



Town of Fairlee Water System Rate Study August 2022

Introduction

The Town of Fairlee (Town) Water System is a public community water system providing water service to 214 customers. A recent water system improvement project included installation of water meters throughout the system, with exception to some clusters of seasonal properties, with each cluster served through a new master meter. The Town is now ready to revise the method of billing customers from a flat rate system (with several rate categories based on account type) to a billing rate structure that accounts for metered water usage. RCAP Solutions, Inc. (RSOL) has reviewed the metered data and has developed alternative rate structures for consideration.

Existing Conditions and Goals

Current water rates are structured as a flat rate with sixteen different rate categories based on property type and use, including an adjustment for properties with multiple units of the same type. Water rates for each rate category has been adjusted each year, based on the previous year's actual expenses. This system provides a reasonably predictable source of revenue; however, the Town requires continuous monitoring of changes in use for each property to maintain fair and equitable rates across the customer base. The Town wishes to provide an updated rate structure with the following goals:

1. To recover enough revenue to offset system costs and provide for a reserve fund for replacement of short-term assets. The Town is currently developing a Water System Asset Management Plan to identify the level of Reserve Funds recommended;
2. To be simple to implement and easy to understand; and
3. To promote infill development.

Approach

Our approach to determine a recommended rate structure for the Town is as follows:

1. Review the existing budget of projected revenues and expenses
2. Review the existing customer database and metered records to date
3. Based on review of the data and discussions with Town Officials, identify a number of reasonable alternative rate structures to consider
4. Using the existing metered data, make predictions on future water usage for each customer
5. Test each alternative rate structure against a representative group of customers, to show the impact of each rate structure on each customer category

Existing Budget

A summary of the existing Town's water system revenues and expenses is presented in **Table No. 1**, including the budget and actual revenues and expenses for 2021 and the budget for 2022. A more detailed line-item budget is included in **Appendix A**. The line-item budget includes all revenues and costs of the water system, including expenses and grant proceeds from special projects. For the rate analysis we eliminated the special project line items in order to predict a budget for a typical year, as some portions of the special project expenses may carry over to different budget years and are technically not incurred expenses until converted to a future annual debt service payment. In addition, the actual 2021 revenues presented in the Town Report were for only 3 of the 4 quarters; Quarter 4 (Q4) revenues will be reported in 2022 actuals. This "adjusted" budget attempts to account for these variations and provide typical revenues and expenses for a given year to use in developing rate structure alternatives.

A large portion of water system expenses can be considered as "fixed expenses", which include costs that are incurred independent of the amount of water produced, such as (but not limited to) debt service, insurance, fixed salaries, regulatory fees, and sampling. The table in **Appendix A** presents an estimation of the percentage (and amount) of each budgeted line item that is considered a fixed expense, for use in the rate analysis.

As a means for comparison and for funding applications, the concept of an Equivalent Residential Unit (ERU) is introduced. One ERU is intended to represent the characteristics of a single family three-bedroom residential home. This provides the opportunity to portray the water usage of a commercial operation or other use category into an equivalent number of single-family homes. This allows us to compare usage patterns to other water systems in Vermont and can also be considered as an alternative in a rate structure calculation so that non-residential properties are assessed charges for fixed costs of the water system based on their relative demand or capacity.

Some observations of the "adjusted" budget include:

- The existing rate structure appears to be sufficient to meet the water system's expenses. The Town's practice of updating the rate schedule based on the prior year's actual consumption is a good sound practice and prevents sudden significant increases in water rates.
- The cost of Operations & Maintenance is approximately \$350 per ERU, which is generally within the range of other water systems throughout the State.
- Approximately 95% of revenues for the system are generated from customer billing, with the balance from interest, potential new connection fees, and from the entire Town tax base subsidizing a 10% share of the existing debt service.
- A new rate structure will need to provide a consistent source of revenue in order to meet expenses, of which a large majority are fixed expenses. The "fixed expenses" presented in the table in **Appendix A** is approximately 40% of the total O&M. Typically, this fixed expense is a much higher percentage of the O&M costs for small water systems, sometimes as high as 80 – 85%. The lower percentage applied for this rate analysis is based on the Town's desire to provide a higher weighting on consumption in

developing rates. Depending on consumption patterns the Town observes with the metered data collected, this percentage may be reconsidered each time the Town reviews and modifies water rates (which are currently adjusted yearly).

- The current budgeted revenues appear to be in excess of budgeted expenses, which is essentially a contribution to reserves. It is recommended this practice be continued and formalized so the Town has dedicated funds to cover costs during short-term emergencies and for replacement of short-term assets such as pumps, filter media, equipment, etc.

Existing Customer Information and Metered Data

The existing Town customer database consists of 201 active accounts, some of which are billed according to multiple meters on their property to service separate structures; there are 214 active meters in operation. Detailed information by account and each meter is presented in **Appendix B**.

The Town provided a list of accounts with the following information for each account:

- Account number
- Name, Location
- Existing Billing Code
- Metered data from April 2021 through December 2021 (2nd, 3rd, and 4th Quarter)
- Meter number (in some cases, one account number includes multiple water meters)
- Date meter became active
- Nominal size of the meter

Usage data was also provided for each meter as of the date it became active, generally during the period June through September 2000, and quarterly readings started in the second quarter of 2021 (April through June 2021). This first period of data (from June 2021 through March 2021) was not used because of the inconsistent duration period and assumed variations in usage that may have occurred during the startup of the system.

The relative percentages of customers by category, shown as a total of the number of accounts (by meter) and as a total of metered water usage, respectively, are presented in **Figure No. 1**.

Some observations from the data provided:

- Based on the metered data, the average residential customer of a single-family home uses approximately 10,000 gallons per quarter, or approximately 110 gallons per day. This is consistent with residential usage in other small Vermont communities.
- The residential and seasonal categories together used a proportionate share of the total water usage in the system. However, individual water usage varies greatly across the category.
- Metered usage in the 2nd quarter (April through June) was higher than the 3rd quarter (July through September) by 35%, and higher than the 4th quarter (October through December) by more than 100% (meaning by more than double the value). The differences in the Residential Category are even greater,

at 44% and 86%, respectively. This is not an expected water use pattern for residential customers, which expects relatively stable water use patterns from quarter to quarter, with potential for higher usage in the summer months (Q3). State of Vermont COVID-19 Restrictions were in place from March 2020 through June 2021. The pandemic is expected to have affected water usage patterns, and upon review of total water produced by the water system by month for the years 2019 through 2021 shows a statistically significant increase in water production during the months when COVID-19 Restrictions were in place. This observation is important when formulating water rates based on consumption, as an over-estimation of consumption will result in a lower water rate, and thus lower revenues if actual consumption is lower than expected.

Existing water production for the past three years was reviewed and is provided in **Appendix C**. It is noted there appears to be an increase in total production during the time when COVID-19 restrictions were in place. In addition, a simplified comparison of total water production to total metered consumption was prepared, also shown in **Appendix C**. Theoretically, the total water produced less the total metered consumption during a given time period is considered “non-revenue” water and can be due to both planned events (such as filter backwashing and hydrant flushing) and unplanned events (such as leaks, or water main breaks, or fires) that use water without the ability to collect revenue. It is noted one of the quarters showed the metered consumption to be higher than the total water production, which is not possible. This is only a cursory review and should not be used to make broad assumptions about the level of water loss in the system; however, it is recommended to review this data on a quarterly basis to see if there

Financial Reserves

A recommended best practice is for water systems to maintain reserve funds – money in the bank collected as revenue for future anticipated and unanticipated expenses, such as:

- Equipment replacement of short-lived assets such as pumps, meters, generators, and control systems;
- Local share of planning for system expansion and upgrade costs, such as preliminary engineering reports and design (although the State of Vermont Drinking Water State Revolving Fund (DWSRF) provides a planning loan program to fund these types of costs, and defers payment by incorporating costs into a long-term construction loan;
- Emergency funds for unforeseen breakdowns, damage from natural disasters, and system repairs;
- funds for unexpected revenue shortfalls from economic downturns, the loss of high-use customers, and other issues;
- debt-service reserve funds that may be required by lenders. The debt service reserve is for making regular debt-service payments should other funds for making debt-service payments not be available

There are no nationally accepted standards for the amount of money that water systems should keep in reserve. It is generally accepted to have a minimum of 2-3 months of expenses, plus approximately 10% of the annual debt service in reserves. The Town is in process of developing an Asset Management Plan for the water system, which may provide some insight into recommended amounts to provide in reserve for replacement of short-term assets.

The existing Town budget as adjusted appears to carry a small surplus in the 2021 and 2022 budgets, approximately 5% of the budget. It is recommended the Town set a specific line item in the budget in future years and dedicate funds to reserves. This rate alternatives provided below assume this surplus of approximately \$10,000 per year will be dedicated for reserves.

Types of Rate Structures Considered and Assumptions Made

The breakdown the existing water rate using the current Water Rate Categories is presented in **Appendix D**. The following rate structures were reviewed for comparison:

1. Single Consumption Rate
2. Declining Block Rate
3. Declining Block Rate with Base Charge set by Meter Size
4. Declining Block Rate with Base Charge set by ERUs

Table No. 2 presents a summary of the impact of the different rate structure alternatives on the annual water bills of a representative sampling of customers, and the percentage change to their existing water bill. This can be used to show how in some cases there are wide disparities in the potential changes in costs to different groups of customers. The complete model database which predicts the water rate for each alternative for each customer is presented in **Appendix E**.

Alternative No. 1 - Single Consumption Rate

A single consumption rate means that all water delivered to a customer is billed at the same rate, without any base charges. This is obviously the most simplistic and easily understood rate structure, is understandable that customers desire to be charged solely for what they consume and would be the easiest for the Town to implement and manage. The rate is determined by the following:

1. The amount needed to be raised by Water Rents for the next billing period(s). From **Table No. 1**, the estimated revenue amount needed for the year 2022 is \$185,258.
2. The total amount of water delivered to customers in 2021 was 14,883,443 gallons, which is usually expressed in blocks of 1,000 gallons, or 14,883 thousand gallons.

Based these numbers, the single consumption rate would be set at:

$\$185,258 / 14,883 \text{ thousand gallons} = \mathbf{\$12.45 \text{ per thousand gallons}}$

Adjustments may be made to revenue to account for adding a line item for a reserve fund, or to the estimated consumption to account for a potential drop in consumption due to the higher unit cost of water.

This method is not recommended for the Town, for the following reasons:

- Water systems with a significant portion of their revenue based on water usage are vulnerable to variations in usage patterns. Since the total revenue is based only on the estimated amount of water to

be billed in the future, any significant changes in usage or the loss of a large customer would cause a sudden drop in revenues. This is of special concern for the Town because there isn't a long history of water usage to be confident in the water usage patterns in the system.

- This rate will cause the widest variation in bills between the lowest and highest water users. For instance, this rate is approximately twice the existing rate for customers in the metered use category (currently \$6.56 per thousand gallons), which are generally the largest water users. On the other hand, the median water usage is approximately 9,000 gallons per quarter, which would result in a water bill of approximately \$460 per year for a typical single-family home, a more than 10% reduction from the current rate. And as this is the median, half of the customers would pay less than \$460 per year.
- The practice of using consumption for the entire bill also misses an important aspect of water system operation known as "readiness to serve." The water system has spent considerable funds to provide the service and will incur the fixed operational costs even if a property doesn't use the water for a given period of time. Having available fire protection – otherwise not charged for in Town - and the ability to consume water – water that is delivered to the consumer, under pressure and meeting state and federal water quality regulations – is valuable to a customer even before water is delivered to the property.

Alternative No. 2 – Decreasing Block Rate (with No Base Charge)

A block rate means that consumption is separated into different ranges or "blocks" of usage, and each block is billed at a separate unit rate. A decreasing block rate is a structure that sets a lower unit cost for water usage as water usage increases. This structure helps to lower costs for very large water users and is based on the premise that the incremental cost of delivering water decreases as the quantity of water delivered increases. This rate structure may be applicable to the Town due to the Town's desire to support large water users in the system, such as the Lake Morey Resort, and because the Town's source is not limited. Many systems utilize an "increasing" block rate (which increases the unit cost of water as usage increases) to promote conservation.

Table No. 3 presents a proposed rate schedule using a decreasing block rate structure. We used the following method to calculate the rate:

1. Plot existing quarterly metered data for each customer, sorted from lowest to highest, as shown in the chart in **Appendix F**. We can use this chart to approximate certain "inflection" points in the data, where the slope of the line increases would indicate a point where customers are using higher amounts of water and may benefit from a reduced unit rate. This is a highly subjective analysis, and it is merely a way to start an iterative process for developing a block rate for users. For Fairlee there appears to be three inflection points – at approximately 20,000, 40,000, and 100,000 gallons per quarter usage, respectively - where the incremental quarterly usage increases at a different rate. The most significant observation is that only 5 of the 214 metered accounts are in excess of 100,000 gallons per quarter. These accounts will benefit the most from the decreasing block rate.
2. Then we estimated the total amount of water consumption within each block, based on the previous year's metered data. **Table No. 3** shows that over half of water usage in the system is from customers

that are using less than 18,000 gallons per quarter, and approximately one quarter of water usage is from the 5 customers that use greater than 102,000 gallons per quarter.

3. We then needed to allocate a total amount of revenue the water system needs to collect from each block. In order to create a decreasing block rate, the water customers in the lower block will need to pay a higher percentage of the total revenue, in order for the larger users to see a reduced unit rate for water. This was completed using an iterative process by assigning a percentage of the \$185,258 annual revenue needed to each block (i.e., 68% for the lowest block), and with the total amount of revenue needed from that block (\$125,975) and the total estimated water usage in that block (7,889,863) we can derive a proposed unit rate for that block (\$125,975 divided by 7,889 thousand gallons equals \$15.97 per thousand gallons). It is shown in **Table No. 3** the highest block which uses 23% of the total volume is only contributing 10% of the total cost. This method is justified for the following reasons:
 - a. The incremental cost to produce water is reduced as more water is produced, and thus the unit price of water can be reduced similarly to the “bulk discount” concept with other material goods.
 - b. This block rate structure is similar to the tax code structure, where a high-volume customer will pay the same amount for the first 6,000 gallons as the low volume customer and pays each block rate for the volume within that particular block. So high volume users are only receiving the “discounted” rate for the water in the higher block ranges.
 - c. In comparison to the uniform rate alternative, high volume customers will experience a significant increase in costs, for some approximately 100% or double the cost of the current rate, and that will be detrimental to the Town’s goal to promote commercial development in the service area.

Referring to **Table No. 3**, the decreasing block rate does provide rates for the high-volume users that are similar to their existing rates. This alternative does not include a base charge, and thus would still be subject to high variability depending on water usage patterns. The next two alternatives discussed are similar to Alternative No. 2 with an addition of a Base Charge. The justification for providing a Base Charge is to provide a steady revenue source from customers regardless of usage to cover the “fixed expenses” of the water system.

Alternative No. 3 – Decreasing Block Rate with Base Charge according to Meter Size

In this alternative, an estimate of revenues to be generated to account for all the fixed expenses of the Town water system were calculated to be \$115,712 as presented in **Appendix A**. These charges will be collected as a Base Charge and will be apportioned to each customer based on their respective meter size. This method is based on the concept of the “capacity to serve”, where a customer with a large meter is able to receive a higher volume of water compared to a customer with a standard 5/8” meter. The ratio is based on the hydraulic capacity of the water meter, which is presented in Section 22 of the Town’s Water System Policy. The breakdown of how the Base Charge was determined is presented in **Appendix G**.

With \$185,258 of revenue needed from customers, and \$115,712 generated from the Base Charge, the remaining amount (\$69,546) will need to be generated based on metered usage, using a decreasing block rate. Water systems typically provide a set volume of water that is included in the Base Charge. From the data available, in 2021 the median water usage of a typical single-family household in Fairlee is approximately 9,000 gallons per quarter. We have included an allocation of 6,000 gallons per quarter with the Base Charge, so customers with very low usage will not be charged a usage fee.

The same methodology as Alternative No. 2 was used to generate the block rate and is presented in **Table No. 4**.

This alternative is a promising rate structure for the Town to consider due to the following reasons:

- This method achieves the Town's desire to provide a simple basis for charging water customers. Town staff would no longer be tasked with tracking changes in use to accommodate changes in the customer billing category.
- Based on plumbing codes, the size of a meter is required to be adequate to serve the peak demands of the customer's planned usage, and thus a larger meter would justifiably require a higher base rate to accommodate their increased demands on the system. It is presumed that any new construction and or significant changes in use to existing buildings may require a State Potable Water Supply and Wastewater System Permit, or at least an allocation letter from the Town Water System, which could trigger a review of the meter size required for the building.
- The projected annual water bills presented in **Table 2** appear to show the least amount of deviation (% change) from a customer's existing bill across all categories of usage using this method. And if a customer's bill is significantly increased, the increase is primarily due to the amount of water usage consumed.

Alternative No. 4 – Decreasing Block Rate with Base Charge according to Allocation of ERUs

This alternative is similar to Alternative No. 3, except instead of using the size of the meter to differentiate customers, we developed a structure based on Equivalent Residential Units (ERUs) as discussed above. Each property was assigned an ERU value based on the property's usage characteristics, in a manner very similar to existing water rate categories the Town already implements. The expected ERU value for each category is presented in **Appendix D**, and the assigned ERU value for each property is presented in **Appendix E**.

The 214 metered accounts in the system are estimated to be comprised of 326.5 ERUs. As with Alternative No. 3, the Base Charge for Alternative No. 4 should generate \$115,712 in revenue to cover the fixed expenses of the system. Based these numbers, the Base Charge would be set at:

$\$115,712 / 326.5 \text{ ERUs} = \$354 \text{ per ERU per Year or } \$89 \text{ per ERU per Quarter}$



To collect the total expenses of \$185,258 with \$117,712 collected as a Base Charge, the remaining amount of revenue needed ($\$185,258 - \$117,712 = \$69,546$) will need to be generated based on metered usage, using a block rate.

In this alternative, each ERU will receive a 6,000-gallon allocation of water usage that is included with the Base Charge. Thus, if a property is assigned as 3 ERUs, then each quarter they will receive an allocation of $3 \times 6,000 = 18,000$ gallons before they would need to start paying a block charge.

We followed the same methodology as Alternative Nos. 2 and 3 to generate the block rates, which are presented in **Table No. 5**.

This alternative has some benefits, including:

- With ERU allocations assigned accurately to each property based on a predictable standard for the Town, this method is generally accepted to provide the fairest system of user rates, as any particular property use can be equated to a multiple of a typical single-family home.
- This method tends to differentiate customers based on their expected water use over the long-term (quarterly or annually) compared to Alternative No. 3 which differentiates customers based on their capacity to draw an “instantaneous peak demand” from the system based on meter size. For example, a home with a standard 5/8” meter that has one or two accessory apartments would be charged a higher Base Charge than a typical single-family home, regardless of occupancy.

However, this method of applying ERU values to customers with varying uses requires a significant amount of time and effort from Town staff, especially in a community with a high number of changes in use. The process of allocating and changing ERU allocations would need to be incorporated into existing Town processes, such as the zoning approval process. In addition, ERU allocations for specialized uses are sometime very difficult to estimate and are subject to interpretation, which can lead to conflicts and appeals of allocation requests.

Affordability

There is no universal measure of affordability criteria for water rates. Commonly used indicators of affordability for annual water rates are between 1% and 2% of median household income (MHI). USDA Rural Development uses 1.5% of MHI which is generally accepted in Vermont.

The MHI in Town of Fairlee based on the 2019 American Community Survey (ACS) data from is \$52,128 and the MHI in the Town of Fairlee Census Designated Place (CDP) which includes approximately 79 households on the water system is \$51,711.

All alternatives fall within the affordability criteria.

Unmetered Properties

The Town has several properties, mostly seasonal, that are not feasible to be fitted with individual water meters other than in underground meter pits. The Town is not interested in investing in buried meter pits at this time. The rate model developed in this report used “master meter” readings where available and presented costs for the individual properties as if the group was one large customer. The Town is expected to use these projected costs and pro-rate them to the unmetered properties at this time, which is an accepted practice.

Summary and Conclusions

Table Nos. 6, 7, 8, and 9 present the proposed rate structures for Alternative Nos. 1 through 4, respectively. As presented above, the impact of the proposed rate structures on representative properties with different water usage patterns are presented in **Table No. 2**.

As discussed previously, Alternative Nos. 1 and 2 are not recommended due to the high variability of revenue generated based on water usage and are presented primarily to show why a system based on the “capacity to serve” is preferred, with a Base Charge.

Both Alternative Nos. 3 and 4 are reasonable and provide an equitable distribution of rates to customers. Based on several discussions with Town staff, and meetings with the Selectboard, the Town has decided that Alternative No. 3 is the preferred water rate structure for the Town.

Water Use Policy

The current Town Water Use Policy dated October 22, 2012, will need to be updated to accommodate the new metered rate structure. Individual sections that will need to be modified include:

- *Section 18 (Billing Procedures)* – it is expected the Town will be issuing water bills on a quarterly basis for all customers
- *Section 22 (Meters)* – this section needs to be modified to indicate that all water will be sold based on a Metered Rate including a Base Charge, with special exceptions only as permitted by the Town.
- *Sections 28 (Water Rates and Charges)* – this section should be modified to reference the new rate structure and modify references to “Flat Charge” to “Base Charge”.
- *Section 29 (User Connection Fees for New Service)* reference a separate Town Document which should be reviewed for consistency with the new rate structure.
- *Section 30 (Conditions of Billing and Water Service)* – the Town may choose to continue the connection fee structure as presented or revise to mimic the proposed rate structure with varying fees based on the size of the meter.

Table 1
Town of Fairlee Water System
Summary of Revenues and Expenses¹

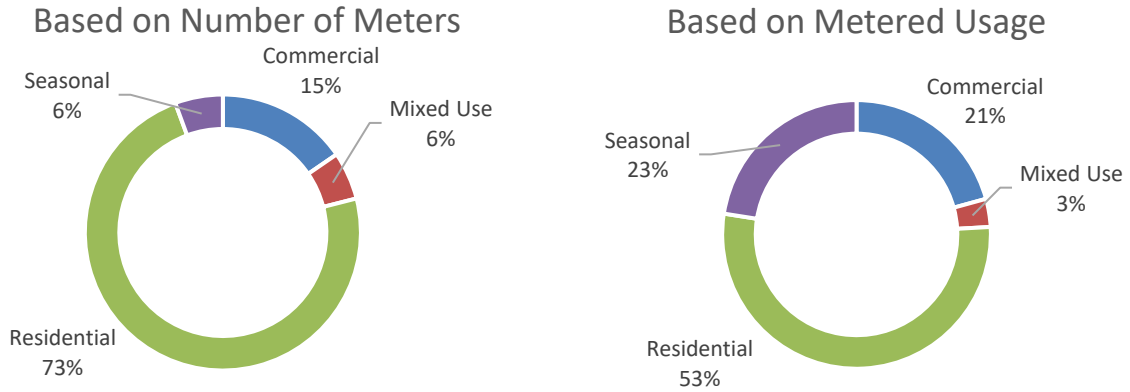
	2021 Actual ²	2021 Budget	2022 Budget
Revenues			
Water Rent (for Customer Billed Usage)	172,376	181,625	185,258
Other Revenues	9,705	7,293	9,793
Total Revenues	182,081	188,918	195,051
Expenses			
Debt Service	67,714	67,714	67,714
Operation and Maintenance	102,998	118,570	118,160
Total Expenses	170,712	186,284	185,874
Net Profit/(Loss)	11,369	2,635	9,177
No. of Equivalent Residential Units (ERUs)	327	327	327
Annual Cost per ERU per year (Equivalent to a Flat Rate Cost)	523	571	569
Average Cost per ERU per year for O&M	315	363	362

Notes:

¹ A more detailed line-item budget is included in Appendix A.

² Actual Revenue in 2021 was adjusted to estimate a full year of revenue collected.

Figure No. 1
Town of Fairlee Water System
Percentage of Customers by Use Category for Data Collected in 2021



Use Category	No. of Meters	Total Gallons Billed in 2021
Commercial	33	3,085,173
Mixed Use	12	503,840
Residential	157	7,942,270
Seasonal	12	3,352,160
	214	14,883,443

**Table 2
Town of Fairlee Water Rate Study
Summary of Impact of Different Rate Alternatives to Representative Customer Water Bills**

Alternative No. 1 - Every gallon used is charged at the same rate
 Alternative No. 2 - Decreasing Block Rate with no base charge (see Table No. 2 for block rates)
 Alternative No. 3 - Provide a base charge with meter size, 6,000 gallon allocation included with base charge (see Table No. 3 for block rates)
 Alternative No. 4 - Provide a base charge with Equivalent Residential Units, 6,000 gallon allocation (per ERU) included with base charge (see Table No. 4 for block rates)

Account No. ¹	Representative Property	No. of ERUs ²	Meter Size	Average Usage (gallons per ERU per Quarter)	Existing Annual Bill ³	Projected Annual Water Bill and % Change from Existing								Notes
						Alternative No. 1	% Change	Alternative No. 2	% Change	Alternative No. 3	% Change	Alternative No. 4	% Change	
0242156-000	COMMUNITY CHURCH OF CHRIS	1.0	5/8 x 3/4	633	\$524	\$32	-94%	\$40	-92%	\$460	-12%	\$354	-32%	Extremely low water usage
0222078-000	HALL MARILYN W	1.0	5/8 x 3/4	6,187	\$524	\$308	-41%	\$395	-25%	\$467	-11%	\$362	-31%	SFH, low water usage
	TYPICAL 3 BEDROOM SFH	1.0	5/8 x 3/4	9,000	\$524	\$448	-14%	\$575	10%	\$572	9%	\$474	-9%	Typical SFH, average water usage
0222084-000	HALLMARTEL CLARENCE & JEN	1.0	5/8 x 3/4	20,790	\$524	\$1,035	98%	\$1,286	146%	\$994	90%	\$896	71%	SFH w/ kids, higher water usage
0242161-000	MACGREGOR JOHN & KATRINA	4.0	1	10,693	\$2,095	\$2,130	2%	\$2,264	8%	\$2,342	12%	\$2,148	3%	4-unit apartment house
0080302-000	WRIGHT SCOTT W & SHARON L	5.0	5/8 x 3/4	27,916	\$3,663	\$6,950	90%	\$5,471	49%	\$3,398	-7%	\$5,390	47%	Bed & Breakfast, separate cottages
0080305-200	PERRY DANIEL A III & ANIT	10.0	2	27,107	\$7,113	\$13,496	90%	\$8,380	18%	\$7,027	-1%	\$10,138	43%	Laundromat
M242045-000	LAKE MOREY INN GOLF RESOR	1.0	1	3,617	\$95	\$180		\$231		\$775		\$362		Lake Morey Resort
M242045-000	LAKE MOREY INN GOLF RESOR	1.0	1	22,197	\$582	\$1,105		\$1,332		\$1,795		\$899		
M242045-000	LAKE MOREY INN GOLF RESOR	3.0	1	21,112	\$1,662	\$3,153		\$2,916		\$2,704		\$2,418		
M242045-000	LAKE MOREY INN GOLF RESOR	20.0	2	31,793	\$16,685	\$31,658		\$16,451		\$12,800		\$21,858		
M242045-000	LAKE MOREY INN GOLF RESOR	1.0	5/8 x 3/4	21,870	\$574	\$1,089		\$1,294		\$1,008		\$865		
	Lake Morey Resort - Total	25.0			\$19,503	\$37,006	90%	\$21,993	13%	\$18,307	-6%	\$26,040	34%	
0080228-010	FLANDERS PAUL C REVOCABLE	1.0	5/8 x 3/4	5,277	\$524	\$263		\$337		\$465	-11%	\$360		Mulit-family residential shown as 8 SFHs with high usage
0080228-010	FLANDERS PAUL C REVOCABLE	5.0	5/8 x 3/4	30,626	\$2,618	\$7,624		\$5,298		\$3,284	25%	\$5,251		
0080228-010	FLANDERS PAUL C REVOCABLE	2.0	5/8 x 3/4	19,992	\$1,047	\$1,991		\$2,195		\$1,546	48%	\$1,731		
	Paul Flanders Revocable Trust - Total	8.0			\$4,189	\$9,878	136%	\$7,831	87%	\$5,296	26%	\$7,342	75%	
M000001-000	SEASONAL LINE - EAST	7.5	2	7,467	\$1,469	\$2,788	90%	\$2,727	86%	\$3,826	160%	\$3,474	136%	Seasonal camps
M000002-000	SEASONAL LINE - WEST	7.5	1	7,180	\$1,413	\$2,681	90%	\$2,764	96%	\$2,641	87%	\$3,012	113%	Seasonal camps

Notes:
¹ Accounts with multiple entries include multiple meters.
² ERU Allocations were estimated based on type of use to match the existing account type, and/or actual metered data to achieve a maximum of approximately 30,000 gal per quarter per ERU. Refer to Appendix D.
³ Existing bill is based on flat rate for account type; for metered accounts, existing bill is based on the estimated 2021 total volume to provide a consistent comparison, and may not reflect the actual bill in 2021.

Table 3
Town of Fairlee Water Rate Study
Alternative No. 2 - Decreasing Block Rate

	Block Range (gallons per quarter)	Total Annual Volume Billed in Each Block¹ (gallons)	% of Total Volume	Percentage of Revenue to be Collected from Block²	Target Annual Revenue by Block	Proposed Block Rate³ (\$/1,000 gal)
Block 1	0 - 18,000	7,889,863	53%	68%	\$125,975	\$15.97
Block 2	18,000 - 36,000	1,742,490	12%	12%	\$22,231	\$12.76
Block 3	36,000 - 102,000	1,901,843	13%	10%	\$18,526	\$9.74
Block 4	102,000 - N/A	3,349,247	23%	10%	\$18,526	\$5.53
Totals		14,883,443			\$185,258	

Notes:

¹Total volumes for each block are estimated from 2021 data presented in Appendix E.

²Percentages of revenue for each block are set iteratively using judgement, with a higher percentage for the lowest block in order to recover fixed costs of the system.

³Block Rate is equal to (Target Annual Revenue [\$/] / Total Annual Volume [gal]) x 1,000 [gal/1,000 gal].

Table 4
Town of Fairlee Water Rate Study
Alternative No. 3 - Decreasing Block Rate with Base Charge (based on Meter Size)

	Block Range (gallons per quarter)	Total Annual Volume Billed in Each Block (gallons)	% of Total Volume	Percentage of Revenue to be Collected from Block	Target Annual Revenue by Block	Proposed Block Rate (\$/1,000 gal)
Block 1	6,000 - 18,000	3,729,643	35%	50%	\$34,773	\$9.32
Block 2	18,000 - 36,000	1,742,490	16%	20%	\$13,909	\$7.98
Block 3	36,000 - 102,000	1,901,843	18%	15%	\$10,432	\$5.49
Block 4	102,000 - N/A	3,349,247	31%	15%	\$10,432	\$3.11
Totals		10,723,223			\$69,546	

Refer to Notes in Table 3.

Table 5
Town of Fairlee Water Rate Study
Alternative No. 4 - Decreasing Block Rate with Base Charge (based on ERUs)

	Block Range (gallons per ERU per quarter)	Total Annual Volume Billed in Each Block (gallons)	% of Total Volume	Percentage of Revenue to be Collected from Block	Target Annual Revenue by Block	Proposed Block Rate (\$/1,000 gal)
Block 1	6,000 - 18,000	5,218,087	62%	75%	\$52,159	\$10.00
Block 2	18,000 - 36,000	2,262,050	27%	20%	\$13,909	\$6.15
Block 3	36,000 - 102,000	975,500	12%	5%	\$3,477	\$3.56
Totals		8,455,637			\$69,546	

Refer to Notes in Table 3.

Table 6 Town of Fairlee Water Rate Study Alt No. 1 - Uniform Rate			
		Base Charge	Proposed Uniform Rate
No Base Charge		\$0	
Uniform Rate (for all water consumed)			\$12.45 per 1,000 gallons
Notes:			

Table 7 Town of Fairlee Water Rate Study Alt No. 2 - Decreasing Block Rate (no Base Charge)			
	Block Range (gallons per quarter)	Base Charge	Proposed Block Rate
No Base Charge		\$0	
Block 1	0 - 18,000		\$15.97 per 1,000 gallons
Block 2	18,000 - 36,000		\$12.76 per 1,000 gallons
Block 3	36,000 - 102,000		\$9.74 per 1,000 gallons
Block 4	102,000 - N/A		\$5.53 per 1,000 gallons
Notes:			

Table 8				
Town of Fairlee Water Rate Study				
Alt No. 3 - Decreasing Block Rate with Base Charge (based on Meter Size)				
	Block Range (gallons per quarter)	Meter Size	Quarterly Base Charge	Proposed Block Rate
Base Charge	0 - 6,000	5/8"	\$115	
		3/4"	\$192	
		1"	\$307	
		1 1/2"	\$613	
		2"	\$920	
Block 1	6,000 - 18,000			\$9.32 per 1,000 gallons
Block 2	18,000 - 36,000			\$7.98 per 1,000 gallons
Block 3	36,000 - 102,000			\$5.49 per 1,000 gallons
Block 4	102,000 -			\$3.11 per 1,000 gallons
Notes:				

Table 9			
Town of Fairlee Water Rate Study			
Alt No. 4 - Decreasing Block Rate with Base Charge (based on ERUs)			
	Block Range (gallons per ERU per quarter)	Quarterly Base Charge	Proposed Block Rate
Base Charge	0 - 6,000	\$89 per ERU	
Block 1	6,000 - 18,000		\$10.00 per 1,000 gallons
Block 2	18,000 - 36,000		\$6.15 per 1,000 gallons
Block 3	36,000 -		\$3.56 per 1,000 gallons
Notes:			

Table 10
Town of Fairlee Water System
Review of Affordability Criteria

Alternative Water Rate	Annual Cost for Typical SFH¹	% of Median Household Income
Existing Water Rate	\$524	1.01%
Alt No. 1 - Uniform Rate	\$448	0.87%
Alt No. 2 - Decreasing Block Rate	\$575	1.11%
Alt No. 3 - Decreasing Block Rate with Base Charge (from Meter Size)	\$572	1.11%
Alt No. 4 - Decreasing Block Rate with Base Rate (from ERU basis)	\$474	0.92%

Notes:

¹ Based on a typical 3-bedroom home that uses 100 gallons per day.

² Based on the Fairlee CDP MHI from 2019 ACS of \$51,711

Appendix A
Town of Fairlee Water Rate Study
Water System Budget

	From Town Reports			Adjusted Budget for Use in Rate Analysis				
	2021 Actual ¹	2021 Budget	2022 Budget	2021 Actual (without Special Projects and Including Q4 Billing)	2021 Budget (without Special Projects)	2022 Budget (without Special Projects)	% of line item that is a "Fixed Expense"	Fixed O&M Expenses for FY22
Revenues								
Annual Water Rent	93,538.85	143,640.88	146,513.70	127,885.89	143,640.88	146,513.70		
Metered Water Rent ²	20,694.16	19,744.66	20,139.55	25,427.74	19,744.66	20,139.55		
Seasonal Water Rent	13,570.37	18,239.76	18,604.56	19,062.22	18,239.76	18,604.56		
Late Fees		500.00	500.00	-	500.00	500.00		
Water Hookup Fees	1,500.00		1,500.00	1,500.00	-	1,500.00		
Misc. Income								
State of VT Loan - Asset Mgmt Program	13,592.82	28,900.00	15,307.18					
State of VT Loan - Village Septic PER			76,000.00					
Interest Income	1,412.57		1,000.00	1,412.57	-	1,000.00		
Town Portion of Loan Payment	6,792.80	6,792.80	6,792.80	6,792.80	6,792.80	6,792.80		
USDA Anticipation Loan Proceeds								
USDA Grant Proceeds	1,078,371.19	1,160,796.23	82,425.04					
Litigation Settlement								
Total Revenues	1,229,472.76	1,378,614.33	368,782.83	182,081.22	188,918.10	195,050.61		
Less Town Portion of Loan Payment	(6,792.80)	(6,792.80)	(6,792.80)	(6,792.80)	(6,792.80)	(6,792.80)		
Payment	(60,921.20)	(60,921.20)	(60,921.20)	(60,921.20)	(60,921.20)	(60,921.20)		
Total Revenues for Operating	1,161,758.76	1,310,900.33	301,068.83	114,367.22	121,204.10	127,336.61		
Expenses								
Salaries & Wages - Operations	12,921.83	12,000.00	12,660.00	12,921.83	12,000.00	12,660.00	50%	6,330.00
Salaries & Wages - Accounting	1,960.17	10,400.00	10,400.00	1,960.17	10,400.00	10,400.00	50%	5,200.00
Payroll Taxes Expense	1,130.07	1,713.60	1,764.09	1,130.07	1,713.60	1,764.09	50%	882.05
Advertising	28.60	150.00	150.00	28.60	150.00	150.00	100%	150.00
Computer, Internet & Cyber Security	-	-	240.00	-	-	240.00	100%	240.00
Discounts Allowed	-	-	-	-	-	-		-
Dues and Subscriptions	275.00	275.00	275.00	275.00	275.00	275.00	100%	275.00
Insurance	3,599.00	3,599.00	2,796.00	3,599.00	3,599.00	2,796.00	100%	2,796.00
Mileage/Travel Reimb	561.99	750.00	750.00	561.99	750.00	750.00	100%	750.00
Office Supplies	66.50	500.00	500.00	66.50	500.00	500.00	100%	500.00
Postage	315.54	500.00	500.00	315.54	500.00	500.00	100%	500.00
Professional Fees	-	5,000.00	7,000.00	-	5,000.00	7,000.00	25%	1,750.00
Professional Fees - Asset Mgmt. Program	17,641.82	24,624.00	6,982.18					
Professional Fees - Village Septic PER	1,916.20	-	76,000.00					
Professional Fees - Water Tank	-	-	-					-
Professional Fees - USDA	608,954.99	504,308.31	70,774.41					-
Pump House Repairs & Maintenance	19,277.37	25,000.00	15,000.00	19,277.37	25,000.00	15,000.00	25%	3,750.00
Filtration System Repairs & Maintenance	2,889.04	5,000.00	1,000.00	2,889.04	5,000.00	1,000.00	25%	250.00
Reservior Tank Repairs & Maintenance	-	1,000.00	5,000.00	-	1,000.00	5,000.00	25%	1,250.00
Water Lines Repair & Maintenance	14,635.69	17,000.00	17,000.00	14,635.69	17,000.00	17,000.00	25%	4,250.00
Meters Repair & Maintenance	978.12	-	1,000.00	978.12	-	1,000.00	25%	250.00
Special Projects	13,804.05	11,000.00	11,000.00	13,804.05	11,000.00	11,000.00	25%	2,750.00
Gate Valve/Hydrants	1,214.82	5,000.00	5,000.00	1,214.82	5,000.00	5,000.00	25%	1,250.00
State of Vermont	924.57	1,000.00	1,000.00	924.57	1,000.00	1,000.00	100%	1,000.00
Telephone/Internet/Cybersecurity	1,904.09	1,500.00	2,500.00	1,904.09	1,500.00	2,500.00	100%	2,500.00
Training	48.00	200.00	200.00	48.00	200.00	200.00	100%	200.00
Treasurer/TA Salary	4,982.00	4,982.00	5,425.00	4,982.00	4,982.00	5,425.00	100%	5,425.00
Testing Water/Well Head	1,355.00	2,000.00	2,000.00	1,355.00	2,000.00	2,000.00	100%	2,000.00
Electric	16,120.56	8,500.00	12,000.00	16,120.56	8,500.00	12,000.00	25%	3,000.00
Propane	2,904.84	1,500.00	3,000.00	2,904.84	1,500.00	3,000.00	25%	750.00
Other Expenses	1,101.00	-	-	1,101.00	-	-		-
Subtotal - O&M	731,510.86	647,501.91	271,916.68	102,997.85	118,569.60	118,160.09		47,998.05
Debt Service								
Water Bond Payment - USDA	67,714.00	67,714.00	67,714.00	67,714.00	67,714.00	67,714.00		67,714.00
Subtotal - Debt Service	67,714.00	67,714.00	67,714.00	67,714.00	67,714.00	67,714.00		67,714.00
Total Expenses	799,224.86	715,215.91	339,630.68	170,711.85	186,283.60	185,874.09		115,712.05
Net Profit/(Loss)				11,369	2,635	9,177		
No. of Equivalent Residential Units (ERUs)				327	327	327		
Annual Cost per ERU per year (Equivalent to a Flat Rate Cost)				523	571	569		
Average Cost per ERU per year for O&M				315	363	362		

Notes:

¹ Actual Revenue in 2021 presented in Town Report is only for Q1, Q2, and Q3. Q4 Billing was applied to 2022 Actuals in accounting system.

² Actual Revenue from Metered Water does not appear to include the master meters for the "East" and "West" Seasonal Lines.

Appendix C
Town of Fairlee Rate Study
2001 Water Production by Month, gallons¹

	2019	2020	2021
January	1,295,500	1,236,900	1,528,200
February	1,159,100	1,156,000	1,271,600
March	1,011,200	1,392,300	1,248,900
April	1,190,300	1,394,200	1,339,010
May	1,267,600	1,768,600	1,488,310
June	1,481,000	2,016,700	1,878,350
July	1,722,700	2,035,300	1,870,200
August	1,688,000	2,069,900	1,822,390
September	1,534,400	1,810,900	1,514,590
October	1,503,800	1,605,700	1,409,340
November	1,444,800	1,482,300	1,622,480
December	1,342,500	1,600,900	1,252,370

Notes:

¹ Based on source water meter records.

² Months where COVID-19 Restrictions were in place are highlighted in yellow.

Town of Fairlee
Preliminary Water Audit
Comparison of Water Production to Amount Billed

Time Period (in 2021)	Total Water Production by Quarter	Total Metered Usage by Quarter ¹	% Non-Revenue Water ²
Q1	4,048,700	3,299,273	19%
Q2 ³	4,705,670	5,210,770	-11%
Q3	5,207,180	3,850,980	26%
Q4	4,284,190	2,522,420	41%
Totals	18,245,740	14,883,443	18%

Notes:

¹ Based on total of all meter records for Q2, Q3, and Q4. Q1 is an estimate based on engineering judgment.

² Non-revenue water is the result of planned and unplanned events, such as hydrant flushing and fire-fighting events.

³ Metered usage in Q2 was higher than total production; not clear on cause

Appendix D
Town of Fairlee Water Rate Study
Existing Water Rate Categories and Estimate of ERUs (for Alternative No. 4)

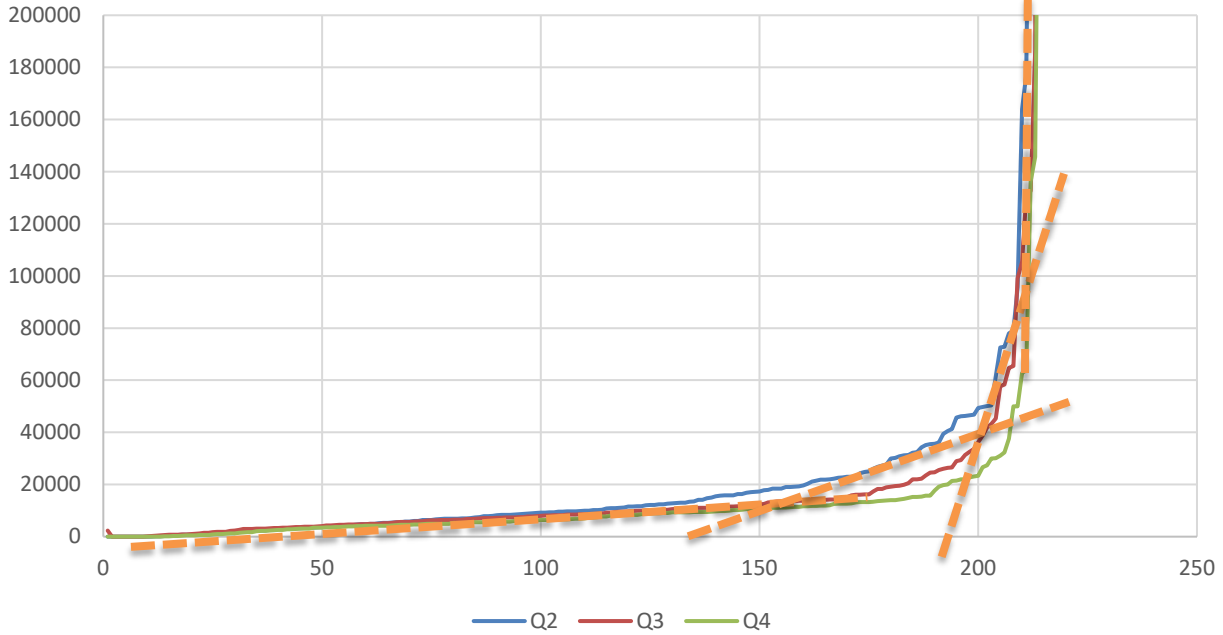
Category	Annual Rate	Quarterly Rate	Definition	No. of existing billing units in system	Projected Revenue in 2021	ERU Equivalent (as multiple of H1 Category)	No. of ERUs
H1	\$523.68	\$130.92	One family residential household dwelling or apartment unit.	203.25	\$137,388	1	203.25
H2	\$555.92	\$138.98	One family residential household dwelling or apartment unit with swimming pool.	13		1	13
HA-1	\$299.32	\$ 74.83	Residential or commercial unit with full bath, no kitchen facilities.	2		0.5	1
C1	\$391.96	\$ 97.99	Commercial unit having one water closet and a lavatory, such as a store or small office. Facilities not generally for public use.	16.25		0.75	12.1875
C2	\$523.68	\$130.92	Commercial unit with kitchen (no dishwasher). Client consultations. Facilities for public use, including one shower unit.	11.25		1	11.25
C3	\$775.80	\$193.95	Commercial unit such as bait shop, dog grooming facility, beauty salon, snack bar or similar use. Restaurants open less than 6 months a year.	3.5		1.5	5.25
C4	\$1,055.60	\$263.90	Commercial unit such as store with deli or restaurant open 6 months or more a year. Facilities for public use.	5		2	10
C5	\$523.68 plus \$ 34.64 per room	\$130.92 \$ 8.66	This is a home that rents rooms. Base charge plus annual fee of \$34.64 per room that is rented out.	0		0	0
C6	\$125.56	\$ 31.39	Facility open three months during the summer with one sink, no toilet/ bathroom facilities. Automated home lawn irrigation system.	1		0.25	0.25
CA-1	\$391.96	\$ 97.99	Commercial Auxiliary building with water service off main buildinQ. No toilet or kitchen facilities.	3		0.75	2.25
DC	\$523.68 plus \$9.40/child	\$130.92 plus \$2.35/child	This is the base charge for a home with a daycare facility.	1	1.2	1.2	
D1			This is the annual fee for a home with a daycare facility of \$9.40 per child based on the State- established license capacity (6+).	6			
A1	\$164.84	\$ 41.21	Auxiliary building with water service off main building.	6	0.33	1.98	
S1	\$456.00	\$114.00	Seasonal rate for homes or camps from May 15 to October 15. Must also pay for turning water on and off.	41.5	\$21,967	0.75	31.125
S2	\$385.16	\$ 96.29	Stand-by sprinkler fee for buildings with sprinkler systems.	5		0.75	3.75
SA-1	\$223.52	\$ 55.88	Boat houses OR guest house/apartment with bathroom facilities and/or kitchen facilities. (Seasonal)	5		0.5	2.5
M1	\$6.56	per 1,000 gallons	Special situations that require billing water on a per gallon basis. (NOT associated with new meter billing).	5,503	\$36,102	Estimated ERUs based on actual 2021 consumption	65.75

Notes:
1. Total metered consumption for Q1 for the M1 Category was 0 gallons.
2. Total metered consumption for Q2, Q3, and Q4 for the M1 Category totaled 4,189,000 gallons. Q1 consumption was estimated.

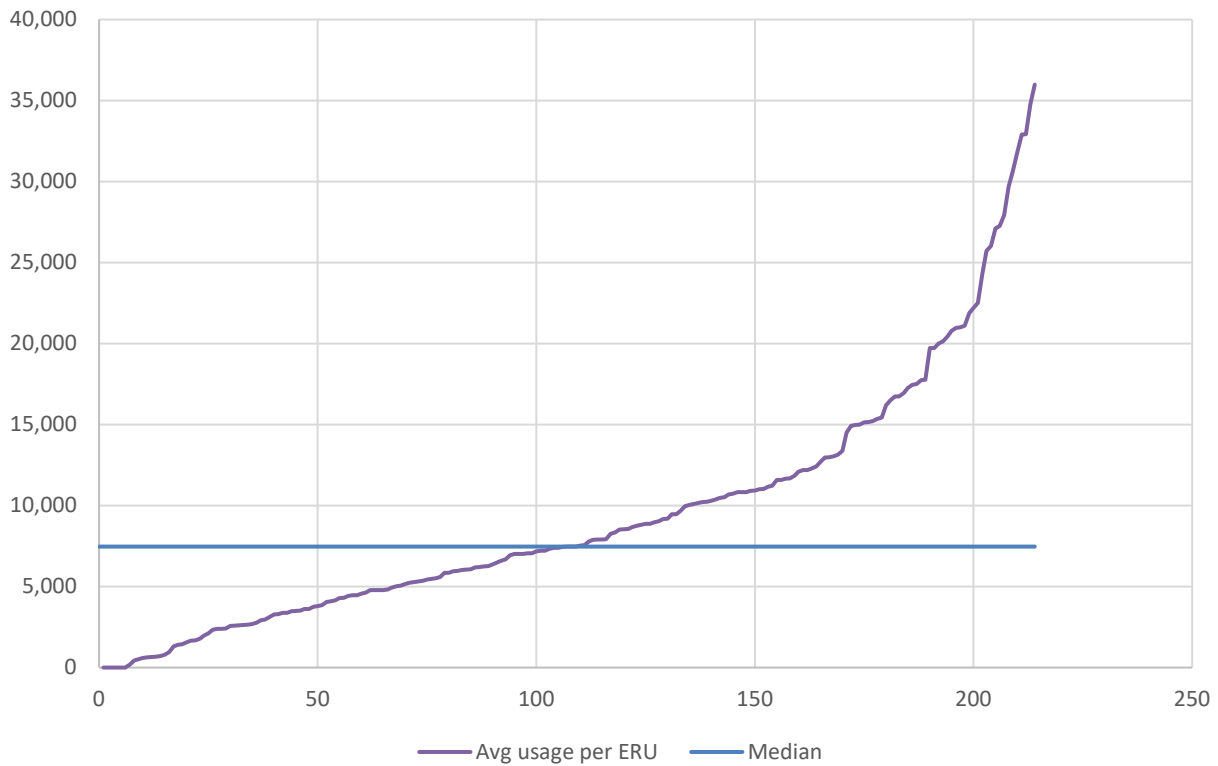
Appendix F Town of Fairlee Water Rate Study Total Water Usage by 6,000 Blocks in Each Quarter of 2021 ¹												
1Q21			2Q21			3Q21			4Q21			Total Volume for 2021 ²
Block (gal)	# of accounts	Total Volume for Block (gal)		# of accounts	Total Volume for Block (gal)		# of accounts	Total Volume for Block (gal)		# of accounts	Total Volume for Block (gal)	
0-5999	66	193,850	0-5999	71	172,580	0-5999	73	210,540	0-5999	94	271,250	848,220
6000-11999	74	657,193	6000-11999	52	459,380	6000-11999	73	644,740	6000-11999	71	639,220	2,400,533
12000-17999	37	542,370	12000-17999	29	426,360	12000-17999	30	424,760	12000-17999	25	349,620	1,743,110
18000-23999	13	271,610	18000-23999	20	416,600	18000-23999	12	243,650	18000-23999	10	214,890	1,146,750
24000-29999	9	237,773	24000-29999	7	181,970	24000-29999	8	212,220	24000-29999	2	54,080	686,043
30000-35999	3	103,967	30000-35999	11	358,790	30000-35999	3	97,440	30000-35999	4	123,500	683,697
36000-41999	3	122,767	36000-41999	4	157,310	36000-41999	3	117,000	36000-41999	1	37,580	434,657
42000-47999	1	42,773	42000-47999	5	231,440	42000-47999	2	88,520				362,733
48000-53999	1	53,847	48000-53999	4	199,490				48000-53999	2	100,080	353,417
54000-59999	1	56,000				54000-59999	2	116,080				172,080
60000-65999			60000-65999	1	61,500	60000-65999	2	130,250	60000-65999	2	126,700	318,450
66000-71999	1	66,980							132000-137999	1	136,300	203,280
72000-77999			72000-77999	3	223,440							223,440
78000-83999			78000-83999	1	79,020							79,020
84000-89999	1	86,367							144000-149999	1	145,600	231,967
			90000-95999	1	95,600							95,600
						96000-101999	1	99,100				99,100
						102000-107999	1	105,350				105,350
						126000-131999	1	130,710				130,710
						132000-137999	1	132,620				132,620
138000-143999	1	139,580										139,580
150000-155999	1	153,130										153,130
			162000-167999	1	163,900							163,900
			174000-179999	1	177,090							177,090
						186000-191999	1	186,900				186,900
270000-275999	1	271,067										271,067
294000-299999	1	300,000										300,000
			312000-317999	1	316,900							316,900
									318000-323999	1	323,600	323,600
						906000-911999	1	911,100				911,100
			480000-485999	1	480,700							480,700
			1008000-1013999	1	1,008,700							1,008,700
Totals		3,299,273			5,210,770			3,850,980			2,522,420	14,883,443

Notes:
¹ Values represent the total usage for the accounts that registered in the block range.

Quarterly Water Usage by Meter/Account for Alternative No. 2 -
Declining Block Rate (Ranked from Lowest to Highest Usage)



Average Water Usage by ERU for Alternative No. 4 -
Base Rate with ERU Basis
(Ranked from Lowest to Highest Usage)



Appendix G

Town of Fairlee Water Rate Study

2021 Usage and Determination of Base Rate by Meter Size

Meter Size	Total No. of Meters	Total No. of Projected ERUs	Q1		Q2		Q3		Q4		Total, 2021		Maximum Flow Capacity (gpm)	Multiple of Base Charge from 5/8 meter ¹	Annual Base Charge per Year by Meter Size ²	Quarterly Base Charge per Year by Meter Size	Total Revenue Collected as Base Rate	% of Total Revenue
			gallons	% of Total	gallons	% of Total	gallons	% of Total	gallons	% of Total	gallons	% of Total						
5/8"	202	263	2,405,110	73%	3,219,950	62%	2,328,370	60%	1,836,620	73%	9,790,050	66%	15	1.0	\$460	\$115	\$92,871	80%
3/4"	1	1	3,617	0.1%	6,810	0.1%	2,280	0.1%	1,760	0.1%	14,467	0.1%	25	1.67	\$768	\$192	\$768	1%
1"	6	19	151,080	4.6%	237,910	4.6%	272,530	7.1%	116,140	4.6%	777,660	5.2%	40	2.67	\$1,228	\$307	\$7,365	6%
1 1/2"	3	23	413,433	12.5%	706,100	13.6%	317,300	8.2%	216,900	8.6%	1,653,733	11.1%	80	5.3	\$2,451	\$613	\$7,352	6%
2"	2	21	326,033	9.9%	1,040,000	20.0%	930,500	24.2%	351,000	13.9%	2,647,533	17.8%	120	8.0	\$3,678	\$920	\$7,356	6%
Totals	214	326.5	3,299,273		5,210,770		3,850,980		2,522,420		14,883,443						\$115,712	

Notes:

¹ Multiple of Base Charge is a factor applied to larger meters due to the ratio of the meter's flow capacity to a standard 5/8-inch meter based on industry standards. For example, a 2-inch meter can flow 8 times more than a standard 5/8" meter.

² Based on the target to meet the "Fixed Costs" from the Budget in Appendix A, the Base Charge is determined algebraically from the number of meters of each size and the multiple factor described above, as follows:

$(202 \times \text{base charge for std meter}) + (1 \times 1.5 \times \text{base charge}) + (6 \times 2.5 \times \text{base charge}) + (3 \times 5.0 \times \text{base charge}) + (2 \times 8.0 \times \text{base charge}) = \$115,712$. Solving for base charge = \$464