

2625-00

May 27, 2021

Mr. Ron Miner, Superintendent  
Merrimack Village District  
2 Greens Pond Road  
Merrimack, NH 03054

**Re: Rate Recommendations  
Merrimack Village District  
Merrimack, NH**

Dear Mr. Miner:

In accordance with ESR #57, Underwood Engineers (UE) issued a draft report dated January 20, 2021, which explored conservation rate options for the Merrimack Village District (MVD). This report included a description of conservation rates and how they work, summaries of conservation rate experiences of other local communities, several conservation rate options and discussion, seasonal and drought/surcharge rate options, and considerations for MVD if conservation rates are to be implemented.

As a separate item, UE reviewed budget information provided by MVD, and noted that a 9% rate increase would be needed just to match revenues to the MVD provided budget, however this would not support the asset management program and capital reserve contributions. An adjustment of 22% would be needed to continue previous capital reserve contributions.

Conservation rate recommendations, as well as rate increase recommendations were discussed at the Board of Commissioners meeting held on April 20, 2021. Following the Board meeting, UE summarized additional rate scenarios for the following parameters:

- Use the existing consumption rate of \$2.32/100 CF as a baseline
- Use a tier threshold of 3,000 CF/qtr.
- Use a tier cost ratio of 1.1
- Provide rate options to meet the FY2022 budget provided by MVD, and also to meet the FY2022 budget plus \$500,000 for asset management and capital reserve funding.

Based on the above analyses, UE provided the following recommendations, which were discussed at the Board of Commissioners meeting held on May 17, 2021:

- Implement a tiered rate structure to promote conservation and increase conservation messaging.

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Mr. Ron Miner  
May 27, 2021

- Adjust rates 22% to generate revenue to support asset management and capital reserves. Additional increases will be needed to support future debt and O&M.
- Perform a rate model update prior to FY2023 to identify further needed rate increases once GAC O&M and debt schedule information can be better defined.
- It should be noted that the 22% increase is consistent with and actually less than the projections presented in 2018.

The proposed conservation rate option (tier threshold of 3,000 CF/qtr., and tier ratio of 1.1) along with the recommended 22% rate increase is shown in the attached Table.

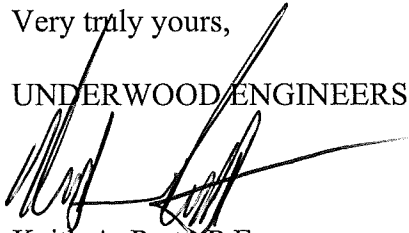
Additional attached supplemental information includes:

- Sample bills with the following scenarios for low, average, and high residential users, commercial users, and industrial users:
  - Current rates
  - Current rates with 9% rate increase (for comparison)
  - Tiered rates with 9% rate increase
  - Tiered rates with 22% rate increase (recommended)
- Comparison of rate recommendation (22% against 2018/19 projections) showing that we are less than what was anticipated when the warrant articles were approved.
- Finalized Conservation Rates Technical Memorandum dated January 20, 2021.

Please call if you have any questions.

Very truly yours,

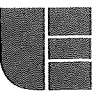
UNDERWOOD ENGINEERS, INC.



Keith A. Pratt, P.E.  
President

MLM/kap

Encl.



**MVD - Proposed Conservation Rate Schedule with 22% Rate Increase  
May 21, 2021**

<u>Description of Service:</u>	<u>Rate:</u>	
Water Consumption/Usage Charge:	\$2.83 per 100 cubic feet for usage up to 3,000 cubic feet per quarter \$3.11 per 100 cubic feet for usage over 3,000 cubic feet per quarter	
Meter Charge	<u>Quarterly:</u>	<u>Yearly:</u>
5/8"	\$19.50	\$78.00
1"	\$34.75	\$139.00
1-1/2"	\$53.75	\$215.00
2"	\$79.25	\$317.00
3"	\$120.50	\$482.00
4"	\$186.75	\$747.00
6"	\$349.00	\$1,396.00
8"	\$541.75	\$2,167.00
10"	\$764.00	\$3,056.00
12"	\$1,359.00	\$5,436.00
Hydrant Charge	<u>Quarterly:</u>	<u>Yearly:</u>
Domestic	\$23.75	\$95.00
Mercantile	\$47.50	\$190.00
Industrial	\$118.25	\$473.00
Fire Protection	<u>Quarterly:</u>	<u>Yearly:</u>
2"	\$68.25	\$273.00
4"	\$136.75	\$547.00
6"	\$306.25	\$1,225.00
8"	\$545.25	\$2,181.00
10"	\$945.50	\$3,782.00
12"	\$1,227.25	\$4,909.00

## 15. SAMPLE WATER BILLS (Existing Rates compared to Alternatives)

Town of Merrimack, NH

Description	Average gpd	Meter Size	Consum. CF/Qtr	Hydrant	Meter	Cons. T1	Cons. T2	Charge	Annual \$ Inc.	Annual % Inc.	
<b>Residential (Hydrant Only)</b>											
Current Rates FY2021	0	5/8"	0	\$78	\$64	\$2.32		\$36	\$142		
Current Rates FY2022 - 9%	0	5/8"	0	\$85	\$70	\$2.53		\$39	\$155	9%	
Tiered Rates FY2022 - 9%	0	5/8"	0	\$85	\$70	\$2.53	\$2.78	\$39	\$155	9%	
Tiered Rates FY2022 - 22%	0	5/8"	0	\$95	\$78	\$2.83	\$3.11	\$43	\$173	22%	
<b>Residential Single Unit (Very Low User)</b>											
Current Rates FY2021	80	5/8"	976	\$78	\$64	\$2.32		\$58	\$233		
Current Rates FY2022 - 9%	80	5/8"	976	\$85	\$70	\$2.53		\$63	\$254	9%	
Tiered Rates FY2022 - 9%	80	5/8"	976	\$85	\$70	\$2.53	\$2.78	\$63	\$254	9%	
Tiered Rates FY2022 - 22%	80	5/8"	976	\$95	\$78	\$2.83	\$3.11	\$71	\$284	22%	
<b>Residential Single Unit (Average Residential in Town)</b>											
Current Rates FY2021	206	5/8"	2513	\$78	\$64	\$2.32		\$94	\$375		
Current Rates FY2022 - 9%	206	5/8"	2513	\$85	\$70	\$2.53		\$102	\$409	9%	
Tiered Rates FY2022 - 9%	206	5/8"	2513	\$85	\$70	\$2.53	\$2.78	\$102	\$409	9%	
Tiered Rates FY2022 - 22%	206	5/8"	2513	\$95	\$78	\$2.83	\$3.11	\$114	\$458	22%	
<b>Residential Single Unit (Higher user)</b>											
Current Rates FY2021	400	5/8"	4880	\$78	\$64	\$2.32		\$149	\$595		
Current Rates FY2022 - 9%	400	5/8"	4880	\$85	\$70	\$2.53		\$162	\$648	9%	
Tiered Rates FY2022 - 9%	400	5/8"	4880	\$85	\$70	\$2.53	\$2.78	\$167	\$667	12%	
Tiered Rates FY2022 - 22%	400	5/8"	4880	\$95	\$78	\$2.83	\$3.11	\$187	\$747	26%	
<b>Residential Single Unit (Very High user)</b>											
Current Rates FY2021	820	5/8"	10000	\$78	\$64	\$2.32		\$268	\$1,070		
Current Rates FY2022 - 9%	820	5/8"	10000	\$85	\$70	\$2.53		\$292	\$1,166	9%	
Tiered Rates FY2022 - 9%	820	5/8"	10000	\$85	\$70	\$2.53	\$2.78	\$309	\$1,237	16%	
Tiered Rates FY2022 - 22%	820	5/8"	10000	\$95	\$78	\$2.83	\$3.11	\$346	\$1,385	29%	
<b>Residential Single Unit (Based on NHDES Statewide Average)</b>											
Current Rates FY2021	197	5/8"	2403	\$78	\$64	\$2.32		\$91	\$365		
Current Rates FY2022 - 9%	197	5/8"	2403	\$85	\$70	\$2.53		\$99	\$398	9%	
Tiered Rates FY2022 - 9%	197	5/8"	2403	\$85	\$70	\$2.53	\$2.78	\$99	\$398	9%	
Tiered Rates FY2022 - 22%	197	5/8"	2403	\$95	\$78	\$2.83	\$3.11	\$111	\$445	22%	
<b>STATE AVERAGE COST (2021)</b>	<b>197</b>	<b>5/8"</b>	<b>2403</b>						<b>\$577</b>		
<b>Commercial</b>											
Current Rates FY2021	2500	2"	30498	\$156	\$260	\$2.32		\$812	\$3,247		
Current Rates FY2022 - 9%	2500	2"	30498	\$170	\$283	\$2.53		\$885	\$3,539	9%	
Tiered Rates FY2022 - 9%	2500	2"	30498	\$170	\$283	\$2.53	\$2.78	\$954	\$3,817	18%	
Tiered Rates FY2022 - 22%	2500	2"	30498	\$190	\$317	\$2.83	\$3.11	\$1,068	\$4,273	32%	
<b>Industrial</b>											
Current Rates FY2021	5000	4"	60996	\$388	\$612	\$2.32		\$1,665	\$6,662		
Current Rates FY2022 - 9%	5000	4"	60996	\$423	\$667	\$2.53		\$1,815	\$7,261	9%	
Tiered Rates FY2022 - 9%	5000	4"	60996	\$423	\$667	\$2.53	\$2.78	\$1,962	\$7,848	18%	
Tiered Rates FY2022 - 22%	5000	4"	60996	\$473	\$747	\$2.83	\$3.11	\$2,196	\$8,784	32%	



Current recommendation is far below what was projected due primarily to delay in debt service payments

## 15. SAMPLE WATER BILLS (Existing Rates compared to Alternatives)

Town of Merrimack, NH

Description	Average gpd	Meter Size	Consum. CF/Qtr	Existing Rates					Proposed Rates					FY 2021					FY 2022							
				FY 2019					FY 2020					FY 2021					FY 2022							
				Hydrant	Meter	Cons	Charge	Annual	Hydrant	Meter	Cons	Charge	Annual	Hydrant	Meter	Cons	Charge	Annual	Hydrant	Meter	Cons	Charge	Annual			
<b>Residential (Hydrant Only)</b>																										
Existing rates	0	5/8"	0	\$65	\$54	\$1.95	\$30	\$119	\$65	\$54	\$1.95	\$30	\$119	0%	\$65	\$54	\$1.95	\$30	\$119	0%	\$65	\$54	\$1.95	\$30	\$119	0%
Proposed rates (a)	0	5/8"	0	\$65	\$54	\$1.95	\$30	\$119	\$73	\$61	\$2.20	\$34	\$134	13%	\$83	\$69	\$2.49	\$38	\$152	13%	\$83	\$69	\$2.49	\$38	\$152	13%
Proposed rates (b)	0	5/8"	0	\$65	\$54	\$1.95	\$30	\$119	\$73	\$61	\$2.20	\$34	\$134	13%	\$83	\$69	\$2.49	\$38	\$152	13%	\$93	\$77	\$2.79	\$43	\$170	12%
Proposed rates (c)	0	5/8"	0	\$65	\$54	\$1.95	\$30	\$119	\$73	\$61	\$2.20	\$34	\$134	13%	\$83	\$69	\$2.49	\$38	\$152	13%	\$100	\$83	\$3.01	\$46	\$184	21%
Proposed rates (d)	0	5/8"	0	\$65	\$54	\$1.95	\$30	\$119	\$73	\$61	\$2.20	\$34	\$134	13%	\$83	\$69	\$2.49	\$38	\$152	13%	\$116	\$97	\$3.49	\$53	\$213	40%
<b>Residential Single Unit (Very Low User)</b>																										
Existing rates	80	5/8"	976	\$65	\$54	\$1.95	\$49	\$195	\$65	\$54	\$1.95	\$49	\$195	0%	\$65	\$54	\$1.95	\$49	\$195	0%	\$65	\$54	\$1.95	\$49	\$195	0%
Proposed rates (a)	80	5/8"	976	\$65	\$54	\$1.95	\$49	\$195	\$73	\$61	\$2.20	\$55	\$220	13%	\$83	\$69	\$2.49	\$62	\$249	13%	\$83	\$69	\$2.49	\$62	\$249	13%
Proposed rates (b)	80	5/8"	976	\$65	\$54	\$1.95	\$49	\$195	\$73	\$61	\$2.20	\$55	\$220	13%	\$83	\$69	\$2.49	\$62	\$249	13%	\$93	\$77	\$2.79	\$70	\$279	12%
Proposed rates (c)	80	5/8"	976	\$65	\$54	\$1.95	\$49	\$195	\$73	\$61	\$2.20	\$55	\$220	13%	\$83	\$69	\$2.49	\$62	\$249	13%	\$100	\$83	\$3.01	\$75	\$301	21%
Proposed rates (d)	80	5/8"	976	\$65	\$54	\$1.95	\$49	\$195	\$73	\$61	\$2.20	\$55	\$220	13%	\$83	\$69	\$2.49	\$62	\$249	13%	\$116	\$97	\$3.49	\$87	\$349	40%
<b>Residential Single Unit (Average Residential in Town)</b>																										
Existing rates	206	5/8"	2513	\$65	\$54	\$1.95	\$79	\$315	\$65	\$54	\$1.95	\$79	\$315	0%	\$65	\$54	\$1.95	\$79	\$315	0%	\$65	\$54	\$1.95	\$79	\$315	0%
Proposed rates (a)	206	5/8"	2513	\$65	\$54	\$1.95	\$79	\$315	\$73	\$61	\$2.20	\$89	\$356	13%	\$83	\$69	\$2.49	\$101	\$402	13%	\$83	\$69	\$2.49	\$101	\$402	13%
Proposed rates (b)	206	5/8"	2513	\$65	\$54	\$1.95	\$79	\$315	\$73	\$61	\$2.20	\$89	\$356	13%	\$83	\$69	\$2.49	\$101	\$402	13%	\$93	\$77	\$2.79	\$113	\$451	12%
Proposed rates (c)	206	5/8"	2513	\$65	\$54	\$1.95	\$79	\$315	\$73	\$61	\$2.20	\$89	\$356	13%	\$83	\$69	\$2.49	\$101	\$402	13%	\$100	\$83	\$3.01	\$122	\$487	21%
Proposed rates (d)	206	5/8"	2513	\$65	\$54	\$1.95	\$79	\$315	\$73	\$61	\$2.20	\$89	\$356	13%	\$83	\$69	\$2.49	\$101	\$402	13%	\$116	\$97	\$3.49	\$141	\$563	40%
<b>Residential Single Unit (Higher user)</b>																										
Existing rates	400	5/8"	4880	\$65	\$54	\$1.95	\$125	\$500	\$65	\$54	\$1.95	\$125	\$500	0%	\$65	\$54	\$1.95	\$125	\$500	0%	\$65	\$54	\$1.95	\$125	\$500	0%
Proposed rates (a)	400	5/8"	4880	\$65	\$54	\$1.95	\$125	\$500	\$73	\$61	\$2.20	\$141	\$565	13%	\$83	\$69	\$2.49	\$159	\$638	13%	\$83	\$69	\$2.49	\$159	\$638	13%
Proposed rates (b)	400	5/8"	4880	\$65	\$54	\$1.95	\$125	\$500	\$73	\$61	\$2.20	\$141	\$565	13%	\$83	\$69	\$2.49	\$159	\$638	13%	\$93	\$77	\$2.79	\$179	\$715	12%
Proposed rates (c)	400	5/8"	4880	\$65	\$54	\$1.95	\$125	\$500	\$73	\$61	\$2.20	\$141	\$565	13%	\$83	\$69	\$2.49	\$159	\$638	13%	\$100	\$83	\$3.01	\$193	\$772	21%
Proposed rates (d)	400	5/8"	4880	\$65	\$54	\$1.95	\$125	\$500	\$73	\$61	\$2.20	\$141	\$565	13%	\$83	\$69	\$2.49	\$159	\$638	13%	\$116	\$97	\$3.49	\$223	\$893	40%
<b>Residential Single Unit (Based on NHDES Statewide Average)</b>																										
Existing rates	197	5/8"	2403	\$65	\$54	\$1.95	\$77	\$306	\$65	\$54	\$1.95	\$77	\$306	0%	\$65	\$54	\$1.95	\$77	\$306	0%	\$65	\$54	\$1.95	\$77	\$306	0%
Proposed rates (a)	197	5/8"	2403	\$65	\$54	\$1.95	\$77	\$306	\$73	\$61	\$2.20	\$87	\$346	13%	\$83	\$69	\$2.49	\$98	\$391	13%	\$83	\$69	\$2.49	\$98	\$391	13%
Proposed rates (b)	197	5/8"	2403	\$65	\$54	\$1.95	\$77	\$306	\$73	\$61	\$2.20	\$87	\$346	13%	\$83	\$69	\$2.49	\$98	\$391	13%	\$93	\$77	\$2.79	\$110	\$438	12%
Proposed rates (c)	197	5/8"	2403	\$65	\$54	\$1.95	\$77	\$306	\$73	\$61	\$2.20	\$87	\$346	13%	\$83	\$69	\$2.49	\$98	\$391	13%	\$100	\$83	\$3.01	\$118	\$473	21%
Proposed rates (d)	197	5/8"	2403	\$65	\$54	\$1.95	\$77	\$306	\$73	\$61	\$2.20	\$87	\$346	13%	\$83	\$69	\$2.49	\$98	\$391	13%	\$116	\$97	\$3.49	\$137	\$548	40%
STATE AVERAGE COST (2018)	197	5/8"	2403					\$552					\$552						\$552						\$552	
<b>Commercial</b>																										
Existing rates	2500	2"	30498	\$131	\$219	\$1.95	\$682	\$2,729	\$131	\$219	\$1.95	\$682	\$2,729	0%	\$131	\$219	\$1.95	\$682	\$2,729	0%	\$131	\$219	\$1.95	\$682	\$2,729	0%
Proposed rates (a)	2500	2"	30498	\$131	\$219	\$1.95	\$682	\$2,729	\$148	\$247	\$2.20	\$771	\$3,084	13%	\$167	\$280	\$2.49	\$871	\$3,484	13%	\$167	\$280	\$2.49	\$871	\$3,484	13%
Proposed rates (b)	2500	2"	30498	\$131	\$219	\$1.95	\$682	\$2,729	\$148	\$247	\$2.20	\$771	\$3,084	13%	\$167	\$280	\$2.49	\$871	\$3,484	13%	\$187	\$313	\$2.79	\$976	\$3,903	12%
Proposed rates (c)	2500	2"	30498	\$131	\$219	\$1.95	\$682	\$2,729	\$148	\$247	\$2.20	\$771	\$3,084	13%	\$167	\$280	\$2.49	\$871	\$3,484	13%	\$202	\$338	\$3.01	\$1,054	\$4,216	21%
Proposed rates (d)	2500	2"	30498	\$131	\$219	\$1.95	\$682	\$2,729	\$148	\$247	\$2.20	\$771	\$3,084	13%	\$167	\$280	\$2.49	\$871	\$3,484	13%	\$234	\$391	\$3.49	\$1,220	\$4,878	40%
<b>Industrial</b>																										
Existing rates	5000	4"	60996	\$326	\$514	\$1.95	\$1,399	\$5,598	\$326	\$514	\$1.95	\$1,399	\$5,598	0%	\$326	\$514	\$1.95	\$1,399	\$5,598	0%	\$326	\$514	\$1.95	\$1,399	\$5,598	0%
Proposed rates (a)	5000	4"	60996	\$326	\$514	\$1.95	\$1,399	\$5,598	\$368	\$581	\$2.20	\$1,581	\$6,325	13%	\$416	\$656	\$2.49	\$1,787	\$7,148	13%	\$416	\$656	\$2.49	\$1,787	\$7,148	13%
Proposed rates (b)	5000	4"	60996	\$326	\$514	\$1.95	\$1,399	\$5,598	\$368	\$581	\$2.20	\$1,581	\$6,325	13%	\$416	\$656	\$2.49	\$1,787	\$7,148	13%	\$466	\$735	\$2.79	\$2,001	\$8,005	12%
Proposed rates (c)	5000	4"	60996	\$326	\$514	\$1.95	\$1,399	\$5,598	\$368	\$581	\$2.20	\$1,581	\$6,325	13%	\$416	\$656	\$2.49	\$1,787	\$7,148	13%	\$504	\$794	\$3.01	\$2,162	\$8,649	21%
Proposed rates (d)	5000	4"	60996	\$326	\$514	\$1.95	\$1,399	\$5,598	\$368	\$581	\$2.20	\$1,581	\$6,325	13%	\$416	\$656	\$2.49	\$1,787	\$7,148	13%	\$583	\$919	\$3.49	\$2,502	\$10,007	40%

\$100 \$83 \$3.01 \$122 \$487 21%  
 \$116 \$97 \$3.49 \$141 \$563 40%  
**95 78 2.83/3.11 458**

Notes:



25 Vaughan Mall  
Portsmouth, NH, 03801-4012  
Tel: 603-436-6192 Fax: 603-431-4733

## Technical Memorandum

To: Ronald Miner, Superintendent, Merrimack Village District  
From: Meagan L. McCowan, P.E., Keith A. Pratt, P.E., Underwood Engineers  
Date: January 20, 2021  
Subject: Conservation Rates

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### **Background**

Adequate water supply has been a concern for many communities due to recent drought, including the Merrimack Village District (MVD). At certain times, MVD has had to purchase water from adjacent water systems to support peak needs. MVD would like to explore opportunities to conserve water, including the possibility of implementing a water rate structure designed to encourage water conservation. Additionally, MVD would like to recover costs of outside sales when needed and establish a rate structure that targets the appropriate users to pay for these additional costs. Water rates designed to encourage water conservation are typically tiered rate structures with lower usage costs for users who fall within a lower water usage range, and higher usage costs for users who use water in a higher range.

### **Water Conservation Rates**

An increasing block rate structure is geared towards promotion of water conservation, and includes one or more tier, with a usage threshold for each tier, and increasing unit costs for each tier. Approximately 10 out of 148 utilities in New Hampshire currently utilize increasing block rates per information on the NHDES rate dashboard.

Considerations include:

- Increasing block rates are typically appropriate for homogenous customer groups with identifiable peaking factors, and may not be appropriate for customer classes that are generally consistent in their water usage (e.g., industrial or commercial users)
- Revenue stability may decrease since a proportionately greater revenue amount is to be collected in the higher usage tier for each revenue class.

Blocks may be sized:

- To capture a certain percentage of bills
- To capture indoor vs outdoor usage
- To capture basic water needs of typical single family

Different blocks may be utilized for different customer classes or meter sizes.



### **Experience of Local Communities using Tiered Rates**

UE spoke with representatives of the Town of Exeter and the City of Portsmouth regarding their experience with tiered water rates.

#### **Town of Exeter**

The Town of Exeter switched to tiered water rates around 2006. They have three consumption tiers, with higher costs for each successive tier based on consumption. Tiers exist for both water and sewer rates, so this emphasizes the message of conservation. Residential and commercial users are both charged based on the same tiers, but they also switched to a flat service charge for all users, instead of a service charge based on meter size. This was likely done in consideration of the fact that commercial users will be charged in the higher tiers even though they are not contributing to peak demands, typically.

Exeter notes the greatest benefit of the tiered rates is that it keeps the message of conservation always in the mind of their customers. Without tiered rates, customers may not think about conservation. While only modest conservation may have been observed when the rates were implemented, it was noted that customers would likely be using more now if the rates were not implemented. The Town did make sure to get out in front of the public with the proposed change and a message of conservation, and this was generally well received. They also noted that billing was not an issue with the software they had. Exeter bills quarterly.

#### **City of Portsmouth**

The City of Portsmouth switched to tiered water rates in the early 2000's. They have two consumption tiers, with higher costs for the higher consumption tier. There is also a separate irrigation meter rate with three tiers to address sewer use by irrigation users, with higher costs for each successive tier based on consumption. Customers may request an irrigation meter, but only if they have a separate irrigation system that is certified to be water usage efficient. Irrigation usage is deducted from their sewer bill.

The irrigation tiers are more expensive than the normal tiers, and the third irrigation tier is significantly more expensive. Residential and commercial users are both charged based on the same tiers and there is also a service charge based on meter size. While the amount of consumption reduced may be intangible, Portsmouth supports the tiered system as a method to reduce consumption and, more importantly, keep conservation in the mind of the customers. Since sewer rates are based on water consumption, this magnifies the impacts of the tiers and helps promote conservation. The City also offers rebates on water conserving appliances. In addition to the tiered rates, the City also recommends monthly billing, as well as mandatory water restrictions when necessary.

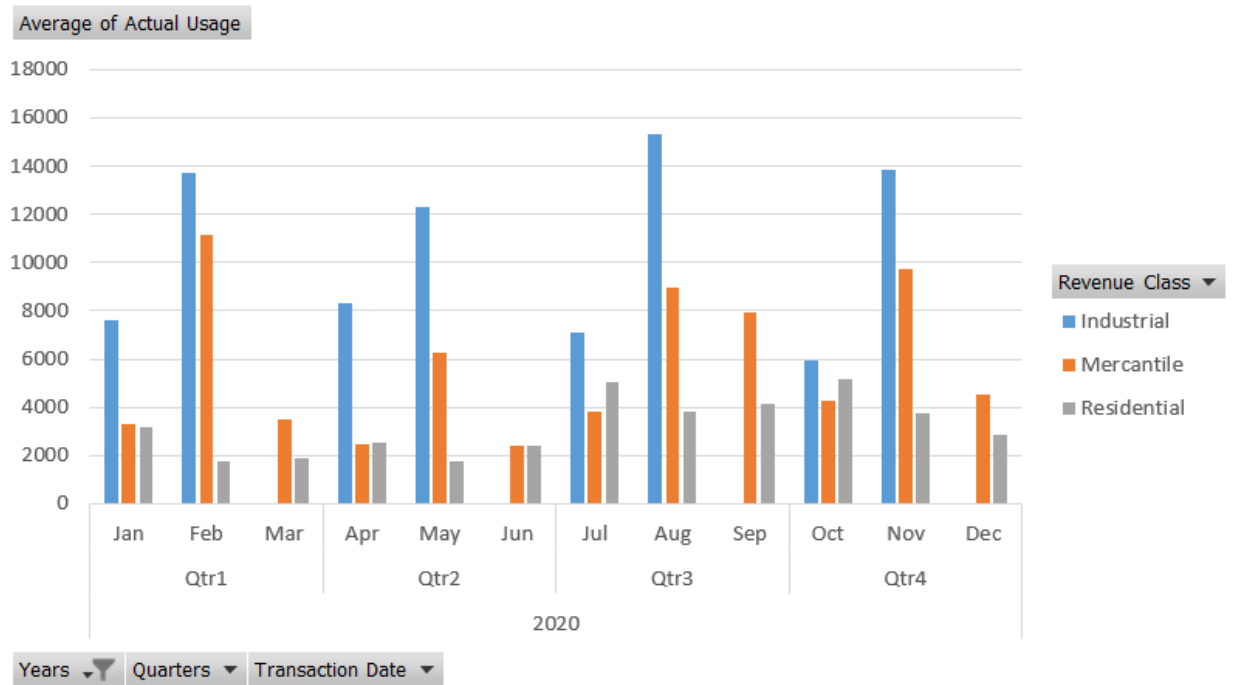
### **Conservation Rate Model**

UE evaluated possible conservation / tiered rate models for MVD using the tiered structure similar to the Portsmouth model. This is also consistent with typical industry standards as presented in the AWWA Manual of Practice on rate setting. The assumptions in building the model include:

- The rates will generate the same revenue as the 2018 Rate Model Update as a baseline.

- The tier 1 threshold options considered were 2,500 CF/qtr. (~207 gpd) and 3,000 CF/qtr. (250 gpd).
- Consumption within each tier was based on actual 2020 usage data provided by MVD. Approximately 53% of the consumption fell within the tier 1 threshold of 3,000 CF/qtr. and approximately 49% of the consumption fell within the tier 1 threshold of 2,500 CF/qtr.
- Quarterly charges were reduced for some of the scenarios.
- Overall usage was assumed to be 95% of what was assumed in the model, to account for conservation when the rates are implemented. This adjusted for potential loss in revenue.

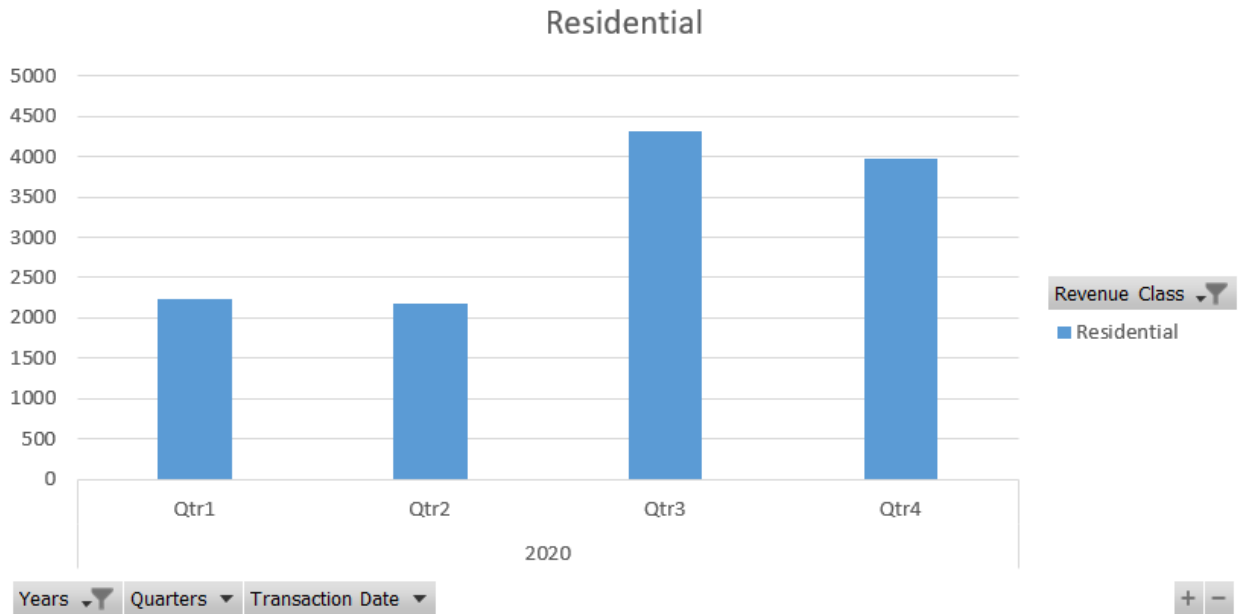
Figures 1, 2, 3 and 4 show average water usage by user class in MVD for 2020. Consumption of 2,500 or 3,000 CF/qtr. appears reasonable for a residential user during non-peak seasons. Commercial and industrial users have different usage patterns and use more water than residential users.



**Figure 1. 2020 Average Water Usage by Month**

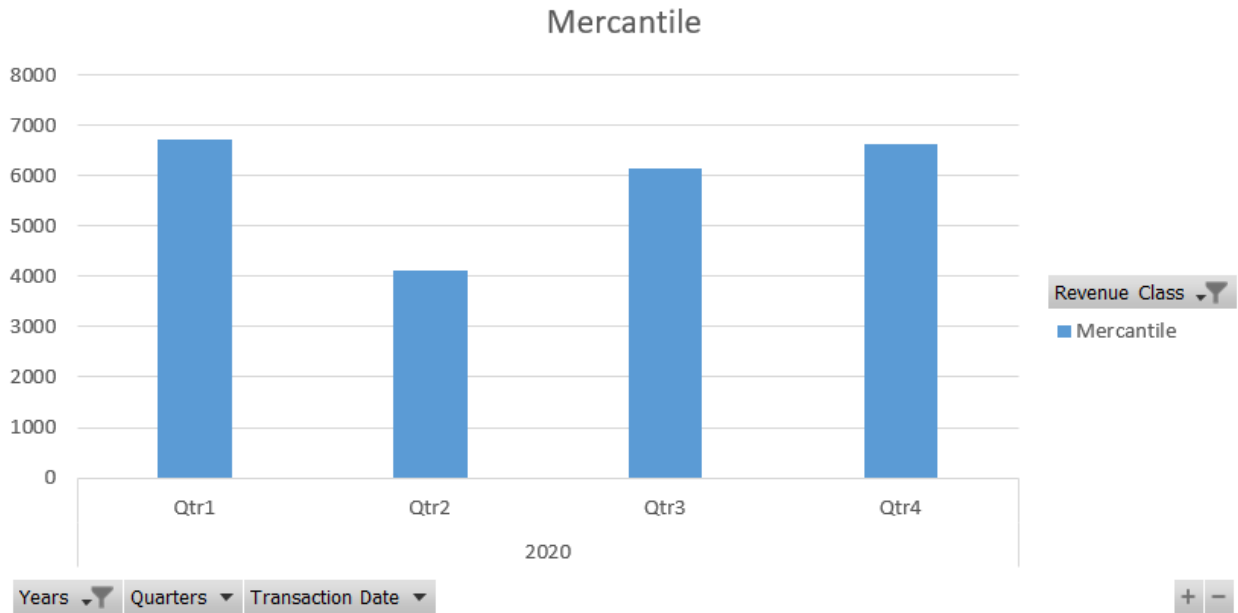


Average of Actual Usage



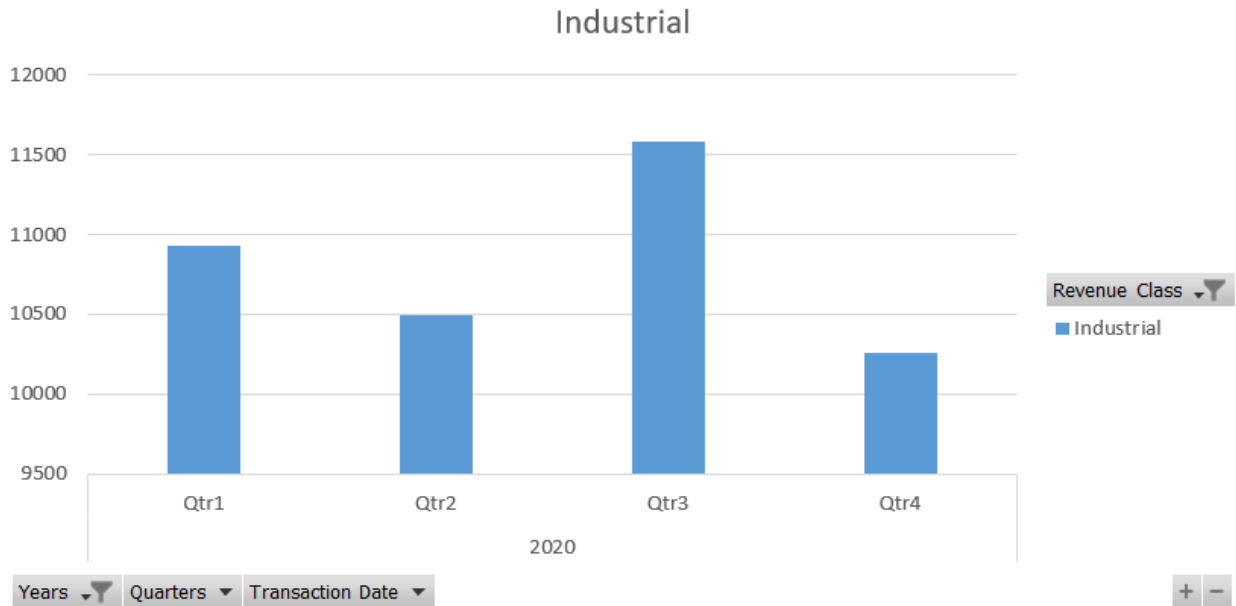
**Figure 2. 2020 Residential Average Water Usage by Quarter**

Average of Actual Usage



**Figure 3. 2020 Mercantile Average Water Usage by Quarter**

## Average of Actual Usage



**Figure 4. 2020 Industrial Average Water Usage by Quarter**

Tiered rate options evaluated by UE are summarized in Table 1. Table 2 shows the quarterly bill for a MVD residential user using significantly more water in the summer for each option and Table 3 includes sample bill comparisons for different user classes. Table 4 compares bills for options A and E to Portsmouth and Exeter bills assuming the same usage. The intent was to compare the impact of the tiers.

**Table 1. MVD Tiered Rate Options Evaluated**

Option	Tier 1 Threshold CF/qtr.*	Tier 2 Threshold CF/qtr.	Tier 1 Rate / 1000CF (FY19)	Tier 2 Rate / 1000CF (FY19)	Cost Ratio	Fixed Charge/qtr.
<b>Tiered Rates A</b>	3,000	>3,000	\$1.88	\$2.25	1.2	\$29.75
<b>Tiered Rates B</b>	3,000	>3,000	\$1.66	\$2.49	1.5	\$29.75
<b>Tiered Rates C</b>	2,500	>2,500	\$1.82	\$2.28	1.25	\$29.75
<b>Tiered Rates D*</b>	3,000	>3,000	\$2.12	\$2.54	1.2	\$23.00
<b>Tiered Rates E**</b>	3,000	>3,000	\$2.42	\$2.90	1.2	\$15.00

\*3,000 CF/qtr. is similar to Portsmouth. 2,500 CF/qtr. is just above a typical low quarter in MVD (2020 Q1 and Q2 residential usage)

\*\*Reduced meter charge by half

\*\*\*Reduced meter and hydrant charge by half



**Table 2. MVD 5/8” Meter Residential User Quarterly Rate for Options A-E (Example)**

Date	Usage CF/qtr.	Current Rates	Tiered Rates A	Tiered Rates B	Tiered Rates C	Tiered Rates D	Tiered Rates E
2/10/2020	1,200	\$53	\$52	\$50	\$52	\$48	\$44
5/10/2020	1,200	\$53	\$52	\$50	\$52	\$48	\$44
8/10/2020	5,400	\$135	\$140	\$139	\$141	\$148	\$157
11/10/2020	9,400	\$213	\$230	\$239	\$232	\$249	\$273
Ratio Q4 Bill to Q1 Bill		4.0	4.4	4.8	4.5	5.1	6.2

See attached Table 3 for more detailed Sewer Bill comparisons.

**Table 4. MVD 5/8” Meter Residential User Quarterly Rate for Current (2019) rates, Option A, Option E, Portsmouth Rates & Exeter Rates**

Date	CF/qtr.	Current Rates	Tiered Rates A	Tiered Rates E	Portsmouth Water Only	Portsmouth Water+ Sewer	Exeter Water Only	Exeter Water+ Sewer
2/10/2020	1,200	\$53	\$52	\$44	\$67	\$239	\$117	\$281
5/10/2020	1,200	\$53	\$52	\$44	\$67	\$239	\$117	\$281
8/10/2020	5,400	\$135	\$140	\$157	\$269	\$1,077	\$421	\$1,079
11/10/2020	9,400	\$213	\$230	\$273	\$477	\$2,532	\$735	\$1,902
Ratio Q4 Bill to Q1 Bill		4.0	4.4	6.2	7.2	10.6	6.3	6.8

Per MVD, summertime peak demands result in the need to purchase water from Pennichuck Water Works which increases operating costs because water purchased is more expensive than water treated by MVD. To account for this, we ran the model to include an additional \$100,000 annually. UE re-evaluated each option (A-E) shown in Tables 5 and 6, but with an additional \$100,000 revenue requirement to be paid by consumption charges.

**Table 5. MVD 5/8” Meter Residential User Quarterly Rate for Options A-E, Adjusted for \$100,000 in Additional MVD Revenue**

Date	Usage CF/qtr.	Current Rates	Tiered Rates A	Tiered Rates B	Tiered Rates C	Tiered Rates D	Tiered Rates E
2/10/2020	1,200	\$53	\$53	\$51	\$53	\$50	\$45
5/10/2020	1,200	\$53	\$53	\$51	\$53	\$50	\$45
8/10/2020	5,400	\$135	\$146	\$145	\$147	\$153	\$163
11/10/2020	9,400	\$213	\$240	\$250	\$242	\$259	\$283
Ratio Q4 Bill to Q1 Bill		4.0	4.5	4.9	4.6	5.2	6.3

**Table 6. MVD 5/8” Meter Residential User Quarterly Rate for Current (2019) rates, Option A, Option E, Portsmouth Rates & Exeter Rates, Adjusted for \$100,000 in Additional MVD Revenue**

Date	CF/qtr.	Current Rates	Tiered Rates A	Tiered Rates E	Portsmouth Water Only	Portsmouth Water+ Sewer	Exeter Water Only	Exeter Water+ Sewer
2/10/2020	1,200	\$53	\$53	\$45	\$67	\$239	\$117	\$281
5/10/2020	1,200	\$53	\$53	\$45	\$67	\$239	\$117	\$281
8/10/2020	5,400	\$135	\$146	\$163	\$269	\$1,077	\$421	\$1,079
11/10/2020	9,400	\$213	\$240	\$283	\$477	\$2,532	\$735	\$1,902
<b>Ratio Q4 Bill to Q1 Bill</b>		4.0	4.5	6.3	7.2	10.6	6.3	6.8

### Preliminary Observations

- In general, significant rate impacts were not observed if keeping fixed charges the same and varying the consumption tier threshold or the cost ratio between tier 1 and tier 2 (Options A, B, and C). More significant, but still modest rate impacts were found if the fixed charge is reduced (Options D and E). A small increase to quarterly bills (between 2-5%) was observed when the additional \$100,000 revenue requirement was added.
- There are disadvantages of decreasing fixed revenue since this may affect revenue stability.
- Commercial and industrial users are more significantly impacted compared to residential users using large amounts of water (all options). The rates may not be targeting those with the greatest ability to conserve.
- The inclusion of sewer into the tiered rate structure (Table 4) magnifies the rate impact.
- While the tiered rate conservation messaging may be helpful, the modest impacts to irrigation user bills may not be enough to change conservation habits on average, although peak usages may benefit some.
- Some form of a conservation option is recommended, but the outcome is more about messaging, and results probably will not allow MVD to avoid development of another supply.
- When establishing a conservation structure, it should be done concurrently with a review and potential modifications of conservation ordinances, such as the “odd-even restrictions”.
- Consideration should be given to other options available, shown below.

- Seasonal Rates



A seasonal rate structure includes a higher rate that is time-based, and charged during a community’s peak demand season. The higher rates send a signal to consumers to encourage conservation during peak demand periods and may also better match cost recovery with consumption patterns. An example of setting seasonal rates from AWWA is shown in Table 7 (this is an example only and not based on MVD data).

Considerations may include:

- Monthly billing is recommended as quarterly billing may not give customers enough notice to observe the pricing signals.
- A cost-of-service study may be necessary to determine costs during peak periods and off-peak periods.
- Revenue stability may be impacted, as more revenue is generated during peak periods. Peak period consumption may be impacted by wet or dry seasons.
- Customer education and notification is key.

**Table 7. AWWA M1 Seasonal Rate Calculation Example**

**Table IV.5-1 Seasonal residential class rates—Peak and off-peak approach**

Seasons	Consumption, 1,000 gal	Consumption, %	Allocated Cost	Rate, \$/1,000 gal	Estimated Revenue
Winter (off-peak)	387,200	40	\$929,675	\$2.40	\$929,280
Summer (peak)	580,800	60	1,790,708	\$3.08	1,788,864
Estimated Total	968,000	100	\$2,720,383		\$2,718,144

**Table IV.5-2 Seasonal residential class rates—Excess-use approach**

Seasons/Blocks	Consumption, 1,000 gal	Consumption, %	Rate, \$/1,000 gal	Estimated Revenue
Winter (off-peak)	387,200	40	\$2.40	\$929,673
Summer (peak)				
Block 1				
First 10,000 gal/month	290,400	30	\$2.40	696,960
Block 2				
Over 10,000 gal/month	290,400	30	\$3.77	1,094,808
Estimated Total	968,000	100		\$2,721,048

○ Drought and Surcharge Rates

Surcharges are typically implemented for a limited period of time, and are meant to help achieve a desired outcome, such as providing a price incentive for

conservation, collecting money for a certain fund or for emergency purposes. Considerations include:

- They are considered a temporary conservation tool, not long term, but can effectively reduce short term demand issues.
- The method of surcharge will impact different customers / customer classes differently.

Drought Surcharge options may be a:

- General rate adjustment
- General volumetric surcharge
- User-class base volumetric surcharge
- Individualized volumetric surcharge
- Targeted user-class volumetric surcharge

A drought surcharge rate structure may include different rates as the water system encounters drought conditions. Drought conditions should be tied to a State or other standard system. The rates may start as increasing block rates, with rate increases to certain blocks implemented based on the severity of the drought conditions. An example of setting drought rates from AWWA M1 is shown in Table 8.

**Table 8. AWWA M1 Seasonal Rate Calculation Example**

**Table V.3-1 Drought surcharge pricing example (\$ per 1,000 gallons)**

Customer Class	Non-Drought, Normal Water	Stage 1, Moderate Drought	Stage 2, Severe Drought	Stage 3, Critical Drought
<b>Single-Family Residential</b>				
Block 1	\$1.00	\$1.00	\$1.10	\$1.50
Block 2	\$1.50	\$1.87	\$2.25	\$3.00
Block 3	\$2.00	\$2.50	\$3.00	\$4.00
<b>Multiple-Family Residential</b>				
Block 1	\$1.25	\$1.25	\$1.38	\$1.87
Block 2	\$1.25	\$1.87	\$2.25	\$3.50
<b>Commercial/Industrial</b>				
Block 1	\$1.30	\$1.63	\$1.79	\$1.95
Block 2	\$1.30	\$1.87	\$2.25	\$3.50
<b>Irrigation</b>				
Block 1	\$1.75	\$2.19	\$2.63	\$2.89
Block 2	\$1.75	\$2.50	\$3.00	\$4.00

NOTE: For example only and based on specific assumptions.

### **Recommendations**

- Consider monthly billing when conservation rates are implemented. More frequent billing will help bring pricing signals to the customer's attention more quickly, which will likely result in better water conservation. Monthly billing will also help confirm whether excessive lost water observed over the summer season is real, or just calculated that way due to the quarterly billing cycle.
- Consider modifications to conservation bans concurrently.
- Consider coordinating with Town sewer department on conservation rates to see if they would support a tiered structure for sewer billing as well. If sewer rates include the conservation structure, this may intensify the conservation signal to the customer.
- Communication with and education of the customer is essential in making any conservation-oriented option successful.
- If the goal is simply to generate additional annual revenue from the users who create the peak demands, then a tiered structure would likely be the best approach (Option A or C). The low users would see similar bills as previously, but higher users would see modest increases. Commercial and Industrial users would see increases too, however.
- Prior to implementing rate options, we recommend a work session.
- Additionally, UE recommends that MVD take a holistic approach to implementing conservation rates, with consideration to drought response measures, the need for coordination with the Town, changes to billing, and effective communication with the public needed for successful implementation.

### **Other considerations**

- It may be appropriate to complete a cost-of-service study if there is resistance to the rate adjustments.
- Consider additional messaging and conservation support by ongoing educational material or low flow plumbing support.
- Consider a certification process for irrigation such as EPA's "Water Sense" program.

Table 3: Sample Bill Comparisons for Options A-E

15. SAMPLE WATER BILLS (Existing Rates compared to Alternatives)									
Town of Merrimack, NH									
Description	Average gpd	Meter Size	Consum. CF/Qtr	Existing Rates		FY 2019			
				Hydrant	Meter	Cons. T1	Cons. T2	Charge	Annual
<b>Residential (Hydrant Only)</b>									
2018 Model rates (Option D)	0	5/8"	0	\$65	\$54	\$1.95		\$30	\$119
Tiered Rates A	0	5/8"	0	\$65	\$54	\$1.88	\$2.25	\$30	\$119
Tiered Rates B	0	5/8"	0	\$65	\$54	\$1.66	\$2.49	\$30	\$119
Tiered Rates C	0	5/8"	0	\$65	\$54	\$1.82	\$2.28	\$30	\$119
Tiered Rates D	0	5/8"	0	\$65	\$27	\$2.12	\$2.54	\$23	\$92
Tiered Rates E	0	5/8"	0	\$33	\$27	\$2.42	\$2.90	\$15	\$60
<b>Residential Single Unit (Very Low User)</b>									
2018 Model rates (Option D)	80	5/8"	976	\$65	\$54	\$1.95		\$49	\$195
Tiered Rates A	80	5/8"	976	\$65	\$54	\$1.88	\$2.25	\$48	\$192
Tiered Rates B	80	5/8"	976	\$65	\$54	\$1.66	\$2.49	\$46	\$184
Tiered Rates C	80	5/8"	976	\$65	\$54	\$1.82	\$2.28	\$48	\$190
Tiered Rates D	80	5/8"	976	\$65	\$27	\$2.12	\$2.54	\$44	\$175
Tiered Rates E	80	5/8"	976	\$33	\$27	\$2.42	\$2.90	\$38	\$154
<b>Residential Single Unit (Average Residential in Town)</b>									
2018 Model rates (Option D)	206	5/8"	2513	\$65	\$54	\$1.95		\$79	\$315
Tiered Rates A	206	5/8"	2513	\$65	\$54	\$1.88	\$2.25	\$77	\$308
Tiered Rates B	206	5/8"	2513	\$65	\$54	\$1.66	\$2.49	\$72	\$286
Tiered Rates C	206	5/8"	2513	\$65	\$54	\$1.82	\$2.28	\$76	\$302
Tiered Rates D	206	5/8"	2513	\$65	\$27	\$2.12	\$2.54	\$76	\$305
Tiered Rates E	206	5/8"	2513	\$33	\$27	\$2.42	\$2.90	\$76	\$303
<b>Residential Single Unit (Higher user)</b>									
2018 Model rates (Option D)	400	5/8"	4880	\$65	\$54	\$1.95		\$125	\$500
Tiered Rates A	400	5/8"	4880	\$65	\$54	\$1.88	\$2.25	\$128	\$513
Tiered Rates B	400	5/8"	4880	\$65	\$54	\$1.66	\$2.49	\$126	\$506
Tiered Rates C	400	5/8"	4880	\$65	\$54	\$1.82	\$2.28	\$129	\$518
Tiered Rates D	400	5/8"	4880	\$65	\$27	\$2.12	\$2.54	\$137	\$546
Tiered Rates E	400	5/8"	4880	\$33	\$27	\$2.42	\$2.90	\$144	\$578
<b>Residential Single Unit (Very High user)</b>									
2018 Model rates (Option D)	400	5/8"	10000	\$65	\$54	\$1.95		\$225	\$899
Tiered Rates A	400	5/8"	10000	\$65	\$54	\$1.88	\$2.25	\$244	\$975
Tiered Rates B	400	5/8"	10000	\$65	\$54	\$1.66	\$2.49	\$254	\$1,017
Tiered Rates C	400	5/8"	10000	\$65	\$54	\$1.82	\$2.28	\$246	\$984
Tiered Rates D	400	5/8"	10000	\$65	\$27	\$2.12	\$2.54	\$267	\$1,067
Tiered Rates E	400	5/8"	10000	\$33	\$27	\$2.42	\$2.90	\$293	\$1,173
<b>Residential Single Unit (Based on NHDES Statewide Average)</b>									
2018 Model rates (Option D)	197	5/8"	2403	\$65	\$54	\$1.95		\$77	\$306
Tiered Rates A	197	5/8"	2403	\$65	\$54	\$1.88	\$2.25	\$75	\$299
Tiered Rates B	197	5/8"	2403	\$65	\$54	\$1.66	\$2.49	\$70	\$279
Tiered Rates C	197	5/8"	2403	\$65	\$54	\$1.82	\$2.28	\$74	\$294
Tiered Rates D	197	5/8"	2403	\$65	\$27	\$2.12	\$2.54	\$74	\$296
Tiered Rates E	197	5/8"	2403	\$33	\$27	\$2.42	\$2.90	\$73	\$292
<b>STATE AVERAGE COST (2018)</b>	<b>197</b>	<b>5/8"</b>	<b>2403</b>						<b>\$552</b>
<b>Commercial</b>									
2018 Model rates (Option D)	2500	2"	30498	\$131	\$219	\$1.95		\$682	\$2,729
Tiered Rates A	2500	2"	30498	\$131	\$219	\$1.88	\$2.25	\$763	\$3,052
Tiered Rates B	2500	2"	30498	\$131	\$219	\$1.66	\$2.49	\$823	\$3,292
Tiered Rates C	2500	2"	30498	\$131	\$219	\$1.82	\$2.28	\$770	\$3,081
Tiered Rates D	2500	2"	30498	\$131	\$110	\$2.12	\$2.54	\$825	\$3,302
Tiered Rates E	2500	2"	30498	\$66	\$110	\$2.42	\$2.90	\$917	\$3,669
<b>Industrial</b>									
2018 Model rates (Option D)	5000	4"	60996	\$326	\$514	\$1.95		\$1,399	\$5,598
Tiered Rates A	5000	4"	60996	\$326	\$514	\$1.88	\$2.25	\$1,572	\$6,288
Tiered Rates B	5000	4"	60996	\$326	\$514	\$1.66	\$2.49	\$1,706	\$6,823
Tiered Rates C	5000	4"	60996	\$326	\$514	\$1.82	\$2.28	\$1,587	\$6,347
Tiered Rates D	5000	4"	60996	\$326	\$257	\$2.12	\$2.54	\$1,687	\$6,748
Tiered Rates E	5000	4"	60996	\$163	\$257	\$2.42	\$2.90	\$1,864	\$7,457