COMPREHENSIVE CORRECTIVE ACTION PLAN

ESTILL COUNTY WATER DISTRICT NO. 1
ESTILL COUNTY, KENTUCKY

MAY 2019

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I. EXECUTIVE SUMMARY

This report is in response to Kentucky Public Service Commission (PSC) order Case No. 2018-00276, which directed the Estill County Water District No. 1 (ECWD) to develop a comprehensive corrective action plan to reduce of unaccounted-for water (UW) to 15 percent. The deadline for filing is May 15, 2018.

In 2018, ECWD operated with an annual UW of 39.63 percent. UW has been steadily on the rise since 2008 and is a result of a declining customer base, reduced household consumption, inaccurate metering, and physical problems in the system. This report will examine system components, historical trends and current operating conditions. Current operating conditions will be used to develop a water balance. The findings will be used to draft a plan to reduce UW over a ten year planning period.

The plan will list specific corrective actions focused on improving metering accuracy, establishing system monitoring capabilities, replacing failing infrastructure and increasing the operational / loss reduction capacity of ECWD. Major items of work will include: installing zone meters, establishing districted metering areas (DMAs), installing advanced metering infrastructure (AMI), replacing residential and commercial meters, developing institutional controls, and replacing problematic mains and service lines. An implementation strategy will also be presented a list of measureable outcomes that can be used to evaluate the success of the plan.

The goal is the reduction of UW to 15 percent by 2029. In doing so, ECWD hopes to achieve regulatory compliance, develop a sustainable operation and provide the citizens of Estill County with a reliable source of public water for decades to come.

II. INTRODUCTION

On December 21, 2018, the Public Service Commission (PSC) ordered Estill County Water District No.1 (ECWD) to prepare a comprehensive corrective action plan to reduce water loss. Bell Engineering has been procured to assist ECWD with preparation of the comprehensive corrective action plan.

For calendar year ending 2018, the ECWD reported 32 percent unaccounted-for water (UW) as shown on the attached Monthly Loss Report Annual Summary for 2018. However, based on the standard established by 807 KAR 5:066, system overflows and estimated line breaks should not be included in the UW calculation. The revised UW for ECWD for 2018, which considers water losses due to system overflows and line breaks as unaccounted-for losses has been calculated as 39.63 percent. The PSC has encouraged ECWD to reduce its unaccounted-for water (UW) to 15 percent annually. The goal of this comprehensive corrective action plan is to reduce UW to 15 percent over the next 10 years.

This report will present information on the current condition of ECWD distribution system, analyze historic operating trends, propose corrective actions, outline a course for implementation and establish measurable outcomes.

III. SYSTEM INFORMATION

ECWD was established in 1964 and is located at 76 Old Cedar Grove Road, Irvine, Kentucky 40366. ECWD, Kentucky Division of Water (DOW) permit number KY0330123, provides potable water service to approximately 3,800 customers in Estill County. ECWD is regulated by the PSC and DOW and is a member of the Kentucky Rural Water Association (KRWA) and the Bluegrass Area Development District (BGADD) Regional Water Management Council. ECWD is a distribution system and purchases all water for resale from Irvine Municipal Utilities (IMU) and Jackson County Water Association. System data can be found on the Kentucky Water Resource and Information System (WRIS) website at www.wris.ky.gov. A copy of the WRIS system data report and asset inventory report are attached.

A complete list of ECWD's infrastructure is included in the attached asset inventory report. The last major infrastructure project, Phase 10 Water System Improvements, was completed in 2015. An existing system map is attached.

The section below discusses ECWD's existing lines, storage facilities, pump stations, meters, telemetry, staff, institutional controls, equipment, rates and wholesale supply. The objective is to provide an overview of the system and identify potential sources of UW in the system.

A. Lines

Summary- ECWD is composed of approximately 1,469,417 linear feet (lf) of transmission, distribution and service line. The lines were installed from 1960 to 2015 and range in size from 3/4-inch diameter to 12-inch diameter. The types of line include polyethylene (PE), polyvinyl chloride (PVC), cast iron (CI), asbestos cement (AC) and ductile iron (DI). The majority of line is composed of 4-inch and 6-inch PVC.

Potential Sources of UW- The PSC considers the useful life of water line to be from 50 to 75 years. Improper installation, improper application, poor maintenance and environmental influence can shorten a water line's useful life. For the purpose of identifying potential contributors to UW, only line with a reported date of installation of 1960 or earlier is considered. The table below lists those segments of line which meet these criteria.

Line Installed 1960 or Earlier			
Size (diameter)	**Material**	**Length (lf)**	**Approx. Install Date**
< 2"	DI	669	1960
3"	DI	6,436	1960
4"	DI	2,907	1960
6"	Cast Iron / DI	48,133	1960
8"	DI	8,615	1960
12"	DI	10,927	1960
Total Length of Line Installed 1960 or Earlier		77,687	
Total Length of Line in the System		1,469,417	

Approximately 5.4 percent of ECWD's lines are approaching the end of their useful life.

In addition to aged lines, ECWD has indicated that the pressure class of pipe in the Crooked Creek and lower Sand Hill areas is insufficient for current operating pressures. Pressure recording devices should be installed in these areas to confirm operating pressures. The recorded pressures can then be evaluated to determine the potential for pressure related problems.

There are known issues with pipe material in the system. Some 3/4-inch service line connections are composed of a thin walled plastic material referred to as "blue max" pipe. This material, popular in the 1980's, becomes brittle with age and is prone to leaking. ECWD reports a concentration of "blue max" pipe in the South Irvine area. These service line connections should be identified and replaced.

There are approximately five (5) stream/creek crossings which were not installed in accordance with DOW and Ten State standards. These crossings have the potential to be damaged during high water events and are prone to leaking. The crossings are located at Kissey Branch, McSwain Branch, Murphy Ford, Red Lick and Highway 594. Pictured to the right is the crossing at Locust School Branch. This crossing has separated and a 3/4-inch PE "jumper" is currently being used to supply customers.

ECWD should continue its annual inspection of valves and other system components as required by 807 KAR 5:006, Section 26(6)(b) and replace and/or repair as needed.

B. Storage Facilities

Summary- ECWD has nine (9) above-ground storage facilities, including stand-pipes and elevated storage tanks. ECWD's total combined storage capacity is approximately 1,325,000 gallons. These facilities were installed between 1974 and 2007.

Potential Sources of UW-The useful life of above-ground storage facilities is approximately 40 years. The only storage facility in the system that is older than 40 years is the Winston Tank. This 200,000-gallon tank was installed in 1976 and was last inspected by DOW in 2008. The Winston Tank represents approximately 15 percent of the system storage capacity. Two important aspects of steel tank construction are the interior and exterior coating systems. These coating systems often need to be replaced several times throughout the useful life of a tank. Typically, coating systems are good for approximately 12-15 years and need to be inspected on an annual or biennial basis. Of the nine (9) tanks in operation, five (5) tanks do not appear to have not been inspected within the last 15 years. ECWD should considered hiring professional services to conduct a condition assessment of each tank as soon as funding permits.

C. Pump Stations

Summary- ECWD has ten (10) pump stations. These pump stations are located at Dry Branch, New River, Cedar Grove, Pea Ridge, Ivory Hill, Dug Hill, Chestnut Stand, South Irvine, Hwy 851 and Cobb Hill.

Potential Sources of UW- The image on the right is inside the Cedar Grove station. The station is in an underground vault which shows signs of accelerated deterioration on exposed plumbing and electrical fixtures. Based on the condition of the Cedar Grove station, ECWD should considered hiring professional services to conduct a condition assessment of the Cedar Grove station as well as the remaining as soon as funding permits.

D. Meters

Summary-The ECWD system contains approximately 3,900 meters including residential meters, commercial meters, and master meters. The type of meters vary as do the dates of installation. The following is a breakdown of the meters in the system based on application.

Residential and Commercial Meters				
Meter Size	**Meter Type**	**Meter Count**	**Application**	**Date Installed**
¾-Inch	Sensus Radio Read	3800	Residential/ Commercial	2007
1"	Sensus Omni Meter	16	Commercial	2007
2"	Turbine	15	Commercial	Prior to 2007
3"	Turbine	3	Commercial	Prior to 2007

Master Meters				
Meter Size	**Supplier**	**Customers Supplied**	**Location**	**Date Installed**
6"	IMU	2800	Irvine Bridge	<1960
6"	IMU	850	Dry Branch	unknown
2"	IMU	12	Sweet Lick	unknown
2"	Jackson County	12	KY HWY 89 / County Line	2007

Existing Zone Metering				
Meter Size	**Meter Type**	**Meter Count**	**Location**	**Date Installed**
Unknown	Unknown	1	Dry Branch PS	2014
Unknown	Unknown	1	Dug Hill PS	2014

Potential Sources of UW-The last major meter replacement project occurred in 2007. Meters have varied useful lives depending on size, type, application and frequency of use. Manufacturers will promote lifetime meters; however, the PSC has taken a more realistic approach and requires the following meter testing frequency.

Required Meter Testing Frequency	
Meter Size	**Testing Frequency**
3/4-Inch to 1-Inch	Once every 10 years
1 1/4-Inch to 2-Inch	Once every 4 years
3-Inch	Once every 2 years
4-Inch and Larger	Annually

ECWD is equipped with a test bench system and routinely checks meters and replaces / repairs them as needed. ECWD is currently conducting a sample test of iPERL smart meters in the system. ECWD is considering upgrading all residential and commercial meters in the system with the iPERLs or equal. A smart meter provides some unique advantages over the existing radio-read meters including: improved low-flow metering capabilities, remote read and management technology, enhanced anti-theft / tamper notifications, and cloud based data collection and storage. The goal is to integrate the smart meters into an advanced metering infrastructure (AMI) network. Based on the relative age of the majority of meters in the system and the desire to upgrade to a smart meter unit, ECWD should consider meter replacement.

Given the physical size of the system, the two (2) existing "zone" meters do not provide adequate monitoring coverage. ECWD should consider subdividing its system into districted metering areas (DMA). Typically, DMAs are divided by pressure zones and are capable of being isolated. DMAs utilize "zone" meters to monitor flow entering the area. The flow is then compared to metered sales to determine area loss. A compound meter is recommended for zone meter application. These meters can be equipped with pressure sensing equipment and integrated into an AMI network. The installation of zone meters and establishment of DMAs will provide ECWD with accurate real-time flow information that can be used to pinpoint areas of loss, focus repair efforts, and prioritize future projects. ECWD should considered installing zone meters and establishing DMAs as soon as funding permits.

The master meter at Irvine Bridge is pictured below. IMU owns and maintains the master meter and is responsible for its annual calibration and testing. Results are provided to ECWD. There are several concerns regarding this master meter. The first concern with the master meter is the length of straight pipe on the upstream and downstream sides of the meter. Typically, meter manufacturers will recommend various lengths of straight pipe upstream and downstream of a meter to attain a desirable flow profile for that meter. The straight run of pipe is required

to ensure laminar flow through the meter. Compound and turbine meters are subject to inaccurate readings under turbulent flow conditions. It is not known if the recommended length of straight run is being achieved at the Irvine Bridge Master Meter but based on the photograph there is some concern that it is not. The second concern with the master meter involves accessibility. The meter vault is located on railroad right-of-way and track time must be obtained from the railroad prior to conducting activities at the site. The third concern involves the lines located on the downstream side of the meter. These lines are owned and maintained by ECWD. These lines have been installed along the bank of the Kentucky River. The soil conditions along the bank of the river can become heavily saturated and unstable during high water events. Unstable soil conditions allow for differential movement in lines. Differential movement can create breaks in lines particularly in lines composed of ball and socket type pipe or in lines with insufficient blocking at horizontal and vertical bends. The final concern arises out of a leak that occurred in the IMU system in 2015 and that drained the Wisemantown tank in the ECWD system. This incident indicates that water is capable of backflow from the ECWD system to the IMU system through the master meter. IMU recently replaced the check valve assembly in the meter vault; however, this will not safeguard ECWD from significant loss if there is a break in the line in the river. Because of the age of the master meter and the concerns presented herein, both ECWD and IMU have explored the possibility of relocating the master meter and river crossing. Because of cost share concerns, the project was left in the preliminary stage. Should a mutually agreeable funding scenario be developed, it is recommended that the relocation project be pursued. In the interim, it is recommended that ECWD install a backflow prevention device.

E. Telemetry

Summary- ECWD uses telemetry/SCADA devices supplied by MicroComm. Devices are installed at all tank and pump station locations and provide data to ECWD to a single server located at ECWD's office. MicroComm also provides the necessary software updates and services this equipment upon request.

Potential Sources of UW- Not applicable.

F. Staff

Summary-The ECWD employs seven full-time staff along with three commissioners. An "Operations and Procedures" manual was adopted in March 2013. A list of current employees along with their respective job titles, qualifications and dates of hire appears below.

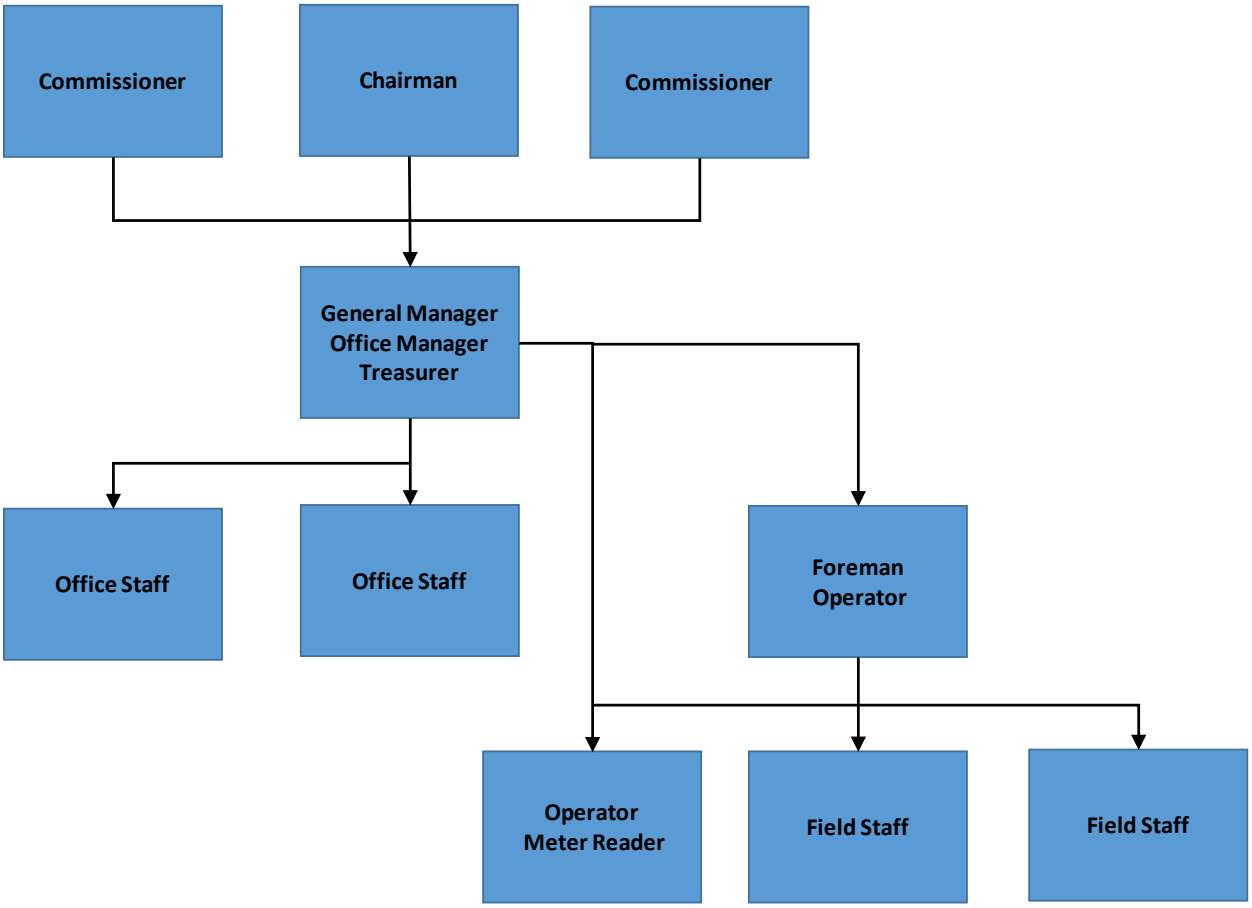
Current Employees ECWD			
Title	**Name**	**Date of Hire (years of experience)**	**Qualifications**
General Manager	Audrea Miller	6/2005 (14)	High School Diploma
Office Assistant	Luciana Cox	8/2007 (12)	Associates Degree
Office Assistant	Debra Risen	9/1998 (21)	High School Diploma
Superintendent / Operator	William Murphy	5/2007 (12)	High School Diploma Class II Distribution
Operator/Meter Reader	Vernon Tipton	10/2000 (19)	High School Diploma CDL Class II Distribution
Maintenance Personnel	Brian Darbyshire	3/2019 (<1)	HS Diploma
Maintenance Personnel	William Patrick	4/2019 (<1)	HS Diploma
Chairman	Blain Click	5/2018 (1)	College Degree
Commissioner	Jack Stickney	5/2018 (1)	College Degree
Commissioner	Robert Johnson	5/2018 (1)	College Degree

Potential Sources of UW-To determine adequacy of the ECWD's current staff size, similar systems were evaluated. These systems had office staff ranging from 2 to 3 persons and field staff ranging from 6 to 8 persons, not including the general managers and/or superintendents. It appears that the ECWD's office staff size is adequate but its field staff needs to be expanded. It is recommended that ECWD hire at least two (2) additional field personnel. Potential problems associated with undersized field staff include but are not limited to:

1. Inability to provide proper roadside safety and traffic control during repairs along state and county rights-of-way.
2. Inability to perform routine maintenance.
3. Slower response times to emergency calls.
4. Increased work-related stress.

5. Territorialism.

The flow chart below depicts ECWD's the current organizational structure.



G. Institutional Controls

Summary- One of the proven practices of sustainable water utilities is the establishment and implementation of institutional controls in the form of written planning and procedure documents. These documents typically focus on providing fundamental services, optimizing daily operations, investing capital assets and preparing for future demands. Such documents may include: O&M Manuals, Policy and Procedures Manual, Loss Detection Plan, Comprehensive Loss Reduction Plan, Capital Improvements Plan, Water Audit, Flushing Plan and system wide hydraulic model. ECWD currently lacks many of these documents.

Potential Sources of UW- ECWD should review existing institutional controls and address any deficiency identified.

H. Equipment

Summary- ECWSD currently owns the following meter reading and leak detection equipment: Flow Metrix Digital Leak Detector, Sensus VXU, Sensus VGB, Sensus FL6502 Handheld Reader, Inspector 07 Locator, and Dynasonic Portable Flow Meter.

In addition to the metering and leak detection equipment, ECWD also owns the following equipment that is used to sustain daily operations and perform routine maintenance:

Vehicles and Equipment	
Make/Model	**Quantity**
2003 GMC Canyon Truck	3
2003 GMC Sierra Truck	1
Trailer	1
1999 Single Axel International Dump Truck	1
1996 Case Backhoe 580 L	1
2007 Case Backhoe 580 M	1
Gas Generator	1
Air Compressor	1
16-ft Tandem Axel Trailer	1
Pneumatic Boring Machine	2
Pneumatic Jackhammer	2
Concrete Saw	2
Trash Pump	1
1980 Ford Tractor w/ finish mower and scraper	1
Miscellaneous Hand Tools	1
Meter Test Bench	1

Potential Sources of UW-Old, unserviceable equipment can impair daily operations, inflate maintenance cost, reduce leak detection capabilities, increase repair times and create an unsafe workplace. Some of the equipment listed above appears to be beyond its useful life and may no longer be safely operated. The Kentucky Association of Counties (KaCo) will conduct safety audits for county agencies upon request. ECWD should request such and implement its recommendations.

I. Existing Rates

Summary-The ECWD has approximately 3,800 customers. Metered sales are checked and billed on a monthly basis. The total volume of metered sales for 2018 was approximately 154,985,710 gallons. Metered customers are categorized by meter size. The current rates were placed into effect on August 20, 2018. A copy of the current rate tariff has been included as an attachment. The following is a breakdown of the current rate schedule.

Current Monthly Rate Schedule		
Meter Size	**Usage**	**Rate**
5/8-Inch x ¾-Inch	First 2,000 Gallons	$ 21.58 Minimum Bill
	Next 3,000 Gallons	$ 10.53 Per 1,000 Gallons
	Next 3,000 Gallons	$ 10.31 Per 1,000 Gallons
	Over 10,000 Gallons	$ 8.20 Per 1,000 Gallons
1-Inch	First 5,000 Gallons	$ 53.18 Minimum Bill
	Next 5,000 Gallons	$ 10.31 Per 1,000 Gallons
	Over 10,000 Gallons	$ 8.20 Per 1,000 Gallons
2-Inch	First 16,000 Gallons	$ 153.95 Minimum Bill
	Over 16,000 Gallons	$ 8.20 Per 1,000 Gallons
Bulk Loading		$ 7.29 Per 1,000 Gallons
A $ 4.81 per month surcharge is added to the minimum bill for all Cobhill customers.		

Average monthly usage per meter is approximately 3,399 gallons with a corresponding average monthly bill of approximately $32.11. The ECWD disconnects/reconnects approximately 50 meters per month.

Meters are read using radio read technology. There are thirteen (13) routes in the system which take approximately 3 to 4 days to cover. Metering reading typically starts around the 10th of each month. Disconnects/Reconnects typically occur around the 21st of each month. It takes ECWD staff approximately 2 days to complete disconnects/reconnects.

Potential Sources of UW-The initial concern is that the existing rate structure will not provide sufficient revenue to support the water loss reduction activities

recommended in this plan. In ECWD's last application for rate adjustment, the PSC disallowed approximately $159,880 in purchased water and purchased power expenses related to ECWD's excessive water loss. The rates that the PSC approved do not allow ECWD to fully recover its actual cost of purchased water. ECWD should consider requesting PSC approval to assess a surcharge whose proceeds would be used solely to support the water loss reduction activities recommended in this plan.

ECWD should adopt a policy that requires a rate study on a biennial basis to assess the adequacy of existing rates. Agencies such as the Kentucky Rural Community Action Partnership (RCAP) can assist with these rate studies. ECWD should plan for a 3.5 percent inflationary increases in operating cost per year.

ECWD should apply for an adjustment in its rates using the PSC's purchased water adjustment process as soon as possible when its wholesale suppliers increase their rates for wholesale water service. Any delay in applying for such adjustment will compound ECWD's current revenue problems and will result in a reduction in net operating income.

ECWD performed a billing software audit in March 2018. It is recommended that ECWD perform billing software audits on a periodic basis.

J. Wholesale Supply

Summary- ECWD is a retail supplier of potable water. All water is purchased at wholesale rates from IMU (KY 0330205) and Jackson County Water Association (KY 0550209). As previously discussed, there are four (4) points of purchase in the system, three (3) with IMU and one (1) with Jackson County. ECWD's water purchase agreements with these suppliers are on file with the PSC. A breakdown of ECWD's wholesale supply appears below.

Wholesale Water Distribution				
Supplier	MM Location	Number of ECWD Customers Supplied	Percent of Customers Supplied	Annual Volume (gal)
IMU	Irvine Bridge	3,000	79%	201,156,000
IMU	Dry Branch	750	20%	56,240,000
IMU	Sweet Lick	<25	<1%	332,000
Jackson C.	KY HWY 89	<25	<1%	388,700

ECWD purchases water from IMU at a rate of $3.13 per 1,000 gallons and $3.50 per 1,000 from Jackson County Water Association.

ECWD manually reads the Irvine Branch master meter daily. It reads the Dry Branch meter using telemetry, but currently also manually reads the meter daily.

Potential Sources of UW-There is always the potential for inaccuracy in master meter readings. Without redundancy in metering, ECWD is forced to rely on results of annual meter calibration tests and/or variances in monthly bills to be made aware of metering errors. ECWD should consider installing redundant metering devices at all master meter locations. These meters should be compound meters and should be integrated into an AMI network as zone meters.

Concerns regarding the master meter at Irvine Bridge were discussed previously.

Other water sources of supply may available to ECWD in an emergency. It is recommended that ECWD explore emergency regional inter-connect options with the City of Beattyville and Madison County Water District.

IV. SITUATIONAL ASSESSMENT

The focus of this section of the report is a situational assessment of the ECWD as it relates to system loss. The first part of the assessment will analyze historical data provided by ECWD and develop trends for customer base, average monthly usage, average annual sales, annual water purchases and NRW. The second part of the assessment will identify the "as-is" condition of the ECWD system by analyzing data reported for 2018, the last full year of operation. The final part of the assessment will predict future operating conditions for ECWD by applying the historical trends to the data provided for the last full year of operation.

A key component of the "as-is" analysis is the development of a water balance. A water balance is a preliminary effort conducted in lieu of a water audit. The objective of a water balance is to quantify the components of NRW in the system and assign realistic volumes and monetary values to each component. In order to do this several assumptions had to be made. Assumptions were based on sound engineering principles, estimates provided by ECWD, system characteristics and the results of the trend analysis. It is recommended that a water audit be completed once zone meters are installed and DMAs are established. Once a water audit is completed, and more precise information available, the water balance can be revised and updated.

A. Historical Trends (2008-2018)

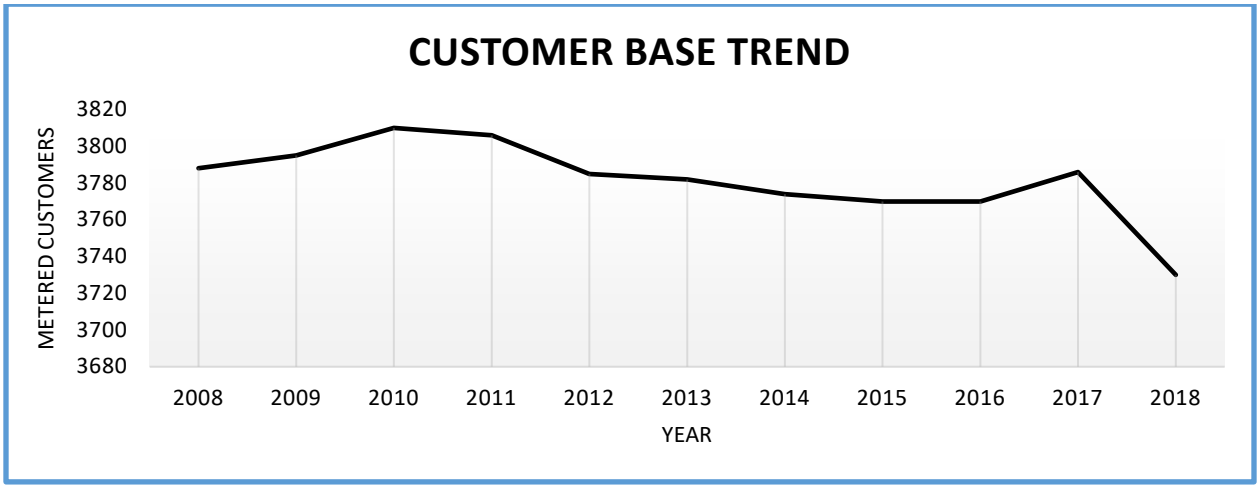
The following table summarizes historical information provided by ECWD for the period beginning in 2008 and ending in 2018.

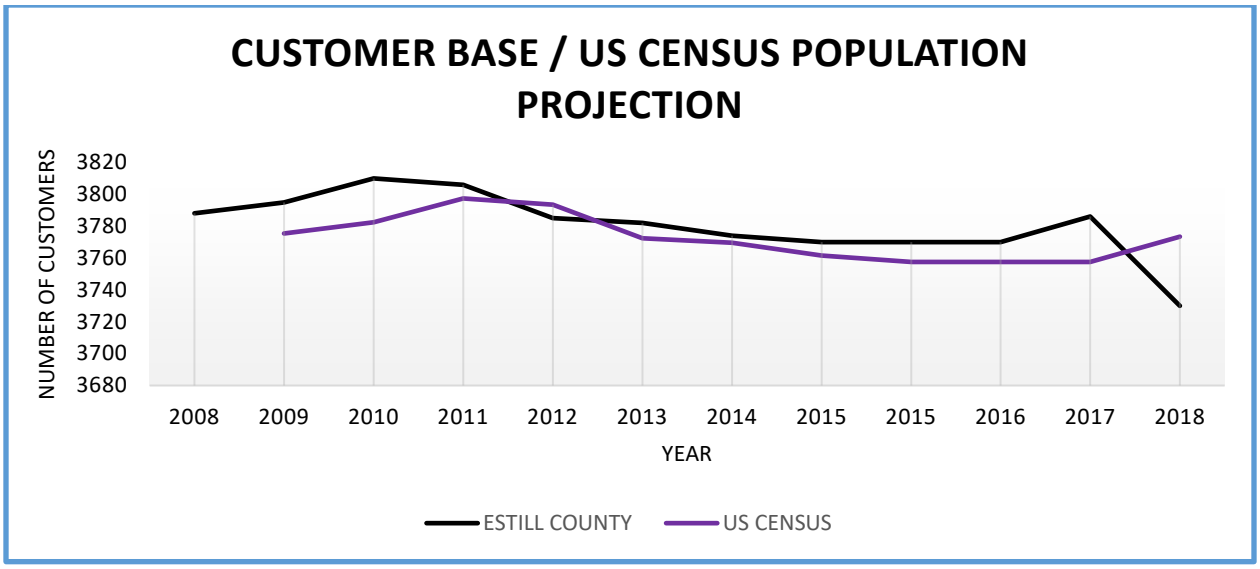
10-Year Historical Trends for the ECWD				
Year	Customer Base (meters)	Average Monthly Usage (gallons)	Annual Metered Sales (gallons)	Annual Purchased Water (gallons)
2008	3788	4251	193,217,000	258,730,000
2009	3795	4174	190,073,000	255,870,000
2010	3810	4153	189,872,000	258,940,000
2011	3806	4049	184,920,000	256,620,000
2012	3785	4136	187,871,000	247,840,000
2013	3782	3889	176,516,000	261,790,000
2014	3774	3925	177,752,000	281,730,000
2015	3770	3757	169,948,000	264,870,000
2016	3770	3635	164,452,000	255,997,000
2017	3786	3519	159,859,000	258,128,000
2018	3730	3463	154,986,000	258,117,000

1. Customer Base Trend

The reported customer base information for the period occurring from 2008 through 2018 is shown in the table below.

Customer Base Data											
Year	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Customer Base (Meters)	3788	3795	3810	3806	3785	3782	3774	3770	3770	3786	3730
Change from Previous Year (Meters)		7	15	-4	-21	-3	-8	-4	0	16	-56
% Change from Previous Year		0.18 %	0.40 %	-0.10 %	-0.55 %	-0.08 %	-0.21 %	-0.11 %	0.00 %	0.42 %	-1.48 %





The United States Census Bureau has estimated that Estill County, Kentucky had a population rate of change of -3.3 percent from July 2010 to July 2018. A copy of the US Census Bureau Quick Facts sheet for Estill County has been included as an attachment. The decline is prevalent throughout eastern Kentucky and can be directly attributed to the decline in the coal mining industry.

Data Analysis

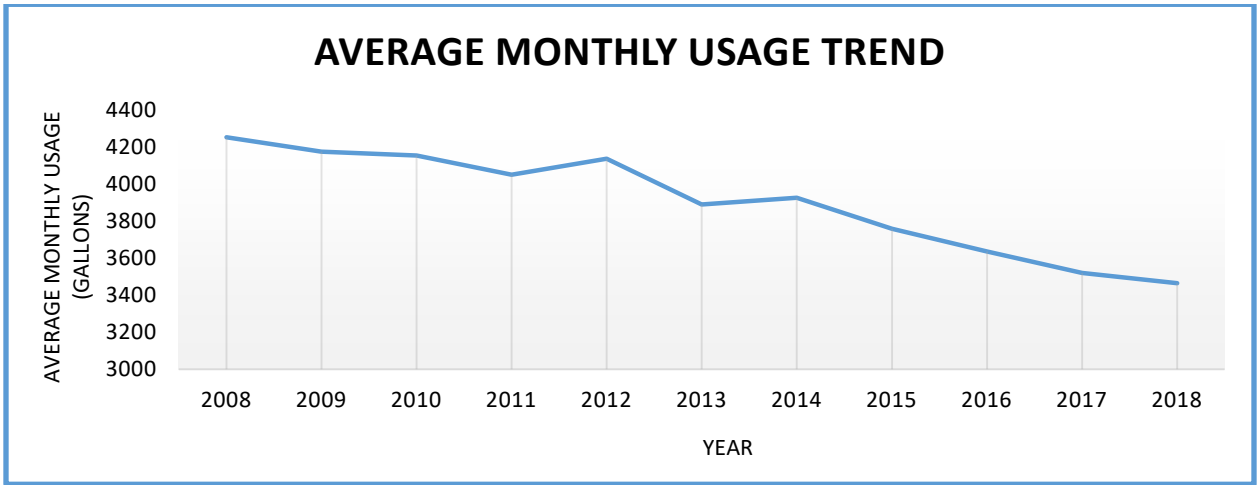
- The total change in customer base was -58 customers.
- The average annual change in customer base was -5.8 customers per year.
- The largest change occurred between 2017 and 2018, -56 customers.
- Years with positive growth were 2009, 2010, and 2017.
- Years with negative growth include 2011, 2012, 2013, 2014, 2015, and 2018.
- There was no change in the number of customers in 2016.
- The average annual rate of change in customer base was approximately -0.15 percent per year.

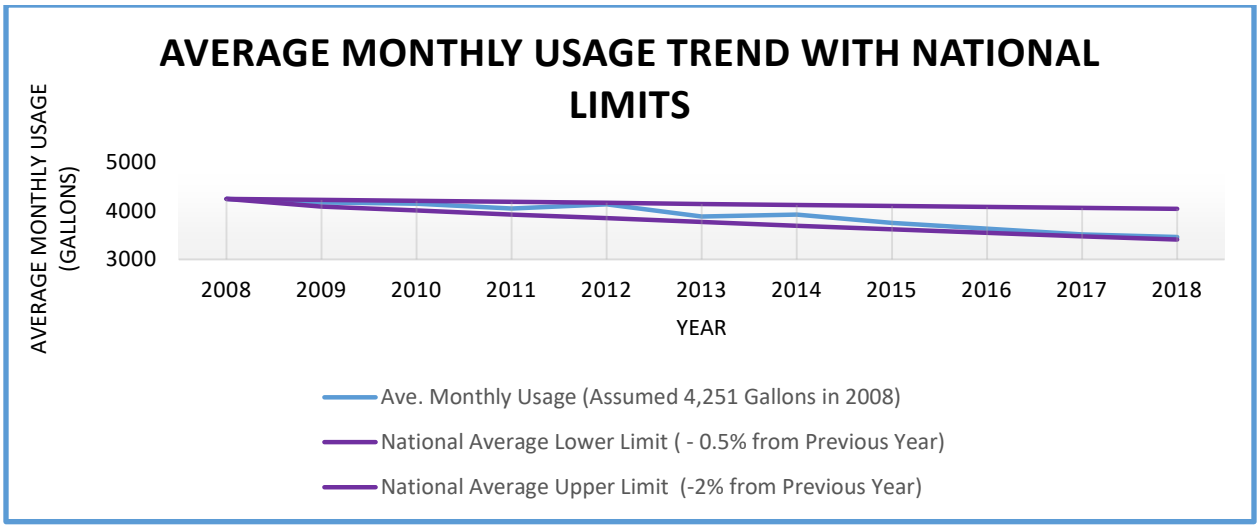
- The change in population projected by the US Census Bureau for the same period was -0.33 percent per year.
- The decline in the ECWD customer base trends in the same direction as the decline in local population.
- It can be assumed that this trend will continue and will mirror US Census Bureau population projections into the foreseeable future.
- When performing any rate analysis, the decline in customer base should be taken into consideration and included in revenue projections.

2. Average Monthly Usage Trend

The reported average monthly usage information for the period occurring from 2008 through 2018 is shown in the following table.

Average Monthly Usage Data											
Year	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Average Monthly Usage (Gallons)	4251	4174	4153	4049	4136	3889	3925	3757	3635	3519	3463
Change from Previous Year (Gallons)		-77	-21	-104	87	-247	36	-168	-122	-116	-56
% Change from Previous Year		-1.8 %	-0.5 %	-2.5 %	2.2 %	-6.0 %	0.9 %	-4.3 %	-3.3 %	-3.2 %	-1.2 %





According to research, the domestic consumption of treated water is decreasing nationally at a rate between 0.5 percent and 2.0 percent on an annual basis. Three (3) articles are included as an attachment that discuss this trend in further detail. Each states that the primary factors influencing decreasing domestic consumption are declining household populations, increased use of water efficient appliances and improved plumbing codes/ building practices.

Data Analysis

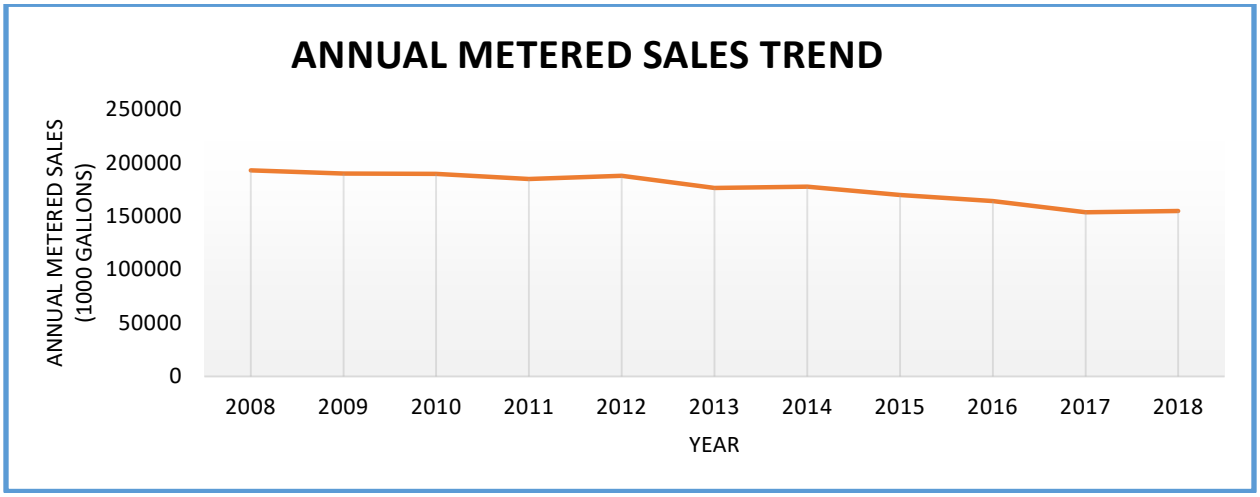
- The total change in average monthly usage was -788 gallons per customer.
- The average annual change in average monthly usage was -78.8 gallons per meter per year.
- The largest change occurred between 2012 and 2013, -247 gallons per customer or -6.0 percent.
- Years with positive growth include 2012 and 2014.
- Years with negative growth include 2009, 2010, 2011, 2013, 2015, 2016, 2017, and 2018.
- The average rate of change was approximately -2.0 percent per year.
- The national range is between -0.5 percent and -2.0 percent per year.

- By assuming a common starting point in 2008 and applying the -0.5 percent and -2.0 percent national rate of change on a yearly basis from 2008 through 2018, the graph above shows that ECWD's average monthly usage decline is within the upper and lower limits of national averages.
- It would be expected that ECWD's rate would trend towards the lower end of the national range given that ECWD is a rural distribution system that should not be as heavily influenced by the factors affecting the national trend as a municipal system.
- The fact that ECWD's usage trend falls within the national range is useful in predicting future usage.

3. Annual Metered Sales Trend

The reported annual metered information for the period occurring from 2008 through 2018 is shown in the following table.

Annual Metered Sales Data											
Year	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Annual Metered Sales (1000 Gallons)	193,217	190,073	189,872	184,920	187,871	176,516	177,752	169,948	164,452	159,859	154,986
Change from Previous Year (1000 Gallons)		-3,150	-200	-4,950	2,950	-11,350	1,230	-7,800	-5,500	-4.593	4,873
% Change from Previous Year		-1.63%	-0.11%	-2.61%	1.60%	-6.04%	0.70%	-4.39%	-3.24%	-2.79%	-3.05%

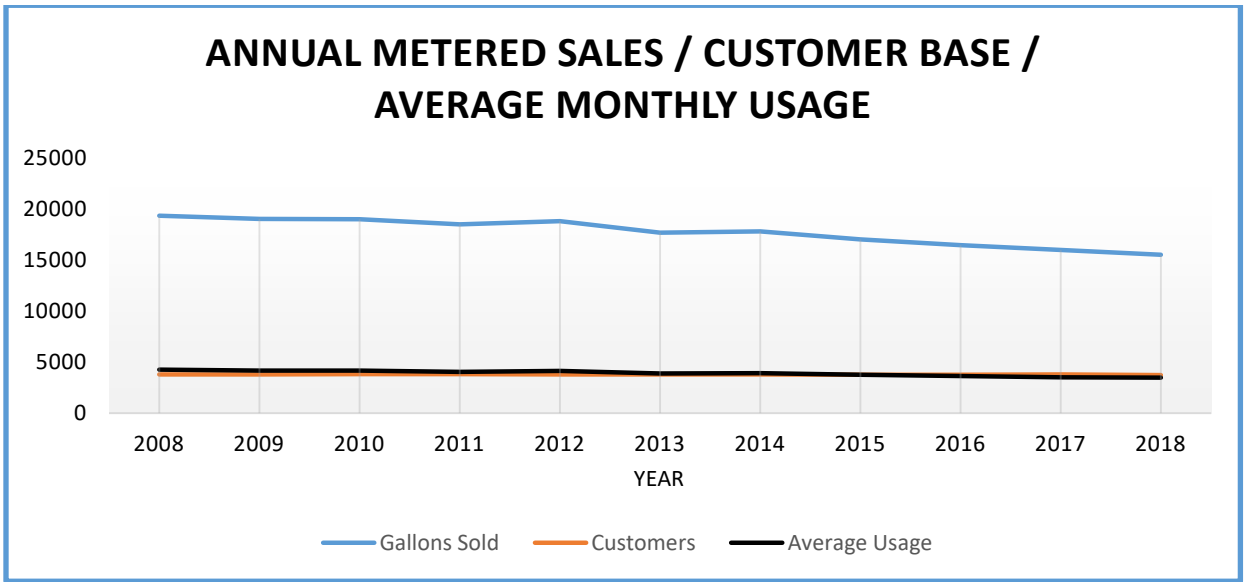


Calculations were made using an Excel spreadsheet. The calculated results were used to compare changes in customer base and average monthly usage with the change in annual metered sales. The objective was to compare the reported difference in annual sales with the calculated difference in annual sales in order to determine the accuracy of reported data. An example of the calculations for calendar year 2009 follows. Similar calculations were conducted for each year.

for 2009B20:C46	
2008 Metered Sales	193,217,000
2009 Metered Sales	190,073,000
Difference in Metered Sales (2008-2009)	-3,144,000
2008 Customer Base	3,788
2009 Customer Base	3,795
Difference In Customer Base (2008-2009)	7
Average Monthly Usage in 2008	4,251
Average Monthly Usage in 2008 x Diff. in Customer Base	29,757
12 Month Loss is Sales attributed to Difference in Customer Base	357,084
2008 Average Usage	4,251
2009 Average Usage	4,174
Difference	-77
2009 Customer Base	3,795
Difference in Average Monthly Usage x Customer Base	-291,754
12 Month Loss in Sales Attributed to Difference in Average Usage	-3,501,054
Total Calculated Loss in Sales (12 Moth Loss from Customer Base + 12 Moth Loss from Average Usage)	-3,143,970
Total Loss from Reported Sales	-3,144,000
Difference	-30

The summary of those calculations follow:

Difference in Reported Annual Sales and Calculated Annual Sales										
Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Reported Difference in Annual Sales (1000 Gallons)	-3,150	-200	-4,950	2,950	-11,350	1,230	-7,800	-5,500	-4,593	-4,873
Calculated Difference in Annual Sales (Gallons)	-30	0	0	19,755	0	0	0	4,600	- 20,798	-1,972
% Deviation from Reported Sales	0.0%	0.0%	0.0%	0.67%	0.0%	0.0%	0.0%	- 0.08%	0.45%	0.04%



Data Analysis

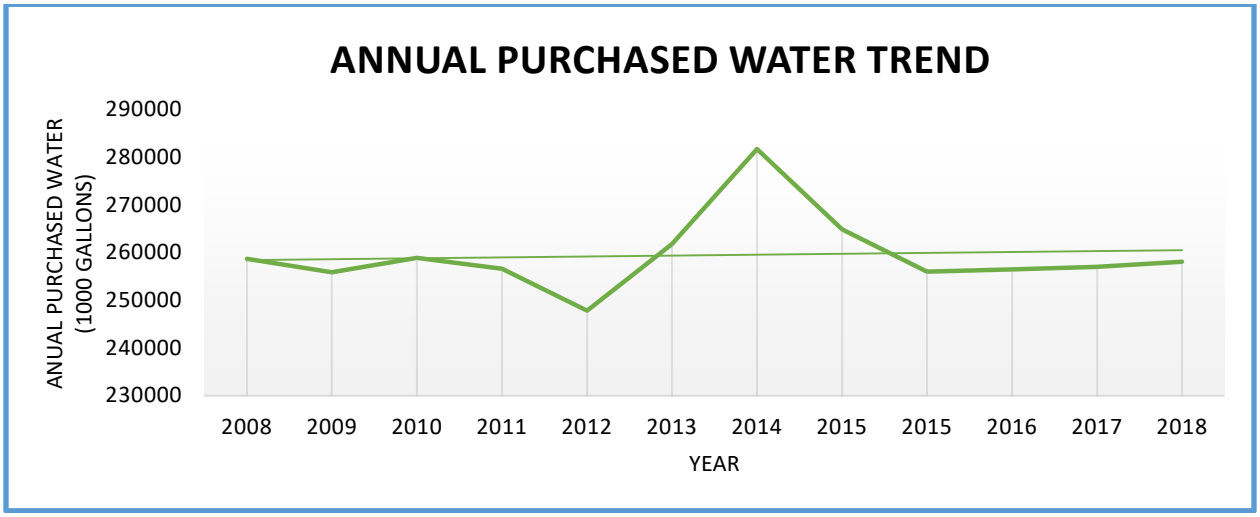
- The total change in annual metered sales -38,231,290 gallons.
- The average annual change in annual metered sales was -3,823,100 gallons per year.
- The largest change occurred between 2012 and 2013, -11,350,000 gallons.
- Years with positive growth include 2012, 2014 and 2018.

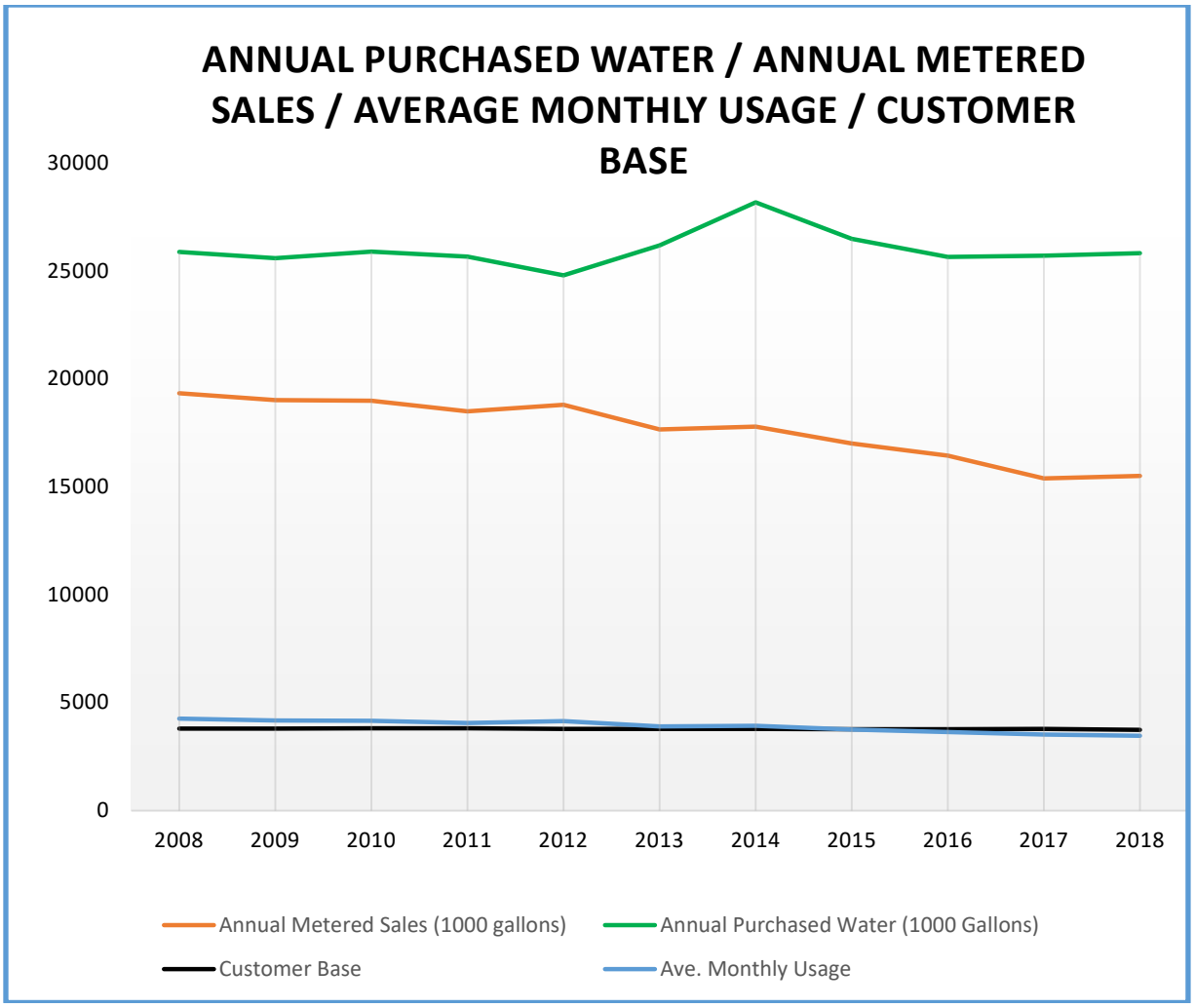
- Years with negative growth include 2009, 2010, 2011, 2013, 2015, 2016 and 2017.
- The average annual rate of change was approximately -2.2 percent per year.
- The annual change in metered sales was -2.16 percent which was greater than the annual change in customer base and annual change in monthly usage.
- From the graph above it is apparent that sales is trending at a faster rate than both customer base and monthly usage.
- It has been previously established that both the declining customer base and declining monthly usage are typical for the region and nation as a whole.
- The greater rate of decline in metered sales relative to the rate of decline of the customer base and monthly usage may be an indicator of metering inaccuracies or inaccuracies in billings.
- The age of the meters was established in a previous section. This information coupled with the metered sales trend comparison suggests that meters need to be replaced and billing software needs to be audited.

4. Annual Purchased Water Trend

The annual purchased water information reported by the ECWD for the period occurring from 2008 through 2018 follows.

Annual Purchased Water Data											
Year	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Annual Purchased Water (1000 Gallons)	258,730	255,870	258,940	256,620	247,840	261,790	281,730	264,870	255,997	258,128	258,117
Change from Previous Year (1000 Gallons)		-2860	3070	-2320	-8,780	13,950	19,940	-16,860	-8,873	2,131	-11
% Change from Previous Year		-1.11%	1.20%	-0.90%	-3.42%	5.63%	7.62%	-5.98%	-3.34%	8.3%	-0.4%





Data Analysis

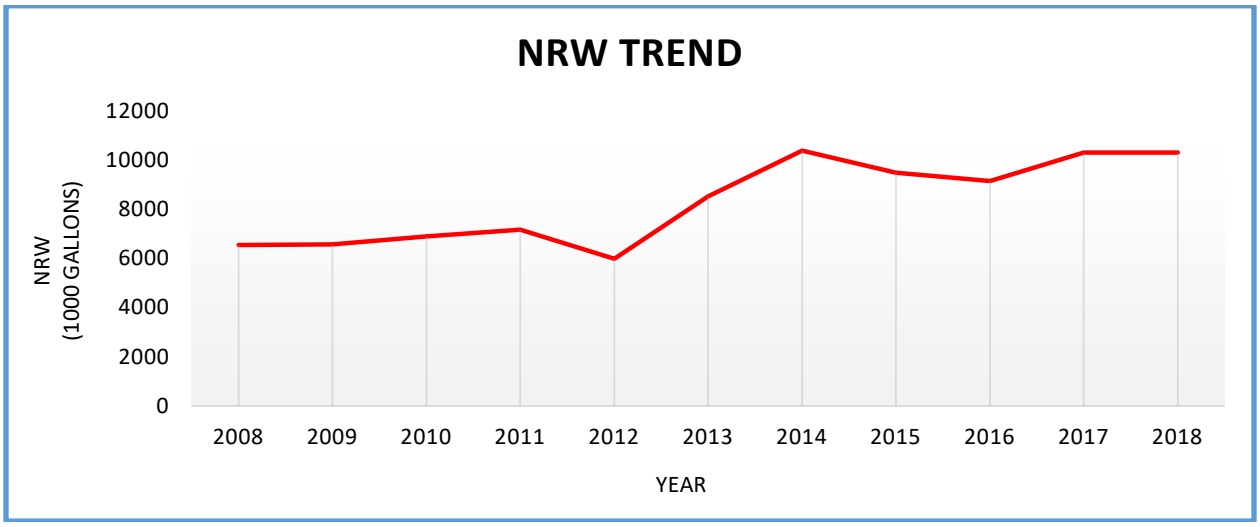
- The total change in annual purchased water was -613,000 gallons.
- The average annual change was -61,300 gallons per year.
- The largest change occurred between 2012 and 2013, 19,940,000 gallons.
- Years with increased purchase include 2010, 2013, 2014, and 2017.
- The average annual rate of change was approximately -0.61 percent.

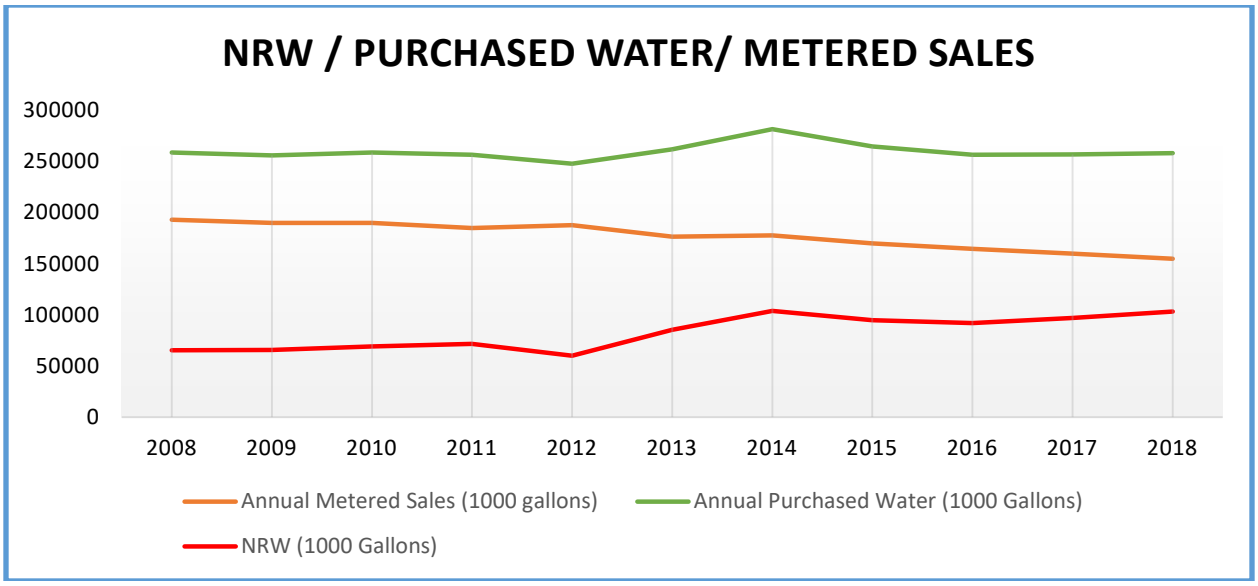
- Annual purchased water has changed by less than one percent from 2008 to 2018. The only substantial variance occurred in 2015 because of the water required to complete the Phase-10 project.
- The rate of change of purchased water when compared to the rate of change of the customer base, monthly usage and metered sales is significantly less.
- Since 2011, it appears that the difference between the annual purchased water and meter sales is increasing. This can be directly attributed to the -0.61 percent rate of change of purchased compared to the -2.16 percent rate of change of metered sales.
- As established, the difference between purchased water and meter sales is NRW.
- The fact that the difference between the purchased water and meter sales depicts an increasing NRW trend.

5. NRW Trend

NRW is the difference between purchased water and water used in metered sales. The calculated NRW for the 10-year period from 2008 through 2018 is shown below.

NRW Data											
Year	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
NRW (1000 Gallons)	65,513	65,797	69,068	71,700	59,969	85,274	103,978	94,922	91,545	98,269	103,131
Change from Previous Year (1000 Gallons)		284	3,271	2,632	-11,731	25,305	18,704	-9,056	-3,377	6,724	4,862
% Change from Previous Year		0.43%	4.97%	3.81%	-16.4%	42.2%	21.9%	-8.71%	-3.56%	7.35%	4.95%





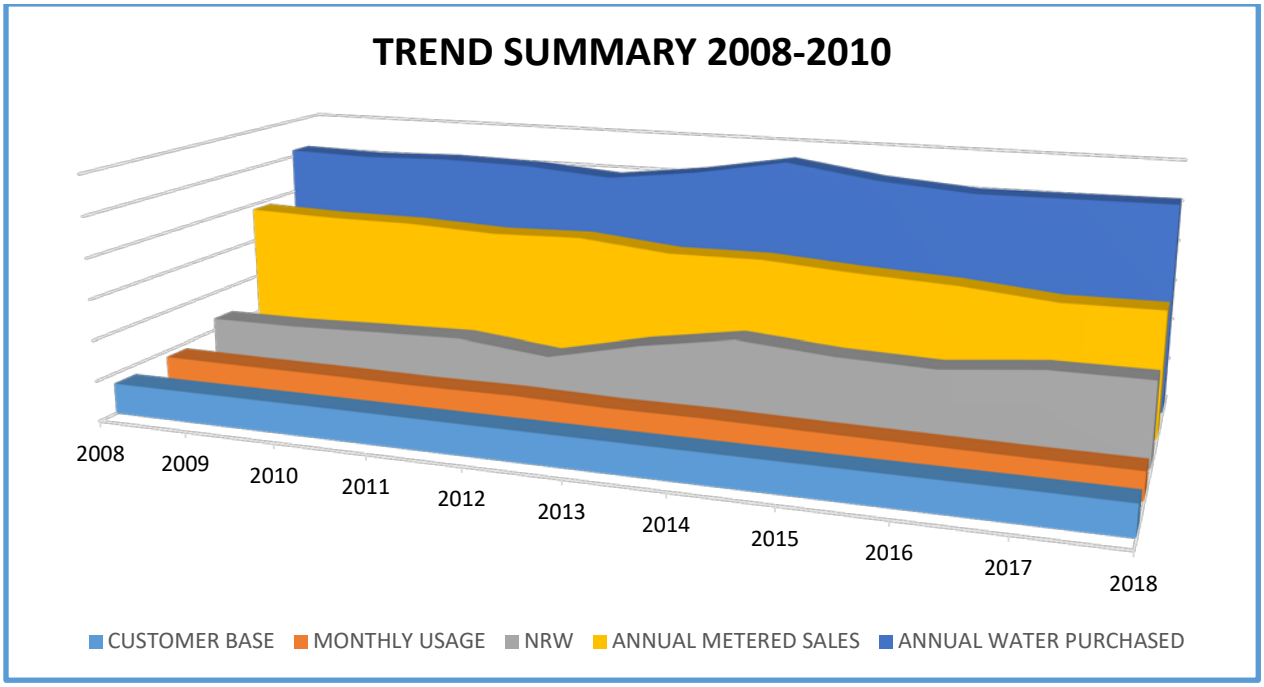
Data Analysis

- The total change in NRW was 37,617,700 gallons.
- The average annual change in NRW was 3,761,770 gallons per year.
- The largest change occurred between 2012 and 2013, 25,305,000 gallons.
- Years with increasing NRW include 2009, 2010, 2011, 2013, 2014, 2017, and 2018.
- The average annual rate of change was approximately 5.7 percent per year.
- The overall trend has steadily increased since 2012.
- The year-to-year increase in NRW is an indicator of the continued degradation of the existing infrastructure and the increase in metering/billing inaccuracies.

6. Trend Summary

The following summarizes the trends developed in the previous section.

Summary of Trend Data (2008-2018)		
Trend	**Change Over 10 Years**	**% Change per Year**
Customer Base	-58 customers	-0.15%
Average Monthly Usage	-788 gallons per meter	-2.0%
Annual Meter Sales	– 38,231,290 gallons	-2.2%
Annual Water Purchased	– 610,000 gallons	-0.61%
NRW	37,617,700 gallons	5.7%



Summary

- The customer base is decreasing at a rate of approximately 0.15 percent per year.
- Average monthly usage is decreasing at a rate of approximately 2.0 percent per year, which falls within the national range.
- Annual metered sales is decreasing at a rate of approximately 2.2 percent, which can be directly attributed to a declining customer base and declining usage.

- Purchased water has remained virtually unchanged.
- The annual NRW rate is growing because of the decreasing annual metered sales and the increasing annual water purchased.

B. Existing Conditions (2018)

ECWD's water usage report for 2018 reports 40 percent NRW and 32 percent UW. The report also indicated that the 32 percent UW equated to a loss of approximately 227,535 gallons per day (gpd) or 158 gpm for the entire system for 2018. At an average purchase price of $3.13 per 1,000 gallons, the annual loss equated to a loss of $322,800.00 in potential earnings. As described in the introduction, the revised UW for the ECWD for 2018 has been calculated to be 39.63 percent. The revised UW equates to a loss of 280,251 gpd or 195 gpm for the entire system. At an average purchase price of $3.13 per 1,000 gallons, the revised annual loss equates to an approximate loss of $320,173.00 in potential earnings.

C. Water Balance (2018)

A water audit has not been performed on the ECWD system. In lieu of a water audit, a water balance has been developed for calendar year 2018. The objective is to help assign preliminary volumetric amounts to potential contributors of NRW and UW. Volumetric amounts will prioritize corrective actions. The volumetric amounts will be derived from ECWD's reported percentages. Where information is unavailable, assumptions will be made based on system condition and trends. The water balance is not a substitute for a water audit, but simply provides a starting point from which decisions can be made. The water balance should be updated as more information becomes available. The components of the water balance are:

System Input Volume-System input volume is the annual volume of water purchased.
Billed Authorized Consumption-Billed authorized consumption is the annual volume of water billed by registered customers who are authorized to do so.
Non-Billed Authorized Consumption-Non-billed authorized consumption is the annual volume of water used by the local fire department or consumed to sustain operations.
Unaccounted for Water-Unaccounted for water is the annual volume of water calculated by the difference in system input volume and billed authorized consumption and non-billed authorized consumption.
Non-Revenue Water-NRW is the difference between the system input volume and the billed authorized consumption.

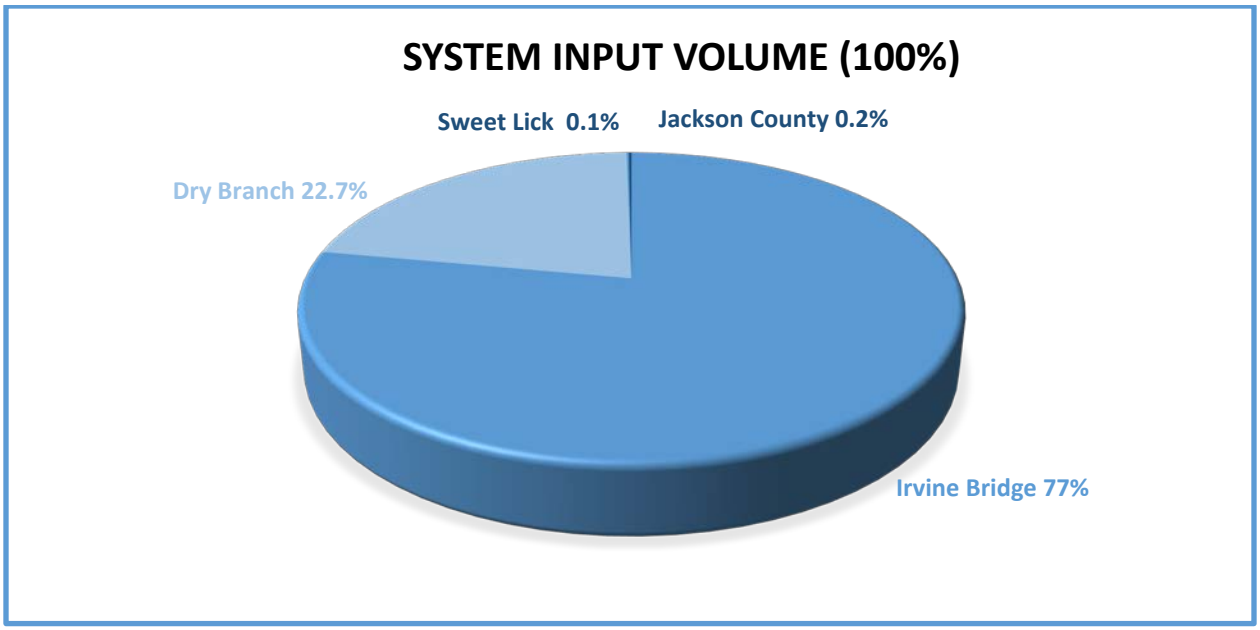
Apparent Loss-Apparent loss is that portion of NRW composed of unauthorized consumption and is typically associated with metering and/or billing inaccuracies and theft.
Real Loss-Real loss is that portion of NRW lost through line leaks including service line connections up to the point of metered sales.

1. System Input Volume

The system input volume for ECWD for calendar 2018 was reported to be 258,116,700 gallons. The water was purchased from four (4) separate metering locations. The following table and graph summarize the purchases and 100 percent of the total system input volume for the water balance. The established purchase prices of $3.13 per 1,000 gallons for IMU sales and $3.50 per 1,000 for Jackson County Water Association sales were applied to the reported volumes to determine cost.

System Input Volume 2018					
Description	Volume (gallons)	Unit	Percent of System Input Volume	Percent of Water Balance	Cost
Water Purchased Irvine Bridge MM	201,156,000	Gallons	77.93%	77.93%	$629,618
Water Purchased Dry Branch MM	56,240,000	Gallons	21.79%	21.79%	$176,595
Water Purchased Sweet Lick MM	332,000	Gallons	0.13%	0.13%	$1,039
Water Purchased Jackson Co. MM	388,000	Gallons	0.15%	0.15%	$1,358
TOTAL	258,116,700	Gallons	100.00%	100.00%	$808,610

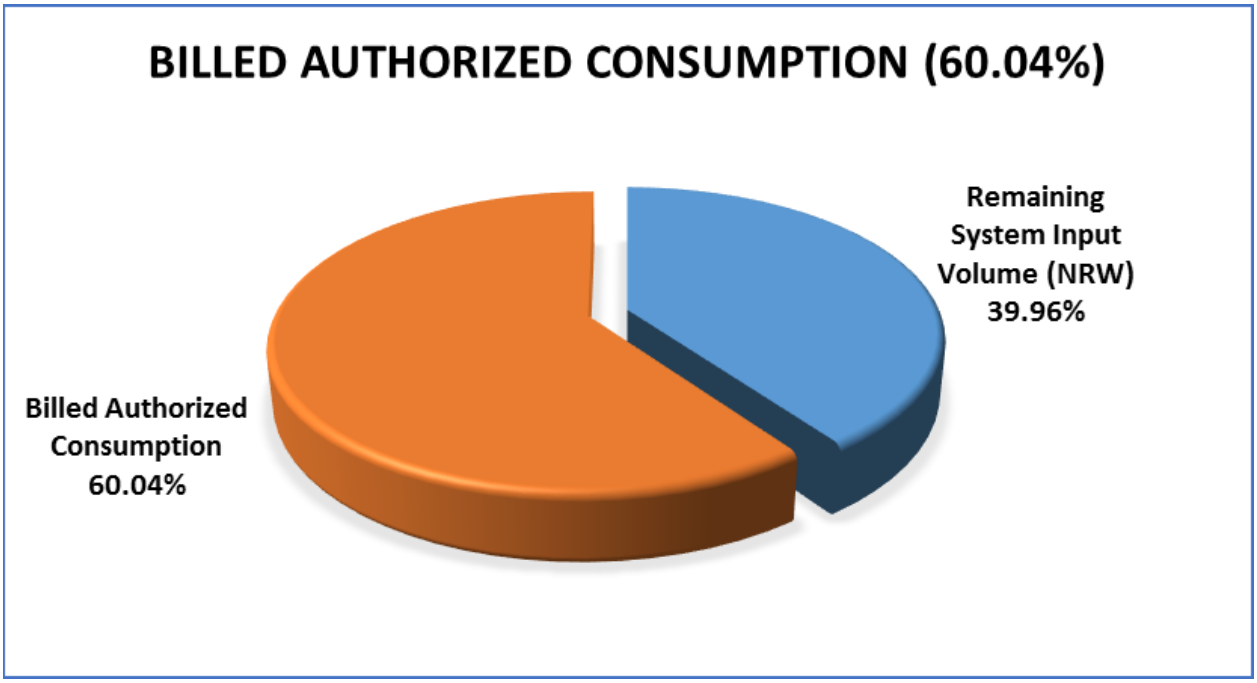
The calculated price per gallon of purchased water (system input) was calculated to be $0.0031 per gallon.



2. Billed Authorized Consumption

The billed authorized consumption for ECWD for calendar 2018 was reported to be 154,985,710 gallons. The billed authorized consumption is 60.04 percent of the system input volume and represents metered sales. The following table and graph summarize the billed authorized consumption.

Billed Authorized Consumption 2018					
Description	Volume	Unit	Percent of Billed Authorized Consumption	Percent of System Input Volume	Cost
Water Sold Irvine Bridge MM	121,305,180	Gallons	78.27%	47.00%	$0.00
Water Sold Dry Branch MM	32,928,780	Gallons	21.25%	12.75%	$0.00
Water Sold Sweet Lick MM	406,540	Gallons	0.26%	0.16%	$0.00
Water Sold Jackson Co. MM	345,210	Gallons	0.25%	0.13%	$0.00
TOTAL	154,985,710	Gallons	100.00%	60.04%	$0.00



The remaining system input volume is NRW, which is calculated as follows:

NRW = System Input Volume-Billed Authorized Consumption
Percent NRW = (NRW/System Input Volume) x 100

NRW (2018)		
Description	**Volume**	**Unit**
System Input Volume (Purchased Water)	258,116,700	Gallons
Billed Authorized Consumption	154,985,710	Gallons
NRW	103,130,990	Gallons
Percent NRW	39.96	%

3. Non-Billed Authorized Consumption

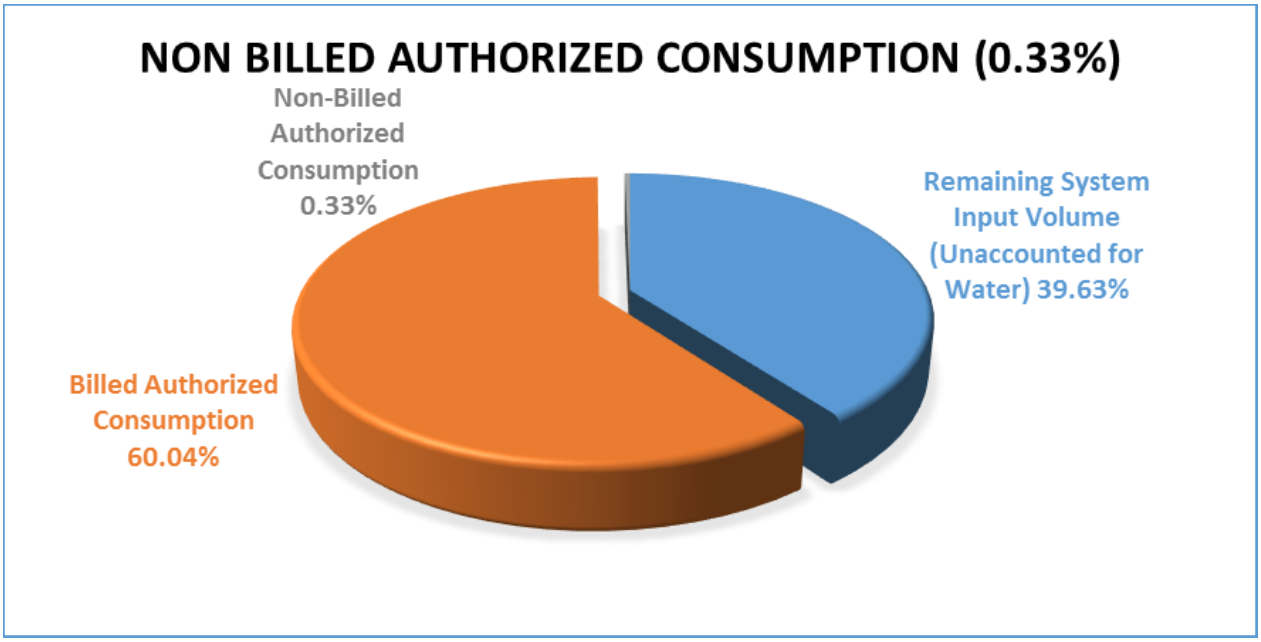
The non-billed authorized consumption for the ECWD for calendar 2018 as provided was 853,600 gallons. The non-billed authorized consumption is approximately 0.33 percent of the system input volume. The following table and graph summarize the non-billed authorized consumption.

Non-Billed Authorized Consumption 2018					
Description	**Volume**	**Unit**	**Percent of Non-Billed Authorized Consumption**	**Percent of System Input Volume**	**Approximate Cost**
Flushing	388,653	Gallons	45.53%	0.15%	$1,205
Fire Department Use	464,947	Gallons	54.47%	0.18%	$1,441
TOTAL	853,600	Gallons	100.00%	0.33%	$2,646

Fire Department use is calculated by applying a factor of 0.003 percent to ECWD's total billed sales.

Estimating flushing volumes are calculated by use of a spreadsheet developed by KRWA that utilizes the formula GPM = $29.83(cd^2)(\sqrt{p})$,

Estimated volumes associated with breaks and/or line repairs are calculated using a similar spreadsheet developed by KRWA. Volumes are determined based on duration, pipe size, operating pressure and type leak.



The remaining system input volume is unaccounted for water, which is calculated as follows:

Unaccounted for Water = System Input Volume-(Billed Authorized Consumption + Non Billed Authorized Consumption)

Percent Unaccounted for Water = (Unaccounted for Water / System Input Volume) x 100

Unaccounted for Water (2018)		
Description	**Volume**	**Unit**
System Input Volume (Purchased Water)	258,116,700	Gallons
Billed Authorized Consumption	154,985,710	Gallons
Non-Billed Authorized Consumption	853,600	Gallons
Unaccounted for Water	102,277,390	Gallons
Percentage of Unaccounted for Water	39.63	%

4. Real and Apparent Loss

UW is composed of real and apparent loss. Real and apparent loss are the focal point of the water balance and have been calculated to be 102,277,390 gallons collectively. Real loss includes water loss occurring from leaks in the distribution system; whereas, apparent loss includes water loss occurring from malfunctioning meters, billing errors and theft. The combined volume represents 39.63 percent of the system input volume.

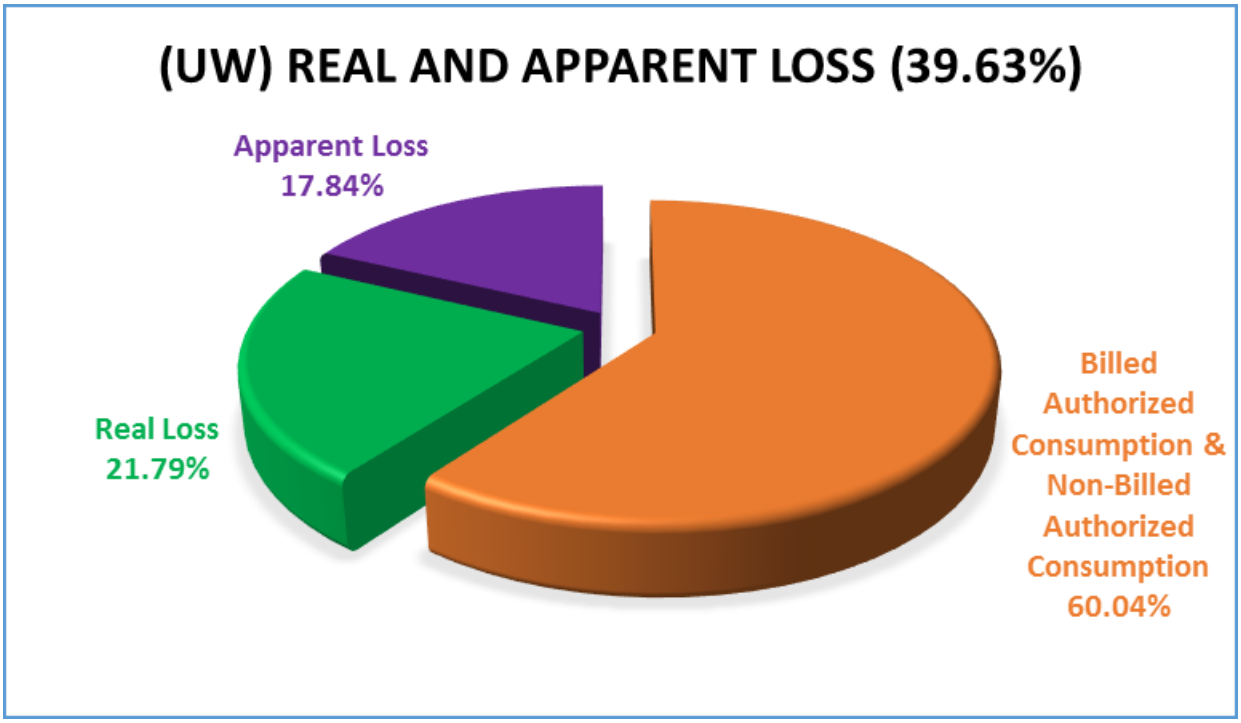
Up to this point, most data presented herein has been provided by ECWD or derived from the data provided. Unfortunately, determining the actual volumes of the various components of real and apparent loss is difficult due to the lack of available information. Once zone meters are installed, DMAs are established and a water audit is completed, the following estimated volumes can be replaced with more accurate information.

ECWD believes metering inaccuracies are a significant contributor to UW. Metering inaccuracies are categorized as apparent loss. ECWD estimates that metering inaccuracies may be as high as 20 percent of UW or 20,455,478 gallons per year. Total metered sales for 2018 were 154,985,710 gallons. The estimated volume from metering inaccuracies represents approximately 13 percent of the total metered sales volume for 2018. ECWD is basing its estimate on the decline in annual metered sales, age of the meters and problems encountered with meters in the field. ECWD's estimated volume of 20,455,478 gallons will be used. Once a water audit is completed, this amount can be revised.

ECWD estimated that loss from line leaks and system overflows account for approximately 20.14 percent of the UW or 20,600,200 gallons per year. Line leaks would be categorized as real loss. This estimate was derived from known breaks that were repaired. Based on the age of the system and the pressure issues in the lower Sand Hill and Crooked Creek areas, there may be additional sources of loss that remain undiscovered. For these reasons, the initial volume is being increase to approximately 30 percent or 30,683,217 gallons per year. Once a water audit is complete, this amount can be revised.

The remaining 50 percent of UW or 51,138,695 gallons will be equally divided among real loss and apparent loss. As a result, the total real loss is estimated at 56,252,565 gallons per year and the apparent loss is estimated at 46,024,825 gallons per year. The following table and chart summarize real and apparent loss.

UW or Real and Apparent Loss 2018					
Description	Volume	Unit	Percent of Unaccounted for Water	Percent of System Input Volume	Approximate Cost
Real Loss	56,252,565	Gallons	55.00%	21.79%	$174,382
Apparent Loss	46,024,825	Gallons	45.00%	17.84%	$142,677
TOTAL	102,277,390	Gallons	100.00%	39.63%	$317,060

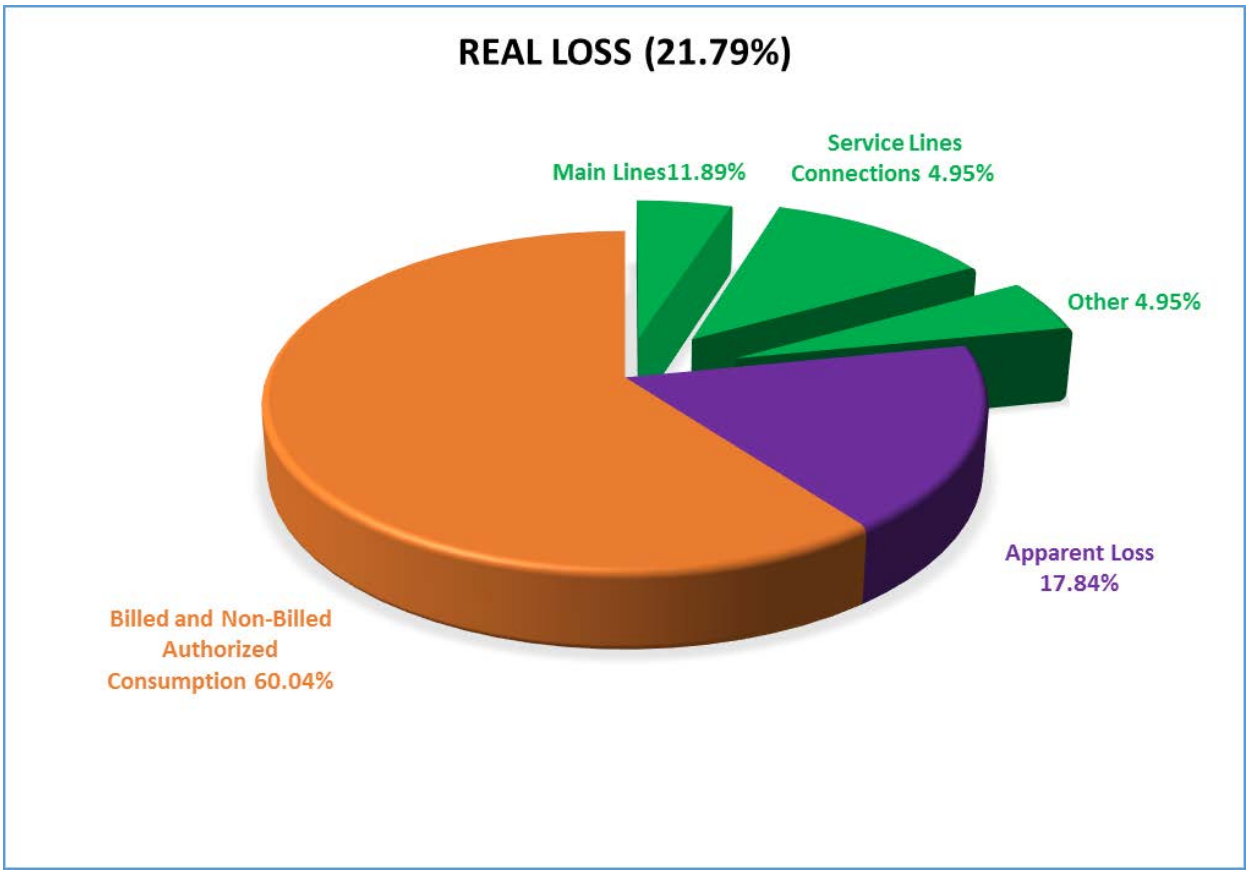


5. Detailed Real Loss

It has been reasoned that real loss makes up 55 percent of the UW or 21.79 percent of the system input volume on an annual basis and has a volume of approximately 56,252,565gallons. It has also been reasoned that main line leaks account for approximately 30,683,217gallons per year or approximately 54.5 percent of the real loss. ECWD has estimated that approximately 400 services still use "blue max" service tubing. The remaining 45.5 percent of real loss will be evenly divided between service line connections and "other." Other will include sources of real loss yet to be identified. Once the water audit is complete the detailed real loss can be adjusted.

The following table and chart summarize detailed real loss.

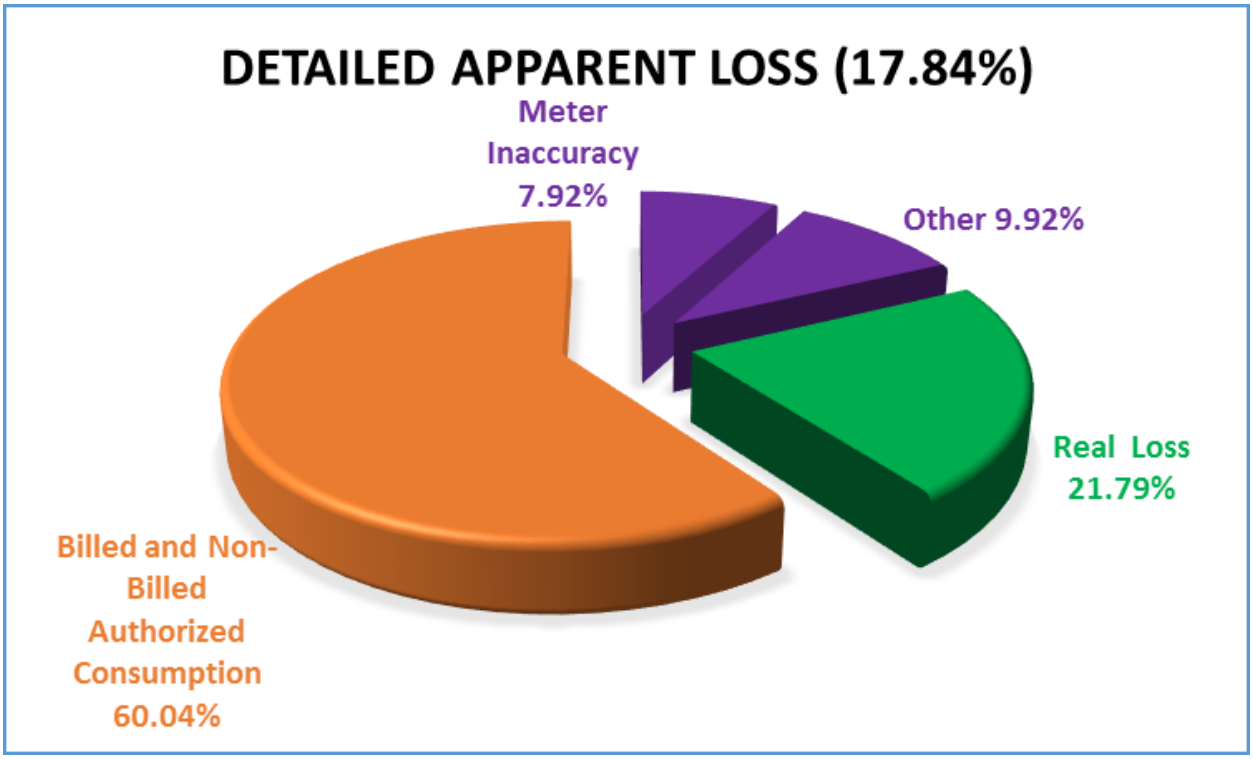
Detailed Real Loss (21.79%) 2018					
Description	**Volume**	**Unit**	**Percent of Real Loss**	**Percent of System Input Volume**	**Approximate Cost**
Main Line Leaks	30,683,217	Gallons	54.50%	11.89%	$95,118
Service Line Connections	12,784,674	Gallons	22.75%	4.95%	$39,632
Other	12,784,674	Gallons	22.75%	4.95%	$39,632
TOTAL	56,252,565	Gallons	100.00%	21.79%	$174,382


REAL LOSS (21.79%)
Main Lines11.89%
Service Lines Connections 4.95%
Other 4.95%
Apparent Loss 17.84%
Billed and Non-Billed Authorized Consumption 60.04%

6. Detailed Apparent Loss

It has been assumed that apparent loss makes up 45 percent of the UW or 17.84 percent of the system input volume and has an annual volume of approximately 46,024,825 gallons. It has also been assumed that inaccurate meters account for approximately 20,455,478 gallons per year or 44.44 percent of the apparent loss. The remaining 55.56 percent of apparent loss will be attributed to "other." Other will include staffing limitations, deficiencies in institutional controls and sources, potential metering inaccuracies at the Irvine Bridge master meter and sources of apparent loss yet to be identified. Once the water audit is completed, detailed apparent loss can be adjusted. The following table and chart summarize detailed real loss

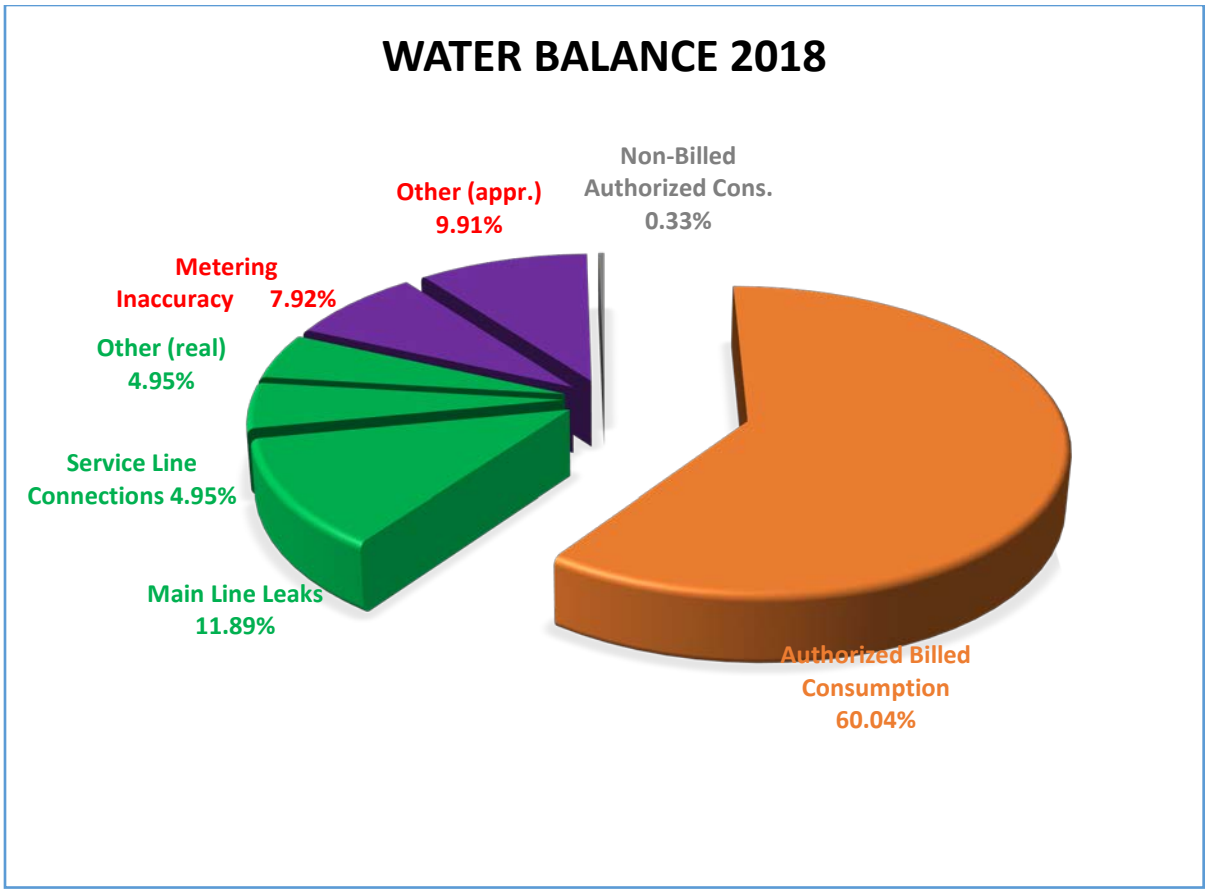
Detailed Apparent Loss (17.84%) 2018					
Description	**Volume**	**Unit**	**Percent of Apparent Loss**	**Percent of System Input Volume**	**Approximate Cost**
Metering Inaccuracy	20,455,478	Gallons	44.44%	7.92%	$63,412
Other	25,569,347	Gallons	55.56%	9.92%	$79,265
TOTAL	46,024,825	Gallons	100.00%	17.84%	$142,677

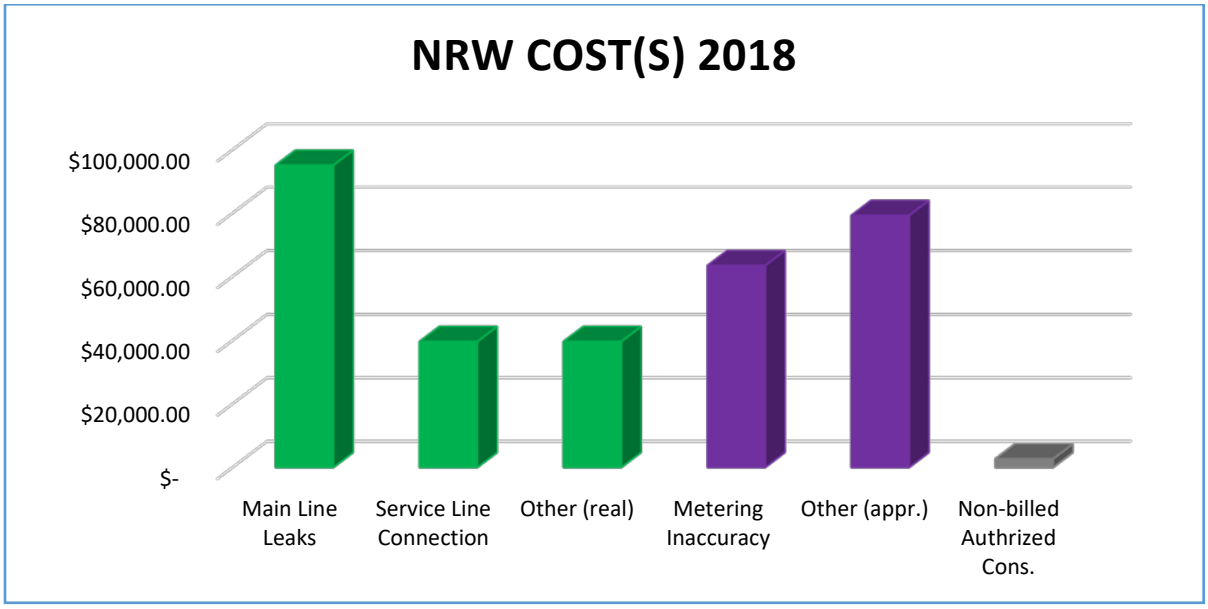


7. Water Loss Balance Summary (2018)

The following table and graph highlight the initial water balance developed herein.

2018 Water Balance Summary ECWD				
Description	Volume	Units	Percent of System Input Volume	Approximate Cost
System Input Volume (100%)				
Water Purchased Irvine Bridge MM	201,156,000	Gallons	77.93%	$629,618
Water Purchased Dry Branch MM	56,240,000	Gallons	21.79%	$176,595
Water Purchased Sweet Lick MM	332,000	Gallons	0.13%	$1,039
Water Purchased Jackson County MM	388,700	Gallons	0.15%	$1,358
Total System Input Volume	258,116,700	Gallons	100.00%	$808,610
Billed Authorized Consumption (60%)				
Water Sold Irvine Bridge MM	121,305,180	Gallons	47.00%	$0
Water Sold Dry Branch MM	32,928,780	Gallons	12.75%	$0
Water Sold Sweet Lick MM	406,540	Gallons	0.16%	$0
Water Sold Jackson County MM	345,210	Gallons	0.13%	$0
Total Billed Authorized Consumption	154,985,710	Gallons	60.04%	$0
Non-Billed Authorized Consumption (0.33%)				
Flushing	388,653	Gallons	0.15%	$1,205
Fire Department Use	464,947	Gallons	0.18%	$1,441
Total Non-Billed Authorized Consumption	853,600	Gallons	0.33%	$2,646
Real Loss (21.79%)				
Main Line Leaks	30,683,217	Gallons	11.89%	$95,118
Service Line Connections	12,784,674	Gallons	4.95%	$39,632
Other	12,784,674	Gallons	4.95%	$39,632
Total Real Loss	56,252,565	Gallons	21.79%	$174,382
Apparent Loss (17.84%)				
Metering Inaccuracy	20,455,478	Gallons	7.92%	$63,412
Other	25,269,347	Gallons	9.92%	$79,265
Total Apparent Loss	46,024,825	Gallons	17.84%	$142,677


WATER BALANCE 2018
Non-Billed Authorized Cons. 0.33%
Other (appr.) 9.91%
Metering Inaccuracy 7.92%
Other (real) 4.95%
Service Line Connections 4.95%
Main Line Leaks 11.89%
Authorized Billed Consumption 60.04%

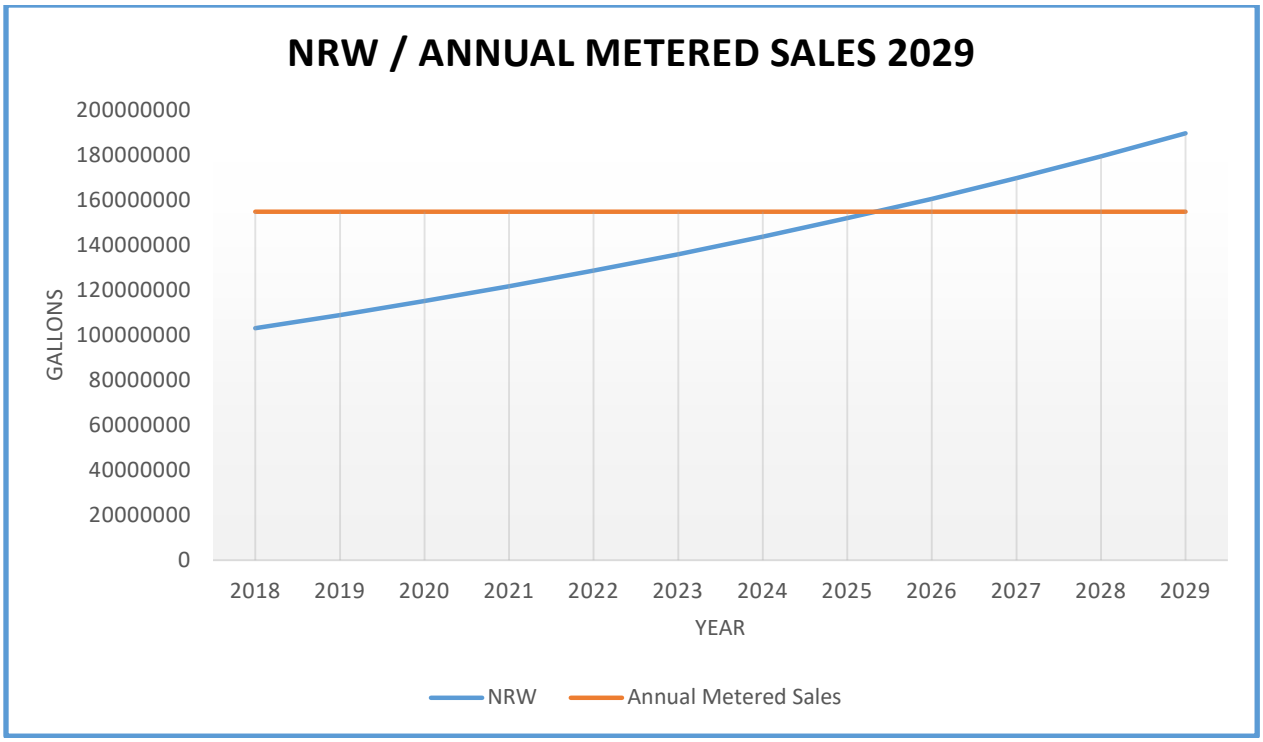

NRW COST(S) 2018
$100,000.00
$80,000.00
$60,000.00
$40,000.00
$20,000.00
$-
Main Line Leaks
Service Line Connection
Other (real)
Metering Inaccuracy
Other (appr.)
Non-billed Authrized Cons.

D. Future Projections (2029)

It is important that ECWD understand the future operating condition it may face over the next 10 years and the importance of implementing a loss reduction plan. The following table and graph highlight the projections for NRW and annual metered sales through 2029. These projections assume that no action has been taken by ECWD to reduce loss in the system.

Annual metered sales assumed to remain constant from 2018 through 2029. As discovered during the trend analysis, the annual metered sales rate are declining on average by 2.2 percent per year. A conservative approach was chosen and the annual meter sales were held constant. The NRW projection was calculated by applying the average annual increase to the 2018 amount through 2029. The table below summarizes these calculations.

NRW/Annual Meter Sales Projection through 2029												
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
NRW w/ 5.7% Annual Rate	103,130,990	109,008,410	115,221,889	121,789,537	128,731,541	136,069,238	143,825,185	153,021,223	160,688,544	169,847,791	179,529,115	189,762,275
Annual Meter Sales w/ No Annual Rate Increase	154,986,000	154,986,000	154,986,000	154,986,000	154,986,000	154,986,000	154,986,000	154,986,000	154,986,000	154,986,000	154,986,000	154,986,000



The graph above depicts the "no action" approach to loss reduction. The trend lines presented above are linear. The linear trend line represents a tangent to a non-linear equation. Should the current conditions persist, and no action taken to reduce NRW in the system, NRW will exceed annual metered sales between 2026 and 2029. At this point, daily operations will no longer be feasible.

V. STRATEGIC PLANNING

Strategic planning is a management activity that enables organizations to focus resources and energy towards achieving a common goal. The common goal is the reduction of UW to 15 percent by 2029. In doing so, ECWD hopes to achieve regulatory compliance, develop a sustainable operation and provide the citizens of Estill County with a reliable source of public water for decades to come.

This section of the report provides a framework for reducing system loss by defining proposed corrective actions and developing an implementation strategy. Consideration is given to potential problems encountered steps that can be taken to avoid these problems are identified. Finally, a list of measurable outcomes that can be used to evaluate the plans overall success is provided.

A. Goals

The established goal is the reduction of UW to 15 percent by 2029.

B. Corrective Actions

ECWD can take the following corrective actions to achieve the strategic goals previously outlined. Each task has been categorized according to anticipated date of completion.

0–2 Years

1. *Install Backflow Prevention Device at Irvine Bridge Master Meter*–ECWD should purchase and install a backflow prevention device in the vicinity of the Irvine Bridge master meter. Installing a backflow prevention device will safeguard ECWD from any potential loss associated with line breaks in the Kentucky River and may reduce metering inaccuracies. Installing a backflow prevention device should not impact the hydraulics of the ECWD system and may be viewed by DOW as a maintenance activity. Confirmation from DOW should be obtained prior to commencing construction activities. Professional services would not be required but are recommended to ensure proper installation. An opinion of probable cost is not available. This project may be done with ECWD general funds and force labor.

2. *Request Authority from the PSC to Assess a Loss Reduction Surcharge*–ECWD will require additional funds to perform the corrective actions recommended in this report. Present rates for service do not generate sufficient funds to meet current operating expenses and debt service. ECWD should seek authority from the PSC to assess a surcharge whose proceeds would be used solely for water loss reduction efforts. At a minimum, the surcharge should generate funds equal to the purchased water expense and purchase power expense disallowed in ECWD's last general rate proceeding as related to excessive water loss.

3. *Revise Project Profile WX21065008, Phase II Water System Improvements*–A copy of the current project profile for Phase II has been attached. The existing profile includes the installation of zone meters, establishment of DMA's, the purchase of 700 residential meters, the development of a hydraulic model and the replacement of six (6) non-standard creek crossings. A project profile was approved in 2018.

The opinion of probable cost for this project is $1,080,000.00. The project profile should be amended to include the installation of advanced meter infrastructure (AMI). It may be necessary to omit the six (6) non-standard creek crossings and the hydraulic model in order to keep the probable cost the same. If these portions of the project are removed, they may be completed as stand-alone projects. A map depicting the proposed DMA's and zone meter locations has been attached. Professional services will be required.

4. *Secure Funding for WX21065008, Phase II Water System Improvements*- The ECWD should apply for funding for the project. Professional services will be required to support funding applications. Funding sources may include the Kentucky Infrastructure Authority (KIA), and the US Department of Agriculture Rural Development (USDA RD). Grant funding from the Appalachian Regional Commission (ARC) and/or the Community Development Block Grant (CDBG) program may also be viable options.

5. *Design, Bid and Construct WX21065008, Phase II Water System Improvements*-When funds are available the ECWD should secure professional service to design, bid and construct WX21065008, Phase II Water System Improvements.

6. *Hire Dedicated Loss Reduction Staff and Purchase Additional Leak Detection Equipment* -When funds are available, ECWD should hire additional staff for the sole purpose of loss reduction. In addition, ECWD should purchase additional leak detection equipment as needed. Surcharge proceeds can be used as a potential source of financing for this activity.

7. *Secure Professional Services to Conduct a Condition Assessment of all Storage Facilities in the System* -When funds are available, ECWD should secure professional services to conduct a condition assessment of all storage facilities in the system. Surcharge proceeds can be used as a potential source of financing for this activity.

8. *Secure Professional Services to Conduct a Condition Assessment of all Pump Stations in the System* -When funds are available, ECWD should secure professional services to conduct a condition assessment of all pump stations in the system, including the Cedar Grove pump station. Surcharge proceeds can be used as a potential source of financing for this activity.

9. *Conduct an Audit of Telemetry Systems* -When funds are available, ECWD should retain MicroComm conduct an audit of all telemetry systems. Surcharge proceeds can be used as a potential source of financing for this activity.

10. *Secure Professional Services to Develop a Hydraulic Model*-When funds are available, ECWD should secure professional services for the development of a comprehensive hydraulic model of the system. The model can be initially developed from physical attributes and refined as more information becomes available from zone metering. Surcharge proceeds can be used as a potential source of financing for this activity.

11. *Upgrade and Develop Institutional Controls*-When funds are available, ECWD should secure professional service or enlist the services of KACO, BGADD, KRWA or RCAP to upgrade and develop a Policy and Procedures Manual, a Comprehensive Loss Reduction Plan, a Leak Detection Plan, appropriate O&M Manuals, a Water Audit, and a Capital Improvements Plan. Surcharge proceeds can be used as a potential source of financing for this activity.

12. *Revise Project Profile WX21065006, Meter Purchase and Replacement Project*-A copy of the current project profile for Meter Purchase and Replacement Project has been attached. The existing profile includes the purchase and installation of 3,000 new residential meters. A project profile was approved in 2017. The opinion of probable cost for this project is $1,319,450.00. The project profile should be amended to include the expansion of the AMI network to include the new meters. Professional services will be required.

13. *Secure Funding for WX21065006, Meter Purchase and Replacement Project*- ECWD should apply for funding for the project. Professional services will be required to support funding applications. Funding

sources may include KIA, and USDA RD. Grant funding from ARC and/or CDBG may also be viable options.

14. *Install Pressure Recording Devices in Crooked Creek and lower Sand Hill Areas*- When funds are available, ECWD should secure professional services to install pressure recording devices in these areas. Data gathered can be used to verify the need for main replacement. Surcharge proceeds can be used as a potential source of financing for this activity.

15. *Hire Leak Detection Services*- When funds are available, ECWD should considered hiring leak detection services to pinpoint sources of loss in problematic areas in the system. Surcharge proceeds can be used as a potential source of financing for this activity.

16. *Develop a Project Profile for the Replacement of Service Line Connections in South Irvine*-ECWD should develop a project to replace existing "blue max" service line connections in the South Irvine area. Project development should include defining the scope, estimating project costs, establishing a project timeline, and identifying possible funding sources. The project profile should be submitted to BGADD for inclusion in the WRIS database. Professional services will be required.

17. *Develop a Project Profile for the Replacement of Water Main in the Crooked Creek Area*-ECWD should develop a project to replace existing water mains in the Crooked Creek area. Project development should include defining the scope, estimating project costs, establishing a project timeline, and identifying possible funding sources. The project profile should be submitted to BGADD for inclusion in the WRIS database. Professional services will be required.

18. *Develop a Project Profile for the Replacement of Water Main in the Lower Sand Hill Area*-ECWD should develop a project profile to replace existing water mains in the Crooked Creek area. Project development should include defining the scope of work, estimated project costs, establishing a project timeline, and identifying possible funding sources. The project profile should be submitted to the BGADD water management council for inclusion in the WRIS database. Professional services will be required.

19. *Rate Study/Rate Increase*- ECWD should hire professional services or utilize public agencies to complete a rate study. The rate study should determine if existing rates are sufficient to sustain daily operations, pay debt service and fund loss reduction efforts.

20. *Billing Software Audit*- ECWD should conduct periodic audits of billing software and billing procedures.

21. *Continued Education and Training*-The PSC and DOW require that key personnel receive the proper training and maintain the necessary licensure with regards operating and/or managing a water distribution system. ECWD should continue to provide ample opportunity for staff to receive continued education training and continue to maintain accurate training records.

2-5 Years

1. *Design, Bid and Construct WX21065006, Meter Purchase and Replacement Project*-When funds are available, ECWD should secure professional services to design, bid and construct WX21065006, Meter Purchase and Replacement Project.

2. *Develop a Project Profile for a Tank Renovation Project*-Based on the results of the condition assessment, a project profile should be developed to address the deficiencies identified. Project development should include defining the scope of work, estimating the project costs, establishing a project timeline, and identifying possible funding sources. The project profile should be submitted to the BGADD for inclusion in the WRIS database. Professional services will be required.

3. *Develop a Project Profile for a Pump Station Rehabilitation Project*-Based on the results of the condition assessment, a project profile should be developed to address the deficiencies identified. Project development should include defining the scope of work, estimating project costs, establishing a project timeline, and identifying possible funding sources. The project profile should be submitted to the BGADD for inclusion in the WRIS database. Professional services will be required.

4. *Develop a Project Profile for Upgrades to Existing Telemetry*-Based on the results of the system audit, a project profile should be developed to address the deficiencies identified. Project development should include

defining the scope of work, estimating project costs, establishing a project timeline, and identifying possible funding sources. The project profile should be submitted to the BGADD for inclusion in the WRIS database. Professional services will be required.

5. *Secure Funding for Service Line Connection Replacement Project in South Irvine*- ECWD should apply for funding for the project. Professional services will be required to support funding applications. Funding sources may include KIA, and USDA RD. Grant funding from ARC and/or CDBG may also be viable options.

6. *Design, Bid, and Construct Service Line Connection Replacement Project in South Irvine*-When funds are available, the ECWD should secure professional services to design, bid and construct the Service Line Connection Replacement Project in South Irvine. The proposed project included on the attached proposed systems improvements map.

7. *Secure Funding for Replacement of Water Main Lower Sand Hill*- ECWD should apply for funding for the project. Professional services will be required to support funding applications. Funding sources may include KIA, and USDA RD. Grant funding from ARC and/or CDBG may also be viable options.

8. *Rate Study/Rate Increase*- ECWD should hire professional services or utilize public agencies to complete a rate study. The rate study should determine if existing rates are sufficient to sustain daily operations, pay debt service and fund loss reduction efforts.

5-10 Years

1. *Design, Bid and Construct Replacement of Water Main Lower Sand Hill Area*-When funds are available, ECWD should secure professional services to design, bid and construct Replacement of Water Main Lower Sand Hill. The proposed project is included on the attached proposed systems improvements map.

2. *Secure Funding for Replacement of Water Main Crooked Creek Area*- ECWD should apply for funding for the project. Professional services will be required to support funding applications. Funding sources may include KIA, and USDA RD. Grant funding from ARC and/or CDBG may also be viable options.

3. *Design, Bid, and Construct Replacement of Water Crooked Creek Area*- When funds are available, ECWD should secure professional services to design, bid and construct Replacement of Water Main Lower Sand Hill. The work is included on the attached proposed systems improvements map.

4. *Secure Funding for a Tank Renovation Project*- ECWD should apply for funding for the project. Professional services will be required to support funding applications. Funding sources may include KIA, and USDA RD. Grant funding from ARC and/or CDBG may also be viable options.

5. *Design, Bid, and Construct a Tank Renovation Project*-When funds are available, ECWD should secure professional services to design, bid and construct a Tank Rehabilitation Project.

6. *Secure Funding for a Pump Station Rehabilitation Project*- ECWD should apply for funding for the project. Professional services will be required to support funding applications. Funding sources may include KIA, and USDA RD. Grant funding from ARC and/or CDBG may also be viable options.

7. *Design, Bid and Construct a Pump Station Rehabilitation Project*-When funds are available, ECWD should secure professional services to design, bid and construct a Renovation/Replacement Project.

8. *Secure Funding for a Telemetry Upgrade Project*- ECWD should apply for funding for the project. Professional services will be required to support funding applications. Funding sources may include KIA, and USDA RD. Grant funding from ARC and/or CDBG may also be viable options.

9. *Design, Bid, and Construct a Telemetry Upgrade Project*-When funds are available, ECWD should secure professional services to design, bid and construct a Telemetry Upgrade Project.

10. *Master Meter Relocation and River Crossing (WX21065008)*-A copy of this project profile has been included as an attachment. As previously discussed, the master meter location and configuration create several concerns for ECWD and may be a potential source of loss. A project

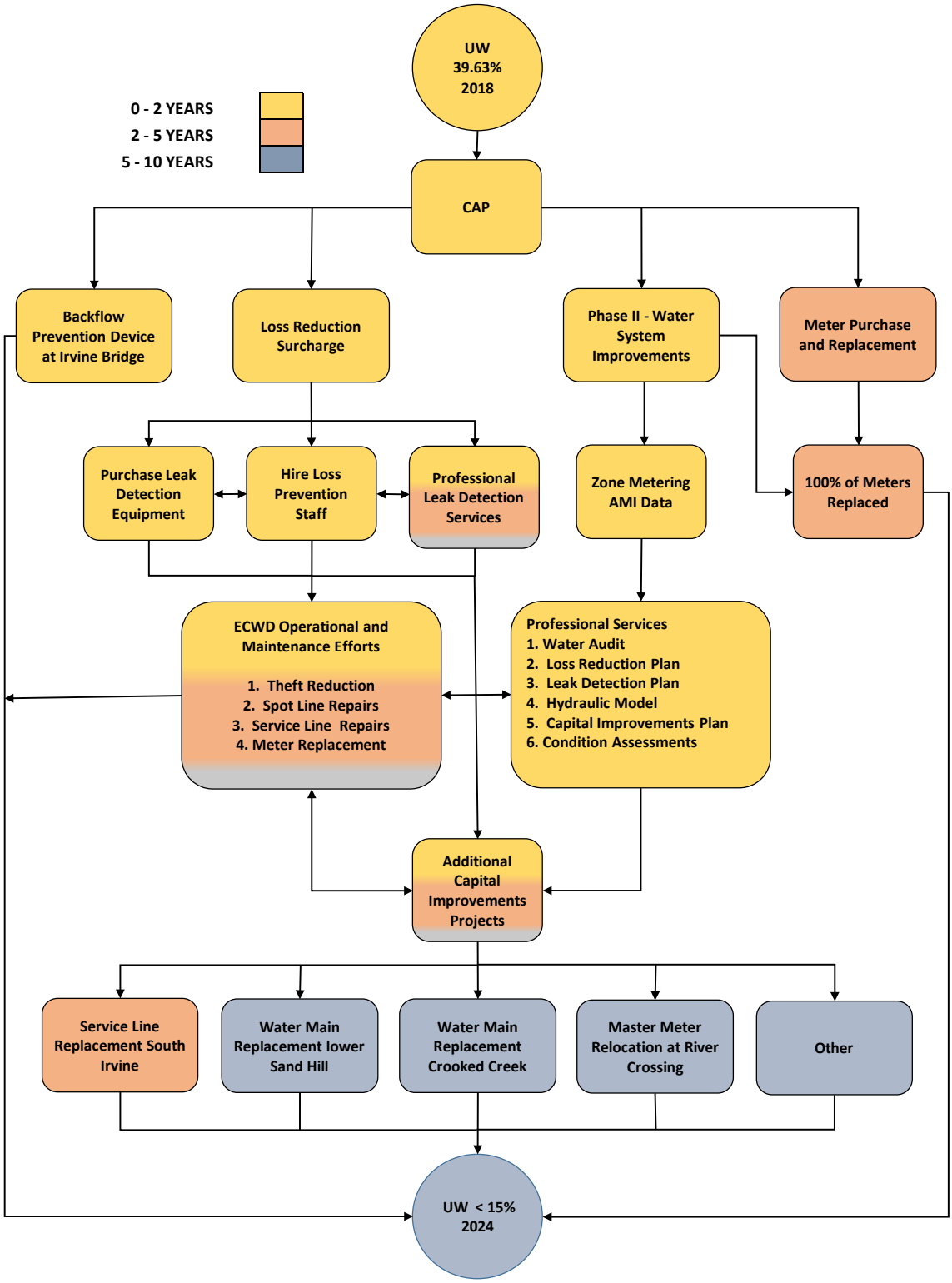
profile was approved in 2017. The opinion of probable cost for this project is $688,512.00. Project costs should be revised to reflect current pricing. Professional services will be required. This project is currently unfunded.

11. *ECWD/Beattyville Emergency Regional Interconnect (WX2106507)*-A copy of this project profile has been included as an attachment. This project would provide and additional source of supply to be used on an emergency basis. The project involves the inter-connect of the Beattyville System with ECWD system in the eastern portion of Estill County. This project is not a high priority. A project profile was approved in 2017. The opinion of probable cost for this project is $818,421.00. Project costs should be revised to reflect current pricing. Professional services will be required. This project is currently unfunded.

C. Implementation

1. Plan Schematic

The following is a graphic representation of the corrective action plan for ECWD. The flowchart should be examined using a top down method. Each task or group of tasks is colored coded depending on the date of implementation. Tasks are linked with arrows indicating the sequence of implementation.


UW
39.63%
2018
0 - 2 YEARS
2 - 5 YEARS
5 - 10 YEARS
CAP
Backflow Prevention Device at Irvine Bridge
Loss Reduction Surcharge
Phase II - Water System Improvements
Meter Purchase and Replacement
Purchase Leak Detection Equipment
Hire Loss Prevention Staff
Professional Leak Detection Services
Zone Metering AMI Data
100% of Meters Replaced
ECWD Operational and Maintenance Efforts
1. Theft Reduction
2. Spot Line Repairs
3. Service Line Repairs
4. Meter Replacement
Professional Services
1. Water Audit
2. Loss Reduction Plan
3. Leak Detection Plan
4. Hydraulic Model
5. Capital Improvements Plan
6. Condition Assessments
Additional Capital Improvements Projects
Service Line Replacement South Irvine
Water Main Replacement lower Sand Hill
Water Main Replacement Crooked Creek
Master Meter Relocation at River Crossing
Other
UW < 15%
2024

D. Priority of Work

The following is a list of priorities of work. The goal is to establish priorities of work that are reasonable, supportive of subsequent projects and provide the best return on investment.

1. *Improving the Operating Efficiency and Loss Reduction Capabilities of ECWD*- This priority of work focuses on improving the operating efficiency and loss reduction capabilities of ECWD. Corrective actions include: installation of a backflow prevention device at the Irvine Bridge master meter; hiring additional staff for the sole purpose of loss reduction; upgrading and developing institutional controls; assessing system components through inspection and/or pressure monitoring; completing a water audit; developing a hydraulic model; maintaining sufficient rates; and purchasing additional leak detection equipment. Many of these tasks should be accomplished in the 0-2 year period; however, the goal is the progressive improvement of operational efficiency and loss reduction capabilities beyond the 10 year planning period.

2. *Installing Zone Meters, Establishing DMAs and Installing an AMI Network*- This priority of work focuses on installing zone meters, establishing DMAs and installing an AMI network to provide ECWD with sufficient system information to enable ECWD to focus on loss reduction efforts. Zone metering will establish redundant metering at each wholesale purchase point. Corrective actions that are involved in this priority include the construction of the Phase II Water Systems Improvement Project and Meter Purchase and Replacement Project.

3. *Meter Replacement* – This priority of work is focused solely on the replacement of existing residential and commercial meters with smart meter units. These units will help in loss reduction by providing improved low-flow metering, remote management and monitoring capabilities, and advanced tampering/unauthorized access notifications. The proposed meters will be integrated into the AMI network. Corrective actions that are involved in this priority include the following: construction of the Phase II Water System Improvements Project, Construction of the Meter Purchase and Replacement Project.

4. *Develop and Prioritization Capital Improvement Projects* – The final priority of work focuses on developing and prioritizing capital improvement projects aimed at replacing infrastructure with significant loss contribution. In order to identify and prioritize capital projects information from the zone meters and the AMI network will need to be analyzed. For this reason, this priority of work was ranked fourth overall. Corrective actions that are involved in this priority of work include: a potential service line replacement project in South Irvine, a potential water main replacement project in the Crooked Creek area, a potential water main replacement project in the lower Sand Hill area, tank renovations, pump station rehabilitations and others.

E. Potential Problems

Before the implementation of any plan it is important to mitigate risk. The following is a list of potential problems and mitigation efforts that should be taken to avoid these problems.

1. *Ineligible to Receive Funding Assistance Because of Payment History*- USDA RD and KIA are primary lending agencies that fund rural water infrastructure projects in Kentucky. Several of the corrective actions outlined above involve large scale capital improvements which will require use of USDA RD and/or KIA loan funds. To remain eligible, the ECWD is advised to keep existing loans current, make timely payment on all loans and maintain required reserve accounts.

2. *Delays in Funding Assistance Because of Incomplete Financial Records*- Most funding agencies will require the submittal of financial records during the application process. Incomplete financial records can cause delays in processing funding applications. ECWD is advised to continue to keep detailed financial records.

3. *Noncompliance with DOW*- DOW provides regulatory oversight, reviews plans and specifications, and assists in the administration of KIA funds. It is imperative that ECWD maintain a good working relationship with the DOW. ECWD should continue to comply with all monitoring and reporting requirements and ensure that all employees maintain the required licensure for their position. ECWD is

encouraged to use professional engineering services to assist with DOW compliance issues when needed.

4. *Noncompliance with the PSC*-The PSC provides regulatory oversight for water districts in Kentucky. ECWD is advised to continue to comply with PSC orders and encouraged to continue to use legal counsel to assist with compliance efforts when needed.

5. *Funding Availability*-The availability of funds from different sources vary as do the application and qualification requirements. It is recommended that ECWD develop strategic partnerships to assist with funding needs. The following is a list of partners that can provide assistance: KIA, USDA RD, BGADD, Department for Local Government (DLG), the Estill County Fiscal Court, DOW, RCAP and the Kentucky Economic Development Authority (EDA),

F. Measureable Outcomes

This section of the report will establish measurable outcomes associated with the corrective actions presented herein. The overall goal is to reduce UW to 15 percent by 2029. It is estimated that each proposed corrective action will be 60 percent effective in loss reduction.

0-2 Years

The following sources of loss should be addressed within the first two (2) years of implementing the corrective action plan. At 60 percent effectiveness, the anticipated result is a 3.93 percent reduction in UW by the end of the two (2) year period. This 3.93 percent reduction should correspond to a reduction in annual purchased water of 10,134,694 gallons.

1. *Other (Apparent Loss)*-It has been assumed that other (apparent loss) is responsible for approximately 9.92 percent of the annual water purchased and contributes approximately 25,569,347 gallons annually to UW. During the first two (2) years of implementation, it is assumed that ECWD will hire additional personnel dedicated to loss reduction, purchase additional leak detection equipment, upgrade and develop institutional controls, install a backflow prevention device at the Irvine Bridge master meter, and hire leak detection professionals. It is anticipated that these actions will reduce other (apparent loss) contribution to UW by 2.98 percent (60 percent effectiveness x 50

percent completion x 9.92 percent of purchased water). This should result in the reduction of annual purchased water by 7,681,553 gallons.

2. *Metering Inaccuracies*-It has been assumed that metering inaccuracies are responsible for approximately 7.92 percent of the annual water purchased and contributes approximately 20,455,478 gallons annually to UW. During the first two (2) years of implementation, it is assumed that ECWD will use KIA or USDA RD funds to complete the Phase II Water System Improvements project. This project will establish DMAs through the installation of zone meters, develop the initial components of an AMI network, relocate approximately five (5) non-standard creek crossings and replace approximately 20 percent of the residential and commercial meters in the system. During the first two (2) years of implementation, it is assumed that completing the Phase II project, will reduce the loss contribution associated with metering inaccuracies by inaccurate meters by 0.95 percent (20 percent meters x 60 percent effectiveness x 7.92 percent of purchased water). This should result in the reduction of annual purchased water by 2,453,141 gallons.

The following table summarizes the calculations presented above.

	2019	Main Line Leaks	Service Line Connections	Other	Metering Inaccuracy	Other	2021	
Main Line Leaks	11.89%						11.89%	Main Line Leaks
Service Line Connections	4.95%						4.95%	Service Line Connections
Other	4.95%						4.95%	Other
Metering Inaccuracies	7.92%				-0.95%		6.97%	Metering Inaccuracies
Other	9.92%					-2.98%	6.94%	Other
Total	39.63%	0.00%	0.00%	0.00%	-0.95%	-2.98%	35.70%	Total

2-5 Years

At 60 percent effectiveness, the anticipated result by the end of Year 5 is an additional 9.75 percent reduction in UW. This 9.75 percent reduction should correspond to a reduction in annual purchased water of 25,160,183 gallons.

1. *Metering Inaccuracies*- It is assumed that the contribution from metering inaccuracies will reduce from 7.92 percent to 6.97 percent during the first 2 years of implementation. During the next 3 years, it is assumed that ECWD will use KIA or USDA RD funds to complete the Meter Purchase and Replacement project. This project will complete the AMI network and replace the remaining 80 percent of residential and commercial meters in the system. It is anticipated that completion of the Meter Purchase and Replacement project will reduce the percent contribution on inaccurate meters by an additional 3.80 percent (80 percent meters x 50 percent effectiveness x 7.92 percent of purchased water). This should result in the reduction of annual purchased water by 9,812,564 gallons.

2. *Service Line Replacement South Irvine Area*- It is assumed that service line connections are responsible for approximately 4.95 percent of the annual water purchased and contribute approximately 12,784,674 gallons annually to UW. Between Year 3 and Year 5, it is assumed that ECWD will use KIA or USDA RD funds to complete a project focused on replacing service line connections in the South Irvine area. It is anticipated that replacing service line connections in South Irvine will reduce the percent contribution of service line connections by 2.97 percent (60 percent effective x 4.95 percent of purchased water). This should result in the reduction of annual purchased water by 7,666,066 gallons.

3. *Other (Apparent Loss)* - It has been assumed that other (apparent loss) was reduced by 2.98 percent during the first 2 years of implementation. It is assumed that ECWD will continue to improve operational efficiency and loss reduction capabilities with similar efforts over the next 3 years. It is anticipated that these continued efforts will reduce other (apparent loss) by an additional 2.98 percent (60 % effectiveness x 50 % completion x 9.92 percent of purchased water). This should result in the reduction of annual purchased water by 7,681,553 gallons.

The following table summarizes the calculations presented above.

	2019	2021	Main Line Leaks	Service Line Connections	Other	Metering Inaccuracy	Other	2024	
Main Line Leaks	11.89%	11.89%						11.89%	Main Line Leaks
Service Line Connections	4.95%	4.95%		-2.97%				1.98%	Service Line Connections
Other	4.95%	4.95%						4.95%	Other
Metering Inaccuracies	7.92%	6.97%				-3.80%		3.17%	Metering Inaccuracies
Other	9.92%	6.94%					-2.98%	3.96%	Other
Total	39.63%	35.70%	0.00%	-2.97%	0.00%	-3.80%	-2.98%	25.95%	Total

5-10 Years

The anticipated result by the end of Year 10 is an additional 11.29 percent reduction in UW. This reduction should correspond to a reduction in annual purchased water of 29,149,119 gallons.

1. *Main Line Leaks*- It has been assumed that main line leaks are responsible for approximately 11.89 percent of the annual water purchased and contribute approximately 30,683,217 gallons annually to UW. Between Year 5 and Year 10, it is assumed that ECWD will use KIA or USDA RD funds to complete projects aimed at replacing main lines in the Crooked Creek and lower Sand Hill areas. It is anticipated that replacing main lines in these areas will reduce the percent contribution by 8.32 percent (70 percent effective x 11.89 percent of purchased water). The effectiveness has been increased to 70 percent because of the potential availability of system information acquired from the DMAs and AMI network, pressure monitoring and professional leak detection services. This should result in the reduction of the annual purchased water amount by 21,483,053 gallons.

2. *Other*- It has been assumed that other (real loss) is responsible for 4.95 percent of the annual water purchased and contributes approximately 12,784,674 gallons to UW annually. Between Year 5 and Year 10, it is assumed that ECWD will use KIA or USDA RD funds to complete projects aimed at rehabilitating pump stations and tanks identified during the condition assessment. In addition, it is assumed that other

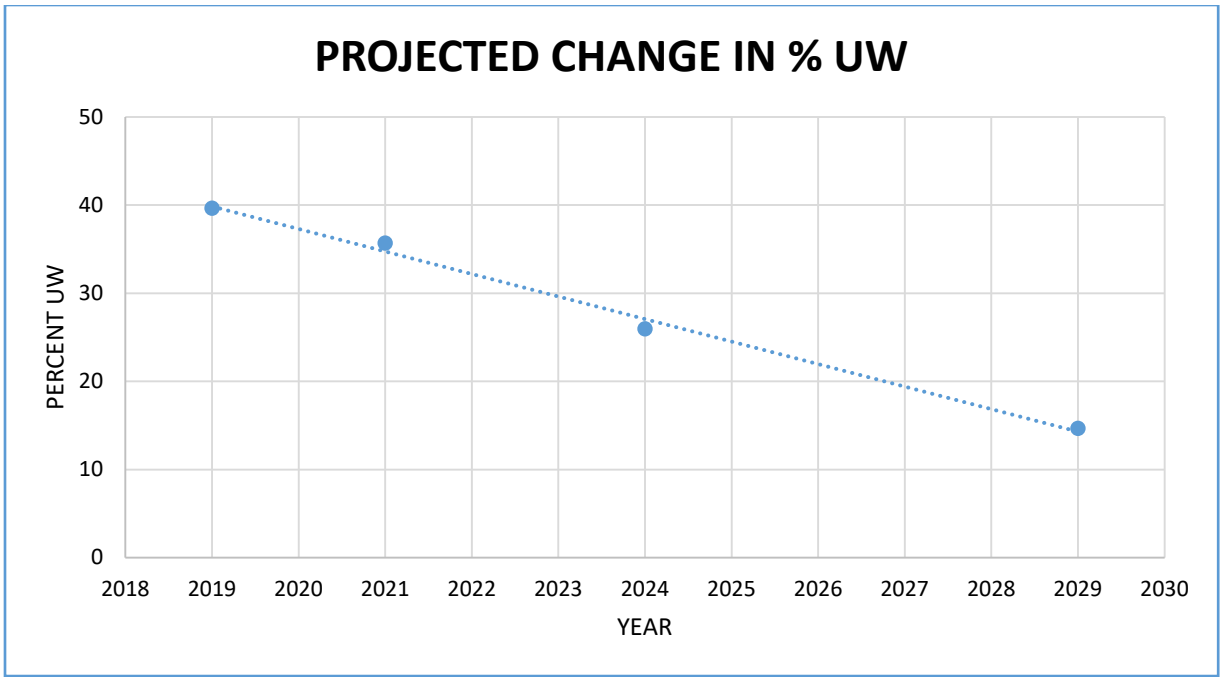
unknown sources of loss will be identified repaired. It is anticipated that rehabilitating pump stations and tanks along with repairs to unknown sources will reduce the percent contribution of other (real loss) 2.97 percent (60 % effectiveness x 50 % completion of other real loss x 4.95 percent of purchased water). This should result in the reduction of the purchased water amount by 7,666,066 gallons.

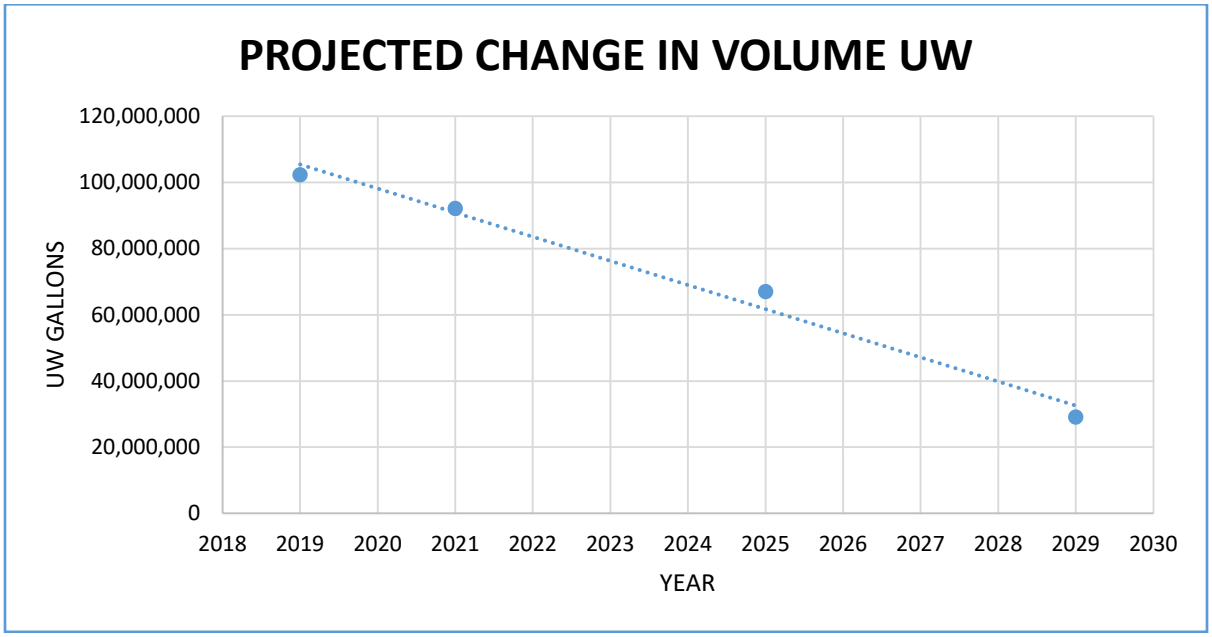
The following table summarizes the calculations presented above.

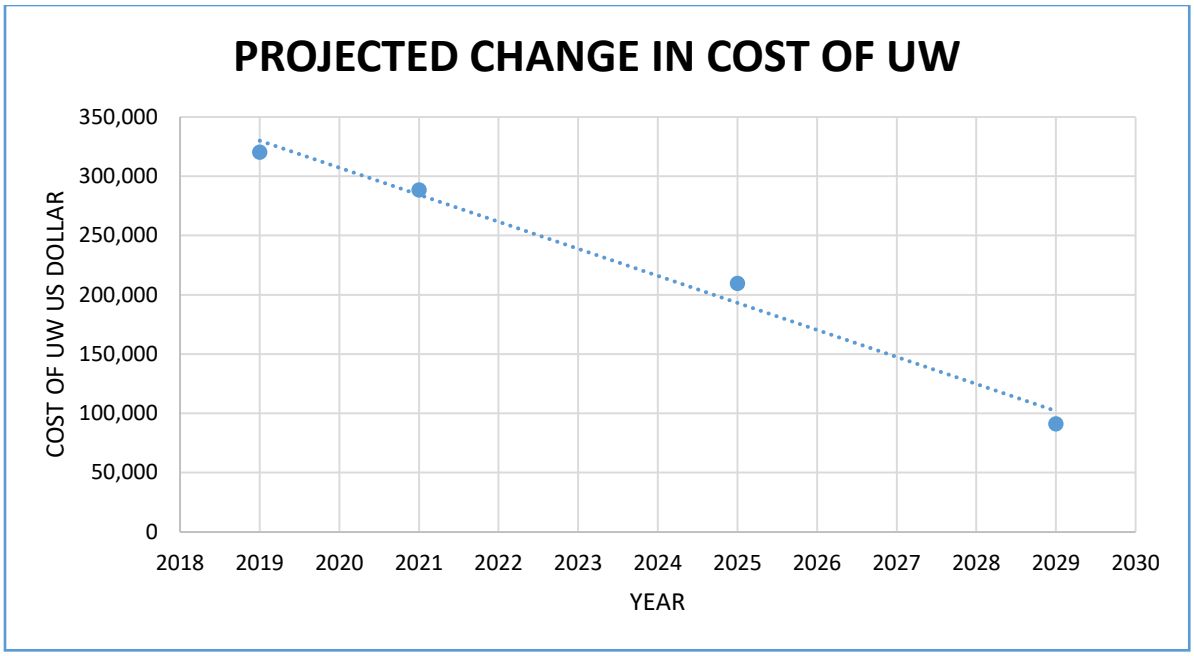
	2019	2021	2024	Main Line Leaks	Service Line Connections	Other	Metering Inaccuracy	Other	2029	
Main Line Leaks	11.89%	11.89%	11.89%	-8.32%					3.57%	Main Line Leaks
Service Line Connections	4.95%	4.95%	1.98%						1.98%	Service Line Connections
Other	4.95%	4.95%	4.95%			-2.97%			1.98%	Other
Metering Inaccuracies	7.92%	6.97%	3.17%						3.17%	Metering Inaccuracies
Other	9.92%	6.94%	3.96%						3.96%	Other
Total	39.63%	35.70%	25.95%	-8.32%	0.00%	-2.97%	0.00%	0.00%	14.66%	Loss

The following summarizes the measureable outcomes for the planning period. The table is intended for a quick reference and has been color coded to match the color coding on the implementation flow chart. The results presented herein are based on results of the water balance and assumes 60 percent effectiveness of the proposed corrective actions. These volumes should be refined as more accurate data is available from the DMAs and the AMI network.

Planning Period (Year Ending)	Corrective Action(s)	Reduction in UW %	Reduction in UW Volume (gallons)	Reduction in UW Cost (dollars)
0-2 Years (2021)	1. Install backflow prevention device at Irvine Bridge master meter 2. Request loss reduction surcharge 3. Construct Phase II Water System Improvements Project 4. Hire additional staff for loss reduction 5. Upgrade an develop institutional controls 6. Revise project profile and secure funding for Phase II Water System Improvements Project 7. Construct Phase II Water System Improvements Project 8. Establish DMAs and install zone meters as part of the Phase II project 9. Install AMI network as part of the Phase II project 10. Replace 20 % of residential and commercial meters as part of the Phase II project 11. Replace six (6) non-standard creek crossings 12. Revise project profile and sercure funding for the Meter Purchase and Replacement Project 13. Complete a water audit 14. Revise/update corrective action plan 15. Develop a hydraulic model 16. Conduct a rate analysis 17. Conduct a billing software audit 18. Hire leak detection professionals as needed 19. Develop project profiles for additional water main replacement and service line replacement projects 20. Attend continued edcuational training 21. Install pressure monitors in Crooked Creek and Lower Sand Hill areas 22. Conduct condition assessment on pump stations and storage tanks	3.93%	10,134,694 gallons	$31,722
2-5 Years (2024)	1. Construct Meter Purchase and Replacement Project 2. Replace remaining 80% of rmeters as part of the Meter Purchase and Replacement Project 3. Finalize AMI network as part of the Meter Purchase and Replacement Project 4. Purchase additional leak detection equipment as needed 5. Continue upgrade an development of institutional controls 6 . Finalize Capital Improvements Plan and prioritize captial improvements projects 7. Revise project profile and secure funding for Service Line Replacement Project in South Irvine 8. Construct Service Line Replacement Project for South Irvine 9. Secure funding for Water Main Replacement Project in the Crooked Creek Area 10. Secure funding for Water Main Replacement Project in the lower Sand Hill Area 11. Develop Project Profile for Pump Station Rehabilitation Project 12. Develop Project Profile for Storage Tank Renovation Project 13. Assess telemetry system 14. Conduct a rate analysis 15. Conduct a billing software audit 16. Attend continued education training 17. Conduct a billing software audit 18. Develop project profile and secure funding for Storage Tank Renovation Project, Pump Station Rehabilitation Project, and Telemetry Upgrades Project	9.75%	25,160,183 gallons	$78,751
5-10 Years (2029)	1. Construct Water Main Replacement Project in the lower Sand Hill area 2. Continue upgrade and development of instituional controls 3. Purchase additional leak detection as needed 4. Construct Water Main Replacement Project in the Crooked Creek area 5. Conduct a rate analysis 6 . Conduct a billing software audit 7. Attend continued education training 8. Construct Storage Tank Renovation Project 9. Construct Pump Staion Rehabilitation Project 10. Construct Telemetry Upgrade Project 11. Develop other capital projects 12. Relocate and Replace Irvine Bridge Master Meter and River Crossing if feasible 13. Establish emergency regional interconnects with Beatttyville and Madison County as needed	11.29%	29,149,119 gallons	$91,237


PROJECTED CHANGE IN % UW
PERCENT UW
50
40
30
20
10
0
2018
2019
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029
2030
YEAR


PROJECTED CHANGE IN VOLUME UW
UW GALLONS
120,000,000
100,000,000
80,000,000
60,000,000
40,000,000
20,000,000
0
2018
2019
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029
2030
YEAR



VI. CONCLUSION AND RECOMMENDATIONS

In 2018, ECWD's UW was 39.63 percent. UW has been steadily increasing over the past 10 years. If no action is taken, UW will exceed meter sales within the next 10 years. PSC Case No. 2018-00276 requires that ECWD develop a comprehensive corrective action plan focused on reducing UW to 15 percent. The excessive UW is a function of a declining customer base, a nation-wide trend of reduced domestic consumption, loss from leaks, inaccurate meters, and other issues. ECWD intends to implement corrective actions over a 10 year period. Efforts focus on installing zone meters, establishing DMAs, constructing an AMI network, replacing residential and commercial meters, improving operational efficiency, expanding loss reduction capabilities, developing institutional controls, and completing capital improvement projects.

It is recommended that ECWD proceed initially with the corrective actions presented herein. Once zone meters are installed, DMAs are established and the AMI network is put into operation, ECWD should revise the corrective action plan. It is recommended that ECWD track progress by maintaining records of completed task.

ATTACHMENT A
PSC ORDER FOR
CASE NO. 2018-00276

COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

ELECTRONIC APPLICATION OF ESTILL COUNTY WATER DISTRICT NO. 1 FOR AUTHORIZATION TO CONSOLIDATE ITS EXISTING LOANS WITH CITIZENS GUARANTY BANK	)))))	CASE NO. 2018-00276

ORDER

On December 4, 2018, Estill County Water District No. 1 (Estill District No. 1) filed an application seeking Commission approval to consolidate its existing loans of approximately $238,415 with Citizens Guaranty Bank of Irvine, Kentucky (Citizens Guaranty), and to issue a promissory note reflecting a longer term and lower rate of interest. There are no intervenors in this case, and the matter is submitted to the Commission for a decision based upon the evidentiary record.

Estill District No. 1 proposed to retire existing promissory notes held by Citizens Guaranty in the amount of $238,415, which were originally used to purchase a service vehicle, and to meet current operating expenses and debt service payments.[1] The outstanding balance consists of four fixed-rate loans with original principal amounts of $100,305, $110,330, $110,254, and $18,453 with interest rates ranging from 3.85 percent to 4.50 percent.[2] Estill District No. 1 proposes to consolidate this indebtedness and the

[1] Application, at 5, Table 3.

[2] *Id.*

outstanding principal amounts of approximately $55,030, $88,294, $79,821, and $15,269, totaling $238,414, into one loan with a total principal of $238,713 over a term of ten years, with an interest rate of 3.00 percent per annum.[3] Pursuant to the terms of the promissory note, the interest rate of the proposed loan is subject to adjustment to the current market rate of interest on the third and seventh anniversaries of the note's execution. The adjusted interest rate, however, may not exceed the interest rate on two-year U.S. Government Treasury Notes auctioned most recent to the promissory note's anniversary date plus 1.5 percent.[4] The promissory note will be secured with Estill District No. 1's existing accounts receivable balance and any acquired after the execution of the promissory note, and by a security interest in the service vehicle purchased originally with the proceeds of Note No. 37095, with an original cost of $18,453.

In support of its Application, Estill District No. 1 provided an expected amortization schedule for the consolidated loan that shows the total principal and interest payments on the proposed debt will be approximately $276,586.[5] Under the current loan agreements, the total principal and interest payments, including balloon payments of $55,210 and $59,721 due in 2019, $10,080 due in 2020, and $61,137 due in 2021, would total approximately $248,421.

While the proposed loan will not result in net savings, it will result in an improved cash flow, which will enable Estill District No. 1 to timely reschedule existing United States Department of Agriculture Rural Development (RD) debt. In addition to the loan

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[3] Estill District No. 1 did not reconcile the difference of $298 between the total principal owed on the four outstanding loans and the consolidated loan proposed in its application.

[4] *Id.* at 11.

[5] *Id.* Exhibit 11.

consolidation being requested in its Application, Estill District No. 1 also stated that it has been in negotiations with RD to reamortize and reschedule its current bond issuances under which Estill District No. 1 is considered to be a delinquent borrower.[6] While the proposed reamortization and rescheduling of Estill District No. 1's existing RD debt does not require Commission authorization,[7] as a condition to the reamortization and rescheduling of its debt, Estill District No. 1 must demonstrate that it has sufficient cash flow to meet the revised payment schedule and the reserve requirements of its loan. To accomplish this, the approval and implementation of the loan consolidation with Citizens Guaranty is necessary. The reamortization and rescheduling of the RD debt at the current rate will reduce the annual debt service by about $80,527 over the next five years on average.[8] However, to ensure it receives that reduction, Estill District No. 1 requested a decision no later than December 27, 2018, because the current RD poverty lending rate of 2.375 percent per annum will only remain in effect until December 31, 2018.

The Commission has reviewed the proposed loan consolidation and finds that while the terms of the consolidation do not provide positive gross savings for Estill District No. 1, there is some value in that the proposed consolidation improves Estill District No. 1's cash flow position in the short term. Further, the improved cash flow position will permit Estill District No. 1 to restructure its RD debt as discussed above, which will reduce its annual debt service on the RD debt by about $80,527 annually over each of the next five years. In addition to improving its cash flow position, Estill District No. 1 has stated

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[6] *Id.* at 8.

[7] *Id.* at 14, and KRS 278.300(10).

[8] *Id.* at 20.

that it waives any right in any future general rate proceeding to recover through rates the portion of the promissory note's debt service payments related to these notes,[9] thereby recognizing the Commission's Order in Case No. 2017-00176 that found through the adoption of the findings of the Commission Staff Report that rate recovery of debt service payments on notes issued without Commission approval and used to pay for operating expenses and debt service payments would constitute retroactive ratemaking.[10]

Having considered the evidence of record and being otherwise sufficiently advised, the Commission finds, subject to the conditions discussed herein and in Estill District No. 1's application, that the proposed loan from Citizens Guaranty is for lawful objects within the corporate purposes of Estill District No. 1; is necessary and appropriate for and consistent with the proper performance by the utility of its service to the public; will not impair its ability to perform that service; is reasonable, necessary, and appropriate for such purposes; and should therefore be approved.

However, the Commission observes that authorizing Estill District No. 1 to refinance the Citizens Guaranty loans, and thereby restructure the RD debt only buys it time—it does not correct systemic problems that have led to its current financial crisis. First among those problems is water loss, which Estill District No. 1 reported to be 35.2625 percent in its 2016 Annual Report. Commission regulations state that a utility's unaccounted-for water loss for ratemaking purposes shall not exceed 15 percent of the total water produced and purchased, excluding water consumed by a utility in its own

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[9] *Id.* at 13.

[10] Case No. 2017-00176, *Electronic Application of Estill County Water District No. 1 for Rate Adjustment Pursuant to 807 KAR 5:076* (Ky. PSC Dec. 20, 2017).

operations.[11] Reduction of Estill District No. 1's unaccounted-for water loss to 15 percent would result in an approximate $147,680 decrease to purchased water expense,[12] which means Estill District No. 1 is paying approximately $0.90 per 1,000 gallons sold for expenses associated with unaccounted-for water loss greater than 15 percent.[13] Thus, it would likely prove futile to authorize the loan herein without simultaneously ensuring that Estill District No. 1 is taking steps to correct the primary cause of its financial condition.

Estill District No. 1's new board indicated in the Application and in testimony that it recognized the significance of its water loss and that it was taking steps to address it.[14]

[11] 807 KAR 5:066(6)(3).

[12]

Purchased Water/Power from 2016 Annual Report	$	728,833
Times: Water Loss Above 15 Percent		20.2625%
Purchased Water Expense Reduction	$	147,680

[13]

Purchased Water Expense Reduction	$	147,680
Divide by: Water Sales (in 000s)		164,453
Amount per 1,000 gallons sold	$	0.90

[14] *See* Application at Paragraph 8, 13 ("Its financial problems stem from a high rate of unaccounted-for water loss. As shown in Table 1 below . . . [s]ince 2014, it has experienced an unaccounted water rate in excess of 35 percent."); Click Testimony at 3, 6 ("Its financial problems stem from a high rate of unaccounted-for water loss. . . . Shortly after the Commission denied the request for authorization for the proposed KRWFC loan, three new commissioners were appointed to Estill District's Board of Commissioners. As a Board, we have focused exclusively on two issues: restructuring Estill District's delinquent RD loans and reducing Estill District's unaccounted-for water loss. For purposes of my testimony today, I will address only our efforts regarding debt restructuring.").

However, while the Commission appreciates the new board's recognition of the problem and intent to resolve it; the Commission believes that it must hold Estill District No. 1 accountable for the excessive water loss to ensure that the time this loan and the RD debt restructuring give Estill District No. 1 to correct the issue is used wisely. Given Estill District No. 1's history of non-compliance and its financial condition, it may not get another opportunity to correct the water loss issues. Thus, while Estill District No. 1 has authority to obtain the loan as requested, it must also file a detailed and comprehensive plan to correct its excessive water loss on or before April 1, 2019, to permit the Commission to monitor its progress in resolving that issue.

Finally, while the Commission was able to address this Application within the period requested, utilities and practitioners, particularly those with a history of urgent requests, should not count on the Commission making such prompt decisions. If the Commission had been unable make a decision approving the loan on the written record or if other pressing matters fell within the window provided by Estill District No. 1, the Commission would not have been able to issue this order within the time requested, and Estill District No. 1's financial condition would have suffered. Thus, to ensure that those responsible meet their fiduciary and professional responsibilities, applications and other requests for action by the Commission must be filed in timely manner, which at a minimum should be 60 days before approval is required for applications for authority to incur debt.

IT IS THEREFORE ORDERED that:

1. Estill District No. 1 is authorized to borrow from Citizens Guaranty no more than the total amount needed to pay off the loans proposed to be consolidated as proposed in its the Application.

2. Estill District No. 1 shall only agree to such terms and conditions that are consistent with the parameters set out in its Application.

3. The proceeds from the loan authorized herein shall be used only for the purposes set out in the Application.

4. Within ten days of the execution of the new Citizens Guaranty loan documents, Estill District No. 1 shall file with the Commission one copy in paper medium and an electronic version of the loan documents.

5. Estill District No. 1 shall file a detailed and comprehensive plan to correct its excessive water loss on or before April 1, 2019.

6. Failure to file the plan required by ordering paragraph 5 may result in the imposition of penalties pursuant to KRS 278.990 or other actions as deemed appropriate by the Commission.

7. Any documents filed pursuant to ordering paragraphs 4 and 5 shall reference this case number and shall be retained in the post-case correspondence file.

8. Nothing contained herein shall be deemed a warranty or finding of value for the debt authorized herein on the part of the Commonwealth of Kentucky or any agency thereof.

9. This case is closed and removed from the Commission's docket.

By the Commission

ENTERED

DEC 21 2018

KENTUCKY PUBLIC
SERVICE COMMISSION

ATTEST:

Executive Director

*Estill County Water District #1
76 Cedar Grove Road
Irvine, KY 40336

*Audrea Miller
Office Manager
Estill County Water District #1
76 Cedar Grove Road
Irvine, KY 40336

*Gerald E Wuetcher
Attorney at Law
STOLL KEENON OGDEN PLLC
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Lexington, KENTUCKY 40507-1801

*Mary Ellen Wimberly
STOLL KEENON OGDEN PLLC
300 West Vine Street
Suite 2100
Lexington, KENTUCKY 40507-1801

ATTACHMENT B
WRIS SYSTEM DATA AND INVENTORY REPORT(S)

WRIS Asset Inventory Report

KY0330123 - Estill County Water District #1

Rating Code	Condition Rating	Performance Rating	Priority Rating
0			Not a priority
1	New or Excellent - None or minor defects.	Exceeds/Meets all performance targets.	It would be nice to have.
2	Good - Defects that have not begun to deteriorate.	Minor performance deficiencies.	Improved system operations & maintenance (O&M) efficiency.
3	Fair - Moderate defects that will continue to deteriorate.	Considerable performance deficiencies.	Internal safety concern or public nuisance.
4	Poor - Severe defects that will collapse/break in near future.	Major performance deficiencies.	Potential public health, safety, or environmental concern.
5	Inoperable - Defects need immediate attention.	Fails to meet performance targets.	Existing threat to public health, safety, or environment.

Water Line Assets

Size (inches)	Material	Decade Constructed	Length (feet)	Condition ID	Performnce ID	Priority ID	WRIS PNum
Assessment Area: 1							
Up to 2	DUCTILE IRON	1960	659				
Up to 2	PVC	1970	2,332				
Up to 2	PVC	2000	8,112				
3	DUCTILE IRON	1960	1,261				
3	PVC	1980	1,477				
3	PVC	1990	2,242				
3	PVC	2000	21,175				
4	DUCTILE IRON	1960	2,907				
4	DUCTILE IRON	2010	0				
4	PVC	1970	30,696				
4	PVC	1990	17,994				
4	PVC	2000	28,968				
4	PVC	2010	10,257				
6	CAST IRON	1960	899				
6	DUCTILE IRON	1960	36,922				
6	DUCTILE IRON	1970	457				
6	DUCTILE IRON	1990	752				
6	DUCTILE IRON	2000	13				
6	DUCTILE IRON	2010	104				
6	PVC	1970	41,315				
6	PVC	2000	3,180				
6	PVC	2010	66				
8	DUCTILE IRON	1960	3,417				
8	DUCTILE IRON	1990	2,059				
8	DUCTILE IRON	2010	2,185				
8	PVC	2000	2,769				
12	DUCTILE IRON	1960	5,729				
Assessment Area: 2							
Up to 2	PVC	1990	1,851				
3	DUCTILE IRON	1960	5,175				
3	OTHER	2000	2,665				
3	PVC	1990	20,006				
3	PVC	2000	2,624				
4	DUCTILE IRON	2000	17,011				

WRIS Asset Inventory Report

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Water Line Assets

Size (inches)	Material	Decade Constructed	Length (feet)	Condition ID	Performnce ID	Priority ID	WRIS PNum
4	PVC	1990	46,546				
4	PVC	2000	3,179				
4	PVC	2010	11,302				
6	DUCTILE IRON	1960	10,312				
6	DUCTILE IRON	1990	3,859				
6	DUCTILE IRON	2010	8				
6	OTHER	2000	19,883				
6	PVC	1990	87,085				
6	PVC	2000	25,242				
8	DUCTILE IRON	1960	5,198				
Assessment Area: 3							
3	PVC	1990	2,076				
4	PVC	1990	38,465				
4	PVC	2000	12,157				
6	PVC	1990	32,212				
Assessment Area: 4							
3	PVC	2000	34,070				
4	PVC	2000	56,845				
6	DUCTILE IRON	2000	9,491				
6	PVC	2000	95,747				
Assessment Area: 6							
Up to 2	PVC	1990	2,260				
3	PVC	1990	35,019				
3	PVC	2000	20,002				
4	PVC	1980	864				
4	PVC	1990	31,426				
4	PVC	2000	22,020				
6	PVC	1980	9,106				
6	PVC	1990	41,801				
6	PVC	2000	10,500				
Assessment Area: 7							
Up to 2	PVC	1970	21,342				
3	PVC	1970	16,496				
3	PVC	2000	18,217				
4	DUCTILE IRON	2010	596				

WRIS Asset Inventory Report

KY0330123 - Estill County Water District #1

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Water Line Assets

Size (inches)	Material	Decade Constructed	Length (feet)	Condition ID	Performnce ID	Priority ID	WRIS PNum
4	PVC	1970	106,853				
4	PVC	2000	24,775				
6	DUCTILE IRON	1990	23				
6	PVC	1970	46,246				
6	PVC	1990	90				
6	PVC	2000	6				
6	PVC	2010	13				
8	DUCTILE IRON	2010	504				
8	PVC	2010	909				
10	PVC	1970	900				
Assessment Area: 8							
Up to 2	PVC	1990	2,937				
3	OTHER	2000	3,619				
3	PVC	1990	46,692				
3	PVC	2000	18,302				
4	PVC	2000	37,089				
6	PVC	2000	39,626				
Assessment Area: 4-1							
Up to 2	PVC	1980	3,182				
3	PVC	1980	4,328				
3	PVC	1990	1,908				
3	PVC	2000	17,277				
4	PVC	1980	51,121				
6	PVC	1980	39,110				
6	PVC	1990	2,565				
6	PVC	2000	19,828				
6	PVC	2010	14				
8	PVC	1980	1,524				

WRIS Asset Inventory Report

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Water Tank Assets

Asset Name	Capacity (gallons)	Date Constructed	Date Inspected	Condition ID	Performnce ID	Priority ID	WRIS PNum
Assessment Area: 1							
WISEMANTOWN TANK	250,000	01/01/2007	08/01/2008				
Assessment Area: 2							
KY 851 TANK	100,000	01/01/1998	01/01/1998				
Assessment Area: 3							
BARNES MT TANK	100,000	01/01/1998	01/01/1998				
Assessment Area: 4							
WATSON RD TANK	128,000	01/01/2000	08/01/2008				
Assessment Area: 6							
PALMER TANK	140,000	01/01/1991	01/01/1991				
Assessment Area: 7							
SAND HILL TANK	128,000	01/01/1991	08/01/2008				
WINSTON TANK	200,000	01/01/1976	08/01/2008				
Assessment Area: 8							
KNOB LICK RD TANK	80,000	01/01/2000	01/01/2000				
Assessment Area: 4-1							
IRON MOUNTAIN TANK	200,000	01/01/1984	01/01/1984				

WRIS Asset Inventory Report

KY0330123 - Estill County Water District #1

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4	Poor - Severe defects that will collapse/break in near future.	Major performance deficiencies.	Potential public health, safety, or environmental concern.
5	Inoperable - Defects need immediate attention.	Fails to meet performance targets.	Existing threat to public health, safety, or environment.

Pump Station Assets

Asset Name	Pump Count	Condition ID	Performnce ID	Priority ID	WRIS PNum
Assessment Area: 1					
DUG HILL PUMPSTATION	2				
NEW RIVER PUMP STATION	2				
PEA RIDGE PUMP STATION	2				
Assessment Area: 2					
851 PUMP STATION	2				
SOUTH IRVINE PUMP STATION	2				
Assessment Area: 4					
COBB HILL PUMP STATION	2				
Assessment Area: 6					
IVORY HILL PUMP STATION	2				
Assessment Area: 7					
CEDAR GROVE PUMP STATION	2				
Assessment Area: 4-1					
DRY BRANCH PUMP STATION	2				

WRIS Asset Inventory Report

KY0330123 - Estill County Water District #1

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0			Not a priority
1	New or Excellent - None or minor defects.	Exceeds/Meets all performance targets.	It would be nice to have.
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5	Inoperable - Defects need immediate attention.	Fails to meet performance targets.	Existing threat to public health, safety, or environment.

Water Treatment Plants

WRIS System Data Report

KY0330123 - Estill County Water District #1

DOW Permit ID: **KY0330123** — Link: DOW SDWIS Report

DOW Permit Type: **DRINKING WATER (PWSID)**

DOW Permit Name: **Estill Co Water District**

WRIS System Name: **Estill County Water District #1**

System Type:	**Community**	Water Source Type:	**Surface Water Purchaser**	ADD WMC Contact:	**Karyn Leverenz**
ADD ID:	**BGADD**	Primary County:	**Estill**	Dow Field Office:	**Frankfort**
Permit Dates: Issued:	**04.01.1975**	Expired:		Inactivated:	

OPERATIONS AND MANAGEMENT INFORMATION

Primary Facility Information:

- ☐ This is a treatment facility.
- ☑ This is a maintenance facility.

Facility Name: **Estill County Water District #1**
Facility Contact: **Audrea Miller**
Facility Phone: **606-723-3795**
Facility Addr 1: **76 Old Cedar Grove Rd**
Facility Addr 2:
City, State Zip: **Irvine, KY 40336**

Date Last Modified: 03.15.2019

System Management Entity Information:

Entity Name: **Estill County Water District #1**
Office Phone: **606-723-3795** Fax:
Office Address 1: **76 Old Cedar Grove Rd**
Office Address 2:
City, State Zip: **Irvine, KY 40336**

System Management Contact Information:

Contact Type	Contact Name	Title	EMail
1 Operations Contact:	**Audrea Miller**	**General Manager**	a.miller@estillcountywater.com
2 Business Contact:	**Audrea Miller**	**General Manager**	a.miller@estillcountywater.com
Manager:	**Audrea Miller**	**General Manager**	a.miller@estillcountywater.com

1 Person responsible for physical infrastructure operations.
2 Person responsible for billing and financial operations.

Date Last Modified: 03.15.2019

OWNER ENTITY INFORMATION

Entity Type: **Water District (KRS 74)** PSC Group ID: **21500**
Entity Name: **Estill County Water District #1**
Web URL: **http://www.estillcountywater.com/**
Office EMail: **ecwd1@alltell.net**
Office Phone: **606-723-3795** Toll Free: Fax:

Mail Address Line 1:	**76 Cedar Grove Rd**	Phys Address Line 1:	
Mail Address Line 2:		Phys Address Line 2:	
Mail City, State Zip:	**Irvine, KY 40336**	Phys City, State Zip:	

Contact:	**Audrea Miller**	Financial Contact:		Auth Official:	**Blain Click**
Contact Title:	**General Manager**	Financial Contact Title:		Auth Official Title:	**Chair**
Contact EMail:	**a.miller@estillcountywater.com**	Financial Contact EMail:		Auth Official EMail:	
Contact Phone:	**606-723-3795**	Financial Contact Phone:		Auth Official Phone:	**606-723-3795**

Data Source: **Kentucky Infrastructure Authority**

Date Last Modified: 03.15.2019

System Respondent _____ ADD WMP _____ Date _____

WRIS System Data Report

KY0330123 - Estill County Water District #1

DOW Permit ID: **KY0330123** — Link: DOW SDWIS Report

DOW Permit Type: **DRINKING WATER (PWSID)**

DOW Permit Name: **Estill Co Water District**

WRIS System Name: **Estill County Water District #1**

System Type: **Community** | Water Source Type: **Surface Water Purchaser** | ADD WMC Contact: **Karyn Leverenz**

ADD ID: **BGADD** | Primary County: **Estill** | Dow Field Office: **Frankfort**

Permit Dates: Issued: **04.01.1975** | Expired: | Inactivated:

DEMOGRAPHIC INFORMATION

Counties Directly Served: **5**

	Population	Households
Directly Serviceable:	**9,374**	**4,254**
Indirectly Serviceable:	**5,739**	**2,586**
Total Serviceable:	**15,113**	**6,840**

Note: Population counts are based on KIA census block overlay with WRIS mapped features.

County Served	Connection Count	Serviceable Population	Serviceable Households	Med. HH Income	MHI MOE
Estill	3,800	9,292	4,209	$30,019	$9,182
Jackson		3	1	$27,869	$4,960
Lee	12	35	21	$23,349	$3,157
Madison		27	12	$51,919	$7,483
Powell		17	11	$40,429	$7,565
Totals:	**3,812**	**9,374**	**4,254**	**$30,074**	**$9,142**

MHI Source: American Community Survey 2013-2017 5Yr Estimates (Table B19013). MHI MOE = Med HH Income Margin of Error.

FISCAL ATTRIBUTES

Date Established: **01.01.1964** | Employees: **8**

Does this system:

(a) Produce Water? **No**

(b) Have wholesale customers? **Yes**

(c) Purchase water? **Yes**

If this is a municipal system, what is the cost per 4,000 gallons of finished water for customers:

(a) inside your municipality:

(b) outside your municipality:

If this is a non-municipal system, what is the customer cost per 4,000 gallons of finished water? **$42.36**

Date of Last Rate Adjustment: **08-20-2018**

Comments: **The connection in Powell County is still there but only functions as an emergency connection.**

Cost for finished water from Irvine is $3.13

Date Last Modified: 03.15.2019

Providers that sell water to this system:

Seller DOW Permit ID	Seller Name	Water Type	Ann. Vol. (MG)	Cost Raw	Cost Fin	Interconnects Perm	Interconnects Seas	Interconnects Emer
KY0330205	Irvine Municipal Utilities	F	257.728		$2.94	3	0	0
KY0550209	Jackson County Water Association Inc	F	0.389		$3.50	1	0	0
	Totals and Averages		**258.117**		**$3.22**	**4**	**0**	**0**

Providers that purchase water from this system:

Purchaser DOW Permit ID	Purchaser Name	Water Type	Ann. Vol. (MG)	Cost Raw	Cost Fin	Interconnects Perm	Interconnects Seas	Interconnects Emer	Serviceable Population	Serviceable Households
KY0990357	Powells Valley Water District	F			$2.45	0	0	1	5,739	2,586
	Totals and Averages				**$2.45**	**0**	**0**	**1**	**5,739**	**2,586**

- MG = Million Gallons
- Water Types: R = Raw Water, F = Finished Water, B = Both Raw and Finished Water
- Cost Categories: Raw = Raw Untreated Water, Fin = Finished Treated Water
- Raw and Finished costs are per 1,000 gallons.
- Interconnect Types: Perm = Permanent, Seas = Seasonal, Emer = Emergency

WRIS System Data Report

KY0330123 - Estill County Water District #1

SYSTEM PLANNING

Water Treatment Plants:

Facility Name	Design Capacity (MGD)	Ave. Daily Prod. (MGD)	High. Daily Prod. (MGD)
Totals			

Operational Statistics:

	WRIS	SDWIS MOR
Total Annual Vol. Produced (MG):		
Total Annual Vol. Purchased (MG):	**258.117**	**258.091**
Total Annual Vol. Provided (MG):	**258.117**	**258.091**
Estimated Annual Water Loss:	**40%**	**40%**

			WRIS	SDWIS MOR
Wholesale Customers:	**1**	Wholesale Usage (MG):		
Residential Customers:	**3,600**	Residential Usage (MG):		
Commercial Customers:	**215**	Commercial Usage (MG):		
Institutional Customers:		Institutional Usage (MG):		
Industrial Customers:		Industrial Usage (MG):		
Other Customers:		Other Cust. Usage (MG):	**154.985**	
Total Customers:	**3,816**			
		Flushing, Maintenance and Fire Protection Usage (MG):		
		Total Annual Water Usage (MG):	**154.985**	**154.985**

Water supply inadequacies during normal operating conditions:

Not provided.

Water supply inadequacies during drought operating conditions:

Not provided.

Comments: **water lost is at approximately 30% - system needs to replace the meters and is working towards a project to replace/upgrade them.**

Usage reflects all customers. System has begun to track sales by customer type and will be updated accordingly at next year's system visit.

Date Last Modified: 03.15.2019

WMP Site Visit - Survey Information:

Site Visit / Survey Date: **03.14.2019**

Survey Administrator: **Karyn Leverenz**

Principal Respondent: **Audrea Miller, Blain Click**

Other Respondent(s): **Shana Cox**

Comments: **None.**

Date Last Modified: 03.15.2019

WRIS System Data Report

KY0330123 - Estill County Water District #1

SYSTEM MAINTENANCE

- The management of this system participates in an Area Water Management Planning Council (AWMPC).
- ✓ The management of this system participates in regular training activities.
- ✓ System operator(s) participate in regular training activities.
- ✓ This system has an asset management plan.

  Date asset management plan last updated: **07/01/2007**
- ✓ This system as a capital improvement plan.

  Date capital improvement plan last updated: **07/01/2007**
- This system has GIS capabilities.

  Date GIS data last submitted to the WRIS:

This system has a policy manual in place containing the following items:

Personnel Policies	✓ Standard Operating Procedures
✓ Line Maintenance Program	✓ Meter Testing Program
✓ Routine Pressure Checks	✓ Pump Station Maintenance Schedule
✓ Emergency Operation Procedures	✓ Backup Sources
✓ A Water Shortage Plan	✓ A Water Conservation Plan

Date of last DOW Sanitary Survey: Month: **3**, Year: **2018**

- ✓ This system has periodic service outages.

  Cause(s): **Only during repair work.**
- This system has periodic pump failures.

  Cause(s):
- ✓ This system has periodic line breaks.

  The following components are associated with periodic line breaks:

  Typical line size: **6.00**

  Typical line location(s): **Along road right of way**

  Typical cause(s): **Normal leaks due to age of line**

  Other cause(s):

  Est. Water Loss Percentage: **25.0 %**
- This system has localized problems.

  The following components are associated with localized problems:

  Problem location(s):

  Problem diameter(s):

  Problem pressure(s):

  Problem cause(s):

  Other problem characteristics:
- ✓ This system has as-built plans (record drawings).

  Est. degree of accuracy for as-built plans (%): **95%**
- ✓ This system uses an on-staff inspector(s) for construction projects.

Maintenance notes for this system:

System recently replaced two pump stations which alleviated most of the pump failures and localized issues previously reported.

Date Last Modified: 03.05.2018

WRIS System Data Report

KY0330123 - Estill County Water District #1

DOW Permit ID: **KY0330123**

Link: DOW SDWIS Report

DOW Permit Type: **DRINKING WATER (PWSID)**

DOW Permit Name: **Estill Co Water District**

WRIS System Name: **Estill County Water District #1**

System Type: **Community** | Water Source Type: **Surface Water Purchaser** | ADD WMC Contact: **Karyn Leverenz**

ADD ID: **BGADD** | Primary County: **Estill** | Dow Field Office: **Frankfort**

Permit Dates: Issued: **04.01.1975** | Expired: | Inactivated:

The following projects are associated with this system (included constructed projects):

PNUM	Applicant	Project Status	Funding Status	Schedule	Project Title	Agreed Order	Profile Modified	GIS Modified
WX21065004	Estill County Water District #1	Constructed	Not Funded	0-2 Years	ECWD Phase 10 Water Line Extension, Tank Improvements	N	04.30.2015	09.06.2013
WX21065005	City of Irvine	Under Construction	Fully Funded	0-2 Years	Water Plant Modernization	N	10.29.2018	
WX21065006	Estill County Water District #1	Approved	Not Funded	0-2 Years	ECWD - Meter Purchase and Replacement Project	N	11.26.2018	06.05.2017
WX21065007	Estill County Water District #1	Approved	Not Funded	0-2 Years	ECWD/Beattyville Emergency Regional Interconnect	N	01.15.2019	01.02.2019
WX21065008	Estill County Water District #1	Approved	Not Funded	0-2 Years	ECWD - Master Meter Relocation and River Crossing	N	01.25.2017	
WX21065009	Estill County Water District #1	Approved	Not Funded	0-2 Years	ECWD - Phase 11 - System Improvements / Unaccounted for Water Re	N	01.15.2019	02.05.2019

ATTACHMENT C
EXISTING SYSTEM MAP

ATTACHMENT D
CURRENT RATE TARIFF

ESTILL COUNTY WATER DISTRICT

P.S.C. Ky. No.....
Cancels P.S.C. Ky. No.....

ESTILL COUNTY WATER DISTRICT #1

OF

IRVINE, KENTUCKY 40336

Rates, Rules and Regulations for Furnishing Water Service

AT

ESTILL COUNTY, KENTUCKY

Filed with PUBLIC SERVICE COMMISSION OF KENTUCKY

ISSUED.. May 27....., 19.92... EFFECTIVE....., 19.....

PUBLIC SERVICE COMMISSION OF KENTUCKY EFFECTIVE

JUL 14 1992

PURSUANT TO 807 KAR 5:011. SECTION 9 (1)

BY: _____
PUBLIC SERVICE COMMISSION MANAGER

ISSUED BY ESTILL COUNTY WATER DISTRICT NO. 1
(Name of Utility)

BY.. Archie McIntosh

Archie McIntosh, Chairman

FOR ESTILL COUNTY WATER DISTRICT NO. 1

P.S.C. Ky. No. 7335

Original Sheet No. 2

ESTILL COUNTY WATER DISTRICT NO. 1

Cancelling P.S.C. Ky. No. _____

Sheet No. _____

RULES AND REGULATIONS

TERRITORY OF ESTILL COUNTY WATER DISTRICT NO. 1

TRACT NO. I

Beginning at the Lee County Boundary line at the centerline of the Kentucky River, thence along the centerline of the Kentucky River in a Northwesterly direction to the centerline of the Kentucky River to the Madison County Boundary line; thence in a southernly direction along the Madison County Boundary line to the Jackson County Boundary line; thence in a Easternly direction along the Jackson County Boundary line to the Lee County Boundary line; thence in a Northeasternly direction along the Lee County boundary line to the beginning at the centerline of the Kentucky River; Estill County Water District No. 1, as enlarged includes all of the territory in Estill County, Kentucky, South of the Kentucky River.

TRACT NO. II

Beginning at a point in the centerline of the Kentucky Highway 89 where the bridge of Sweet Lick Creek crosses Highway 89 going in a Northeastern direction to a point on the Estill County, Powell County line known as Marble Yard. Following the Estill County, Powell County line to Red River, following Red River to where Red River enters into the Kentucky River. Following up the Kentucky River to a point on the Eastern side of the Kentucky River Northwest of Irvine. This is a point known as the old West Irvine Bridge embuttment. From there a straight line back to the starting point in the centerline of Highway 89 at Sweet Lick Bridge.

There are excepted and excluded from said Tract No. II the following tracts of land:

TRACT NO. 1: Beginning at a point in a corner of the existing corporate limits of the City of Irvine, Kentucky, said point being 780 feet west of the center of Main Street; and 55 feet south of the centerline of Rice Street, if extended; thence north 740 feet to a point; thence north 42° east 230 feet to a corner to Edgewood Estates, said corner being also in the east right-of-way line of Kentucky 89; thence with the northwest boundary of Edgewood Estates north 63° 56' east 213 feet; north 58° 19' east 28.6 feet; north 50° 09' east 58.4 feet; north 39° 15' east 715.8 feet; and north 54° 28' west 168.1 feet to a corner, said corner being the northern most corner of Edgewood Estates; thence with the northeast boundary of Edgewood Estates south 44° 53' east 789.5 feet to a corner, said corner being the eastern most

DATE OF ISSUE July 10, 1979 (Month Day Year)

DATE EFFECTIVE July 10, 1979 (Month Day Year)

ISSUED BY Charlie McCulloch Chairman West Irvine, Kentucky

(Name of Officer Title Address)

corner of Edgewood Estates and in the north right-of-way line of a county road; thence with the county road right-of-way and Edgewood Estates south 47° 04' west 564.9 feet to a corner; thence leaving Edgewood Estates and crossing the county road and the property of C. T. Williams south 23° 30' east 770 feet to a corner between the Housing Commission property and Mrs. Bertha Wallace's property; said corner being a corner to the existing corporate limits of the City of Irvine, Kentucky; thence with the northern boundary of the Housing Commission property, said boundary being also the existing northern corporate limits of the City of Irvine, Kentucky west 132.88 feet; north 37.30 feet; west 295 feet to a corner between the lands of the Housing Commission and Irvine High School, said corner also in Sweet Lick Creek; thence in a westerly direction with the meanders of Sweet Lick Creek and the property of Irvine High School 700 feet to the east right-of-way line of Kentucky 89; thence in a Westernly direction with the meanders of Sweet Lick Creek and the property of Irvine High School 700 feet to the East right-of-way line of Kentucky State Highway 89.

TRACT NO. 2: Beginning at the City limits of Irvine, Estill County, Kentucky, being the northern section of the said City of Irvine; thence in a Northernly direction on Kentucky Highway 89 for a distance of two and two-tenth (2-2/10) miles, all real property on both sides of said Highway.

TRACT NO. 3: Beginning at the intersection of Kentucky Highway No. 89 and Kentucky Highway No. 1705, known as the White Oak Road, and in Northeasternly direction on Kentucky Highway No. 1705 for a distance of three and three-tenth (3-3/10) miles, all real property on both sides of said Highway.

TRACT NO. 4: Beginning at the intersection of Kentucky Highway No. 1705 Kentucky Highway No. 794, known as the Dry Branch Road, and in a Northernly direction for a distance five tenth (.5) mile, all real property on both sides of said Highway.

TRACT NO. 5: Beginning at the intersection of Kentucky Highway No. 1705 and Kentucky No. 1058, known as the right fork of White Oak Road, and in a Southeasternly direction for a distance of six tenth (.6) mile, all real property on both sides of said Highway.

AREA Estill County, Kentucky

PSC KY NO. 2

5th Revised SHEET NO. 3

Estill County Water District No. 1
(NAME OF UTILITY)

CANCELLING PSC KY NO. 2

4th Revised SHEET NO. 3

A. Monthly Rates

5/8 x 3/4 Meter

First 2,000 Gallons	$	21.58 Minimum Bill	(I)
Next 3,000 Gallons		10.53 Per 1,000 Gallons	(I)
Next 5,000 Gallons		10.31 Per 1,000 Gallons	(I)
Over 10,000 Gallons		8.20 Per 1,000 Gallons	(I)

1 Inch Meter

First 5,000 Gallons	$	53.18 Minimum Bill	(I)
Next 5,000 Gallons		10.31 Per 1,000 Gallons	(I)
Over 10,000 Gallons		8.20 Per 1,000 Gallons	(I)

2 Inch Meter

First 16,000 Gallons	$	153.95 Minimum Bill	(I)
Over 16,000 Gallons		8.20 Per 1,000 Gallons	(I)

Bulk Loading Station	$	7.29 Per 1,000 Gallons	(I)

A $4.81 per month surcharge is added to the minimum bill for all Cobhill customers.

DATE OF ISSUE September 6, 2018
MONTH / DATE / YEAR

DATE EFFECTIVE August 20, 2018
MONTH / DATE / YEAR

ISSUED BY /s/ Blain Click
SIGNATURE OF OFFICER

TITLE Chairman

BY AUTHORITY OF ORDER OF THE PUBLIC SERVICE COMMISSION
IN CASE NO. 2018-00269 DATED September 5, 2018

KENTUCKY
PUBLIC SERVICE COMMISSION
Gwen R. Pinson
Executive Director
Gwen R. Pinson
EFFECTIVE
8/20/2018
PURSUANT TO 807 KAR 5:011 SECTION 9 (1)

B. DEPOSITS:

Customers will pay equal deposits in the amount of $100.00. This amount does not exceed the average bill of residential customers served by the company and is equal to 2/12 of the average annual bill. (I)

C. METER CONNECTION/TAP ON CHARGES:

5/8 x 3/4 INCH	$1,277.00	(I)
All larger meters	Actual Cost	

An additional charge shall be made for meter connections where rock is encountered. The charge shall be applied per linear trench foot and shall not exceed the actual cost of excavation. (N)

FOR Estill County, Kentucky
Community, Town or City

P.S.C. KY. NO. 3
Original SHEET NO. 7

Estill County Water District No. 1
(Name of Utility)

CANCELLING P.S.C. KY. NO. 2

SHEET NO.

D. SPECIAL NON-RECURRING CHARGES:

Late Payment Charge	10%	
Disconnection/Reconnection Charge	$50.00	(I)
Returned Payment Charge	$25.00	
Service Call/Investigation	$50.00	(I)
Meter Test Request	$80.00	(I)
Damage to Meter Setting or Lid	Actual Cost	
Meter Relocate	Actual Cost	(N)

DATE OF ISSUE
Month / Date / Year

DATE EFFECTIVE July 8, 2018
Month / Date / Year

ISSUED BY /s/ Daniel Blain Click
(Signature of Officer)

TITLE Chairman

BY AUTHORITY OF ORDER OF THE PUBLIC SERVICE COMMISSION
IN CASE NO. DATED

KENTUCKY
PUBLIC SERVICE COMMISSION
Gwen R. Pinson
Executive Director
Gwen R. Pinson
EFFECTIVE
7/8/2018
PURSUANT TO 807 KAR 5:011 SECTION 9 (1)

Credit/Debit Card Policy

N

All customers may pay their bill by credit or debit card. This method of payment may be made in person at the utility office, online, or by telephone. Customers must have the current month's bill to pay by telephone.

If on the bill due date an attempt to pay with a credit/debit card is made and the card is declined for any reason, payment is still due in full on that date and will be considered late on that date. All late charges will be applied. If a customer is paying on the disconnect day and the card is denied, the same rules as above apply, in addition to service being disconnected.

When a customer makes a payment by credit card, the processor (not the district) will assess a convenience fee for providing this service. Prior to processing the transactions, the customer will be informed of the fee amount.

ACH-Bank Draft/ Automatic Withdraw Policy

All customers may pay their bill by ACH-Bank Draft/Automatic Withdraw. The ACH-Bank Draft/Automatic Withdraw will be scheduled for the 5th of each month. On the 5th of each month the payment will be processed. If for any reason payment is declined the payment will still be due by the 10th of the month. All late charges and penalties will apply if payment is not made by the 10th of the month.

When a customer makes a payment by the ACH-Bank Draft/Automatic Withdraw, the processor (not the district) will assess a convenience fee for providing this service.

FOR ESTILL COUNTY, KENTUCKY

P.S.C. Ky. No. 2

Original Sheet No. 5

ESTILL COUNTY WATER DISTRICT NO. 1

Cancelling P.S.C. Ky. No. 7735

Original Sheet No. 4

RULES AND REGULATIONS

The following rules and regulations are hereby adopted, subject to change by the Commissioners at any time, subject to approval of the Public Service Commission through the filing of revised tariff sheets with the Public Service Commission. These rules and regulations are intended to supplement any Bond Resolution, any Rate Resolution and the By-Laws.

A. All taps and connections to the mains of the District shall be made by and/or under the direction and supervision of District personnel.

B. Service may be discontinued by the District for, upon 10 days' written notice (except that in the event of a violation under Item 7 below, Service may be terminated immediately), any violation of any rule, regulation or condition, and especially for any of the following reasons:

1. Misrepresentation in the application or contract as to the property or fixtures to be supplied or additional use to be made of water.

2. Failure to report to the District additions to the property or fixtures to be supplied or additional use to be made of water.

3. Resale of water.

4. Waste or misuse of water due to improper or imperfect service pipes and/or failure to keep such pipes in a suitable state of repair.

PUBLIC SERVICE COMMISSION OF KENTUCKY EFFECTIVE

NOV 21 1991

PURSUANT TO 807 KAR 5:011, SECTION 9 (1)

BY: PUBLIC SERVICE COMMISSION MANAGER

DATE OF ISSUE Nov. 27, 1991 (Month Day Year)

DATE EFFECTIVE Nov. 27, 1991 (Month Day Year)

ISSUED BY Archie McIntosh, Chairman RR #5, Irvine, KY 40336

Name of Officer Title Address

5. Tampering with meter, meter seal, service or valves, or permitting such tampering by others.

6. Connection, cross-connection or permitting the same, of any separate water supply to premises which receive water from the District.

7. When a dangerous condition is found to exist on the customer's or applicant's premises, with reference to the continuation of water service, water service shall be cut off without notice or shall be refused, provided the District shall notify the customer or applicant immediately of the reasons for the discontinuance or refusal and the correction action to be taken by the applicant or customer before service can be restored.

C. Any customer desiring to discontinue the service to his premises for any reason must give notice of discontinuance in person, writing or phone at the business office of the District at least three (3) days prior to the date on which the customer desires to discontinue service, and the customer shall not be liable for water consumed beyond the date of discontinuance stated in such notice; if such notice in person or in writing is not given, a customer shall remain liable for all water used and service rendered to such premises by the District until such notice is received by the District.

D. Bills and notices relating to the conduct of the business of the District will be mailed to the

customer at the address listed on the user's agreement unless a change of address has been filed in writing with the District; and the District shall not otherwise be responsible for delivery of any bill or notice nor will the customer be excused from the payment of any bill or any performance required in said notice.

E. Bills for water service are due and payable at the office of the District, or to any designated agent, on the date of issue. The past due date shall be the tenth day after the date of issue. Bills will be dated and mailed on the first day of each month.

All bills not paid on or before the past due date shall be deemed delinquent. When a bill has been delinquent for a period of twenty days, the District shall serve a customer a written final notice of said delinquency, and of the intent of the District to discontinue service ten days after the date of such notice unless such bill is paid prior to the expiration of such ten days. If a delinquent bill is not paid within ten days after date of such final notice (thirty days from the past due date), the water supply to the customer may be discontinued without further notice; provided, however, if, prior to discontinuance of service, there is delivered to the District, or to its employee empowered to discontinue service, a written certificate signed by a physician, a registered nurse or a public health officer that, in the opinion of the certifier, discontinuance of service will aggravate an existing illness or infirmity on the affected premises, service shall not be discontinued until the affected resident

C 9-93

PUBLIC SERVICE COMMISSION OF KENTUCKY EFFECTIVE

NOV 21 1991

PURSUANT TO 807 KAR 5:011, SECTION 9 (1)

BY: [signature]
PUBLIC SERVICE COMMISSION MANAGER

FOR Estill County, Kentucky

P.S.C. Ky. No. 2

Revised Sheet No. 7

Estill County Water District No.1

Cancelling P.S.C. Ky. No.

Original Sheet No. 7

RULES AND REGULATIONS

E. Bills for water service are due and payable at the office of the District, or to any designated agent, on the date of issue. the past due date shall be the tenth day after the date of issue. Bills will be dated and mailed on the first day of each month.

All bills not paid on or before the past due date shall be deemed delinquent. When a bill had been deliquent for a period of five days, the "District" shall serve a customer a written final notice of said deliquency, and of the intent of the "District" to discontinue service five days after the date of such notice unless such bill is paid prior to the expiration of such five days. If a delinquent bill is not paid within five days after date of such final notice (ten days from the past due date), the water supply to the customer may be discontinued without further notice.

PUBLIC SERVICE COMMISSION
OF KENTUCKY
EFFECTIVE

SEP 22 1993

PURSUANT TO 807 KAR 5:011,
SECTION 9 (1)
BY: [signature]
PUBLIC SERVICE COMMISSION MANAGER

DATE OF ISSUE 8 (Month) 20 (Day) 93 (Year)

DATE EFFECTIVE 8 (Month) 20 (Day) 93 (Year)

ISSUED BY Archie McIntosh (Name of Officer) Chairman (Title) 76 Old Richmond Rd. Irvine, KY (Address)

can make other living arrangements or until thirty (30) days elapse from the time of the District's receipt of said certification, whichever occurs first.

F. Where the water supply to the customer has been discontinued for non-payment of delinquent bills, a charge of $ 10.00 will be made for reconnection of service, but the reconnection will not be made until all delinquent bills and other charges, if any, owed by the customer to the District have been paid.

G. The District reserves the right to request that a nominal amount be placed on deposit with the District for the purpose of establishing or maintaining any customer's credit, such amount not to exceed two-twelfths (2/12ths) of the estimated annual bill of such customer. Upon the payment of such deposit, the District shall issue to such customer a certificate of deposit, showing the name of the customer, the location of the initial premises occupied by the customer and the date and amount of the deposit. The District will pay to such customer interest on such deposit a rate no greater than receuved and at no time exceed 6 percent annually.

H. All meters shall be installed, renewed and maintained at the expense of the District, and the District reserves the right to determine the size and type of meter used.

I. It shall be the policy of the District to test each meter at least once every 12 months. In addition, upon written request of any customer,

PUBLIC SERVICE COMMISSION OF KENTUCKY EFFECTIVE

JUL 14 1992

PURSUANT TO 807 KAR 5:011, SECTION 9(1)

BY: _____
PUBLIC SERVICE COMMISSION MANAGER

the meter serving such customer shall be tested by the District. Such test will be made without charge to the customer if the meter has not been tested within 12 months preceding the requested test; otherwise, a charge of $2.00 will be made and then only if the test indicates meter accuracy within the limits of 2%.

If a meter is inaccurate in excess of 2%, whether upon periodic testing or upon requested testing, additional tests shall be made at once to determine the average error of the meter, and the adjustments shall be made in the customer's bills as follows:

1. If the result of such tests shows an average error greater than 2% fast, the customer's bill for the period during which the meter error is known to have existed, shall be recomputed and the account adjusted on the basis of the test. If the period during which the error existed cannot be determined with reasonable precision, the time period shall be estimated using such data as elapsed time since the last meter test, if applicable, and historical usage data for the customer. If that data is not available the average usage of similiar customer loads shall be used for comparison purposes in calculating the time period. If the customer and utility are unable to agree on an estimate of the time period during which the error existed, the Commission shall determine the issue.

PUBLIC SERVICE COMMISSION OF KENTUCKY EFFECTIVE

JUL 14 1992

BY: PUBLIC SERVICE COMMISSION MANAGER

PURSUANT TO 807 KAR 5:011, SECTION 9 (1)

DATE OF ISSUE Nov. 27, 1991 (Month Day Year)

DATE EFFECTIVE Nov. 27, 1991 (Month Day Year)

ISSUED BY Archie McIntosh, Chairman (Name of Officer, Title)

RR #5 [illegible] KY 40336 (Address)

BY: PUBLIC SERVICE COMMISSION MANAGER

RULES AND REGULATIONS

2. In all instances of customer overbilling, the customer's account shall be credited or the overbilled amount refunded at the discretion of the customer within 30 days after final meter results. A customer will repay any underbilling over a similiar time period as the underbilling occured.

3. If the result of such tests necessitates making a refund or back billing a customer, the customer shall be notified in writing of the percentage of error, fast or slow, the date(s) of testing, and the amount of charge or credit to be shown on the next bill of the customer.

J. Where a meter has ceased to register, or meter reading could not be obtained, the quantity of water consumed will be based upon an average of the prior six months consumption and the conditions of water service prevailing during the period in which the meter failed to register.

K. The District shall make all reasonable efforts to eliminate interruption of service and when such interruptions occur will endeavor to reestablish service with the shortest possible delay. When the service is interrupted all consumers affected by such interruption will be notified in advance whenever it is possible to do so.

RULES AND REGULATIONS

L. The District shall in no event be held responsible for any claim made against it by reason of the breaking of any mains or service pipes or by reason of any other interruption of the supply of water caused by the failure of machinery or stoppage for necessary repairs. No person shall be entitled to damages nor for any portion of a payment refunded for any interruption of service which in the opinion of the District may be deemed necessary.

M. Customers having boilers and/or pressure vessels receiving a supply of water from the District must have a check valve on the water supply line and a vacuum valve on the stream line to prevent collapse in case the water supply from the District is discontinued or interrupted for any reason, with or without notice.

N. The premises receiving a supply of water and all service lines, meters and fixtures, including any fixtures within said premises, shall at all reasonable hours be subject to inspection by the District.

O. Piping on the premises of a customer must be so installed that connections are conveniently located with respect to the District lines and mains. The customer shall provide a place for metering which is unobstructed and accessible at all times.

P. An extension of fifty (50) feet or less to the District's distribution main shall be made without charge (other than the prescribed standard connection charge) for a prospective customer who shall

apply for and contract to use service for one (1) year or more and who provides a guarantee for such service.

For each extension to the District's distribution main in excess of fifty (50) feet, the District shall require the customer to whose premises such extension is made to deposit with the District the total cost of the excessive footage over fifty (50) feet, based on the average estimated cost per foot of the total extension. Such deposit may be refundable to the customer in certain instances, in accordance with Title 807 KAR 5:066, Section 12(2)(b).

Q. If any loss or damage to the property of the District or any accident or other injury to persons or property is caused by or results from the negligence or wrongful action of the customer, member of his household, his agent or employee, as determined by a court of law having jurisdiction over the parties, the cost of the necessary repairs or replacements shall be paid by the customer to the District, and any liability otherwise resulting shall be that of the customer.

R. Water furnished by the District may be used for domestic consumption by the customer, member of his household and employees only. The customer shall not sell the water to any other person.

S. All customers shall grant or convey, or shall cause to be granted or conveyed, to the District a perpetual easement and right of way across any property owned or controlled by the customer wherever said easement or right of way is

necessary for the District water facilities and lines so as to be able to furnish service to the customer.

T. Complaints may be made to the operator of the system whose decision may be appealed to the Commissioners of the District within ten days; otherwise, the operator's decision will be final.

PUBLIC SERVICE COMMISSION
OF KENTUCKY
EFFECTIVE

NOV 21 1991

PURSUANT TO 807 KAR 5:011,
SECTION 9 (1)
BY: _____
PUBLIC SERVICE COMMISSION MANAGER

Form for filing Rate Schedules

FOR ESTILL COUNTY, KENTUCKY
Community, Town or City

P.S.C. KY. NO. _____

1st Revised SHEET NO. 14

ESTILL COUNTY WATER DISTRICT NO. 1

CANCELLING P.S.C. KY NO. _____

Original SHEET NO. 14

CLASSIFICATION OF SERVICE

RATE
PER UNIT

Water bills to all multi-unit premises, including duplexes, apartment buildings, trailer parks, mobile home parks, and premises containing both a permanent dwelling and a mobile home or trailer, haveing a single master meter, shall be computed by dividing the number of gallons of water registered by such master meter in each month by the number of units on such premises, and the bill for each unit shall be computed from the rate schedule. The amount of the unit bill so computed shall then be multiplied by the number of units on the previses on the day the meter is read, to establish the monthly bill for such premises. The minimum monthly bill to each multi-unit premises shall be the approved tariffed minimum bill by the number of units on the premises on the date the meter is read.

PUBLIC SERVICE COMMISSION
OF KENTUCKY
EFFECTIVE

MAR 05 1999

PURSUANT TO 807 KAR 5:011,
SECTION 9 (1)
BY: Stephanie Bell

DATE OF ISSUE 01 | 31 | 99
MONTH | DATE | YEAR

DATE EFFECTIVE ~~01 | 31 | 99~~ 3-5-99
MONTH | DATE | YEAR

ISSUED BY Roy K. Embs
SIGNATURE OF OFFICER

TITLE Chairman

Issued by authority of an Order of the Public Service Commission of Kentucky in Ca
No. _____ dated _____.

Estill County Water District #1

P.S.C. Ky. No. 2

1st Revised Sheet No. 15

Estill County Water District No.1

Cancelling P.S.C. Ky. No. 2

Original Sheet No. 15

RULES AND REGULATIONS

NEW EXTENSION POLICY

The "District" shall determine the total cost of the proposed water main extension (exclusive of the meter connections) and the total length of the extension. The "District" shall pay the portion of the cost of the water main extension equal to 50ft for each applicant for service. That part of the cost not covered by the "District's" portion shall be contributed equally by those applicants desiring service on the main extension. Each applicant will also be required to pay the "District's" approved "Tap-on-fee" for a meter connection to the main extension.

Each year, for a refund period of not less than ten (10) years, the "District" shall refund to the customer or customers who paid for the excessive footage the cost of fifty (50) feet of the extension in place for each additional customer connected during the year whose service line is directly connected to the extension install and no to extensions or laterals therefrom. Total amount refunded shall not exceed the amount paid the "District". No refund shall be made after the refund period ends.

PUBLIC SERVICE COMMISSION
OF KENTUCKY
EFFECTIVE

SEP 22 1993

PURSUANT TO 807 KAR 5:011,
SECTION 9 (1)
BY: [signature]
PUBLIC SERVICE COMMISSION MANAGER

DATE OF ISSUE 8 (Month) 20 (Day) 93 (Year)

DATE EFFECTIVE 8 (Month) 20 (Day) 93 (Year)

ISSUED BY Archie McIntosh (Name of Officer), Chairman (Title), 76 Old Richmond Rd. Irvine, KY (Address)

FOR _____

P.S.C. Ky. No. _____

_____ Sheet No. _____

Cancelling P.S.C. Ky. No. _____

heet No. _____

ESTILL COUNTY W.D. #1

FIRST CLASS MAIL
U.S. POSTAGE PAID

PERMIT NO.:

FORWARD & ADDRESS CORRECTION

ACCOUNT NO.:

ITEM	AMOUNT	CODE	READING DATE	PREVIOUS READING	CURRENT READING	USAGE	UC	MR	AMOUNT

NET BILL DUE NOW

GROSS AMOUNT DUE AFTER DUE DATE

NET BILL DUE NOW

ESTILL COUNTY WATER DSIT. #1
76 OLD RICHMOND ROAD
IRVINE, KY 40336

GROSS BILL

DUE AFTER

ENTER READING

RETURN STUB WITH PAYMENT

ESTILL CO. WATER DISTRICT #1
76 OLD RICHMOND RD., LP #1
IRVINE, KY 40336
(606) 723-3795

OFFICE HOURS
MONDAY THRU FRIDAY 8:00 A.M TO 4:00 P.M.

RATE SCHEDULES ARE AVAILABLE AT OFFICE OR WILL BE FURNISHED UPON WRITTEN REQUEST.

ENCLOSE THIS STUB WHEN PAYING BY MAIL FOR PROPER CREDIT

CODES:
WT = WATER
SWR = SEWER
GS = GAS
FP = FIRE PROTECTION
TP = TRASH PICK-UP
BC = BAD CHECK CHARGE
SC = SERVICE CHARGE
CF = CONNECTION FEE
CR = CREDIT BALANCE
AR = PAST DUE BALANCE
TX = TAXES
EA = ESTIMATION ADJUSTMENT
EF = ESTIMATION FEES
RA = RATE ADJUSTMENT

UC (USAGE CODES):
E = ESTIMATED
M = METER CHANGE

PUBLIC SERVICE COMMISSION OF KENTUCKY EFFECTIVE

SEP 22 1993

PURSUANT TO 807 KAR 5:011 SECTION 9 (1)

BY: _____
PUBLIC SERVICE COMMISSION MANAGER

NOT RESPONSIBLE FOR MAIL DELIVERY

DATE OF ISSUE _____

ISSUED BY _____
Nam

APPROVED BY STATE BOARD OF ACCOUNTS

Form for filing Rate Schedules

FOR ESTILL COUNTY, KENTUCKY
Community, Town or City
P.S.C. NO. 2
SHEET NO. 16
CANCELLING P.S.C. NO.
8 SHEET NO. G

ESTILL COUNTY WATER DISTRICT #1
Name of Issuing Corporation

CLASSIFICATION OF SERVICE

RATE PER UNIT

DEPOSITS

The Company may require a minimum cash deposit or other guaranty to secure payment of bills

Service may be refused or discontinued for failure to pay the requested deposit. Interest, as prescribed by KRS 278.460, will be paid annually either by refund or credit to the customer's bill, except that no refund or credit will be made if the customer's bill is delinquent on the anniversary date of the deposit.

The deposit may be waived upon a customer's showing of satisfactory credit or payment history, and required deposits will be returned after one (1) year if the customer has established a satisfactory payment record for that period. If a deposit has been waived or returned and the customer fails to maintain a satisfactory payment record, a deposit may then be required. The Company may require a deposit in addition to the initial deposit if the customer's classification of service changes or if there is a substantial change in usage. Upon termination of service, the deposit, any principal amounts, and any interest earned and owing will be credited to the final bill with any remainder refunded to the customer.

In determining whether a deposit will be required or waived, the following criteria will be considered:

1. Previous payment history with the Company. If the customer has no previous history with the Company, statements from other utilities, banks, etc. may be presented by the customer as evidence of good credit.
2. Whether the customer has an established income or line of credit.
3. Length of time the customer has resided or been located in the area.
4. Whether the customer owns property in the area.
5. Whether the customer has filed bankruptcy proceedings within the last seven years.
6. Whether another customer with a good payment history is willing to sign as a guarantor for an amount equal to the required deposit.

If a deposit is held longer than 18 months, the deposit will be recalculated at the customer's request based on the customer's actual usage. If the deposit on account differs from the recalculated amount by more than $10.00 for a residential customer or 10 percent for a non-residential customer, the Company may collect any underpayment and shall refund any overpayment by check or credit to the customer's bill. No refund will be made if the customer's bill is delinquent at the time of the recalculation.

PUBLIC SERVICE COMMISSION OF KENTUCKY
EFFECTIVE
JUL 14 1992
PURSUANT TO 807 KAR 5:011, SECTION 9 (1)
BY: [signature]
PUBLIC SERVICE COMMISSION MANAGER

DATE OF ISSUE
DATE EFFECTIVE
ISSUED BY ✓ Archie McIntosh
Name of Officer
TITLE ✓ Chairman

Issued by authority of an Order of the Public Service Commission of Kentucky in Case No. dated

Form for filing Rate Schedules

FOR ESTILL COUNTY, KENTUCKY
Community, Town or City
P.S.C. NO. 2 2
SHEET NO. 18
CANCELLING P.S.C. NO.
original SHEET NO.

ESTILL COUNTY WATER DISTRICT #1
Name of Issuing Corporation

CLASSIFICATION OF SERVICE

RATE PER UNIT

MONITORING OF CUSTOMER USAGE

At least once annually the Company will monitor the usage of each customer according to the following procedure:

1. The customer's annual usage for the most recent 12-month period will be compared with the annual usage for the 12 months immediately preceding that period.

2. If the annual usage for the two periods are substantially the same or if any difference is known to be attributed to unique circumstances, such as unusual weather conditions, common to all customers, no further review will be done.

3. If the annual usages differ by 100 percent or more and cannot be attributed to a readily identified common cause, the Company will compare the customer's monthly usage records for the 12-month period with the monthly usage for the same months of the preceding year.

4. If the cause for the usage deviation cannot be determined from analysis of the customer's meter reading and billing records, the Company will contact the customer by telephone or in writing to determine whether there have been changes such as different number of household members or work staff, additional or different appliances, changes in business volume, or known leaks in the customer's service line.

5. Where the deviation is not otherwise explained, the Company will test the customer's meter to determine whether it shows an average error greater than 2 percent fast or slow.

6. The Company will notify the customers of the investigation, its findings, and any refunds or backbilling in accordance with 807 KAR 5:006, Section 10(4) and (5).

In addition to the annual monitoring, the Company will immediately investigate usage deviations brought to its attention as a result of its on-going meter reading or billing processes or customer inquiry.

PUBLIC SERVICE COMMISSION
OF KENTUCKY
EFFECTIVE

JUL 14 1992

PURSUANT TO 807 KAR 5:011,
SECTION 9 (1)

BY: [signature]
PUBLIC SERVICE

DATE OF ISSUE
ISSUED BY Archie McIntosh
Name of Officer
DATE EFFECTIVE
TITLE Chairman
Issued by authority of an Order of the Public Service Commission of Kentucky
in Case No. dated

Form for filing Rate Schedules

FOR ESTILL COUNTY, KENTUCKY
Community, Town or City

P.S.C. KY. NO. _____

Original SHEET NO. 19

ESTILL COUNTY WATER DISTRICT NO. 1

CANCELLING P.S.C. KY NO. _____

_____ SHEET NO. _____

CLASSIFICATION OF SERVICE

RATE
PER UNIT

LEAK ADJUSTMENT POLICY

Adjustments are figured by the difference between an average water bill and the bill that reflects the leak. The adjustment is then based on the District assuming 50% of the loss and the customer is responsible for the other 50% of the loss plus the average bill. Even though an adjustment is to be considered the customer is still responsible for the bill and should they be disconnected for non-payment, the entire amount plus $10.00 reconnect fee must be paid before service will be restored and any adjustment made will be credited to the account.

During the lifetime of the customer water service line, only two leak adjustments will be permitted. Each of these adjustment may cover a maximum of two billing periods. Before a third adjustment can be considered, the entire water service line from the meter box to the house or structure must be replace and evidence of this fact submitted before the third adjustment is given. If plastic pipe is used for any repair of underground water service lines, it must be no less than 200 p.s.i, CTS pipe. THE USE OF RADIATOR CLAMPS, KING NIPPLES, OR THE EQUIVALENT CANNOT BE ACCEPTED.

PUBLIC SERVICE COMMISSION
OF KENTUCKY
EFFECTIVE

MAR 05 1999

PURSUANT TO 807 KAR 5:011,
SECTION 9 (1)

DATE OF ISSUE 01 / 31 / 99
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DATE EFFECTIVE ~~01 / 31 / 99~~ 3-5-99
MONTH / DATE / YEAR

ISSUED BY Roy L. Emp
SIGNATURE OF OFFICER

TITLE Chairman

Issued by authority of an Order of the Public Service Commission of Kentucky in Ca
No. _____ dated _____.

FOR _____

P.S.C. Ky. No. _____

_____ Sheet No. _____

ESTILL CO. WATER DISTRICT 1

Cancelling P.S.C. Ky. No. _____

_____ Sheet No. _____

RULES AND REGULATIONS

SERVICE TO	UNPAID BALANCE	PENALTY	PRESENT READING	PREVIOUS READING	GALLONS USED	WATER CHARGES	HYD. CHG.	SERVICE CHARGES	SALES TAX	TOTAL CHARGES		ACCOUNT NUMBER	AMOUNT DUE

ESTILL COUNTY WATER DISTRICT NO. 1
IRVINE, KENTUCKY 40336

ESTILL COUNTY
WATER DISTRICT NO. 1
76 OLD RICHMOND ROAD
IRVINE, KENTUCKY 40336

BILL TO

RATE SCHEDULES ARE AVAILABLE AT OFFICE OR WILL BE FURNISHED ON WRITTEN REQUEST.

FIRE HYDRANT
.50c PER MONTH

OFFICE OPEN
8:00 TO 4:00
MONDAY THRU FRIDAY

SERVICE TO		
MONTH	DAY	YEAR

KEEP THIS PORTION FOR YOUR RECORDS
10% ADDED ON ALL OVERDUE ACCOUNTS
BILLS DUE 20th OF EACH MONTH

RETURN
THIS STUB WITH
YOUR PAYMENT

345631

345631

PUBLIC SERVICE COMMISSION
OF KENTUCKY
EFFECTIVE

AUG 21 1992

PURSUANT TO 807 KAR 5:011.
SECTION 9 (1)

PUBLIC SERVICE COMMISSION MANAGER

DATE OF ISSUE _____ DATE EFFECTIVE _____
Month Day Year Month Day Year

ISSUED BY _____
Name of Officer Title Address

Form for Filing Rate Schedules

For Estill County, Kentucky
Community, Town or City

P.S.C. NO. 7335

Original SHEET NO. 8.1

Estill County Water District #1
Name of Issuing Corporation

CANCELLING P.S.C. NO. _____

_____ SHEET NO. _____

CLASSIFICATION OF SERVICE	RATE PER UNIT
PURCHASED WATER ADJUSTMENT CLAUSE (cont.) In the event a refund is received from the supplier for amounts previously paid, the following tabulations will be made: 1. Total refund received $_____ 2. Total amount of water estimated to be sold during 2 month period beginning with the first day of the month following receipt of the refund _____ M Gal. 3. Refund factor per unit of water sold (Item 1 divided by Item 2) _____ ¢ 4. The refund factor may be adjusted in the final month to more accurately reflect the amount to be refunded.	

PUBLIC SERVICE COMMISSION
OF KENTUCKY
EFFECTIVE

SEP 29 1983

PURSUANT TO 807 KAR 5:011,
SECTION 9 (1)

BY: _____

DATE OF ISSUE September 29, 1983 DATE EFFECTIVE September 29, 1983

ISSUED BY _____ TITLE Chairman
Name of Officer

FOR Southern Estill County

P.S.C. Ky. No. 7335

ORIGINAL Sheet No. 2 8.2

Estill County Water District #1

Cancelling P.S.C. Ky. No. _____

_____ Sheet No. _____

RULES AND REGULATIONS

Purchased Water Adjustment Clause

Upon increase or decrease in the wholesale rate of purchased water by its supplier, the utility may apply for an adjustment to its water rates in accordance with 807 KAR 5:067. The base rate for future application of the purchased water adjustment clause is:

Supplier	Rate
Irvine Municipal Utilities	$1.16 per 1,000 gallon

PUBLIC SERVICE COMMISSION
OF KENTUCKY
EFFECTIVE

SEP 29 1983

PURSUANT TO 807 KAR 5:011,
SECTION 9 (1)

BY: _____

DATE OF ISSUE September 29, 1983
Month Day Year

DATE EFFECTIVE September 29, 1983
Month Day Year

ISSUED BY _____ Chairman Route 5, Irvine, Ky. 40336
Name of Officer Title Address

ATTACHMENT E
U.S. CENSUS QUICK FACTS FOR ESTILL COUNTY

QuickFacts

Estill County, Kentucky

QuickFacts provides statistics for all states and counties, and for cities and towns with a ***population of 5,000 or more***.

Table

All Topics	Estill County, Kentucky
Population estimates, July 1, 2018, (V2018)	**14,198**
PEOPLE	
Population	
Population estimates, July 1, 2018, (V2018)	**14,198**
Population estimates base, April 1, 2010, (V2018)	14,679
Population, percent change - April 1, 2010 (estimates base) to July 1, 2018, (V2018)	-3.3%
Population, Census, April 1, 2010	14,672
Age and Sex	
Persons under 5 years, percent	▲ 5.8%
Persons under 18 years, percent	▲ 21.8%
Persons 65 years and over, percent	▲ 18.5%
Female persons, percent	▲ 50.6%
Race and Hispanic Origin	
White alone, percent	▲ 98.2%
Black or African American alone, percent (a)	▲ 0.5%
American Indian and Alaska Native alone, percent (a)	▲ 0.3%
Asian alone, percent (a)	▲ 0.1%
Native Hawaiian and Other Pacific Islander alone, percent (a)	▲ Z
Two or More Races, percent	▲ 0.9%
Hispanic or Latino, percent (b)	▲ 1.1%
White alone, not Hispanic or Latino, percent	▲ 97.2%
Population Characteristics	
Veterans, 2013-2017	735
Foreign born persons, percent, 2013-2017	0.2%
Housing	
Housing units, July 1, 2017, (V2017)	6,930
Owner-occupied housing unit rate, 2013-2017	70.5%
Median value of owner-occupied housing units, 2013-2017	$71,000
Median selected monthly owner costs -with a mortgage, 2013-2017	$897

Median selected monthly owner costs -without a mortgage, 2013-2017	$306
Median gross rent, 2013-2017	$578
Building permits, 2017	0
Families & Living Arrangements	
Households, 2013-2017	5,638
Persons per household, 2013-2017	2.53
Living in same house 1 year ago, percent of persons age 1 year+, 2013-2017	89.0%
Language other than English spoken at home, percent of persons age 5 years+, 2013-2017	0.5%
Computer and Internet Use	
Households with a computer, percent, 2013-2017	72.4%
Households with a broadband Internet subscription, percent, 2013-2017	58.5%
Education	
High school graduate or higher, percent of persons age 25 years+, 2013-2017	76.0%
Bachelor's degree or higher, percent of persons age 25 years+, 2013-2017	9.9%
Health	
With a disability, under age 65 years, percent, 2013-2017	20.8%
Persons without health insurance, under age 65 years, percent	▲ 7.1%
Economy	
In civilian labor force, total, percent of population age 16 years+, 2013-2017	48.9%
In civilian labor force, female, percent of population age 16 years+, 2013-2017	43.7%
Total accommodation and food services sales, 2012 ($1,000) (c)	D
Total health care and social assistance receipts/revenue, 2012 ($1,000) (c)	36,792
Total manufacturers shipments, 2012 ($1,000) (c)	D
Total merchant wholesaler sales, 2012 ($1,000) (c)	D
Total retail sales, 2012 ($1,000) (c)	75,272
Total retail sales per capita, 2012 (c)	$5,194
Transportation	
Mean travel time to work (minutes), workers age 16 years+, 2013-2017	33.4
Income & Poverty	
Median household income (in 2017 dollars), 2013-2017	$30,692
Per capita income in past 12 months (in 2017 dollars), 2013-2017	$17,728
Persons in poverty, percent	▲ 24.8%

BUSINESSES

Businesses	
Total employer establishments, 2016	185
Total employment, 2016	1,577
Total annual payroll, 2016 ($1,000)	45,452
Total employment, percent change, 2015-2016	5.4%
Total nonemployer establishments, 2016	774
All firms, 2012	890

Men-owned firms, 2012	415
Women-owned firms, 2012	407
Minority-owned firms, 2012	25
Nonminority-owned firms, 2012	842
Veteran-owned firms, 2012	41
Nonveteran-owned firms, 2012	805

GEOGRAPHY

Geography

Population per square mile, 2010	58.0
Land area in square miles, 2010	253.08
FIPS Code	21065

About datasets used in this table

Value Notes

▲ Estimates are not comparable to other geographic levels due to methodology differences that may exist between different data sources.

Some estimates presented here come from sample data, and thus have sampling errors that may render some apparent differences between geographies statistically indistinguishable. Click the Quick Info ⓘ icon to the left of each row in TABLE view to learn about sampling error.

The vintage year (e.g., V2018) refers to the final year of the series (2010 thru 2018). *Different vintage years of estimates are not comparable.*

Fact Notes

(a) Includes persons reporting only one race
(b) Hispanics may be of any race, so also are included in applicable race categories
(c) Economic Census - Puerto Rico data are not comparable to U.S. Economic Census data

Value Flags

- Either no or too few sample observations were available to compute an estimate, or a ratio of medians cannot be calculated because one or both of the median estimates falls in the lowest or upper interval of an open ended distribution.
D Suppressed to avoid disclosure of confidential information
F Fewer than 25 firms
FN Footnote on this item in place of data
NA Not available
S Suppressed; does not meet publication standards
X Not applicable
Z Value greater than zero but less than half unit of measure shown

QuickFacts data are derived from: Population Estimates, American Community Survey, Census of Population and Housing, Current Population Survey, Small Area Health Insurance Estimates, Small Area Income and Poverty Estimates, State and County Housing Unit Estimates, County Business Patterns, Nonemployer Statistics, Economic Census, Survey of Business Owners, Building Permits.

ATTACHMENT F
ARTICLES ON DECLINE IN DOMESTIC CONSUMPTION OF TREATED WATER

Maureen Duffy
T: 856-309-4546
maureen.duffy@amwater.com

Declining Residential Water Usage

Introduction

In households across the U.S., water usage is declining slowly but steadily; a trend that is expected to continue for the next 15 years or even more. This is good news in light of the challenges some areas in the U.S. face when it comes to managing this essential resource. At the same time, it presents a challenge to water utilities, who must adapt their systems and rates to reduced consumption trends in order to cover fixed costs and maintain reliable service.

A 2010 study by the Water Research Foundation concluded that "a pervasive decline in household consumption has been determined at the national and regional levels."[1] As reported in Journal AWWA, the study, which tracked trends in household water use in North America over the past 30 years, found that "a household in the 2008 billing year used 11,678 gallons less water annually [an approximate 13 percent decline] than an identical household did in 1978."[2]

This finding is supported by American Water's experience, which serves approximately 15 million people in more than 30 states and parts of Canada. The company reported in its 2010 Annual Report a declining trend in residential water usage for all of its regulated states to be in the range of 0.5 to 2 percent annually over the last ten years. Monthly analyses of residential sales across

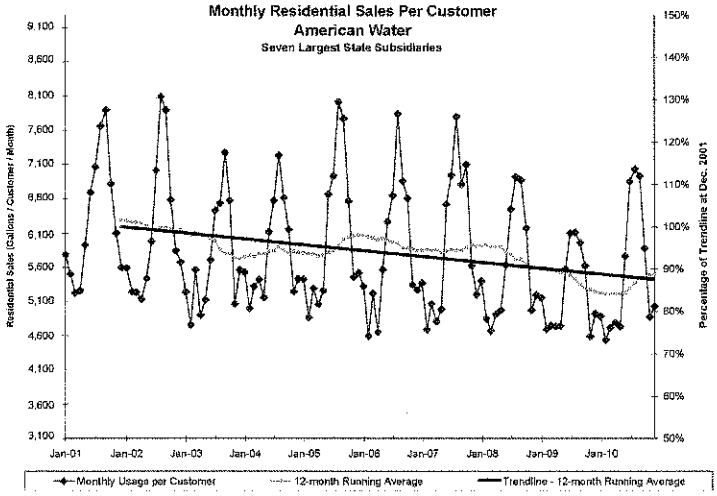


Figure 1

[1] Coomes et al. *North American Water Usage Trends Since 1992*, Water Research Foundation. 2010.
[2] Rockaway et al. "Residential Water Use Trends in North America," *Journal AWWA*. February 2011.

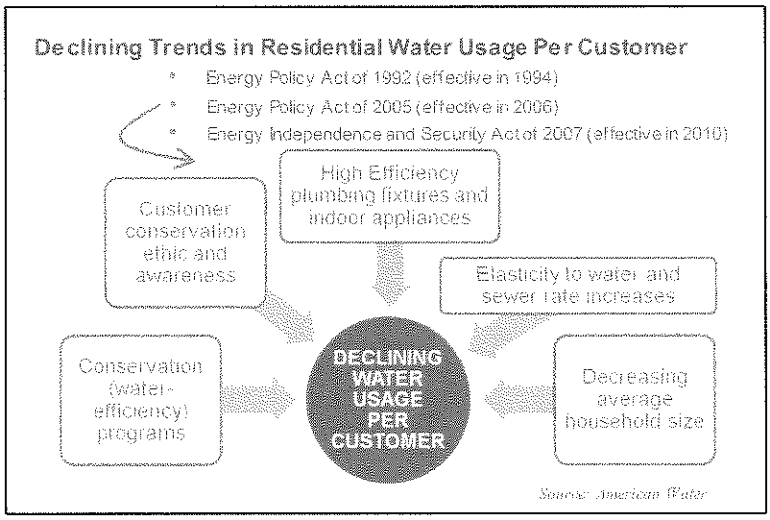
its largest state subsidiaries from 2001 to 2010 reveal an annual decrease of 1 to 2 percent (based on gallons/customer/month) (see figure 1). These subsidiaries provide service to a wide range of household demographics in climates that span from arid to water-rich, providing a broad base by which to assess water usage trends.

The results held true when American Water limited its analysis to winter-only consumption in service areas in the northern portions of the U.S. Because varying weather conditions in summer months can cause large fluctuations in outdoor water needs (lawn and garden watering, for instance, increases during hot, dry periods and is lower in cooler, wetter summers), it is particularly useful to study winter-only trends, when outdoor water usage is at a minimum.

The consistency of findings in both the Water Research Foundation study and American Water's own research indicates that several strong underlying factors are driving indoor residential usage patterns.

Driving the Decline

According to the Water Research Foundation, the primary forces behind this drop are the increased use of water-efficient appliances and a decrease in the number of occupants per household.[3] Others factors to consider are price elasticity, a growing conservation ethic among consumers, and conservation programs implemented by utilities and other entities.



A few highlights:

Water-efficient appliances: Technological advances continue to improve the water efficiency of household appliances, driven by government mandates such as The Energy Policy and Conservation Act of 1992, which required the manufacture of water-efficient toilets, showerheads and faucet fixtures, and the Energy Independence & Security Act of 2007, which established similar high-efficiency standards for dishwashers and clothes washers. As a result, toilets manufactured after 1994 use 1.6 gallons or less per flush, compared to 3.5 to 7 gallons per flush

[3] Coomes et al., 2010.

for older models, while dishwashers manufactured after 2009 and clothes washers after 2010 are held to water efficiency requirements that could reduce usage by 54 and 30 percent, respectively. What's more, fixtures and appliances that surpass these requirements are increasingly prevalent in the marketplace thanks to consumer demand. These improvements correspond to a 35% decrease in water usage by a typical residential household in a new home constructed in 2011 compared to the same household in a non-retrofitted home built prior to 1994.

Background – Flow rates from different appliances

Type of Use	Pre-Regulatory Flow*	New Regulatory Standards and Flows			WaterSense / ENERGY STAR Current Specification+
		New Standard (maximum)	Federal Standard	Year Effective	
Toilets	3.5 gpf	1.6 gpf	U.S. Energy Policy Act	1994	1.28 gpf
Clothes washers^^	41 gpl (14.6 WF)	Estimated 26.6 gpl (9.5 WF)	Energy Independence & Security Act of 2007	2011	Estimated 22.4 gpl (8.0 WF)
Showers	2.75 gpm	2.5 gpm at 80 psi	U.S. Energy Policy Act	1994	No specification
Faucets^^^	2.75 gpm	2.5 gpm at 80 psi (1.5 gpm)	U.S. Energy Policy Act	1994	1.5 gpm at 60 psi
Dishwashers	14.0 gpc	6.5 gpc for standard; 4.5 gpc for compact	Energy Independence & Security Act of 2007	2010	5.8 gpc for standard; 4.0 gpc for compact

* Source: *Handbook of Water Use and Conservation*, Amy Vickers, May 2001
^^ Average estimated gallons per load and water factor (see calculations)
^^^ Regulation maximum of 2.5 gpm at 80 psi, but lavatory faucets available at 1.5 gpm maximum (see calculations)
\+ Source: http://www.epa.gov/watersense/ and http://www.energystar.gov/ websites

ABBREVIATIONS USED:
gpf – gallons per flush; gpl – gallons per load; gpc – gallons per cycle; gpm – gallons per minute
WF – water factor or gallons per cycle per cubic feet capacity of the washer

Figure 3

Price elasticity: Non-essential outdoor water usage – from irrigation to car washing and swimming pools – is more responsive to water and sewer rate increases than is indoor water usage, which is primarily for consumption and hygiene. However, there is some price elasticity there as well, as households are more vigilant about fixing leaks under higher rates.[4] A recent industry study investigating the sensitivity of residential water demand to water price found that a 10% increase in price led to a 3.3% decline in customer demand.[5]

Water conservation practices: Whether as a cost-cutting measure or due to growing environmental awareness, American consumers are increasingly conscientious about conserving household water. Utilities, too, have been educating their customer bases about the importance of preserving the world's water supply. For its part, American Water became a promotional partner of the Environmental Protection Agency's WaterSense program in 2008, and all American Water subsidiaries have links on their websites to the EPA WaterSense site. The company has dedicated its 125th anniversary year (2011) to promoting the value of water and the need to protect it through a variety of national and regional educational programs reaching its customer base and the general public, including a series of public service announcements (PSAs) produced in conjunction with EPA WaterSense and the Student Conservation Association. American Water subsidiaries also offer conservation-related educational materials, and several subsidiaries have pilot or statewide conservation programs that include offering water-efficient fixtures by request or by rebates.

[4] Coomes et al., 2010.
[5] Olmstead et al. *Managing Water Demand: Price vs. Non-Price Conservation Programs*. July 2007.

Benefits of Reduced Usage

By 2013, it is estimated that 36 states will face serious water shortages.[6] Therefore, a decline in per-household water usage is crucial if the nation is to meet the water needs of a growing population.

The water industry, too, reaps certain benefits from this trend. Less water use means less need to divert water from supply sources, leaving more water for passing flows or drought reserve. It leads to reduced power consumption, chemical usage, and waste disposal, which not only lowers operating costs but also provide environmental benefits such as reduced carbon footprint and waste streams.

At times of declining customer usage, operators can seize the opportunity to optimize management of existing water supplies, treatment facilities, and pump stations. For systems that rely on multiple sources of supply, this may translate into operational cost savings by minimizing use of water from higher-cost sources.

Other opportunities include more efficient and effective pumping and treatment. More available storage means operators can schedule more pumping at off-peak times, thus reducing electricity demand charges. Less demand also means less strain on certain process equipment, allowing operators to stretch out scheduled maintenance.

Utility planners need to base capital projects on the most current information and consider downsizing or postponing supply development projects when customer demand projections reflect an anticipated decline in usage. At the same time, they must continue to factor in peak-day demand, which, driven by hot, dry weather spells and other short-term events, may or may not follow the same declining trend as average-day consumption. Because it is peak-day demand that determines capital infrastructure needs such as treatment and pumping capacity, it is essential that utilities understand their own peak usage patterns.

The Challenge

The downside for the water utility industry is that reduced usage creates a revenue decline while a number of fixed costs continue to rise. These range from water utility capital needs – infrastructure renewal, reliability, and regulatory projects, for instance – to operating costs such as plant maintenance, customer services needs, IT support, and security.

"Pricing that recovers the costs of building, operating and maintaining the systems is absolutely essential to achieving sustainability," reports the Water Research Foundation. "Drinking water and wastewater utilities must be able to price water to reflect the full costs of treatment and delivery."[7]

For water utilities that are regulated by public service commissions, the challenge, therefore, is to work with regulators to be progressive in establishing rates that allow appropriate investment in the pipes and plants that ensure reliable service.

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[6] U.S. Government Accountability Office. *Natural Resources, Energy, and the Environment Challenges for the 21st Century*. February 2005.
[7] Coomes et al, 2010.

Solutions

Despite the financial challenges it presents, water utilities are wise to not just accept but embrace the declining usage trend, if simply because it's the right thing to do. As stewards of the nation's water supply, conservation of this vital resource must continue to be a key message and operational focus. Rather, utilities must meet the challenge of reduced demand by building that 1% to 2% decline into its long-term planning.

The value of water is another key message utilities must continue to underscore. It is essential that customers understand that, at about a penny or less a gallon, the clean, quality water delivered to their tap is a bargain, especially compared to other common household utilities.

Investor-owned water utilities also need to work with regulators for a more progressive rate structure so that revenues are not entirely dependent on fluctuations in sales. Revenue balancing, where rates provide for surcharges or refunds based on fluctuations in sales, is one tool to consider. Another would be to increase the fixed charge on the customers' utility bill to recover a greater portion of the utilities fixed costs, thereby reducing exposure to sales volatility. For utilities operating on a basis of decoupled revenue streams, water saved through conservation can be viewed as more cost effective than adding capacity via expansion of water delivery infrastructure.[8]

Conclusion

Based on the average life expectancy of appliances, it is estimated that the replacement of old fixtures with new, more efficient models will continue to affect water usage trends for another 10 to 15 years.[9] Other drivers are likely to continue into the foreseeable future. Looking forward, water utility managers and operators will need to adapt their business planning to accommodate the historic declining trend of 1 to 2% annually, while also watching for signs of its leveling off.

[8] Massachusetts Institute of Technology, Mission 2012: Clean Water: http://web.mit.edu/12.000/www/m2012/finalwebsite

[9] Naumick, Gary A., P.E., *Trends in Residential Water Usage and its Impact on Water Utility Financial Planning*, AWWA Utility Management Conference, February 10, 2011.

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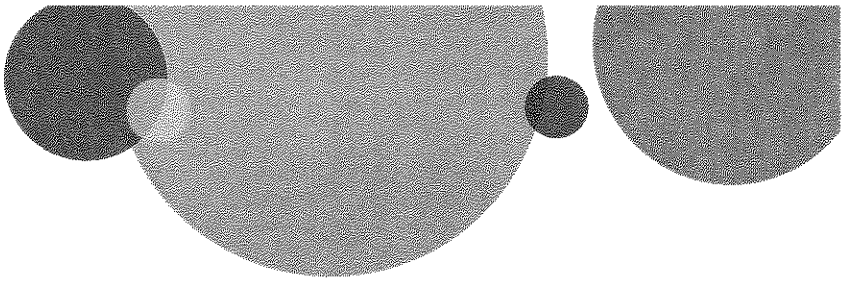


WATER EFFICIENCY

Water Use Estimates

How Water Sales and Research Studies Can Be Used to Predict Future Needs

Quick Facts

- Utility data are useful for analyzing water use trends, but have limitations
- Research studies on residential water use show an overall decline in consumption over time
- New methodologies, standardization of customer categories, and improved documentation will improve use estimates

Overview

Utilities need a comprehensive understanding of the many uses of potable water in order to meet current and future water supply demands. Water sales have been used to understand and predict demands and are based on periodic readings of the customer's meter. However, water meter data has limitations because utilities don't use uniform customer categories, lack detailed water use information, readings may not occur frequently enough to be useful, and not all customers have a meter. Research studies can provide more detailed water use measurements and averages. When combined with non-sales information, such data can help elucidate customer sales.

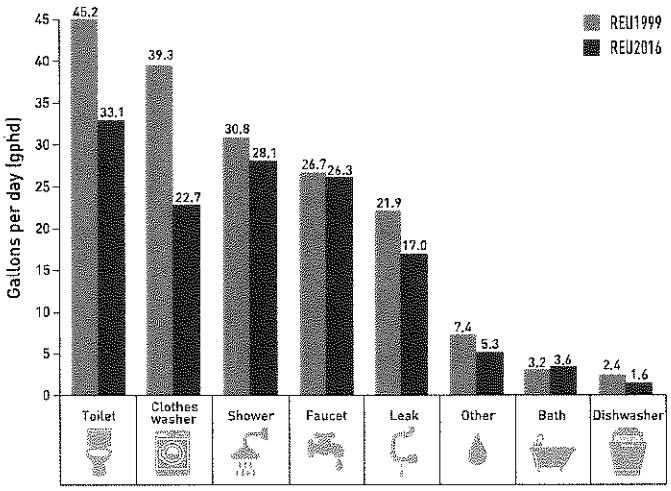
National Water Use Estimates

The national effort to collect water use information is conducted every five years by the U.S. Geological Survey (USGS). In the latest report, the USGS estimated that in 2010 the total water used in the United States was 355 billion gallons per day, a decrease of 13% from 2005. The largest uses of water were thermoelectric power (45%), irrigation (33%) and public supply—residential, commercial, and industrial freshwater uses (12%) (Maupin et al. 2014).

Utility Data On Water Use

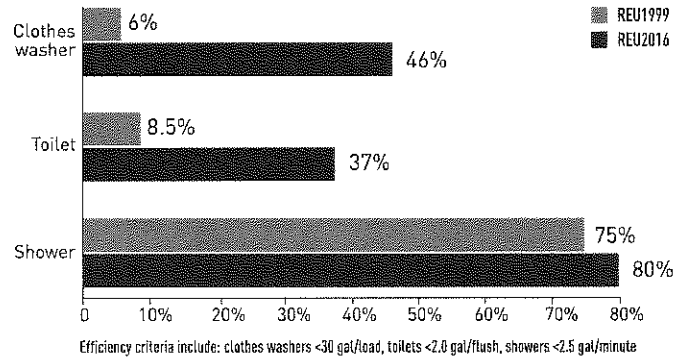
Utilities do not use uniform categories and sub-categories for customer sales, thus water use trends analysis is hampered by a lack of accurate and consistent data. The

Water Research Foundation (WRF) report, *Evaluation of Customer Information and Data Processing Needs for Water Demand Analysis, Planning and Management*, recommended the development of standardized customer classification. It also recommended that utilities geographically reference water customers with their unique locations and maintain at least a 10-year record of customer water use and billing information (Kiefer and Krentz 2016). Some advances in data aggregation of water use information is underway, in part spurred by advanced metering infrastructure and the recognition that data analytics could inform water use trends analysis. Using water sales data, American Water Works Association (AWWA) (2015) calculated "total per capita" consumption at 121.3 gal/person/day and "domestic per capita" consumption at 66.6 gal/person/day. Research studies can provide more detailed measurements of water use.



Source: DeOreo et al. 2016

Figure 1. Indoor per household water use



Source: DeOreo et al. 2016

Figure 2. Percent of homes meeting EPA's WaterSense efficiency criteria

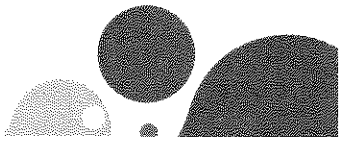
Residential Customers: Single-Family, Detached Homes

Single-family detached homes typically are the largest category of customers, both by volume of water consumer and revenue generated. These homes have the most direct record of water sales since each is individually metered. In the WRF reports, *Residential End Uses of Water* (Mayer et al. 1999) and *Residential End Uses of Water, Version 2* (DeOreo et al. 2016), water use per household was calculated from billing data and detailed water use information was collected for two weeks, which allowed for identification of water use by specific fixtures, appliances or water using behavior (like irrigation). Comparing water use amongst utilities is difficult with billing data alone because it includes irrigation and varies widely based on local climate conditions. The studies focused on comparing residential "indoor" water use since this is more comparable. In the 2016 report, the average indoor water use was 138 gallons per household per day (Figure 1) and 58.6 gallons per capita per day.

Comparing Residential Water Use Over Time

North American Water Usage Trends analyzed 25 years of national sales data from 43 utilities, beginning in 1992. Residential water use per customer (house) declined 389 gallons per year. Reasons for water use declines in various study locations may differ because they are affected by the local economy, demographics, age of housing stock, and growth patterns (Coomes et al. 2010).

Comparing *Residential End Uses of Water* in 1999 and *Residential End Uses of Water,*



Version 2 in 2016, water use has declined 22% per household, from 177 to 138 gallons per household per day (gphd), or 15% per capita (from 69.3 to 58.6 gallons per capita per day [gpcd]).The decline in indoor water use resulted in part from the increased prevalence of more efficient toilets and clothes washers (Figure 2) (DeOreo et al. 2016).

The change in the occurrence of water-efficient appliances and fixtures is being studied in WRF's ongoing project, "Integrating Water Use From Efficient Technology and New Building Codes into Demand Forecasting" (Cooley and Heberger, forthcoming).

Multi-Family Residential Water Use

The multi-family housing sector, larger in urban areas, is a component of most utilities' sales and may be increasing. About 34% of housing units are some form of multi-family housing (U.S. Census Bureau 2013). Water use per unit is not well-documented because most units are not individually metered (Mayer et al. 2004).

It's a commonly held idea that indoor water use from single family homes might be a proxy for use in multi-family housing units, but that has not been proven. Estimates of multi-family housing water use from research studies is 121–217 gallons per day per housing unit (Mayer et al. 2004, DeOreo and Hayden 2008). "Water Use in the Multi-Family Housing Sector" will develop and recommend strategies for estimating multi-family water use (Kiefer, forthcoming).

Commercial, Industrial, And Institutional (CII) Water Use

The CII sector of customers makes up about one-third of utility sales. Understanding such sales is complicated because not all businesses are individually metered, and their diversity prevents creation of homogenous groups of customers.

In the WRF study, *Commercial and Institutional End Uses of Water*, usage was calculated for popular categories of non-residential customers (Table 1). While size or magnitude of operations was accounted for, the study did not take into account variables such as the number of customers or employees (Dziegielewski et al. 2000)

Two WRF projects further the study of water use estimates for non-residential customers. *Methodology for Determining Baseline Commercial, Institutional and Industrial End Uses of Water* developed analytical elements and developed data collection methods for differentiating among the CII groupings (Kiefer and Krentz 2015). The study suggested using 13 primary categories as a starting point: lodging, office building, school/college, health care facility, eating/drinking establishment, retail store, warehouse, auto/auto service, religious building, retirement/nursing home, manufacturing, other commercial/institutional, largest individual users, or dominant end uses. In the ongoing study, "Developing Water Use Metrics and Class Characteristics for Categories in the CII Sector," goals include setting benchmarks for select CII customer categories (Fedak, forthcoming).

Typical water sales data based on monthly or bi-monthly readings of meters and have limitations because of non-uniform customer categories, lack of detailed water use information, and the lack of 1:1 relationship between meter and customer account. Research studies provide more detailed studies of water use by customer type, but are limited snapshots in time. Advances in

Table 1. Water use for non-residential customers from billing data

	Average annual daily use*
Hotels and motels	7,113
Laundries / laundromats	3,290
Car washes	3,031
Urban irrigation	2,596
Schools and colleges	2,117
Hospitals / medical offices	1,236
Office buildings	1,204
Restaurants	906
Food stores	729
Auto shops	687
Membership organizations	629

*gallons per day per utility customer

Source: Dziegielewski et al. 2000

technology (like advanced metering infrastructure) and practices (such as using standardized customer categories and geocoding customer accounts) will help improve the industry's understanding of water use trends and drivers.

There is a need to improve the usefulness of customer data for analyzing water use trends.

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Last Updated April 2017

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WaterNews

U.S. Household Water Use Continues to Decline

November 8, 2017 / in Water Management, Water News / by Brett Walton

Federal report tracks conservation pattern that began two decades ago.

A neighborhood in Weld County, Colorado, one of the few states where household water use is increasing. Photo © J. Carl Ganter / Circle of Blue

By Brett Walton, Circle of Blue

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Continuing a trend that began in the early 1990s with tighter federal plumbing standards, U.S. household water use dropped again in 2015.

When assessing national figures, there are two main ways to gauge water use at home: the amount used per person and total water use, which incorporates changes in population. By both measures, water use is declining [https://pubs.er.usgs.gov/publication/ofr20171131] , according to the latest report from the U.S. Geological Survey, the agency that gathers national data every five years.

For people served by public and private utilities, water use for cooking, drinking, showering, lawn watering, car washing, and other household tasks dropped to an average of 83 gallons per person per day in 2015, down seven percent compared to 2010. Household use was 105 gallons per person per day in 1990.

Total household use declined as well, even as the number of people supplied by utilities increased by 14 million. Household water use in the country dropped by 381 million gallons per day, or two percent. Savings are evident across all utility operations. Total water withdrawals for public supply, a category that includes household use as well as water provided by utilities for commercial and industrial purposes, are the lowest since 1995.

Three factors explain the decline, according to Molly Maupin, a U.S. Geological Survey hydrologist who helped to collect the water-use data. A severe drought in California prompted Gov. Jerry Brown in 2015 to order urban water utilities to cut demand by 25 percent. Those utilities are also implementing a state water conservation law that was passed in 2009. California, not surprisingly, showed the largest decline in total household water use in the country between 2010 and 2015.

Second is that water utilities are paying more attention — by fixing leaks and installing meters. The Georgia Legislature, for instance, passed a law in 2010 that requires utilities to conduct an annual audit to check for leaks.

"People are continuing to use water more carefully," Maupin told Circle of Blue.

Conservation yields financial benefits for residents, too. A study published earlier this year by the Alliance for Water Efficiency, a Chicago-based nonprofit, found that using less water in two Arizona cities [https://www.circleofblue.org/2017/water-management/saving-water-lowered-rates-two-arizona-cities/] led to cheaper rates than if new water supply projects were built in order to keep pace with higher demand.

The third factor is water-saving plumbing fixtures. The federal Energy Policy Act of 1992 dramatically strengthened the plumbing code, requiring toilets, showerheads, faucets, dishwashers, and clothes washers to cut down the flow of water. As a result of the act, toilets flush half as much water as before and showerheads spray 30 percent less.

Research bears this out. Nearly all the decline in residential indoor water use in the last two decades is due to more-efficient fixtures, according to a 2016 study [https://www.circleofblue.org/2016/water-management/infrastructure/study-efficient-fixtures-cut-u-s-indoor-water-use/] funded by the Water Research Foundation. That study examined in detail the behavior of households in nine large cities.

Some states have turned the screws even tighter. California ordered that toilets sold after January 1, 2014, flush 20 percent less water than the federal standard of 1.6 gallons. Texas, Georgia, and Colorado followed with similar laws.

Water use is not declining in every state, though. According to the USGS report, which uses data from state agencies and water utilities, per person water use increased in the states of Alaska, Colorado, Idaho, Louisiana, Utah, Virginia, Wisconsin, and Wyoming.

Most of these states are in the American West, and three are in the upper basin of the Colorado River, where there is strong debate about whether to increase water withdrawals from the shrinking river [https://www.circleofblue.org/2016/world/colorado-rivers-tale-two-basins/].

Brett Walton [https://www.circleofblue.org/author/brett/]

Brett writes about agriculture, energy, infrastructure, and the politics and economics of water in the United States. He also writes the Federal Water Tap [https://www.circleofblue.org/water-tap/], Circle of Blue's weekly digest of U.S. government water news. He is the winner of two Society of Environmental Journalists reporting awards, one of the top honors in American environmental journalism: first place for explanatory reporting for a series on septic system pollution in the United States [https://www.circleofblue.org/2016/world/brettwalton/] (2016) and third place for beat reporting in a small market (2014). Brett lives in Seattle, where he hikes the mountains and bakes pies. Contact Brett Walton [https://www.circleofblue.org/contactbrettwalton/]

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USGS
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Water Use Across the United States Declines to Levels Not Seen Since 1970

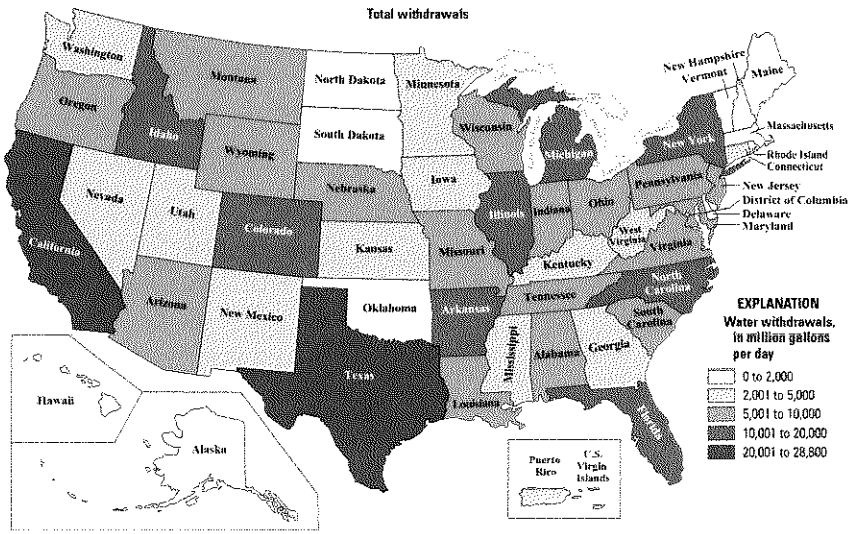
Release Date: JUNE 19, 2018

Reductions in water use first observed in 2010 continue, show ongoing effort towards "efficient use of critical water resources."

Water use across the country reached its lowest recorded level in 45 years. According to a new USGS report, 322 billion gallons of water per day (Bgal/d) were withdrawn for use in the United States during 2015.

This represents a 9 percent reduction of water use from 2010 when about 354 Bgal/d were withdrawn and the lowest level since before 1970 (370 Bgal/d).

"The downward trend in water use shows a continued effort towards efficient use of critical water resources, which is encouraging," said Tim Petty, assistant secretary for Water and Science at the Department of the Interior. "Water is the one resource we cannot live without, and when it is used wisely, it helps to ensure there will be enough to sustain human needs, as well as ecological and environmental needs."



Total water withdrawals by State, 2015 [1 Bgal/d = 1,000 million gallons per day].

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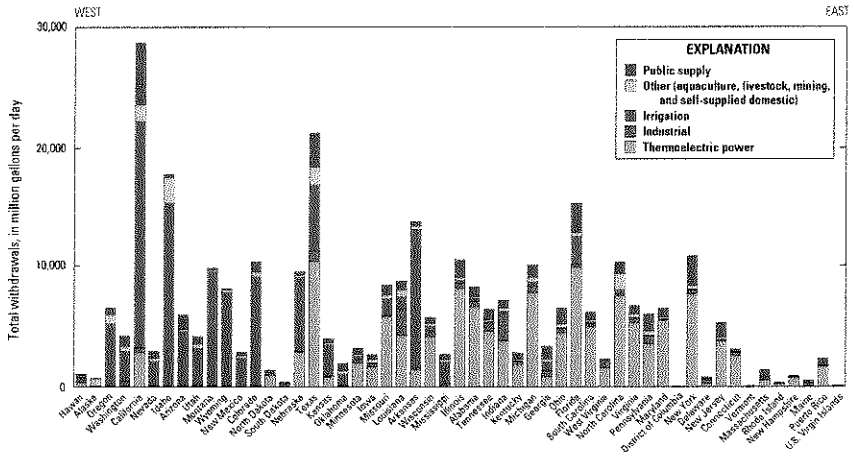
In 2015, more than 50 percent of the total withdrawals in the United States were accounted for by 12 states (in order of withdrawal amounts): California, Texas, Idaho, Florida, Arkansas, New York, Illinois, Colorado, North Carolina, Michigan, Montana, and Nebraska.



Total water withdrawals by category and by State from west to east, 2015 [1 Bgal/d = 1,000 million gallons per day].

California accounted for almost 9 percent of the total withdrawals for all categories and 9 percent of total freshwater withdrawals. Texas accounted for about 7 percent of total withdrawals for all categories, predominantly for thermoelectric power generation, irrigation, and public supply.

Florida had the largest share of saline withdrawals, accounting for 23 percent of the total in the country, mostly saline surface-water withdrawals for thermoelectric power generation. Texas and California accounted for 59 percent of the total saline groundwater withdrawals in the United States, mostly for mining.

"The USGS is committed to providing comprehensive reports of water use in the country to ensure that resource managers and decision makers have the information they need to manage it well," said USGS director Jim Reilly. "These data are vital for understanding water budgets in the different climatic settings across the country."

For the first time since 1995, the USGS estimated consumptive use for two categories — thermoelectric power generation and irrigation. Consumptive use is the fraction of total water withdrawals that is unavailable for immediate use because it is evaporated, transpired by plants, or incorporated into a product.

"Consumptive use is a key component of the water budget. It's important to not only know how much water is being withdrawn from a source, but how much water is no longer available for other immediate uses," said USGS hydrologist Cheryl Dieter.

The USGS estimated a consumptive use of 4.31 Bgal/d, or 3 percent of total water use for thermoelectric power generation in 2015. In comparison, consumptive use

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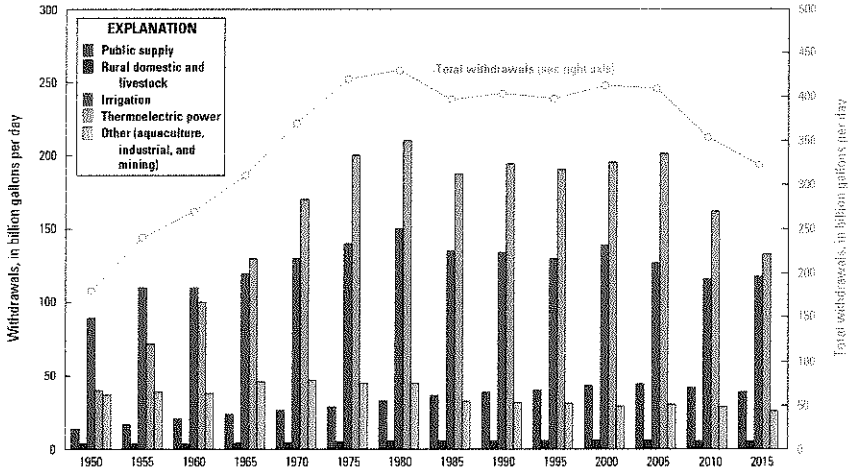
was 73.2 Bgal/d, or 62 percent of total water use for irrigation in 2015.

Water withdrawn for thermoelectric power generation was the largest use nationally at 133 Bgal/d, with the other leading uses being irrigation and public supply, respectively. Withdrawals declined for thermoelectric power generation and public supply, but increased for irrigation. Collectively, these three uses represented 90 percent of total withdrawals.

- Thermoelectric power decreased 18 percent from 2010, the largest percent decline of all categories.
- Irrigation withdrawals (all freshwater) increased 2 percent.
- Public-supply withdrawals decreased 7 percent.



Trends in total water withdrawals by water-use category, 1950-2015.

A number of factors can be attributed to the 18 percent decline in thermoelectric-power withdrawals, including a shift to power plants that use more efficient cooling-system technologies, declines in withdrawals to protect aquatic life, and power plant closures.

As it did in the period between 2005 and 2010, withdrawals for public supply declined between 2010 and 2015, despite a 4 percent increase in the nation's total population. The number of people served by public-supply systems continued to increase and the public-supply domestic per capita use declined to 82 gallons per day in 2015 from 88 gallons per day in 2010. Total domestic per capita use (public supply and self-supplied combined) decreased from 87 gallons per day in 2010 to 82 gallons per day in 2015.

The USGS is the world's largest provider of water data and the premier water research agency in the federal government.

ATTACHMENT G
WRIS PROJECT PROFILES

Drinking Water Project Profile

Legal Applicant:	**Estill County Water District #1**		
Project Title:	**ECWD - Meter Purchase and Replacement Project**		
Project Number:	**WX21065006** View Map	Submitted By:	**BGADD**
Funding Status:	**Not Funded**	Primary County:	**Estill**
Project Status:	**Approved**	Planning Unit:	**Unit 1**
Project Schedule:	**0-2 Years**	Multi-County:	**No**
E-Clearinghouse SAI:		ECH Status:	
Applicant Entity Type:	**Water District (KRS 74)**	ADD WMC Contact:	**Karyn Leverenz**
Date Approved (AWMPC):	**01-20-2017**		

Project Description:

Purchase and install new residential meters throughout the service area. The ECWD currently services approximately 4000 residential and commercial customers in Estill County. This project will be an owner purchase materials project with the replacement being accomplished using ECWSD force labor and equipment.

Need for Project:

Briefly describe how this project promotes public health or achieves and/or maintains compliance with the Clean Water Act or Safe Drinking Water Act:

The project is being developed as a portion of a concerted effort by the ECWD to reduce its overall unaccounted for water loss. On site testing indicates that current meters are rapidly approaching the end of their useful life and are inaccurate in measuring low "trickle" flows. To date the ECWD has taken an active approach to minimizing unaccounted for water loss to include but not limited to upgrading pump stations, telemetry upgrades, valve replacements, installation of test meter assemblies throughout the system, utilization of leak detection services and purchasing a hydraulic model of the system.

Project Alternatives:

Alternate A:

Repair faulty meters. This option is not viable due to the fact that often times repairs exceed the cost of replacement and often times said meters have to be shipped off for repair forcing the ECWD to temporarily replace the meter while being repaired. Additionally, the warranty on repair parts is often limited and insufficient.

Alternate B:

Wait to replacement meters as water line replacement or upgrade projects warrant. This option is not viable in that it does not remedy the situation in a timely manner.

Legal Applicant:

Entity Type:	**Water District (KRS 74)**	PSC Group ID:	**21500**
Entity Name:	**Estill County Water District #1**		
Web URL:	**http://www.estillcountywater.com/**		
Office EMail:	**ecwd1@alltell.net**		
Office Phone:	**606-723-3795** Toll Free:	Fax:	
Mail Address Line 1:	**76 Cedar Grove Rd**	Phys Address Line 1:	
Mail Address Line 2:		Phys Address Line 2:	
Mail City, State Zip:	**Irvine, KY 40336**	Phys City, State Zip:	

Contact:	**Audrea Miller**	Financial Contact:	Auth Official: **Blain Click**
Contact Title:	**General Manager**	Financial Contact Title:	Auth Official Title: **Chair**
Contact EMail:	**a.miller@estillcountywater.com**	Financial Contact EMail:	Auth Official EMail:
Contact Phone:	**606-723-3795**	Financial Contact Phone:	Auth Official Phone: **606-723-3795**

Data Source: **Kentucky Infrastructure Authority** Date Last Modified: 03.15.2019

Drinking Water Project Profile

WX21065006 - Estill County Water District #1
ECWD - Meter Purchase and Replacement Project

Project Administrator (PA) Information

Name: **Leann Lacy**
Title: **Community Development Specialist**
Organization: **Bluegrass Area Development District**
Address Line 1: **699 Perimeter Dr**
Address Line 2:
City: **Lexington** State: **KY** Zip: **40517**
Phone: **859-269-8021** Fax: **859-269-7917**

Applicant Contact (AC) Information

Name: **Dwight Richardson**
Title: **Manager**
Organization: **Estill County Water District #1**
Address Line 1: **76 Cedar Grove Road**
Address Line 2:
City: **Irvine** State: **KY** Zip: **40336**
Phone: **606-723-3795** Fax: **606-726-9083**

Estimated Budget

Project Cost Categories:

Cost Category	Cost
Administrative Expenses:	$ 15,000
Legal Expenses:	$ 5,000
Land, Appraisals, Easements:	
Relocation Expenses & Repayments:	
Planning:	
Engineering Fees - Design:	$ 61,950
Engineering Fees - Construction:	$ 26,550
Engineering Fees - Inspection:	$ 56,000
Engineering Fees - Other:	$ 10,000
Construction:	$ 1,000,000
Equipment:	
Miscellaneous:	$ 25,000
Contingencies:	$ 119,950
Total Project Cost:	**$ 1,319,450**

Construction Cost Categories:

Cost Category	Cost
Treatment:	
Transmission & Distribution:	$ 1,000,000
Source:	
Storage:	
Purchase of Systems:	
Restructuring:	
Land Acquisition:	
Non-Categorized:	
Total ConstructionCost:	**$ 1,000,000**

Total Sustainable Infrastructure Costs:

Note: Total Sustainability Infrastructure Costs are included within construction and other costs reported in this section. This breakout is provided for SRF review purposes.

Project Funding Sources:

Total Project Cost: **$1,319,450**
Total Committed Funding: **$0**
Funding Gap: **$1,319,450 (Not Funded)**

☑ This project will be requesting SRF funding for fiscal year 2020.

Estimated Project Schedule:

Est. Environmental Review Submittal Date:	**09-04-2017**
Estimated Bid Date:	**09-10-2018**
Estimated Construction Start Date:	**10-29-2018**
Estimated Construction Completeion Date:	**07-29-2019**

Funding Source	Loan or Grant ID	Fiscal Year	Amount	Status	Applicable Date
KIA SRF Fund F Loan (DW)	F20-032	2020	$500,000	Ranked	4/4/2019
USDA RD Loan			$614,588	Anticipated	
USDA RD Grant			$204,862	Anticipated	
Total Committed					

Funding Source Notes:

Utility also plans to submit for 2019 SRF funds in the amount of $500,000

Drinking Water Project Profile

WX21065006 - Estill County Water District #1
ECWD - Meter Purchase and Replacement Project

The following systems are beneficiaries of this project:

✓ **KY0330123 Estill County Water District #1**

Note: Check mark indicates primary system for this project.

Project Ranking by AWMPC:

Regional Ranking(s):

Planning Unit Ranking:

Total Points:

- Plans and specs have been sent to DOW.
- Plans and specs have been reviewed by DOW.
- Plans and specs have been sent to PSC.
- Plans and specs have been reviewed by PSC.

Economic, Demographic and Geographic Impacts

Economic Impacts	
Jobs Created:	
Jobs Retained:	

***Demographic Impacts (GIS Census Overlay)**

Serveable Demographic	Project Area	Included Systems	Included Utilities
Population:		9,374	9,374
Households:		4,254	4,254
MHI:		$30,074	*$30,074
MHI MOE		$9,142	*$9,142
MOE as Pct:		30.0%	30.0%
**NSRL:		2	2

Population and household counts are based on 2010 census block values from the SF1 (100%) dataset.

MHI Source is from the American Community Survey 2013-2017 5Yr Estimates (Table B19013) *(for the primary system operated by the above listed beneficiary utilities).

MHI MOE = Med HH Income Margin of Error.

* NSRL (Non-Standard Rate Levels):
0 = Income above Kentucky MHI (KMHI).
1 = Income between 80% KMHI and KMHI.
2 = Income less than or equal to 80% KMHI.
- KMHI = $46,535
- 80% KHMI = $37,228

New Customers	
New Residential Customers:	
New Commercial Customers:	
New Institutional Customers:	
New Industrial Customers:	

New or Improved Service		
Service Demographic	Survey Based	Census Overlay*
No Unserved Households:		
No Underserved Households:	4,000	
No Total Households:	4,000	
* Cost Per Household:	$330	

* GIS Census block overlay figures are estimates of population and households potentially served by systems and projects based on a proximity analysis of relevant service lines to census block boundaries.

** Cost per household is based on surveyed household counts, not GIS overlay values.

Geographic Impacts For Project Area

Counties
Estill

Legislative Districts	
District Name	Legislator
House 091	Cluster Howard
Senate 21	Albert Robinson
Congressional 6	Andy Barr

Groundwater Sensitivity Zones

HUC 10 Watersheds

HUC Code	Watershed Name
0510020404	Station Camp Creek

Geographic Impacts For Included System(s)

Counties
Estill
Jackson
Lee
Madison
Powell

Legislative Districts	
District Name	Legislator
House 074	David Hale
House 089	Robert Goforth
House 091	Cluster Howard
Senate 21	Albert Robinson
Senate 25	Robert Stivers II
Congressional 5	Hal Rogers
Congressional 6	Andy Barr

DW Specific Impacts:

- ☐ This project relates to a public health emergency.
- ☐ This project will assist a non-compliant system to achieve compliance.
- ☑ This project will assist a compliant system to meet future requirements
- ☐ This project will provide assistance not compliance related.
- ☐ This project is necessary to achieve full or partial compliance with a court order, agreed order, or a judicial or administrative consent decree.
- ☐ Primary system has not received any SDWA Notices of Violation within the previous state fiscal year-July through June, i.e. July 2014 – June 2015).

Project Inventory (Mapped Features):

Mapped Point Features

DOW Permit ID	Count	FeatureType	Purpose	Status	Existing Capacity	Proposed Capacity	Units
KY0330123	1	TRADITIONAL METER	WATER EFF - TRADITIONAL METERS	NEW			EA

Administrative Components:

☑ Planning ☑ Design ☑ Construction ☐ Management

Regionalization Components:

Public Water Systems Eliminated:

☐ this project includes the elimination of public water system(s) through merger or acquisition.

Water Treatment Plants Eliminated:

☐ This project includes the elimination of water treatment plant(s) through interconnect(s).

Supplementation of Raw Water Supply:

☐ This project includes supplementing the existing raw water supply.

Supplementation of Potable Water Supply:

☐ This project includes supplementing the existing potable water supply.

Emergency Only Water Supply:

☐ This project provides emergency only water supply.

Water Source Protection:

☐ This project includes land acquisition for water source protection.

Water Treatment Components:

☐ This project includes water treatment components

Treatment Activities:

☐ This project includes a new water treatment plant.

☐ This project includes an expansion of an existing water treatment plant.

☐ This project includes rehabilitation of an existing water treatment plant.

☐ This project includes upgrades to an existing water treatment plant.

☐ This project includes emergency power generators for treatment activities.

☐ This project includes redundant treatment processes.

Acute Public Health Risk:

☐ This project includes infrastructure options to meet Cryptosporidium removal/inactivation requirements.

☐ This project includes infrastructure options to meet CT inactivation requirements.

Chronic Public Health Risk:

☐ This project includes treatment modifications to meet the Disinfectants/Disinfection Byproducts Rule at the water treatment plant.

☐ This project will provide treatment modifications for VOCs, IOCs, SOC, or Radionuclides.

Secondary Contaminants:

☐ This project includes treatment modifications to address Secondary Contaminants.

Security:

☐ This project includes security components for water treatment facilities.

Water Distribution and Storage:

☐ This project includes water distribution and/or storage components.

Water Line Extensions:

☐ This project includes water line extension(s).

Redundancy Components:

☐ This project includes emergency power generators for distribution and/or storage activities.

☐ This project includes redundant distribution and/or storage processes.

Finished Water Quality:

☐ This project includes infrastructure to address inadequate water turnover and disinfection byproducts (DBPs).

☐ This project includes infrastructure to address inability to maintain disinfection residual.

Water Line Replacement:

☐ This project replaces problem water lines (breaks, leaks, or restrictive flows due to age), water lines consisting of lead and/or asbestos-cement (AC), and/or inadequately sized water lines.

Water Storage and Pressure Components:

☐ This project includes the construction of new water tank(s).

☐ This project includes the replacement of existing water tank(s).

☐ This project includes the rehabilitation of existing water tank(s).

☐ This project includes the construction of new pump station(s).

☐ This project includes the rehabilitation of existing pump station(s).

Security:

☐ This project includes security components for water distribution infrastructure.

Sustainable Infrastructure - Green Infrastructure:

Green stormwater infrastructure includes a wide array of practices at multiple scales that manage wet weather and that maintains and restores natural hydrology by infiltrating, evapotranspiring and harvesting and using stormwater. On a regional scale, green infrastructure is the preservation and restoration of natural landscape features, such as forests, floodplains, and wetlands, coupled with policies such as infill and redevelopment that reduce overall imperviousness in a watershed. On the local scale, green infrastructure consists of site and neighborhood-specific practices, such as:

Component	Cost
☐ Bioretention	
☐ Trees	
☐ Green Roofs	
☐ Permeable Pavement	
☐ Cisterns	
Total Green Infrastructure Cost:	**$0**

There are no Green Infrastructure components specified for this project.

Sustainable Infrastructure - Water Efficiency:

The use of improved technologies and practices to deliver equal or better services with less water. Water efficiency encompasses conservation and reuse efforts, as well as water loss reduction and prevention, to protect water resources for the future. Examples include:

	Component	Cost
☐	Installing or retrofitting water efficient devices such as plumbing fixtures and appliances (toilets, showerheads, urinals).	
☐	Installing any type of water meter in previously unmetered areas (can include backflow prevention if in conjunction with meter replacement).	
☒	Replacing existing broken/malfunctioning water meters with AMR or smart meters, meters with leak detection, backflow prevention.	**$1,000,000**
☐	Retrofitting/adding AMR capabilities or leak equipment to existing meters.	
☒	Conducting water utility audits, leak detection studies, and water use efficiency baseline studies, which are reasonably expected to result in a capital project or in a reduction in demand to alleviate the need for additional capital investment.	**$10,000**
☐	Developing conservation plans/programs reasonable expected to result in a water conserving capital project or in a reduction in demand to alleviate the need for capital investment.	
☐	Recycling and water reuse projects that replace potable sources with non-potable sources (Gray water, condensate, and wastewater effluent reuse systems, extra treatment or distribution costs associated with water reuse).	
☐	Retrofit or replacement of existing landscape irrigation systems to more efficient landscape irrigation systems.	
☐	Water meter replacement with traditional water meters.*	
☐	Distribution pipe replacement or rehabilitation to reduce water loss and prevent water main breaks.*	
☐	Storage tank replacement/rehabilitation to reduce water loss.*	
☐	New water efficient landscape irrigation system, where there currently is not one.*	
	Total Water Efficiency Cost:	**$1,010,000**

** Indicates a business case may be required for this item.*

System wide replacement of all meters with a low flow read capability meter IPearl or equal. Mapping should include entire system.

Sustainable Infrastructure - Energy Efficiency:

Energy efficiency is the use of improved technologies and practices to reduce the energy consumption of water projects, use energy in a more efficient way, and/or produce/utilize renewable energy. Examples include:

	Component	Cost
☐	Renewable energy projects, which are part of a public health project, such as wind, solar, geothermal, and micro-hydroelectric that provides power to a utility.	
☐	Utility-owned or publicly-owned renewable energy projects.	
☐	Utility energy management planning, including energy assessments, energy audits, optimization studies, and sub-metering of individual processes to determine high energy use areas.	
☐	Energy efficient retrofits, upgrades, or new pumping systems and treatment processes (including variable frequency drives (VFDs).*	
☐	Pump refurbishment to optimize pump efficiency.*	
☐	Projects that result from an energy efficient related assessment.*	
☐	Projects that cost effectively eliminate pumps or pumping stations.*	
☐	Projects that achieve the remaining increments of energy efficiency in a system that is already very efficient.*	
☐	Upgrade of lighting to energy efficient sources.*	
☐	Automated and remote control systems (SCADA) that achieve substantial energy savings.*	
	Total Energy Efficiency Cost:	**$0**

** Indicates a business case may be required for this item.*

There are no Energy Efficiency components specified for this project.

Sustainable Infrastructure - Environmentally Innovative:

Environmentally innovative projects include those that demonstrate new and/or innovative approaches to delivering services or managing water resources in a more sustainable way. Examples include:

	Component	Cost
☐	Total integrated water resources management planning, or other planning framework where project life cycle costs are minimized, which enables communities to adopt more efficient and cost-effective infrastructure solutions.	
☐	Plans to improve water quantity and quality associated with water system technical, financial, and managerial capacity.	
☐	Source water protection planning (delineation, monitoring, modeling).	
☐	Planning activities to prepare for adaptation to the long-term effects of climate change and/or extreme weather.	
☐	Utility sustainability plan consistent with EPA's sustainability policy.	
☐	Greenhouse gas inventory or mitigation plan and submission of a GHG inventory to a registry as long as it is being done for an SRF eligible facility.	
☐	Construction of US Building Council LEED certified buildings, or renovation of an existing building.	
☐	Projects that significantly reduce or eliminate the use of chemicals in water treatment.*	
☐	Treatment technologies or approaches that significantly reduce the volume of residuals, minimize the generation of residuals, or lower the amount of chemicals in the residuals.*	
☐	Trenchless or low impact construction technology.*	
☐	Using recycled materials or re-using materials on-site.*	
☐	Educational activities and demonstration projects for water or energy efficiency (such as rain gardens).*	
☐	Projects that achieve the goals/objectives of utility asset management plans.*	
	Total Environmentally Innovative Cost:	**$0**

** Indicates a business case may be required for this item.*

There are no Environmentally Innovative components specified for this project.

Sustainable Infrastructure - Asset Management:

If a category is selected, the applicant must provide proof to substantiate claims. The documents must be submitted to Anshu Singh (Anshu.Singh@ky.gov) for CW projects

	Component
Last Rate Adjustment Date:	**08-20-2018** **Download Fee Schedule**
Rate Adjustment Age:	**5 months**

System's monthly water bill, based on 4,000 gallons, as a percentage of MHI: **1.69%**

☐	The system(s) has a Capital Improvement Plan or similar planning document.
☐	The system(s) involved in this project have specifically allocated funds for the rehabilitation and replacement of aging and deteriorating infrastructure.

Project Status: Approved Date Approved: 01-20-2017 Date Revised:

Drinking Water Project Profile

Legal Applicant:	**Estill County Water District #1**		
Project Title:	**ECWD/Beattyville Emergency Regional Interconnect**		
Project Number:	**WX21065007** View Map	Submitted By:	**BGADD**
Funding Status:	**Not Funded**	Primary County:	**Estill**
Project Status:	**Approved**	Planning Unit:	**Unit 1**
Project Schedule:	**0-2 Years**	Multi-County:	**No**
E-Clearinghouse SAI:		ECH Status:	
Applicant Entity Type:	**Water District (KRS 74)**	ADD WMC Contact:	**Karyn Leverenz**
Date Approved (AWMPC):	**01-20-2017**		

Project Description:

Develop and construct an emergency regional interconnect between the Estill County Water District No. 1 and the City of Beattyville along KY HWY 52 in the vicinity of the Estill County / Lee County Line. The project will provide a secondary source of potable water for the Estill County Water District No. 1 in the event of an emergency. The work will involve the installation of approximately 8,000 lf of 6-inch pvc and pe water line and appurtenances along with a master meter, meter vault and telemetry.

Need for Project:

Briefly describe how this project promotes public health or achieves and/or maintains compliance with the Clean Water Act or Safe Drinking Water Act:

The Estill County Water District No. 1 currently purchases all water for resale from IMU. The Estill County Water District No. 1 currently provides water services to approximately 4,000 customers. In the past, problems with the existing interconnect with IMU have left ECWD customers without water for extended periods of time and have place an unnecessary burden on the local community and created serious health and public safety risks. This project would provide a secondary source of treated water that could be utilized in emergency situations.

Project Alternatives:

Alternate A:

Develop and construct a secondary interconnect with other suppliers in the region.

Alternate B:

Develop redundant systems in the current interconnect with IMU.

Legal Applicant:

Entity Type:	**Water District (KRS 74)**	PSC Group ID:	**21500**
Entity Name:	**Estill County Water District #1**		
Web URL:	**http://www.estillcountywater.com/**		
Office EMail:	**ecwd1@alltell.net**		
Office Phone:	**606-723-3795** Toll Free:	Fax:	
Mail Address Line 1:	**76 Cedar Grove Rd**	Phys Address Line 1:	
Mail Address Line 2:		Phys Address Line 2:	
Mail City, State Zip:	**Irvine, KY 40336**	Phys City, State Zip:	

Contact:	**Audrea Miller**	Financial Contact:	Auth Official: **Blain Click**
Contact Title:	**General Manager**	Financial Contact Title:	Auth Official Title: **Chair**
Contact EMail:	**a.miller@estillcountywater.com**	Financial Contact EMail:	Auth Official EMail:
Contact Phone:	**606-723-3795**	Financial Contact Phone:	Auth Official Phone: **606-723-3795**

Data Source: **Kentucky Infrastructure Authority** Date Last Modified: 03.15.2019

Drinking Water Project Profile

WX21065007 - Estill County Water District #1
ECWD/Beattyville Emergency Regional Interconnect

Project Administrator (PA) Information

Name: **Leann Lacy**
Title: **Community Development Specialist**
Organization: **Bluegrass Area Development District**
Address Line 1: **699 Perimeter Dr**
Address Line 2:
City: **Lexington** State: **KY** Zip: **40517**
Phone: **859-269-8021** Fax: **859-269-7917**

Applicant Contact (AC) Information

Name: **Dwight Richardson**
Title: **Manager**
Organization: **Estill County Water District #1**
Address Line 1: **76 Cedar Grove Road**
Address Line 2:
City: **Irvine** State: **KY** Zip: **40336**
Phone: **606-723-3795** Fax: **606-726-9083**

Estimated Budget

Project Cost Categories:

Cost Category	Cost
Administrative Expenses:	$ 15,000
Legal Expenses:	$ 5,000
Land, Appraisals, Easements:	$ 5,000
Relocation Expenses & Repayments:	
Planning:	
Engineering Fees - Design:	$ 46,991
Engineering Fees - Construction:	$ 11,748
Engineering Fees - Inspection:	$ 40,972
Engineering Fees - Other:	$ 10,000
Construction:	$ 604,310
Equipment:	
Miscellaneous:	$ 5,000
Contingencies:	$ 74,400
Total Project Cost:	**$ 818,421**

Construction Cost Categories:

Cost Category	Cost
Treatment:	
Transmission & Distribution:	$ 604,310
Source:	
Storage:	
Purchase of Systems:	
Restructuring:	
Land Acquisition:	
Non-Categorized:	
Total ConstructionCost:	**$ 604,310**

Total Sustainable Infrastructure Costs:

Note: Total Sustainability Infrastructure Costs are included within construction and other costs reported in this section. This breakout is provided for SRF review purposes.

Project Funding Sources:

Total Project Cost: **$818,421**
Total Committed Funding: **$0**
Funding Gap: **$818,421 (Not Funded)**

☑ This project will be requesting SRF funding for fiscal year 2020.

Estimated Project Schedule:

Est. Environmental Review Submittal Date:	**06-05-2017**
Estimated Bid Date:	**09-14-2017**
Estimated Construction Start Date:	**10-30-2017**
Estimated Construction Completeion Date:	**02-15-2018**

Funding Source	Loan or Grant ID	Fiscal Year	Amount	Status	Applicable Date
KIA SRF Fund F Loan (DW)	F20-056	2020	$818,421	Ranked	4/4/2019
ARC			$318,421	Anticipated	
CDBG			$500,000	Anticipated	
Total Committed					

Funding Source Notes:

Drinking Water Project Profile

WX21065007 - Estill County Water District #1
ECWD/Beattyville Emergency Regional Interconnect

The following systems are beneficiaries of this project:

✓ **KY0650024 Beattyville Water Works**

KY0330123 Estill County Water District #1

Note: Check mark indicates primary system for this project.

Project Ranking by AWMPC:

Regional Ranking(s):

Planning Unit Ranking:

Total Points:

Plans and specs have been sent to DOW.

Plans and specs have been reviewed by DOW.

Plans and specs have been sent to PSC.

Plans and specs have been reviewed by PSC.

Economic, Demographic and Geographic Impacts

Economic Impacts	
Jobs Created:	
Jobs Retained:	

***Demographic Impacts (GIS Census Overlay)**

Servceable Demographic	Project Area	Included Systems	Included Utilities
Population:	3	7,290	7,290
Households:	2	3,132	3,132
MHI:	$23,349	$22,347	*$22,347
MHI MOE	$3,157	$4,659	*$4,659
MOE as Pct:	14%	21.0%	21.0%
**NSRL:		2	2

Population and household counts are based on 2010 census block values from the SF1 (100%) dataset.

MHI Source is from the American Community Survey 2013-2017 5Yr Estimates (Table B19013) *(for the primary system operated by the above listed beneficiary utilities).

MHI MOE = Med HH Income Margin of Error.

* NSRL (Non-Standard Rate Levels):
0 = Income above Kentucky MHI (KMHI).
1 = Income between 80% KMHI and KMHI.
2 = Income less than or equal to 80% KMHI.
- KMHI = $46,535
- 80% KHMI = $37,228

Geographic Impacts For Project Area

Counties
Lee

Legislative Districts

District Name	Legislator
House 091	Cluster Howard
Senate 25	Robert Stivers II
Congressional 5	Hal Rogers

Groundwater Sensitivity Zones

HUC 10 Watersheds

HUC Code	Watershed Name
0510020405	Millers Creek-Kentucky River

Geographic Impacts For Included System(s)

Counties
Breathitt
Estill
Jackson
Lee
Madison
Owsley
Powell
Wolfe

Legislative Districts

District Name	Legislator
House 074	David Hale
House 089	Robert Goforth
House 091	Cluster Howard
House 097	Bobby McCool
Senate 21	Albert Robinson
Senate 25	Robert Stivers II
Senate 30	Brandon Smith
Congressional 5	Hal Rogers
Congressional 6	Andy Barr

New Customers	
New Residential Customers:	
New Commercial Customers:	
New Institutional Customers:	
New Industrial Customers:	

New or Improved Service		
Service Demographic	Survey Based	Census Overlay*
To Unserved Households:		2
To Underserved Households:	4,000	
To Total Households:	4,000	2
* Cost Per Household:	$205	

* GIS Census block overlay figures are estimates of population and households potentially served by systems and projects based on a proximity analysis of relevant service lines to census block boundaries.

* Cost per household is based on surveyed household counts, not GIS overlay values.

DW Specific Impacts:

- ☐ This project relates to a public health emergency.
- ☐ This project will assist a non-compliant system to achieve compliance.
- ☑ This project will assist a compliant system to meet future requirements
- ☐ This project will provide assistance not compliance related.
- ☐ This project is necessary to achieve full or partial compliance with a court order, agreed order, or a judicial or administrative consent decree.
- ☐ Primary system has not received any SDWA Notices of Violation within the previous state fiscal year-July through June, i.e. July 2014 – June 2015).

Project Inventory (Mapped Features):

Mapped Point Features

DOW Permit ID	Count	FeatureType	Purpose	Status	Existing Capacity	Proposed Capacity	Units
KY0330123	1	INTERCONNECT METER	METER - FINISHED WATER INTERCONNECT	NEW			EA

Mapped Line Features

DOW Permit ID	Line Type	Purpose	Activity	Size (in.)	Material	Length (LF)
KY0330123	WATER LINE: FINISHED	DISTRIBUTION	EXTENSION	6.00	PE	3,532
KY0330123	WATER LINE: FINISHED	DISTRIBUTION	EXTENSION	6.00	PVC	3,067
					Total Length	6,599

Administrative Components:

☑ Planning ☑ Design ☑ Construction ☐ Management

Regionalization Components:

Public Water Systems Eliminated:

☐ this project includes the elimination of public water system(s) through merger or acquisition.

Water Treatment Plants Eliminated:

☐ This project includes the elimination of water treatment plant(s) through interconnect(s).

Supplementation of Raw Water Supply:

☐ This project includes supplementing the existing raw water supply.

Supplementation of Potable Water Supply:

☐ This project includes supplementing the existing potable water supply.

Emergency Only Water Supply:

☑ This project provides emergency only water supply.

DOW Permit ID	System Name
KY0330123	Estill County Water District #1

Water Source Protection:

☑ This project includes land acquisition for water source protection.

Water Treatment Components:

☐ This project includes water treatment components

Treatment Activities:

☐ This project includes a new water treatment plant.

☐ This project includes an expansion of an existing water treatment plant.

☐ This project includes rehabilitation of an existing water treatment plant.

☐ This project includes upgrades to an existing water treatment plant.

☐ This project includes emergency power generators for treatment activities.

☐ This project includes redundant treatment processes.

Acute Public Health Risk:

☐ This project includes infrastructure options to meet Cryptosporidium removal/inactivation requirements.

☐ This project includes infrastructure options to meet CT inactivation requirements.

Chronic Public Health Risk:

☐ This project includes treatment modifications to meet the Disinfectants/Disinfection Byproducts Rule at the water treatment plant.

☐ This project will provide treatment modifications for VOCs, IOCs, SOC, or Radionuclides.

Secondary Contaminants:

☐ This project includes treatment modifications to address Secondary Contaminants.

Security:

☐ This project includes security components for water treatment facilities.

Water Distribution and Storage:

☑ This project includes water distribution and/or storage components.

Water Line Extensions:

☑ This project includes water line extension(s).

Length of extensions: **6,599** LF

Number of new connections: **0**

Redundancy Components:

☐ This project includes emergency power generators for distribution and/or storage activities.

Number of units provided: **0**

☑ This project includes redundant distribution and/or storage processes.

The entire project is designed to provide a redundant source of potable water for the ECWD.

Finished Water Quality:

☐ This project includes infrastructure to address inadequate water turnover and disinfection byproducts (DBPs).

☐ This project includes infrastructure to address inability to maintain disinfection residual.

Water Line Replacement:

☐ This project replaces problem water lines (breaks, leaks, or restrictive flows due to age), water lines consisting of lead and/or asbestos-cement (AC), and/or inadequately sized water lines.

Water Storage and Pressure Components:

☐ This project includes the construction of new water tank(s).

☐ This project includes the replacement of existing water tank(s).

☐ This project includes the rehabilitation of existing water tank(s).

☐ This project includes the construction of new pump station(s).

☐ This project includes the rehabilitation of existing pump station(s).

Security:

☐ This project includes security components for water distribution infrastructure.

Sustainable Infrastructure - Green Infrastructure:

Green stormwater infrastructure includes a wide array of practices at multiple scales that manage wet weather and that maintains and restores natural hydrology by infiltrating, evapotranspiring and harvesting and using stormwater. On a regional scale, green infrastructure is the preservation and restoration of natural landscape features, such as forests, floodplains, and wetlands, coupled with policies such as infill and redevelopment that reduce overall imperviousness in a watershed. On the local scale, green infrastructure consists of site and neighborhood-specific practices, such as:

Component	Cost
☐ Bioretention	
☐ Trees	
☐ Green Roofs	
☐ Permeable Pavement	
☐ Cisterns	
Total Green Infrastructure Cost:	**$0**

There are no Green Infrastructure components specified for this project.

Sustainable Infrastructure - Water Efficiency:

The use of improved technologies and practices to deliver equal or better services with less water. Water efficiency encompasses conservation and reuse efforts, as well as water loss reduction and prevention, to protect water resources for the future. Examples include:

Component	Cost
☐ Installing or retrofitting water efficient devices such as plumbing fixtures and appliances (toilets, showerheads, urinals).	
☐ Installing any type of water meter in previously unmetered areas (can include backflow prevention if in conjunction with meter replacement).	
☐ Replacing existing broken/malfunctioning water meters with AMR or smart meters, meters with leak detection, backflow prevention.	
☐ Retrofitting/adding AMR capabilities or leak equipment to existing meters.	
☐ Conducting water utility audits, leak detection studies, and water use efficiency baseline studies, which are reasonably expected to result in a capital project or in a reduction in demand to alleviate the need for additional capital investment.	
☐ Developing conservation plans/programs reasonable expected to result in a water conserving capital project or in a reduction in demand to alleviate the need for capital investment.	
☐ Recycling and water reuse projects that replace potable sources with non-potable sources (Gray water, condensate, and wastewater effluent reuse systems, extra treatment or distribution costs associated with water reuse).	
☐ Retrofit or replacement of existing landscape irrigation systems to more efficient landscape irrigation systems.	
☐ Water meter replacement with traditional water meters.*	
☐ Distribution pipe replacement or rehabilitation to reduce water loss and prevent water main breaks.*	
☐ Storage tank replacement/rehabilitation to reduce water loss.*	
☐ New water efficient landscape irrigation system, where there currently is not one.*	
Total Water Efficiency Cost:	**$0**

** Indicates a business case may be required for this item.*

There are no Water Efficiency components specified for this project.

Sustainable Infrastructure - Energy Efficiency:

Energy efficiency is the use of improved technologies and practices to reduce the energy consumption of water projects, use energy in a more efficient way, and/or produce/utilize renewable energy. Examples include:

Component	Cost
☐ Renewable energy projects, which are part of a public health project, such as wind, solar, geothermal, and micro-hydroelectric that provides power to a utility.	
☐ Utility-owned or publicly-owned renewable energy projects.	
☐ Utility energy management planning, including energy assessments, energy audits, optimization studies, and sub-metering of individual processes to determine high energy use areas.	
☐ Energy efficient retrofits, upgrades, or new pumping systems and treatment processes (including variable frequency drives (VFDs).*	
☐ Pump refurbishment to optimize pump efficiency.*	
☐ Projects that result from an energy efficient related assessment.*	
☐ Projects that cost effectively eliminate pumps or pumping stations.*	
☐ Projects that achieve the remaining increments of energy efficiency in a system that is already very efficient.*	
☐ Upgrade of lighting to energy efficient sources.*	
☐ Automated and remote control systems (SCADA) that achieve substantial energy savings.*	
Total Energy Efficiency Cost:	**$0**

** Indicates a business case may be required for this item.*

There are no Energy Efficiency components specified for this project.

Sustainable Infrastructure - Environmentally Innovative:

Environmentally innovative projects include those that demonstrate new and/or innovative approaches to delivering services or managing water resources in a more sustainable way. Examples include:

	Component	Cost
☐	Total integrated water resources management planning, or other planning framework where project life cycle costs are minimized, which enables communities to adopt more efficient and cost-effective infrastructure solutions.	
☐	Plans to improve water quantity and quality associated with water system technical, financial, and managerial capacity.	
☐	Source water protection planning (delineation, monitoring, modeling).	
☐	Planning activities to prepare for adaptation to the long-term effects of climate change and/or extreme weather.	
☐	Utility sustainability plan consistent with EPA's sustainability policy.	
☐	Greenhouse gas inventory or mitigation plan and submission of a GHG inventory to a registry as long as it is being done for an SRF eligible facility.	
☐	Construction of US Building Council LEED certified buildings, or renovation of an existing building.	
☐	Projects that significantly reduce or eliminate the use of chemicals in water treatment.*	
☐	Treatment technologies or approaches that significantly reduce the volume of residuals, minimize the generation of residuals, or lower the amount of chemicals in the residuals.*	
☒	Trenchless or low impact construction technology.*	**$10,000**
☐	Using recycled materials or re-using materials on-site.*	
☐	Educational activities and demonstration projects for water or energy efficiency (such as rain gardens).*	
☐	Projects that achieve the goals/objectives of utility asset management plans.*	
	Total Environmentally Innovative Cost:	**$10,000**

** Indicates a business case may be required for this item.*

This project will involve some direction drill or traditional bore and encasement.

Sustainable Infrastructure - Asset Management:

If a category is selected, the applicant must provide proof to substantiate claims. The documents must be submitted to Anshu Singh (Anshu.Singh@ky.gov) for CW projects

Component

Last Rate Adjustment Date: **04-01-2019** **Download Fee Schedule**

Rate Adjustment Age: **0 months**

System's monthly water bill, based on 4,000 gallons, as a percentage of MHI: **1.79%**

☐ The system(s) has a Capital Improvement Plan or similar planning document.

☐ The system(s) involved in this project have specifically allocated funds for the rehabilitation and replacement of aging and deteriorating infrastructure.

Project Status: Approved Date Approved: 01-20-2017 Date Revised:

Drinking Water Project Profile

Legal Applicant:	**Estill County Water District #1**		
Project Title:	**ECWD - Master Meter Relocation and River Crossing**		
Project Number:	**WX21065008** View Map	Submitted By:	**BGADD**
Funding Status:	**Not Funded**	Primary County:	**Estill**
Project Status:	**Approved**	Planning Unit:	**Unit 1**
Project Schedule:	**0-2 Years**	Multi-County:	**No**
E-Clearinghouse SAI:		ECH Status:	
Applicant Entity Type:	**Water District (KRS 74)**	ADD WMC Contact:	**Karyn Leverenz**
Date Approved (AWMPC):	**01-20-2017**		

Project Description:

Relocate and replace existing master meter with IMU. Relocation work includes providing a new river crossing to point of tie-in. Project will include installation of a master meter and meter vault, approximately 1300 lf of 12-inch di water line and appurtenances, 800 lf of 12-inch pe water line installed via directional drill, flush hydrants, gate valves, test meter assemblies, air release assemblies, mag meter and telemetry.

Need for Project:

Briefly describe how this project promotes public health or achieves and/or maintains compliance with the Clean Water Act or Safe Drinking Water Act:

ECWD has detected a leak in the current portion of line located in the Kentucky River stemming from the existing master meter to the point of tie-in. The master meter is approximately 40 years old and is located within the right-of -way of CSX Railroad. The meter site is difficult to access and is desperate need of repair. Estimates are that the current leak is responsible for approximately 50% of the ECWD unaccounted or water loss.

Project Alternatives:

Alternate A:

Replace existing meter and valving in the existing valve vault and slip line the current river crossing. This option does not remedy the accessibility issue of the current site and will reduce the line size of the existing interconnect.

Alternate B:

Relocate the master meter and lines to a secondary site. This option is more expensive and will require that a portion of the proposed main cross CSX right-of-way.

Legal Applicant:

Entity Type:	**Water District (KRS 74)**	PSC Group ID:	**21500**
Entity Name:	**Estill County Water District #1**		
Web URL:	**http://www.estillcountywater.com/**		
Office EMail:	**ecwd1@alltel.net**		
Office Phone:	**606-723-3795** Toll Free:	Fax:	
Mail Address Line 1:	**76 Cedar Grove Rd**	Phys Address Line 1:	
Mail Address Line 2:		Phys Address Line 2:	
Mail City, State Zip:	**Irvine, KY 40336**	Phys City, State Zip:	

Contact:	**Audrea Miller**	Financial Contact:	Auth Official: **Blain Click**
Contact Title:	**General Manager**	Financial Contact Title:	Auth Official Title: **Chair**
Contact EMail:	**a.miller@estillcountywater.com**	Financial Contact EMail:	Auth Official EMail:
Contact Phone:	**606-723-3795**	Financial Contact Phone:	Auth Official Phone: **606-723-3795**

Data Source: **Kentucky Infrastructure Authority** Date Last Modified: 03.15.2019

Drinking Water Project Profile

WX21065008 - Estill County Water District #1
ECWD - Master Meter Relocation and River Crossing

Project Administrator (PA) Information

Name: **Leann Lacy**
Title: **Community Development Specialist**
Organization: **Bluegrass Area Development District**
Address Line 1: **699 Perimeter Dr**
Address Line 2:
City: **Lexington** State: **KY** Zip: **40517**
Phone: **859-269-8021** Fax: **859-269-7917**

Applicant Contact (AC) Information

Name: **Dwight Richardson**
Title: **Manager**
Organization: **Estill County Water District #1**
Address Line 1: **76 Cedar Grove Road**
Address Line 2:
City: **Irvine** State: **KY** Zip: **40336**
Phone: **606-723-3795** Fax: **606-726-9083**

Estimated Budget

Project Cost Categories:

Cost Category	Cost
Administrative Expenses:	$ 15,000
Legal Expenses:	$ 5,000
Land, Appraisals, Easements:	$ 5,000
Relocation Expenses & Repayments:	
Planning:	
Engineering Fees - Design:	$ 34,880
Engineering Fees - Construction:	$ 14,940
Engineering Fees - Inspection:	$ 36,100
Engineering Fees - Other:	$ 10,000
Construction:	$ 480,000
Equipment:	
Miscellaneous:	$ 25,000
Contingencies:	$ 62,592
Total Project Cost:	**$ 688,512**

Construction Cost Categories:

Cost Category	Cost
Treatment:	
Transmission & Distribution:	$ 480,000
Source:	
Storage:	
Purchase of Systems:	
Restructuring:	
Land Acquisition:	
Non-Categorized:	
Total ConstructionCost:	**$ 480,000**

Total Sustainable Infrastructure Costs:

Note: Total Sustainability Infrastructure Costs are included within construction and other costs reported in this section. This breakout is provided for SRF review purposes.

Project Funding Sources:

Total Project Cost: **$688,512**
Total Committed Funding: **$0**
Funding Gap: **$688,512 (Not Funded)**

☐ This project will be requesting SRF funding for fiscal year 2020.

Estimated Project Schedule:

Est. Environmental Review Submittal Date:	**04-03-2017**
Estimated Bid Date:	**08-28-2017**
Estimated Construction Start Date:	**10-09-2017**
Estimated Construction Completeion Date:	**11-30-2017**

Funding Source	Loan or Grant ID	Fiscal Year	Amount	Status	Applicable Date

Funding Source Notes:

The following systems are beneficiaries of this project:

✓ **KY0330205 Irvine Municipal Utilities**
KY0330123 Estill County Water District #1

Note: Check mark indicates primary system for this project.

Project Ranking by AWMPC:

○ Plans and specs have been sent to DOW.
○ Plans and specs have been reviewed by DOW.

Drinking Water Project Profile

WX21065008 - Estill County Water District #1
ECWD - Master Meter Relocation and River Crossing

Regional Ranking(s):
Planning Unit Ranking:
Total Points:

Plans and specs have been sent to PSC.
Plans and specs have been reviewed by PSC.

Economic, Demographic and Geographic Impacts

Economic Impacts	
Jobs Created:	
Jobs Retained:	

*Demographic Impacts (GIS Census Overlay)			
Servceable Demographic	Project Area	Included Systems	Included Utilities
Population:		4,642	4,642
Households:		2,283	2,283
MHI:		$27,697	*$27,697
MHI MOE		$4,709	*$4,709
MOE as Pct:		17.0%	17.0%
**NSRL:		2	2

Population and household counts are based on 2010 census block values from the SF1 (100%) dataset.

MHI Source is from the American Community Survey 2013-2017 5Yr Estimates (Table B19013) *(for the primary system operated by the above listed beneficiary utilities).

MHI MOE = Med HH Income Margin of Error.

* NSRL (Non-Standard Rate Levels):
0 = Income above Kentucky MHI (KMHI).
1 = Income between 80% KMHI and KMHI.
2 = Income less than or equal to 80% KMHI.
- KMHI = $46,535
- 80% KMHI = $37,228

New Customers	
New Residential Customers:	
New Commercial Customers:	
New Institutional Customers:	
New Industrial Customers:	

New or Improved Service		
Service Demographic	Survey Based	Census Overlay*
To Unserved Households:		
To Underserved Households:	4,000	
To Total Households:	4,000	
* Cost Per Household:	$172	

* GIS Census block overlay figures are estimates of population and households potentially served by systems and projects based on a proximity analysis of relevant service lines to census block boundaries.

** Cost per household is based on surveyed household counts, not GIS overlay values.

Geographic Impacts For Project Area

Counties
Estill

Legislative Districts	
District Name	Legislator
House 091	Cluster Howard
Senate 21	Albert Robinson
Congressional 6	Andy Barr

Groundwater Sensitivity Zones

HUC 10 Watersheds

HUC Code	Watershed Name
0510020404	Station Camp Creek
0510020405	Millers Creek-Kentucky River

Geographic Impacts For Included System(s)

Counties
Estill
Jackson
Lee
Madison
Powell

Legislative Districts	
District Name	Legislator
House 074	David Hale
House 089	Robert Goforth
House 091	Cluster Howard
Senate 21	Albert Robinson
Senate 25	Robert Stivers II
Congressional 5	Hal Rogers
Congressional 6	Andy Barr

DW Specific Impacts:

- ☐ This project relates to a public health emergency.
- ☐ This project will assist a non-compliant system to achieve compliance.
- ☑ This project will assist a compliant system to meet future requirements
- ☐ This project will provide assistance not compliance related.
- ☐ This project is necessary to achieve full or partial compliance with a court order, agreed order, or a judicial or administrative consent decree.
- ☐ Primary system has not received any SDWA Notices of Violation within the previous state fiscal year-July through June, i.e. July 2014 – June 2015).

Project Inventory (Mapped Features):

Mapped Point Features

DOW Permit ID	Count	FeatureType	Purpose	Status	Existing Capacity	Proposed Capacity	Units
KY0330205	1	INTERCONNECT METER	METER - FINISHED WATER INTERCONNECT	ELIMINATE			EA
KY0330205	1	INTERCONNECT METER	METER - FINISHED WATER INTERCONNECT	NEW			EA

Mapped Line Features

DOW Permit ID	Line Type	Purpose	Activity	Size (in.)	Material	Length (LF)
KY0330205	WATER LINE: FINISHED	DISTRIBUTION	EXTENSION	12.00	DUCTILE IRON	1,950
					Total Length	1,950

Administrative Components:

☑ Planning ☑ Design ☑ Construction ☐ Management

Regionalization Components:

Public Water Systems Eliminated:

☐ this project includes the elimination of public water system(s) through merger or acquisition.

Water Treatment Plants Eliminated:

☐ This project includes the elimination of water treatment plant(s) through interconnect(s).

Supplementation of Raw Water Supply:

☐ This project includes supplementing the existing raw water supply.

Supplementation of Potable Water Supply:

☐ This project includes supplementing the existing potable water supply.

Emergency Only Water Supply:

☐ This project provides emergency only water supply.

Water Source Protection:

☐ This project includes land acquisition for water source protection.

Water Treatment Components:

☐ This project includes water treatment components

Treatment Activities:

☐ This project includes a new water treatment plant.

☐ This project includes an expansion of an existing water treatment plant.

☐ This project includes rehabilitation of an existing water treatment plant.

☐ This project includes upgrades to an existing water treatment plant.

☐ This project includes emergency power generators for treatment activities.

☐ This project includes redundant treatment processes.

Acute Public Health Risk:

☐ This project includes infrastructure options to meet Cryptosporidium removal/inactivation requirements.

☐ This project includes infrastructure options to meet CT inactivation requirements.

Chronic Public Health Risk:

☐ This project includes treatment modifications to meet the Disinfectants/Disinfection Byproducts Rule at the water treatment plant.

☐ This project will provide treatment modifications for VOCs, IOCs, SOC, or Radionuclides.

Secondary Contaminants:

☐ This project includes treatment modifications to address Secondary Contaminants.

Security:

☐ This project includes security components for water treatment facilities.

Water Distribution and Storage:

☑ This project includes water distribution and/or storage components.

Water Line Extensions:

☑ This project includes water line extension(s).

Length of extensions: **1,950** LF

Number of new connections:

Redundancy Components:

☐ This project includes emergency power generators for distribution and/or storage activities.

Number of units provided: **0**

☐ This project includes redundant distribution and/or storage processes.

Finished Water Quality:

☐ This project includes infrastructure to address inadequate water turnover and disinfection byproducts (DBPs).

☐ This project includes infrastructure to address inability to maintain disinfection residual.

Water Line Replacement:

☐ This project replaces problem water lines (breaks, leaks, or restrictive flows due to age), water lines consisting of lead and/or asbestos-cement (AC), and/or inadequately sized water lines.

Water Storage and Pressure Components:

☐ This project includes the construction of new water tank(s).

☐ This project includes the replacement of existing water tank(s).

☐ This project includes the rehabilitation of existing water tank(s).

☐ This project includes the construction of new pump station(s).

☐ This project includes the rehabilitation of existing pump station(s).

Security:

☐ This project includes security components for water distribution infrastructure.

Sustainable Infrastructure - Green Infrastructure:

Green stormwater infrastructure includes a wide array of practices at multiple scales that manage wet weather and that maintains and restores natural hydrology by infiltrating, evapotranspiring and harvesting and using stormwater. On a regional scale, green infrastructure is the preservation and restoration of natural landscape features, such as forests, floodplains, and wetlands, coupled with policies such as infill and redevelopment that reduce overall imperviousness in a watershed. On the local scale, green infrastructure consists of site and neighborhood-specific practices, such as:

Component	Cost
☐ Bioretention	
☐ Trees	
☐ Green Roofs	
☐ Permeable Pavement	
☐ Cisterns	
Total Green Infrastructure Cost:	**$0**

There are no Green Infrastructure components specified for this project.

Sustainable Infrastructure - Water Efficiency:

The use of improved technologies and practices to deliver equal or better services with less water. Water efficiency encompasses conservation and reuse efforts, as well as water loss reduction and prevention, to protect water resources for the future. Examples include:

	Component	Cost
☐	Installing or retrofitting water efficient devices such as plumbing fixtures and appliances (toilets, showerheads, urinals).	
☐	Installing any type of water meter in previously unmetered areas (can include backflow prevention if in conjunction with meter replacement).	
☐	Replacing existing broken/malfunctioning water meters with AMR or smart meters, meters with leak detection, backflow prevention.	
☐	Retrofitting/adding AMR capabilities or leak equipment to existing meters.	
☒	Conducting water utility audits, leak detection studies, and water use efficiency baseline studies, which are reasonably expected to result in a capital project or in a reduction in demand to alleviate the need for additional capital investment.	**$10,000**
☐	Developing conservation plans/programs reasonable expected to result in a water conserving capital project or in a reduction in demand to alleviate the need for capital investment.	
☐	Recycling and water reuse projects that replace potable sources with non-potable sources (Gray water, condensate, and wastewater effluent reuse systems, extra treatment or distribution costs associated with water reuse).	
☐	Retrofit or replacement of existing landscape irrigation systems to more efficient landscape irrigation systems.	
☐	Water meter replacement with traditional water meters.*	
☐	Distribution pipe replacement or rehabilitation to reduce water loss and prevent water main breaks.*	
☐	Storage tank replacement/rehabilitation to reduce water loss.*	
☐	New water efficient landscape irrigation system, where there currently is not one.*	
	Total Water Efficiency Cost:	**$10,000**

** Indicates a business case may be required for this item.*

Existing river crossing and outdated master meter will be replaced and relocated reference mapping.

Sustainable Infrastructure - Energy Efficiency:

Energy efficiency is the use of improved technologies and practices to reduce the energy consumption of water projects, use energy in a more efficient way, and/or produce/utilize renewable energy. Examples include:

	Component	Cost
☐	Renewable energy projects, which are part of a public health project, such as wind, solar, geothermal, and micro-hydroelectric that provides power to a utility.	
☐	Utility-owned or publicly-owned renewable energy projects.	
☐	Utility energy management planning, including energy assessments, energy audits, optimization studies, and sub-metering of individual processes to determine high energy use areas.	
☐	Energy efficient retrofits, upgrades, or new pumping systems and treatment processes (including variable frequency drives (VFDs).*	
☐	Pump refurbishment to optimize pump efficiency.*	
☐	Projects that result from an energy efficient related assessment.*	
☐	Projects that cost effectively eliminate pumps or pumping stations.*	
☐	Projects that achieve the remaining increments of energy efficiency in a system that is already very efficient.*	
☐	Upgrade of lighting to energy efficient sources.*	
☐	Automated and remote control systems (SCADA) that achieve substantial energy savings.*	
	Total Energy Efficiency Cost:	**$0**

** Indicates a business case may be required for this item.*

There are no Energy Efficiency components specified for this project.

Sustainable Infrastructure - Environmentally Innovative:

Environmentally innovative projects include those that demonstrate new and/or innovative approaches to delivering services or managing water resources in a more sustainable way. Examples include:

	Component	Cost
☐	Total integrated water resources management planning, or other planning framework where project life cycle costs are minimized, which enables communities to adopt more efficient and cost-effective infrastructure solutions.	
☐	Plans to improve water quantity and quality associated with water system technical, financial, and managerial capacity.	
☐	Source water protection planning (delineation, monitoring, modeling).	
☐	Planning activities to prepare for adaptation to the long-term effects of climate change and/or extreme weather.	
☐	Utility sustainability plan consistent with EPA's sustainability policy.	
☐	Greenhouse gas inventory or mitigation plan and submission of a GHG inventory to a registry as long as it is being done for an SRF eligible facility.	
☐	Construction of US Building Council LEED certified buildings, or renovation of an existing building.	
☐	Projects that significantly reduce or eliminate the use of chemicals in water treatment.*	
☐	Treatment technologies or approaches that significantly reduce the volume of residuals, minimize the generation of residuals, or lower the amount of chemicals in the residuals.*	
☐	Trenchless or low impact construction technology.*	
☐	Using recycled materials or re-using materials on-site.*	
☐	Educational activities and demonstration projects for water or energy efficiency (such as rain gardens).*	
☐	Projects that achieve the goals/objectives of utility asset management plans.*	
	Total Environmentally Innovative Cost:	**$0**

** Indicates a business case may be required for this item.*

There are no Environmentally Innovative components specified for this project.

Sustainable Infrastructure - Asset Management:

If a category is selected, the applicant must provide proof to substantiate claims. The documents must be submitted to Anshu Singh (Anshu.Singh@ky.gov) for CW projects

	Component
Last Rate Adjustment Date:	**08-01-2018** **Download Fee Schedule**
Rate Adjustment Age:	**5 months**

System's monthly water bill, based on 4,000 gallons, as a percentage of MHI: **1.20%**

☐ The system(s) has a Capital Improvement Plan or similar planning document.

☐ The system(s) involved in this project have specifically allocated funds for the rehabilitation and replacement of aging and deteriorating infrastructure.

Project Status: Approved Date Approved: 01-20-2017 Date Revised:

Drinking Water Project Profile

Legal Applicant:	**Estill County Water District #1**		
Project Title:	**ECWD - Phase 11 - System Improvements / Unaccounted for Water Re**		
Project Number:	**WX21065009** View Map	Submitted By:	**BGADD**
Funding Status:	**Not Funded**	Primary County:	**Estill**
Project Status:	**Approved**	Planning Unit:	**Unit 1**
Project Schedule:	**0-2 Years**	Multi-County:	**No**
E-Clearinghouse SAI:		ECH Status:	
Applicant Entity Type:	**Water District (KRS 74)**	ADD WMC Contact:	**Karyn Leverenz**
Date Approved (AWMPC):	**10-19-2018**		

Project Description:

The project will involve implementing improvements designed to help reduce unnaccounted for water in the system. Work will include but not be limited to the installation of flow metering devices and backflow prevention devices, development of a hydraulic model, relocation/replacement of six (6) substandard existing river crossings, and replace approximately 20% of the existing residential meters.

Need for Project:

Briefly describe how this project promotes public health or achieves and/or maintains compliance with the Clean Water Act or Safe Drinking Water Act:

The project will involve implementing improvements designed to help reduce unaccounted for water in the system. Work will include but not be limited to the installation of flow metering devices and backflow prevention devices, development of a hydraulic model, relocation/replacement of six (6) substandard existing river crossings, and replace approximately 20% of the existing residential meters.

Project Alternatives:

Alternate A:

Replacement of a small portion of the system thought to be a source of loss. This option has been considered, however; the District feels it needs to put in place flow monitoring devices so that the system can be evaluated as a whole and the specific problematic areas identified for repair or replacement.

Alternate B:

Establish additional sources of supply to include other interconnects and/or a treatment facility. Given the problems associated with the existing system, the District feels it is in their best interest and the best interest of the residents of Estill County, to repair and/or replace what is already in use. In order to identify the problematic areas and focus efforts and resources, the District feels that monitoring devices and a comprehensive hydraulic model are needed.

Legal Applicant:

Entity Type:	**Water District (KRS 74)**	PSC Group ID:	**21500**
Entity Name:	**Estill County Water District #1**		
Web URL:	**http://www.estillcountywater.com/**		
Office EMail:	**ecwd1@alltell.net**		
Office Phone:	**606-723-3795** Toll Free:	Fax:	
Mail Address Line 1:	**76 Cedar Grove Rd**	Phys Address Line 1:	
Mail Address Line 2:		Phys Address Line 2:	
Mail City, State Zip:	**Irvine, KY 40336**	Phys City, State Zip:	

Contact:	**Audrea Miller**	Financial Contact:		Auth Official:	**Blain Click**
Contact Title:	**General Manager**	Financial Contact Title:		Auth Official Title:	**Chair**
Contact EMail:	**a.miller@estillcountywater.com**	Financial Contact EMail:		Auth Official EMail:	
Contact Phone:	**606-723-3795**	Financial Contact Phone:		Auth Official Phone:	**606-723-3795**

Data Source: **Kentucky Infrastructure Authority** Date Last Modified: 03.15.2019

Drinking Water Project Profile

WX21065009 - Estill County Water District #1
ECWD - Phase 11 - System Improvements / Unaccounted for Water Re

Project Administrator (PA) Information

Name: **Leann Lacy**
Title: **Community Development Specialist**
Organization: **Bluegrass Area Development District**
Address Line 1: **699 Perimeter Dr**
Address Line 2:
City: **Lexington** State: **KY** Zip: **40517**
Phone: **859-269-8021** Fax: **859-269-7917**

Applicant Contact (AC) Information

Name: **Audrea Miller**
Title: **Office Manager**
Organization: **Estill County Water District #1**
Address Line 1: **76 Cedar Grove Rd**
Address Line 2:
City: **Irvine** State: **KY** Zip: **40336**
Phone: **606-723-3795** Fax: **606-726-9063**

Project Engineer (PE) Information:

☒ This project requires a licensed Professional Engineer.
☒ A Professional Engineer has been procured for this project.

Project Engineer Information:

License No: **PE 24245**
PE Name: **Robert Alan Bowman**
Phone: **606-365-2534** Fax: **859-278-2911**
E-Mail: **abowman@hkbell.com**
Firm Name: **Bell Engineering**
Addr Line 1: **Bell Engineering**
Addr Line 2: **2480 Fortune Drive**
Addr Line 3: **Ste 350**
City: **Stanford** State: **KY** Zip: **40484**
Status: **Current** Disciplinary Actions: **NO**
Issued: **06-09-2005** Expires: **06-30-2019**

Engineering Firm Information:

Permit No: **152**
Firm Name: **Bell Engineering**
Phone: **859-278-5412** Fax: **859-278-2911**
Web URL: **http://www.hkbell.com/**
EMail: **jroberts@hkbell.com**
Addr Line 1: **2480 Fortune Drive, Ste. 350**
Addr Line 2:
City: **Lexington** State: **KY** Zip: **40509**
Status: **Current** Disciplinary Actions: **NO**
Issued: **03-29-1993** Expires: **12-31-2019**

Estimated Budget

Project Cost Categories:

Cost Category	Cost
Administrative Expenses:	$ 50,000
Legal Expenses:	$ 20,000
Land, Appraisals, Easements:	$ 10,000
Relocation Expenses & Repayments:	
Planning:	
Engineering Fees - Design:	$ 45,000
Engineering Fees - Construction:	$ 15,000
Engineering Fees - Inspection:	$ 50,000
Engineering Fees - Other:	$ 10,000
Construction:	$ 800,000
Equipment:	
Miscellaneous:	
Contingencies:	$ 80,000
Total Project Cost:	**$ 1,080,000**

Construction Cost Categories:

Cost Category	Cost
Treatment:	
Transmission & Distribution:	$ 775,000
Source:	
Storage:	
Purchase of Systems:	
Restructuring:	
Land Acquisition:	
Non-Categorized:	$ 25,000
Total ConstructionCost:	**$ 800,000**

Total Sustainable Infrastructure Costs:

Note: Total Sustainability Infrastructure Costs are included within construction and other costs reported in this section. This breakout is provided for SRF review purposes.

Drinking Water Project Profile

WX21065009 - Estill County Water District #1
ECWD - Phase 11 - System Improvements / Unaccounted for Water Re

Project Funding Sources:

Total Project Cost: **$1,080,000**
Total Committed Funding: **$0**
Funding Gap: **$1,080,000 (Not Funded)**

☑ This project will be requesting SRF funding for fiscal year 2020.

Estimated Project Schedule:

Est. Environmental Review Submittal Date:	**11-26-2018**
Estimated Bid Date:	**04-23-2019**
Estimated Construction Start Date:	**05-27-2019**
Estimated Construction Completeion Date:	**07-29-2019**

Funding Source	Loan or Grant ID	Fiscal Year	Amount	Status	Applicable Date
KIA SRF Fund F Loan (DW)	F20-014	2020	$1,080,000	Ranked	4/4/2019
USDA RD Loan			$817,500	Anticipated	
USDA RD Grant			$262,500	Anticipated	
Total Committed					

Funding Source Notes:

The following systems are beneficiaries of this project:

✓ **KY0330123 Estill County Water District #1**

Note: Check mark indicates primary system for this project.

Project Ranking by AWMPC:
Regional Ranking(s):
Planning Unit Ranking:
Total Points:

○ Plans and specs have been sent to DOW.
○ Plans and specs have been reviewed by DOW.
○ Plans and specs have been sent to PSC.
○ Plans and specs have been reviewed by PSC.

Economic, Demographic and Geographic Impacts

Economic Impacts	
Jobs Created:	
Jobs Retained:	

***Demographic Impacts (GIS Census Overlay)**

Serveable Demographic	Project Area	Included Systems	Included Utilities
Population:		9,374	9,374
Households:		4,254	4,254
MHI:		$30,074	*$30,074
MHI MOE		$9,142	*$9,142
MOE as Pct:		30.0%	30.0%
**NSRL:		2	2

Population and household counts are based on 2010 census block values from the SF1 (100%) dataset.

MHI Source is from the American Community Survey 2013-2017 5Yr Estimates (Table B19013) *(for the primary system operated by the above listed beneficiary utilities).

MHI MOE = Med HH Income Margin of Error.

* NSRL (Non-Standard Rate Levels):
0 = Income above Kentucky MHI (KMHI).
1 = Income between 80% KMHI and KMHI.
2 = Income less than or equal to 80% KMHI.
- KMHI = $46,535
- 80% KHMI = $37,228

Geographic Impacts For Project Area

Counties
Estill

Legislative Districts	
District Name	**Legislator**
House 091	Cluster Howard
Senate 21	Albert Robinson
Congressional 6	Andy Barr

Groundwater Sensitivity Zones

HUC 10 Watersheds

HUC Code	Watershed Name
0510020403	Lower Red River
0510020404	Station Camp Creek
0510020405	Millers Creek-Kentucky River

Geographic Impacts For Included System(s)

Counties
Estill
Jackson
Lee
Madison
Powell

Legislative Districts

District Name	Legislator
House 074	David Hale
House 089	Robert Goforth
House 091	Cluster Howard
Senate 21	Albert Robinson
Senate 25	Robert Stivers II
Congressional 5	Hal Rogers
Congressional 6	Andy Barr

New Customers

New Residential Customers:	
New Commercial Customers:	
New Institutional Customers:	
New Industrial Customers:	

New or Improved Service		
Service Demographic	**Survey Based**	**Census Overlay***
No Unserved Households:		
No Underserved Households:	500	
No Total Households:	500	
* Cost Per Household:	$2,160	

* GIS Census block overlay figures are estimates of population and households potentially served by systems and projects based on a proximity analysis of relevant service lines to census block boundaries.

* Cost per household is based on surveyed household counts, not GIS overlay values.

DW Specific Impacts:

- ☐ This project relates to a public health emergency.
- ☐ This project will assist a non-compliant system to achieve compliance.
- ☑ This project will assist a compliant system to meet future requirements
- ☑ This project will provide assistance not compliance related.
- ☐ This project is necessary to achieve full or partial compliance with a court order, agreed order, or a judicial or administrative consent decree.
- ☑ Primary system has not received any SDWA Notices of Violation within the previous state fiscal year-July through June, i.e. July 2014 – June 2015).

Project Inventory (Mapped Features):

Mapped Point Features

DOW Permit ID	Count	FeatureType	Purpose	Status	Existing Capacity	Proposed Capacity	Units
KY0330123	1	RADIO METER	WATER EFF - UNMETERED AREA	REHAB			EA

Mapped Line Features

DOW Permit ID	Line Type	Purpose	Activity	Size (in.)	Material	Length (LF)
KY0330123	WATER LINE: FINISHED	DISTRIBUTION	REHAB - REPLACE PROBLEM LINES	3.00	PVC	455
KY0330123	WATER LINE: FINISHED	DISTRIBUTION	REHAB - REPLACE PROBLEM LINES	4.00	PVC	356
KY0330123	WATER LINE: FINISHED	DISTRIBUTION	REHAB - REPLACE PROBLEM LINES	6.00	PVC	110
					Total Length	921

Administrative Components:

☑ Planning ☑ Design ☑ Construction ☑ Management

Regionalization Components:

Public Water Systems Eliminated:

- ☐ this project includes the elimination of public water system(s) through merger or acquisition.

Water Treatment Plants Eliminated:

- ☐ This project includes the elimination of water treatment plant(s) through interconnect(s).

Supplementation of Raw Water Supply:

- ☐ This project includes supplementing the existing raw water supply.

Supplementation of Potable Water Supply:

- ☐ This project includes supplementing the existing potable water supply.

Emergency Only Water Supply:

- ☐ This project provides emergency only water supply.

Water Source Protection:

☐ This project includes land acquisition for water source protection.

Water Treatment Components:

☐ This project includes water treatment components

Treatment Activities:

☐ This project includes a new water treatment plant.

☐ This project includes an expansion of an existing water treatment plant.

☐ This project includes rehabilitation of an existing water treatment plant.

☐ This project includes upgrades to an existing water treatment plant.

☐ This project includes emergency power generators for treatment activities.

☐ This project includes redundant treatment processes.

Acute Public Health Risk:

☐ This project includes infrastructure options to meet Cryptosporidium removal/inactivation requirements.

☐ This project includes infrastructure options to meet CT inactivation requirements.

Chronic Public Health Risk:

☐ This project includes treatment modifications to meet the Disinfectants/Disinfection Byproducts Rule at the water treatment plant.

☐ This project will provide treatment modifications for VOCs, IOCs, SOC, or Radionuclides.

Secondary Contaminants:

☐ This project includes treatment modifications to address Secondary Contaminants.

Security:

☐ This project includes security components for water treatment facilities.

Water Distribution and Storage:

☑ This project includes water distribution and/or storage components.

Water Line Extensions:

☐ This project includes water line extension(s).

Redundancy Components:

☐ This project includes emergency power generators for distribution and/or storage activities.

Number of units provided: **0**

☐ This project includes redundant distribution and/or storage processes.

Sustainable Infrastructure - Energy Efficiency:

Energy efficiency is the use of improved technologies and practices to reduce the energy consumption of water projects, use energy in a more efficient way, and/or produce/utilize renewable energy. Examples include:

	Component	Cost
☐	Renewable energy projects, which are part of a public health project, such as wind, solar, geothermal, and micro-hydroelectric that provides power to a utility.	
☐	Utility-owned or publicly-owned renewable energy projects.	
☐	Utility energy management planning, including energy assessments, energy audits, optimization studies, and sub-metering of individual processes to determine high energy use areas.	
☐	Energy efficient retrofits, upgrades, or new pumping systems and treatment processes (including variable frequency drives (VFDs).*	
☐	Pump refurbishment to optimize pump efficiency.*	
☐	Projects that result from an energy efficient related assessment.*	
☐	Projects that cost effectively eliminate pumps or pumping stations.*	
☐	Projects that achieve the remaining increments of energy efficiency in a system that is already very efficient.*	
☐	Upgrade of lighting to energy efficient sources.*	
☐	Automated and remote control systems (SCADA) that achieve substantial energy savings.*	
	Total Energy Efficiency Cost:	**$0**

** Indicates a business case may be required for this item.*

There are no Energy Efficiency components specified for this project.

Sustainable Infrastructure - Environmentally Innovative:

Environmentally innovative projects include those that demonstrate new and/or innovative approaches to delivering services or managing water resources in a more sustainable way. Examples include:

	Component	Cost
☐	Total integrated water resources management planning, or other planning framework where project life cycle costs are minimized, which enables communities to adopt more efficient and cost-effective infrastructure solutions.	
☐	Plans to improve water quantity and quality associated with water system technical, financial, and managerial capacity.	
☐	Source water protection planning (delineation, monitoring, modeling).	
☐	Planning activities to prepare for adaptation to the long-term effects of climate change and/or extreme weather.	
☐	Utility sustainability plan consistent with EPA's sustainability policy.	
☐	Greenhouse gas inventory or mitigation plan and submission of a GHG inventory to a registry as long as it is being done for an SRF eligible facility.	
☐	Construction of US Building Council LEED certified buildings, or renovation of an existing building.	
☐	Projects that significantly reduce or eliminate the use of chemicals in water treatment.*	
☐	Treatment technologies or approaches that significantly reduce the volume of residuals, minimize the generation of residuals, or lower the amount of chemicals in the residuals.*	
☒	Trenchless or low impact construction technology.*	**$10,000**
☐	Using recycled materials or re-using materials on-site.*	
☐	Educational activities and demonstration projects for water or energy efficiency (such as rain gardens).*	
☐	Projects that achieve the goals/objectives of utility asset management plans.*	
	Total Environmentally Innovative Cost:	**$10,000**

** Indicates a business case may be required for this item.*

This project will involve some direction drill or traditional bore and encasement.

Finished Water Quality:

☐ This project includes infrastructure to address inadequate water turnover and disinfection byproducts (DBPs).

☐ This project includes infrastructure to address inability to maintain disinfection residual.

Water Line Replacement:

☑ This project replaces problem water lines (breaks, leaks, or restrictive flows due to age), water lines consisting of lead and/or asbestos-cement (AC), and/or inadequately sized water lines.

Total length of line replacement: **921**

Water Storage and Pressure Components:

☐ This project includes the construction of new water tank(s).

☐ This project includes the replacement of existing water tank(s).

☐ This project includes the rehabilitation of existing water tank(s).

Number of rehabilitated tanks: **0**

☐ This project includes the construction of new pump station(s).

Number of new pump stations: **0**

☐ This project includes the rehabilitation of existing pump station(s).

Number of rehabilitated pump stations: **0**

Security:

☐ This project includes security components for water distribution infrastructure.

Sustainable Infrastructure - Green Infrastructure:

Green stormwater infrastructure includes a wide array of practices at multiple scales that manage wet weather and that maintains and restores natural hydrology by infiltrating, evapotranspiring and harvesting and using stormwater. On a regional scale, green infrastructure is the preservation and restoration of natural landscape features, such as forests, floodplains, and wetlands, coupled with policies such as infill and redevelopment that reduce overall imperviousness in a watershed. On the local scale, green infrastructure consists of site and neighborhood-specific practices, such as:

Component	Cost
☐ Bioretention	
☐ Trees	
☐ Green Roofs	
☐ Permeable Pavement	
☐ Cisterns	
Total Green Infrastructure Cost:	**$0**

There are no Green Infrastructure components specified for this project.

Sustainable Infrastructure - Water Efficiency:

The use of improved technologies and practices to deliver equal or better services with less water. Water efficiency encompasses conservation and reuse efforts, as well as water loss reduction and prevention, to protect water resources for the future. Examples include:

	Component	Cost
☐	Installing or retrofitting water efficient devices such as plumbing fixtures and appliances (toilets, showerheads, urinals).	
☐	Installing any type of water meter in previously unmetered areas (can include backflow prevention if in conjunction with meter replacement).	
☒	Replacing existing broken/malfunctioning water meters with AMR or smart meters, meters with leak detection, backflow prevention.	**$270,000**
☐	Retrofitting/adding AMR capabilities or leak equipment to existing meters.	
☒	Conducting water utility audits, leak detection studies, and water use efficiency baseline studies, which are reasonably expected to result in a capital project or in a reduction in demand to alleviate the need for additional capital investment.	**$25,000**
☐	Developing conservation plans/programs reasonable expected to result in a water conserving capital project or in a reduction in demand to alleviate the need for capital investment.	
☐	Recycling and water reuse projects that replace potable sources with non-potable sources (Gray water, condensate, and wastewater effluent reuse systems, extra treatment or distribution costs associated with water reuse).	
☐	Retrofit or replacement of existing landscape irrigation systems to more efficient landscape irrigation systems.	
☐	Water meter replacement with traditional water meters.*	
☐	Distribution pipe replacement or rehabilitation to reduce water loss and prevent water main breaks.*	
☐	Storage tank replacement/rehabilitation to reduce water loss.*	
☐	New water efficient landscape irrigation system, where there currently is not one.*	
	Total Water Efficiency Cost:	**$295,000**

** Indicates a business case may be required for this item.*

Water Meter Replacement - Replace approximately 20% of residential meters (500 each) to a meter that will record low flows.

Distribution Pipe Replacement - Relocate six (6) sub standard river crossing to mitigate potential future line failures. Install flow monitoring devices at all tank sites and throughout the system to help quantify system flows and identify areas that are problematic.

Hydraulic Model - Hire professional services to develop and manage a comprehensive hydraulic model.

Sustainable Infrastructure - Asset Management:

If a category is selected, the applicant must provide proof to substantiate claims. The documents must be submitted to Anshu Singh (Anshu.Singh@ky.gov) for CW projects

Component

Last Rate Adjustment Date: **08-20-2018** **Download Fee Schedule**

Rate Adjustment Age: **5 months**

System's monthly water bill, based on 4,000 gallons, as a percentage of MHI: **1.69%**

☐ The system(s) has a Capital Improvement Plan or similar planning document.

☐ The system(s) involved in this project have specifically allocated funds for the rehabilitation and replacement of aging and deteriorating infrastructure.

Project Status: Approved Date Approved: 10-19-2018 Date Revised:

ATTACHMENT H
DMA/ZONE METERING MAP

ATTACHMENT I
PROPOSED SYSTEM IMPROVEMENTS MAP

ATTACHMENT J
REPORTED ECWD USAGE DATA

Monthly Water Loss Report

Water Company: Estill County Water District

For the Month of: ANNUAL **Year:** 2018

Water Purchased @ Irvine Bridge	201,156,000	gallons
Water Purchased @ Dry Branch	56,240,000	gallons
Water Purchased @ Sweet Lick	332,000	gallons
Water Purchased @ Jackson Co.	388,700	gallons
A: Total Water Purchased =	**258,116,700**	**gallons**
Water Sold @ Irvine Bridge	121,305,180	gallons
Water Sold @ Dry Branch	32,928,780	gallons
Water Sold @ Sweet Lick	406,540	gallons
Water Sold @ Jackson Co.	345,210	gallons
Total Sold =	**154,985,710**	**gallons**
Difference @ Irvine Bridge	**79,850,820**	gallons
Difference @ Dry Branch	**23,311,220**	gallons
Difference @ Sweet Lick	**-74,540**	gallons
Difference @ Jackson Co.	**43,490**	gallons
B: Difference: (Produced+Purchased) - Sold =	**103,130,990**	**gallons**
% Difference @ Irvine Bridge	**40**	%
%Difference @ Dry Branch	**41**	%
%Difference @ Sweet Lick	**-22**	%
%Difference @ Jackson Co.	**11**	%
% Difference =	40	% total water
Gallons of Water Accounted For:		
Breaks (Estimated Total)	20,525,200	gallons
Hydrant Flushing	388,653	gallons
Storage Tank Overflow	75,000	gallons
Fire Department Use	464,947	gallons
Other	0	gallons
C: Total Gallons Accounted For =	**21,453,800**	**gallons**
Loss: Unaccounted-for Water: (B-C) =	**81,677,190**	**gallons**
% Loss: Unaccounted-for Water: (B-C)/A %	32	% unaccounted - for loss
	365	days in year
Gallons / Day Loss =	**223,773**	**gallons/day**
Gallons / Minute Loss =	**155**	**gallons/min.**
Total Gallons Lost Divided by 1,000	103,131	

Purchase Rate 3.13

$322,800.00 total dollar amount lost

Monthly Water Loss Report

Water Company: Estill County Water District

For the Month of: JANUARY **Year:** 2018

Water Purchased @ Irvine Bridge	18,380,000	gallons
Water Purchased @ Dry Branch	5,300,000	gallons
Water Purchased @ Sweet Lick	27,000	gallons
Water Purchased @ Jackson Co.	64,700	gallons
A: Total Water Purchased =	**23,771,700**	**gallons**
Water Sold @ Irvine Bridge	10,536,130	gallons
Water Sold @ Dry Branch	2,891,800	gallons
Water Sold @ Sweet Lick	33,750	gallons
Water Sold @ Jackson Co.	32,490	gallons
Total Sold =	**13,494,170**	**gallons**
Difference @ Irvine Bridge	**7,843,870**	gallons
Difference @ Dry Branch	**2,408,200**	gallons
Difference @ Sweet Lick	**-6,750**	gallons
Difference @ Jackson Co.	**32,210**	gallons
B: Difference: (Produced+Purchased) - Sold =	**10,277,530**	**gallons**
% Difference @ Irvine Bridge	**43**	%
%Difference @ Dry Branch	**45**	%
%Difference @ Sweet Lick	**-25**	%
%Difference @ Jackson Co.	**50**	%
% Difference =	43	% total water
Gallons of Water Accounted For:		
Breaks (Estimated Total)	949,643	gallons
Hydrant Flushing	41,002	gallons
Storage Tank Overflow		gallons
Fire Department Use	40,483	gallons
Other		gallons
C: Total Gallons Accounted For =	**1,031,128**	**gallons**
Loss: Unaccounted-for Water: (B-C) =	**9,246,402**	**gallons**
% Loss: Unaccounted-for Water: (B-C)/A %	39	% unaccounted - for loss
	31	days in month
Gallons / Day Loss =	**298,271**	**gallons/day**
Gallons / Minute Loss =	**207**	**gallons/min.**
Total Gallons Lost Divided by **1,000**	**10,278**	

Purchase Rate 3.13

$32,168.67 total dollar amount lost

Monthly Water Loss Report

Water Company: Estill County Water District

For the Month of: FEBRUARY Year: 2018

Water Purchased @ Irvine Bridge	17,830,000	gallons
Water Purchased @ Dry Branch	5,100,000	gallons
Water Purchased @ Sweet Lick	23,000	gallons
Water Purchased @ Jackson Co.	25,900	gallons
A: Total Water Purchased =	**22,978,900**	**gallons**
Water Sold @ Irvine Bridge	10,911,340	gallons
Water Sold @ Dry Branch	2,766,430	gallons
Water Sold @ Sweet Lick	30,990	gallons
Water Sold @ Jackson Co.	31,750	gallons
Total Sold =	13,740,510	gallons
Difference @ Irvine Bridge	6,918,660	gallons
Difference @ Dry Branch	2,333,570	gallons
Difference @ Sweet Lick	-7,990	gallons
Difference @ Jackson Co.	-5,850	gallons
B: Difference: (Produced+Purchased) - Sold =	**9,238,390**	**gallons**
% Difference @ Irvine Bridge	39	%
%Difference @ Dry Branch	46	%
%Difference @ Sweet Lick	-35	%
%Difference @ Jackson Co.	-23	%
% Difference =	40	% total water
Gallons of Water Accounted For:		
Breaks (Estimated Total)	1,773,555	gallons
Hydrant Flushing	28,612	gallons
Storage Tank Overflow		gallons
Fire Department Use	41,222	gallons
Other		gallons
C: Total Gallons Accounted For =	**1,843,389**	**gallons**
Loss: Unaccounted-for Water: (B-C) =	7,395,001	gallons
% Loss: Unaccounted-for Water: (B-C)/A %	32	% unaccounted - for loss
	28	days in month
Gallons / Day Loss =	**264,107**	**gallons/day**
Gallons / Minute Loss =	**183**	**gallons/min.**
Total Gallons Lost Divided by 1,000	9,238	

Purchase Rate 3.13

$28,916.16 total dollar amount lost

Monthly Water Loss Report

Water Company: Estill County Water District

For the Month of: MARCH **Year:** 2018

Water Purchased @ Irvine Bridge	13,910,000	gallons
Water Purchased @ Dry Branch	4,040,000	gallons
Water Purchased @ Sweet Lick	19,000	gallons
Water Purchased @ Jackson Co.	25,900	gallons
A: Total Water Purchased =	**17,994,900**	**gallons**
Water Sold @ Irvine Bridge	8,826,850	gallons
Water Sold @ Dry Branch	2,334,830	gallons
Water Sold @ Sweet Lick	29,610	gallons
Water Sold @ Jackson Co.	23,110	gallons
Total Sold =	**11,214,400**	**gallons**
Difference @ Irvine Bridge	**5,083,150**	gallons
Difference @ Dry Branch	**1,705,170**	gallons
Difference @ Sweet Lick	**-10,610**	gallons
Difference @ Jackson Co.	**2,790**	gallons
B: Difference: (Produced+Purchased) - Sold =	**6,780,500**	**gallons**
% Difference @ Irvine Bridge	**37**	%
%Difference @ Dry Branch	**42**	%
%Difference @ Sweet Lick	**-56**	%
%Difference @ Jackson Co.	**11**	%
% Difference =	38	% total water
Gallons of Water Accounted For:		
Breaks (Estimated Total)	729,820	gallons
Hydrant Flushing		gallons
Storage Tank Overflow		gallons
Fire Department Use	33,634	gallons
Other		gallons
C: Total Gallons Accounted For =	**763,454**	**gallons**
Loss: Unaccounted-for Water: (B-C) =	**6,017,046**	**gallons**
% Loss: Unaccounted-for Water: (B-C)/A %	33	% unaccounted - for loss
	31	days in month
Gallons / Day Loss =	**194,098**	**gallons/day**
Gallons / Minute Loss =	**135**	**gallons/min.**
Total Gallons Lost Divided by **1,000**	**6,781**	

Purchase Rate 3.13

$21,222.97 total dollar amount lost

Monthly Water Loss Report

Water Company: Estill County Water District

For the Month of: APRIL Year: 2018

Water Purchased @ Irvine Bridge	15,340,000	gallons
Water Purchased @ Dry Branch	4,550,000	gallons
Water Purchased @ Sweet Lick	24,000	gallons
Water Purchased @ Jackson Co.	27,100	gallons
A: Total Water Purchased =	**19,941,100**	**gallons**
Water Sold @ Irvine Bridge	8,933,260	gallons
Water Sold @ Dry Branch	2,497,370	gallons
Water Sold @ Sweet Lick	33,550	gallons
Water Sold @ Jackson Co.	29,570	gallons
Total Sold =	11,493,750	gallons
Difference @ Irvine Bridge	6,406,740	gallons
Difference @ Dry Branch	2,052,630	gallons
Difference @ Sweet Lick	-9,550	gallons
Difference @ Jackson Co.	-2,470	gallons
B: Difference: (Produced+Purchased) - Sold =	**8,447,350**	**gallons**
% Difference @ Irvine Bridge	42	%
%Difference @ Dry Branch	45	%
%Difference @ Sweet Lick	-40	%
%Difference @ Jackson Co.	-9	%
% Difference =	42	% total water
Gallons of Water Accounted For:		
Breaks (Estimated Total)	4,886,715	gallons
Hydrant Flushing	95,751	gallons
Storage Tank Overflow		gallons
Fire Department Use	34,481	gallons
Other		gallons
C: Total Gallons Accounted For =	5,016,947	gallons
Loss: Unaccounted-for Water: (B-C) =	3,430,403	gallons
% Loss: Unaccounted-for Water: (B-C)/A %	17	% unaccounted - for loss
	30	days in month
Gallons / Day Loss =	**114,347**	**gallons/day**
Gallons / Minute Loss =	**79**	**gallons/min.**
Total Gallons Lost Divided by **1,000**	8,447	
Purchase Rate 3.13		
	$26,440.21	total dollar amount lost

Monthly Water Loss Report

Water Company: Estill County Water District

For the Month of: MAY **Year:** 2018

Water Purchased @ Irvine Bridge	17,710,000	gallons
Water Purchased @ Dry Branch	4,910,000	gallons
Water Purchased @ Sweet Lick	38,000	gallons
Water Purchased @ Jackson Co.	32,100	gallons
A: Total Water Purchased =	**22,690,100**	**gallons**
Water Sold @ Irvine Bridge	8,911,770	gallons
Water Sold @ Dry Branch	2,326,080	gallons
Water Sold @ Sweet Lick	27,670	gallons
Water Sold @ Jackson Co.	22,060	gallons
Total Sold =	**11,287,580**	**gallons**
Difference @ Irvine Bridge	**8,798,230**	gallons
Difference @ Dry Branch	**2,583,920**	gallons
Difference @ Sweet Lick	**10,330**	gallons
Difference @ Jackson Co.	**10,040**	gallons
B: Difference: (Produced+Purchased) - Sold =	**11,402,520**	**gallons**
% Difference @ Irvine Bridge	**50**	%
%Difference @ Dry Branch	**53**	%
%Difference @ Sweet Lick	**27**	%
%Difference @ Jackson Co.	**31**	%
% Difference =	50	% total water
Gallons of Water Accounted For:		
Breaks (Estimated Total)	2,442,106	gallons
Hydrant Flushing	26,614	gallons
Storage Tank Overflow		gallons
Fire Department Use	33,863	gallons
Other		gallons
C: Total Gallons Accounted For =	**2,502,583**	**gallons**
Loss: Unaccounted-for Water: (B-C) =	**8,899,937**	**gallons**
% Loss: Unaccounted-for Water: (B-C)/A %	39	% unaccounted - for loss
	31	days in month
Gallons / Day Loss =	**287,095**	**gallons/day**
Gallons / Minute Loss =	**199**	**gallons/min.**
Total Gallons Lost Divided by **1,000**	11,403	

Purchase Rate 3.13

$35,689.89 total dollar amount lost

Monthly Water Loss Report

Water Company: Estill County Water District

For the Month of: JUNE **Year:** 2018

Water Purchased @ Irvine Bridge	16,150,000	gallons
Water Purchased @ Dry Branch	4,830,000	gallons
Water Purchased @ Sweet Lick	34,000	gallons
Water Purchased @ Jackson Co.	33,300	gallons
A: Total Water Purchased =	**21,047,300**	**gallons**
Water Sold @ Irvine Bridge	12,297,000	gallons
Water Sold @ Dry Branch	3,222,830	gallons
Water Sold @ Sweet Lick	34,450	gallons
Water Sold @ Jackson Co.	30,770	gallons
Total Sold =	**15,585,050**	**gallons**
Difference @ Irvine Bridge	3,853,000	gallons
Difference @ Dry Branch	1,607,170	gallons
Difference @ Sweet Lick	-450	gallons
Difference @ Jackson Co.	2,530	gallons
B: Difference: (Produced+Purchased) - Sold =	**5,462,250**	**gallons**
% Difference @ Irvine Bridge	24	%
%Difference @ Dry Branch	33	%
%Difference @ Sweet Lick	-1	%
%Difference @ Jackson Co.	8	%
% Difference =	26	% total water
Gallons of Water Accounted For:		
Breaks (Estimated Total)	1,018,917	gallons
Hydrant Flushing	110,155	gallons
Storage Tank Overflow		gallons
Fire Department Use	46,755	gallons
Other		gallons
C: Total Gallons Accounted For =	**1,175,827**	**gallons**
Loss: Unaccounted-for Water: (B-C) =	**4,286,423**	**gallons**
% Loss: Unaccounted-for Water: (B-C)/A %	20	% unaccounted - for loss
	30	days in month
Gallons / Day Loss =	**142,881**	**gallons/day**
Gallons / Minute Loss =	**99**	**gallons/min.**
Total Gallons Lost Divided by **1,000**	5,462	

Purchase Rate 3.13

$17,096.84 total dollar amount lost

Monthly Water Loss Report

Water Company: Estill County Water District

For the Month of: JULY Year: 2018

Water Purchased @ Irvine Bridge	16,550,000	gallons EST-NEW M
Water Purchased @ Dry Branch	4,510,000	gallons
Water Purchased @ Sweet Lick	35,000	gallons
Water Purchased @ Jackson Co.	36,100	gallons
A: Total Water Purchased =	21,131,100	gallons
Water Sold @ Irvine Bridge	10,705,590	gallons
Water Sold @ Dry Branch	2,998,700	gallons
Water Sold @ Sweet Lick	41,010	gallons
Water Sold @ Jackson Co.	32,980	gallons
Total Sold =	13,778,280	gallons
Difference @ Irvine Bridge	5,844,410	gallons
Difference @ Dry Branch	1,511,300	gallons
Difference @ Sweet Lick	-6,010	gallons
Difference @ Jackson Co.	3,120	gallons
B: Difference: (Produced+Purchased) - Sold =	7,352,820	gallons
% Difference @ Irvine Bridge	35	%
%Difference @ Dry Branch	34	%
%Difference @ Sweet Lick	-17	%
%Difference @ Jackson Co.	9	%
% Difference =	35	% total water
Gallons of Water Accounted For:		
Breaks (Estimated Total)	1,080,000	gallons
Hydrant Flushing		gallons
Storage Tank Overflow	75,000	gallons
Fire Department Use	41,334	gallons
Other		gallons
C: Total Gallons Accounted For =	1,196,334	gallons
Loss: Unaccounted-for Water: (B-C) =	6,156,486	gallons
% Loss: Unaccounted-for Water: (B-C)/A %	29	% unaccounted - for loss
	31	days in month
Gallons / Day Loss =	198,596	gallons/day
Gallons / Minute Loss =	138	gallons/min.
Total Gallons Lost Divided by 1,000	7,353	
Purchase Rate 3.13		
	$23,014.33	total dollar amount lost

Monthly Water Loss Report

Water Company: Estill County Water District

For the Month of: AUGUST **Year:** 2018

Water Purchased @ Irvine Bridge	18,079,000	gallons
Water Purchased @ Dry Branch	4,990,000	gallons
Water Purchased @ Sweet Lick	28,000	gallons
Water Purchased @ Jackson Co.	31,200	gallons
A: Total Water Purchased =	**23,128,200**	**gallons**
Water Sold @ Irvine Bridge	10,819,830	gallons
Water Sold @ Dry Branch	3,214,260	gallons
Water Sold @ Sweet Lick	32,140	gallons
Water Sold @ Jackson Co.	33,900	gallons
Total Sold =	**14,100,130**	**gallons**
Difference @ Irvine Bridge	**7,259,170**	gallons
Difference @ Dry Branch	**1,775,740**	gallons
Difference @ Sweet Lick	**-4,140**	gallons
Difference @ Jackson Co.	**-2,700**	gallons
B: Difference: (Produced+Purchased) - Sold =	**9,028,070**	**gallons**
% Difference @ Irvine Bridge	**40**	%
%Difference @ Dry Branch	**36**	%
%Difference @ Sweet Lick	**-15**	%
%Difference @ Jackson Co.	**-9**	%
% Difference =	39	% total water
Gallons of Water Accounted For:		
Breaks (Estimated Total)	2,122,617	gallons
Hydrant Flushing	8,761	gallons
Storage Tank Overflow		gallons
Fire Department Use	42,300	gallons
Other		gallons
C: Total Gallons Accounted For =	**2,173,678**	**gallons**
Loss: Unaccounted-for Water: (B-C) =	**6,854,392**	**gallons**
% Loss: Unaccounted-for Water: (B-C)/A %	30	% unaccounted - for loss
	31	days in month
Gallons / Day Loss =	**221,109**	**gallons/day**
Gallons / Minute Loss =	**154**	**gallons/min.**
Total Gallons Lost Divided by 1,000	9,028	
Purchase Rate 3.13		
	$28,257.86	total dollar amount lost

Monthly Water Loss Report

Water Company: Estill County Water District

For the Month of: SEPTEMBER **Year:** 2018

Water Purchased @ Irvine Bridge	16,337,000	gallons
Water Purchased @ Dry Branch	4,670,000	gallons
Water Purchased @ Sweet Lick	25,000	gallons
Water Purchased @ Jackson Co.	30,300	gallons
A: Total Water Purchased =	**21,062,300**	**gallons**
Water Sold @ Irvine Bridge	10,287,260	gallons
Water Sold @ Dry Branch	2,580,340	gallons
Water Sold @ Sweet Lick	37,760	gallons
Water Sold @ Jackson Co.	26,680	gallons
Total Sold =	12,932,040	gallons
Difference @ Irvine Bridge	**6,049,740**	gallons
Difference @ Dry Branch	**2,089,660**	gallons
Difference @ Sweet Lick	**-12,760**	gallons
Difference @ Jackson Co.	**3,620**	gallons
B: Difference: (Produced+Purchased) - Sold =	**8,130,260**	**gallons**
% Difference @ Irvine Bridge	**37**	%
%Difference @ Dry Branch	**45**	%
%Difference @ Sweet Lick	**-51**	%
%Difference @ Jackson Co.	**12**	%
% Difference =	39	% total water
Gallons of Water Accounted For:		
Breaks (Estimated Total)	1,012,382	gallons
Hydrant Flushing		gallons
Storage Tank Overflow		gallons
Fire Department Use	38,796	gallons
Other		gallons
C: Total Gallons Accounted For =	**1,051,178**	**gallons**
Loss: Unaccounted-for Water: (B-C) =	7,079,082	gallons
% Loss: Unaccounted-for Water: (B-C)/A %	34	% unaccounted - for loss
	30	days in month
Gallons / Day Loss =	**235,969**	**gallons/day**
Gallons / Minute Loss =	**164**	**gallons/min.**
Total Gallons Lost Divided by 1,000	8,130	

Purchase Rate 3.13

$25,447.71 total dollar amount lost

Monthly Water Loss Report

Water Company: Estill County Water District

For the Month of: OCTOBER **Year:** 2018

Water Purchased @ Irvine Bridge	17,910,000	gallons
Water Purchased @ Dry Branch	4,360,000	gallons
Water Purchased @ Sweet Lick	27,000	gallons
Water Purchased @ Jackson Co.	29,900	gallons
A: Total Water Purchased =	**22,326,900**	**gallons**
Water Sold @ Irvine Bridge	10,112,390	gallons
Water Sold @ Dry Branch	2,672,550	gallons
Water Sold @ Sweet Lick	36,460	gallons
Water Sold @ Jackson Co.	26,880	gallons
Total Sold =	**12,848,280**	**gallons**
Difference @ Irvine Bridge	**7,797,610**	gallons
Difference @ Dry Branch	**1,687,450**	gallons
Difference @ Sweet Lick	**-9,460**	gallons
Difference @ Jackson Co.	**3,020**	gallons
B: Difference: (Produced+Purchased) - Sold =	**9,478,620**	**gallons**
% Difference @ Irvine Bridge	**44**	%
%Difference @ Dry Branch	**39**	%
%Difference @ Sweet Lick	**-35**	%
%Difference @ Jackson Co.	**10**	%
% Difference =	**42**	**% total water**
Gallons of Water Accounted For:		
Breaks (Estimated Total)	1,504,800	gallons
Hydrant Flushing		gallons
Storage Tank Overflow		gallons
Fire Department Use	38,545	gallons
Other		gallons
C: Total Gallons Accounted For =	**1,543,345**	**gallons**
Loss: Unaccounted-for Water: (B-C) =	**7,935,275**	**gallons**
% Loss: Unaccounted-for Water: (B-C)/A %	36	% unaccounted - for loss
	31	days in month
Gallons / Day Loss =	**255,977**	**gallons/day**
Gallons / Minute Loss =	**178**	**gallons/min.**
Total Gallons Lost Divided by **1,000**	**9,479**	
Purchase Rate **3.13**		
	$29,668.08	total dollar amount lost

Monthly Water Loss Report

Water Company: Estill County Water District

For the Month of: NOVEMBER **Year:** 2018

Water Purchased @ Irvine Bridge	17,310,000	gallons
Water Purchased @ Dry Branch	4,540,000	gallons
Water Purchased @ Sweet Lick	28,000	gallons
Water Purchased @ Jackson Co.	26,100	gallons
A: Total Water Purchased =	**21,904,100**	**gallons**
Water Sold @ Irvine Bridge	10,100,260	gallons
Water Sold @ Dry Branch	3,049,580	gallons
Water Sold @ Sweet Lick	38,990	gallons
Water Sold @ Jackson Co.	30,990	gallons
Total Sold =	**13,219,820**	**gallons**
Difference @ Irvine Bridge	**7,209,740**	gallons
Difference @ Dry Branch	**1,490,420**	gallons
Difference @ Sweet Lick	**-10,990**	gallons
Difference @ Jackson Co.	**-4,890**	gallons
B: Difference: (Produced+Purchased) - Sold =	**8,684,280**	**gallons**
% Difference @ Irvine Bridge	**42**	%
%Difference @ Dry Branch	**33**	%
%Difference @ Sweet Lick	**-39**	%
%Difference @ Jackson Co.	**-19**	%
% Difference =	40	% total water

Gallons of Water Accounted For:

Breaks (Estimated Total)	1,665,445	gallons
Hydrant Flushing	77,758	gallons
Storage Tank Overflow		gallons
Fire Department Use	39,659	gallons
Other		gallons
C: Total Gallons Accounted For =	**1,782,862**	**gallons**
Loss: Unaccounted-for Water: (B-C) =	**6,901,418**	**gallons**
% Loss: Unaccounted-for Water: (B-C)/A %	32	% unaccounted - for loss
	30	days in month
Gallons / Day Loss =	**230,047**	**gallons/day**
Gallons / Minute Loss =	**160**	**gallons/min.**
Total Gallons Lost Divided by 1,000	8,684	

Purchase Rate 3.13

$27,181.80 total dollar amount lost

Monthly Water Loss Report

Water Company: Estill County Water District

For the Month of: DECEMBER **Year:** 2018

Water Purchased @ Irvine Bridge	15,650,000	gallons
Water Purchased @ Dry Branch	4,440,000	gallons
Water Purchased @ Sweet Lick	24,000	gallons
Water Purchased @ Jackson Co.	26,100	gallons
A: Total Water Purchased =	**20,140,100**	**gallons**
Water Sold @ Irvine Bridge	8,863,500	gallons
Water Sold @ Dry Branch	2,374,010	gallons
Water Sold @ Sweet Lick	30,160	gallons
Water Sold @ Jackson Co.	24,030	gallons
Total Sold =	**11,291,700**	**gallons**
Difference @ Irvine Bridge	**6,786,500**	gallons
Difference @ Dry Branch	**2,065,990**	gallons
Difference @ Sweet Lick	**-6,160**	gallons
Difference @ Jackson Co.	**2,070**	gallons
B: Difference: (Produced+Purchased) - Sold =	**8,848,400**	**gallons**
% Difference @ Irvine Bridge	**43**	%
%Difference @ Dry Branch	**47**	%
%Difference @ Sweet Lick	**-26**	%
%Difference @ Jackson Co.	**8**	%
% Difference =	**44**	**% total water**
Gallons of Water Accounted For:		
Breaks (Estimated Total)	1,339,200	gallons
Hydrant Flushing		gallons
Storage Tank Overflow		gallons
Fire Department Use	33,875	gallons
Other		gallons
C: Total Gallons Accounted For =	**1,373,075**	**gallons**
Loss: Unaccounted-for Water: (B-C) =	**7,475,325**	**gallons**
% Loss: Unaccounted-for Water: (B-C)/A %	**37**	**% unaccounted - for loss**
	31	days in month
Gallons / Day Loss =	**241,140**	**gallons/day**
Gallons / Minute Loss =	**167**	**gallons/min.**
Total Gallons Lost Divided by **1,000**	**8,848**	

Purchase Rate 3.13

$27,695.49 total dollar amount lost

ESTILL COUNTY WATER USAGE PER YEAR

YEAR	CUST.	GAL. SOLD	AVG USAGE
1993	2312	143,369,000	5168
1994	2385	153,518,820	5364
1995	2438	145,857,000	4986
1996	2561	139,223,000	4530
1997	2625	144,696,000	4594
1998	2777	151,069,710	4533
1999	2916	159,836,000	4568
2000	3128	159,521,000	4250
2001	3362	170,828,990	4234
2002	3449	173,726,000	4197
2003	3492	170,938,000	4079
2004	3532	170,077,000	4013
2005	3584	173,113,000	4025
2006	3649	181,220,000	4139
2007	3821	205,290,000	4477
2008	3788	193,217,000	4251
2009	3795	190,073,000	4174
2010	3810	189,872,000	4153
2011	3806	184,920,000	4049
2012	3785	187,871,000	4136
2013	3782	176,516,000	3889
2014	3774	177,752,000	3925
2015	3770	169,948,000	3757
2016	3770	164,452,000	3635
2017	3786	159,859,010	3519
2018	3730	154,985,710	3463