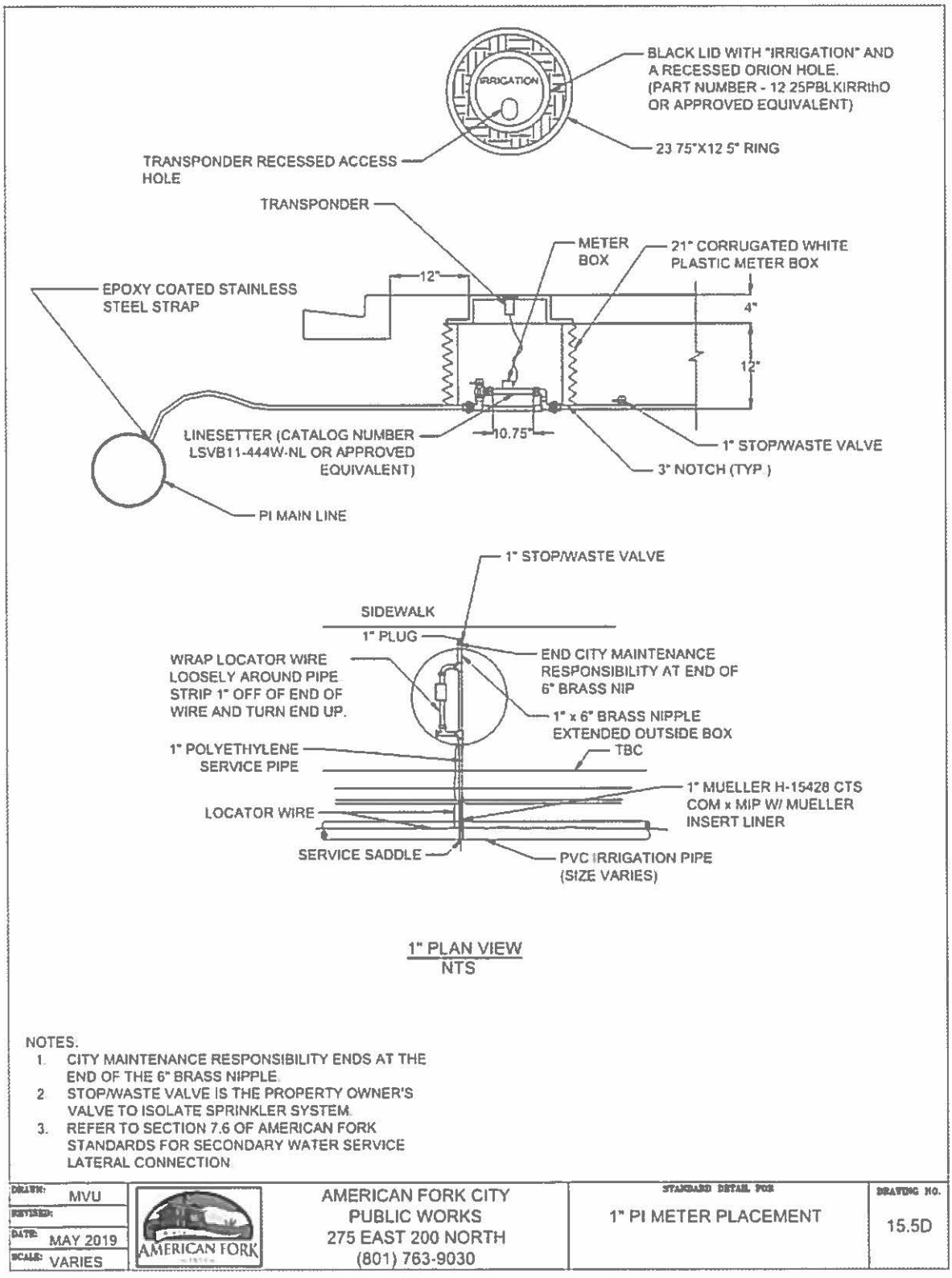


Figure 2: Typical Meter Connection

Evaluation Criteria

Evaluation Criterion A: Quantifiable Water Savings

Up to 30 points may be awarded for this criterion. This criterion prioritizes projects that will conserve water and improve water use efficiency by modernizing existing infrastructure. Points will be allocated based on the quantifiable water savings expected as a result of the project. Points will be allocated to give greater consideration to projects that are expected to result in more significant water savings. All applicants should be sure to address the following:

Water Savings

Describe the amount of estimated water savings. *For projects that conserve water, please state the estimated amount of water expected to be conserved (in acre-feet per year) as a direct result of this project.*

The amount of water the City expects to conserve is 597 acre-feet annually by installing meters as part of this project. Additional savings may be seen once the entire system is metered and rate structure is implemented to encourage water conservation.

Four cities/water districts in northern Utah have installed flow meters on their secondary water systems or received grant awards to do so:

The first example is Weber Basin Water Conservancy District. They have been implementing a pressurized irrigation metering program in partnership with the Bureau of Reclamation, State of Utah, and Utah State University since 2011. Currently this metering program is not coupled with a usage-based rate schedule but instead is utilized to help educate the system users on how much water they are using and how to utilize the resource better. The District provided a secondary water metering report that details the program and water conservation achieved (see Appendix F). In this report they have documented a 23 percent reduction in use between 2012 and 2015.

The second example is Payson City in Utah County, Utah recently received a WaterSMART grant for the installation of pressurized irrigation meters in 2016. They have not had the meters installed for long enough to demonstrate the anticipated water conservation. In their WaterSMART application they described how they have installed approximately 25 test meters to help determine the water use compared to what is necessary to maintain healthy landscaping. They estimated that there was a potential of 0.31 ac-ft per user conservation within their system. They have estimated a 15 percent conservation can be achieved with the use of pressurized irrigation meters.

The third is Alpine City. Alpine recently received a WaterSMART grant but have not been able to complete the system due to how recently the award was granted. Alpine City estimated total of 1,040 acre-feet of savings over 1900 acres. They estimated the average savings of 0.43 acre-feet per lot based on their analysis. This would equal a total of 21 percent savings once fully implemented.

The fourth is Salem City. Salem recently received a WaterSMART grant but have not been able to complete the system due to how recently the award was granted. Salem City estimated total of 460 acre-feet of savings over 1915 lots. This would be 0.24 acre-feet per lot with an estimated 31 percent savings once fully implemented.

To be conservative American fork City estimates the lowest of the four examples. It is estimated that American Fork will see a 20 percent savings in usage based on the implementation of a secondary irrigation meters. Total PI usage averaged 9630 acre-feet/ per year over the last nine years of data, since the secondary system was installed. This means that 1,444 acre-feet of water per year could be saved per year. American Fork currently has nearly 7,500 connections. This means that the average savings per connection or lot is 0.26 acre-feet per lot once all connections are metered. This project will replace approximately 2,324 meters so the water savings will be 597 acre-feet.

Current Water Losses

Describe current losses: *Please explain where the water that will be conserved is currently going (e.g., back to the stream, spilled at the end of the ditch, seeping into the ground)?*

The conserved water is currently being delivered to users on the City's PI system who are overwatering their landscape and exceeding their estimated water need. This is due to a lack of knowledge of their actual water consumption and a lack of understanding of their landscape's estimated water need. In addition, because customers are not charged based on usage, there is little incentive for users to adjust their watering patterns.

The conserved water will eliminate the need for the City to supplement the PI system with culinary water pumped from the City's culinary wells as well as reduce the amount of culinary water needed throughout the year. The 597 acre-feet of conserved water will allow for an additional 613 connections to the PI system based on the average lot size in the City.

Support/Documentation of Water Savings

Describe the support/documentation of estimated water savings: *Please provide sufficient detail supporting how the estimate was determined, including all supporting calculations. Note: projects that do not provide sufficient supporting detail/calculations may not receive credit under this section. Please be sure to consider the questions associated with your project type (listed below) when determining the estimated water savings, along with the necessary support needed for a full review of your proposal. In addition, please note that the use of visual observations alone to calculate water savings, without additional documentation/data, are <u>not</u> sufficient to receive credit under this section. Further, the water savings must be the result of reducing or eliminating a current, ongoing loss, not the result of an expected future loss.*

It is anticipated that once meters are installed on all City PI connections and users are billed according to their actual usage, users will modify their watering patterns to match the estimated water need for their landscape. The total estimated water savings is 597 acre-feet, or 20 percent, of the current water

used by the City This is a conservative estimate of the water savings. This number appears realistic based on similar projects and studies completed by WBWCD, Payson City, Alpine, and Salem all located in northern Utah as well.

For the interim period, between the completion of the metering project and the point when the population growth of the City requires water deliveries beyond the available supply, the conserved water will not be diverted by the City. It will be left in American Fork River system as instream flows, potentially assisting in aquifer recharge.

Project Types

Please address the following questions according to the type of infrastructure improvement you are proposing for funding. See Appendix A: Benefit Quantification and Performance Measure Guidance for additional guidance on quantifying water savings. Note--You may delete the project types that are not applicable.

(1) ***Municipal Metering:*** *Municipal metering projects can provide water savings when individual user meters are installed where none exist to allow for unit or tiered pricing, when existing individual user meters are replaced with advanced metering infrastructure (AMI) meters, and when new meters are installed within a distribution system to assist with leakage reduction. To receive credit for water savings for a municipal metering project, an applicant must provide a detailed description of the method used to estimate savings, including references to documented savings from similar previously implemented projects. Applicants proposing municipal metering projects should address the following:*

a. *How has the estimated average annual water savings that will result from the project been determined? Please provide all relevant calculations, assumptions, and supporting data.*

It is assumed that American Fork will see a 20 percent savings in usage based on the implementation of a secondary irrigation meters. Total PI usage averaged 9630 acre-feet/ per year over the last nine years of data, since the secondary system was installed. This means that 1,444 acre-feet of water per year could be saved. American Fork currently has nearly 7,500 connections. This means that the average savings per connection or lot is 0.26 acre-feet per lot once all connections are metered. This project will add approximately 2,324 meters so the water savings will be 597 acre-feet.

b. *How have current distribution system losses and/or the potential for reductions in water use by individual users been determined?*

The City currently has mainline meters installed on their PI system. Without metering the end user, distribution system losses cannot be determined. The potential for reductions in water use by individual user was determined by using the lowest of four recent studies or application for this grant.

c. *For installing individual water user meters, refer to studies in the region or in the applicant's service area that are relevant to water use patterns and the potential for reducing such use. In the absence of such studies, please explain in detail how expected water use reductions have been estimated and the basis for the estimations.*

Payson City, a neighboring city to American Fork, installed 25 residential secondary water meters randomly throughout their PI system to evaluate customer usage. Data was collected for water years 2009 to 2012. The sample test selection consisted of an average lot size of 0.33 acres with an average landscaped area of 0.2 acres (irrigable acreage). According to the Utah State University Extension Office, as stated in the previously mentioned publication, the estimated water need for residential landscaping and irrigation in the Payson City area is 24.6 inches annually. The data collected from this case study indicated that nearly 50 percent of the residents metered used more than the recommended 24.6 inches of water, with the highest user applying 167.12 inches (85 percent more than recommended).

In addition, WBWCD collected data on their system after installing secondary water meters and indicated that they experienced water savings between 30 and 40 percent.

American Fork City's PI delivery experience indicates similar water use patterns to other Utah Cities. American Fork currently has nearly 7,500 connections. This means that the average savings per connection or lot is 0.26 acre-feet per lot once all connections are metered. This project will add approximately 2,324 meters so the water savings will be 597 acre-feet.

d. If installing distribution main meters will result in conserved water, please provide support for this determination (including, but not limited to leakage studies, previous leakage reduction projects, etc.). Please provide details underlying any assumptions being made in support of water savings estimates (e.g., how leakage will be reduced once identified with improved meter data).

The City currently has mainline meters installed on their PI system such that this will not be part of the proposed project. However, the ability to corroborate mainline meter readings with end user meter readings will allow the City to identify potential areas of leakage within the distribution system. This will improve the overall system efficiency and management to maximize water savings. In addition, it will allow the City to concentrate their maintenance crews on specific areas of the system to search for possible problems or issues.

e. What types (manufacturer and model) of devices will be installed and what quantity of each?

It is anticipated that Badger E-Series meter will be installed on all connections. All meters will utilize the iTron 100W communication module to allow AMI connectivity. The City is anticipating installing 2,300 meters for the 1-inch connections, 15 meters for the 1-1/2-inch connections, and 9 meters for the 2-inch connections as part of the proposed project.

f. How will actual water savings be verified upon completion of the project?

Actual water savings will be calculated by comparing historic mainline meter readings with post-project mainline meter readings. The difference will be the water savings realized by the project. In addition, the City will be able to track individual water savings by comparing monthly water use over time with the initial reading for each individual user.

Evaluation Criterion B: Water Supply Reliability

Up to 18 points may be awarded under this criterion. This criterion prioritizes projects that address water reliability concerns, including making water available for multiple beneficial uses and resolving water related conflicts in the region.

Note that an agreement will not be awarded for an improvement to conserve irrigation water unless the applicant agrees to the terms of Section 9504(a)(3)(B) of Public Law 111-11 (see p. 52 of the FOA for additional information).

Please address how the project will increase water supply reliability. Proposals that will address more significant water supply shortfalls benefitting multiple sectors and multiple water users, will be prioritized. General water supply reliability benefits (e.g., proposals that will increase resiliency to drought) will also be considered. Please provide sufficient explanation of the project benefits and their significance. These benefits may include, but are not limited to, the following:

1. Will the project make water available to address a specific water reliability concern? Please address the following:

- *Explain and provide detail of the specific issue(s) in the area that is impacting water reliability, such as shortages due to drought, increased demand, or reduced deliveries. Will the project directly address a heightened competition for finite water supplies and over-allocation (e.g., population growth)?*

The proposed project requires collaboration among the American Fork Irrigation Company, Highland City, and CUWCD. The entities are all directly tied to Reclamation through various projects, most associated with the CUP. The project has the support of all involved entities listed. In addition. The influence and support of all listed entities has been crucial to the progress of achieving the goal of metering the City system. It is anticipated that by making usage data available to residents, individuals will be encouraged to conserve water and enhance their on-site efficiency.

This project area has specifically been selected based on previous low-pressure issues in the project area due to slightly undersized pipes. By reducing the usage in the project area, the demand will be reduced, the previous low-pressure issues will be limited.

- *Describe how the project will address the water reliability concern? In your response, please address where the conserved water will go and how it will be used, including whether the conserved water will be used to offset groundwater pumping, used to reduce diversions, used to address shortages that impact diversion or reduce deliveries, made available for transfer, left in the river system, or used to meet another intended use.*

The City's water reliability is always a concern. The Wasatch Front area is very susceptible to drought. The water that is saved will go to reduce pumping costs, groundwater aquifer recharge, or uses needed by the American Fork Irrigation Company. In a study by the North Utah County Aquifer Association the area around the American Fork Upper irrigation pond is identified is identified as the number one priority for recharge. The population in this area is rapidly growing thus increasing the need to prevent depletion of the ground water aquifer particularly for the use of irrigation. The

associated demand with this growth dramatically reduces the reliability of the City's water supply and is likely to lead to a water crisis or conflicts among local water entities.

To prevent future crises or conflicts, the City is taking a proactive approach to planning for the future with the proposed metering project which will conserve water and extend their existing water supply as far as is practical. The City has also already implemented the requirement that all new connections to the pressurized irrigation system be metered

- *Provide a description of the mechanism that will be used, if necessary, to put the conserved water to the intended use.*

The City's system is uniquely positioned to allow for direct surface spreading recharge of any excess water not used by the system in extremely wet years and in years of low irrigation water or drought the water savings will directly reduce pumping costs associated with pumping valuable groundwater that is suitable for drinking water to be used as irrigation water. Adjustments at the American Fork Irrigation Company weir may be made to divert the saved water in other needed ways.

- *Indicate the quantity of conserved water that will be used for the intended purpose.*

All of the conserved water will be used for the intended purpose

2. Will the project make water available to achieve multiple benefits or to benefit multiple water users? Consider the following:

- *Will the project benefit multiple sectors and/or users (e.g., agriculture, municipal and industrial, environmental, recreation, or others)?*

The project will make water available for use in multiple areas. As previously mentioned, groundwater recharge, possible agricultural, and environmental with the help and the work of the American fork Irrigation Company.

- *Will the project benefit species (e.g., federally threatened or endangered, a federally recognized candidate species, a state listed species, or a species of particular recreational, or economic importance)? Please describe the relationship of the species to the water supply, and whether the species is adversely affected by a Reclamation project.*

Some of the conserved water will remain in the natural river systems controlled by American fork Irrigation Company, Central Utah Project, Highland Conservancy District, and Provo River Water Users, who will dictate which specific river system the water will be directed to. All systems may be associated with Reclamation endangered species recovery programs. The conserved water will benefit local endangered fish species and improve the overall fish habitat and ecosystem.

- *Will the project benefit a larger initiative to address water reliability?*

The water savings put into groundwater recharge are part of the larger initiative of the North Utah County Aquifer Association

- *Will the project benefit Indian tribes?*

Not applicable.

- *Will the project benefit rural or economically disadvantaged communities?*

Not applicable.

- *Describe how the project will help to achieve these multiple benefits in your response, please address where the conserved water will go and where it will be used, including whether the conserved water will be used to offset groundwater pumping, used to reduce diversions, used to address shortages that impact diversions or reduce deliveries, made available for transfer, left in the river system, or used to meet another intended use.*

The water that is conserved will go to reduce pumping costs, groundwater aquifer recharge, or uses needed by the referenced water districts. In a study by the North Utah County Aquifer Association the area around the American Fork Upper irrigation pond is identified is identified as the number one priority for recharge. The population in this area is rapidly growing thus increasing the need to prevent depletion of the ground water aquifer particularly for the use of irrigation. The associated demand with this growth dramatically reduces the reliability of the City's water supply and is likely to lead to a water crisis or conflicts among local water entities.

To prevent future crises or conflicts, the City is taking a proactive approach to planning for the future with the proposed metering project which will conserve water and extend their existing water supply as far as is practical. The City has also already implemented the requirement that all new connections to the pressurized irrigation system be metered

3. Does the project promote and encourage collaboration among parties in a way that helps increase the reliability of the water supply?

By decreasing the demand on the regions water system this project will help increase the reliability of the water systems in the whole area. In addition, many other municipalities including but not limited to Salem, Payson, and Alpine have already been implementing this type of a project. Collaboration among municipalities will help encourage users to be wise about monitoring their own usage and mindful of local water supplies.

- *Is there widespread support for the project?*

Given that many other municipalities in the region are implementing these types of projects they obviously support these types of projects.

- *What is the significance of the collaborations/support?*

While this project will be successful on its own, collaborative support between other agencies will help gain widespread support for conserving our natural resources.

- *Is the possibility of future water conservation improvements by other water users enhanced by completion of this project?*

As water users begin to see the difference these meters will make on their own watering habits, they could possibly encourage other friends or municipalities to do similar projects.

- *Will the project help to prevent a water-related crisis or conflict? Is there frequently tension of litigation over water in the basin?*

As with many areas that are part of the West, this area has had many conflicts in that past and if the water supply is not conserved and a few years of low water supply happen then there is an increased risk of tension or litigation.

- *Describe the roles of any partners in the process. Please attach any relevant supporting documents.*

At this point the City does not have any partners in the process.

4. Will the project address water supply reliability in other ways not described above?

There is always a possibility that water supply reliability will be positively affected in other ways not previously mentioned. As of this point, they are unknown.

Evaluation Criterion C: Implementing Hydropower

Up to 18 points may be awarded for this criterion. This criterion prioritizes projects that will install new hydropower capacity in order to utilize our natural resources to ensure energy is available to meet our security and economic needs.

If the proposed project includes construction or installation of a hydropower system, please address the following:

Describe the amount of energy capacity. *For projects that implement hydropower systems, state the estimated amount of capacity (in kilowatts) of the system. Please provide sufficient detail supporting the stated estimate, including all calculations in support of the estimate.*

Not applicable.

Describe the amount of energy generated. *For projects that implement hydropower systems, state the estimated amount of energy that the system will generate (in kilowatt hours per year). Please provide sufficient detail supporting the stated estimate, including all calculations in support of the estimate.*

Not applicable.

Describe any other benefits of the hydropower project. *Please describe and provide sufficient detail on any additional benefits expected to result from the hydropower project, including:*

- *Any expected reduction in the use of energy currently supplied through a Reclamation project*
- *Anticipated benefits to other sectors/entities*
- *Expected water needs, if any, of the system*

Not applicable.

Evaluation Criterion D: Complementing On-Farm Irrigation Improvements

Up to 10 points may be awarded for projects that describe in detail how they will ***complement on-farm irrigation improvements*** *eligible for NRCS financial or technical assistance.*

Note: Scoring under this criterion is based on an overall assessment of the extent to which the WaterSMART Grant project will complement ongoing or future on-farm improvements. Applicants should describe any proposal made to NRCS, or any plans to seek assistance from NRCS in the future, and how an NRCS-assisted activity would complement the WaterSMART Grant project. Financial assistance through the Environmental Quality Incentives Program (EQIP) is the most commonly used program by which NRCS helps producers implement improvements to irrigation systems, but NRCS does not have additional technical or financial assistance programs that may be available. Applicants may receive maximum points under this criterion by providing the information described in the bullet points below. ***Applicants are not required to have assurances of NRCS assistance by the application deadline to be awarded the maximum number of points under this sub-criterion.*** *Reclamation may contact applicants during the review process to gather additional information about pending applications for NRCS assistance if necessary.*

Please note: on-farm improvements themselves are not eligible activities for funding under this FOA. The criterion is intended to focus on how the WaterSMART Grant project will complement ongoing or future on-farm improvements. NRCS will have a separate application process for the on-farm components of selected projects that may be undertaken in the future, separate of the WaterSMART Grant project.

If the proposed projects will complement an on-farm improvement eligible for NRCS assistance, please address the following:

- *Describe any planned or ongoing projects by farmers/ranchers that receive water from the applicant to improve on-farm efficiencies.*
    - *Provide a detailed description of the on-farm efficiency improvements.*
    - *Have the farmers requested technical or financial assistance from NRCS for the on-farm efficiency projects, or do they plan to in the future?*
    - *If available, provide documentation that the on-farm projects are eligible for NRCS assistance, that such assistance has or will be requested, and the number or percentage of farms that plan to participate in available NRCS programs.*
    - *Applicants should provide letters of intent from farmers/ranchers in the affected project areas.*

Not applicable.

- *Describe how the proposed WaterSMART project would complement any ongoing or planned on-farm improvement.*
  - *Will the proposed WaterSMART project directly facilitate the on-farm improvement? If so, how? For example, installation of a pressurized pipe through WaterSMART can help support efficient on-farm irrigation practices, such as drip-irrigation.*

    OR
  - *Will the proposed WaterSMART project complement the on-farm project by maximizing efficiency in the area? If so, how?*

Not applicable.

- *Describe the on-farm water conservation or water use efficiency benefits that are expected to result from any on-farm work..*
  - *Estimate the potential on-farm water savings that could result in acre-feet per year. Include support or backup documentation for any calculations or assumptions.*

Not applicable.

Note: On-farm water conservation improvements that complement the water delivery improvement projects selected through this FOA may be considered for NRCS funding and technical assistance to the extent that such assistance is available. For more information, including application deadlines and a description of available funding, please contact your local NRCS office. See the NRCS website for office contact information, www.nrcs.usda.gov/wps/portal/nrcs/main/national/contact/states/.

Evaluation Criterion E: Department of the Interior Priorities

Up to 10 points may be awarded based on the extent that the proposal demonstrates that the project supports the Department of the Interior priorities. Please address those priorities that are applicable to your project. It is not necessary to address priorities that are not applicable to your project. A project will not necessarily receive more points simply because multiple priorities are addressed. Points will be allocated based on the degree to which the project supports one or more of the priorities listed, and whether the connection to the priority(ies) is well supported in the proposal.

1. *Creating a conservation stewardship legacy second only to Teddy Roosevelt*
   a. *Utilize science to identify best practices to manage land and water resources and adapt to changes in the environment;*
   b. *Examine land use planning processes and land use designations that govern public use and access;*
   c. *Revise and streamline the environmental and regulatory review process while maintaining environmental standards.*
   d. *Review Department water storage, transportation, and distribution systems to identify opportunities to resolve conflicts and expand capacity;*
   e. *Foster relationships with conservation organizations advocating for balanced stewardship and use of public lands;*

f. *Identify and implement initiatives to expand access to Department lands for hunting and fishing;*
g. *Shift the balance towards providing greater public access to public lands over restrictions to access.*

As shown through multiple reports, studies, and the emphasis of the WaterSMART program, metering is critical in striving to conserve water, improve water management, and increase water use efficiency. As such, science has proven it to be a best practice among all types of water systems. This project directly meets the DOI's priority to utilize science to identify best practices to manage water resources and adapt to changes in the environment. The installation of meters will greatly improve American Fork City's management of their water resources and allow them to adapt to the environment and population growth moving into the future.

2. *Utilizing our natural resources*
   a. *Ensure American Energy is available to meet our security and economic needs;*
   b. *Ensure access to mineral resources, especially the critical and rare earth minerals needed for scientific, technological, or military applications;*
   c. *Refocus timber programs to embrace the entire 'healthy forests' lifecycle;*
   d. *Manage competition for grazing resources.*

Not applicable.

3. *Restoring trust with local communities*
   a. *Be a better neighbor with those closest to our resources by improving dialogue and relationships with persons and entities bordering our lands;*
   b. *Expand the lines of communication with Governors, state natural resource offices, Fish and Wildlife offices, water authorities, county commissioners, Tribes, and local communities.*

American Fork and its neighbors have had a large amount of exposure to Reclamation projects via the CUP. While the results have been mostly positive to those in the local communities, any improvements to water systems in the area only serves to demonstrate that the Reclamation cares about local water resources and expand the lines of communication to American Fork City officials and employees while solidifying the existing relationships with other local water districts or irrigation companies.

4. *Striking a regulatory balance*
   a. *Reduce the administrative and regulatory burden imposed on U.S. industry and the public;*
   b. *Ensure that Endangered Species Act decisions are based on strong science and thorough analysis.*

Not applicable.

5. *Modernizing our infrastructure*
   a. *Support the White House Public/Private Partnership Initiative to modernize U.S. infrastructure;*

b. *Remove impediments to infrastructure development and facilitate private sector efforts to construct infrastructure projects serving American needs;*
c. *Prioritize Department infrastructure needs to highlight:*
    1. *Construction of infrastructure;*
    2. *Cyclical maintenance;*
    3. *Deferred maintenance.*

The addition of meters to the existing PI system will modernize the system as a whole and utilize the best advances in technology by installing smart meters that will connect to an AMI system. This project aids the DOI in modernizing the infrastructure of the United States by improving this system which will serve as an example to others of how other systems can also improve.

Evaluation Criterion F: Implementation and Results

Up to 6 points may be awarded for these subcriteria.

Subcriterion F.1 – Project Planning

Points may be awarded for proposals with planning efforts that provide support for the proposed project.

Does the applicant have a Water Conservation Plan and/or System Optimization Review (SOR) in place? *Please self-certify or provide copies of these plans where appropriate to verify that such a plan is in place.*

Provide the following information regarding project planning:

(1) Identify any district-wide, or system-wide, planning that provides support for the proposed project. This could include a Water Conservation Plan, SOR, Drought Contingency Plan or other planning efforts done to determine the priority of this project in relation to other potential projects.

American Fork City has an approved Water Conservation Plan dated November 2014. The City is currently in the process of updating the water conservation plan and the new draft includes secondary meter installation as a major way to conserve water. In association with this project, one of the goals of the City is to improve irrigation practices and implement water-efficient landscapes that will enhance the beauty of the City. Encouragement and guidance listed in the conservation plan includes the following:

- Water landscape only as much as required by the type of landscape, and the specific weather patterns of your area, including cutting back on watering times in the spring and fall. We encourage our customers to utilize the weekly lawn watering guide located at www.conservewater.utah.gov.
- Group plants in terms of water need, and zone sprinkler systems accordingly.
- Encourage customers to alter parking strips by allowing more water-wise plantings.
- Do not water on hot, sunny, and/or windy days. You may actually end up doing more harm than good to your landscape, as well as wasting a significant amount of water.

- Sweep sidewalks and driveways instead of using the hose to clean them off.
- Wash your car from a bucket of soapy (biodegradable) water and rinse while parked on or near the grass or landscape so that all the water running off goes to beneficial use instead of running down the gutter to waste.
- Check for and repair leaks in all pipes, hoses, faucets, couplings, valves, etc. Verify there are no leaks by turning everything off and checking your water meter to see if it is still running. Some underground leaks may not be visible due to draining off into storm drains, ditches, or traveling outside your property.
- Use mulch around trees and shrubs, as well as in your garden to retain as much moisture as possible. Areas with drip systems will use much less water, particularly during hot, dry and windy conditions.
- Keep your lawn well-trimmed and all other landscaped areas free of weeds to reduce overall water needs of your yard.

In addition to these individual measures that can be taken, the plan also lists metering the PI system as a city-wide measure that, if taken, will greatly add to the conservation efforts of the City as a whole.

(2) Describe how the project conforms to and meets the goals of any applicable planning efforts and identify any aspect of the project that implements a feature of an existing water plan(s).

The proposed metering project will provide American Fork City the ability to extend its water supply based on the projected growth of the City. With the limited supply of available water in Utah County. The groundwater recharge will help implement the needed priority of recharging the aquifer between local municipalities with the time necessary to plan for the additional required infrastructure to meet future demands in Utah County. In addition, this project is a direct solution to water conservation efforts as listed in the City's water conservation plan.

Subcriterion F.2 – Performance Measures

Points may be awarded based on the description and development of performance measures to quantify actual project benefits upon completion of the project.

Provide a brief summary describing the performance measure that will be used to quantify actual benefits upon completion of the project (e.g., water saved or better managed, energy generated or saved). For more information calculating performance measure, see Appendix A: Benefit Quantification and Performance Measure Guidance.

The City will compare post-project measurements with historic records of water deliveries and power usage associated with the supplemental pumping. The historic records include mainline meter readings at the head of the PI system as well as flow meter readings and electric power usage at the culinary wells used to supplement the PI system. The same meters will be used to record post-project usage for comparison to historic records.

Note: All Water and Energy Efficiency Grant applicants are required to propose a "performance measure" (a method of quantifying the actual benefits of their project once it is completed). A provision will be included in all assistance agreements with Water and Energy Efficiency Grant

recipients describing the performance measure and requiring the recipient to quantify the actual project benefits in their final report to Reclamation upon completion of the project. If information regarding project benefits is not available immediately upon completion of the project, the financial assistance agreement may be modified to remain open until such information is available and until a Final Report is submitted. Quantifying project benefits is an important means to determine the relative effectiveness of various water management efforts, as well as the overall effectiveness of Water and Energy Efficiency Grants.

Note: program funding may be used to install necessary equipment to monitor progress. However, program funding may not be used to measure performance after project construction is complete (these costs are considered normal operation and maintenance costs and are the responsibility of the applicant).

Subcriterion F.3 - Readiness to Proceed

Points may be awarded based upon the extent to which the proposed project is capable of proceeding upon entering into a financial assistance agreement.

Note: Applicants that describe a detailed plan (e.g., estimated project schedule that shows the stages and duration of the proposed work, including major tasks, milestones, and dates) will receive the most points under this criterion.

- *Describe the implementation plan of the proposed project. Please include an estimated project schedule that shows the stages and duration of the proposed work, including major tasks, milestones, and dates.*

American Fork has a plan to begin work on this project as soon as it is approved, and a contract is executed. The Council has passed a resolution committing the funds given an award. A schedule is shown if Figure 3

American Fork City Secondary Irrigation Metering Project
PROJECT SCHEDULE

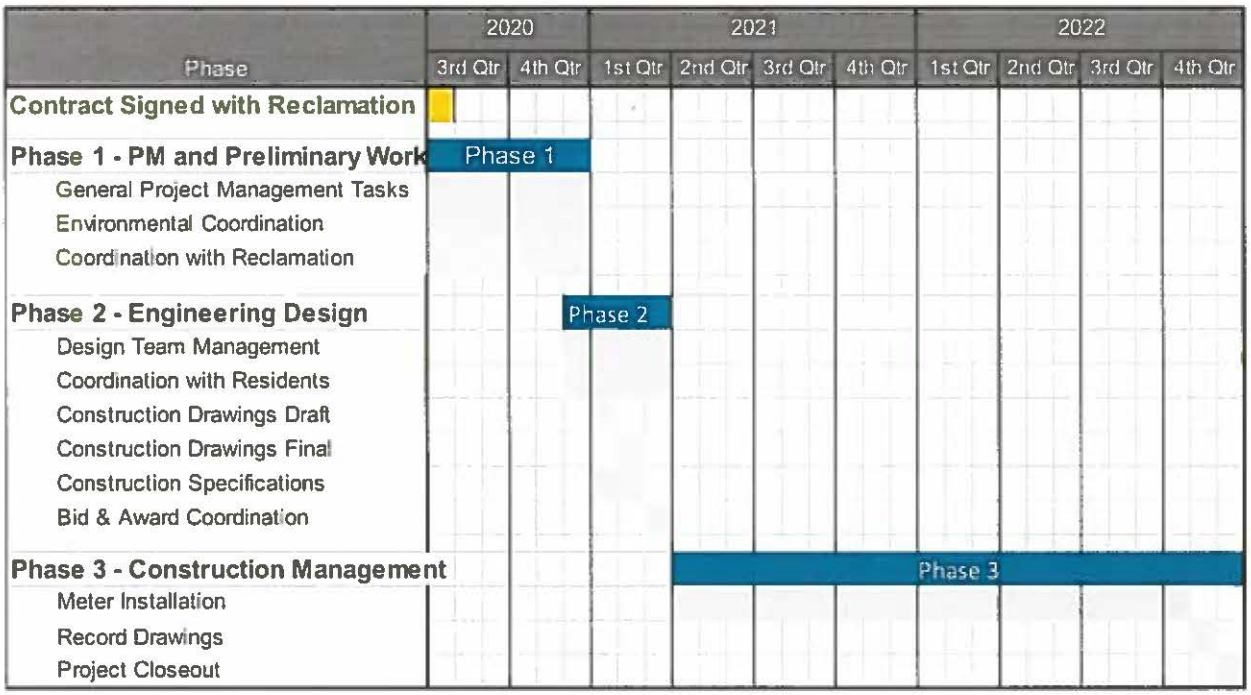


Figure 3 Project Schedule

- *Describe any permits that will be required, along with the process for obtaining such permits.*

The City is not required to obtain any permits as the work will be done in existing ROW and/or easements. The contractor selected to do the project will be required to submit a no cots right-of-way (ROW) permit to the City for their work. In certain situation temporary construction easement may be required from individual property owners. The City will obtain these permits as needed.

- *Identify and describe any engineering or design work performed specifically in support of the proposed project.*

Engineering and design have not been completed. Engineering and design will be done as part of the approved project.

- *Describe any new policies or administrative actions required to implement the project.*

Budgets and contracts will need to be approved by administration as part of this project. They are easily obtained through standard city procedures.

- *Describe how the environmental compliance estimate was developed. Has the compliance cost been discussed with the local Reclamation office?*

The estimate was taken from the Salem project and the City has not had any discussion with the local Reclamation office.

Evaluation Criterion G: Nexus to Reclamation Project Activities

Up to 4 points may be awarded if the proposed project is in a basin with connections to Reclamation project activities. No points will be awarded for proposals without connection to a Reclamation project or Reclamation activity.

- *Is the proposed project connected to Reclamation project activities? If so, how? Please consider the following:*
  - *Does the applicant receive Reclamation project water?*
  - *Is the project on Reclamation project lands or involving Reclamation facilities?*
  - *Is the project in the same basin as a Reclamation project or activity?*
  - *Will the proposed work contribute water to a basin where a Reclamation project is located?*

Some of the water to be metered by the implementation of this project may be Reclamation water. The project is located in the same basin as a portion of the CUP, a large project sponsored by Reclamation. Conserved water will remain as instream flows within the same basin as the Reclamation CUP.

- *Will the project benefit any tribe(s)?*

No, this project will not benefit any tribes.

Evaluation Criterion H: Additional Non-Federal Funding

Up to 4 points may be awarded to proposals that provide non-Federal funding in excess of 50 percent of the project costs. State the percentage of non-Federal funding provided using the following calculation:

$$\frac{\textit{Non-Federal Funding}}{\textit{Total Project Cost}} = \frac{\$1,535,400}{\$3,004,700} = \mathbf{51\%}$$

Project Budget

Project costs for environmental and cultural compliance and engineering/design that were incurred or are anticipated to be incurred prior to award should be included in the proposed project budget.

If the proposed project is selected, the awarding Reclamation Grants Officer will review the proposed pre-award costs to determine if they are consistent with program objectives and are

allowable in accordance with the authorizing legislation. Proposed pre-award costs must also be compliant with all applicable administrative and cost principles criteria established in 2 Code of Federal Regulations (CFR) Part 200, available at www.ecfr.gov, and all other requirements of this FOA. ***In no case will costs incurred prior to July 1, 2019 be considered for inclusion in the proposed project budget for Fiscal Year 2020 funding.***

Please note that the costs for preparing and submitting an application in response to this FOA, including the development of data necessary to support the proposal, are not eligible project costs under this FOA and must not be included in the project budget. In addition, Budget Proposals must not include costs for the purchase of water or land, or to secure an easement other than a construction easement. These costs are not eligible project costs under this FOA.

Funding Plan and Letters of Commitment

Describe how the non-Federal share of project costs will be obtained. Reclamation will use this information in making a determination of financial capability.

Project funding provided by a source other than the applicant shall be supported with letters of commitment from these additional sources. Letters of commitment shall identify the following elements:

- *The amount of funding commitment*
- *The date the funds will be available to the applicant*
- *Any time constraints on the availability of funds*
- *Any other contingencies associated with the funding commitment*

Commitment letters from third party funding sources should be submitted with your application. If commitment letters are not available at the time of the application submission, please provide a timeline for submission of all commitment letters. Cost-share funding from sources outside the applicant's organization (e.g., loans or State grants), should be secured and available to the applicant prior to award.

Reclamation will not make funds available for an award under this FOA until the recipient has secured non-Federal cost-share. Reclamation will execute a financial assistance agreement once non-Federal funding has been secured or Reclamation determines that there is sufficient evidence and likelihood that non-Federal funds will be available to the applicant subsequent to executing the agreement.

Please Identify the sources of the non-Federal cost share contribution for the project, including:

- *Any monetary contributions by the applicant towards the cost-share requirement and source of funds (e.g., reserve account, tax revenue, and/or assessments)*
- *Any costs that will be contributed by the applicant*
- *Any third party in-kind costs (i.e., goods and services provided by a third party)*
- *Any cash requested or received from other non-Federal entities*
- *Any pending funding request (i.e., grants or loans) that have not yet been approved and explain how the project will be affected if such funding is denied*

The City will provide monetary funding from existing City revenues and reserve funds for the construction portion of the project.

In addition, please identify whether the budget proposal includes any project costs that have been or may be incurred prior to award. For each cost, describe:

- *The project expenditure and amount*
- *The date of cost incurrence*
- *How the expenditure benefits the project*

The City will not have any project expenses prior to the project start date

Please include the following chart to summarize all funding sources. Denote in-kind contributions with an asterisk (*).

Table 16: Summary of Non-Federal and Federal Funding Sources

FUNDING SOURCES	AMOUNT
Non-Federal Entities	
1. American Fork City fund balances	$1,535,400
Non-Federal Subtotal	**$1,535,400**
Other Federal Entities	
1. Not Applicable	$0
Other Federal Subtotal	**$0**
REQUESTED RECLAMATION FUNDING	**$1,500,000**

Budget Proposal

The total project cost (Total Project Cost), is the sum of all allowable items of costs, including all required cost sharing and voluntary committed cost sharing, including third-party contributions, that are necessary to complete the project.

Table 17: Total Project Cost Table

SOURCE	AMOUNT
Costs are reimbursed with the requested Federal Funding	**$1,500,000**
Costs to be paid by the applicant	**$1,535,400**
Value of third party contributions	**$0**
TOTAL PROJECT COST	**$3,035,400**

The budget proposal should include detailed information on the categories listed below and must clearly identify ***all*** *items of cost, including those that will be contributed as non-Federal cost share by the applicant (required and voluntary), third-party in-kind contributions, and those that will be covered using the funding requested from Reclamation, and any requested pre-award costs. Unit costs must be provided for all budget items including the cost of services or other work to be provided by consultants and contractors. Applicants are strongly encouraged to review the procurement standards for Federal awards found at 2 CFR §200.317 through §200.326 before developing their budget proposal. If you have any questions regarding your budget proposal or eligible costs, please contact the grants management specialist identified in Section G. Agency Contacts.*

It is also strongly advised that applicants use the budget proposal format shown below in Table 2 or a similar format that provides this information. If selected for award, successful applicants must submit detailed supporting documentation for all budgeted costs. It is not necessary to include separate columns indicating which cost is being contributed as non-Federal cost share or which costs will be reimbursed with Federal funds.

Note: The costs of preparing bids, proposals, or applications on potential Federal and non-Federal awards or projects, including the development of data necessary to support the non-Federal entity's application are not eligible project costs and should not be included in the budget proposal (2 CFR §200.460).

Table 18: Budget Proposal

Budget Item Description	Computation		Quantity Type	Total Cost
	$/Unit	Quantity		
Legal Services	$200/hr	120	Hours	$24,000
Environmental Services	See Appendix C		Hours	$42,800
Cultural Clearance	$100/hr	150	Hours	$15,000
Engineering Services	See Appendix D			$82,300
Construction Management	See Appendix D			$249,600
Construction Contract	See Appendix E			$2,591,700
Reclamation Reporting	$100/hr	300	Hours	$30,000
Total Project Costs				**$3,035,400**

Budget Narrative

Submission of a budget narrative is mandatory. An award will not be made to any applicant who fails to fully disclose this information. The budget narrative provides a discussion of, or explanation for, items included in the budget proposal. The types of information to describe in the narrative include, but are not limited to, those listed in the following subsections. Costs, including the valuation of third-party in-kind contributions, must comply with the applicable cost principles contained in 2 CFR Part §200, available at the Electronic Code of Federal Regulations (www.ecfr.gov).

Note--You may adjust the following subsections as applicable.

All unit costs were estimated based on actual construction bids as reported by WBWCD. Engineering judgment was used when comparable items were not available, or costs needed to be adjusted to fit conditions specific to the proposed project. All associated construction materials for this project have been included in the installation of the associated meters. It is anticipated that all other incidental construction materials and costs associated with the installation of the meters are included. Inflation is also accounted for in the unit costs as WBWCD installed meters several years prior to the proposed project.

All funding secured from Reclamation will be used to pay contractual agreements to implement the project including the construction contract and fees for engineering services, environmental services, and cultural compliance. City employees will not earn salary, wages, fringe benefits, or reimbursements from the Federal funding obtained to implement this project. All City employees will be paid under the existing city budget.

Contractual

Identify all work that will be accomplished by consultants or contractors, including a breakdown of all tasks to be completed, and a detailed budget estimate of time, rates, supplies, and materials that will be required for each task. For each proposed contract, identify the procurement method that will be used to select the consultant or contractor and the basis for selection. Please note that all procurements with an anticipated aggregate value that exceeds the Micro-purchase Threshold (currently $10,000) must use a competitive procurement method (see 2 CFR §200.320 – Methods of procurement to be followed*). Only contracts for architectural/engineering services can be awarded using a qualifications-based procurement method. If a qualifications-based procurement method is used, profit must be negotiated as a separate element of the contract price. See 2 CFR §200.317 through §200.326 for additional information regarding procurements, including required contract content. Note: A modification to an existing contract for services without first obtaining multiple quotes or proposals is considered a noncompetitive procurement, regardless of the method used to award the existing contract.*

All funding for the project will be used to pay consultants, construction contractors, and subcontractors. These include all fees associated with engineering, environmental, and construction

management services. Detailed tasks to be completed, labor hours, rates, supplies, and materials for each contractual task are outlined in the appendices as follows:

Appendix C – Probable Cost for Environmental Services
Appendix D – Probable Cost for Engineering Services
Appendix E – Probable Cost for Construction Services

Environmental and Regulatory Compliance Costs

Prior to awarding financial assistance, Reclamation must first ensure compliance with Federal environmental and cultural resources laws and other regulations ("environmental compliance"). Every project funded under this program will have environmental compliance costs associated with activities undertaken by Reclamation and the recipient.

To estimate environmental compliance costs, please contact compliance staff at your local Reclamation Office for additional details regarding the type and costs of compliance that may be required for your project. Note, support for your compliance costs estimate will be considered during review of your application. Contact the Program Coordinator (see Section G. Agency Contacts) for Reclamation contact information regarding compliance costs and requirements.

Environmental compliance costs are considered project costs and must be included as a line item in the project budget and will be cost shared accordingly.

The amount of the line item should be based on the actual expected environmental compliance costs for the project, including Reclamation's cost to review environmental compliance documentation. Environmental compliance costs will vary based on project type, location, and potential impacts to the environment and cultural resources.

How environmental compliance activities will be performed (e.g., by Reclamation, the applicant, or a consultant) and how the environmental compliance funds will be spent, will be determined pursuant to subsequent agreement between Reclamation and the applicant. The amount of funding required for Reclamation to conduct any environmental compliance activities, including Reclamation's cost to review environmental compliance documentation, will be withheld from the Federal award amount and placed in an environmental compliance account to cover such costs. If any portion of the funds budgeted for environmental compliance is not required for compliance activities, such funds may be reallocated to the project, if appropriate.

Costs associated with environmental and regulatory compliance must be included in the budget. Compliance costs include costs associated with any required documentation of environmental compliance, analyses, permits, or approvals. Applicable Federal environmental laws could include NEPA, ESA, NHPA, CWA, and other regulations depending on the project. Such costs may include, but are not limited to:

- *The cost incurred by Reclamation to determine the level of environmental compliance required for the project*
- *The cost incurred by Reclamation, the recipient, or a consultant to prepare any necessary environmental compliance documents or reports*

- *The cost incurred by Reclamation to review any environmental compliance documents prepared by a consultant*
- *The cost incurred by the recipient in acquiring any required approvals or permits, or in implementing any required mitigation measures*

As indicated above, the cost budgeted for environmental compliance is $42,800 as shown in Appendix C. This budget includes Reclamation costs associated with ensuring environmental compliance. It is anticipated that the NEPA compliance will include a simple environmental assessment. The budgeted amount is approximately one percent of total project costs.

A total of $30,000 is budgeted for all coordination with Reclamation throughout the duration of the project. This cost includes preparing progress reports, submitting reimbursement requests, and all other coordination required to meet Reclamation guidelines.

Total Costs

Indicate total amount of project costs, including the Federal and non-Federal cost-share amounts.

The total project cost is $3,035,400.

Required Permits or Approvals

Applicants must state in the application whether any permits or approvals are required and explain the plan for obtaining such permits or approvals.

No permits or approvals are expected as part of this project.

Note that improvements to Federal facilities that are implemented through any project awarded funding through this FOA must comply with additional requirements. The Federal government will continue to hold title to the Federal facility and any improvement that is integral to the existing operations of that facility. Please see P.L. 111-11, Section 9504(a)(3)(B). Reclamation may also require additional reviews and approvals prior to award to ensure that any necessary easements, land use authorizations, or special permits can be approved consistent with the requirements of 43 CFR Section 429, and that the development will not impact or impair project operations or efficiency.

Letters of Support

Please include letters from interested stakeholders supporting the proposed project. To ensure your proposal is accurately reviewed, please attach all letters of support/partnership letters as an appendix. (Note: this will not count against the application page limit.) Letters of support received after the application deadline for this FOA will not be considered in the evaluation of the proposed project.

Letters of Support are included in Appendix A.

Official Resolution

Include an official resolution adopted by the applicant's board of directors or governing body, or for State government entities, an official authorized to commit the applicant to the financial and legal obligations associated with receipt of a financial assistance award under this FOA, verifying:

- *The identity of the official with legal authority to enter into an agreement*
- *The board of directors, governing body, or appropriate official who has reviewed and supports the application submitted*
- *The capability of the applicant to provide the amount of funding and/or in-kind contributions specified in the funding plan*
- *That the applicant will work with Reclamation to meet established deadlines for entering into a grant or cooperative agreement*

An official resolution meeting the requirements set forth above is mandatory. *If the applicant is unable to submit the official resolution by the application deadline because of the timing of board meetings or other justifiable reasons, the official resolution may be submitted up to 30 days after the application deadline.*

The signed Official Resolution is shown in Appendix B.

Unique Entity Identifier and System for Award Management

All applicants (unless the applicant has an exception approved by Reclamation under 2 CFR §25.110[d]) are required to:

(i) Be registered in the System for Award Management (SAM) before submitting its application;

(ii) Provide a valid unique entity identifier in its application; and

(iii) Continue to maintain an active SAM registration with current information at all times during which it has an active Federal award or an application or plan under consideration by a Federal awarding agency.

American Fork City holds an active SAM registration with CAGE code 7TQQ0 and DUNS number 105727452. The City will maintain an active registration throughout the duration of the project.

Meeting the requirements set forth above is mandatory. *If the applicant is unable to complete registration by the application deadline, the unique entity identifier must be obtained and SAM registration must be initiated within 30 days after the application deadline in order to be considered for selection and award.*

Reclamation will not make a Federal award to an applicant until the applicant has complied with all applicable unique entity identifier and SAM requirements and, if an applicant has not fully complied with the requirements by the time the Reclamation is ready to make an award, Reclamation may determine that the applicant is not qualified to receive a Federal award and use that determination as a basis for making a Federal award to another applicant.

Appendix A

Letters of Support

American Fork Irrigation

American Fork UT
Established 1920

September 30, 2019

David Bunker
Administrator
American Fork City
51 East Main Street
American Fork, Utah 84003

Re: American Fork City Pressurized Irrigation Metering Project.

Dear Mr. Bunker,

I am writing this letter to show my support to American Fork City for pursuing the secondary metering project through funding from the Bureau of Reclamation Water SMART grant. The project will be beneficial to the American Fork Irrigation Company and to our community.

We are encouraged by the efforts of American Fork City in being good stewards of the secondary irrigation water resources, specifically their conservation efforts.

Sincerely,

E M John

Ernest M. John
President
American Fork Irrigation Company

9-30-19
Date

Appendix B

Signed Official Resolution

RESOLUTION NO. 2019-09-39R

A RESOLUTION PROVIDING FOR THE SUBBMITTAL OF A GRANT APPLICATION TO THE UNITED STATES DEPARTMENT OF THE INTERIOR, BUREAU OF RECLAMATION FOR THE WATERSMART WATER AND ENERGY EFFICIENCY GRANTS.

WHEREAS, the United States Department of the Interior, Bureau of Reclamation has announced the *WaterSMART Water and Energy Efficiency Grants* in order to prevent water supply crises and ease conflict in the western United States, and has requested proposals from eligible entities to be included in the WaterSMART Program, and

WHEREAS, the City of American Fork has need for funding to complete a pressurized irrigation metering project.

NOW, THEREFORE, BE IT RESOLVED by the City Council of American Fork City as follows:

1. That David Bunker, City Administrator, is hereby identified as the official with legal authority to enter into an agreement resulting from a successful application for this grant and is specifically authorized to do so.

2. The City Council designates David Bunker as the Official to review and support the application prior to submission of the grant application.

3. The City does hereby commit to provide the amount of funding and/or in-kind contributions specified in the funding plan included in the funding plan portion of the grant application.

4. That American Fork City is hereby committed to work with the Bureau of Reclamation to meet established deadlines for entering into a grant or cooperative agreement.

5. This resolution shall take effect immediately upon passing.

Passed by the City Council of the City of American Fork, Utah, this 24 day of September 2019.

Bradley J. Frost, Mayor

ATTEST:

Terilyn Lurker, City Recorder

AMERICAN FORK CITY CORPORATE SEAL UTAH COUNTY STATE OF UTAH

Appendix C

Probable Cost for Environmental Services

(Environmental and Cultural Resources Compliance)

American Fork Pressurized Irrigation Metering Project

Probable Cost Opinion for Environmental and Cultural Resource Services

(Rate Table Attached)

Task Description	Hours By Personnel Category							Total Hours	Total Labor Charges	Other Direct Costs	Total Fee
	1	2	3	4	7	14	15				
	Principal	Project Manager	Senior Engineer	Staff Engineer	Designer	Office Assistant	Clerk				
NEPA Compliance											
Task 1. Cultural Resources Survey/Report		4						4	$564	$10,000	$10,564
Task 2. Preparation of Environmental Assessment Draft			120			4		124	$14,760	$0	$14,760
Task 3. Coordination with Reclamation[1]			8					8	$968	$12,000	$12,968
Task 4. Coordination with Other Agencies		4	8					12	$1,532	$0	$1,532
Task 5. Preparation of Environmental Assessment Final			16			6		22	$2,296	$0	$2,296
Task 6. FONSI	1		4					5	$645	$0	$645
SUBTOTAL	**1**	**8**	**156**	**0**	**0**	**10**	**0**	**175**	**$20,765**	**$22,000**	**$42,800**
Project Totals	1	8	156	0	0	10	0	175	$20,765.00	$22,000.00	$42,800.00

[1] *Cost assumed for USBR portion of Environmental Work*

Appendix D

Probable Cost for Engineering Services

(Engineering Design and Construction Management)

American Fork Pressurized Irrigation Metering Project

Probable Cost Opinion for Engineering Services

Probable Cost Opinion for Environmental and Cultural Resource Services

(Rate Table Attached)

Task Description	Hours By Personnel Category							Total Hours	Total Labor Charges	Other Direct Costs	Total Fee
	1	2	3	4	7	14	15				
	Principal	Project Manager	Senior Engineer	Staff Engineer	Designer	Office Assistant	Clerk				
Phase 1 - Project Management & Coordination											
Task 1. General Project Management Tasks	6							6	$966	$0	$966
Task 5. Coordination with Reclamation		40						40	$5,640	$0	$5,640
SUBTOTAL	**6**	**40**	**0**	**0**	**0**	**0**	**0**	**46**	**$6,606**	**$0**	**$6,700**
Phase 2 - Engineering Design											
Task 1. Design Team Management	16							16	$2,576	$0	$2,576
Task 2. Coordination with Client & Shareholders		80	120					200	$25,800	$0	$25,800
Task 3. Construction Drawings Draft		8	40		100			148	$15,668	$0	$15,668
Task 4. Construction Drawings Final	2	20			50			72	$7,992	$70	$8,062
Task 5. Construction Specifications	4	20	36	40		8		108	$12,500	$60	$12,560
Task 6. Bid & Award Coordination	3	40	24			30		97	$10,827	$20	$10,847
SUBTOTAL	**25**	**168**	**220**	**40**	**150**	**38**	**0**	**641**	**$75,363**	**$150**	**$75,600**
Phase 3 - Construction Management											
Task 1. Construction Team Management	16	40						56	$8,216	$0	$8,216
Task 2. On-Site Observation and Documentation		160		1600				1,760	$190,560	$300	$190,860
Task 3. Submittal Reviews		40						40	$5,640	$100	$5,740
Task 4. Contractor Coordination	15	140						155	$22,155	$0	$22,155
Task 5. Record Drawings Preparation		24			24			48	$5,712	$60	$5,772
Task 6. Project Closeout	8	40	24					72	$9,832	$60	$9,892
Task 7. Reclamation Reporting	8	40						48	$6,928	$0	$6,928
SUBTOTAL	**47**	**484**	**24**	**1600**	**24**	**0**	**0**	**2,179**	**$249,043**	**$520**	**$249,600**
Project Totals	78	692	244	1640	174	38	0	2,866	$331,012	$670	$374,700

Appendix E

Probable Cost for Construction Services

American Fork Secondary Metering Project

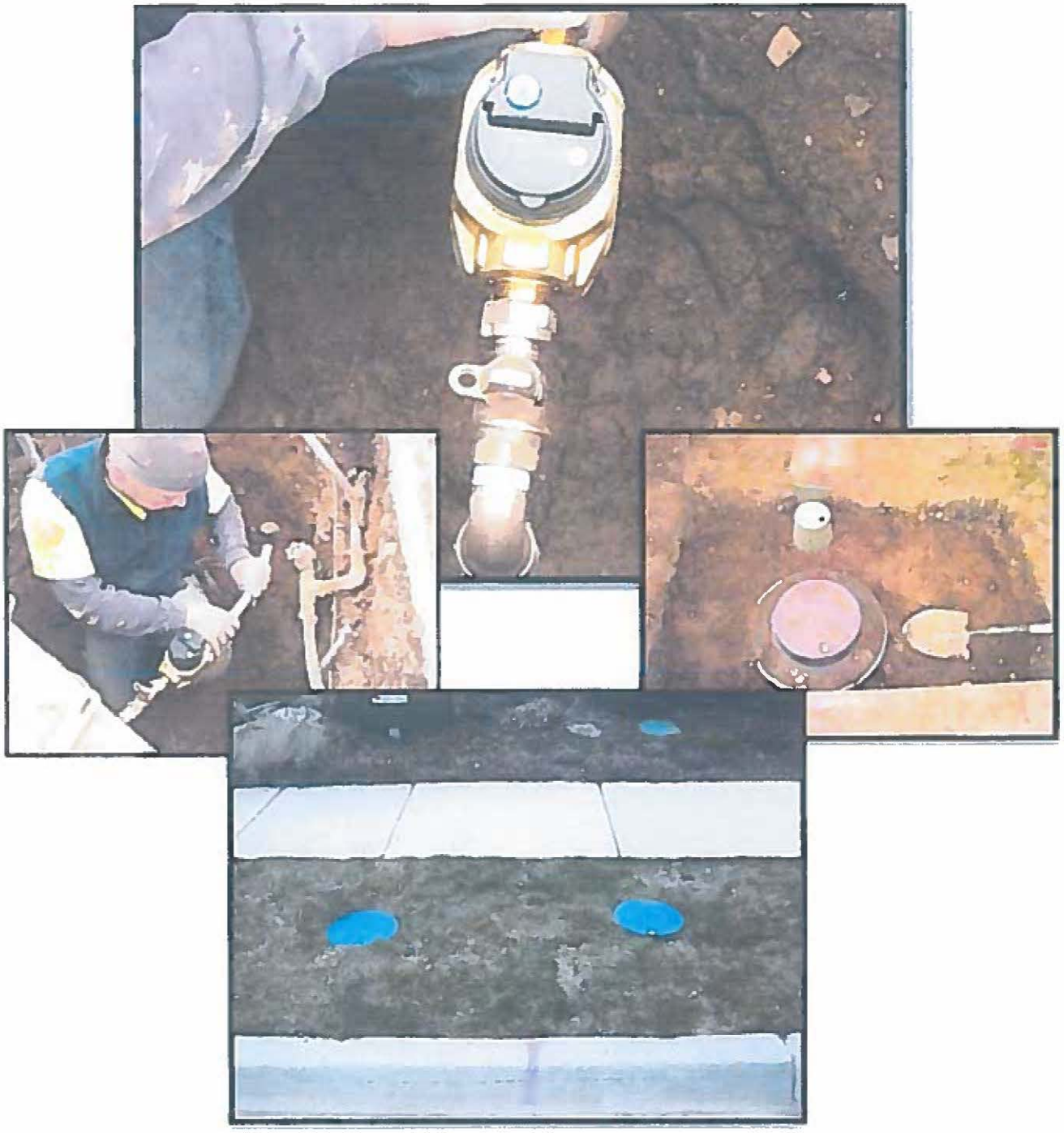
Construction Cost Estimate

ITEM	ITEM DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL COST
1	Mobilization (10%)	1	EA	$235,570	$236,000
2	Cost to install 1" PI meter	2,300	EA	$1,000	$2,300,000
3	Cost to install 1-1/2" PI meter	15	EA	$1,320	$19,800
4	Cost to install 2" PI meter	9	EA	$1,540	$13,900
5	AMR Equipment	1	LS	$22,000	$22,000
				Construction Total	**$2,591,700**

Appendix F

Weber Basin Conservancy District Report

Weber Basin Water Conservancy District
Secondary Water Metering Report
December 2015



Weber Basin Water Conservancy District
Secondary Water Metering Report

1. Meter Project Summary.

Weber Basin Water Conservancy District (District) has been studying and tracking data on meters for secondary water for the past several years. The first individual property meters were installed as test meters in 2006 to evaluate their effectiveness and verify if they could tolerate poor water quality, winter temperatures and other pressurized secondary water system related issues. The Elster Smart Meter was the selected meter and 30 meters were installed in various locations within the District's service area as test meters. These 30 meters were watched and tracked to evaluate performance for 3 full irrigation seasons. In 2010, it was determined that the meters would be successful and the District adopted a policy that all new secondary connections of the District would require the installation of a meter. Since 2010, the meter studies have continued with the adoption of additional meter types (there are now 4 types of meters in the field) and a total of 2,683 meters installed to date. It was also determined there was a need to purchase an electronic read system which has the capability of collecting data in hourly increments. The system chosen to meet the data needs and to be compatible with the various brands of meters was the Itron AMR system (using the 100W electronic radio transmitter or ERT).

In 2010, the District partnered with the Bureau of Reclamation to install 1,100 meters in the Uintah Bench and South Weber areas. This was the first large installation project for secondary water meters, so there was some question as to what the outcome of this project would be. Care was taken to ensure that cities and the neighborhoods affected were well informed and had opportunity to voice their concerns at city meetings and District sponsored open houses. Overall it could be said that things progressed smoothly and all concerns were addressed and resolved as they came up. After installation, there were a few challenges with software and the Itron units interacting with Elster's meter register. The issues were resolved with the help of Itron and Elster, but it was determined that the data for that first full year (2011) could be partially incorrect or compromised and would not be used in comparison with other data collected during the following years. Things began working properly, however since that time, the District has begun using the Sensus iPerl meter. This new meter is a true one inch meter and we have not had any issues with anything since its implementation. The Elster Smart Meter is still in place but is no longer being specified as an option for installation.

At the end of the 2015 irrigation season, the District now has 4 full years of irrigation data comprised of monthly consumption and hourly usage. Because new meters are being added every month, and for consistency purposes, the data being used for this report comes from a study group of 1,057 meters that have been in since 2010. However, a second study group is also set up and data from that group will be used in comparison with this first group as we have a few years of consistency with that group. In connection with this data, all metered users are receiving a water use statement each month letting them know their usage compared to their estimated need. The need is based on their parcel's landscape area using a historical 30 year average evapotranspiration value and irrigation system efficiency assumptions to determine

water need for their landscape area. More detail will be given on the system and how it all comes together in the body of this report.

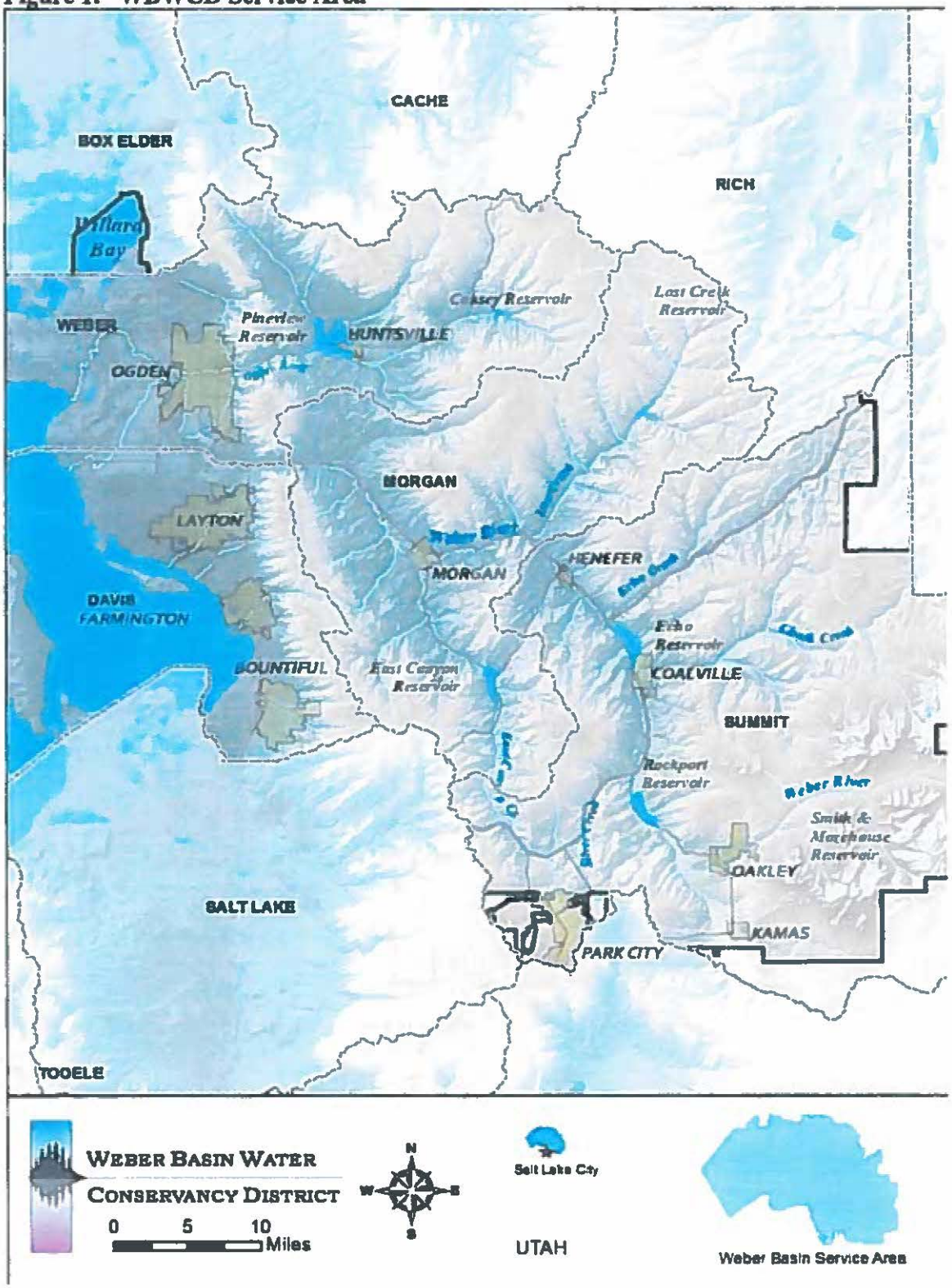
Overall, the metering is proving to be very effective with helping people know what they are using and how to adjust their usage down to meet the target need for their yard. The target need provides adequate and acceptable water for all users to maintain healthy turf and other landscape plant material while guiding users to eliminate waste and excess irrigation and to be accountable for their water. The potential conservation savings are large, and it is recommended that all secondary connections receive a meter and begin receiving help and education on how to reduce their landscape water needs. There will always be some ongoing issues of repair and replacement associated with any metering system, but over the last 4 irrigation seasons the results have been very positive with few setbacks. Some of the success of metering is being able to address the users' questions, gather and use quantifiable data on usage and conservation, and now being able to incorporate GIS and mapping technology to show on a larger scale where high use areas are and indicate which users may struggle to understand proper landscape water needs. The more information available the better we can analyze and implement programs and provide educational information to users which are cost effective and make the most sense for achieving desired water conservation goals and maintaining adequate water supply.

2. WBWCD Background

The Bureau of Reclamation began planning for the Weber Basin Project in 1942. Between 1952 and 1969, the Bureau of Reclamation constructed the original project consisting of reservoirs, canals, irrigation and drainage systems, and power plants. Weber Basin Water Conservancy District was created in June of 1950, by a decree of the Second District Court of Utah, under the guidelines of the Utah Water Conservancy Act. The District entered into a repayment contract with the United States Government in1952, which will be completed in 2034, to repay all of the original Weber Basin Project costs.

The Weber Basin Water Conservancy District is the legal agency representing the people of the five-county area of the project as shown below in Figure 1. The counties involved include Davis, Morgan, Summit, Weber, and part of Box Elder, which total a population of approximately 640,000 people and growing. That population is expected to double over the next 40 years and is going to require additional water supply and better management of the water supply currently available. The District administers the sale and delivery of project water and other water resources, operates and maintains the project facilities, and has contracted with the U.S. Government for repayment of reimbursable costs of the Weber Basin Project.

Figure 1. WBWCD Service Area



The Weber Basin Project was planned to conserve and utilize practically all of the excess flows of streams in the natural drainage basin of the Weber River, including the basin of the Ogden River, its principal tributary. Other areas encompassed are those lying between the west slope of the Wasatch Mountains and the east shore of the Great Salt Lake.

The District operates and maintains facilities for municipal potable and secondary irrigation needs providing approximately 225,000 acre feet of water annually to meet those needs. Of the total water delivered, 85,000 acre feet goes to municipal and industrial uses and 139,000 acre feet is delivered for irrigation needs of both agriculture and residential pressurized secondary irrigation systems. The District operates seven large storage reservoirs which store approximately 400,000 acre feet of the District's water, which is approximately a two years water supply for the current population.

Irrigation water for agriculture and municipal uses accounts for approximately 61% of Weber Basin Water Conservancy District's total water deliveries. Within the District's service area over 138,000 acre-feet of water is used to irrigate lands in five counties. In Utah it is estimated that approximately 60%-67% of all per capita water use is used to water landscapes which are primarily turf grass lawn. The District is committed to reducing water usage and has set a goal to reduce all water usage 25% by 2025 using the year 2000 as the base year.

One of the most promising areas identified to conserve water is by reducing irrigation usage for residential and urban applications in the landscape. Within the District's service area may exist the largest area of retail secondary water connections in the United States. The District has approximately 17,650 individual connections that are operated and maintained by the District, with many other irrigation companies and cities having tens of thousands of connections in their own retail areas throughout Davis and Weber Counties. This is water that is not treated but is in its own system directed to each property for the use of irrigating landscapes and gardens. Up until the last several years, this water has not been metered due to the difficulty with the meters currently on the market not being able to last with the poor water quality and the wear or plugging of the moving parts within those meters. This water has been allocated to properties based on property size and generally averages 1 acre foot per raw acre of property. However, the users have no way to know how much water they are using or when their allocation has been exceeded because there has been no metering of any kind in the past.

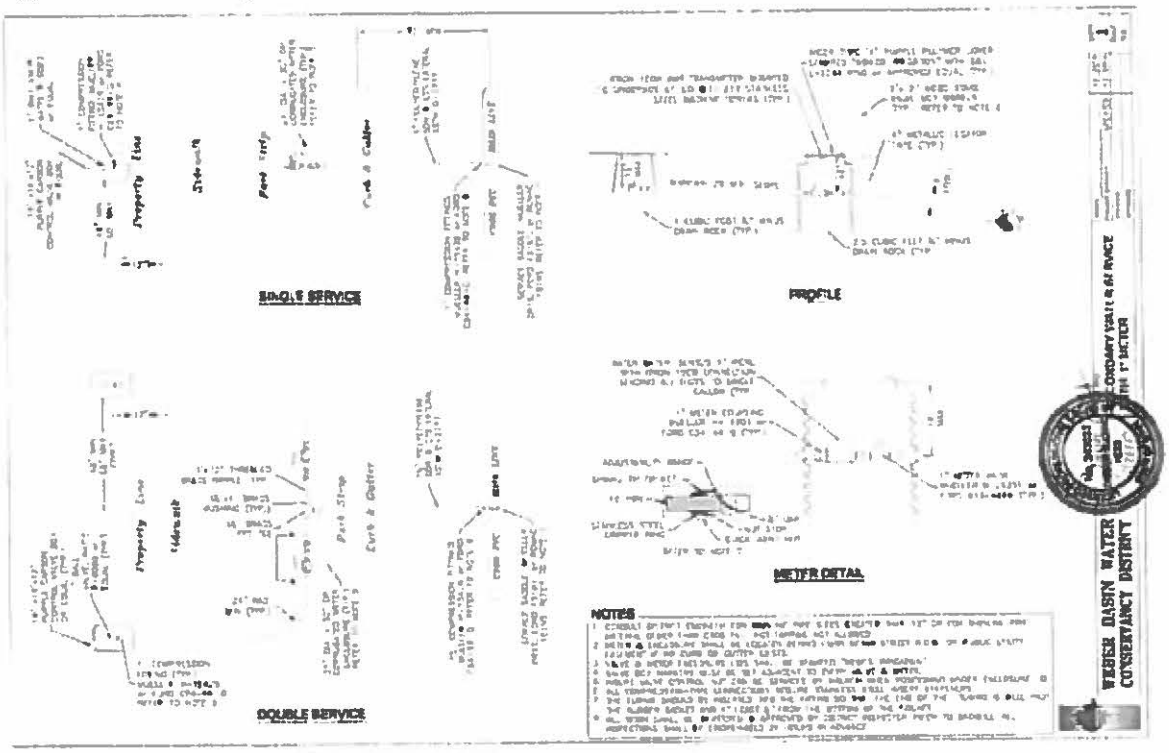
The District understands the importance of secondary water metering and the vital role metering will play in creating sustainable conservation. Goals for water use reductions will be achieved through usage accountability of the water currently being delivered. With a consistent study group of 1,057 meters with good data from 2012-1015, we have seen a reduction from an average use of .80 acre feet (AF) per connection down to .49 AF, which is a reduction of 39% over 4 years. This is meter data after a meter was installed. It is assumed and data is being gathered to show that unmetered connections do in fact use more than the .80 AF and many exceed allocation every year. More data will be made available as it is gathered. Effects of metering are continue to be seen with the meters now installed, and unlike drought messaging which creates a short term response, the meter will help users know what they use all the time to maintain the constant reduction rather than short term messaging or restriction response. The District will continue metering until all of its retail secondary connections have meters. It will take time and money to work through the system and install a meter on all existing connections.

3. Meter Project History

The District started metering individual properties in 2006 with a pilot study which included the installation of 30 Smart Meters (made by Severn Trent, later sold to Elster). The intent was to allow the District to monitor the effectiveness of the meters to see if they would work for secondary water systems. Some of the concerns included the ability of the meters to tolerate the conditions that exist in secondary systems and if they would read with accuracy the volume of water delivered. Secondary water connections are generally shallow, have the potential of being submerged for extended periods, and only have water through them for 6 months (no water during the winter season). These original 30 meters did not have capability for electronic reading but were read and monitored for 3 years to determine if they would provide a solution for accountability on every connection. The District has now replaced all of these meters so they can be read with all others and store data with the data collector. The data from these meters has shown that there is a lot of water being used, and it has shown that metering can work and will be an effective conservation tool to achieve long term savings and provide water for future growth needs.

To assist the District in this pilot meter study, the Utah Division of Water Resources joined as a partner to gather data and determine if the meters would be acceptable for secondary water systems. It was determined from the study that the Elster Smart Meter would be effective and be able tolerate poor water quality and provides accurate volume of water delivered. At the time, there were not many other options. It was determined that the District could move forward and commit to metering its secondary water connections on a larger scale beginning with the implementation of a policy that all new connections on Weber Basin's retail secondary system require a meter to be installed. A policy was created and adopted by the District's board of directors and took effect in 2010, with the full engineering drawings for specified installation and all other necessary information available for developers. The current meter installation specification is shown below as Figure 2.

Figure 2: Secondary Water Meter Installation Detail



This new policy did allow some choice in meters even though the smart meter was the only meter tested in the pilot study. The option available to developers was centered on using the Elster Smart Meter and Badger E Series with an Itron radio meter reading system to be used to read and gather usage data. The policy was developed at the same time that a larger project was being planned to install meters on existing connections, some of which would receive the Badger meters.

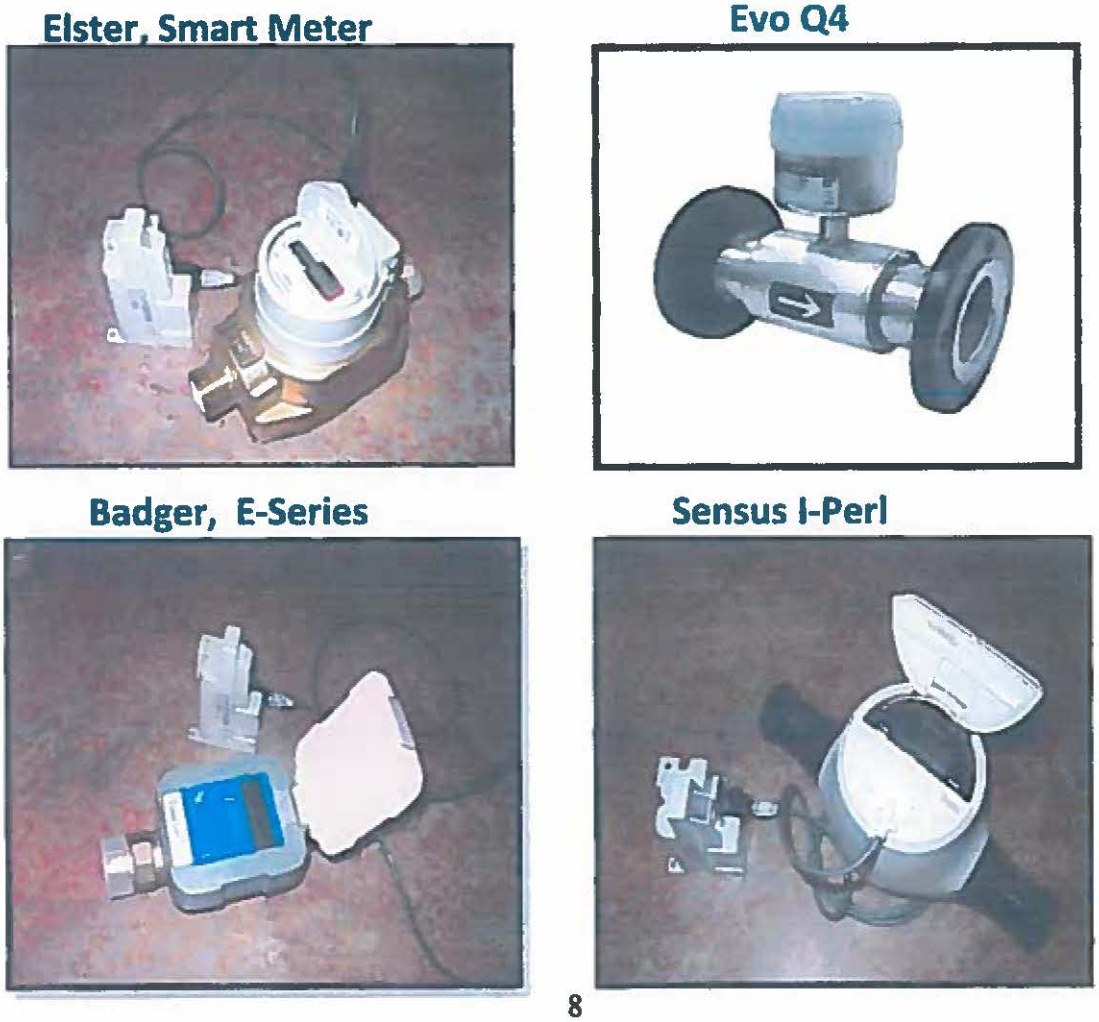
Since that time, the District has also been using and testing the Elster EvoQ4 and Sensus iPerl meters to determine if they will provide the reliability needed as well. All these meters have been produced and marketed with the ability to do what is needed in handling poor water quality, turbidity and no water in the pipes for half of the year. Itron was chosen as the read and data storage system because of its ability to be used with multiple brands and companies. The District is using several EvoQ4 meters on large connections because it is the only meter that can be used on connections larger than one inch diameter while still being cost effective. Other manufacturers have produced larger meters, but they are very costly. The District has now chosen to use the Sensus iPerl meter for all residential connections. This meter will be used until technology improves and other meters are introduced on the market and proven effective for this application. If it is determined that another meter can show effectiveness and affordability the District is willing to look at using other meters in the future. Below in Table 1, there is a comparison of each meter and the costs associated (all but labor to install it) to have an operational system.

Table 1. Meter Brands and Cost Comparisons

Meter Brand	Meter Cost	Cable	AMR - Itron 100W	Fittings	Enclosure (all parts)	Total
SmartMeter 3/4"	$158.00	included	$72.75	$120.00	$90.00	**$440.75**
Badger E Series 1"	$186.00	included	$72.75	$120.00	$90.00	**$468.75**
Badger E Series 1.5"	$484.00	included	$72.75	$120.00	$90.00	**$766.75**
Sensus I-PerlL 1"	$182.00	included	$72.75	$120.00	$90.00	**$464.75**
Evo Q 4 (4")	$1,977.00	$261.00	$72.75	$120.00	$90.00	**$2,520.75**
Evo Q 4 (2")	$1,526.00	$261.00	$72.75	$120.00	$90.00	**$2,069.75**

Photos of each of the meters are included here in Figure 3. Labor costs fluctuate and are not listed here because of the variability at the time of bidding. Our past experience indicates that labor to install is on average about equal to the cost of the meter components.

Figure 3. Meters Used in Weber Basin's Metering Projects



After installation there will be costs associated with the ongoing maintenance and operation of the system. These costs include time and materials for ongoing program operations, not including any meter or ERT replacement costs. The District has put together a cost breakdown of what it has taken to maintain and track meter usage so far. This work is at the heart of making a metering program successful. These costs will change as more meters are installed. It is likely the cost per meter would go down as more meters are installed due to the economy of scale and many portions of this work occurring regardless of the number of meters installed. Some costs will however increase such as paper, postage and time needed to prepare larger number of statements. Some of this can become more automated with equipment as the size of the project justifies cost to purchase such equipment. The operation cost estimations and calculations are shown below in Table 2, however, these costs will change as the number of meters in the system changes. From read time to time to process and the materials needed to get usage info to consumers will change as numbers increase.

Table 2. Costs of Maintaining Meters, Gathering Data and Providing Statements for Meter Study Group

Annual Meter Program Costs For Basic Ongoing Operation, No Physical Hardware

Average Employee wages and Benefits			$45.50					
Mileage allowance by IRS			$0.55					
	May	June	July	Aug.	Sept.	Oct.	Total	Cost
Time for reading (in hours)	20	20	20	20	20	20	120	$5,460.00
Mileage of truck for meter reading	200	200	200	200	200	200	1200	$660.00
Time to generate reports (in hours)	4	4	4	4	4	4	24	$1,092.00
Maintenance of meters/amr's (ERT)(in hours)	8	8	8	8	8	8	48	$2,184.00
Printing cost (paper & ink, etc)	130	130	130	130	130	130	780	$780.00
Time to print, fold and stuff envelopes (hours)	8	8	8	8	8	8	48	$2,184.00
Postage cost	510	510	510	510	510	510	3060	$3,060.00
Time to respond to questions (hours)	8	5	3	3	3	4	26	$1,183.00
Update Meter Customer website (hours)	8	3	3	3	3	3	23	$1,046.50
Programming time for changes and bugs (meter software) (hours)	8	3	3	3	3	3	23	$1,046.50
Database maintenance / tracking development	8	2	2	2	2	2	18	$819.00
							Total	$19,515.00
Annual Cost per metered connection			**$15.01**					
Annual Cost Per Acre Foot Allocated (1401 af/allocated)			**$13.93**					
Annual Cost per Acre Foot Used (1004.8 af/delivered)			**$19.44**					

The pilot study provided the information needed for the District to proceed with a larger scale project and install 1,100 meters. With partial grant funding from Reclamation the District went forward with an installation project in the Uintah Bench area. The area was chosen because it is mostly built out, there are system limitations for delivery and there were larger trunk line meters installed for the area that could be used as comparisons to see if metering affected overall water delivery. The trunk line data will be used to compare usage once the entire Uintah Bench area is metered. It was determined that since this was the first experience with metering existing connections, there would need to be some public relations done to educate and address any questions and keep a positive image with secondary customers. The Langdon

Group was retained to handle the PR as a third party to help these meter recipients and cities where the meters would be installed to understand the goals, construction process, and why the District was metering. Meetings were held with the cities and city councils, open houses were done, and information was provided door to door to all those that would be receiving a meter. There was a website created with information and answers to common questions, and a phone hotline number was set up to address any concerns as the project proceeded.

The first 1,100 meters needed to be installed in the off season, so it was decided they would be installed in 2 phases with phase 1 to include portions of Washington Terrace and South Ogden. These areas were chosen due to some system limitations and pressure concerns as well as the varied location of both front and back yard connections. Phase 1 of the project began in the spring of 2011 with about 500 meters installed. It was planned that data for the entire 2011 irrigation season could be gathered. Phase 2 was completed in the spring of 2012 before irrigation water was turned on and included all of South Weber and additional portions of South Ogden, finishing the total 1,100 meters.

The data collection did begin the first year (spring of 2011) and included monthly reads and hourly consumption data for each connection. A report had been devised to provide the homeowner with their monthly value compared to a personalized need based on parcel size and historical weather data. An example of this first report is shown in Figure 4 below. This first report was a bit cumbersome to create because a database had not yet been created and a software program had not been purchased to put the data into any specific format (such as a billing format). The progression of the user statements is something that improved significantly over the 3 years since we have been providing them to the users. The main reason being that District staff was able to create and customize some software that would take the raw data, place it into our existing water contract system database then extract that data and put it into the format that we desired in a report.

Figure 4. 2011 Water Use Report Generated with Merge Files in Excel

WEBER BASIN WATER CONSERVANCY DISTRICT

2837 East Highway 193 • Layton, Utah 84040 • Phone (801) 771-1677 • (SLC) 359-4494 • Fax (801) 544-0103

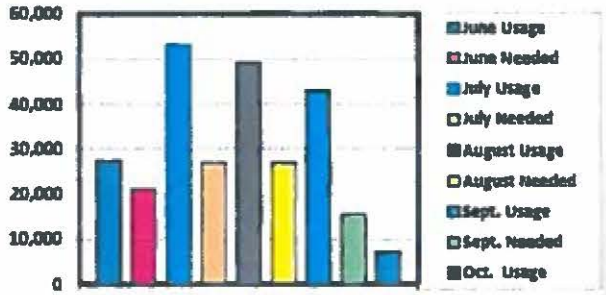
October 26, 2011

JAMES WOLD
1011 E 4775 S
OGDEN, UT 84403

Secondary Water Usage Statement

Account Number: 061980001W
Period of Usage: October 1 – October 15, 2011

Water Use Chart and Comparisons



Thank you for your cooperation with the secondary water meter project. We hope the usage information you received has been useful for you in managing your water usage.

Over the next several weeks, Weber Basin employees will be checking all metered connections to make sure everything is working properly. We will be correcting any problems that are found. Thank you.

Current Meter Read		Previous Meter Read		Days	Your Total October Usage	October water needs vary year to year and range from zero to several thousand gallons depending on lot size and weather. This year it has been cool and wet; minimal water was needed.
Date	Reading	Date	Reading			
10/15/2011	198021	9/30/2011	191049	16	6972	

*The average water needs listed on this statement are calculated based on lot size, historical local climate data, turf water needs, general landscape and soil characteristics for your area.

*For more information about the project or information about water conservation, please visit our website at www.webbasin.com/conservation. If you would like to receive this report by email, please send your email address to dmcknight@webbasin.com.

We would encourage you to visit Weber Basin's Learning Garden in Layton, or participate in free landscape classes, free water checks and other events. All classes and programs are free. Visit www.webbasin.com/conservation for resources and conservation information.

*Questions or for help in reducing your outdoor water use, please contact Adam McKnight of our office at 801-771-1677.

Please drain and winterize your irrigation system to avoid freezing or damaging your pipes or the meters. Thank you.

After just the first couple of months of metering in Phase 1, there was an issue that came up where data for many connections was showing very low or even negative values compared to the prior month. It took some time and patience to figure out that the data logging AMR unit was interacting incorrectly with the meters and resetting the meter register. The District frustration associated with this problem as well as the end user concern over accurate values was very high but with the help of both Itron and Elster, all AMR units were replaced with a new units (testing in manufacturing labs identified a compatibility problem, and they resolved the issue and provided new equipment). The downside to this little setback was that the data for 2011 was deemed unreliable for accuracy of usage. Some of the data may have been correct, but there was enough uncertainty that it was decided to never use the 2011 data in any of the comparisons of metered water use.

In connection with the installation and again with help from Reclamation, an additional study related to secondary meters began with USU extension. It was done simultaneously with the install but focused on the behavioral and social science side to metering. The project was to evaluate and survey the users to determine how this meter would be perceived and to receive and gather feedback from end users regarding the information that they were provided about their water usage and their general perceptions of a meter installed on their connection. USU assisted the District in this effort and in developing surveys and determining an appropriate usage volume for each parcel based on fly over areal mapping and thermal imaging. Their work was connected with the project during the 2011 and 2012 irrigation seasons and provided good direction for the District to fine tune the reporting and evaluation of water need and the report provided to what it is today (more detail is discussed in the data section). The survey work from USU has been completed, and their full report can be provided upon request. It is not attached to this report due to the length of their report which also included the surveys and focus group questions and the processes to do these types of human behavior studies.

In the spring of 2013 the District installed 40 additional meters in South Ogden, this time trying the Sensus iPerl. The iPerl needed to be put to the test to see if it would also meet the District's requirements for quality and data collection. As of the completion of the 2015 irrigation season, there were no issues to report about the function of the meter, the collection of the data or other problems that were encountered with testing their meter in this project. This meter is now added to the approved meter for installation and included in the specifications of meters suitable for our desired outcomes.

There is now reliable data for 1,057 metered connections for four consecutive irrigation years. Additional meters have been installed ongoing since that time bringing the total to 2,683 individual property meters. We continue to use the 1,057 meters with consecutive years of data for analysis but have started a second data set of different metered connections that have only been in the ground for a couple of years. That data is being analyzed and will be used as a comparison to the first study group to measure effectiveness across demographics and areas. The District has been tracking and monitoring usage and providing water use information to all users that have a meter on their connection. Data and additional details from Phases 1 and 2 of the project are discussed below in the data section of this report.

4. Meter Data and Analysis

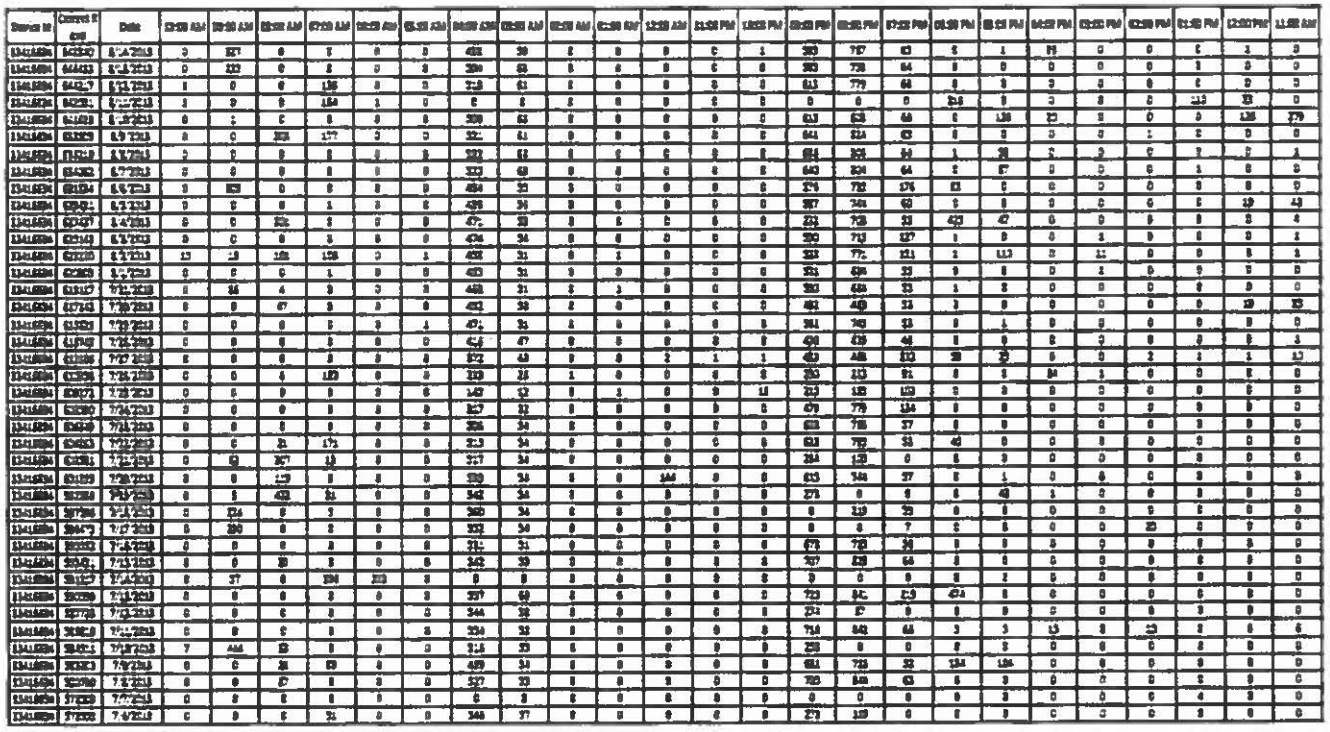
The data collected so far has been very informative and has helped the District continue to fine tune the information given to home owners. In addition, the data has provided the District the needed water usage information that has previously only been estimated and assumed due to the lack of detailed metering information. Current retail irrigation water is allocated at 3 acre-feet per acre and users are charged based on the allocated water to their parcel, not usage. Until meters were installed it was not known to what extent the end users stayed within their water allocation or to what extent they were exceeding what they pay for on individual basis. The overall water deliveries helped to estimate average residential use, but no specific detailed information was available. Several university studies and studies from water districts throughout the West have shown that the most effective way to reduce water usage is to have water use accountability and provide financial or other incentives to conserve water. The meters are beginning to give the District a more accurate and bigger picture on secondary water use which will be important for future policy decisions, future water development and how to proceed with conservation programs and water supply planning for the future.

The data is very important to the District in terms of total water delivered compared to water allocated for each parcel. Allocations have previously been determined by the parcel size (not irrigated area), but the allocation is now determined by parcel size minus 2,500 square feet for impermeable surfaces. The estimated need provided to homeowners through the metering project is based not on parcel size but area of landscape on that parcel. A map similar to those on Google maps is used and staff will zoom into that parcel and use GIS software to hand draw measurement lines around the parcel which excludes home, concrete (except sidewalk by street) and any other visual structures. The rest of the area is classified as landscape, and it is assumed the area is all turf and the estimated need is based on that area.

To effectively gather data and to determine how water is being used, it was decided that a system that can collect and store hourly data would be the most beneficial. The Itron 100W data logger with a radio read collection system was determined to meet this need since it is compatible with multiple meter manufacturers and can provide hourly data. Each unit, attached to the meter will gather and store hourly flow through the meter and keep up to 40 days of data in memory. After 40 days it is like a rolling log, the oldest data is replaced by new data. These 40 days of data logging provides the District the flexibility to read and gather the data each month with a few days to spare if a problem is noticed or if for some reason data collection is missed during normally scheduled read dates.

Hourly data has proven to be very effective for the District in the case of usage disputes. There have been a few cases where a user has called very concerned that the meter may be incorrectly reading usage. With a few direct questions about their normal watering habits, a comparison can be made to the hourly data, and verification made to see if what they claim matches the data collected. This process has helped to educate homeowners on usage and volume and has also been useful to find and correct a few meter problems where indeed a meter was not reading correctly or a leak in their system can be determined. Occasionally a site visit needs to be made and water run through a faucet into a bucket to compare and ensure meter accuracy. An example of hourly data in spreadsheet form is shown here below in Figure 5.

Figure 5. Example of Hourly Data Spreadsheet

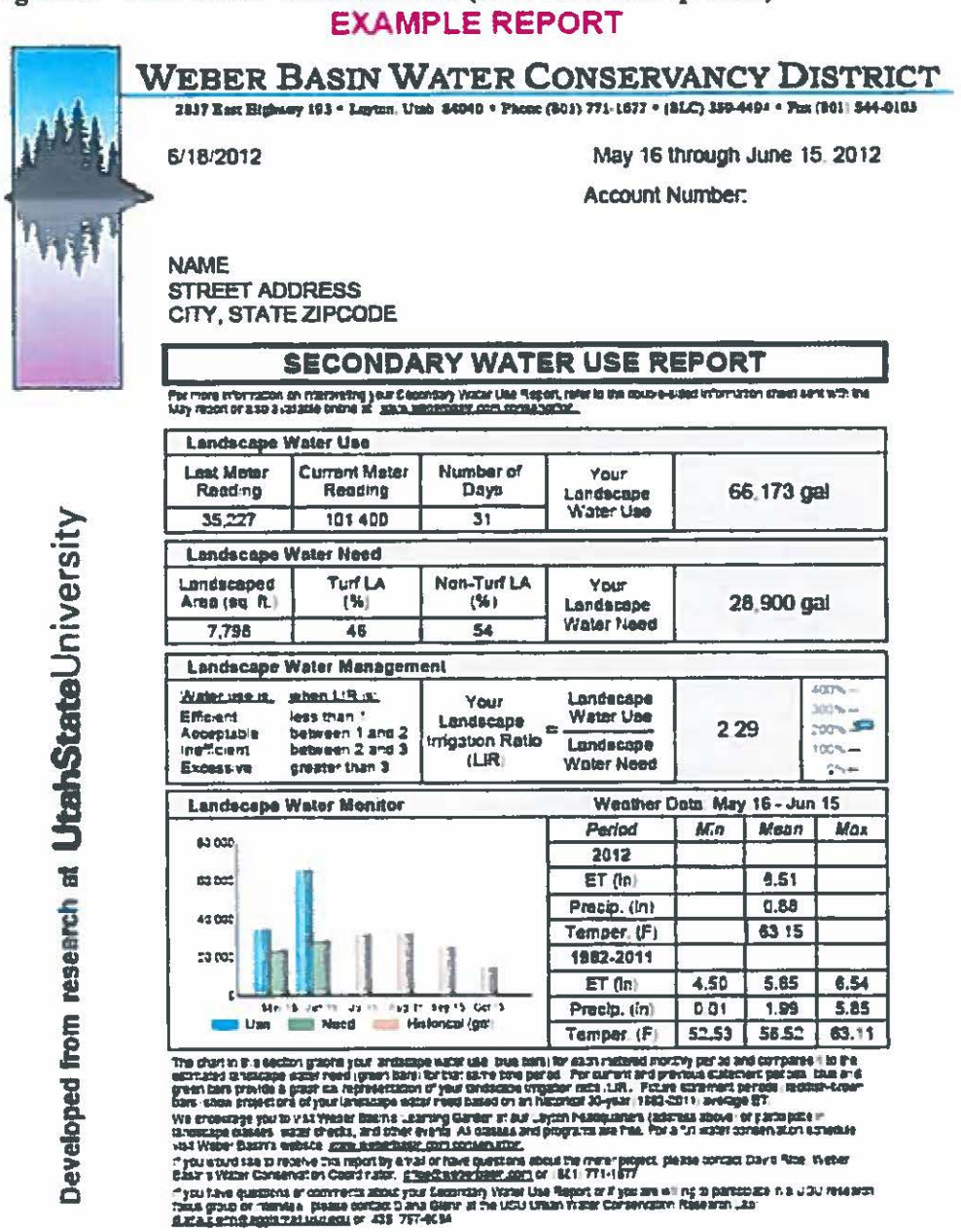


The data collected each month is brought back to the office and uploaded from raw form into a data base that was created and designed to be used for multiple features and format outputs and to assist the ease of creating water usage statements and data reports. The reading of the meters is broken into smaller manageable routes, usually by city boundaries to simplify and help manage the data and analysis. It takes staff about 12-16 hours to drive the entire District service area gathering the data (hourly data takes a little longer to gather than monthly values only) from the various metered areas. Since meters are being installed on new connections, there are small pockets of meters in areas all throughout the District's service area.

The data collected each month is analyzed and quality checked to ensure good data collection. A few reports in the Itron software are generated to assist in quality checking. Various tamper and code reports indicate if there was a problem on any meter. If a problem exists or is suspected, a site visit and manual check on the meter and the meter registry are done to see if a physical problem exists. The data is then used with District developed software to create user reports which are printed in color, a process which takes about 4 hours to complete with one printer. The processing done to have the documents ready for print is done overnight. It essentially creates a PDF file for each user statement which is then printed in batches. It should be mentioned that an e-mail option was provided to users, and there are approximately 300 statements that are not printed but generated in a digital format and e-mailed to users who have requested a paperless statement. An example of the first water use statement is shown in Figure

4 (page 12). New statements that the District is using are shown in Figures 6 and 7 below. Figure 6 below, shows the statement used in 2012 with the partnership between the District and USU, and Figure 7 shows the modifications and simplification that the District implemented at the beginning of 2013 and is still using to date. This format seems to be effective and simple enough for homeowners to understand and use effectively, modifications can and will be made as needed to ensure that the statement is providing the information a homeowner can use.

Figure 6. 2012 Meter Use Statement (USU Partnership Year)



EXAMPLE REPORT

WEBER BASIN WATER CONSERVANCY DISTRICT

2837 East Highway 193 • Layton, Utah 84040 • Phone (801) 771-1677 • (SLC) 359-4494 • Fax (801) 544-0103

6/18/2012

May 16 through June 15, 2012

Account Number:

NAME
STREET ADDRESS
CITY, STATE ZIPCODE

SECONDARY WATER USE REPORT

For more information on interpreting your Secondary Water Use Report, refer to the enclosed information sheet sent with the May report or also available online at www.weberbasin.com/conservation

Developed from research at UtahStateUniversity

Landscape Water Use

Last Meter Reading	Current Meter Reading	Number of Days	Your Landscape Water Use	66,173 gal
35,227	101,400	31		

Landscape Water Need

Landscaped Area (sq. ft.)	Turf LA (%)	Non-Turf LA (%)	Your Landscape Water Need	28,900 gal
7,798	46	54		

Landscape Water Management

Water use is:	when LIR is:
Efficient	less than 1
Acceptable	between 1 and 2
Inefficient	between 2 and 3
Excessive	greater than 3

Your Landscape Irrigation Ratio (LIR) = Landscape Water Use / Landscape Water Need = 2.29

Landscape Water Monitor

Weather Data: May 16 - Jun 15

Period	Min	Mean	Max
2012			
ET (in)		9.51	
Precip. (in)		0.88	
Temper. (F)		63.15	
1982-2011			
ET (in)	4.50	5.85	6.54
Precip. (in)	0.01	1.99	5.85
Temper. (F)	52.53	58.52	63.11

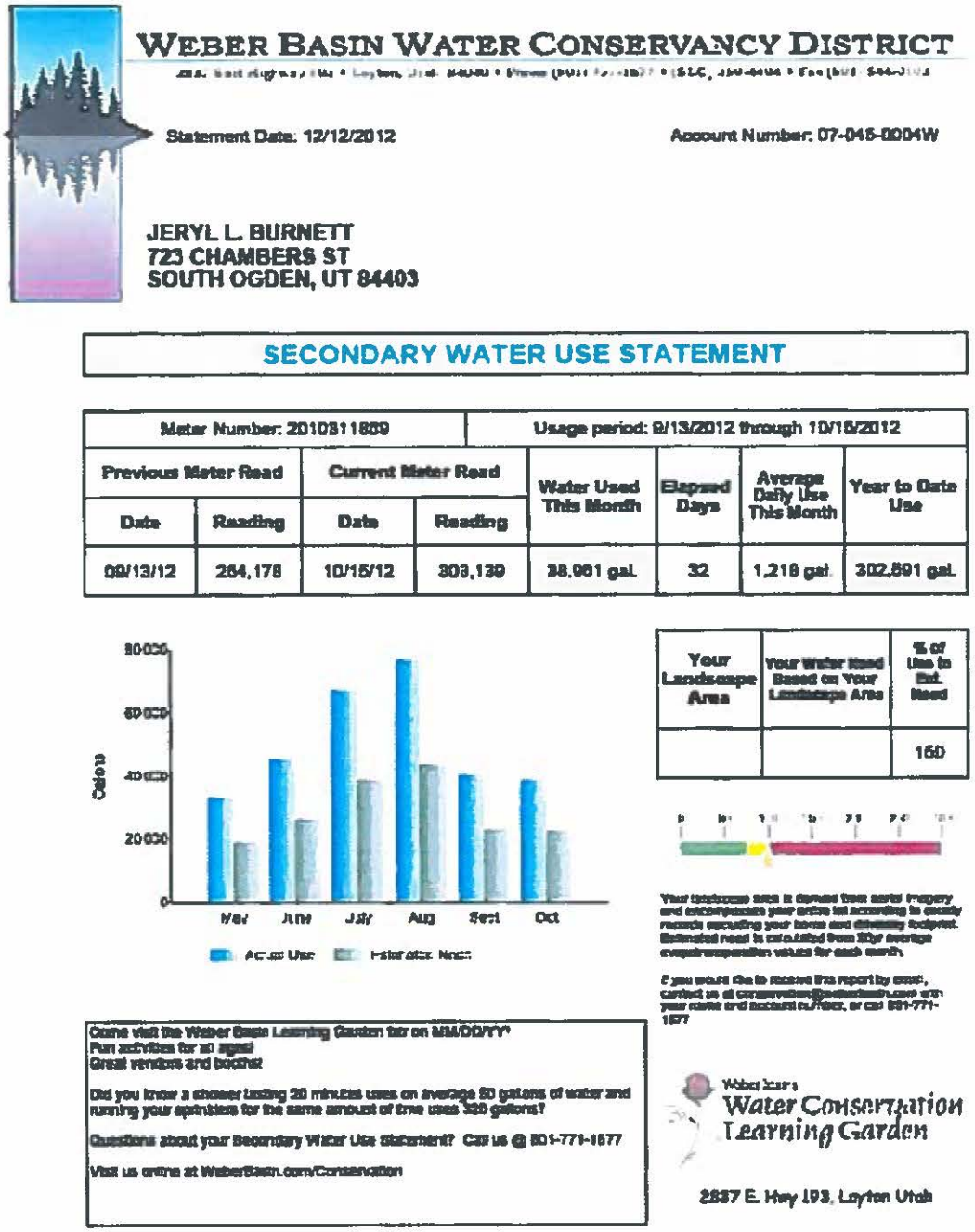
This chart in the section graphs your landscape water use (blue bars) for each metered monthly period and compares it to the estimated landscape water need (green bars) for that same time period. For current and previous statement periods, blue and green bars provide a graphical representation of your landscape irrigation ratio (LIR). Future statement periods (medium-brown bars) show projections of your landscape water need based on an historical 30-year (1982-2011) average ET.

We encourage you to visit Water Basin's Learning Garden at our Layton headquarters (address above) or participate in landscape classes, water checks, and other events. All classes and programs are free. For a full water conservation schedule visit Weber Basin's website: www.weberbasin.com/conservation

If you would like to receive this report by e-mail or have questions about the meter project, please contact Dave Rice, Water Smart's Water Conservation Coordinator, drice@weberbasin.com or (801) 771-1677.

If you have questions or comments about your Secondary Water Use Report or if you are willing to participate in a USU research focus group or interview, please contact D and Glenn at the USU Urban Water Conservation Research Lab at wcrl.engineering@gmail.com or 435-797-8634.

Figure 7. 2013 Sample User Statement Sent to Each Metered User



WEBER BASIN WATER CONSERVANCY DISTRICT

Statement Date: 12/12/2012

Account Number: 07-045-0004W

JERYL L. BURNETT
723 CHAMBERS ST
SOUTH OGDEN, UT 84403

SECONDARY WATER USE STATEMENT

Meter Number: 2010811889		Usage period: 9/13/2012 through 10/15/2012					
Previous Meter Read		Current Meter Read		Water Used This Month	Elapsed Days	Average Daily Use This Month	Year to Date Use
Date	Reading	Date	Reading				
09/13/12	264,178	10/15/12	303,139	38,961 gal.	32	1,218 gal.	302,891 gal.

Your Landscape Area	Your Water Used Based on Your Landscape Area	% of Use to Est. Need
		150

Your landscape area is derived from aerial imagery and encompasses your entire lot according to county records excluding your home and driveway footprint. Estimated need is calculated from 30yr average evapotranspiration values for each month.

If you would like to receive this report by email, contact us at conservation@weberbasin.com with your name and account number, or call 801-771-1677

Come visit the Weber Basin Learning Garden fair on MM/DD/YY!
Fun activities for all ages!
Great vendors and booths!

Did you know a shower lasting 20 minutes uses on average 50 gallons of water and running your sprinklers for the same amount of time uses 320 gallons?

Questions about your Secondary Water Use Statement? Call us @ 801-771-1677

Visit us online at WeberBasin.com/Conservation

Weber Basin
Water Conservation
Learning Garden

2837 E. Hwy 193, Layton Utah

There is a lot of information that can be gathered from the data. The data is comprehensive, and there is hourly usage information for every meter which can be used for different reports and analysis. Since there isn't data to compare usage prior to meter installation to the current metered usage, the information presented here may indicate some prior behavior but it is impossible to tell. However, water use is likely decreasing in part because of more awareness and the educational campaigns, more media attention and other programs that have been implemented over the last several years that have helped users recognize their over use and change their behaviors.

Tables 3A through 3D below show data from a metered study group in a comparison between 2012 and 2015. Total usage and number of users exceeding water allocation to their property for this group, which includes 1,057 meters, is tracked over the four year period. It should be noted that the data for each city pertaining to the percent of estimated need is not weighted but represents the average of the city as whole. The totals in Table 4 have been weighted toward individual use. In instances where a meter fails and is replaced, the data continues to be collected, but the meter may not have recorded some usage during the period that it failed. A small amount of data could have been lost with a few of these meters. However, the District found no significant change in the data with the brief outages, so no adjustments for dead meters water uses or losses has been made for this group.

In Table 4 below, the data is from the same study group but the numbers are presented in total form and not by city areas. The difference in use between years is significant, and it is very difficult to identify the exact reason why the usage is different between each year due to many factors, which may include weather differences. It is clear however that usage is declining. There were varied weather conditions, and the media emphasis during different years could have brought more awareness to general public use which influenced behavior and water reductions from year to year. The relatively dry conditions over the last 4 years have brought a lot of media attention to water supply and water usage.

Table 3A. 2012 Meter Data

Allocation Amounts	# of Properties	Alloc. (AF)	Estimated Need(AF)	Use (AF)	% of Alloc.	% of Need	Number Exceeding Allocation	Percent Exceeding Allocation
Washington Terrace	263	259.5	141.2	199.9	77.0	142	48	18%
South Ogden	292	251.9	155.0	228.6	91	148	81	28%
South Ogden Badgers	48	35.3	17.3	36.4	103	211	23	48%
South Weber	356	436.2	284.9	323.2	74	113	65	18%
South Ogden Ph. 2	98	86.8	64.0	85.8	99	134	43	44%
Totals	**1057**	**1069.7**	**662.2**	**874**	**83**	**136**	**260**	**25%**

Table 3B. 2013 Meter Data

Allocation Amounts	# of Properties	Alloc. (AF)	Estimated Need(AF)	Use (AF)	% of Alloc.	% of Need	Number Exceeding Allocation	Percent Exceeding Allocation
Washington Terrace	263	259.5	141.2	162	62	115	16	6%
South Ogden	292	251.9	155.0	172.8	69	111	42	14%
South Ogden Badgers	48	35.3	17.3	25.7	73	148	11	23%
South Weber	356	436.2	284.9	249.8	57	88	18	5%
South Ogden Ph. 2	98	86.8	64.0	65.1	75	102	17	17%
Totals	**1057**	**1069.7**	**662.2**	**675.3**	**64**	**105**	**104**	**10%**

Table 3C. 2014 Meter Data

Allocation Amounts	# of Properties	Alloc. (AF)	Estimated Need(AF)	Use (AF)	% of Alloc.	% of Need	Number Exceeding Allocation	Percent Exceeding Allocation
Washington Terrace	263	259.5	141.2	150.6	58	107	14	5%
South Ogden	292	251.9	155.0	162.2	64	105	43	15%
South Ogden Badgers	48	35.3	17.3	23.2	66	134	6	13%
South Weber	356	436.2	284.9	235.8	54	83	20	6%
South Ogden Ph. 2	98	86.8	64.0	58	67	91	10	10%
Totals	**1057**	**1069.7**	**662.2**	**629.9**	**60**	**98**	**93**	**9%**

Table 3D. 2015 Meter Data

Allocation Amounts	# of Properties	Alloc. (AF)	Estimated Need(AF)	Use (AF)	% of Alloc.	% of Need	Number Exceeding Allocation	Percent Exceeding Allocation
Washington Terrace	263	259.5	141.2	124.8	48	88	4	2%
South Ogden	292	251.9	155.0	131.7	52	85	14	5%
South Ogden Badgers	48	35.3	17.3	19.9	56	115	3	6%
South Weber	356	436.2	284.9	192.8	44	68	10	3%
South Ogden Ph. 2	98	86.8	64.0	46.5	54	73	4	4%
Totals	**1057**	**1069.7**	**662.2**	**515.5**	**49**	**80**	**35**	**3%**

For the data set above, 1,057 connections that have had consecutive data for 2012 -2015 were used in the comparisons over the four years. In Table 4 below, the same data set is used and shows clearly that the study group has reduced consumption and is now using much less than the traditional allocation of 3 acre feet per acre. Users complying with the volume given them as the estimated need shows a significant improvement from 145% in 2012 to just 90% in 2015. However, each year has a fairly large standard deviation, meaning that the range of usage is quite large but still converging from one year to the next. Similar tendencies can be found on the

percent of allocation used. This data seems conclusive in showing that having a meter and receiving usage information promotes accountability and will cause behavior changes in usage to occur when users are given a target.

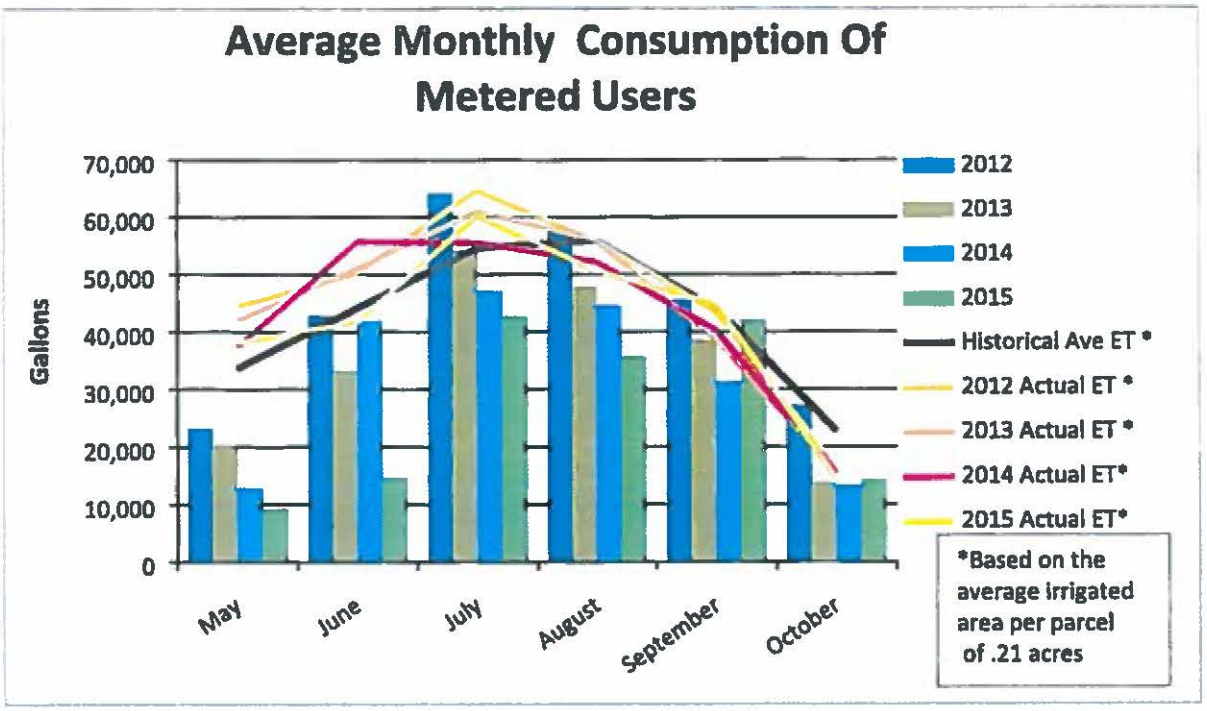
Table 4. 2012-2015 Water Use Comparison

	2012	2013	2014	2015
Used Gallons	284,912,371	220,146,962	205,346,968	168,066,551
Used AF	874	675.3	629.9	515.5
Gross Acreage	324.4	324.4	324.4	324.4
Used AF / Gross Acreage	2.69	2.08	1.94	1.59
Landscaped Area	225.3	225.3	225.3	225.3
Used AF/ Landscaped Area	3.9	3	2.8	2.3
Estimated Need (Gal)	215,886,557	215,886,557	215,886,557	215,886,557
Percentage Used / Est. Need (Weighted)	145.00%	117.40%	109.71%	90.24%
Average % Allocation Used (Weighted)	83.00%	64.00%	59.60%	50.18%
Average Allocation	1.0 AF	1.0 AF	1.0 AF	1.0 AF
Total Allocation	1074.0 AF	1074.0 AF	1074.0 AF	1074.0 AF

***This data includes 1,057 meters that have data for 2012, 2013, 2014, and 2015, with accurate landscape area. 2012 was adjusted to reflect an Oct. 1st shutdown.**

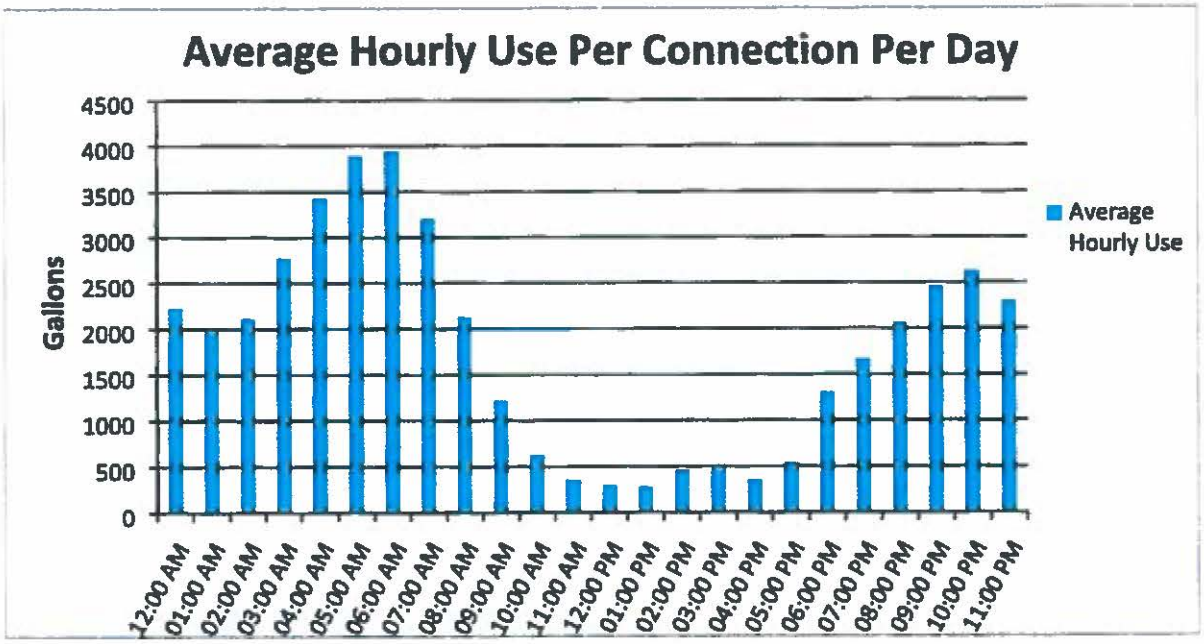
Chart 1 below illustrates the water use information shown in Table 4 in more of a graphical representation. It is clear the there is a reduction in use when comparing the four years of metered data. The historical average evapotranspiration (ETo) value is used in all reports to water users so that value is also shown here. The actual values are not much different from the historical, however for information purposes the actual ETo values are; 2012; 34.69 inches; 2013; 33.55 inches; 2014; 32.38 inches; and 2015; 31.54 inches. The historical 30 year average is 31.26 inches. This lower ET values from 2013 to 2015 could have and should have played some role in overall reduction in use over that same time. More analysis for weather will be done to determine its effect. This reduction in overall use does show that awareness and conservation messaging, even if it is drought messaging, does reach end users and they do respond. The continuation of data gathering, which will include figuring out a weather normalization process, will help the District know if sustainable changes are being made even when no drought messaging is present or there are no water restrictions in place during an irrigation year. The knowledge users have with their usage should help to sustain reasonable irrigation water use once habits are formed and compliance is achieved the first time.

Chart 1. 2012-2015 Average Monthly Consumption Comparison



To illustrate a significant conservation and policy messaging impact, Chart 2 below shows the average hourly use among all metered users. It is very clear that the policy of no watering between 10:00 am and 6:00 pm has been generally adopted among water users. There are still those that are not following the policy, but they are a small percentage of users. With meter data such as this, those who do not comply with policy or specific yearly messaging can be identified and encouraged to comply with incentives or disincentives. This is also a very useful chart in identifying system demand peaking which can facilitate the operation of the District facilities and distribution system that involves pumping, small reservoir levels, pipe sizing, etc.

Chart 2. Average Hourly Use in Gallons Among all Metered Water Users



All the information presented in this report is only a representation of the types of reports or analysis that can be created with metered secondary (landscape) water data. Another tool that can be used from the data collected by each meter is the creation of what is referred to as a heat map. In Figures 8, 9, 10 and 11 below, heat maps are used to show what can be done to visually show a good representation of how water use has changed in one of the metered areas during the four year time period. This kind of information makes it easy to quickly see the areas where water use may be an issue and may help in the future for conservation targeting programs.

These maps are useful tools in visually identifying patterns or problem spots where moderate or very high water use has occurred. These maps can be generated every month and used know where we might see over-usage later in the season due to early season use patterns or early season excessive use. The red indicates parcels where water use has exceeded the water allocation for that property. Yellow indicates use between 76% and 100% of allocation and green indicates water use that fits within allocations for the property at below 75%. These tools can assist the District in determining what factors may be part of water use trends. There could be soil issues, neighborhood expectations, issues within individual systems dealing with pressure causing poor sprinkler system uniformity and coverage. There could be various factors of demographics where the neighborhoods may consist of larger homes and naturally a higher income level where there is less concern over resources and more thought for curb appeal or there are high social pressures to ensure things look a certain way. It is likely that in the future the District will rely on usage data as illustrated in heat maps to use targeted programs to help educate users about proper water use for landscapes.

Figure 8. 2012 Heat Map for South Ogden Area

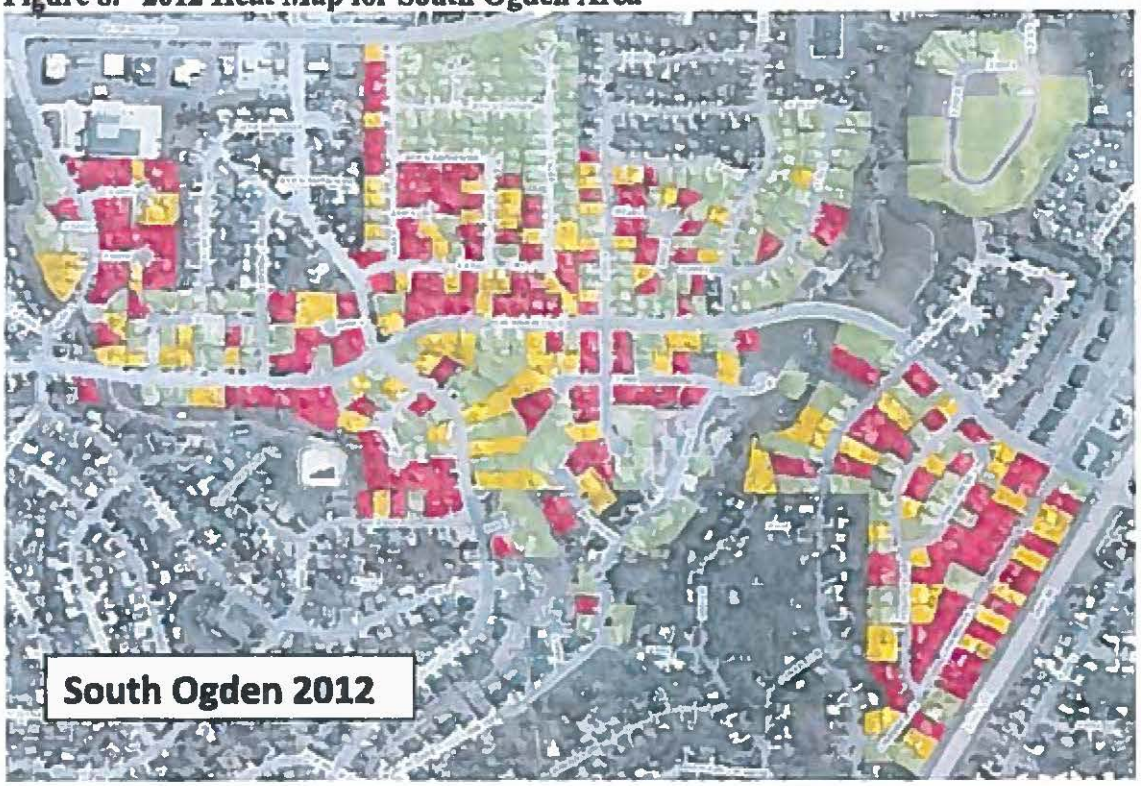


Figure 9. 2013 Heat Map for South Ogden Area

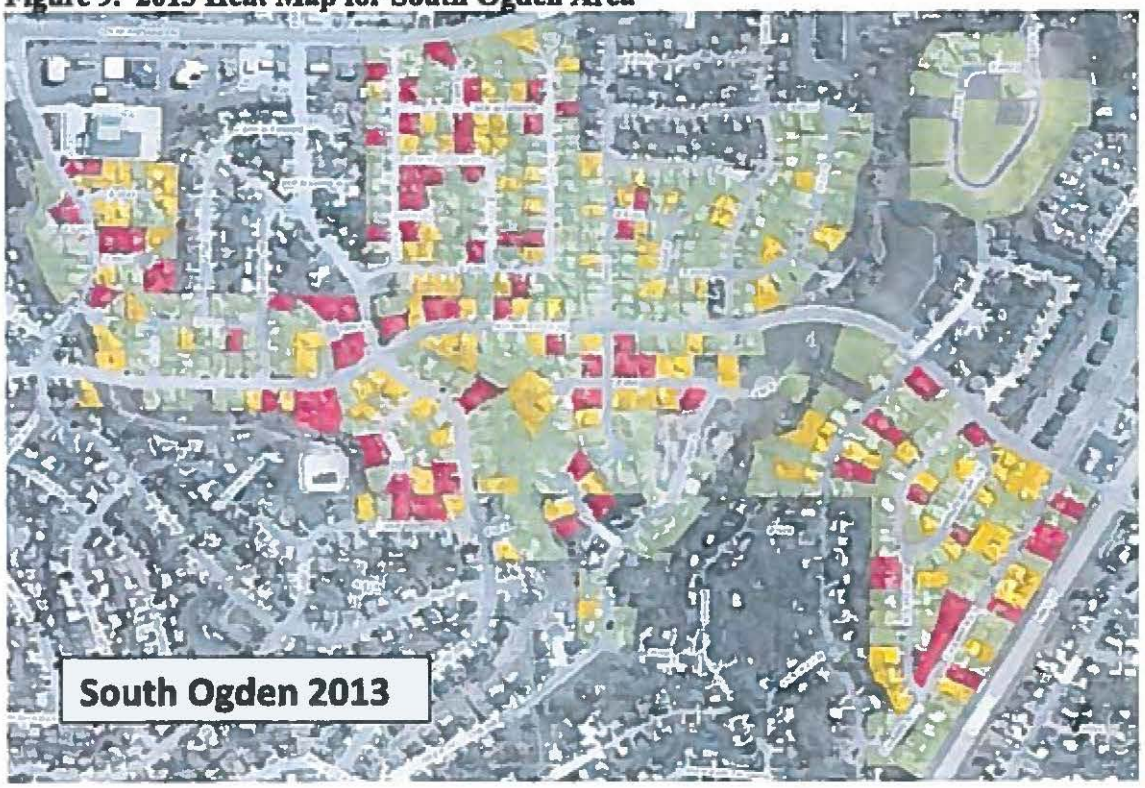


Figure 10. 2014 Heat Map for South Ogden Area

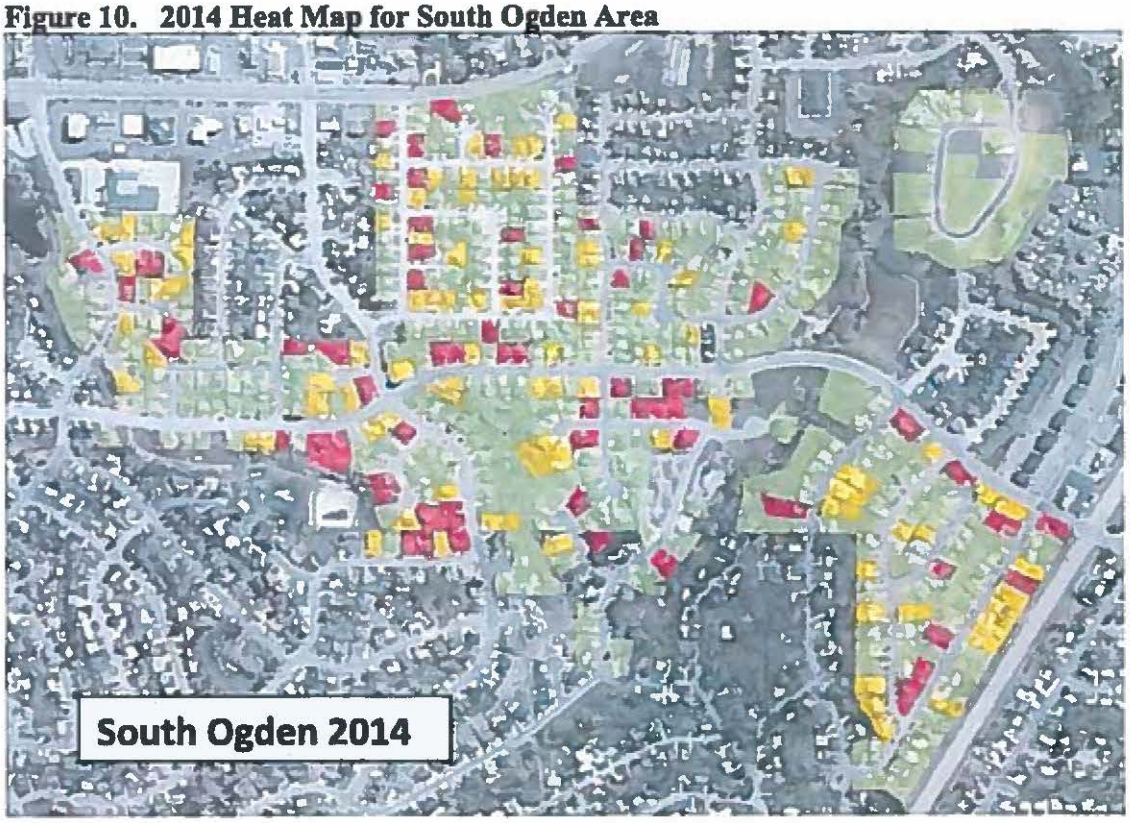
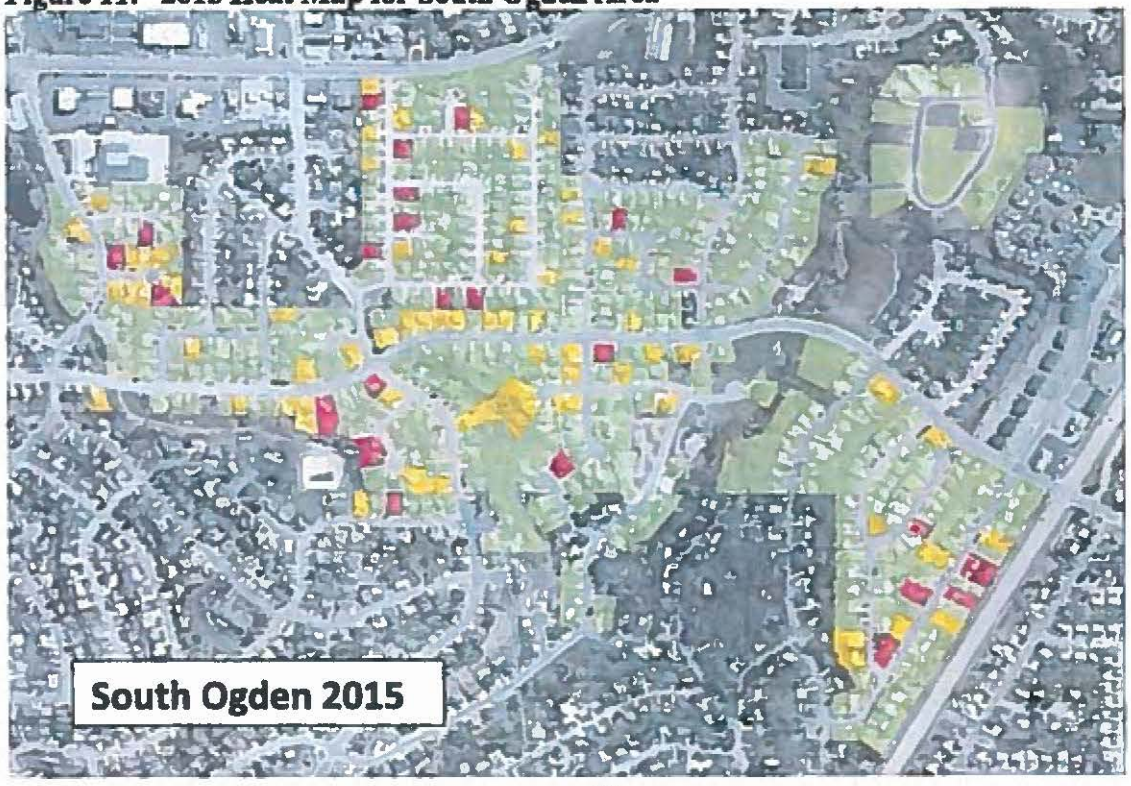


Figure 11. 2015 Heat Map for South Ogden Area



5. Customer Feedback and Perception and District Customer Service

The physical installation of meters is one piece of the overall project, easily defined by cost, time and exact specifications. The perception and response of District customers was somewhat unknown and very unpredictable at first, but as time passes, the feedback is becoming more positive in general. This section will focus on initial perception and the feedback gathered from District staff, the Langdon group and USU as they participated with us in the initial phases of meter installation.

As the District started the first large scale metering project, it was known there would be some learning along the way as well as adjustments. For the first project, it was determined to retain the Langdon Group as the District's PR representation and direct contact for public feedback, comment concern or other issues. The plan was established to go into the project with as much good public involvement, knowledge and input as possible to address, minimize, and resolve any concerns as the project progressed. The Langdon Group helped set up public open houses where maps, information about the meters, the install process and impacts could be discussed with concerned residents. They also assisted in the development of a meter website, creating a phone hotline, and the door to door information and questionnaire for those that would be receiving the meters. This was beneficial for the first round because of the newness of this type of project and the District's desire to remain in a positive light with its customers.

A few of the major concerns from customers that came immediately included the construction impacts, the potential for damaging established landscapes, and the fear of being charged high rates for secondary water once a meter was installed. An overarching question of why the District was doing this now and why their area was the first to be done came up in personal contacts with staff and the Langdon Group. All of these questions became the focus of the PR efforts to educate the public on conservation principles, user responsibility and accountability, and the assurance that water rates would not change in the near future until there was equity among all of Weber Basin's customers. The door to door contact and providing the recipients of the meter with good information and even a specific time window of when their meter would be installed (48 hour window) was helpful to ease anxiety and fear among many meter recipients.

Once the meter was installed and usage information began to be provided, the questions changed from the concern over installation to the concern over accuracy, and the looming question of how much they would be charged for going over their estimated need. Some of this has remained over the years, but for the most part is no longer a concern except for those that may be just receiving a new meter. There still remains a sense of skepticism and distrust among many of the metered customers mostly because they struggle to understand the volumes of water that a sprinkler system uses. For most, the only comparison they have is their indoor use which may range between 8-10,000 gallons a month for the average household compared to the 40,000 -80,000 gallons a month of sprinkler irrigation depending on parcel size. When they receive their outdoor usage information on their statements and the value is in the tens of thousands, many can't believe that they would use such large volumes of water. Their perception is that they have small yards and run their sprinklers for relatively short irrigation cycles. Meter data shows that typical usage would include cycles that run for 2 or more hours and use up to 3,000

gallons per cycle or more. Because of the huge range in yard sizes, an average has not been calculated, but usage could be calculated by creating a sort group for properties of similar size to get average use by lot size. This type of information could also be useful to homeowners to help them know where they fit compared to those that irrigate an area of similar size.

During the installation of Phase 1, the District also contracted with USU on a social science research study. The focus was to assess how best to interact with water users during these types of transitions to ensure desired efficiency outcomes and accountability results. One area of focus was on the development of a report to share meter data with the users in a format to provide understanding of landscape water needs and the appropriateness of their own use. It also included analyzing the perceptions and behaviors of water users in connection with the information that they would receive about their usage. The study was intended to span 2011 and 2012 with comparisons of use over those two years using the data collected but providing somewhat different information to evaluate what type of information works best. However, with the data gathering problems encountered during 2011, the data from that season was not able to be used. The study was altered and more emphasis was placed on the meter statement development and the use of surveying and talking to those that would be interested in sharing their perspectives related to having a meter and the information they were receiving. It essentially became more of the social science study that focused on behavior and perception rather than actual water use data.

The USU study and the development of the secondary water use report provided users their monthly consumption value, a landscape water need based on area imagery (size of their lot and landscape area), the evapotranspiration and weather data for the same period, and how they did in comparison to how much their need was (based on lot size and weather info). No hourly irrigation information was provided to water users; however if they called to discuss their use and had concerns, their hourly data was available and could be discussed and explained over the phone. An example of the imagery used in 2013 with the digitization of landscape area is shown below in Figure 12. This process allows the District to get a much better idea of need and to help homeowners understand their need and be able to get water use to appropriately match that need.

Figure 12. Digitization for Landscape Areas on Metered Parcels House, Driveway and Other Structures Not Part of Irrigation Need

USU also conducted surveys and did a couple focus groups to gather feedback about the project and meter customer comfort level with the information being provided. The majority of responses echoed the initial sentiment in that they did not agree with what they were being told concerning their consumption and they did not think the estimates provided were adequate to maintain their property. There were those that loved what was being done and loved the information and even desired more technical and detailed reports, but this group was in the minority of those surveyed. Because of the length of the report and findings, a full copy of the USU report on their study will be made available upon request. The underlying issue that seemed to surface is that the general public using secondary water believe they are being conservative and efficient, but when given actual data on their usage they are shocked and disbelieve that they are high users. Many feel like they cannot reduce what they use without risk of losing the quality of their landscape, especially regarding green lawns.

The District now has several additional years of data since the USU and Langdon Group contracts. The District is still faced with ongoing public interaction; however, the metering has progressed smoothly with fewer and fewer concerns from metered customers. There is still the typical response during the first year on any metered connection, but most of the other items and concerns with metering are addressed smoothly with very little problem. The District has maintained positive customer service and support in every occasion when staff interacts with customers. These interactions have been through phone conversation, meter reading contact and maintenance interactions or by metered customers participating in other conservation programs such as the water check, free landscape classes or Learning Garden events. Each of these provides an opportunity for staff to be positive, help resolve questions or concerns and where needed, fix a problem.

Since the metering began, there have been new meters added on an ongoing basis. The information is entered into the database, and there are a couple of data sets that are now being managed so that the District will be able to make comparisons between different demographics of water users in different locations. The District will continue to keep study groups separated by when the meter was installed so that the comparisons can be consistent within that study group. The District will also continue to plan meter projects to install as many meters as possible each year as far as the budget allows.

Throughout the irrigation season many calls are fielded regarding water usage and the meters. All calls were fielded by District staff. Information and the data base technology created by District staff have allowed the tracking of calls, services, and any District interaction to a specific address. Not every call was logged into this system during the year, but it is anticipated that in the future, all types of calls can be logged then reports generated with the data from those calls which could assist staff with specific reports for each type of situation. It should be noted that the 2013 year was a good learning year for the District. Modifications were made to the user reports, the process for determining landscape area was simplified with adjustments being made to the calculation for the users "estimated need", and it became very obvious that the need for hourly data is critical in helping users understand and learn how to be more efficient and to resolve customer disputes over the accuracy of the meter reads. With just monthly values, there would be no way to resolve the issue of how often and how long they water and the determination if a meter needs to be tested for accuracy.

During the last four years of metering, District staff conducted all the relevant work related to the meter project. No outside consulting or other agreements were in place for the collection or analysis of meter user data. The fielding of calls and discussing of hourly data with each of water user was handled by staff as were the personal sight visits and any physical meter issues. Most of the calls are handled with a quick look at the data, and for the first couple years, every call was logged with date and time and the type of call and issues resolved. As the District continues to meter and now has a program in place for project management, all calls can now be logged and tracked for better recal of what issues occurred and how they were resolved. Calls with various questions or complaints mostly centered on the accuracy of the read data and the legitimacy of the estimated need that was being provided to them for "efficient use". This is not the total number of calls taken but those that were historically logged. It is estimated that the number of calls were at a minimum double the logged volume. Many of the calls were not logged because of the complexity of the water year and the call concerns that may or may not have dealt directly with the meter and the data. It should be noted that during the last four years there were water restrictions due to low water storage levels and warmer, drier conditions. During this time, door hangers were used as a means to reinforce the water use statements for those that were exceeding their estimated need by more than 200% in any given month. There have been fewer of these individuals each year. A specific message of water use being high on a bright orange "Water Violation" tag really got the attention of the high water users and resulted in many calls. The majority of the calls that were taken about water use and meter data resulted from the door hangers.

As the years have passed, adjustments have been made and much has been learned. In 2013, as each month passed it was apparent that many would exceed their allocation early in the season. It was determined that the highest of users would receive a personal visit by staff. The purpose of these visits was to inform them of the excessive use, show them their data and help where possible on scheduling or on providing other conservation education or services. Some of these visits resulted in staff helping them with their timers, or just explaining the use, which changed usage behaviors the following month. Most of these visits were accepted very well while a few did not appreciate a personal visit and basically accosted staff about how the meter is ridiculous, not accurate and an invasion to their rights or personal privacy. The concept of "big brother is watching" is fairly prevalent among metered users. This year of visiting did provide some experience about how people are reacting. Site visits are made each year as need is determined, but not for every parcel exceeding allocation. The District has found that there are those that refuse to accept and give any heed to the information and personal education provided relating to their water consumption for their yards, and they continue to be excessively high users, some exceeding their estimated need by over 300% and exceeding their allocation, sometimes by July of the irrigation season. These indifferent and high users are actually very few compared to most users.

There are many things that have been learned during the past 4 years of metering secondary connections on a larger scale. The following bullet points are some of the most significant.

- Customer service and information are critically important. Doing a meter project without good information will create doubt and mistrust with customers (which naturally exists but can be managed and turned into positive if treated properly).

- When metering secondary water, there will be many users that doubt the accuracy of the meter and the value of the information provided. Continue in a positive way to help the users learn that what you are providing is accurate. Internal checks can help make sure you are correct and acknowledge to them when errors or mistakes happen.
- There is about a 1% failure rate for the meter or other physical components. Any metering program has to plan for some bad meters and their quick replacement. Data adjustments when switching meters to provide continual accurate information is vital. Sometimes the customer will help to identify the issue. The technology continues to improve and if a fixed network is use, failures can be identified in any hour time window.
- It is difficult to determine what is most effective and what is minimally effective in doing these programs in connection with other conservation programs because there are always multiple actions and programs taking place at the same time. To isolate one thing and try to determine effectiveness is not a reality, hence you continue with the things that seem to be working until proven otherwise through experience.
- There may be some users that no matter how much information and education you provide, they will continue to use what they feel is right and will not comply with their proper use or stay within their allocation. Financial incentives/disincentives may be the only way to reach this group of users.
- The meters have shown both in numbers and visually on GIS mapping that the majority of people are responsible users and will respond to messaging and education when it is provided. Most people want to be responsible but they just haven't known how much water they have actually been wasting until they get a meter and begin to use the data to alter behavior patterns. The key is that most people will not give up landscape quality to save water. If they can achieve both, they are willing and able to do their part.
- Hourly data is a must to help users identify over-use in scheduling and in enforcing time of day or other water use restrictions. Without it, you have no basis to know if what you are providing is correct, and it is their word against yours if a dispute arises.
- A multifaceted approach is good to provide many means of understanding and tools for water users to interpret and use to their best abilities. Technology and many other tools are available, but keeping it simple and clear is the most useful for the general end user.

6. Recommendations

The experience Weber Basin has had in metering has provided new perspectives and insight into what it is going to take to meter secondary water users across the District's entire service area. The costs are very high, and the staff needs to read meters, maintain and replace meters, track data, deal with customer calls and inquiries and generate statements will increase over time as the number of metered users grows. There has been valuable data gained in relation to usage and the perspective of users in how they use their water and even the insight of

how some customers view it as their right to use water how and when they please. The efforts to educate will be ongoing as long as there continues to be the landscape style and level of expectation that we currently have for our home landscapes. The culture of the Weber Basin Service area has been up until now, a culture of cheap, all you can use water with little or no accountability. Changing this mindset will not come over night, but with the help of actual numbers for their consumption, it will make it easier for the District to change individual user behavior when all users have a meter.

It is the recommendation of District staff that the metering of users continues and if possible accelerates to accomplish the goal of all users being metered in a reasonable time table. If the current rate of installation were to continue, it would likely be more than 30 years before all of the District's existing connections are metered. The new connections won't be of concern as they will all be metered as growth happens. However, the meters are only rated to last for 20 years (battery life). The point will come where full meter replacement will need to occur before all secondary users have a meter. With that in mind, it would be recommended to budget for and seek additional grant funds to accelerate the meter installations to ensure that all users are metered before meter replacement would have to start.

There is a high conservation value in metering to gain valuable water use data and provide the means for users to begin to be accountable for their water use. As population continues to grow and water supplies remain the same with the compounding effect of drought cycles, metering will play a key role in future water supply and management. Metering provides a tool for tracking use, improving efficiency, determining problems and leaks, and if needed, the ability to increase water rates in a tiered structure to penalize those that will not otherwise use their water responsibly. There may be a need to have the high users pay for future water supply that will be costly to develop but driven by the high use and demand of irresponsible users. The meters can rightly justify changes in rates for high users as well as the need for future water supply due to responsible use among the majority as there will be an increasing need for additional water supply and development.

The District has determined that the Sensus IPerl meter is the main meter to be used on a one inch connection. But as time passes on, new and better products and technology may dictate something else. The IPerl has little to no effect on pressure and will meet the needs for data storage and collection currently desired. There are many types of data gathering systems as well. From touch pads on meter lids to higher end network systems where a data logger sends data to collectors which route that data to a computer in the office for instant access to data. We have chosen to use the Itron drive-by system which gathers that data from the data loggers on each meter as a staff member drives through the various neighborhoods. Over time and with the use of meters in the entire service area, it will likely become a necessity for the use of and the cost associated with installing a network type system. This will only become needed as the volume of meters dictates the cost justification in time, fuel and other component cost savings.

One additional item of note and recommendation is the reminder that every type of reading program needs software to get that data into the desired needed format to be useful. Whether it is billing software or other type of database software, it is important that this be an item of discussion for any metering program. The data is useless without the proper software to make the data useful and in the proper format. When beginning this process, the District did not

realize that a separate billing or report generating software would be needed. The District was fortunate enough to have a very good programmer on staff that was able to write code and was able to create a custom program for taking the data and converting it into a useable format for a statement for each water user and for other types or reports that are desired.

7. Conclusion

In conclusion, the metering of secondary water has many challenges and certainly costs. The District as the entity is charged with providing adequate water supply with increased demands and increased need for conservation and user accountability. That burden for water accountability should naturally be shared with the users of the water. The meter and the data gathered from metered connections on water use is the very tool which can bring knowledge to each water user and help them to become more accountable for the water they use. Metering essentially becomes a large scale and significant water supply project, with the potential of reducing water by 1 acre foot per acre per acre of landscaped area.

There may need to be policy changes and there will certainly be more education and programming to teach people about efficient and proper use of water in the landscape. In the future there may need to be changes made regarding the cost for secondary water and how that breakdown would be made and how billing for secondary water will be collected. Overall, the metering has been very successful. The data collected is invaluable and will provide the necessary information for the District to make wise policy decisions. Current water supply can be managed more effectively and future water supply projects and the timing of those projects to meet all water demands can be planned and constructed to meet real and projected need in a more efficient and effective manner.