

#7405-01

Drinking Water Revolving Fund
Green Project Reserve Qualification Template

Applicant: Genesee Co Drain Commissioner Project No: _____
Project Name: 2014 DWRF Meter Replacement & AMR/AMI System

Identify by page number from the project plan, or attach excerpts, where water efficiency or energy efficiency improvement justification is provided or discussed to support the need for the recommended green project reserve component: Pages 13, 14, 31-34.

Please ensure all requested information is provided to enable an assessment by the Michigan Department of Environmental Quality (DEQ) of whether the project or project component can qualify for funding from the green project reserve.

Meter Replacements with Conventional Meters

- Over the last five years, water lost or unaccounted for in the system has averaged 307,520,985 gallons per year and is 6.71 percent of the water produced each year.
- Identify the source of this information (i.e. water audit, water conservation study, production and billing records): Billing Records
- Identify the portion of the water loss that is likely due to inaccurate meters: 2-3%
- The expected reduction in water loss by installing replacement traditional water meters in all or a portion of the system is 149,600,000 gallons per year, reducing the water loss percentage to 5.6.
- It takes 0.9 kilowatt hours (kWh) of electricity to produce and distribute 1,000 gallons of water. At a cost of \$ 0.12 per kWh, the estimated annual electrical cost for the water loss due to inaccurate meters based on the five-year average is \$ 14,400.
- Based on the average cost per year for the loss and the estimated cost of 8,006,872 for replacing the meters, the project will pay for itself in 556 months/years.
- Attached all relevant data and calculations that were used to provide answers to these questions. PAGES 13, 14, 31-34 & ATTACHED SHOW THAT PAYBACK PERIOD IS 6.7 YEARS

Water Main Replacement

- Over the last ten years, _____ water main breaks have occurred on the water mains that are proposed for replacement, an average of _____ breaks/mile/year.
- Identify the length, diameter, age and type of pipe to be replaced: _____

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3. Each break is estimated to result in the average loss of _____ gallons of water, calculated to total _____ gallons/year of water lost for those water mains.
 4. Present the data indicating how this is a significant source of water loss in the system and how the pipes proposed for replacement are likely to generate the greatest return in leak reduction. _____

 5. The energy savings from pumping/delivering water through the new water mains versus the old ones is estimated at _____ KWH/year.
 6. Describe the condition of the replaced mains with respect to friction/head loss etc from tuberculation or other deterioration issues. As appropriate, identify if the soils are corrosive and contributing to the deterioration/breaks or leaks in the mains, and how the replacement mains are designed to address future corrosion:

 7. Total projects costs for the water main replacement component of the project are \$ _____.
 8. Identify the source of data used for these calculations: _____

Submitted by:


Name JOHN O'BRIEN

3/10/01
Date

DIRECTOR, DIVISION OF WATER & WASTE SERVICES
Title

Genesee County Drain Commission - Division of Water & Waste Services						
Table 1-4 Five Year Water System Efficiency						
Year	Water Purchased		Water Sold		Lost Water	
	Cubic Feet		Cubic Feet		Cubic Feet	Percentage
2009	616,352,400		594,736,958		21,615,442	3.51%
2010	616,632,200		585,092,058		31,540,142	5.11%
2011	621,182,300		572,717,934		48,464,366	7.80%
2012	630,152,800		579,781,667		50,371,133	7.99%
2013	587,285,100		533,714,027		53,571,073	9.12%

Genesee County Drain commission - Division of Water And Waste Services
Water System Electrical Costs 2013

2013	Center North			Center South			Houran			Vassar				
	kWh	Cost	Gas	kWh	Cost	Gas	2013	kWh	Cost	Gas	2013	kWh	Cost	Gas
January	87,156	\$7,240.46	\$1,176.81	63,532	\$6,386.72	142.82	January	23,200	\$2,433.21		January	27,240	\$3,280.78	
February	77,493	\$7,895.55	\$1,246.06	58,921	\$6,270.07	289.08	February	24,400	\$2,167.42		February	24,180	\$3,920.67	
March	78,078	\$8,153.48	\$552.87	57,692	\$7,457.37	220.2	March	21,600	\$2,068.21		March	27,010	\$3,277.74	
April	87,864	\$7,904.56	\$1,120.37	68,952	\$6,995.86	162.21	April	20,000	\$2,035.63		April	23,150	\$2,885.76	
May	73,505	\$11,094.49	\$416.25	63,354	\$8,422.13	34.67	May	18,400	\$1,233.89		May	27,270	\$3,493.73	
June	101,231	\$11,311.70	\$166.85	69,058	\$7,611.91	20.17	June	0	\$123.89		June	71,160	\$9,731.12	
July	101,467	\$10,233.95	\$99.51	62,163	\$8,255.84	13.77	July	0	\$4,703.07		July	24,870	\$3,493.05	
August	91,922	\$10,535.85	\$136.40	65,607	\$8,869.12	11.65	August	41,200	\$1,591.99		August	47,410	\$6,586.77	
September	97,821	\$9,172.53	\$223.02	7,216	\$8,232.11	11.65	September	13,200	\$1,274.24		September	34,560	\$4,824.04	
October	89,810	\$7,661.38	\$26.14	71,888	\$6,315.87	13.06	October	11,200	\$124.88		October	25,120	\$3,302.04	
November	79,388	\$9,903.72	\$694.88	53,480	\$7,608.06	90.85	November	0	\$113.13		November	22,200	\$2,937.50	
December	88,352	\$7,886.46	\$807.88	65,988	\$7,238.01	173.67	December	25,600	\$2,706.08		December	22,200	\$2,898.55	
Total	1,048,027	\$107,094.63	\$6,669.04	709,861	\$89,803.07	\$1,183.80	Total	198,800	\$19,465.64	\$0.00	Total	376,370	\$49,561.75	\$0.00

2013	Henderson			Noble			Fenton Rd			System Wide Electrical Costs				
	kWh	Cost	Gas	kWh	Cost	Gas	2013	kWh	Cost	Gas	2013	kWh	Cost	\$/kWh
January	58082	\$5,966.12		7,200	\$694.88		January	0	\$22.24	5,820	\$1,548.38	3,278,163	\$386,378.58	\$0.12
February	56842	\$5,664.74		5,200	\$690.62		February	0	\$22.24	5,080	\$644.97			
March	58695	\$6,230.19		5,840	\$694.88		March	0	\$22.24	4,490	\$576.27			
April	58385	\$4,872.50		5,680	\$576.60		April	810	\$128.10	2,180	\$311.61			
May	48175	\$10,787.48		4,640	\$604.56		May	8,100	\$1,030.05	0	\$64.29			
June	47468	\$7,277.92		4,240	\$664.37		June	21,650	\$2,958.83	0	\$68.76			
July	60669	\$7,884.10		4,640	\$653.98		July	30,610	\$4,223.74	0	\$67.86			
August	66474	\$8,093.50		4,560	\$698.90		August	24,120	\$3,332.95	0	\$68.76			
September	68470	\$6,344.09		4,880	\$542.08		September	30,640	\$4,228.86	0	\$69.75			
October	58313	\$5,620.83		4,000	\$511.29		October	21,690	\$2,797.90	0	\$69.75			
November	49021	\$5,275.03		3,760	\$851.64		November	24,610	\$3,179.40	11,330	\$1,548.38			
December	45026	\$7,628.06		6,480	\$1,017.27		December	22,370	\$2,862.96	5,820	\$729.56			
Total	664,615	\$81,664.56	\$0.00	61,120	\$8,201.67	\$0.00	Total	184,540	\$24,808.92	34,860	\$5,778.34			

Master meters exist for these wholesale communities which provide their own individual operations and maintenance of the water distribution system.

The WWS transmission and distribution system consists of approximately 116 miles of water transmission and distribution mains ranging in size from 6-inch to 72-inch. Figure 1-2 provides a schematic of the existing water system facilities throughout Genesee County.

The WWS water transmission and distribution system is relatively new and consists of approximately 98% ductile iron pipe and 2% cast iron pipe and a limited amount of concrete pipe. A majority of the water main breaks occur in the areas with cast iron pipe, which include the Dalton Subdivision, Florine Drive, sections of Linden Road and along Pierson Road.

The Division maintains and reads approximately 18,500 water meters throughout the water system.

WWS has twenty one (21) water storage facilities throughout the water system.

1.4.2. Condition of Facilities

1.4.2.1. Water System Efficiency and Green Objectives

The Meter Replacement and AMR/AMI System Project is being submitted for Green Project Reserve consideration. The latest MDEQ guidance indicated that the Green Project Reserve Template was required but the business case was no longer required for this type of project. The Green Project Reserve Template is located in Appendix G.

The GCDC-WWS currently reads approximately 18,500 meters in the water system. Sixty-nine percent (69%) of these meters exceed their useful life and the water system efficiency has consistently declined over the last five years and will continue to decline if the meters are not replaced in a timely manner. In 2009 lost water was 21,615,442 cubic feet and just 3.5% of the water purchased. By 2013 lost water had increased to 53,571,073 cubic feet and 9.12% of the water purchased. A linear extrapolation shows that system efficiency would exceed 15% in 2019 which would fall outside the AWWA acceptable range for water efficiency. Table 1-4 below shows the system efficiency for the last 5 years.

Year	Water Purchased	Water Sold	Lost Water	Lost Water
	Cubic Feet	Cubic Feet	Cubic Feet	Percentage
2009	616,352,400	594,736,958	21,615,442	3.51%
2010	616,632,200	585,092,058	31,540,142	5.11%
2011	621,182,300	572,717,934	48,464,366	7.80%
2012	630,152,800	579,781,667	50,371,133	7.99%
2013	587,285,100	533,714,027	53,571,073	9.12%

To demonstrate the economic impacts of this increase in lost water, every 1,000,000 cubic feet of lost water equals \$39,400 in lost revenue. The difference between 5% efficiency and 9.1 % efficiency is approximately 20,000,000 cubic feet each year or \$788,000 annually in lost revenue and at the current rate of meter degradation would increase an additional \$39,400 each year.

The energy costs related to the lost water are 0.6 kWh per 100 cubic feet of water at \$0.12 per kWh. The difference between 5% lost water and 9.1% lost water is 20,000,000 cubic feet or 120,000 kWh or \$14,400 annually.

The existing meter reading system is a manual read system that uses vehicles and meter reader employees that walk from customer meter to customer meter throughout the 130,000 square mile water service area. This system is energy and labor intensive requiring 3.5 full time equivalents (FTE), and almost \$6,000 in gas and oil each year. The impact of these costs can be seen in the cost per meter read. The existing cost per meter read is \$2,66 or an annual cost of \$281,730. The anticipated cost per meter read with the AMR/AMI system is \$0.10 per meter read or \$10,170 annually resulting in annual savings of \$271,600. These costs are outlined in detail in Section 3, The Selected Alternative.

Table 1-5 Genesee County WWS Meter Replacement and AMR/AMI System Project Cost

Item Description	Quantity	Unit	Unit Price	Total Estimated Cost	Useful Life (Years)	Salvage Value
Residential Meters	10,000	Each	\$130.00	\$1,300,000.00	20	0
Commercial Meters	2,800	Lump sum *	Lump Sum	\$2,055,975.00	20	0
Automated Meter Reader	18,500	Each	\$130.00	\$2,405,000.00	20	0
Meter and Reader Installation	12,800	Each	\$55.00	\$704,000.00		
Reader Installation	5,700	Each	\$20.00	\$114,000.00		
Fixed Base AMI system	7	Each	\$100,000.00	\$700,000.00	20	0
Total Estimated Project Cost / Salvage Value				\$7,278,975.00		0
Project Contingency @ 10%				\$727,897.50		
Total Project Cost				\$8,006,872.50		

* Appendix F shows commercial meter unit costs

3.2. Project Cost Estimate

The opinion of probable project cost is shown in Table 3-1. All unit costs are provided in 2014 dollars. Total Estimated Project Cost is calculated assuming 10% allowance for contingencies. Construction duration is assumed as two years. A 20 year lifespan is assumed in the calculation of salvage value.

Item Description	Quantity	Unit	Unit Price	Total Estimated Cost	Useful Life (Years)	Salvage Value
Residential Meters	10,000	Each	\$130.00	\$1,300,000.00	20	0
Commercial Meters	2,800	Lump sum *	Lump Sum	\$2,055,975.00	20	0
Automated Meter Reader	18,500	Each	\$130.00	\$2,405,000.00	20	0
Meter and Reader Installation	12,800	Each	\$55.00	\$704,000.00		
Reader Installation	5,700	Each	\$20.00	\$114,000.00		
Fixed Base AMI system	7	Each	\$100,000.00	\$700,000.00	20	0
Total Estimated Project Cost / Salvage Value				\$7,278,975.00		0
Project Contingency @ 10%				\$727,897.50		
Total Project Cost				\$8,006,872.50		

* Appendix F shows commercial meter unit costs

3.3. Operation and Maintenance Annual Cost Comparisons

3.3.1 Meter Read Costs

The Division plans to install 12,800 meters and AMRs and an additional 5,700 AMRs on meters that have not yet reached their useful life. The 12,800 meters represents about 69% of the existing meters that the Division reads. The Division reads the commercial accounts each month and the residential meters are read on a rotating quarterly basis. Table 3-2 below presents the total cost to read all of the meters under the Division's control on an annual basis. Table 3-3 presents the total cost to collect the meter data using the proposed Fixed Base AMR/AMI System. As can be seen from the comparisons the cost to read the meters manually is estimated at \$2.66 per meter read and the cost to read meters with the AMR/AMI system is \$0.10 per meter read. The estimated annual cost savings to use the AMR/AMI system for all accounts would be \$271,599.

Table 3-2 Manual Meter Read Cost Analysis		
Description	Cost	Notes
Salary	\$83,283.20	Provided by Payroll Dept. 2.5 FTE
Benefits	\$56,632.58	Provided by Payroll Dept. 2.5 FTE
Vehicle Expenses	\$47,528.00	Based on M-dot Schedule C Hourly Rate Car/Truck Under 10,500 lbs
Fuel	\$5,687.50	Based on 2.5 vehicles at 13,000 mi year/vehicle. 20 mi. per Gal (2.5 Vehicles), \$3.50 per gallon
Oil	\$320.00	Based on 3 oil changes per vehicle per year @ \$40 per oil change
Insurance	\$2,500.00	Estimated @ \$1,000 per year
Admin	\$85,779.00	Provided by Payroll Dept. Based on 1 FTE of Admin support
Total Expense	\$281,730.28	
Number of meters read annually	106,000	
Cost per meter read	\$2.66	

Table 3-3 Fixed Base AMR/AMI Meter Read Cost Analysis		
Description	Cost	Notes
Salary	\$480.48	Estimated at 1 FTE at 2 hours per month
Benefits	\$326.73	Provided by Payroll Dept.
Vehicle Expenses	\$365.60	Estimated at 40 hours per year for trouble shooting. Based on M-dot Schedule C Hourly Rate Car/Truck Under 10,500 lbs
Fuel	\$300.00	Based on 2,000 mi year/vehicle for trouble shooting. 20 mi. per Gal
Oil	\$40.00	Based on 1 oil change
Insurance	\$80.00	Estimated 2000/25000 mile ratio
Admin	\$8,577.90	Estimated at 0.1 FTE of Admin support
Total Expense	\$10,170.71	
Number of meters read annually	106,000	
Cost per meter read	\$0.10	

3.3.2 Increased Water System Revenue

The Division's 2013 water loss was 9.12% and 53,571,073 cubic feet. This equates to 2.1 million dollars in lost revenues each year. Every 1,000,000 cubic feet of lost water equals \$39,400 in lost revenue (10,000 Ccf * \$3.94/Ccf). Assuming the meter replacement program can return the water loss to the 5-6 percent range, and the difference between 5-6 % efficiency and 9.1 % efficiency is approximately 20,000,000 cubic feet each year. This would produce an additional \$788,000 in additional revenue each year.

3.3.3 Energy Cost Reduction

The energy costs related to the lost water are 0.6 kWh per 100 cubic feet of water at \$0.12 per kWh. The difference between 5-6 % lost water and 9.1% lost water is approximately 20,000,000 cubic feet or 120,000 kWh or \$14,400 annually.

3.3.4 Interest Rate Savings

The Division will be requesting MDEQ Low Interest Loan funding with a 2.75% interest rate. The annual principle and interest payment on the loan of \$8,006,872 would be \$525,825. If the Division bonded for the Project Cost with a traditional loan at an estimated 5.125% the annual principle and interest payment would be \$649,319. The annual savings comparing 2.75% to 5.125% per year would be \$123,494 and the total saving for the 20 year loan period would be \$2,469,883. See Appendix H for associated spreadsheets.

3.3.5 Present Worth Analysis

The twenty year present worth analysis indicates that the present worth of the Existing Meter Read System Alternative is \$1,091,071 and the present worth of the Meter Replacement and AMR/AMI Alternative is \$645,698 indicating that the Meter Replacement and AMR/AMI Alternative is the more cost effective project. The present worth analyses can be found in Appendix D.

3.3.6 Summary of Cost Benefit Analysis

Table 3-4 below provides a summary of the cost savings and increased revenues that are projected for the project. The table provides an estimate of 6.7 years for the project payback period.

Item	Annual Cost Savings/Revenue
Meter Reading Costs	\$271,599
Lost Water Revenue	\$788,000
Energy Cost Savings	\$14,400
Interest Rate Savings	\$123,494
Total Cost Savings/Revenues	\$1,197,493
Total Project Cost	\$8,006,872.50
Project Payback Period (years)	6.7

3.4. User Costs

The project would be financed through user charges. The annual cost per household (meter) for the project is provided in 3.5. This is based on the estimated annual debt service (AEAC) divided by the adjusted equivalent meters (41,700). The increase in an average residential users bill is projected to be \$12.61 per year, or \$1.05 per month, this equates to a 2.44 % annual increase. However, it is anticipated that the rate structure and rates proposed in the 2012 Jones and Henry Rate study are sufficient to support the project without any additional rate increases.

Table 3-5 Estimated User Costs Impact

	AEAC	AEAC per Meter ¹	2013 Average Water Bill ²	Average Equivalent Monthly Cost Increase	New 2010 Average Water Bill	Estimated % Increase
Meter Replacement and AMR/AMI Project	\$525,825	\$12.61	\$42.99	\$1.05	\$44.04	2.44%

¹ Assumes 41,700 Equivalent Meters

² Assumes a 5/8" meter, Average Monthly Bill obtained from July 2012 Water Rate Study