

COMMONWEALTH OF KENTUCKY
BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

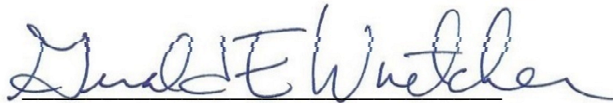
GRAVES COUNTY WATER DISTRICT'S)	
UNACCOUNTED-FOR WATER LOSS)	CASE NO.
REDUCTION PLAN, SURCHARGE, AND)	2019-00347
MONITORING)	

NOTICE OF FILING

Graves County Water District (“Graves District”) files with the Public Service Commission (“the Commission”) the attached report on the progress of its water loss detection and repair program for the period from October 1, 2021 to September 30, 2022 as required by the Commission’s Order of September 30, 2019 in Case No. 2018-00429.

Dated: March 14, 2023

Respectfully submitted,

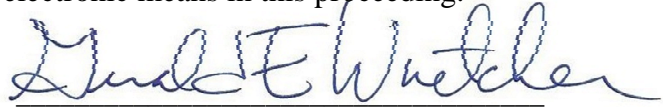


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CERTIFICATE OF SERVICE

In accordance with 807 KAR 5:001, Section 8, and the Public Service Commission's Order of July 22, 2021 in Case No. 2020-00085, I certify that this document was transmitted to the Public Service Commission on March 14, 2023 and that there is currently no party that the Public Service Commission has excused from participation by electronic means in this proceeding.

A handwritten signature in blue ink, appearing to read "Gerald E. Wuetcher", written over a horizontal line.

Gerald E. Wuetcher

**ANNUAL PROGRESS REPORT OF GRAVES COUNTY
WATER DISTRICT'S WATER LOSS DETECTION AND REPAIR PROGRAM
(OCTOBER 1, 2021 – SEPTEMBER 30, 2022)**

On September 30, 2019, the Public Service Commission (“Commission”) in Case No. 2018-00429¹ authorized Graves County Water District (“Graves District”) to collect a monthly surcharge of \$5.00 per customer for service rendered on and after October 1, 2019 and continuing for 72 months or until the total amount of the surcharge assessed equaled \$1,721,600, whichever occurred first, subject to certain conditions. These conditions included the submission of a yearly report containing a schedule of the estimated and actual progress of Graves District’s water loss detection and repair program and the estimated and actual expenditures made with surcharge proceeds.² The Commission indicated that this yearly report will be used to evaluate the need for prospective adjustments to the water loss detection and repair program and the authorized surcharge.

This report addresses Graves District’s water loss and detection program for the period from October 1, 2021 to September 30, 2022 (“Review Period”). It compares the results of the program’s third year to the assumptions and estimates contained in Graves District’s program proposal and the program’s first two years of operation. As Graves District noted in its proposal, the accuracy of the original cost estimates and the program’s results cannot be gauged until the program has operated for a minimum of two years.³ When submitting its proposal, however, Graves District could not have foreseen the significant challenges that confront the program’s implementation, including a global pandemic, supply chain shortages, a significant increase in

¹ *Application of Graves County Water District for An Alternative Rate Adjustment*, Case No. 2018-00429 (Ky. PSC Sep. 30, 2019).

² *Id.* at 14.

³ Case No. 2018-00429, Supplemental Proposal of Graves County Water District for a Water Loss Detection and Repair Surcharge at 5 (filed Aug. 19, 2019).

material costs and the destructive tornado that struck Graves County, Kentucky in December 2021. Given the extensive efforts necessary to recover from the December 2021 tornado, many of which are still ongoing, Graves District does not expect to achieve the Water Loss Detection and Repair Program's announced goals before the end of 2027, two years later than originally projected. At this time, Graves District recommends that the Commission make no adjustments to the surcharge amount. It believes that additional time is necessary to permit its operations to fully recover from the effects of the December 2021 tornado before any changes to the Water Loss Detection and Repair Program are made. Recognizing the time that has been lost due to its tornado recovery and rehabilitation efforts, Graves District has adjusted some of the Program's mileposts to reflect the need for additional time.

Program Implementation

In its Order of September 30, 2019, the Commission directed Graves District to submit a comprehensive unaccounted-for water loss reduction plan that established priorities and a time schedule for eliminating each source of unaccounted-for water loss and provides a detailed spending plan for the surcharge proceeds.⁴ On December 20, 2019, Graves District submitted its comprehensive plan.⁵ Appendix A to this report compares the original schedule for implementing the program with the program's current status.

During its first year, the proposed plan's implementation generally proceeded according to schedule. In December 2019 Mayfield Electric and Water Systems ("MEWS") hired an employee whose principal responsibility was leak detection on Graves District's system.⁶ Although Graves

⁴ Order of Sept. 30, 2019 at 12.

⁵ A detailed spending plan for the surcharge proceeds had been contained in the surcharge proposed submitted in Case No. 2018-00429 on August 19, 2019.

⁶ Graves District contracts with Mayfield Electric and Water Systems for all operation and maintenance services. MEWS performs these services in consultation with Graves District's Board of Commissioners.

District originally proposed to assign two persons who would each perform 20 hours of leak detection activity weekly, Graves District determined that assigning one person whose sole duty was leak detection would be more effective. Other MEWS employees continued to perform leak detection assignments when necessary. In January 2020, Graves District entered into a lease agreement for a hydro-excavator truck. In May 2020 it purchased a Mikron 3 listening device to better locate leaks. It, however, elected not to purchase 20 noise logger devices and related equipment as originally proposed. MEWS agreed to purchase the devices and to share the equipment with Graves District at no cost.

Beginning in February 2020, installation of additional magnetic water meters throughout Graves District's distribution system to establish district metered areas ("DMAs") began. Water usage for each DMA is metered with a meter connected to MEWS's Automated Meter Infrastructure ("AMI"). MEWS monitors water usage within each zone and can quickly identify excessive water usage in a DMA. Once excessive water usage is identified, leak sensors are deployed in the DMA. These sensors significantly narrow the area in which the leak is located. The leak detection specialist then pinpoints the exact leak location, and a work crew is deployed to repair the leak.

Graves District originally proposed to establish 35 DMAs by the end of the second year of the program. As of September 30, 2020, 19 DMAs existed. In its report on the program's first year, Graves District stated its intention to have 53 DMAs in operation by September 30, 2021.⁷ With a greater number of DMAs, Graves District asserted, water leaks could be detected earlier, and the volume of lost water further reduced. In addition to the savings from lower water losses, reducing

⁷ Annual Progress Report of Graves County Water District's Water Loss and Repair Program (Jan. 4, 2021) at 3.

the search area for a leak through the creation of additional DMAs was expected to lower water loss detection expense since fewer manhours will be spent searching for a leak.

Graves District has not met its goal of establishing 53 DMAs. As of September 30, 2021, only 26 DMAs were operational. No additional DMAs were established during the Review Period. The installation of DMAs in the Year 2 was slowed due to supply chain problems. Suppliers were unable to fill Graves District's orders for metering equipment. Only four additional meters were delivered to Graves District during Year 2. Ten additional meters were delivered in December 2021, but these meters were severely damaged or destroyed during the tornado. (They have since been replaced using proceeds from Graves District's insurance policy claim.)

Since December 2021 tornado, Graves District has focused on repair and rehabilitation efforts rather than the installation of new DMAs. Personnel shortages required Graves District to concentrate on its maintenance and repair efforts and limited efforts to establish new DMAs. Graves District expects to establish at least four DMAs in the current program year (Year 4) and to establish more a greater number of DMAs in Year 5 and Year 6 as MEWS adds and trains additional personnel. Graves District's goal of 53 DMAs remains unchanged. Graves District intends to periodically review its plans for DMAs to determine if adjustments are necessary and if the time period to meet its goal of 53 DMA should be extended.

As new metering equipment is acquired and installed, MEWS is integrating that equipment into its AMI infrastructure. The real-time information is being used to assign the leak specialist and other MEWS employees to locate and repair leaks on Graves District's system. Graves District is continuing to review predictive analysis software and currently plans to purchase such software in the fourth year of the program.

Finally, as noted in the Year 2 report, the December 10, 2021 tornado significantly disrupted Graves District's operations. The City of Mayfield suffered extensive damage. MEWS's offices were significantly damaged. Leak detection efforts did not return to normal until March 2022. Although MEWS was able to restore service to all areas in which it directly or indirectly serves, it has devoted significant efforts to system rehabilitation to return both systems to pre-tornado levels.

Surcharge Revenue

During the Review Period, Graves District collected \$289,355 in surcharge revenues, or an average of \$24,113 monthly. In the prior review period, \$289,740, or a monthly average of \$24,145 of surcharge revenues were collected. In the first three years of the surcharge, Graves District has collected \$843,310 in revenue from the surcharge.

In its proposal, Graves District calculated surcharge revenue assuming 4,781 customers and expected annual revenues from the surcharge of \$286,860. As shown in Table 1 below, Graves District's customer base has exceeded that level for much of the time the surcharge has been in effect. Based upon the average monthly number of customers paying the surcharge in the Review Period (4,829), Graves District now estimates annual surcharge revenue of \$289,355 and expects the District to reach the total authorized amount in 72.4 months. The last month that the surcharge will likely be billed remains October 2025. As of the end of Year 3, Graves District had collected approximately \$843,310 of surcharge revenue.

TABLE 1						
	YEAR 1		YEAR 2		YEAR 3	
Month	Customer Bills	Surcharge Revenue	Customer Bills	Surcharge Revenue	Customer Bills	Surcharge Revenue
October			4,841	\$ 24,205	4,794	\$23,970
November	4,778	\$ 23,890	4,827	\$ 24,135	4,838	\$24,190
December	4,813	\$ 24,065	4,838	\$ 24,190	4,812	\$24,060
January	4,794	\$ 23,970	4,830	\$ 24,150	4,818	\$24,090
February	4,796	\$ 23,980	4,815	\$ 24,075	4,795	\$23,975
March	4,793	\$ 23,965	4,818	\$ 24,090	4,820	\$24,100
April	4,774	\$ 23,870	4,819	\$ 24,095	4,799	\$23,995
May	4,783	\$ 23,915	4,826	\$ 24,130	4,814	\$24,070
June	4,816	\$ 24,080	4,830	\$ 24,150	4,851	\$24,255
July	4,825	\$ 24,125	4,829	\$ 24,145	4,844	\$24,220
August	4,834	\$ 24,170	4,818	\$ 24,090	4,844	\$24,220
September	4,837	\$ 24,185	4,857	\$ 24,285	4,844	\$24,210
TOTAL	52,843	\$264,215	57,948	\$289,740	57,873	\$289,355

Overall Expenditures

Table 2 reflects projected expenditures in the program's first three years of actual and projected expenditures, as well as estimated expenditures for Year 4. It also shows the total amount estimated for each category as set forth in Graves District's proposal. The discussion below and Appendix B to this report provide additional details regarding the actual and projected amounts.

Table 2							
	Proposed Total	Year 1 Actual	Year 2 Projected	Year 2 Actual	Year 3 Projected	Year 3 Actual	Year 4 Projected
DMA Establishment	\$ 383,285	\$109,832	\$ 179,792	\$ 63,403	\$179,874	\$30,370	\$ 13,100
Hydro-Excavator Truck	\$ 300,000	\$ 52,084	\$ 78,125	\$ 78,125	\$ 78,125	\$ 78,125	\$ 78,125
Leak Detection Equipment	\$ 22,825	\$ 4,400	\$ 18,425	\$ 0	\$ 18,425	0	0
Loss Detection	\$ 541,710	\$ 57,936	\$ 90,675	\$ 83,271	\$ 66,800	\$ 59,780	\$67,313
Leak Repair	\$ 200,000	\$ 28,311	\$ 36,220	\$ 9,010	\$ 32,953	\$ 27,422	\$40,583
Total	\$1,447,820	\$252,563	\$ 403,237	\$233,809	\$376,177	\$195,697	\$199,121

During the first three years of the Water Loss Detection and Repair Program, Graves District has expended \$682,069 of surcharge proceeds, or approximately 80.88 percent of the collected surcharge proceeds.

Establishment of DMAs

During the Review Period, no DMA was established, leaving the total number of DMAs in operation as of September 30, 2022 at 26. Total cost to establish the existing DMAs was \$173,235, which results in an average DMA installation cost of \$6,663.⁸ Graves District had originally estimated the cost of a DMA at \$10,951 or approximately \$4,288 greater than the average DMA cost. The principal reason for the significant difference in expected and actual DMA cost is lower than expected meter costs. In its proposal, Graves District estimated the average meter cost to be \$5,295. In the first year of the surcharge's operation, Graves District procured six-inch magnetic meters with encoder at a cost of \$3,949.50. Additionally, the fifteen percent contingency (or \$1,428) included in the original estimate proved unnecessary. The lower cost of a DMA enables Graves District to install additional DMAs. During the second year of the surcharge, however, the price for meters has increased approximately four percent.

During the Review Period, Graves District acquired ten additional meters⁹ at a total cost of \$30,370 but did not establish any DMAs. It expects to establish at least four DMAs during Year 4. It has budgeted \$13,100 to DMA establishment for Year 4.¹⁰ Graves District still plans to establish a total of 53 DMAs but does not expect to reach this goal prior to September 30, 2025. To reach this goal, 27 DMAs must be established at a projected cost of \$179,874.¹¹

⁸ At the close of the Review Period, Graves District had one meter remaining in inventory. The cost of this meter is considered when determining the average cost of a DMA.

⁹ These meters were destroyed or significantly damaged during the December 2021 tornado. Graves District's insurance carrier has reimbursed the District for the loss and replacements have been acquired.

¹⁰ Graves District assumes the cost of each DMA will be \$6,662. As Graves District currently has ten meters in inventory to use for DMAs and the unit cost of each meter is \$3,037, it assumes that the additional cost to install four DMAs will be \$13,100 (4 x (\$6,662 - \$3,037)).

¹¹ 27 DMAs x \$6,662 per DMA = \$179,874. These cost projections are estimates. Should costs increase, adjustments to the number of installations will be necessary.

Hydro-Excavator Truck

In its original proposed, Graves District proposed to acquire a hydro-excavator truck at an estimated cost of \$300,000. In January 2020, Graves District entered an agreement to a lease a hydro-excavator truck. The monthly lease payment on this truck is approximately \$6,510.39. Annual cost of the lease is \$78,125. Graves District has renewed this lease annually each year since 2020. Total amount expended as of this date for the lease of the hydro-excavator truck is \$286,459. Under the terms of the lease agreement, if the lease is renewed for four successive years, ownership of the truck will transfer to Graves District at the end of the fourth renewal period.

Leak Detection Equipment

In May 2020 Graves District acquired at a cost of \$4,400 a Mikron 3 listening device to locate leaks. This cost is equal to the estimated cost contained in Graves District's proposal. Graves District has not purchased twenty noise logger devices and related equipment as originally proposed. Instead, it uses similar devices that MEWS has acquired and agreed to share at no charge. Graves District originally budgeted \$18,425 in the Review Period for the purchase pressure sensors and pressure release valve monitors and their connection to MEWS monitoring system. This equipment was not purchased during the Review Period. Graves District is continuing to evaluate various pressure sensors and pressure release valve monitors. It is also evaluating the appropriate time to add such equipment to its system. No decision has yet been made as to whether this equipment will be added in Year 4. The cost of such equipment is not reflected in the Year 4 budget.

Loss Detection

Graves District originally proposed to assign two persons working 20 hours weekly to leak detection. After additional consideration, it determined one person devote his or her entire attention

to leak detection was preferable. MEWS hired a leak detection specialist in December 2019. In Year 1, approximately 1,233 regular manhours and 68 overtime manhours were devoted to leak detection.¹² These totals reflect not only the leak detection specialist's time, but that of other MEWS employees who were occasionally assigned leak detection tasks. During the next year, MEWS employees worked approximately 1,899 regular manhours and 24 overtime manhours and traveled approximately 9,934 miles as part of Graves District's leak detection efforts. The most hours were devoted to the areas that were formerly South Graves Water District (838 hours, 5,105 miles) and Consumers Water District (536 hours, 2,461 miles). Total sum expended on leak detection in Year 2 was \$83,271.

Despite the temporary halt to leak detection efforts in the aftermath of the December 2021 tornado, approximately 1,365 regular manhours and 5 overtime manhours were devoted to leak detection during the Review Period. The most hours were devoted to the areas that were formerly South Graves Water District (814 hours, 5,035 miles) and Hickory Water District (354 hours, 1,671 miles). Total sum expended on leak detection during the Review Period was \$59,780.

Graves District expects to spend approximately \$67,313 on its leak detection efforts for the year ending September 30, 2023. This estimate assumes that MEWS employees will work 1,560 regular hours and will travel approximately 7,500 miles as part of that effort.¹³ Graves District will continue to focus its leak detection on the South Graves Water District area, which is currently experiencing the highest water loss rate.

Leak Repair

Graves District originally assumed 200 leaks would be located and repaired in the first year of the program, 100 leaks would be located and repaired in the second year, and 50 leaks would

¹² MEWS vehicles travelled approximately 7,854 miles in support of leak detection assignments.

¹³ This estimate is based upon the current IRS mileage rate of \$0.655 per mile.

be located repaired in each of the remaining four years. It estimated the costs associated with labor and materials to repair a leak at \$400.¹⁴ During Year 1, sixty-eight leaks were repaired at a cost of \$28,310, or an average repair cost of \$416.32 per leak. In its last report, Graves District estimated that over the remaining five years of the surcharge eighty-seven leaks annually would be discovered and repaired. During Year 2, however, only eighteen leaks were detected. The cost to repair these leaks was approximately \$9,010 or an average repair cost of \$500.56.

The lower number of leaks reported in Year 2 led MEWS and Graves District to suspect that some leaks were not being properly recorded. As a result, Graves District modified its reporting system to improve the tracking of leak discovery and repair and to ensure repairs are funded from surcharge proceeds. Water District Job Orders are still used to report the details of leak repairs, including the number of personnel involved, regular and overtime hours, and equipment and materials used. The leak detection specialist, however, now separately reports each located leak. This information is included in the monthly surcharge reports as well as entered in MEWS work reporting system.

Despite the problems resulting from the December 2021 tornado, approximately fifty-eight leaks were discovered and repaired at a total cost of \$27,055, or an average cost of \$466.47 per leak. Graves District assumes that a larger number of leaks will be found in the current year and estimates that \$40,583 will be needed for leak repair.¹⁵

Water Loss Results

It is still too early to draw any conclusions regarding the success of Graves District's water loss detection and repair program. During calendar year 2019, Graves District reported an

¹⁴ Total leak repair cost = (200 leaks x \$400) + (100 leaks x \$400) + (4 years x (50 leaks x \$400)) = \$200,000.

¹⁵ This estimate assumes a total of 87 leaks will be discovered and repaired at an average cost of \$466.47. This level of leak discovery was used to prepare the estimated leak repair expense for the Review Period.

unaccounted-for water loss of 34.1 percent. For Year 1, Graves District’s water loss was 26.7 percent.¹⁶ At the end of the second year, water loss had fallen to 20.74 percent. During Year 3, Graves District’s water loss rose to 27.67 percent. Table 3 compares the water loss for each area of Graves District’s system for the first three years of the program. Graves District believes that the increase is primarily due to damage from the December 2021 tornado. During the last six months of Year 3, water loss has receded, reflecting rehabilitation efforts and increased patrolling for leaks. The area formerly known as South Graves Water District continues to be a major concern and will in Year 4 continue to be the area in which Graves District devotes significant effort.

Table 3					
	December 2019	Year 1 (Dec.-Sep.)	Year 2 (Oct.-Sep.)	Year 3 (Oct.-Sep.)	Apr-Sept 2022
Consumers	29.75	22.50	18.57	19.00	17.39
Fancy Farm	8.89	12.83	18.15	15.95	17.61
Hardeman	26.77	14.89	5.74	20.28	18.54
Hickory	43.35	28.93	15.35	21.48	16.45
Sedalia	0.31	10.57	14.01	22.06	15.04
South Graves	44.19	45.87	45.00	60.17	56.44
Total	34.66	26.7073	20.75	27.67	24.23

¹⁶ This period covers the ten months (December 2019 – September 2020) for which Graves District submitted a monthly water loss report to the Commission.

APPENDIX A

WATER LOSS CONTROL PLAN IMPLEMENTATION SCHEDULE

Action	Original Proposal	Status
Procure Hydro-Excavator	NLT 12/01/2020	Lease Agreement Executed 01/15/2020; Hydro-Excavator in use
Hire Leak Specialist	12/01/2019	Hired 12/01/2019; Began detection activities 01/01/2020
Determine Appropriate Meters for District Meter Areas (“DMAs”)	NLT 02/01/2020	Selected Honeywell Electromagnetic Flow Meter for DMAs 02/2020; purchases began in 03/2020
Establish DMA Sites	Establish 35 DMA sites NLT 12/31/2021	Graves District has established 26 sites as of 9/30/2021; As of 1/4/2021, Graves District announced its intention to establish an additional 18 sites for a total of 53 sites by 9/30/2021. Supply chain problems and tornado recovery efforts have prevented goal from being met. Current plan is to install at least 4 additional DMA sites in Year 4 and an increasing number in Year 5 and Year 6.
Install meter equipment at DMA sites	Install metering equipment at 35 DMA sites NLT 12/31/2021	As of 9/30/2022, metering equipment established at 26 DMA sites; 10 additional meters are currently in inventory
Install Pressure Sensors and Pressure Release Value Monitors	NLT 02/28/2023	As of 10/31/2021, two pressure sensors and pressure release valves have been installed; Graves District is studying alternatives to connect these devices to its monitoring network
Establish Internet of Things for interface with advanced metering infrastructure (“AMI”) meters, DMAs, SCADA water tank	Establish NLT 01/01/2021	Interface established; information being received and processed
Establish workflow for DMA information to field crews	Establish NLT 01/01/2021	Information from DMA sites currently being used to determine surveillance areas for Leak Specialist

APPENDIX A

Establish infrastructure for long-term leak predictive analysis and response	Establish NLT 01/01/2023	Examining predictive analysis software but no purchase as of 3/1/2023
Systemwide monitoring established	12/01/2026	Target Date remains 12/01/2026

APPENDIX B

Total Expenditures:

Labor:	\$ 69,860.00
Materials:	40,889.59
Vehicle Expense:	5,345.12
Equipment:	1,100.00
Hydro-Excavator Truck Lease	<u>78,124.68</u>

Total: \$195,329.39

Labor (Hours:)

Activity	Regular Hours	Overtime Hours
DMA	0	0
Leak Repair	266	72
Leak Detection	1,365	5

Materials:

DMA Activity	\$ 30,370.00
Leak Repair	10,519.59
Leak Detection	<u>0.00</u>

Total: \$40,889.59

Vehicle Mileage:

DMA Activity	0.0 miles
Leak Repair	784.0 miles
Leak Detection	<u>8,234.0 miles</u>

Total: 9,018.0 miles