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Memorandum

To: Pete Thurber, Assistant Director of Public Works for Water/Wastewater Operations
Town of Longmeadow, MA

From: Dave Prickett, P.E.

Date: August 31, 2017

Re: 2017 Water and Sewer Rate Study – Preliminary Project Update
Town of Longmeadow Massachusetts

This Memorandum includes a project update and recommendations for the Town of Longmeadow's 2017 Water and Sewer Rate Study. The information summarized and presented in this Memorandum should be reviewed by the Town and used as a tool to help guide the consideration of the use of second water meters, and alternative rate structures, as well as how these options may impact current and alternative water and sewer billing options.

CURRENT WATER AND SEWER BILLING SYSTEM

The Town of Longmeadow provides water and sewer service to approximately 5,700 customers, the majority of which are residential properties. The Town purchases its water from the City of Springfield, and discharges its wastewater to the City of Springfield regional wastewater system. The Town utilizes a fixed rate structure to bill its customers for water service semi-annually. The current rate for water customers is \$3.22 per hundred cubic feet (HCF). The Town also utilizes a fixed rate semi-annual billing system for its sewer customers. The current sewer rate for FY2018 is \$2.50 per HCF. There is a residential water usage billing annual cap of 220 HCF for residential sewer users. Residential sewer users do not pay the sewer rate above 220 HCF per year. These water users are still billed the full amount for their water usage. Meter data is collected in early February and early August, and invoices are distributed in March and September. In addition to the fixed rate, sewer users are charged an annual meter fee which is dependent on the size of their water meter. A summary of these meter fees is shown in Table 2.

LIMITATIONS WITH CURRENT WATER AND SEWER RATE STRUCTURE

Based on discussions with the Town, some water and sewer customers believe that the current fixed rate sewer billing structure may not be equitable. The Town has discussed the possibility of allowing second water meters for irrigation, so users are not charged sewer fees for irrigation water. The Town has also explored the possibility of utilizing winter averaging, in which winter water consumption is used to determine the charge sewer users pay during the summer months. In addition, the Town may also consider removing the current sewer billing cap of 220 HCF per year for residential users.

In order to better understand the seasonal use patterns of its water and sewer customers, the Town began collecting monthly water data in August 2015. This monthly water data, collected through July 2017, was used in this Project to evaluate the sewer rate alternatives. The Town plans to maintain its current water rate structure, evaluating the need for a change in its fixed water rate each Fiscal Year.



GOALS AND OBJECTIVES

Several key questions were the foundation for the 2017 Water and Sewer Rate Evaluation Project. They included:

- Is the current sewer rate structure fair and equitable?
- What effect(s) would secondary irrigation meters have on the sewer rate structure?
- What effect would winter averaging have on the sewer rate?
- Is the current annual sewer cap of 220 HCF per residential user appropriate?
- What impact does the infiltration and inflow (I/I) component have on sewer rates?

SEWER RATE ALTERNATIVES

The focus of the sewer rate alternatives included consideration of modifying the current sewer billing methods and structure. The Town currently uses a fixed rate system for water, which charges all users the same rate per HCF for water regardless of their consumption. This is an equitable rate structure and does not need to be modified. The sewer rate structure, which bills customers based on their water usage with an annual cap of 220 HCF for residential sewer customers, is considered by some to be inequitable for high water users who use their water for irrigation during the summer months.

Various alternatives were considered including secondary irrigation meters, winter averaging (both 3 and 6-month averages), a fixed fee rate structure, modifying the current sewer cap of 220 HCF per residential user per year, and a no-action alternative, which keeps the existing rate structure in place.

The effect of these alternatives on the sewer rates are shown in Tables 3 and 3A. Table 3 shows the projected revenue based on the current sewer rate system and average water consumption over the past two years, the projected revenue if winter averaging were used at the current sewer rate, and the fixed fee sewer rate that would be needed to generate the same amount of revenue as the current rate system. Winter averaging was estimated over a three-month period from December through February, and a six-month period from October through March. These simulate quarterly and semi-annual billing, respectively. The winter averaging rate necessary to generate the same amount of revenue as the current rate system is also shown. Table 3A shows the projected revenue and rates compared to the percentage of water and sewer customers with second meters. We assumed that the percentage of customers with second meters would be from the top percentile downward. In other words, those customers with the highest water usage would implement second meters first.

A summary of the costs for each alternative based on residential water and sewer user's percentile is shown in Figures 1 and 2. Further cost comparisons for the current rate system, winter averaging, and the effects of the top 5% of residential water users installing second meters are shown in Tables 4 and 5.

INFILTRATION AND INFLOW (I/I) AND SEWER RATES

Wastewater is composed of two major components: base sanitary flows and infiltration and inflow (I/I). Base sanitary flow includes residential and non-residential discharges. Infiltration is defined as the groundwater that enters a sewer system through such means as defective pipes, pipe joints, connections, and manhole walls and cones. Infiltration usually varies during the year in relation to the groundwater levels. Inflow is



directly related to a rainfall event and consists of sources such as roof leaders, cellar drains, yard drains, area and foundation drains, and seepage through manhole covers. Excessive I/I can reduce the hydraulic capacity of sewers, and increase treatment and pumping costs for wastewater. For the Town, which does not own and operate a treatment plant, but rather pumps one-hundred percent of its wastewater to the City of Springfield's Regional WWTP, excessive I/I can increase the cost the Town pays to the City of Springfield to treat its wastewater.

The State of Massachusetts published a series of infiltration and inflow (I/I) requirements for wastewater utilities with sanitary sewer collection systems, which wastewater utilities to perform an I/I Analysis, Sanitary Sewer Evaluation Survey (SSES), and other collection system requirements, no later than December 2017. As part of these requirements, DPC has been working with the Town through a series of steps including a preliminary I/I analysis and flow monitoring period which took place in the Spring of 2017. The I/I analysis is on-going, but based on preliminary observations Longmeadow's unit I/I rates are considered light to moderate, and the Town's I/I component is relatively low compared to the statewide standards.

The majority of the Towns sewer costs are fixed regardless of the amount of wastewater that is pumped to the City of Springfield. Based on FY2018 projections (Table 6) approximately 30% of the Town's wastewater budget is allocated to paying Springfield for O&M and capital needs based on the amount of wastewater pumped to its facility. The Town's I/I component is estimated to be approximately 36% of wastewater flows (CY2014-2016). Therefore, up to 11% of annual cost is variable based on I/I. Additionally, the Town has made a tremendous effort over recent years to mitigate the effects of I/I on the system, including a comprehensive CCTV and pipe cleaning program, and replacing defective pipes as needed to help reduce variable costs. Over the past three calendar years the unit I/I (gallons per day per inch-diameter-mile) across the entire collection system was 700 gpd/idm, compared to industry standards for new pipe of 200-400 gpd/idm, and the MassDEP threshold for excessive I/I of 4,000 gpd/idm.

RECOMMENDED OPTIONS FOR CONSIDERATION

Based on the available water data and the projected rates we recommend that the Town consider the following alternatives:

- a. Keep the current rate system in place, which would continue to cap residential sewer users at 220 HCF per year, and allow the Town to continue to abate water used for irrigation during summer months, without the effort required to install secondary meters or modify the existing rate structure.
- b. Change the current sewer cap of 220 HCF per residential sewer user per year, to 110 HCF per residential sewer user per summer billing period. This is due to a significant portion of sanitary flows from high winter consumption residential sewer users that are currently surpassing the 220 HCF cap, and are not being charged.
- c. Remove the current sewer cap of 220 HCF per residential sewer user per year and permit the installation of secondary water meters for irrigation. Any number of meters installed below the 6% threshold of the top residential water users (shown in Table 3A) will not impact the current sewer revenues. Based on the number of meters that are installed, the Town should review the sewer rate annually as the number of second meters increases.



RECAP OF PROJECT GOALS AND OBJECTIVES

- **Is the current sewer rate structure fair and equitable?**

The current sewer rate structure charges sewer users based on their water consumption, with an annual sewer cap of 220 units (1 unit = 1 HCF = 748 gallons) for residential sewer users. Sewer users are also charged a flat fee annually based on their water meter size (Table 2). The Town does not own and operate a WWTP but rather pumps its wastewater to the City of Springfield's Regional WWTP and pays per gallon pumped. The majority of sewer costs are fixed, and the amount pumped to Springfield only makes up a portion (30%) of the annual wastewater budget. As a result, the current rate system allows the Town to charge sewers used based on their annual consumption, while abating high water consumption that typically occurs during the summer months from irrigation.

- **What effect(s) would secondary irrigation meters have on the sewer rate structure?**

The addition of secondary irrigation meters would have no effect on the sewer rate until more than 6% of the top residential water users installed second meters. Once that number is reached, the Town would need to reevaluate the sewer rates in order to avoid a loss of revenue. This however does not include the major effort required to install secondary meters.

- **What effect would winter averaging have on the sewer rate?**

Winter averaging, whether done over a 3-month or 6-month period would raise the sewer rate by 68% and 55% respectively. Based on consumption over the past two years it is estimated that the rates required to generate the same amount of revenue as the current rate system using winter averaging would be \$3.88/HCF using a 6-month average (October through March) and \$4.20/HCF using a 3-month average (December through February). In addition to raising the current sewer rate, winter averaging would require the Town to change its billing cycle to reflect the new months at which the water meters would be read for winter averaging.

- **Is the current annual sewer cap of 220 HCF per residential user appropriate?**

The current sewer cap allows the Town to reduce the costs of sewer usage for high residential water users whose consumption increases during the summer months due to irrigation. Without secondary meters the cap allows the Town to equitably distribute sewer costs so that users are not paying a sewer charge for water that does not enter the sewer system. Based on our analysis the current cap of 220 units is fair for users whose high usage is for irrigation. The cap, however, does not differentiate high consumption that is from irrigation versus high sanitary consumption. As a result, many customers who consume and discharge greater than 220 units annually into the sewer system benefit from the cap.

- **What impact does infiltration and inflow (I/I) component have on sewer rates?**

The Town's I/I component has little effect on the Town's sewer rates and the current rate structure. The effort the Town has made to reduce the amount of I/I entering its collection system has been done in a cost effective manner, and further reduction is not likely to reduce the few variable costs in the Town's wastewater budget. The most significant of these is the cost to pump wastewater to the City of Springfield. Currently, up to 11% of annual wastewater costs are variable from I/I.



Table 1

Number of Residential Customers by Unit Water Consumption (Percentile Rank)

Town of Longmeadow, MA

Percentile (Up to)	Number of Units Consumed ¹	Number of Residential Customers
10%	0-41	552
20%	41-60	553
30%	60-78	552
40%	78-95	552
50%	95-113	552
60%	113-136	552
70%	136-164	553
80%	164-202	553
90%	202-268	552
100%	268-1276	552

Table 1A

Number of Residential Customers by Unit Water Consumption

Town of Longmeadow, MA

Number of Units Consumed ¹	Number of Residential Customers
0-50	841
51-100	1,578
101-150	1,235
151-200	777
201-220	203
221-250	255
251-300	264
301+	270

Notes:

1. Average annual water consumption from August 2015 through July 2017.

Table 2
Flat Rate Meter Charges for Sewer Users (FY2018)
Town of Longmeadow, MA



Charge Code	Number of Accounts	Yearly Charge	Yearly Revenue
5-8SEW	3,323	\$ 34.28	\$ 113,912
3-4SEW	1,510	\$ 34.28	\$ 51,763
1-SEW	633	\$ 60.94	\$ 38,575
1.5SEW	59	\$ 137.12	\$ 8,090
2-SEW	35	\$ 243.77	\$ 8,532
3-SEW	8	\$ 548.48	\$ 4,388
4-SEW	5	\$ 975.08	\$ 4,875
Total =	5,573	\$ -	\$ 230,136

Table 3
Alternative Sewer Rate Concepts
Town of Longmeadow, MA

Alternative ¹	Projected Revenue Based on Current Rate (\$2.50/HCF) ^{2,3}	Sewer Rate Necessary to Generate Revenue Equal to Current Rate System
Current Rate System FY18	\$ 2,008,248	\$ 2.50
Secondary Water Meters (No Annual Cap)	See Table 3A	
Semi Annual Winter Averaging (Oct-March)	\$ 1,376,670	\$ 3.88
Quartely Winter Averaging (Dec-February)	\$ 1,288,139	\$ 4.20
Fixed Fee (EDU) Alternative ⁴	\$ 2,013,249	\$ 347 per year

Table 3A
Alternative Sewer Rate Structures for Secondary Meters (No Annual Cap)
Town of Longmeadow, MA

Percent of Water and Sewer Customers with Proposed Second Meter	Projected Revenue Based on Current Rate (\$2.50/HCF) ^{2,3}	Sewer Rate Necessary to Generate Revenue Equal to Current Rate System (HCF)
0%	\$ 2,229,175	\$ 2.50*
5%	\$ 2,038,326	\$ 2.50*
6%**	\$ 2,008,248	\$ 2.50
10%	\$ 1,914,460	\$ 2.64
15%	\$ 1,817,264	\$ 2.80
20%	\$ 1,736,362	\$ 2.95
25%	\$ 1,666,813	\$ 3.09
30%	\$ 1,598,676	\$ 3.24

Notes:

1. Average annual water consumption from August 2015 through July 2017.
 2. Projected Revenue includes \$230,136 generated from flat meters charges for sewer users.
 3. HCF = Hundred Cubic Feet
 4. EDU = Equivalent Dwelling Unit. Currently there are approximately 5,802 EDUs in Town.
- * - The rate was held at the current FY2018 rate.
 ** - Up to six percent of the high water users could install secondary meters without impacting annual sewer revenues.

Figure 1
Annual Sewer Cost for Residential Customers (by Consumption Percentile)
Current Rate Structure, Winter Averaging Alternatives, and Fixed Fee
Town of Longmeadow, MA

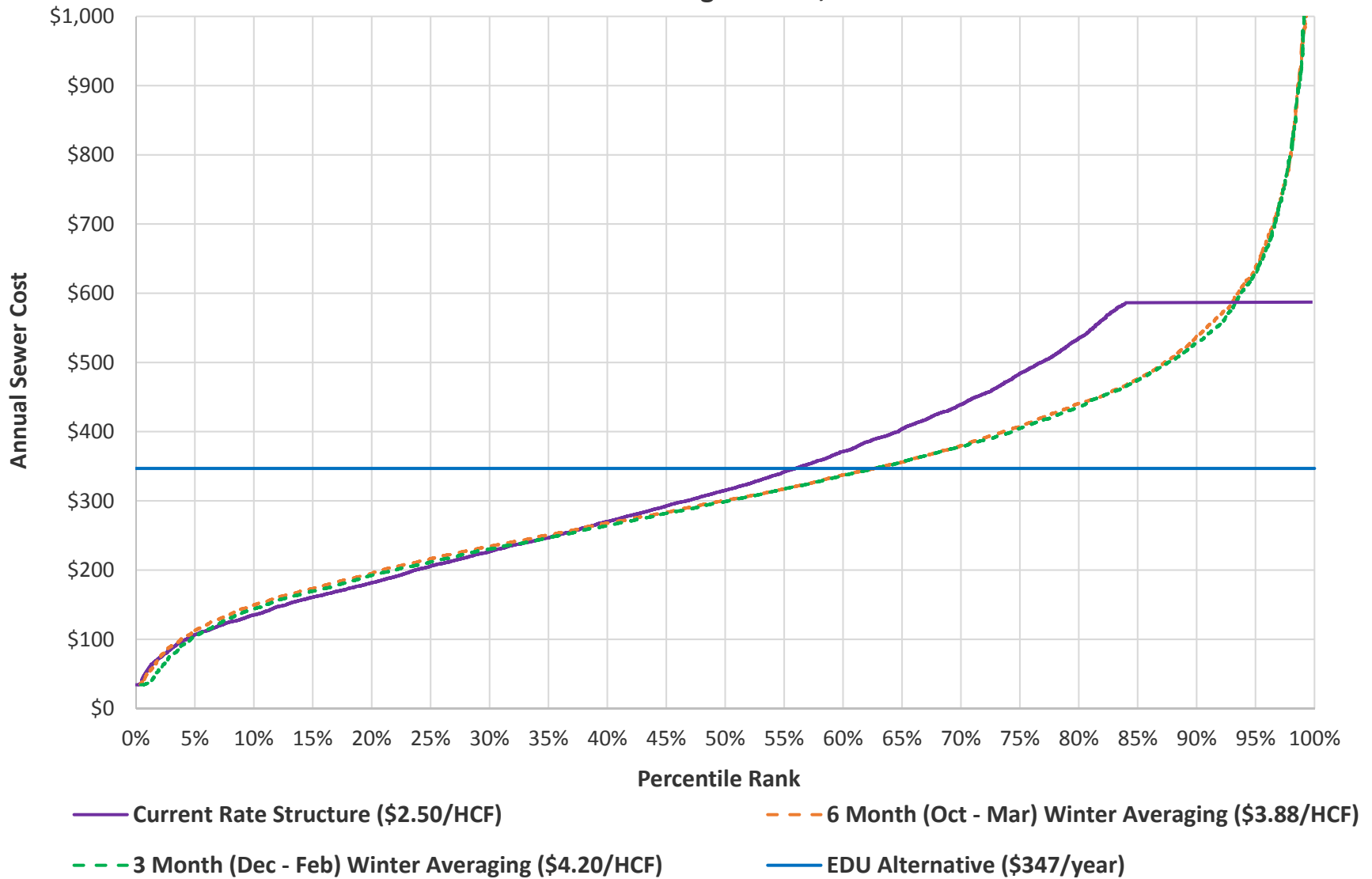


Figure 2
Annual Sewer Cost for Residential Customers (by Consumption Percentile)
Current Rate Structure and Second Meters with No 220 HCF Annual Cap
Town of Longmeadow, MA

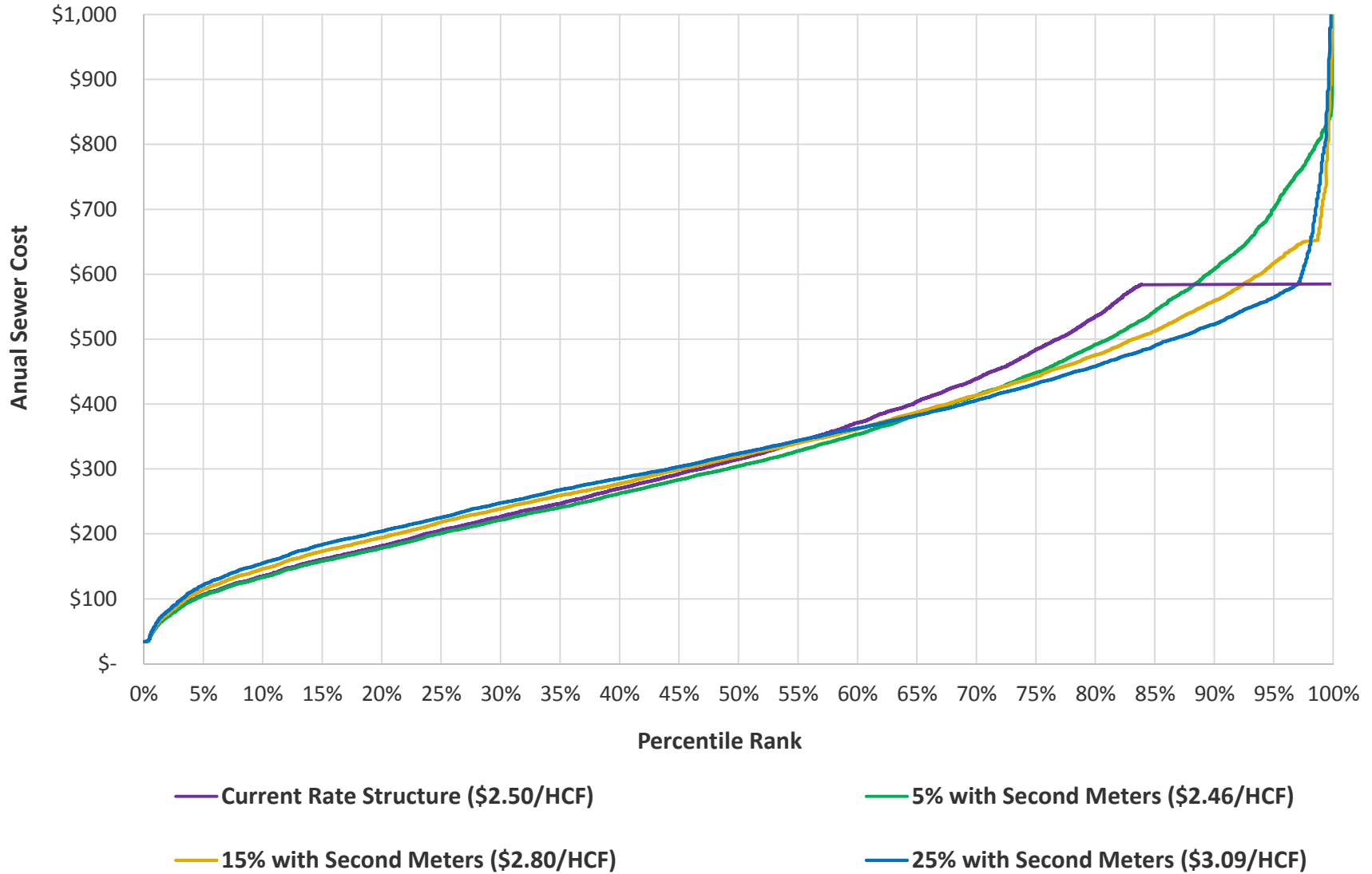


Table 4

**Projected Seasonal Water and Sewer Bills for Residential Customers by Consumption Percentile - Current Rate System vs Winter Averaging
Town of Longmeadow, MA**



Current Rate System ^{1,2}											
Summer	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Water Bill	\$ -	\$ 70	\$ 107	\$ 143	\$ 182	\$ 234	\$ 301	\$ 384	\$ 496	\$ 670	\$ 2,190
Sewer Bill	\$ 17	\$ 72	\$ 101	\$ 128	\$ 158	\$ 199	\$ 251	\$ 316	\$ 402	\$ 292	\$ 292
Winter											
Water Bill	\$ -	\$ 48	\$ 67	\$ 83	\$ 97	\$ 110	\$ 126	\$ 143	\$ 169	\$ 208	\$ 755
Sewer Bill	\$ 17	\$ 54	\$ 69	\$ 82	\$ 92	\$ 103	\$ 115	\$ 128	\$ 148	\$ 292	\$ 292
3-Month Winter Averaging (Dec - Feb) ³											
Summer	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Water Bill	\$ -	\$ 70	\$ 107	\$ 143	\$ 182	\$ 234	\$ 301	\$ 384	\$ 496	\$ 670	\$ 2,190
Sewer Bill	\$ 17	\$ 72	\$ 96	\$ 115	\$ 132	\$ 149	\$ 168	\$ 189	\$ 218	\$ 264	\$ 954
Winter											
Water Bill	\$ -	\$ 48	\$ 67	\$ 83	\$ 97	\$ 110	\$ 126	\$ 143	\$ 169	\$ 208	\$ 755
Sewer Bill	\$ 17	\$ 72	\$ 96	\$ 115	\$ 132	\$ 149	\$ 168	\$ 189	\$ 218	\$ 264	\$ 954
6-Month Winter Averaging (Oct - Mar) ⁴											
Summer	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Water Bill	\$ -	\$ 70	\$ 107	\$ 143	\$ 182	\$ 234	\$ 301	\$ 384	\$ 496	\$ 670	\$ 2,190
Sewer Bill	\$ 17	\$ 75	\$ 97	\$ 117	\$ 134	\$ 150	\$ 169	\$ 190	\$ 220	\$ 268	\$ 927
Winter											
Water Bill	\$ -	\$ 48	\$ 67	\$ 83	\$ 97	\$ 110	\$ 126	\$ 143	\$ 169	\$ 208	\$ 755
Sewer Bill	\$ 17	\$ 75	\$ 97	\$ 117	\$ 134	\$ 150	\$ 169	\$ 190	\$ 220	\$ 268	\$ 927

Notes:

1. Current rate system based on FY18 water rate of \$3.22/HCF and FY18 sewer rate of \$2.50/HCF.
2. Sewer costs includes 220 HCF annual usage cap and flat meter charges.
3. Projected sewer bills based on a fixed rate of \$4.20/HCF.
4. Projected sewer bills based on a fixed rate of \$3.88/HCF.

Table 5

Projected Seasonal Water and Sewer Bills for Residential Customers by Consumption Percentile - Current Rate System vs Second Meters (Top 5%)
Town of Longmeadow, MA



Current Rate System^{1,2}											
Summer	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Water Bill	\$ -	\$ 70	\$ 107	\$ 143	\$ 182	\$ 234	\$ 301	\$ 384	\$ 496	\$ 670	\$ 2,190
Sewer Bill	\$ 17	\$ 72	\$ 101	\$ 128	\$ 158	\$ 199	\$ 251	\$ 316	\$ 402	\$ 292	\$ 292
Winter											
Water Bill	\$ -	\$ 48	\$ 67	\$ 83	\$ 97	\$ 110	\$ 126	\$ 143	\$ 169	\$ 208	\$ 755
Sewer Bill	\$ 17	\$ 54	\$ 69	\$ 82	\$ 92	\$ 103	\$ 115	\$ 128	\$ 148	\$ 292	\$ 292
Second Meters³											
Summer	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Water Bill	\$ -	\$ 70	\$ 107	\$ 143	\$ 182	\$ 234	\$ 301	\$ 384	\$ 496	\$ 670	\$ 2,190
Sewer Bill	\$ 17	\$ 72	\$ 99	\$ 126	\$ 154	\$ 186	\$ 234	\$ 289	\$ 357	\$ 467	\$ 745
Winter											
Water Bill	\$ -	\$ 48	\$ 67	\$ 83	\$ 97	\$ 110	\$ 126	\$ 143	\$ 169	\$ 208	\$ 755
Sewer Bill	\$ 17	\$ 54	\$ 69	\$ 82	\$ 92	\$ 103	\$ 115	\$ 128	\$ 148	\$ 178	\$ 603

Notes:

1. Current rate system based on FY18 water rate of \$3.22/HCF and FY18 sewer rate of \$2.50/HCF.
2. Sewer costs includes 220 HCF annual usage cap and flat meter charges.
3. Projected water and sewer bills based on FY18 rates.

Table 6

Fiscal Year 2018 - Requested Wastewater Budget
Town of Longmeadow, MA



Expense	Requested FY2018
Personnel Services Expense Categories	
Director	\$ 10,902
Assistant Director	\$ 35,259
Engineer	\$ 66,719
Labor	\$ 127,777
Clerical	\$ 18,297
Regular OT	\$ 21,000
Standby OT	\$ 14,680
Total Personnel Expenses	\$ 294,634
Operating Expense Categories	
Employee Benefits	\$ 105,000
Energy - Electricity	\$ 27,000
Energy - Heating Oil	\$ 10,200
Utilities	\$ 4,000
Springfield Sewer	\$ 578,000
Rep and Maint - Buildings	\$ 40,000
Rep and Maint - Vehicle	\$ 13,500
Rep and Maint - DPW Equip.	\$ 12,000
Drain Maint	\$ 7,500
Mains Maint	\$ 30,000
Engineering Service	\$ 14,250
Town Admin Fee	\$ 31,000
Telephone	\$ 2,000
Communications	\$ 1,300
Vehicle Fuel	\$ 17,000
Personal Protective Equipment	\$ 5,200
Other Expense	\$ 15,000
Liability Insurance	\$ 32,000
Fund Reserve	\$ 40,000
Debt Service	\$ 615,022
OPEB Liability	\$ 2,769
Total Operating Expenses	\$ 1,602,741
Total Wastewater Budget	\$ 1,897,375
Total Fixed Costs	\$ 1,261,175
Total Variable Costs	\$ 636,200