WaterSMART: Water and Energy Efficiency Grant for FY2018
Funding Opportunity Announcement No. BOR-DO-18-F006
Funding Group II

Pressure Irrigation Metering Project

Prepared for:

Draper Irrigation Company

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May 7, 2018

TABLE OF CONTENTS

TABLE OF CONTENTS
(continued)

LIST OF TABLES

LIST OF FIGURES

TABLE OF CONTENTS
(continued)

LIST OF APPENDICES

EXECUTIVE SUMMARY

Date:	May 7, 2018
Applicant:	Draper Irrigation Company
City, County, State:	Draper City, Salt Lake County, Utah
Project Name:	Pressure Irrigation Metering Project
Project Length:	3 years (from grant award)
Estimated Completion Date:	September 15, 2021

PROJECT SUMMARY

Draper Irrigation Company (DIC) is applying for funding through the Bureau of Reclamation's WaterSMART Grants: Water and Energy Efficiency Grants for Fiscal Year 2018 funding Opportunity Announcement No. BOR-DO-18-F006. DIC is applying for $1,000,000 in federal funding assistance for Federal Funding Group II (with an owner contribution of $3,134,924), to install 2,063 new 1-inch water meters for existing unmetered irrigation connections. DIC will use the funds to purchase and install water meters and appurtenances, with a goal to increase water conservation and water use efficiency by providing water consumption data to Draper Irrigation Company and its customers and implement billing rates that discourage overwatering. The project will provide benefits under the following categories:

- **Water Conservation** – Improve water conservation by educating customers on actual water use; improving leak detection; and implementing usage-based billing. DIC anticipates the project will reduce water use by approximately 1,092 ac-ft per year.
- **Energy-Water Nexus** – Reduced water use through conservation produces a linear reduction in energy use associated with conveyance and pumping requirements.

The project is not located on a Federal facility.

TECHNICAL PROPOSAL FOR THE PRESSURE IRRIGATION METERING PROJECT

BACKGROUND

Draper Irrigation Company (DIC) is a non-profit shareholder-owned company that provides culinary and pressure irrigation water to customers primarily within Draper City, Utah (see Figure 1-1). DIC is a public water supplier with municipal water rights.

A primary goal of DIC's PI system is to reduce the burden on the culinary water system by replacing high-quality drinking water with lesser-quality water primarily for irrigation of municipal, residential, and commercial landscaping. The PI system also provides service to some small-scale agricultural operations. The PI system obtains water from the DIC-owned sources shown in Table 1:

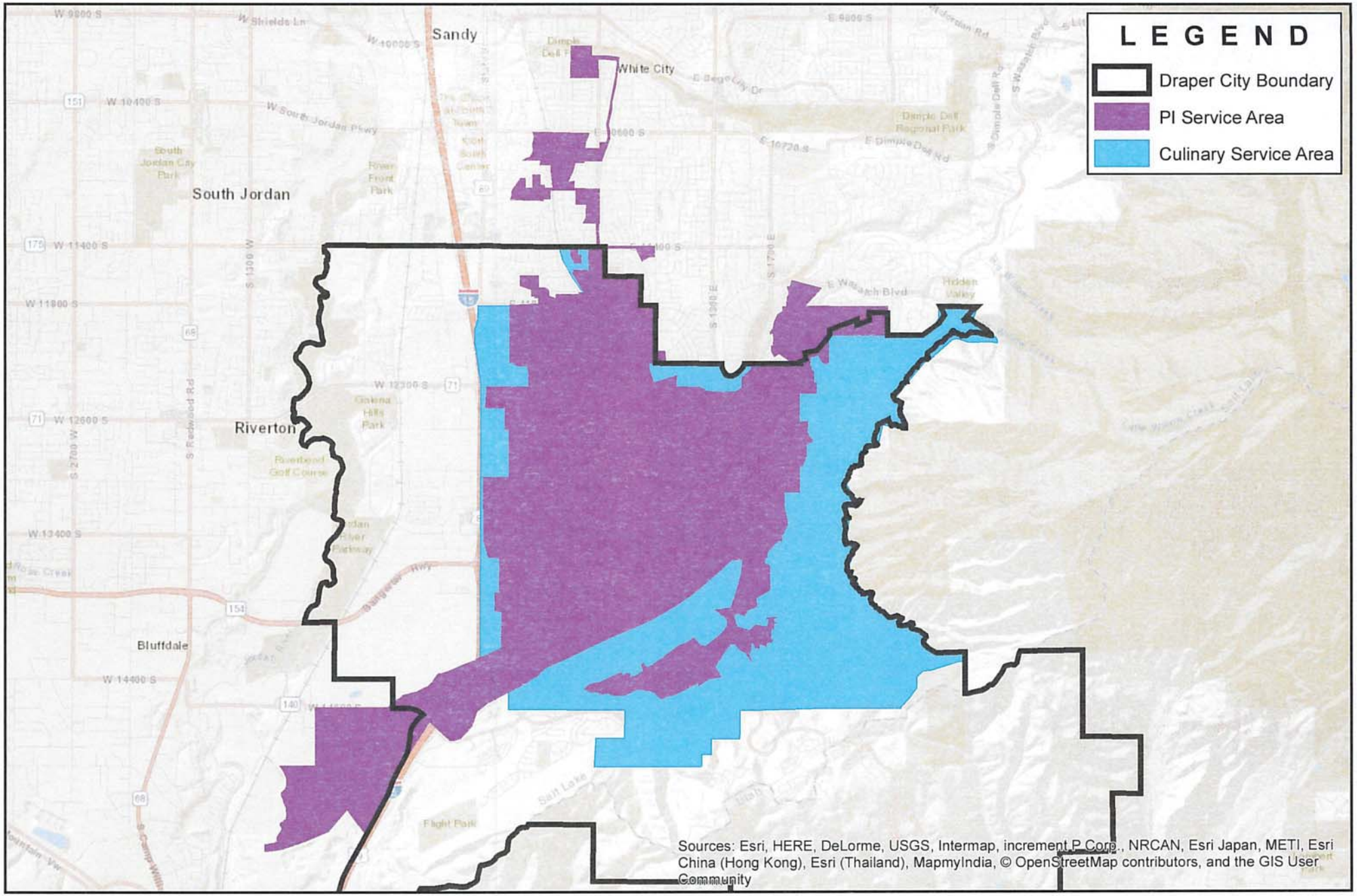
Table 1
Pressure Irrigation Water Sources

Water Right Number	Source	Max Volume (af/yr)
57-3410[1]	Corner Canyon	801.46
57-10180	Jordan River	4,725.85
57-10181		
57-10269		
57-10191[1]	Mountain Streams (& Utah Lake)	6,342.44
57-443[1]	Mountain Streams	
	Water Right Total[2]	**4,725.85**
Non-Water Right Sources (# shares)	**Source**	**Max Volume (af/yr)**
259.75	East Jordan Canal (Utah Lake)	1,257.2
	Non-Water Right Total	**1,257.2**

[1]Sources used for both culinary and pressure irrigation systems.
[2]Dual system sources were not counted in total pressure irrigation rights as they were already fully utilized under the culinary system.

Most of the water comes from Corner Canyon drainage and other mountain runoff. However, during drier years with less snowmelt, DIC uses canal water heavily to offset the peak summer usage. The PI system consists of a large capacity booster station, two sedimentation basins, an open air storage reservoir, and approximately 96 miles of distribution piping. The system has two pressure zones at elevations ranging from 4,420 feet and 4,660 feet above sea level.

The PI source categories are:



BOWEN COLLINS & ASSOCIATES
Celebrating 20 Years

CLIENT
DRAPER IRRIGATION COMPANY

PROJECT
2018 WATER RIGHTS MASTER PLAN

CULINARY AND PI SERVICE BOUNDARIES

NORTH:

SCALE: 0 3,000 6,000 Feet

FIGURE NO.
1-1

P:\Water Pro\093-17-05 Water Rights Plan\2.0 Design Phase\2.9 GIS\WaterPro System.mxd jbean 3/28/2018

Corner Canyon: The Corner Canyon drainage, located south and east of Draper City in the Traverse Ridge Mountain Range, receives water primarily from snowmelt in the lower elevations of Corner Canyon predominantly in spring and early summer. Small springs in the Corner Canyon drainage maintain a base flow throughout the year.

Other mountain runoff: The system diverts water from several canyons east of Sandy City into a collection system that pipes it to a common point near the DIC culinary water treatment plant. This mountain runoff water consists of a combination of snowmelt water (generally between April and June) and spring water (a smaller but relatively constant year-round flow). There is typically sufficient flow to supply water to the PI system in the spring, but not usually during the summer months. Much of the mountain water is diverted into DIC's culinary water treatment plant or Jordan Valley Water Conservancy District (JVWCD) culinary water treatment plant for culinary use. The PI system receives some water from mountain runoff in a typical year, including water not used in either of the water treatment plants, as well as backwash water and sludge decant water from the treatment plant operation.

Utah Lake: Water flows out of Utah Lake into the Jordan River, where the Turner Dam Diversion just north of the Jordan Narrows diverts some water into the East Jordan Canal. Water gravity flows north and east into Draper City, where a pump station at approximately 13520 South and Fort Street pumps the water into the storage reservoir that feeds into the system. This source provides most of the water used in the PI system, especially during the summer months.

DIC currently serves 3,175 PI customers (Appendix A shows a breakdown of existing PI connections). Approximately 603 residential customers and approximately 119 commercial customers are metered. Approximately 2,453 PI connections are not currently metered. There is an ongoing construction project to install 395 PI meters (100 of which have been installed). Once that project is completed in 2019, there will be 2,158 unmetered connections in DIC's PI system.

DIC's current PI rate structure for unmetered customers depends on the size of the lot and does not account for the actual amount of water used. This type of system typically leads to overuse and does hold customers accountable for their water use. The metered customers are on a tiered rate structure that discourages overuse of water.

In 2017, 4,446 acre-ft of water entered the PI system. The average residential PI demand over the past five years was 5,378 acre-feet per year (ac-ft/yr) as shown in Table 2. DIC's 2018 Water Rights Master Plan projects that PI water demand will increase to 7,813 ac-ft/year as the burden of outdoor irrigation shifts from the culinary system to the PI system.

Table 2
Historic PI System Total Source Production

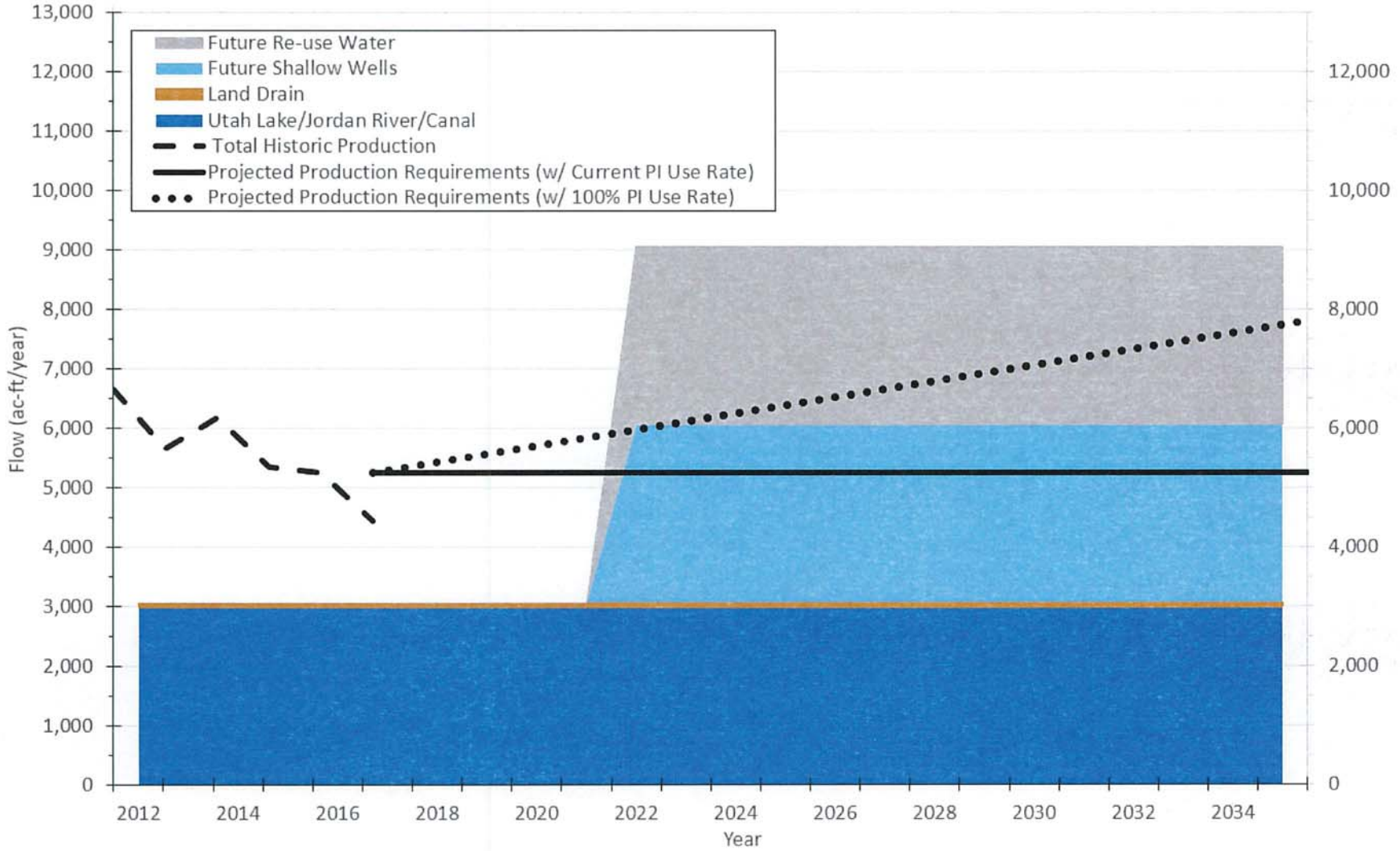
Year	Production (ac-ft)
2013	5,659
2014[1]	6,170
2015	5,356
2016	5,258
2017	4,446
Average	**5,378**

[1]Corner Canyon flow meter malfunctioned during 2014 and the flow reported is an estimate of the actual flow based on comparison to other sources

Figure 1-2 (from DIC's 2018 Water Rights Master Plan) shows the general PI water supply for DIC during dry years when surface waters from local canyons run low. Figure 1-2 also indicates the projected water demands through 2035 (build-out) with current PI use rates and with 100% PI use rates. The two PI use rates are for two scenarios: 1) if the PI system provides 100% of the outdoor use in areas where the culinary and PI systems overlap, and 2) if the existing PI use rate for outdoor watering is maintained (i.e., some customers use culinary water for outdoor use inside the PI system service area). DIC has a goal to have 100% of the outdoor watering provided by the PI system in areas where the culinary and PI services overlap.

In either case, DIC is expected to have insufficient existing reliable water sources to meet production requirements during dry years by at least approximately 2,188 ac-ft/year. DIC is currently investigating the two future projects shown in Figure 1-2 for their feasibility to resolve the existing water deficit. Even if feasible, DIC estimates that both projects are a minimum of 5 years from construction.

Figure 1-2
Culinary Annual Production Requirements and Reliable Supply



[1]Sources used for both culinary and pressure irrigation systems are not shown as they are anticipated to be fully utilized by the culinary system.

DIC has a contract with Jordan Valley Water Conservancy District (JVWCD), which is affiliated with the Central Utah Project (CUP), a Bureau of Reclamation project. CUP funding helped to develop the DIC PI system, which replaced an old flood irrigation system. DIC has also worked directly with the Bureau of Reclamation, receiving a WaterSMART grant for work on the Bear Canyon Intake Structure. This intake structure, which was completed in November 2012, saved an estimated 672 acre-feet of water per year.

In addition, DIC has received a WaterSMART grant from the Bureau of Reclamation for installation of 395 PI water meters in fiscal year 2017. DIC anticipates completion of this project in 2019.

PROJECT LOCATION

This project will occur at 2,063 locations throughout DIC's pressure irrigation (PI) system service boundaries within Salt Lake County, Utah. More specifically the PI system is located within portions of Draper City, Sandy City, and Bluffdale City, Utah as shown on Figure 1-1.

TECHNICAL PROJECT DESCRIPTION

Only 722 of the 3,175 existing connections to DIC's PI system are metered. This project will install 2,063 1-inch PI meters to provide almost complete metering of DIC's entire PI system. The installation of the meters is planned to be split evenly over a three-year period. A proposed phased project schedule is included in Appendix B. The PI Metering project will modify PI service laterals by constructing a meter box with a setter and installing a new meter for the existing unmetered PI connections. Cellular endpoint units along with each meter will allow automatic remote meter reading and provide nearly real-time flow data monitoring for DIC's and the customer's use.

One primary purpose of the new meter and cell point system is to better track water system demands in nearly real time to measure effects of conservation measures. By tracking nearly real time data of water system demands, DIC can educate customers regarding water use, detect leaks, and identify other areas where additional conservation may be possible. The cellular endpoint system can improve the following areas of conservation:

- **Time of Day Audits –** Evapotranspiration between 10:00 a.m. and 6:00 p.m. can waste up to 50 percent of irrigation water. DIC can monitor time of day irrigation usage to determine if time of day restrictions are needed. The system can alert DIC when irrigation occurs during this period.
- **Leak Alerts –** One very important benefit of improved data collection is the ability to identify customer leaks. The cellular endpoint system can save water for DIC and money for its customers. The EPA estimates that the average household will have leaks totaling over 10,000 gallons of water a year.[1] This represents a significant area of potential conservation.

[1] http://www.epa.gov/WaterSense/pubs/fixleak.html

- **Water Audits** –The new system makes it possible to identify the largest users of water on a monthly basis as well as peak instantaneous demand basis. Additionally, DIC will be able to identify the highest users by peak day and peak hour. This may help identify users with less efficient fixtures or sprinkler systems.
- **Expanded Public Education** – The cellular endpoint system further extends the potential for public education by creating an online portal where customers can view their own water use. With some smart meter billing systems, it is possible for customers to compare water use to their nearest neighbors. A large-scale field research project completed by Georgia State University identified savings of up to 5 percent when customers were able to compare their use with those of others[2]. Users may also request water audits through the "Slow the Flow" conservation campaign.
- **Drought and Water Emergency Measures** – In addition to its efforts to achieve long-term water use reductions through conservation, DIC could implement a plan for reducing water consumption in times of drought or other water emergency (such as a line break). The cellular endpoint system can quickly identify large water users in the case of a water emergency and aid in enforcing conservation restrictions if necessary.

EVALUATION CRITERIA

Evaluation Criterion A: Quantifiable Water Savings (30 Points)

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.

Municipal metering of currently unmetered PI connections will reduce water usage by 33% per connection. DIC estimated the combined water savings for all 2,063 water meters at 1,092 ac-ft/year. DIC's 5-year average annual irrigation water production for the entire PI system is 5,378 ac-ft of water per year.

Based on DIC's average annual irrigation water production, this project will result in a 20.3 percent annual water conservation rate as calculated below.

$$\frac{\text{Water Savings} = 1{,}092 \text{ ac} - \text{ft/yr}}{\text{Total PI Water Production} = 5{,}378 \text{ ac} - \text{ft/yr}} = 20.3\%$$

Subcriterion A (2) 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.*

The project will include installation of 1-inch water meters for 2,063 existing unmetered PI customers. Table 3 lists the customer categories and associated lot sizes.

[2] Paul Ferraro & Michael Price, 2011. "Using Non-Pecuniary Strategies to Influence Behavior: Evidence from a Large Scale Field Experiment," NBER Working Papers 17189, National Bureau of Economic Research, Inc.

Table 3
Summary of Irrigated Area

Billing Rate No.	Customer Description	Average Lot Size (acres)	Irrigated Area per Lot[1] (acres)	# of Customers Receiving Meters	Total Irrigated Area (acres)
302	OPEN ACRE GREEN BELT	1.00	0.6	9	5.4
306	<1/3 ACRE	0.27	0.16	569	91.0
307	1/3-2/3 ACRE	0.50	0.3	1,066	319.8
308	2/3-1 ACRE	0.83	0.5	250	125.0
310	PRE 1995	1.00	0.6	169	101.4
			Total	**2,063**	**642.6**

[1]Based on 60% of irrigable area per lot.

The average lot size per customer category was estimated by taking the average of the lot category size range. Based on experience and visual observation of aerial imagery, it was determined that each lot has approximately 60% of the total lot area irrigated. The irrigated area per lot category was multiplied by the applicable number of customers receiving meters to determine the total irrigated area to be metered. 642.6 irrigated acres within DIC's PI service area will be converted from unmetered connections to metered connections as part of this project.

As described in the State of Utah Department of Natural Resources Division of Water Resources 2018 Water Use Data Collection Program report excerpt shown in Appendix C (the full document is available upon request), DIC expects to reduce the unmetered application rate of 5.1 ac-ft/irrigated acre/year to 3.4 ac-ft/irrigated acre/year for metered connections.

The 2,063 customers to be metered have an existing estimated PI water usage of 3,277 ac-ft/yr (642.6 irrigated acres x 5.1 ac-ft/irrigated acre/year). After installing the water meters as part of this project, those 2,063 customers will have an estimated PI water usage of 2,185 ac-ft/yr (642.6 irrigated acres x 3.4 ac-ft/irrigated acre/year). This project will result in a water saving of 1,092 ac-ft/yr.

The projected annual water savings equates to an average of 0.53 ac-ft saved per year per new meter installed.

Subcriterion A (2) b.: *How have current distribution system losses and/or the potential for reductions in water use by individual users been determined?*

This project does not include distribution main meters. However, upon completion of this project (which will add metering to 2,063 of the total 3,175 PI connections), approximately 97% of the PI connections in the system will be metered. The remaining approximately 3% of connections are composed of larger properties that are anticipated to be subdivided which will allow smaller meters to be installed in the future. Once those few remaining connections are metered, DIC will

be able to more accurately determine the volume difference (system losses) from source production versus metered sales. That information will give DIC a greater understanding of their system and depending on the volume of system losses, will help DIC prioritize future projects to reduce those potential system losses.

Reductions in water use by individual users is expected to result from the proposed project due to a combination of factors such as time of day audits, leak alerts, water audits, expanded public education, drought and water emergency measures, etc. The Technical Project Description section of this proposal discussed those factors in detail.

In addition, DIC will implement a tiered volumetric based rate structure for metered connections to discourage overuse of water. For the first irrigation season after installing the meters, DIC will continue billing customers at their existing flat rate but will also provide actual water use information and an estimated water bill using the volumetric rate. This period will give customers time to adapt and change their water usage habits without being alarmed by the potentially higher bill. At the start of the following irrigation season, the system will bill the customer at to the volumetric rate. This approach is expected to result in the water usage savings described in the following section.

Subcriterion A (2) 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.*

Weber Basin Water Conservancy District (WBWCD) provides secondary water to users in northern Utah. WBWCD has installed meters on 1,057 secondary customers within several adjacent neighborhoods. In 2012, homeowners began receiving usage quantities as well as estimates of the amount of water needed for their particular landscaping. Through only voluntary action, the homeowners have reduced their secondary water consumption by an average of 29% over the past five irrigation seasons (see Appendix D). Customers received monthly usage information with their billing statements along with their landscape's estimated need. These usage reductions are promising since they were completely voluntary. WBWCD does not currently charge customers based on their actual usage, though they expect to implement a tiered rate structure once all secondary customers in the district are metered.

The State of Utah Department of Natural Resources Division of Water Resources completed a statewide Water Use Data Collection Program study in January 2018; an excerpt of that study is included in Appendix C (the full document is available upon request). The purpose of the study was to improve the State's ability to accurately determine water usage by public water systems across the state. As part of that study, it was determined that water application rates for sampled systems along the Wasatch Front area (which includes DIC) were approximated as shown in Table 4 below.

Table 4
Application Rates (acre-feet/irrigated acre/year)

Area	Minimum ET Rate Needed for Turf[1]	Application Rate-Metered System	Application Rate-Unmetered System
Wasatch Front	2.1	3.4	5.1

[1]ET rates taken from Hill, R.W. and K.L. Kopp. 2002. Turfgrass Water Use in Utah. Utah St. Univ. Ext. Pub. ENGR/ BIE/WM-36.

According to that study, a metered system will reduce water usage by approximately 33%, which closely matches the 29% average reduction observed from the smaller scale WBWCD investigation. To estimate the water saving expected from this project, DIC used the 33% reduction from the State of Utah Division of Water Resources since it resulted from more than one entity's water usage data.

Table 4 also shows the minimum water application rate for turfgrass necessary to replace the water lost from soil evaporation and leaf transpiration. That application rate is the theoretical minimum amount of water necessary to keep the turfgrass healthy. Seasonal variations in air temperature, wind, and other weather conditions will affect that rate.

Subcriterion A (2) 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).*

Distribution main meters are not included as part of this project because they are already installed in the system.

Subcriterion A (2) e.: *What types (manufacturer and model) of devices will be installed and what quantity of each?*

DIC will install 2,063 Badger Meter 1-inch E-Series Ultrasonic Meters. These meters include no internal moving parts and are compatible with the water quality characteristics of the more turbid canal/Utah Lake water. DIC selected 2,063 Badger Meter ORION Water Endpoints (using the existing cellular communications network) to install with each Badger meter to remotely and automatically transmit water meter data to DIC. Appendix E includes product data sheets for both items and the DIC standard PI water meter construction detail.

Subcriterion A (2) f.: *How will actual water savings be verified upon completion of the project?*

After project completion, DIC will compare the PI water production for all customers to the existing annual average water use to estimate water savings. Due to variability of other factors associated with outdoor irrigation including temperatures, precipitation, wind, etc., multiple years of data will likely provide more insight into actual water savings. As DIC's water production requirements exceed its reliable water supply, DIC is committed to ongoing monitoring and comparison beyond the reporting period to achieve the conservation objectives.

DIC will also select 30 customers of varying lot sizes that will have water meters installed within the first year of the project. DIC will determine actual irrigated area per lot and conduct water audits for those customers each year for three years to measure changes in water use at each audited connection and determine an irrigation application rate per year. As part of the audits, DIC will survey those 30 users to determine the impact of the meters on the user's outdoor watering decision-making.

Evaluation Criterion B: Water Supply Reliability (18 Points)

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.

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

Is there widespread support for the project?

Appendix J includes letters of support from the State of Utah Division of Water Resources, Jordan Valley Water Conservancy District, Central Utah Water Conservancy District, and Draper City. The project has received a particularly large amount of support from JVWCD, which provides wholesale water to users throughout the Salt Lake Valley. The water conserved through this project could potentially allow JVWCD to postpone future water supply projects and allow them to better serve their current customers.

What is the significance of the collaboration/support?

This proposed metering project will allow other entities to meet their future goals. In particular, JVWCD has stated the following ways this project will directly help them:

- Help sustain and conserve existing M&I water supplies, including those provided by Federal projects such as the Central Utah Project and the Provo River Project.
- Reduce the per capita water usage of DIC customers and overall per capita usage within JVWCD's service area.
- Allow JVWCD's current water purchase contract with DIC to supply water to future DIC users.
- Reduce the need for upgrades or additions to water supply infrastructure.

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

Relatively few cities or water service districts in Utah have complete metering of their PI water systems. This proposed project will bring DIC very close to meeting that goal. After completing this project, DIC will be able to demonstrate the benefits of metering

and monitoring their PI system to surrounding cities and service districts, including: water savings, energy cost savings, and significantly increased overall awareness of the current state of the water system.

Will the project make water available to address a specific water reliability concern?

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.

DIC's water rights represent the maximum potential water that the Company can use. The amount of water that can actually be reliably produced and used is limited by timing of system demands, seasonal supply and stream flow variability (drought related), Utah Lake levels, and system delivery capacity. DIC's 2018 Water Rights Master Plan compares the reliable production of Company sources based on these historic supply considerations to projected production requirements. Based on those findings, DIC has an existing reliable PI system deficit of 2,188 ac-ft/year and an existing culinary system deficit of 718 ac-ft/year.

As shown in DIC's 2018 Water Rights Master Plan, historically the Company has been using approximately 3,000 to 5,000 ac-ft/year through their Utah Lake/Jordan River water rights and their East Jordan Canal shares. The Company's total secured water from those sources is 5,983 ac-ft/year (4,725.85 + 1,257.2). The challenge with this source is that it is heavily dependent on water in Utah Lake. Issues such as low water levels (due to reduced runoff and precipitation, temperatures, etc.), toxic algae blooms, and DIC's lower-priority water rights (compared to other rights holders in Utah Lake) all contribute to reducing the reliability of this PI source.

Describe where the conserved water will go/how it will be used. Will the project directly address a heightened competition for finite water supplies and over-allocation (e.g.) population growth? Will it be left in the river system?

The existing PI shortage in a dry year shown in DIC's 2018 Water Rights Master Plan and on Figure 1-2 of this application is greater than the water savings resulting from this project. Therefore, all of the PI water that DIC conserves as part of this project will have to be used by DIC to help reduce the water shortage. However, during a wetter year, the water savings from this project may not be needed by DIC and that excess water will be able to remain in Utah Lake or be left in the Jordan River to be sent downstream.

Describe how the project will address the water reliability concern?

DIC's PI system has an existing deficit of reliable source yield compared to the required production of approximately 2,188 ac-ft/year. The project will not affect the reliability of existing DIC sources; however, it will improve the overall reliability of water to DIC customers because the proposed metering project would make a significant contribution (1,092 ac-ft/year) toward reducing the existing water supply deficit.

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

Lowering customer usage will reduce DIC's water needs and diminish the potential for a water crisis.

Groundwater rights in the Salt Lake Valley have been over-allocated. Surface water rights for sources in the DIC area have also been over-allocated in many cases. For instance, DIC has a lower priority to its Utah Lake rights than other users and has been cut off from those rights in the past during times of water shortages. This general over allocation of water rights may be why the Bureau of Reclamation published a map in 2003 indicating the Salt Lake valley as an area "highly likely" to have conflicts over water supply.

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

As there is an existing deficit of reliable source supply compared to existing PI system demands, DIC expects to use all conserved water in a dry year through the existing PI system infrastructure. During wetter years, DIC may not need the water savings from this project and that excess water will be able to remain in Utah Lake or sent downstream in the Jordan River.

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

There are no partners included with this project.

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

There is an existing deficit of reliable source yield compared to the required production of approximately 2,188 ac-ft/year in DIC's PI system. The proposed metering project would make a significant contribution (1,092 ac-ft/year) toward reducing the existing deficit.

Will the project benefit Indian tribes?

No benefit to Indian tribes is expected to result from this project.

Will the project benefit rural or economically disadvantaged communities?

Additional water sources made available through conservation could potentially be marketed to rural communities during non-dry year conditions.

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.

In Utah County and Salt Lake County, the June Sucker (Chasmistes liorus) is a federally-recognized endangered species. This fish is endemic and unique to Utah Lake (from which DIC obtains most of its PI water).

The primary way this project will benefit the June Sucker is by reducing the amount of water needed from Utah Lake.

The June Sucker primarily lives in Utah Lake and migrates to the Provo River for spawning in late May and June. According to the June 1999 Recovery Plan from the U.S. Fish and Wildlife Service, the Provo River is the only remaining natural spawning habitat for the species. Although adult June Sucker still spawn in the river, habitat and flow alterations seem to be factors in reduced spawning success or recruitment. Flow alterations include the altered hydrologic regime in the Provo River because of Reclamation storage facilities including the Jordanelle and Deer Creek reservoirs.

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

There are no other foreseen ways the proposed project will address water supply reliability.

Evaluation Criterion C: Implementing Hydropower (18 Points)

This project will not implement new hydropower capacity.

Evaluation Criterion D: Complementing On-Farm Irrigation Improvements (10 Points)

This project is not anticipated to complement any on-farm irrigation improvements eligible for NRCS financial or technical assistance.

Evaluation Criterion E: Department of the Interior Priorities (10 Points)
Demonstrate how the project supports Department of the Interior priorities.

> ***Subcriterion 2 a.:*** *Ensure American Energy is available to meet our security and economic needs.*
>
> Implementing the project could result in approximate energy savings of 491,571 kilowatt hours per irrigation season at DIC's canal pump station (see calculation of the energy savings in Appendix F). The amount of coal use to generate electricity depends on the heat content of the fuel and the efficiency or heat rate of the generator. Assuming it takes approximately 1 pound of coal to generate 1 kilowatt hour, this project could reduce the consumption of up to nearly 250 tons of coal per year.
>
> ***Subcriterion 5 a.:*** *Support White House Public/Private Partnership Initiative to modernize U.S. infrastructure.*

Make Targeted Federal Investments - The White House indicates that focusing Federal dollars on the most transformative projects and processes stretches the use and benefit of taxpayer funds. The White House also acknowledges that Federal funds should go to projects that address problems that are a high priority. Two features of the proposed metering project support this:

- The calculated percentage of Federal funding to total project cost is 24.2%. DIC is funding the vast majority of the project costs and is well above the 50% minimum percentage of non-Federal funding.
- The total project costs equate to approximately $916 to the Federal government per ac-ft/year of water saved.

DIC considers this project very high priority due to the existing reliable supply to demand projection deficit in DIC's PI system.

Encourage Self Help – The White House recognizes that localities are better equipped to understand the right level and type of infrastructure investment needed for their communities. Through internal investigations, experience with metering prior unmetered connections, and the results of their 2018 Water Rights Master Plan, DIC has concluded that one of the best returns on investment for their PI system to conserve water and reduce the supply to demand deficit is to meter the unmetered connections. This project is the right level and type of infrastructure investment for DIC.

Modernizing U.S. Infrastructure – This project will radically modernize the existing PI water tracking infrastructure. The 2,063 customers will go from having no water use data at all to having highly accurate ultrasonic meters with cellular endpoint units allowing automatic wireless remote meter reading that provides nearly real-time flow data monitoring available online.

This modern metering system will better track water system demands in nearly real time to measure effects of conservation measures. By tracking nearly real time data of water system demands, DIC will be able to educate customers regarding water use, detect leaks, and identify other areas where additional conservation may be possible.

Evaluation Criterion F: Implementation and Results (6 Points)

Subcriterion F 1 (1) Project Planning: *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 efforts.*

DIC has a system-wide water conservation master plan completed in 2014 that supports this proposed project. An excerpt of this master plan is included in Appendix G (the full document is available upon request).

DIC's 2018 Water Rights Master Plan also identified the need to meter all PI system connections to conserve water and help reduce the water shortfall. Appendix H includes an excerpt (the full document is available upon request).

This project also supports the Bureau of Reclamation's Central Utah Project's water conservation goal of a 25% reduction by 2025. As has been previously described, this project is directly applicable to the CUP due to the water contracts between JVWCD and DIC.

Subcriterion F 1 (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 2014 Water Conservation Master Plan states that achieving the water conservation goals requires universal metering and monitoring of the PI system. This proposed project specifically addresses a significant portion of the goal towards universal metering of the existing PI system. The conservation plan also states that based on a financial analysis, the capital outlay for meter installing is difficult to justify without obtaining grants to defray the cost.

In addition, the 2018 Water Rights Master Plan also recommends metering the entire PI system to help reduce the system's reliable water supply deficit.

Engineering and design efforts completed for the project have focused on calculating losses in the existing system due to overwatering, DIC has evaluated and determined the proper meter for irrigation water use and verified that water from the existing PI sources can be conserved. As DIC's PI system has been shown to have an approximately 2,188 ac-ft/year water shortage during the dry year scenario, this project (which is expected to save DIC approximately 1,092 ac-ft of water per year) is of the highest priority.

Subcriterion F 2: Performance Measures. *Provide a brief summary describing the performance measure that will be used to quantify actual project benefits upon completion of the project.*

After project completion, DIC will compare the PI water production for all customers to the existing annual average water use to estimate water savings. Due to variability of other factors including temperatures, precipitation, wind, etc., multiple years of data will likely provide more insight into actual water savings. As DIC has been shown to have water production requirements that exceed its reliable water supply, DIC is committed to ongoing monitoring and comparison beyond the required reporting period for this grant to ensure the conservation objectives are being achieved.

Water services with leaks that have been identified by the AMI system will be recorded and the water savings for each leak will be estimated through extrapolation of the leak rate over the 213 day irrigation season.

DIC will select 30 customers of varying lot sizes that will have water meters installed within the first year of the project, determine actual irrigated area per lot, and conduct water audits for those customers each year for three years. This will allow DIC to measure changes in water use

at each audited connection and determine an irrigation application rate per year. As part of the audits, DIC will survey those 30 users to determine the impact of the meters on the user's outdoor watering decision-making.

Besides the reduction of water usage, this project will also yield a corresponding reduction of electrical energy needs. This project will reduce energy consumption by reducing the amount of water pumped from the canal into the PI system.

The Canal Pump Station has four pumps ranging from 300 to 500 horsepower with the ability to pump up to 13,500 gallons per minute (gpm) into the PI system (see Appendix F). Although the Canal Pump Station has the potential to supply enough water to the PI system, during times of peak flow and high demand the mountain/canyon runoff (if available) supplements the PI system. However, during a dry year those mountain/canyon sources are not expected to be available for use in the PI system. The following energy savings calculation is based on the current five-year average water use and assumes all PI system flow is originating from Utah Lake through the East Jordan Canal and the Jordan River. Based on the previously determined 1,092 ac-ft/year of water savings due to the proposed meters, there will be a corresponding average reduction of 1,177 gallons/minute of pumping required at the Canal Pump Station.

DIC's North Pump Station has 200 horsepower pumps with the ability to pump 1,700 gpm. However as this pump station is less efficient than the Canal Pump Station and is only used to help convey peaking flows as needed, to be conservative it was assumed only the Canal Pump Station would be used for the energy savings calculation described below.

By implementing the project there will be an approximate energy savings of 491,571 kilowatt hours per irrigation season at the canal pump station. Assuming an average cost of electricity of $0.09/kWh, the associated yearly savings would be $44,241. Please see Appendix F for calculations showing how the canal pump station energy conservation numbers were determined.

DIC proposes to track monthly power costs for a period of at least three years after implementation of the project to determine actual energy savings resulting from the PI metering improvements.

Evaluation Criterion G: Nexus to Reclamation Project Activities (4 Points)

Is the proposed project connected to Reclamation project activities? If so, how?

DIC has a water supply contract with Jordan Valley Water Conservancy District (JVCWD), which is affiliated with the Central Utah Project (a Bureau of Reclamation project). Therefore, any improvement in the conservation or management of water in DIC's system indirectly connects to the Bureau of Reclamation. JVWCD has indicated that completion of this project will directly help JVWCD reach its goals as described in the letter of support from JVWCD as shown in Appendix J.

In addition, DIC has worked directly with the Central Utah Project's (CUP) conservation efforts in the past. DIC received funding to develop their PI water system that replaced an old flood

irrigation system. DIC still has an agreement with the CUP and sends reports providing updates on conservation totals.

DIC also received funding from the BOR for the Bear Canyon Intake Relocation project, to construct a new intake structure resulting in estimated water savings of 672 acre-feet. The project was funded through both the BOR and DIC and was completed in November 2012. Increased water savings from that project could be further achieved because of this new proposed metering project since Bear Canyon is a DIC water source.

Evaluation Criterion H: Additional Non-Federal Funding (4 Points)

State the percentage of non-Federal funding provided.

DIC estimated project costs of $4,134,924. This grant application is for $1,000,000. DIC will fund the remaining costs. The calculated percentage of non-Federal funding is as follows:

$$\frac{\text{Non} - \text{Federal} = \$3{,}134{,}924}{\text{Total Project Cost} = \$4{,}134{,}924} = 75.8\%$$

Based on the calculated 1,092 ac-ft/yr of water savings, the proposed project would result in a BOR overall cost of approximately $916 per ac-ft/year of water saved.

BUDGET PROPOSAL FOR THE PRESSURE IRRIGATION METERING PROJECT

FUNDING PLAN AND LETTERS OF COMMITMENT

1) How you will make your contribution to the cost share requirement, such as monetary and/or in-kind contributions and source funds contributed by the applicant (e.g., reserve account, tax revenue, and/or assessments).

DIC seeks a $1,000,000 grant from the BOR for this metering project. DIC will fund the remaining $3,134,924. As part of this project, DIC will install over one-third of the water meters, making an in-kind labor contribution estimated at $354,184. DIC is pursuing a $1,000,000 low interest loan from the State of Utah Department of Natural Resources Division of Water Resources for part of the funding. DIC's cash reserve will fund the remaining $1,780,740.

2) Describe any donations or in-kind costs incurred before the anticipated project start date that you seek to include as project costs.

DIC has already installed 722 PI meters. Project costs have included the meters, cellular endpoints, and planning costs associated with obtaining bids and other materials. However, DIC is not including any of its historic costs in the grant application and is only including the proposed 2,063 new meters in this project cost.

3) Describe any funding requested or received from other Federal partners. Note: other sources of Federal funding may not be counted towards your 50 percent cost share unless otherwise allowed by statute.

DIC has not requested any other Federal funds for the proposed project.

4) Describe any pending funding requests that have not yet been approved, and explain how the project will be affected if such funding is denied.

There are no other pending funding requests except for the pursuit of a $1,000,000 low interest loan from the State of Utah Department of Natural Resources Division of Water Resources (referred to in the letter of support from the Division of Water Resources). If DIC does not obtain that loan, DIC is prepared to self-fund the additional amount necessary to complete the project from its cash reserves.

Table 5 summarizes all funding sources for the project.

Table 5
Summary of Non-Federal and Federal Funding Sources

FUNDING SOURCES	AMOUNT
Non-Federal Entities	
1. Draper Irrigation Company: In-Kind Labor/Wages	$354,184
2. Draper Irrigation Company: Loan from Board of Water Resources	$1,000,000
3. Draper Irrigation Company: Cash	$1,780,740
Non-Federal Subtotal	**$3,134,924**
Other Federal Entities	
1. None	$0
Other Federal Subtotal	**$0**
REQUESTED RECLAMATION FUNDING	**$1,000,000**

DIC will be funding this project itself with no commitments from other partners. No letters of commitment are therefore required.

BUDGET PROPOSAL

Table 6 shows the proposed budget for the project.

Table 6
Summary of Non-Federal and Federal Funding Sources

BUDGET ITEM DESCRIPTION	COMPUTATION		Quantity Type	TOTAL COST
	$/Unit	Quantity		
Salaries and Wages				
David Gardner - PM/Assistant General Manager	$66.21	80	Hours	$5,297
Steve Cunningham - Office Manager	$47.35	100	Hours	$4,735
Nolan Wootton - Operations Manager	$46.90	100	Hours	$4,696
Meter Technician	$24.60	1,032	Hours	$25,375
Inspector	$27.08	1,688	Hours	$45,711
Meter Installation Crew Member 1	$25.12	2,003	Hours	$50,303
Meter Installation Crew Member 2	$25.00	2,003	Hours	$50,063
Meter Installation Crew Member 3	$18.70	2,003	Hours	$37,447
Meter Installation Crew Member 4	$15.45	2,003	Hours	$30,939
Fringe Benefits				
David Gardner - PM/Assistant General Manager	$14.79	80	Hours	$1,183
Steve Cunningham - Office Manager	$12.65	100	Hours	$1,265
Nolan Wootton - Operations Manager	$12.10	100	Hours	$1,212
Meter Technician	$10.40	1,032	Hours	$10,728

BUDGET ITEM DESCRIPTION	COMPUTATION		Quantity Type	TOTAL COST
	$/Unit	Quantity		
Inspector	$6.92	1,688	Hours	$11,681
Meter Installation Crew Member 1	$10.88	2,003	Hours	$21,787
Meter Installation Crew Member 2	$11.00	2,003	Hours	$22,028
Meter Installation Crew Member 3	$4.30	2,003	Hours	$8,611
Meter Installation Crew Member 4	$10.55	2,003	Hours	$21,126
Travel				
Project Visits (local travel)	$0.55	9,752	Miles	$5,315
Equipment				
Construction Equipment (Vac-Truck, Backhoe, Dump Truck, 1-ton Truck) for Each DIC Installed Meter	$447.50	750	Each	$335,625
Supplies and Materials				
1-inch Meter	$198.40	2,063	Each	$409,299
Cellular Endpoint for Meter	$133.52	2,063	Each	$275,452
Meter Box & Fittings for Each DIC Installed Meter	$525.34	750	Each	$394,004
Contractual/Construction				
Engineering Consultant - Bowen, Collins & Associates (% of Construction Contractor Costs)	4%	1	Lump Sum	$84,778
Construction Contractor				
Meter - Total Installed Cost (less meter and cellular endpoint)	$1,614	1,313	Each	$2,119,454
Contingencies (% of Construction Contractor Costs)	5%	1	Lump Sum	$105,973
Construction Contractor Subtotal				$2,225,426
Other				
Environmental and Regulatory Compliance (% of Total Direct Costs)	1%	1	Lump Sum	$40,841
TOTAL DIRECT COSTS				$4,124,924
Indirect Costs				
WaterSMART Grant Application - Consultant	$10,000	1	Lump Sum	$10,000
TOTAL ESTIMATED PROJECT COSTS				$4,134,924

BUDGET NARRATIVE

The project will include installation of 2,063 total new 1-inch water meters. Of those meters, 1,313 will be contracted out to an independent contractor for installation. The remaining 750 meters will all be installed by DIC personnel. DIC will purchase and provide the actual water meters and cellular endpoints for all installations.

Salaries and Wages

The proposed budget (Table 6) includes estimated time for DIC employees for administering and overseeing the project. That includes project meetings and consultations with the design engineers, project visits, inspections of the independent contractor's work, all required paperwork, reporting, and other duties involved with the project.

DIC will prepare the following reports and submit them to Reclamation: SF-425 Federal Finance Report, interim performance reports (two reports per year) and a final report.

The budget also includes time for DIC personal to install 750 meters:

- Four-member crew for installing meter boxes, setters, fittings, etc.
- Meter technician for installing the water meter itself (the technician will install all 2,063 meters)
- Crew oversight by operations manager and inspector

The time estimates associated with each meter installed by DIC are based on recent DIC meter installation experience. Salaries and wages are based on 2018 figures and will be a donation in-kind by DIC.

Fringe Benefits

The provisional rate fringe benefit rate for DIC personnel is roughly 32 percent of salary and wages for the listed employees. Fringe benefits include Social Security, Medicare, retirement, life and disability insurance, workers' compensation, sick leave, health insurance premiums, cell phone costs, and vehicle allowances. Fringe benefits anticipated for the project will be a donation in-kind by DIC.

Travel

Travel costs were calculated using the 2018 Internal Revenue Service (IRS) reimbursement rate of $0.545 per mile. Costs include approximately 9,752 miles for construction coordination, site visits, construction, meter installations, and inspections. Travel costs are a portion of the recipient cost share. DIC headquarters is located inside the project area, so travel costs will be relatively low and only include mileage costs.

Equipment

The only equipment required for this project will be construction equipment that DIC crews use to install the meters, including the following: vacuum excavation truck, backhoe, dump truck, and a 1-ton truck. DIC owns those pieces of equipment. The budget includes DIC estimates of operational equipment costs associated with installing each meter. All other equipment associated with the project, such as meter reading software, has been previously purchased and is not included as part of this project.

Materials and Supplies

DIC will purchase and supply each meter and cellular endpoint for all 2,063 meters. For the DIC installed meters, there will be additional costs to purchase the meter boxes, setters, fittings, and other miscellaneous parts. All costs associated with this category are based on recent DIC experience.

Contractual

DIC anticipates contracting with Bowen, Collins & Associates, Inc. (the current contracted consultant engineer for DIC) to develop construction plans and bid documents, administer project bidding, and assist with reporting/coordinating with the BOR. Preliminary cost estimates for engineering consultant work are based on a fixed percentage of construction costs for this application. That cost will be refined if a grant award is received.

Construction contractor costs for the project include the cost estimates for an independent contractor to supply and perform all meter installations. This cost does not including supplying the meter or cellular endpoint. The cost also does not include actual installation of the meter (which DIC's meter technician will complete). The costs for this category were determined to be fair and reasonable as they were based on contractor bid results in obtained in February 2018 for a similar DIC PI metering project.

Contractor construction costs include a modest contingency amount to cover unforeseen issues. Total construction contractor costs are estimated to be approximately $2,225,426. DIC is requesting $1,000,000 in matching funds for this budget item. The remaining amount will be the recipient's cost share.

Environmental and Regulatory Compliance Costs

Environmental Compliance costs have been estimated to be 1 percent of the total project costs. DIC anticipates minimal environmental and regulatory compliance costs. The total budgeted amount for environmental and regulatory compliance is included as a portion of the recipient cost share.

Compliance costs will include: the cost incurred by BOR to determine the level of environmental compliance required for the project, the cost of BOR and DIC personnel to prepare any necessary environmental compliance documents or reports, the cost of BOR to review any environmental compliance documents prepared by DIC, the cost of DIC to acquire any required approvals or permits and/or implementing any required mitigation measures.

Indirect Cost

The only indirect costs included in this application are for an engineering consultant to assist in preparing this application and developing data necessary to support the application.

Total Costs

The estimated total project cost for the PI metering project is $4,134,924. The requested federal share is $1,000,000; the total non-federal share is $3,134,924. A copy of the SF424C, Budget Information-Construction Programs is included in the application.

ENVIRONMENTAL AND CULTURAL RESOURCES COMPLIANCE

DIC will not commence any ground-disturbing activities on this project before the environmental compliance process is complete and the BOR explicitly authorizes work to proceed.

1) Will the project impact the surrounding environment (e.g., soil [dust], air, water [quality and quantity], animal habitat)? Please briefly describe all earth-disturbing work and any work that will affect the air, water, or animal habitat in the project area. Please also explain the impacts of such work on the surrounding environment and any steps that could be taken to minimize the impacts.

The project will install meters boxes and meters on existing PI service laterals. Therefore, minimal soil excavation (approximately five feet excavation diameter per meter) will be required. As the service laterals were previously installed, much of the excavated area was previously disturbed. Little to no impacts are expected on the surrounding environment due to soil, air, etc.

2) Are you aware of any species listed or proposed to be listed as a Federal threatened or endangered species, or designated critical habitat in the project area? If so, would they be affected by any activities associated with the proposed project?

The U.S. Fish and Wildlife Service's Information Planning and Conservation System website provides information within an area of interest. The species listed in Table 7 may potentially be affected by activities in Salt Lake County.

Table 7
Federally Listed Threatened and Endangered Species in Salt Lake County

Common Name	Scientific Name	Status
Canada Lynx	Lynx canadensis	Threatened
Yellow-billed Cuckoo	Coccyzus americanus	Threatened
June Sucker	Chasmistes liorus	Endangered
Ute Ladies'-tresses	Spiranthes diluvialis	Threatened

Meters will be installed on existing PI service laterals (mostly in public right-of-way in landscape strips). These existing locations are highly disturbed as potential animal habitat thus no suitable habitat exists. No threatened or endangered species will be impacted by the proposed project.

3) Are there wetlands or other surface waters inside the project boundaries that potentially fall under CWA jurisdiction as "waters of the United States?" If so, please describe and estimate any impacts the project may have.

The project will only disturb urban landscaping; this project will affect no wetlands or waters of the U.S.

4) When was the water delivery system constructed?

The water delivery system was constructed between 1993 to the present.

5) Will the project result in any modification of or effects to, individual features of an irrigation system (e.g., headgates, canals, or flumes)? If so, state when those features were constructed and describe the nature and timing of any extensive alterations or modifications to those features completed previously.

This project will not make any modifications to the irrigation system features.

6) Are any buildings, structures, or features in the irrigation district listed or eligible for listing on the National Register of Historic Places? A cultural resources specialist at your local Reclamation office or the State Historic Preservation Office can assist in answering this question.

There may be historic sites within the project area; however, none are known at this time. DIC will check with the State Historic Preservation Office prior to beginning the project. However, any buildings or facilities in the project area will not be impacted by the project.

7) Are there any known archeological sites in the proposed project area?

There are no known archeological sites in the proposed project area.

8) Will the project have a disproportionately high and adverse effect on low income or minority populations?

The project will not have a disproportionately high or adverse effect on low income or minority populations.

9) Will the project limit access to and ceremonial use of Indian sacred sites or result in other impacts on tribal lands?

There are no known sacred sites or tribal land within the project area. The project will not limit access or affect tribal lands.

(10) Will the project contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species known to occur in the area?

The project will disturb small areas of existing residential landscaping. Introduction, continued existence, or the spread of noxious weeds or non-native invasive species is not expected.

REQUIRED PERMIT 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.

The discussion of the following environmental permits are based on the best of our current knowledge and experience. As outlined in the environmental compliance cost description of the project budget, we will further evaluate the environmental requirements during the design phase of the project.

NEPA – National Environmental Policy Act

DIC does not anticipate any impacts on the environment and will fit within a Categorical Exclusion to NEPA. Best management practices will minimize any environmental impacts during construction.

NHPA – National Historic Preservation Act

DIC will contact the State Historic Preservation Office before beginning any work in the project area. However, there will be no negative impacts to historic sites as a result of this project.

ESA – Endangered Species Act

There is no critical habitat or endangered or threatened species that are anticipated to be affected by this project.

State Permits

No State permits will be required for the project.

Local Permits

All appropriate approvals and permits for the project fall under the jurisdiction of Draper City, Sandy City, and Bluffdale City. DIC has been implementing phases of the PI metering system over the past several years, so this project should be easily approved by those entities. All applicable city ordinances and procedures will be followed and necessary approvals obtained. The construction contractor that is awarded the project will also be constrained to follow all necessary laws and regulations.

LETTERS OF PROJECT SUPPORT

See Appendix J for letters of project support from the State of Utah Division of Water Resources, Jordan Valley Water Conservancy District, Central Utah Water Conservancy District, and Draper City.

OFFICIAL RESOLUTION

Due to the timing of DIC board meetings, the official resolution from the DIC Board of Directors was not submitted with this application. A board meeting is scheduled for May 16th, 2018. The official resolution supporting this application, designating an authorized official, committing DIC to providing the amount of funding and in-kind contributions specified in the proposed project funding plan, and committing DIC to meeting the established deadlines for entering into a grant agreement with the BOR is currently on the May 16th board meeting agenda. A copy of the official resolution to be presented to the Board of Directors is included in Appendix I. After that board meeting, the official resolution will be submitted to the BOR

APPENDIX A

EXISTING PI CONNECTIONS BY TYPE

DRAPER IRRIGATION COMPANY
2017 PRESSURE IRRIGATION CUSTOMER BREAKDOWN

Rate No.	Description	Service Type	Customers
*302	OPEN ACRE- GREEN BELT	PI	9
*306	0-1/3 ACRE	PI	667
*307	1/3-2/3 ACRE	PI	1,165
*308	2/3-1 ACRE	PI	348
309	LARGER THAN 1ACRE 1996-CURRENT	PI	83
*310	PRE 1995	PI	169
311	GREEN BELT/HOME	PI	3
312	1 ACRE/LARGER NEW COMM/INS	PI	9
406	0-1/3 ACRE RES IRR METER	MP	18
407	1/3-2/3 ACRE RES IRR METER	MP	58
408	2/3-1 ACRE RES IRR METER	MP	2
506	0-1/3 ACRE RES IRR METER	MP	222
507	1/3-2/3 ACRE RES IRR METER	MP	228
508	2/3-1 ACRE RES IRR METER	MP	55
509	METERED LARGER THAN 1ACRE 1996-CURRENT	MP	20
601	MTR PRESS IRR COMMERCIAL	MP	119
		TOTAL	**3,175**

*All customers in these categories will be metered as part of this proposed project and other existing on-going projects.

PI = Unmetered Pressure Irrigation, MP = Metered Pressure Irrigation

302-312 billed flat monthly fee, 406-408 to be billed tiered structure in 2018,

506-509 billed on tiered structure, 601-commercial metered rate

APPENDIX B

PROPOSED PROJECT SCHEDULE

DRAPER IRRIGATION COMPANY

2018 THRU 2021 PRESSURE IRRIGATION METERING PROJECT SCHEDULE

2018 Metering Project Schedule

Task Name	Jan 2018				Feb 2018				Mar 2018				Apr 2018				May 2018				Jun 2018				Jul 2018				Aug 2018				Sept 2018				Oct 2018				Nov 2018				Dec 2018			
	1w	2w	3w	4w	1w	2w	3w	4w	1w	2w	3w	4w	1w	2w	3w	4w	1w	2w	3w	4w	1w	2w	3w	4w	1w	2w	3w	4w	1w	2w	3w	4w	1w	2w	3w	4w	1w	2w	3w	4w	1w	2w	3w	4w	1w	2w	3w	4w
PRESSURE IRRIGATION METERING PROJECT																																															
DESIGN																																															
PROJECT BIDDING & AWARD																																															
CONSTRUCTION																																															
TESTING / IRRIGATION SEASON																																															

2019 Metering Project Schedule

Task Name	Jan 2019				Feb 2019				Mar 201				Apr 2019				May 2019				Jun 2019				Jul 2019				Aug 2019				Sept 2019				Oct 2019				Nov 2019				Dec 2019			
	1w	2w	3w	4w	1w	2w	3w	4w	1w	2w	3w	4w	1w	2w	3w	4w	1w	2w	3w	4w	1w	2w	3w	4w	1w	2w	3w	4w	1w	2w	3w	4w	1w	2w	3w	4w	1w	2w	3w	4w	1w	2w	3w	4w	1w	2w	3w	4w
PRESSURE IRRIGATION METERING PROJECT																																															
DESIGN																																															
PROJECT BIDDING & AWARD																																															
CONSTRUCTION																																															
TESTING / IRRIGATION SEASON																																															

2020 Metering Project Schedule

Task Name	Jan 2020				Feb 2020				Mar 2020				Apr 2020				May 2020				Jun 2020				Jul 2020				Aug 2020				Sept 2020				Oct 2020				Nov 2020				Dec 2020			
	1w	2w	3w	4w	1w	2w	3w	4w	1w	2w	3w	4w	1w	2w	3w	4w	1w	2w	3w	4w	1w	2w	3w	4w	1w	2w	3w	4w	1w	2w	3w	4w	1w	2w	3w	4w	1w	2w	3w	4w	1w	2w	3w	4w	1w	2w	3w	4w
PRESSURE IRRIGATION METERING PROJECT																																															
DESIGN																																															
PROJECT BIDDING & AWARD																																															
CONSTRUCTION																																															
TESTING / IRRIGATION SEASON																																															

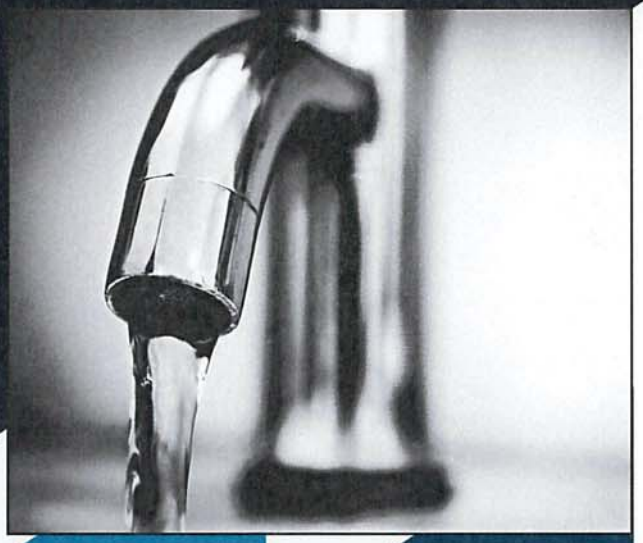
2021 Metering Project Schedule

Task Name	Jan 2021				Feb 2021				Mar 2021				Apr 2021				May 2021				Jun 2021				Jul 2021				Aug 2021				Sept 2021				Oct 2021				Nov 2021				Dec 2021			
	1w	2w	3w	4w	1w	2w	3w	4w	1w	2w	3w	4w	1w	2w	3w	4w	1w	2w	3w	4w	1w	2w	3w	4w	1w	2w	3w	4w	1w	2w	3w	4w	1w	2w	3w	4w	1w	2w	3w	4w	1w	2w	3w	4w	1w	2w	3w	4w
PRESSURE IRRIGATION METERING PROJECT																																															
DESIGN																																															
PROJECT BIDDING & AWARD																																															
CONSTRUCTION																																															
TESTING / IRRIGATION SEASON																																															

APPENDIX C

UTAH DIVISION OF WATER RESOURCES

WATER USE DATA COLLECTION PROGRAM STUDY (EXCERPT)



State of Utah

Water Use
Data Collection Program

Prepared for:

UTAH DNR WATER RESOURCES

Prepared by:

BOWEN COLLINS & ASSOCIATES
Celebrating 20 Years

HANSEN ALLEN & LUCE INC
ENGINEERS

In these examples, it is clear that there is a fair amount of variation in what percentage of the parcel is being irrigated. The smaller lots and larger lots show a decrease in the percent irrigated as compared to the more typical lot sizes. Comparing the two datasets shows a similar pattern, but on average Saratoga Springs residents tend to irrigate a larger percentage of their lot than those in Spanish Fork. A one-size-fits-all approach could lead to misrepresentation. The NDVI dataset can provide clarity to what people are actually doing rather than making assumptions about what they might do.

b. Application rate – The rate that water is applied to irrigated acreage is currently estimated based on evapotranspiration rate and the assumed percentage of application efficiency. Our experience suggests application rates can vary between entities depending on the status of metering, the cost of water, and the communities' view of conservation. However, when some of the variables are accounted for, the data from this study suggest there is a fairly consistent pattern of irrigation application rates (e.g., acre-feet per irrigated acre) among Utah communities. For systems that meter outdoor water use (either potable or secondary), the application rate is consistently between 3 and 4 ac-ft/ac with an average of 3.5 ac-ft/ac for the population centers along the Wasatch Front. A few of the desert communities in the southern portion of the state showed higher values due to the higher summer temperatures and longer irrigation season. Similarly, a few of the higher elevation communities along the Wasatch Back and elsewhere in the state showed lower values. Detailed data for a sample of Utah communities is summarized in Table 3-11.

Table 3-11
Irrigation Application Rates

City	Irrigated Area[1] (ac)	Outdoor Use[2] (ac-ft)	Application Rate (ac-ft/ac)
Saratoga Springs	995	2,547	2.6
Clinton	1,012	3,086	3.0
North Salt Lake	680	2,668	3.9
Midvale	680	2,408	3.5
Herriman	990	3,338	3.4
Roy	1,306	4,594	3.5
Washington Terrace	302	1,048	3.5
Kearns	1,210	3,922	3.2
West Jordan	3,206	10,283	3.2
Spanish Fork	1,290	5,004	3.9
Springville	1,269	5,058	4.0
Orem	2,759	11,729	4.3
Ivins	198	957	4.8
Hurricane	896	4,327	4.8

1. Irrigated area computed by NDVI analysis described earlier.
2. Outdoor use estimated by project team (see Appendix C).

It should be emphasized that the values contained in the table are all for metered outdoor water systems. Application rates for unmetered systems are expected to be significantly higher. Two detailed studies of the difference between metered and unmetered water use for a large group of customers have been conducted in the Weber Basin Water Conservancy District during the last several years. The District's 2011 Supply and Demand Study identified a 32 percent difference in outdoor water use between unmetered secondary and metered potable water customers. A more recent study in 2017 identified a decrease in water use of 33.7 percent for secondary customers once a meter was added to their connection. From these results, it appears reasonable to approximate unmetered secondary application rates by increasing calculated rates for metered connections by about 50 percent.

c. In summary, defining secondary use appears to be more complex than can be adequately represented based on the current data available to the DWRe. Additional

possible, update and correct the original DWRi database instead of maintaining separate DWRi and DWRe databases with different numbers. Share data with relevant State agencies, the local water community, and the public.

4. **Continue documenting assumptions for calculations and sources for corrections.** This practice helps identify recurring problems in data submission and deficiencies in the review process that need to be addressed. It also documents how and why the process is changing over time so assumptions and corrections can be evaluated for their impact on accuracy.

5. **Have each water system provide its own information on reliable supply.** Quantifying reliable supply involves many intricacies and complexities unique to each water system, and no one method accurately captures them for the hundreds of water systems in Utah. It is also demanding in terms of both time and effort. Many water systems already have master plans that either they or their engineers have prepared that contain information about reliable supply. These may be requested during DWRe's review process. Another option is to encourage water systems to report reliable supply as part of their water conservation plans every five years.

6. **Estimate outdoor water use with remote sensing of irrigated areas and observed application rates.** DWRe's current method of estimating outdoor water use by lot size, irrigated percentage, number of connections, and evapotranspiration rate is only situationally accurate. A better approach, as demonstrated here, would be as follows:

   - **Irrigated Area** – It is recommend that irrigated area be computed from four-band aerial imagery after excluding agricultural areas. While this approach requires some calibration and interpretation, it can be largely automated to cover large areas consistently. With statewide imagery updated every two years, the analysis can reveal growth or decline in irrigated area, providing a useful dataset on development patterns.

   - **Application Rates** – It is recommended that application rates be calibrated to those observed for similar locations or system types (e.g., metered vs. unmetered). While this study includes only a limited sample size, it appears that application rates for sampled systems can be approximated as follows:

     - Application Rate (Metered System) = ET Rate/Efficiency Rate of 60%
     - Application Rate (Unmetered System) = ET Rate/Efficiency Rate of 40%

     This would result in the sample application rates as documented in Table 3-12 and shown in Figure 3-2:

Table 3-12
Estimated Application Rates
(Acre-feet/Acre/Year)

	ET Rate for Turf	Application Rate-Metered System	Application Rate-Unmetered System
Wasatch Front	2.1	3.4	5.1
Wasatch Back	1.8	2.9	4.4
St. George Area	2.8	4.7	7.0

Notes
1. ET rates taken from Hill, R.W. and K.L. Kopp. 2002. Turfgrass water use in Utah. Utah St. Univ. Ext. Pub. ENGR/ BIE/WM-36.

APPENDIX D

WEBER BASIN WATER CONSERVATION DISTRICT HISTORIC METERING DATA

WEBER BASIN WATER CONSERVANCY DISTRICT - PI METERED DATA

2012 Meter Data

Allocation Amounts	Use (AF)	Use (in)	% of Allocation	% of Need 28 in	% of Need 32.75 in	# Exceeding Allocation	% Exceding Allocation	# over 28 inches	% users over 28 in
Washington Terrace	199.9	48.4	77.0	174	148	48	18%	242	92%
South Ogden Ph. 1	265.0	52.4	92.3	188	161	104	31%	299	88%
South Weber	323.2	42.3	74.1	152	130	65	18%	297	83%
South Ogden Ph. 2	85.8	45.7	98.9	164	49	43	44%	85	87%
Total	**874.0**	**47**	**82**	**168**	**134**	**260**	**25%**		

2013 Meter Data

Allocation Amounts	Use (AF)	Use (in)	% of Allocation	% of Need 28 in	% of Need 32.75 in	# Exceeding Allocation	% Exceding Allocation	# over 28 inches	% users over 28 in
Washington Terrace	162.0	39.2	62.4	141	120	16	6%	229	87%
South Ogden Ph. 1	198.4	39.2	69.1	141	120	53	16%	273	80%
South Weber	249.8	32.7	57.3	117	100	18	5%	242	68%
South Ogden Ph. 2	65.1	34.7	75.0	124	37	17	17%	75	77%
Total	**675.3**	**36**	**63**	**130**	**104**	**104**	**10%**		

2014 Meter Data

Allocation Amounts	Use (AF)	Use (in)	% of Allocation	% of Need 28 in	% of Need 32.75 in	# Exceeding Allocation	% Exceding Allocation	# over 28 inches	% users over 28 in
Washington Terrace	150.6	36.4	58.1	131	112	14	5%	207	79%
South Ogden Ph. 1	185.5	36.7	64.6	132	113	49	14%	249	73%
South Weber	235.8	30.8	54.1	111	95	20	6%	214	60%
South Ogden Ph. 2	58.0	30.9	66.8	111	95	10	10%	65	66%
Farmington	167.0	31.3	65	112	96	29	11%	156	61%
Total	**796.9**	**33**	**60**	**119**	**102**	**122**	**9%**		

2015 Meter Data

Allocation Amounts	Use (AF)	Use (in)	% of Allocation	% of Need 28 in	% of Need 32.75 in	# Exceeding Allocation	% Exceding Allocation	# over 28 inches	% users over 28 in
Washington Terrace	124.8	30.2	48.1	108	93	4	2%	145	55%
South Ogden Ph. 1	151.5	29.9	52.8	108	92	17	5%	201	59%
South Weber	192.8	25.2	44.2	91	77	10	3%	124	35%
South Ogden Ph. 2	46.5	24.8	53.6	89	76	4	4%	39	40%
Farmington	132.4	24.8	52	89	76	9	4%	94	37%
Total	**647.9**	**27**	**49**	**97**	**83**	**44**	**3%**		

2016 Meter Data

Allocation Amounts	Use (AF)	Use (in)	% of Allocation	% of Need 28 in	% of Need 32.75 in
Washington Terrace	148.9	36.0	57.4	129	111
South Ogden Ph. 1	208.9	41.3	72.7	148	127
South Weber	247.9	32.4	56.8	116	100
South Ogden Ph. 2	62.2	33.1	71.6	119	102
Farmington	171.5	32.2	67	116	99
Total	**839.4**	**35**	**63**	**125**	**107**

2016 Adjusted Meter Data

Allocation Amounts	Use (AF)	Use (in)	% of Allocation	% of Need 28 in	% of Need 32.75 in	# Exceeding Allocation	% Exceding Allocation	# over 28 inches	% users over 28 in
Washington Terrace	144.5	34.9	55.7	125	107	10	4%	203	77%
South Ogden Ph. 1	200.7	39.7	69.9	142	122	60	18%	259	76%
South Weber	241.0	31.5	55.2	113	97	25	7%	223	63%
South Ogden Ph. 2	60.2	32.0	69.3	115	98	13	13%	65	66%
Farmington	165.2	31.0	64	111	95	35	14%	174	68%
Total	**811.4**	**34**	**61**	**121**	**104**	**143**	**11%**		

2017 Meter Data	1.3		landscape (ft2)	14597	allocation	total acreage	0.34236258

Allocation Amounts	Use (AF)	Use (in)	% of Allocation	% of Need 28 in	% of Need 32.75 in
Washington Terrace	168.7	40.8	65.0	147	125
South Ogden Ph. 1	219.2	43.3	76.3	156	133
South Weber	269.8	35.3	61.9	127	108
South Ogden Ph. 2	67.8	36.1	78.1	130	111
Farmington	174.9	32.8	68	118	101
Total	**900.3**	**37**	**68**	**134**	**115**

2017 Adjusted Meter Data

Allocation Amounts	Use (AF)	Use (in)	% of Allocation	% of Need 28 in	% of Need 32.75 in	# Exceeding Allocation	% Exceding Allocation	# over 28 inches	% users over 28 in
Washington Terrace	162.9	39.4	62.8	142	121	27	10%	224	85%
South Ogden Ph. 1	209.5	41.4	73.0	149	127	76	22%	266	78%
South Weber	260.2	34.0	59.7	122	104	33	9%	257	72%
South Ogden Ph. 2	64.5	34.4	74.4	123	105	24	24%	65	66%
Farmington	169.6	31.8	66	114	98	39	15%	170	67%
Total	**866.8**	**36**	**65**	**129**	**111**	**199**	**15%**		

Average Water Reduction % Compared to 2012 Meter Implementation Year

2017	23%
2016	28%
2015	42%
2014	29%
2013	23%
Overall Average Water Reduction	
Average	**29%**

APPENDIX E

BADGER METER INFORMATION AND PI METER CONSTRUCTION DETAIL

Badger Meter

E-Series® Ultrasonic Meter

Cold Water Engineered Polymer Meter, 5/8, 5/8 x 3/4, 3/4, & 1 inch NSF/ANSI Standard 61 Certified, Annex G

DESCRIPTION

The E-Series® Ultrasonic meter uses solid-state technology in a compact, totally encapsulated, weatherproof, and UV-resistant housing, suitable for residential and commercial applications. Electronic metering provides information—such as rate of flow and reverse flow indication—and data not typically available through traditional, mechanical meters and registers. Electronic metering eliminates measurement errors due to sand, suspended particles and pressure fluctuations.

The Ultrasonic 5/8, 5/8 × 3/4, 3/4, and 1 inch meters feature:

- Minimum extended low-flow rate lower than typical positive displacement meters.
- Simplified one-piece electronic meter and register that are integral to the meter body and virtually maintenance free.
- Sealed, non-removable, tamper-protected meter and register.
- Easy-to-read, 9-digit LCD display presents consumption, rate of flow, reverse-flow indication, and alarms.
- High resolution industry standard ASCII encoder protocol.

The Ultrasonic meter is available with an in-line connector for easy connection and installation to AMR/AMI endpoints. It is also available with a flying lead for field splice connection.

APPLICATIONS

Use the Ultrasonic meter for measuring potable cold water in residential, commercial and industrial services. The meter is also ideal for non-potable, irrigation water applications or less than optimum water conditions where small particles exist.

The Ultrasonic meter complies with applicable portions of ANSI/AWWA Standard C700 and NSF/ANSI Standard 61, Annex G. There is currently no AWWA standard that specifically addresses ultrasonic meters for residential applications.

OPERATION & PERFORMANCE

As water flows into the measuring tube, ultrasonic signals are sent consecutively in forward and reverse directions of flow. Velocity is then determined by measuring the time difference between the measurement in the forward and reverse directions. Total volume is calculated from the measured flow velocity using water temperature and pipe diameter. The LCD display shows total volume and alarm conditions and can toggle to display rate of flow.

In the normal temperature range of 45…85° F (7…29° C), the Ultrasonic "new meter" consumption measurement is accurate to:

- ±1.5% over the normal flow range
- ±3.0% from the extended low flow range to the minimum flow value

CONSTRUCTION

E-Series Ultrasonic meters feature an engineered polymer, lead-free meter housing, an engineered polymer and stainless steel metering insert, a meter-control circuit board with associated wiring, LCD, and battery. Wetted elements are limited to the pressure vessel, polymer/stainless steel metering insert and the transducers. The electronic components are housed and fully potted within a molded, engineered polymer enclosure, which is permanently attached to the meter housing. The transducers extend through the polymer housing and are sealed by O-rings.

The metering insert holds the stainless steel ultrasonic reflectors in the center of the flow area, enabling turbulence-free water flow through the tube and around the ultrasonic signal reflectors. The metering insert's patented design virtually eliminates chemical buildup on the reflectors, ensuring long-term metering accuracy.

METER INSTALLATION

The meter is completely submersible and can be installed using horizontal or vertical piping, with flow in the up direction. The meter will not measure flow when an "empty pipe" condition is experienced. An empty pipe is defined as a condition when the flow sensors are not fully submerged.

SPECIFICATIONS

E-Series Ultrasonic Meter Size	5/8 in. (15 mm)	5/8 x 3/4 in. (15 mm)	3/4 in. (20 mm)	1 in. (25 mm)
Operating Range	0.1…25 gpm	0.1…25 gpm	0.1…32 gpm	0.4…55 gpm
Extended Low-Flow Rate	0.05 gpm	0.05 gpm	0.05 gpm	0.25 gpm
Maximum Continuous Operation	25 gpm	25 gpm	32 gpm	55 gpm
Pressure Loss	4.3 psi at 15 gpm	2.3 psi at 15 gpm	2.0 psi at 15 gpm	1.8 psi at 25 gpm
Reverse Flow - Maximum Rate	4.0 gpm	4.0 gpm	4.0 gpm	9.0 gpm
Operating Performance	In the normal temperature range of 45…85° F (7…29° C), new meter consumption measurement is accurate to: • ± 1.5% over the normal flow range • ± 3.0% from the extended low flow range to the minimum flow value			
Storage Temperature	– 40…140° F (– 40…60° C)			
Maximum Ambient Storage (Storage for One Hour)	150° F (72° C)			
Measured-Fluid Temperature Range	34…140° F (1°…60° C)			
Humidity	0…100% condensing; meter is capable of operating in fully submerged environments			
Maximum Operating Pressure of Meter Housing	175 psi (12 bar)			
Register Type	Straight reading, permanently sealed electronic LCD; digits are 0.28 in. (7 mm) high			
Register Display	• Consumption (up to nine digits) • Rate of flow • Alarms • Unit of measure factory programmed for gallons, cubic feet and cubic meters			
Register Capacity	• 10,000,000 gallons • 1,000,000 cubic feet • 100,000 cubic meters			
Totalization Display Resolution	• Gallons: 0.XX • Cubic feet: 0.XXX • Cubic meters: 0.XXXX			
Battery	3.6-volt lithium thionyl chloride; battery is fully encapsulated within the register housing and is not replaceable; 20-year battery life			

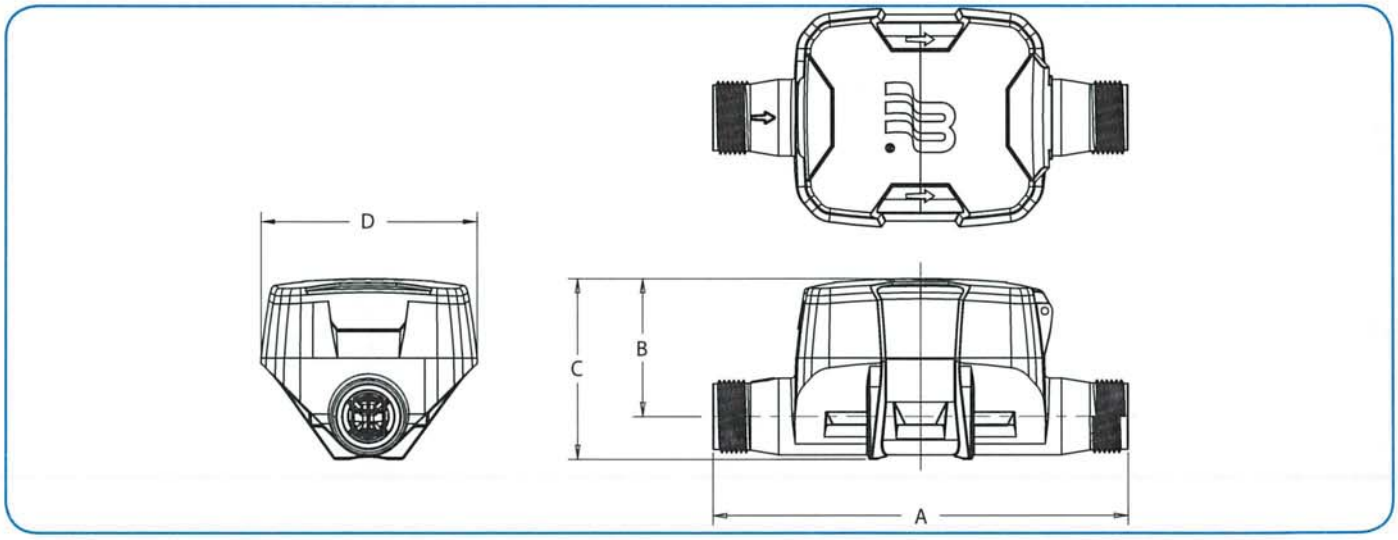
MATERIALS

Meter Housing	Engineered polymer
Measuring Element	Pair of ultrasonic sensors located in the flow tube
Register Housing & Lid	Engineered polymer
Metering Insert	Engineered polymer & stainless steel
Transducers	Piezo-ceramic device with wetted surface of stainless CrNiMo

PHYSICAL DIMENSIONS

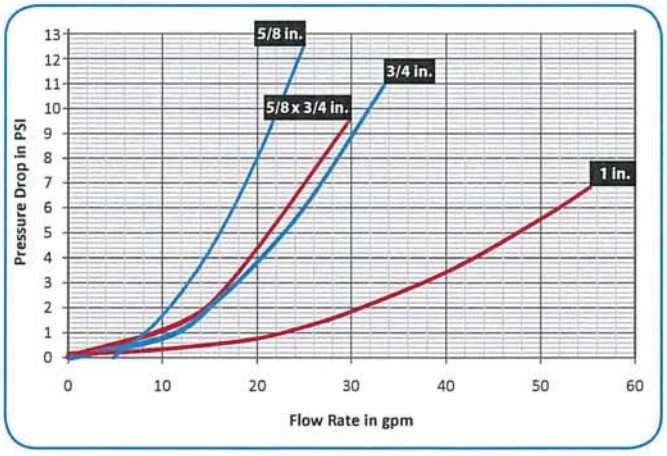
E-Series Ultrasonic Meter Size	5/8 in. (15 mm)	5/8 (15 mm) x 3/4 in. (20 mm)	3/4 in. (20 mm)	1 in. (25 mm)
Size Designation X Lay Length	5/8 × 7-1/2 in.	5/8 × 3/4 × 7-1/2 in.	3/4 × 7-1/2 in. or 3/4 × 9 in.	1 × 10-3/4 in.
Weight (without AMR)	1.60 lb	1.58 lb	3/4 × 7-1/2 in.: 1.58 lb 3/4 × 9 in.: 1.64 lb	2.3 lb
See illustration below for Measurement Designations.				
Length (A)	7.5 in.	7.5 in.	7.5 in. or 8.85 in.	10.75 in.
Height (B)	2.46 in.	2.46 in.	2.46 in.	2.66 in.
Height (C)	3.27 in.	3.23 in.	3.23 in.	3.62 in.
Width (D)	3.90 in.	3.90 in.	3.90 in.	3.90 in.
Bore Size	5/8 in.	3/4 in.	3/4 in.	1 in.
Coupling Nut & Spud Thread	3/4 in. × 14 NPSM	1 in. × 11-1/2 NPSM	1 in. × 11-1/2 NPSM	1-1/4 in. × 11-1/2 NPSM
Tailpiece Pipe Thread (NPT)	1/2 in.	3/4 in.	3/4 in.	1 in.
Service Pipe Thread (NPT)	1/2 in.	3/4 in.	3/4 in.	1 in.

MEASUREMENT DESIGNATIONS



PRESSURE LOSS CHART

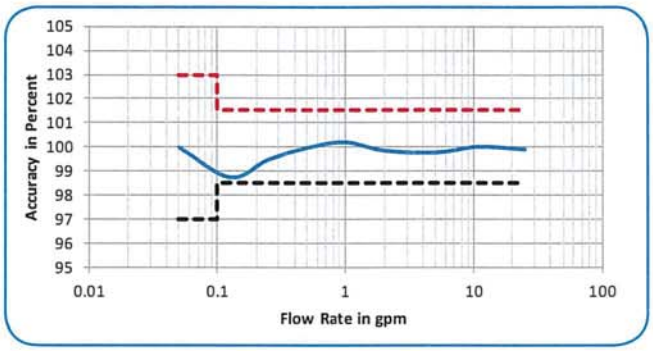
Rate of Flow in gallons per minute (gpm)



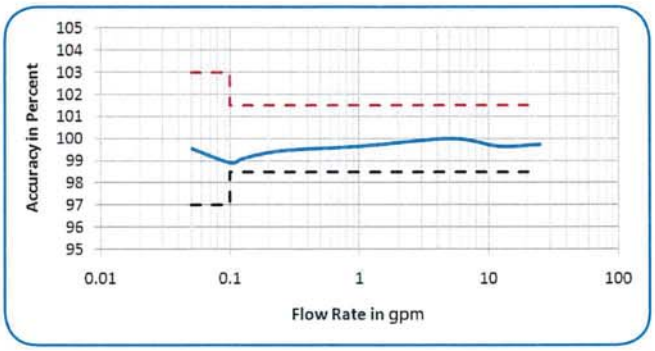
ACCURACY CHARTS

Rate of Flow in gallons per minute (gpm)

5/8 IN. METER



5/8 x 3/4 IN. METER



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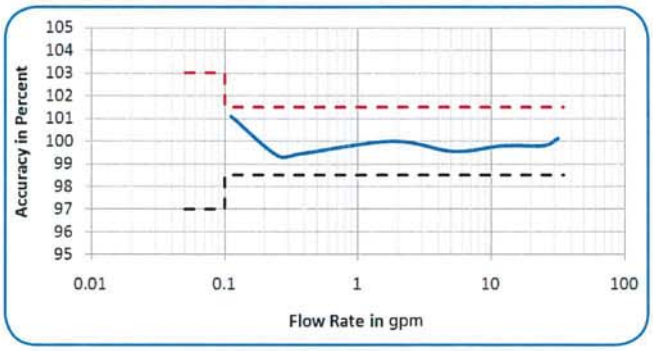
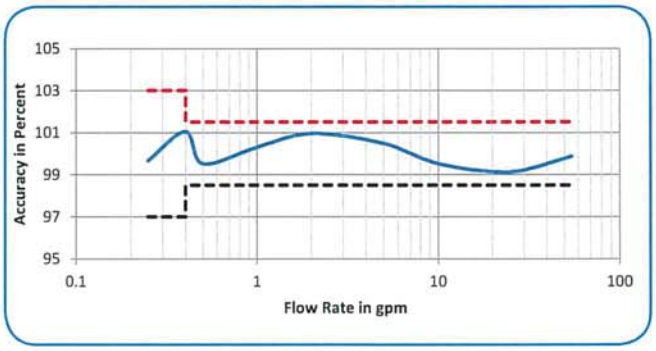


1 IN. METER



Making Water Visible®

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Legacy Document Number: ESM-T-12-EN

Badger Meter

ORION® Water Endpoints

Cellular LTE Endpoint

DESCRIPTION

The ORION® Cellular endpoint is an innovative, two-way water endpoint that utilizes existing cellular infrastructure to efficiently and securely deliver meter reading data to the utility via the reliable cellular network.

The Cellular endpoint is a member of the time-tested ORION family of products from Badger Meter, designed for maximum flexibility. Since 2002, the ORION product family has provided comprehensive Advanced Metering Analytics (AMA) for interval meter reading and data capture using both one-way and two-way communications.

FUNCTIONALITY

Operation: The endpoint communicates with the encoder and captures readings and meter status information. At a predetermined interval, the endpoint broadcasts readings, status, and event data via the cellular network, and the information is captured and analyzed using BEACON AMA software.

Activation: All ORION Cellular LTE endpoints are shipped in an inactive, non-transmitting state. The endpoints offer a Smart Activation feature. After the endpoint is installed, it begins broadcasting data when the encoder senses the first usage of water. No field programming or tools are required to activate the endpoint. Alternatively, an IR fob can be used to activate the endpoint and verify the encoder connection. With proper installation, successful endpoint function can be confirmed through a web app demonstrating that communication has been verified to both the encoder and to the network.

Broadcast Mode: The endpoint broadcasts fixed network reading data through the secure existing cellular network within the service area. The endpoint also transmits a mobile message to support troubleshooting in the field.

Data Storage: The endpoint stores 42 days of 15-minute data.

Output Message: The endpoint broadcasts its unique serial number, meter reading data, and applicable status indicators. Each message is encrypted to meet Advanced Encryption Standard (AES) 256.

APPLICATION

Configurations: The endpoint is a multi-purpose endpoint that can be deployed in indoor, outdoor and pit applications. The electronics and battery assembly are fully encapsulated in epoxy for environmental integrity. The endpoint is available with a connector assembly for ease of installation.

Meter Compatibility: When attached to a Badger Meter high resolution encoder, the endpoint is compatible with all current Badger Meter Recordall® Disc, Turbo Series, Compound Series, Combo Series and Fire Service meters and assemblies, and with E-Series® Ultrasonic, E-Series® Ultrasonic Plus, and M-Series® Electromagnetic flow meters.

Encoder Compatibility: The endpoint is suitable for use with Badger Meter high resolution encoders as well as the following Badger Meter approved three-wire encoder registers that have a manufacture date of 2005 or newer, are programmed into the AMR/AMI three-wire output mode, and have three-wires connected: Elster InVISION and ScanCoder® encoders and evoQ4 meter (encoder output); Hersey® Translator; Master Meter® Octave® Ultrasonic meter encoder output; Metron-Farnier Hawkeye; Mueller Systems 420 Solid State Register (SSR) LCD; Neptune® ProRead, E-Coder® and ARB-V®; and Sensus® Electronic Register encoder (ECR) and ICE.

SPECIFICATIONS

Dimensions	5.125 in. (130 mm) (H) 1.75 in. (44 mm) Diameter at top 2.625 in. (W) x 2.875 in. (D) at base 67 mm (W) x 73 mm (D) at base
Broadcast Network	LTE cellular network, with fallback to 3G where LTE is unavailable. Mobile backup frequency is FCC-regulated 902…928 MHz frequency hopping modulation
Operating Temperature Range	
• Storage, Meter Reading and Mobile Backup	–40…60° C (–40…140° F)
• Cellular Communications	–20…60° C (–4…140° F)
Humidity	0%…100% condensing
Battery	One (1) lithium thionyl chloride D cell (nonreplaceable)

Construction: All ORION Cellular endpoints are housed in an engineered polymer enclosure with an ORION RF board, battery and antenna. To ensure long-term performance, the enclosure is fully potted to withstand harsh environments and to protect the electronics in flooded or submerged pit applications.

Wire Connections: ORION Cellular endpoints are available with in-line connectors (Twist Tight or Nicor®) for easy installation and connection to compatible encoders/meters. The endpoints are also available with flying leads for field splice connections. Other wire connection configurations may be available upon request.

FEATURES

Communication Type	Two-way
Application Type	Control/Monitor
Reading Interval Type	15-minute
Encoder Compatibility	Absolute
Fixed Network Reading	✓
Premise Leak Detection	✓
Cut-Wire Indication	✓
Reverse Flow Indication	✓
No Usage Indication	✓
Encoder Error	✓
Low Battery Indication	✓
Remote Programming	✓
Remote Clock Synchronization	✓
Firmware Upgrades	✓

License Requirements: ORION Cellular LTE endpoints comply with Part 15, Part 22, Part 24, and Part 27 of the FCC Rules. No license is required by the utility to operate an ORION meter reading system. This device complies with Industry Canada license-exempt RSS standard(s).

Transportation: The Federal Aviation Administration prohibits operating transmitters and receivers on all commercial aircraft. The ORION Cellular endpoint is considered an operating transmitter and cannot be shipped by air.

Warning: To reduce the possibility of electrical fire and shock hazards, never connect the cable from the endpoint to any electrical supply source. The endpoint cable provides SELV low voltage limited energy power to the load and should only be connected to passive elements of a water meter register.

Caution: The endpoint batteries are *not* replaceable. Users should make no attempt to replace the batteries.
Changes or modifications to the equipment that are not expressly approved by Badger Meter could void the user's authority to operate the equipment.

Making Water Visible®

www.badgermeter.com

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Analytics Made Easy

Built on a century of water metering experience and the latest technology, the cloud-based BEACON AMA software suite and proven ORION® family of endpoints bring a new level of utility-optimizing information to light. BEACON AMA provides valuable benefits:

The BEACON AMA software suite and ORION family of endpoints bring utility-optimizing information to light

Increased Visibility Through Analytics

- Customizable dashboards to deliver system-wide information to your desktop or device.
- The ability to set unique alert conditions to define and proactively monitor exceptions.
- Secure, hosted platform—ISO 27001certified and SOC 2 examined for secuity, availability and confidentiality.
- Automatic software upgrades keep your system up to date without discs or downloads.
- Built-in API's and data exchange modules support data transfer to utility billing, work order, inventory/asset management, Customer Relationship Management (CRM), Geographic Information Systems (GIS), and other legacy utility systems.

Enhanced Customer Service

- Consumption graphs with temperature and precipitation overlays provide an easy-to-understand picture of how water is being used by each customer.
- Consumer engagement website and smartphone/tablet app provide your end water customers with easy access to their usage activity to gain a greater understanding and control of their consumption patterns.

Focus on Water Management

- All BEACON AMA solutions provide the hosted software platform, system maintenance, software support, and management information that allow you to focus your time and resources on managing your water delivery system.

Future-Proof Technology

- With a BEACON AMA solution, you receive the hosted BEACON AMA software suite with regular updates and the latest ORION communication technology to future-proof your investment and keep your system in step with changes in technology.

BEACON® Advanced Metering Analytics Software Suite

The BEACON AMA software suite is designed to transform your data into proactive intelligence and enhance your overall operations. Here are a few examples of the benefits you can expect:

Enhanced Customer Service

With access to timely information, respond to customer needs more effectively—and resolve billing issues quickly.

Analyze a consumption profile over selected time periods and rapidly respond to customer inquiries.

Simplified Revenue Management

The system supports increased profitability by efficiently importing and exporting billing data.

Improve your process—and access information easily on user-friendly, intuitive screens.

Faster Leak Detection

Set leak detection alerts and thresholds to quickly understand where problems are occurring.

Set threshold and leak detection alerts to monitor water use.

Making Water Visible to Utilities and End Water Customers

Allow end water customers to view and understand their usage profile through an easy-to-use consumer engagement website or smartphone/tablet app.

Consumers can use EyeOnWater Online or the EyeOnWater App to easily gain access to their water usage data.

Better Tools for Government Regulation Compliance

Streamline regulatory compliance by configuring a variety of reports within the BEACON AMA software suite.

Easily compile data for ever-changing compliance reporting.

Badger Meter

BEACON® Advanced Metering Analytics
EyeOnWater® Consumer Engagement

EyeOnWater® is a consumer engagement application that goes beyond traditional monthly statements to connect utilities and their customers like never before. Available exclusively through BEACON® AMA, EyeOnWater enables utility customers to view and understand their usage profile through easy-to-understand consumption graphs and provides a simple method to establish alerts to better manage their water use.

Literally putting water usage data in the palm of consumers' hands, EyeOnWater mobile apps bring the power of the online portal to your customer's iOS device or Android smartphone.

Direct Water Consumption Data
Gives utility customers direct access to their water consumption data, allowing them to easily view, understand and manage their water usage.

Improved Customer Service
Improved customer service and reduced calls to the utility.

Promotes Water Conservation
Promotes changes in behavior related to water conservation.

Features:

- Secure, cloud-based – ISO 27001 certified and SOC 2 examined for security, availability and confidentiality
- Hourly, daily, monthly, and yearly data and charts
- Temperature and precipitation overlays
- Week-over-week consumption comparisons
- Configurable leak alerts by email or SMS text
- Web-based consumer portal, plus Android and iOS mobile apps

Better information. Better utility management. Clearly Better.

BEA-FL-01840-EN-02 (March 2016)

Badger Meter

BEACON® Advanced Metering Analytics

Managed Solution

OVERVIEW

The BEACON® Advanced Metering Analytics (AMA) managed solution from Badger Meter brings a new level of utility optimizing information to light. The managed solution approach combines our intuitive BEACON AMA software suite with the proven ORION® communication technologies to give you greater visibility and control over utility management.

Configured for your utility, the BEACON AMA managed solution utilizes two-way communications—plus cellular and fixed networks—to deliver a simple, yet powerful end-to-end-solution.

Built-in infrastructure management services and a system design that keeps you in step with technology advancements, allows you to do what you do best—manage your water utility. Plus, built-in consumer engagement tools help enhance customer service, increase satisfaction and reduce costs.

SOFTWARE APPLICATIONS

BEACON Advanced Metering Analytics (AMA)

With tools beyond meter reading and network management, BEACON AMA software offers targeted Advanced Metering Analytics. BEACON AMA software puts interval meter data to work to increase efficiency in day-to-day utility operations and address demands for actionable intelligence.

- **Problem solver** – User intuitive data tools place the power of water consumption data at your fingertips, allowing you to rapidly respond to customer inquiries and quickly resolve—and even eliminate—many billing issues.
- **Customized design** – A customizable dashboard delivers information configured to user security access level in a format matched to the utility's individual requirements, providing data management integrity, security and control.
- **Works with you** – Integration with utility systems—billing, work order, inventory, Customer Relationship Management (CRM) and Geographic Information Systems (GIS)—streamlines and improves utility operations without disrupting the current utility billing interface file transfer process.
- **Find out fast** – Alert conditions can be set to monitor and notify users of system exceptions, including continuous flow, for faster leak detection.
- **Innovation at your service** – Secure, hosted platform with automatic software upgrades ensures the latest technology and features are always available.

EyeOnWater®

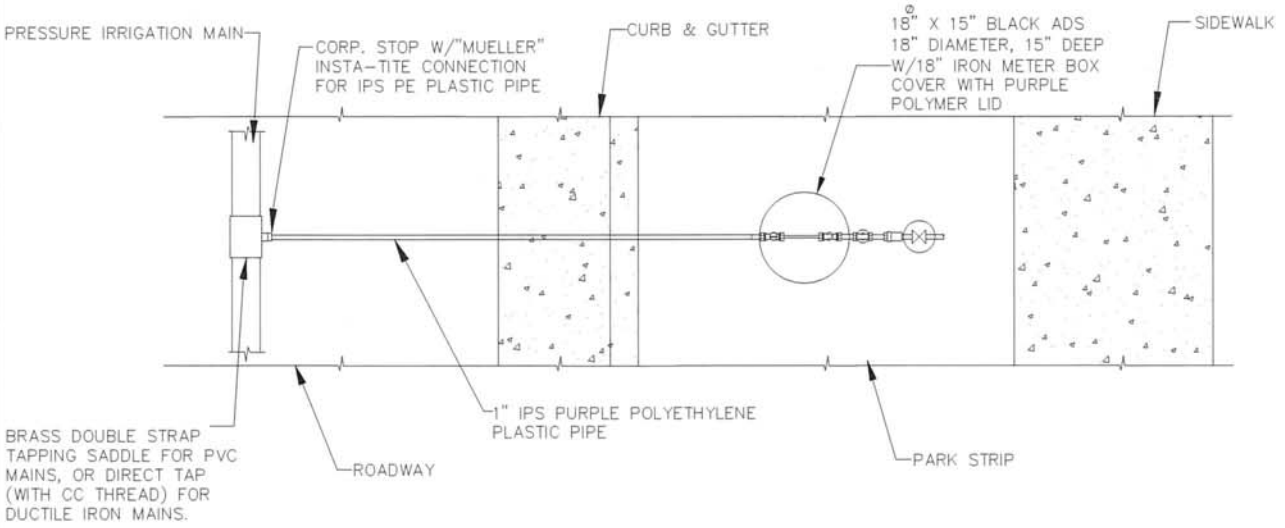
The BEACON AMA software suite includes informative consumer outreach tools to improve customer service consisting of the EyeOnWater consumer engagement website, smartphone mobile apps, and email or SMS text alerts, providing easy access to personal consumption data and alerts to potential leaks. With these tools, water consumers are able to view their usage activity, and gain greater understanding and control of what they use and the value you provide.

HARDWARE

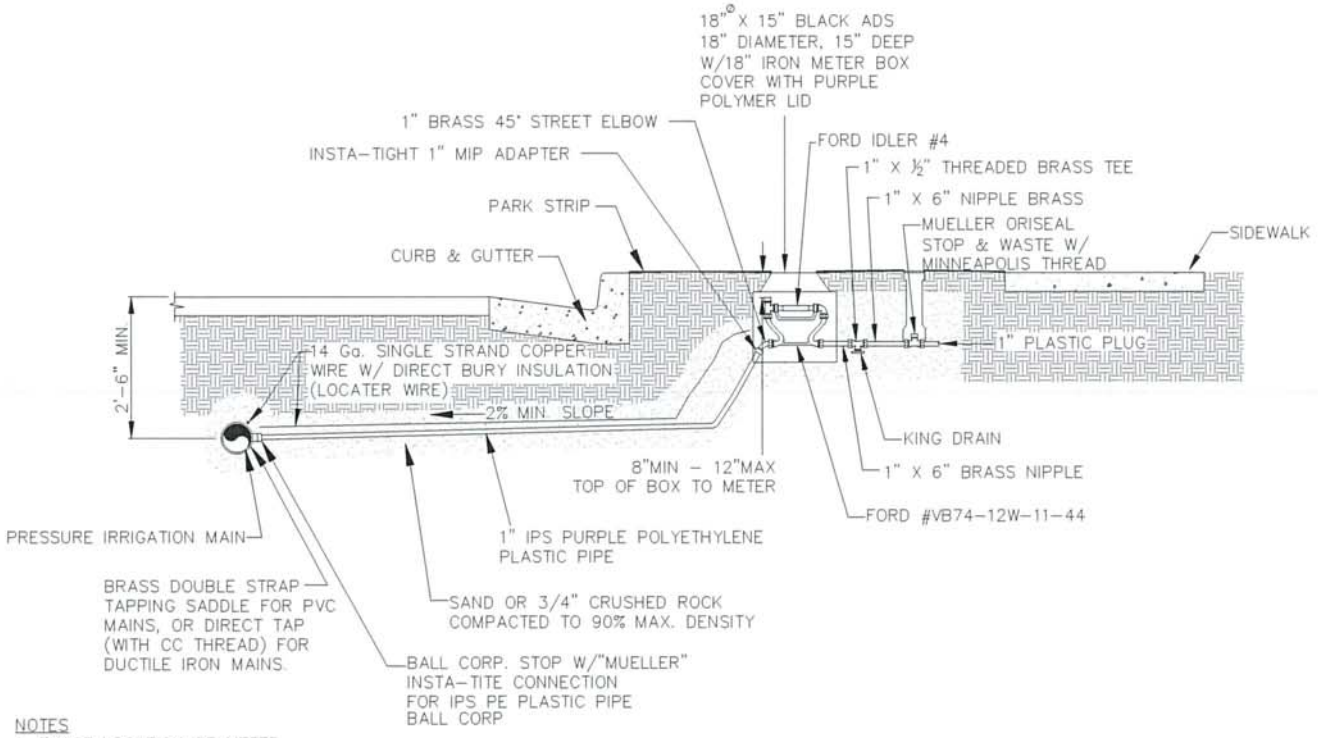
The BEACON AMA managed solution is built on the proven ORION system for interval data capture and two-way communication. In a managed solution, a network analysis of the deployment area is performed to determine the optimal mix of ORION technologies to achieve system performance goals. Should the analysis recommend the inclusion of any fixed network gateways and endpoints, Badger Meter installs and maintains the gateways. The solution also employs cellular endpoints which, as they leverage the public cellular network and require no proprietary gateways to operate, dramatically reduce infrastructure requirements compared to a traditional fixed network. This speeds installations and simplifies expansion as a system evolves.

- **Hourly data** – ORION endpoints are programmed to automatically broadcast hourly meter reading and event data to the BEACON software on a daily basis. Hourly data helps identify potential customer-side leaks and other anomalies in water use, and provide the utility with a potent tool to enhance its customer service. Optionally, endpoints can be reprogrammed over the air via the network to collect data and transmit more frequently.
- **Two-way communication** – BEACON software communicates with ORION endpoints to accomplish a number of system tasks, including requesting additional information from the endpoint and synchronizing the internal endpoint clock. If needed, the ORION two-way system architecture sends upgrades to the endpoint firmware over the air via the network, utilizing the powerful BEACON AMA software suite.
- **Data integrity** – ORION endpoints utilize secure and robust encryption to ensure that data is reliably transmitted and received, that the integrity of the data is maintained, and that data cannot be captured or altered by unauthorized users.

08/05/15



PLAN VIEW



NOTES
1. EXACT LOCATION OF METER AND BOX SHALL BE DETERMINED BY WATERPRO INSPECTOR

ELEVATION

SERVICE CONNECTION DETAIL

WATER PRO INC.	PRESSURE IRRIGATION SERVICE CONNECTION DETAIL	STANDARD DETAIL 10

APPENDIX F

PROJECT PUMPING ENERGY & COST SAVINGS

CANAL PUMP STATION ESTIMATED COST & ENERGY SAVINGS

Pump Station Characteristics

Pump	Average Flow (gpm)	Horsepower	Head (ft)	Pump Efficiency	Motor Efficiency	Cost/kW-hour
1	4500	500	337	85%	90%	0.09
2	4500	500	337	85%	90%	0.09
3	2250	300	404	85%	90%	0.09
4	2250	300	404	85%	90%	0.09
Total	13,500					

Pressure Irrigation Average Flows

PI System Usage Type	PI System - Avg Annual Total	Water Conserved
Gallons/Year	1,752,424,419	355,828,833
Gallons/Month	250,346,346	50,832,690
Acre-Ft/Year	5,378	1,092
Gallons/Minute	**5,795**	**1,177**

Existing PI System Flows & Costs

Pump #	PI Flow (gpm)	Calc. Cost/Hour	Cost/Month	kW Hours /Month
1	4,500	$33.57	$24,170	268,560
3	1,295	$11.59	$8,347	92,747
TOTALS	5,795		$32,518	

PI System Flows & Costs with Conservation from Metering

Pump #	PI Flow (gpm)	Calc. Cost/Hour	Cost/Month	kW Hours /Month
1	3,323	$24.79	$17,850	198,336
3	1,295	$11.59	$8,347	92,747
			$26,197	

DIC Energy and Cost Savings

kW-Hours/Month	kW-Hours/Year	Cost/Month	Cost/Year
70,224	491,571	$6,320	$44,241

The cost of pumping water can be calculated as

$C = 0.746\ Q\ h\ c\ /\ (3960\ \mu_p\ \mu_m)$

where

C = cost per hour (USD, EUR, ...)

Q = volume flow (US gpm)

h = head (ft)

c = cost rate per kWh (USD/kWh, EUR/kWh, ...)

μ_p = pump efficiency (0 - 1)

μ_m= motor efficiency (0 - 1)

APPENDIX G

DIC WATER CONSERVATION MASTER PLAN (EXCERPT)

Water Conservation Master Plan

Prepared for

WATERPRO INC.®
A Draper Irrigation Company

December 2014

1. Executive Summary

Introduction

The rapid population growth that continues throughout the state of Utah, and especially in the Draper area, is putting increasing pressure on existing water supplies.

As required by the Utah Water Conservation Plan Act (73-10-32, UCA), this plan update details the water conservation plans that Draper Irrigation Company/WaterPro Inc. has implemented and is considering in order to preserve our water resources. When accepted by our Board of Directors, this Master Plan will provide a blueprint for our water conservation practices in the years 2015-2020.

Water Resources

Draper Irrigation/WaterPro has sufficient culinary and irrigation rights to service our customers at this time.

With anticipated population growth in our service area, we are actively pursuing more culinary water rights. In recent years we have acquired more well rights, and currently have a goal of buying up to 500 more acre-feet of well rights. In addition, we are in the process of negotiation an agreement to utilize water rights in Little Willow.

We are also pursuing the use of reclaimed water for our irrigation system, if this proves to be practical.

Water Usage and Goal

WaterPro has established a goal of reducing usage of potable water (gallons per capita per day, or gpcd) to 172 gpcd by 2025. In general, our usage has trended downward since 2000, although as the following chart shows, there has been some variation. This up-and-down pattern is also reflected by other water users in the Salt Lake valley, and is probably related to the economic recession in 2008, when people used less water because of financial reasons, and to an unusually hot, dry summer in 2012. We are still aiming for the goal of 172 gpcd by 2025.

Year	Gpcd
2000	242
2008	184
2012	208
2013	185

Conservation Measures

Over the next five-year period, WaterPro plans to adopt conservation measures in several

areas, based on the Best Management Practices (BMPs) recommended by the Utah Division of Water Resources:

- *Universal metering* of our irrigation system. From our last report, we have felt that we have solved the technical problems in finding a meter that works for the pressure irrigation system. We are still struggling with the cost of installing the meters and are looking for grants.
- Work with Draper City to draft and enact *additional water conservation ordinances*.
- Continue and expand our *public information program* to include our newsletter and annual mailings, as well as sponsorship of community festivals.
- Continue to urge our customers to participate in JVWCD's *Water Check program* and conservation program.
- Work in cooperation with Draper City and Jordan Valley Water Conservancy District to continue to offer a *school education program* for elementary school children in Draper.
- Implement *reclaimed water use* if it is practical, based on our ongoing analysis.

6. Additional Conservation Measures

The Company plans to implement the following conservation measures, as based on the Best Management Practices (BMPs) recommended to water providers by the Utah Division of Water Resources.

BMP: Universal Metering

- Install meters on all residential, commercial, institutional and industrial water connections. Meters should be read on a regular basis.
- Establish a maintenance and replacement program for existing meters.
- Meter secondary water at the most specific level possible, somewhere below source water metering. Individual secondary connection metering should be done as soon as technology permits.

Universal Metering:

Culinary system: WaterPro has been installing radio-read meters on culinary connections, and reads them regularly. This helps ensure that we are billing accurately for the culinary water our customers use.

Irrigation system: We have installed meters on the secondary system for our large commercial users with 2" connections. Some commercial users with older and smaller 1" connections are still not metered.

As for our residential users, we have found a meter that we feel will work well with our irrigation system. By 2015 we anticipate that we will have 160 meters installed for residential users with 1" connections, and in that year we will start billing those with meters for their actual use, rather than the flat fee we have historically charged. We are continuing to install meters for our customers with 2" connections.

Cost analysis: Capital costs for installing meters on all pressure irrigation connections will be substantial, while annual costs will include reading, maintaining, and replacing meters as needed.

It is difficult to predict the actual amount of water we will save by metering the secondary system, but the cost savings are unlikely to be enough to justify the large capital outlay based solely on a financial analysis. Because of this expense, we have sought and received matching grants from JVWCD - $60,000 each year for 2013 and 2014. We are continuing to seek grants to defray the cost of installing these meters.

APPENDIX H

2018 WATER RIGHTS MASTER PLAN (EXCERPT)

EXECUTIVE SUMMARY

INTRODUCTION

Draper Irrigation Company (Company) is a major culinary and pressure irrigation (PI) retail water provider to customers primarily in Draper City. The Company last completed a water rights master plan in February of 2012. Since that time, a number of issues have changed in the Company's system including: changes to its water right portfolio, additional available secondary water meter data, revised water production requirement projections, and incorporation of the State of Utah's requirement for a 40-year supply plan into this water rights update. To consider these and other issues relative to the Company's future water supply commitments, the Company has retained Bowen, Collins & Associates (BC&A) to update its water rights master plan.

PRODUCTION REQUIREMENT PROJECTIONS

Based on residential equivalents estimates, historic source water production records, and newly developed estimations of irrigable area within the Company's service boundaries, BC&A developed projections of the Company's water production requirements (both culinary and PI) through build-out in 2035 as shown in Table ES-1.

Table ES-1
Summary of Projected Production Requirements Through Build-out

	Current PI Use Rate		100% PI Use Rate	
Year	**Culinary System (ac-ft)**	**PI System (ac-ft)**	**Culinary System (ac-ft)**	**PI System (ac-ft)**
2017	7,552	5,258	7,552	5,258
2020	7,704	5,259	7,279	5,684
2025	7,958	5,259	6,824	6,393
2030	8,211	5,260	6,369	7,103
2035	**8,465**	**5,261**	**5,913**	**7,813**

There are two scenarios included in Table ES-1. While Company personnel have indicated that there is a Company goal for all outdoor use to be satisfied by PI where available, historic data suggests there are a significant number of customers that are utilizing culinary water for outdoor use even though there is PI water available. Thus, Table ES-1 includes one scenario that assumes current PI use rates continue until build-out. It also includes a second scenario that assumes 100% of the users with access to the PI system will entirely convert over to using PI by build-out.

EXISTING WATER SUPPLY

The water rights and water assets presently held by the Company are summarized in Table ES-2. They represent the theoretical maximum water that can be used by the Company.

Table ES-2
Total Water Assets

Water Right/Source	Annual Volume (ac-ft)
Total Wells	1,476
Total Bear/Corner Canyon	1,607
Total Mountain Streams	6,342
Total Culinary Water Rights	**9,426**
Total Utah Lake	4,726
PI Water Rights[1]	**4,726**
Other Water Assets	2,751
Total Water Assets	**16,902**

[1]Dual system sources were not counted in total pressure irrigation rights as they are already accounted for under the culinary rights.

In reality, the actual amount of water that can be produced and used is limited by system demands, seasonal supply availability, system delivery capacity, and other factors. Table ES-3 shows the estimated reliable capacity of each category of water source that the Company can plan for in a dry year based on historic records.

Table ES-3
Reliable Culinary & Pressure Irrigation Source Production

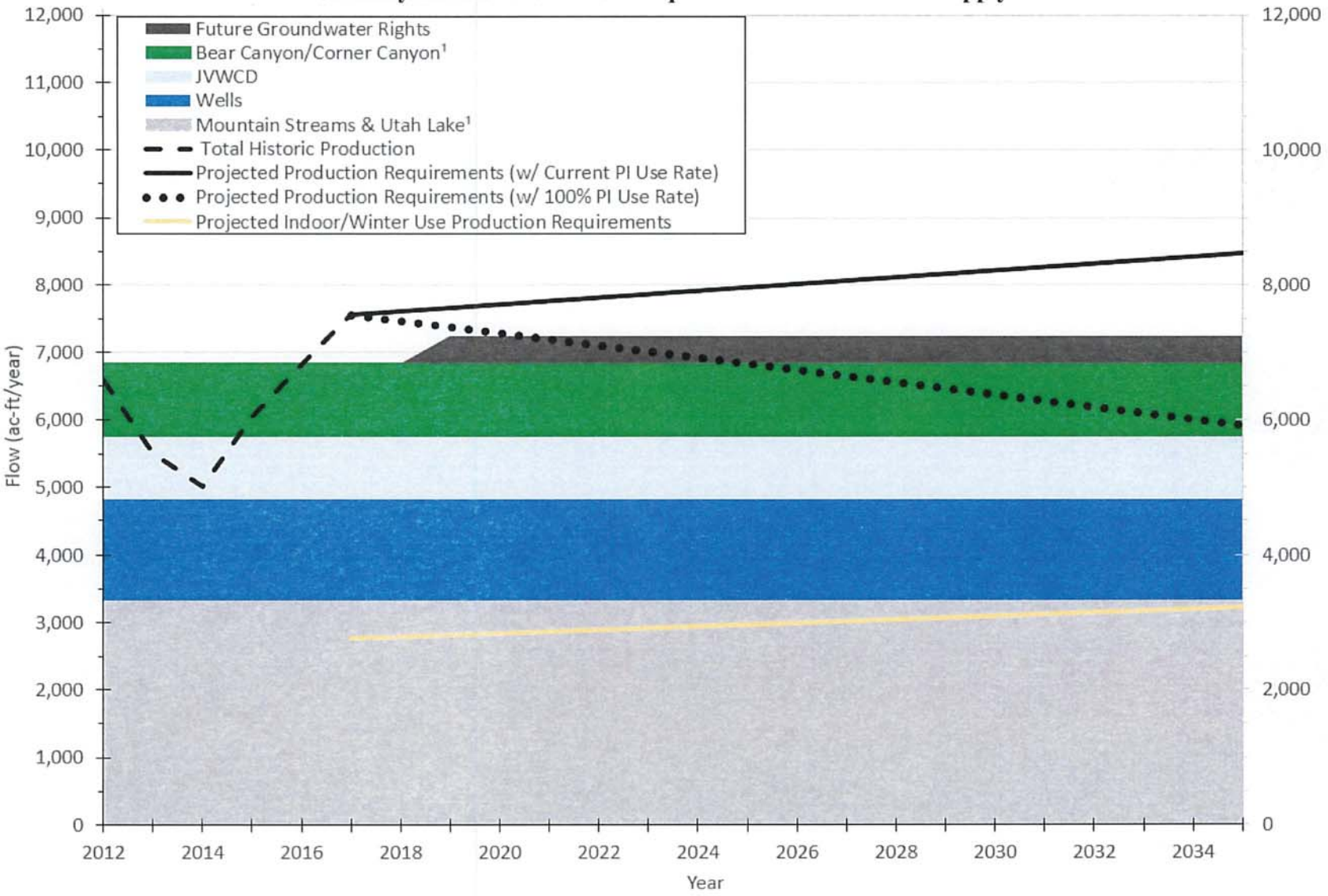
Source	Reliable Yield (ac-ft/year)
Wells	1,476
Misc. Mountain Streams[1] [2]	3,341
Bear Canyon/Corner Canyon[2]	1,068
JVWCD	950
Subtotal Culinary	**6,834**
Utah Lake/Jordan River/Canal	2,992
Land Drain	79
Subtotal PI	**3,070**
Total Reliable Yield	**9,904**

[1]Misc. Mountain Streams includes 345 ac-ft/year estimate of Little Willow reliable flow
[2]Source used for both culinary and pressure irrigation systems.

EXISTING WATER SUPPLY EVALUATION

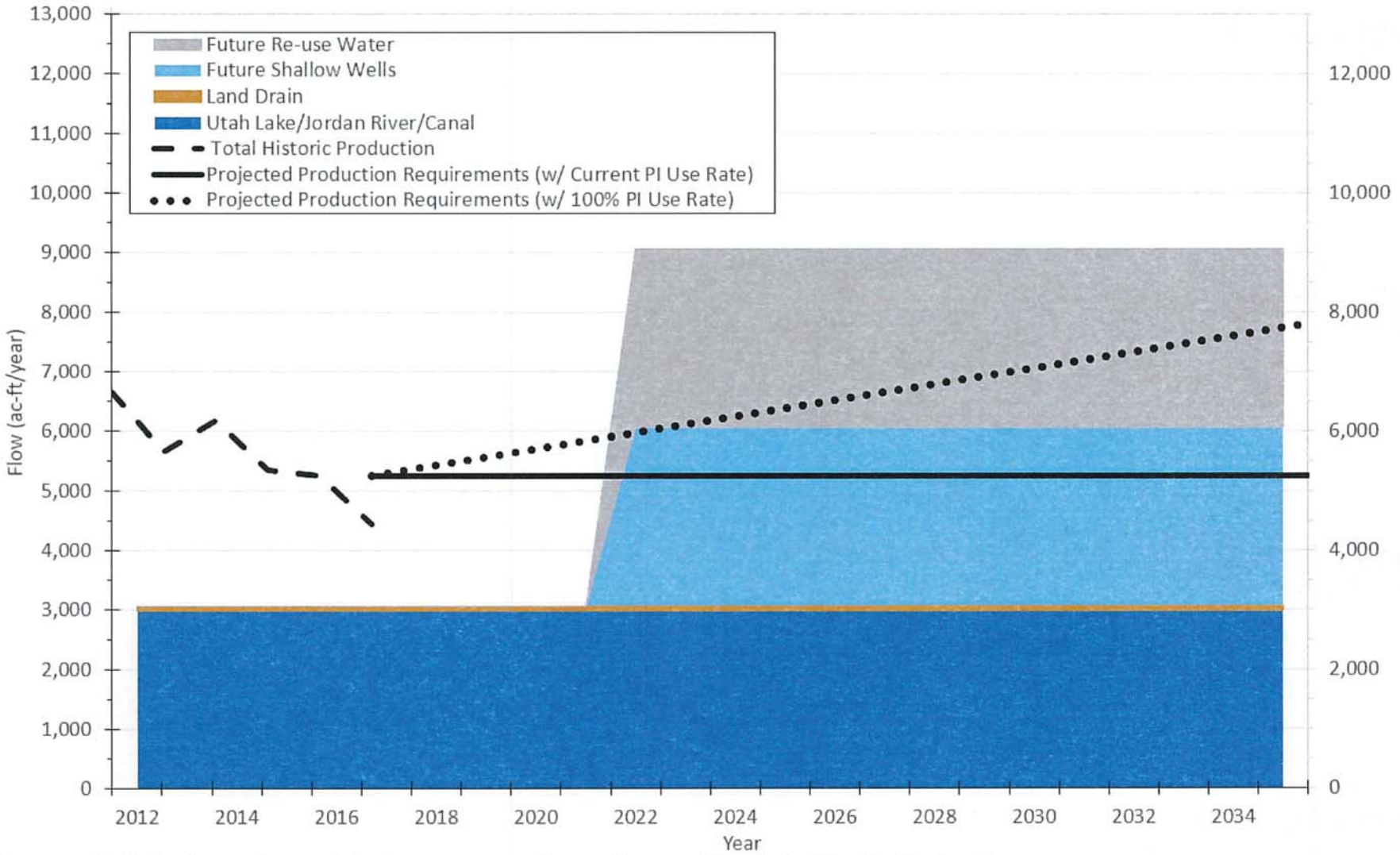
To evaluate the adequacy of Company's supply relative to projected water production requirements in the Company's service area, BC&A plotted projected water production requirements against reliable supply for both culinary and PI service. This is shown in Figures ES-1 and ES-2 for each water system.

Figure ES-1
Culinary Annual Production Requirements and Reliable Supply



[1]Source used for both culinary and pressure irrigation systems.

Figure ES-2
Pressure Irrigation Annual Production Requirements and Reliable Supply[1]



[1]Sources used for both culinary and pressure irrigation systems are not shown as they are anticipated to be fully utilized by the culinary system.

CONCLUSIONS

The following conclusions can be made regarding water supply in the Company's culinary and PI systems:

1. The Company's overall annual reliable water supply (9,904 ac-ft) is only approximately 59% of the existing Company's overall annual theoretical water assets (16,902 ac-ft).
2. Reliable source supply is presently deficient to meet existing production requirements by an estimated 2,906 ac-ft/year (718 ac-ft/year for the culinary system and 2,188 ac-ft/year for the PI system). At build-out the total water deficiency will increase to an estimated 3,822 ac-ft/year.
3. There is approximately 2,550 ac-ft/year of culinary water that is being used for outdoor irrigation within the PI system service area that should be transitioned to the PI system. If approximately 64% or more of that culinary water is transitioned to the PI system, the culinary system will not have a supply deficit at build-out.
4. Meeting future needs in the PI system will require solidifying the yield of the Company's existing Utah Lake assets and securing at least 2,000 ac-ft from another source.
5. While transitioning culinary outdoor use to the PI system can eliminate long term deficits, there could still be a small shortfall over the next several years in a severe drought.
6. Only approximately 44% of the total water used in the PI system is currently metered. PI production requirements are expected to drop if the remaining water is metered. Metering is an essential part of the Company's ability to meet long term demands.
7. Any future source to be acquired should be evaluated for its capacity to supply water during the Company's summer peak usage time.

RECOMMENDATIONS

Because the culinary and PI system projected requirements are directly related, both by some sources being able to serve the culinary and PI systems and the outdoor PI usage rate transition in areas of system overlap, recommendations for both systems will be discussed together. The following recommendations are presented for the Company's consideration:

1. **Eliminate Outdoor Culinary Irrigation in Areas of System Overlap.** Water sources suitable for culinary use are generally more difficult to obtain and it is more costly to treat/provide culinary water. Therefore, culinary water used for outdoor purposes in the overlapping service areas should be transitioned to the PI system. The Company can encourage this from users in the overlapping areas by considering options such as: improve PI water quality, a minimum PI service charges even if PI is not used, aggressive tiered culinary rate structure, and begin a PR campaign to educate users about the need to use PI water and receptive landscaping.

2. **Obtain Additional Permanent Water Assets/Improve Reliability.** There are a variety of options to source new permanent water sources that are needed to meet production requirements; however the Company has indicated three primary alternatives that have

already been investigated by the Company and are preferred: new groundwater/well rights, a new shallow groundwater well system to fully utilize existing rights, and wastewater treatment plant re-use water.

3. **Utah Lake Distributing Canal Shares**. The Company has approximately 224.8 ac-ft/year of water from this source that it is unable to presently utilize in its system because of the lack of physical access to the water. It is recommended that the Company sell or permanently exchange these shares for other permanent rights that the Company can utilize.

4. **Conservation.** The Company should consider continuing to convert the PI system from unmetered to metered connections to reduce water usage. In addition, implementation of a PI system tiered rate structure that discourages overuse of PI water in order to meet its long-term conservation goals would be beneficial.

5. **Consider a Supply Safety Factor.** To account for potential contingencies due to issues such as earthquakes, source pollution, climate change, etc., it is recommended that the Company's production requirements be increased by 10% above the values otherwise presented in this report to incorporate this safety factor.

6. **Prepare for Potential Interim Shortfalls.** To solve the short term water supply deficits, the following alternatives could be considered by the Company:

    - **Implementation of Mandatory Outdoor Irrigation Drought Restrictions.** Until future water assets can be secured to eliminate the deficiencies, outdoor irrigation restrictions should be established by the Company as soon as possible so the restrictions are able to be readily enforced in the future if the Company were to declare drought conditions. If a modest temporary outdoor water use reduction of 20% was achieved, approximately 2,000 ac-ft/year of water could be saved.

    - **Temporary Leasing of Water.** To meet the maximum supply deficiencies for the next 10-years until permanent water sources can be acquired, the Company should temporarily obtain 1,275 ac-ft/year of reliable culinary water and 2,190 ac-ft/year of reliable PI water (3,465 ac-ft/year total).

7. **Additional Data and Master Plan Updating.** There are a variety of additional data that could improve the accuracy of this study. Some steps the Company could take include: metering all source flows (not just the flow taken by the Company), continue to record and store flow data, meter all PI and culinary connections, and develop a PI master plan.

It is recommended that the Company periodically review the assumptions contained in this report to check their accuracy. Any significant changes in development patterns, conservation habits, water use characteristics, or service areas could affect the conclusions of this report. The projections, assumptions, and data contained in this report may need to be revised over time.

CHAPTER 5
CONCLUSIONS AND RECOMMENDATIONS

The purpose of this chapter is to summarize the conclusions from the investigation of the Company's water supply situation and provide recommendations to the Company in regards to the water rights related issues identified in Chapter 4.

CONCLUSIONS

The following conclusions can be made regarding water supply in the Company's culinary and PI systems:

1. The Company's overall annual reliable water supply (9,904 ac-ft) is only approximately 59% of the existing Company's overall annual theoretical water assets (16,902 ac-ft).
2. Reliable source supply is presently deficient to meet existing production requirements by an estimated 2,906 ac-ft/year (718 ac-ft/year for the culinary system and 2,188 ac-ft/year for the PI system). At build-out the total water deficiency will increase to an estimated 3,822 ac-ft/year.
3. There is approximately 2,550 ac-ft/year of culinary water that is being used for outdoor irrigation within the PI system service area that should be transitioned to the PI system. If approximately 64% or more of that culinary water is transitioned to the PI system, the culinary system will not have a supply deficit at build-out.
4. Meeting future needs in the PI system will require solidifying the yield of the Company's existing Utah Lake assets and securing at least 2,000 ac-ft from another source.
5. While transitioning culinary outdoor use to the PI system can eliminate long term deficits, there could still be a small shortfall over the next several years in a severe drought.
6. Only approximately 44% of the total water used in the PI system is currently metered. PI production requirements are expected to drop if the remaining water is metered. Metering is an essential part of the Company's ability to meet long term demands.
7. Any future source to be acquired should be evaluated for its capacity to supply water during the Company's summer peak usage time.

RECOMMENDATIONS

Because the culinary and PI system projected requirements are directly related, both by some sources being able to serve the culinary and PI systems and the outdoor PI usage rate transition areas of system overlap, recommendations for both systems will be discussed together. The following recommendations are presented for the Company's consideration:

Conservation

The Company should consider continuing to convert the PI system from unmetered to metered connections and consider placing increased emphasis on long-term conservation goals. It is our general experience that simply adding meters and charging a volumetric rate to users will significantly reduce water use per irrigated acre. The PI system build-out production requirement projections assume that 100% of the PI system will be metered. Finally, it would be beneficial for the Company to also develop a PI system tiered rate structure that discourages overuse of PI water in order to meet its long-term conservation goals.

Consider a Supply Safety Factor

To account for potential contingencies due to issues presented earlier in this report, such as earthquakes, source pollution, climate change, etc., it is recommended that the Company's production requirements be increased by 10% above the values otherwise presented in this report to incorporate this safety factor. If the reliable source supply can meet the increased production requirements, the Company will be able to reduce some risk associated with potential issues beyond just historic dry conditions. Table 5-1 compares the recommended production requirements with the safety factor to existing reliable source yield.

Table 5-1
Recommended Reliable Source Supply with 10% Safety Factor

Source	Volume (ac-ft/year)	
	2017	**2035**
Total Culinary Reliable Yield	6,834	6,834
Culinary Production Requirements (w/ Current PI Use Rate) /w 10% Safety Factor	8,307	9,311
Surplus (Deficiency) w/ Current PI Use Rate	**(1,473)**	**(2,477)**
Culinary Production Requirements (w/ 100% PI Use Rate) /w 10% Safety Factor	-	6,505
Surplus (Deficiency) w/ 100% PI Use Rate	**-**	**330**

Source	Volume (ac-ft/year)	
	2017	**2035**
Total PI Reliable Yield	3,070	3,070
PI Production Requirements (w/ Current PI Use Rate) /w 10% Safety Factor	5,784	5,788
Surplus (Deficiency) w/ Current PI Use Rate	**(2,714)**	**(2,718)**
PI Production Requirements (w/ 100% PI Use Rate) /w 10% Safety Factor	-	8,594
Surplus (Deficiency) w/ 100% PI Use Rate	**-**	**(5,524)**

APPENDIX I

OFFICIAL RESOLUTION

Official Resolution of Draper Irrigation Company Regarding Participation in Funding for a U.S. Department of the Interior: Bureau of Reclamation WaterSMART Grant Project

Whereas, the Bureau of Reclamation under its Water and Energy Efficiency Grants FY 2018: Funding Group II program has made available to qualifying applicants grant funding on a matching fund basis for water conservation projects and whereas, Draper Irrigation Company has identified a project that exemplifies the objectives of the grant program for the purpose of water conservation through the installation of pressure irrigation water meters;

It is hereby Resolved, dated May 16, 2018, by the Draper Irrigation Company Board of Directors:

- That David A. Gardner is identified as the official with legal authority to represent Draper Irrigation Company and to enter into an agreement resulting from a successful application for this grant, and is specifically authorized to do so.
- That David A. Gardner and the Board of Directors have reviewed and support the application submitted.
- That Draper Irrigation Company has the financial capability to provide the amount of funding and in-kind contributions specified in the funding plan of the application.
- That Draper Irrigation Company will work with Reclamation to meet established deadlines for entering into a grant or cooperative agreement

This resolution shall take effect immediately upon passing. Signed and approved:

_____
Kent S. Ware, President

_____
Ryan Daw, Vice President

_____
George Greenwood, Secretary

_____
Stephen L. Tripp, Past President

_____
Thomas Ward, Director

_____
Dale Smith, Director

_____
Greg J Matis, Director

APPENDIX J

LETTERS OF PROJECT SUPPORT

GARY R. HERBERT
Governor
SPENCER J. COX
Lieutenant Governor

State of Utah
DEPARTMENT OF NATURAL RESOURCES
MICHAEL R. STYLER
Executive Director
Division of Water Resources
ERIC L. MILLIS
Division Director

April 9, 2018

Bureau of Reclamation
Financial Assistance Support Section
Attn: Darren Olson
P.O. Box 25007, MS 84-27814
Denver, Colorado 80225

RE: **WaterSMART: Water & Energy Efficiency Grants for FY 2018**
Draper Irrigation Company – Pressure Irrigation Metering Project

Dear Mr. Olson:

The Utah State Division of Water Resources understands that Draper Irrigation Company (DIC) is seeking federal funds for a proposed secondary water pressure irrigation metering project through the Bureau of Reclamation's WaterSMART grant program.

In the past, DIC received loans from the Division of Water Resources to install the pressurized irrigation system. At that time, there was not a reasonably functional meter for secondary water measurement. Since then metering technology has advanced to the point that there are several secondary water meter options that function well for long periods of time.

As an agency, our mission is to plan, conserve, develop and protect Utah's water resources. Metering secondary water fits into this mission perfectly. It improves water use analysis, water conservation, and overall long-term water supply management.

The Division of Water Resources and the Utah Governor's Office support metering secondary systems and have set up funds to help water providers do so through low interest loans. We therefore recommend Reclamation's joint funding of this project to help ensure its success.

Please do not hesitate to call me at 801-538-7277 if you have any questions.

Respectfully,

Todd Stonely

Todd Stonely, P.E.
Project Funding Manager

1594 West North Temple, Suite 310, PO Box 146201, Salt Lake City, UT 84114-6201
telephone (801) 538-7230 • facsimile (801) 538-7279 • TTY (801) 538-7458 • *www.water.utah.gov*

JORDAN VALLEY WATER
CONSERVANCY DISTRICT

Delivering Quality Every Day

8215 South 1300 West • West Jordan, UT 84088 • Ph: 801.565.4300 • www.jvwcd.org

Richard P. Bay, *General Manager/CEO*
Barton A. Forsyth, *Assistant General Manager, Water Supply/Water Quality*
Alan E. Packard, *Assistant General Manager, Chief Engineer*

April 5, 2018

Darren Olson, Grants Management Specialist
Financial Assistance Support Section
Bureau of Reclamation, Department of the Interior

RE: WaterSMART: Water & Energy Efficiency Grants for FY 2018
Draper Irrigation Company – Pressure Irrigation Metering Project

Dear Mr. Olson:

Jordan Valley Water Conservancy District (JVWCD) understands that Draper Irrigation Company (DIC) is seeking federal funds for a proposed Pressure Irrigation (PI) Metering Project through the Bureau of Reclamation's (BOR) WaterSMART grant program. DIC currently has a wholesale water purchase contract with JVWCD for municipal and industrial (M&I) water deliveries to DIC's retail service area.

As a water conservancy district and a wholesale water provider, we are committed to protection and efficient use of our current and future water supply, and have a conservation goal to reduce M&I water use per capita 25% by 2025. DIC has indicated that this project will result in significant quantifiable water savings, improve management of their PI system, and help ensure the sustainability of their source supply. In addition, this project will directly help JVWCD to reach its goals in the following ways:

- Help sustain and conserve existing M&I water supplies, including those provided by federal projects such as the Central Utah Project, Provo River Project, and Weber River Project.
- Reduce the per capita water usage of DIC customers and overall per capita usage within JVWCD's service area.
- Allow our current water purchase contract with DIC to supply water to future DIC users.
- Reduce the need for upgrades or additions to water supply infrastructure.

Over the past two years, JVWCD has provided matching funding for DIC to install 330 meters on its secondary PI system. This project served as a pilot project to identify costs, water savings, and best practices for installing meters throughout its secondary PI system. We now believe DIC is well positioned to apply the lessons learned from that pilot project and other research to successfully complete the proposed secondary PI meter installation project. We enthusiastically support DIC's proposed project and respectfully recommend DIC be awarded the requested funding.

Please do not hesitate to call me at (801) 565-4300 if you have any questions.

Respectfully,

Richard P. Bay

Richard P. Bay
General Manager/CEO

cc: David Gardner

CENTRAL UTAH WATER
CONSERVANCY DISTRICT

355 W. University Parkway
Orem, UT 84058-7303
801.226.7100
www.cuwcd.com

To Whom It May Concern:

The Central Utah Water Conservancy District (CUWCD) is committed to water conservation and preparing for the future. We recognize the value of utility-initiated conservation and management programs as they are highly-effective in their communities. Draper Irrigation Company (DIC) is striving to implement a water conservation program in-line with these same goals.

Through similar programs, we have seen significant water savings and are confident in the impact metering pressurized irrigation (PI) will have throughout the utility. This management will help DIC in their goal to conserve water and meet future demand. This will also help DIC in offsetting the need for costly upgrades and additions to the water supply infrastructure.

We recognize that metering PI connections will help in reducing water usage and waste throughout their utility. We are pleased to see the DIC moving forward with a valuable water conservation program and support them in this project. As a wholesale water provider, we rely on these types of projects to meet our own goals and allow us to meet future demand. We therefore recommend the Bureau of Reclamation support funding for this project to help ensure its success.

Sincerely,

Rick Maloy
Water Conservation Manager
Central Utah Water Conservancy District

DRAPER CITY

April 4, 2018

Darren Olson, Grants Management Specialist
Financial Assistance Support Section
Bureau of Reclamation, Department of the Interior

RE: **WaterSMART: Water & Energy Efficiency Grants for FY 2018**
Draper Irrigation Company – Pressure Irrigation Metering Project

Dear Mr. Olson:

Draper City understands that Draper Irrigation Company (DIC) is seeking federal funds for a proposed Pressure Irrigation (PI) Metering Project through the Bureau of Reclamation's (BOR) WaterSMART grant program.

DIC is currently operating under a franchise of Draper City, and Draper City is one of its largest customers. It is important for us to support DIC in providing service to our customers and to exercise the best management practices. One of these practices is to meter the secondary water to help with conservation. We work closely with DIC in our water conservation practices, such as educating school children and providing ordinances to support conservation efforts in Draper City.

We understand that DIC has completed a significant amount of research on various meters to determine the best meter for its PI system. We also recognize that metering secondary water connections will help reduce water usage and sustain existing water resources. We therefore recommend BOR's joint funding of this project to help ensure its success.

Please do not hesitate to call me at (801) 576-6513 if you have any questions.

Respectfully,

Troy Walker
Mayor, Draper City