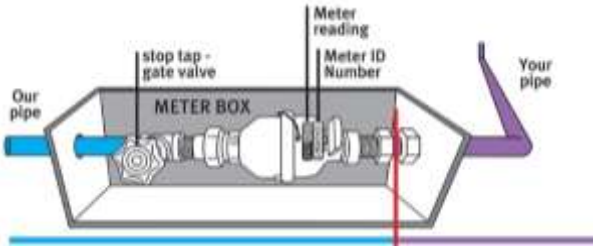
Cost-Benefit Analysis for Universal Water Metering



VAN ANDA IMPROVEMENT DISTRICT




BACKGROUND

The Van Anda Improvement District has recognized that recent growth of the community, as well as limited water processing capacity, have the potential to impact the community significantly. Residents have requested the District to explore the business case for a universal metering program.

VAID's approach to the project involved the following steps:

- Review of water production information from the existing Water Treatment Plant
- Identification of a range of water use reduction options, including universal metering
- Cost-benefit analysis of universal metering and other prioritized options

This report summarizes the outcome of this process, and provides some options for how the District may elect to proceed with this project.

REVIEW OF WATER USAGE IN THE DISTRICT

Characterization of Water Usage

VAID supplies water to residential, as well as Industrial, Commercial & Institutional (ICI – local industry, shops & services) customers within the District. We reviewed customer information and considered the performance of the water distribution network so as to characterize the various types of water usage within The District. Figure 1 below illustrates this water usage characterization.

Figure 1: Characterization of Water Usage

<table>
<tr><td rowspan="5">Total System Production</td><td rowspan="2">Authorized Users</td><td>Residential Users – flat rate</td></tr>
<tr><td>Commercial (ICI) Users – metered</td></tr>
<tr><td rowspan="3">Water Losses</td><td>Distribution System Leaks</td></tr>
<tr><td>Leaks on Private Property</td></tr>
<tr><td>Unauthorized Connections</td></tr>
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In determining options for reducing waste usage in the District, it will be necessary to address all types of water usage.

Water Production Information

We reviewed water production information from 2019 to 2021 to estimate gross water consumption for the District. This water production information is taken from pump hours in 2019 and 2020, and the Water Treatment Plant (WTP) meter readings for 2021.

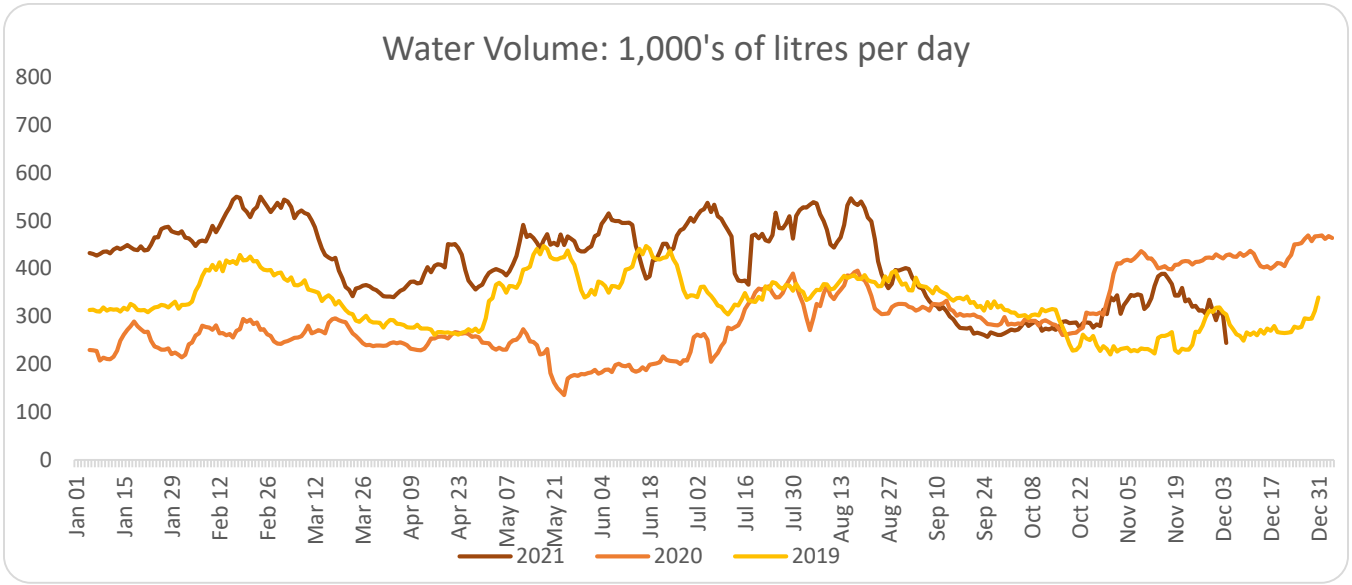
For the purposes of this analysis, the total annual consumption for the District is estimated at 127,798,000 litres, with the exception of calculation of water cost, which will use volume & expenditures from the year 2020 only.

Table 1: Yearly Water Volume

YEAR	Litres
2019	117,797,000
2020	106,312,000
2021	157,192,000*
Average	**127,798,000**

*estimated total based the year to date total as of Sep 30.

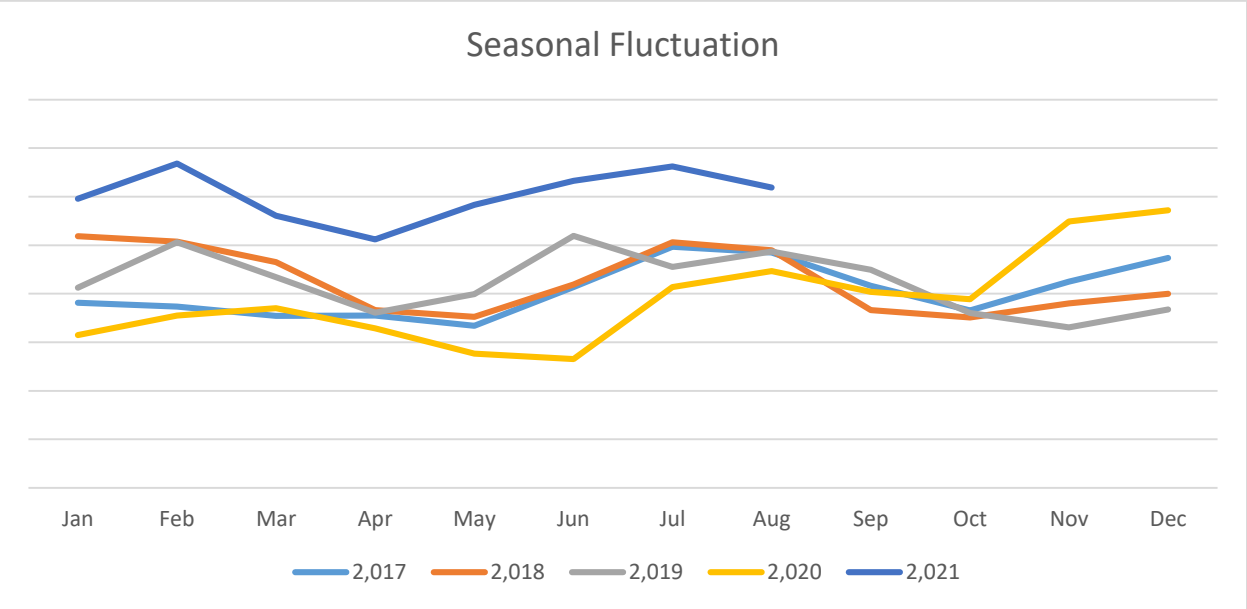
Figure 2: Daily Water Volume



We examined recent years supply capacity, in terms of the ability of the plant to produce sufficient water to meet seasonal fluctuations in water demand as well as populations growth. Figure 2 above shows daily fluctuations overs the years 2019 thru 2021. The next figure shows monthly averages from data collected from 2017 to present. This trend is consistent with typical annual consumption patterns,

which show higher values in summer months due to more outside usage of water, e.g. for irrigation, and also in winter, e.g. when faucets are left open to avoid freezing.

Figure 3: Monthly Averages



It is important to note that in 2021, there were many periods during both the winter and summer months where the pump was in operation for over 20 hours per day, indicating that the water supply infrastructure is operating at or near full capacity for short periods of time. We are happy to inform you that at the time of writing this report, after major leaks repaired in mid-August, the daily pump hours are down to about 13 or less. It remains to be seen if this number will stay low or new leaks will raise usage again.

CONSIDERATION OF UNIVERSAL METERING

The District wishes to consider how universal metering might be applied as a solution to some of the water capacity issues discussed above. The following sections review the premise for universal metering, and provide a cost-benefit analysis based on projected costs to implement a universal metering program for Van Anda.

PROGRAM STRUCTURE

Universal metering involves the application of the user pay principle to water usage for all customers within a water distribution system. This is typically implemented as a transition from a flat rate system. Under a flat rate system, users pay a fixed price, regardless of the amount of water they use. VAID currently charges flat rates by customer type.

With a universal metering program in place, users are charged based on the amount of water they use. This typically results in a greater awareness of the amount of water being used, and also triggers the desired effect of reducing water usage. Data collected by Environment Canada and the National Water and Wastewater Benchmarking Program, indicates that residential water usage is lower for metered customers, as compared with equivalent unmetered customers.

There are four main reasons for metering, all of which are understood to apply at some level in the District:

- **Equity** – with a metered system, end users become directly accountable for their water use, and are charged based on what they use. This provides a financial incentive to conserve water. Those customers who voluntarily implement water conservation measures within their household or property are able to reap the benefit of reduced costs, once a metered system is in place.
- **Water Efficiency/Conservation** – since most metered customers use less water than unmetered ones, implementing a metering program can sustain the existing source of water supply for longer, and free up existing supplies to support future growth. From a sustainability perspective, the less water The District needs to process and distribute, the lower overall environmental impacts will be.
- **Economic Benefits** – lowering water usage can reduce maximum daily demand rates, which in turn influence the amount of required supply capacity. The extension of supply capacity by reducing demand instead of expanding supply can allow the utility to delay capital expansion, and reduce operating costs associated with treatment and distribution.
- **System Management** – installing meters throughout the system provides a powerful management tool that enhances the utility's ability to detect and target leaks, identify areas in need of repair, manage flows and pressures more efficiently, and measure areas of real water losses.

WATER USAGE REDUCTION POTENTIAL

From a water usage reduction perspective, general estimates are that a universal metering program can result in 10-20% sustained reduction in residential usage, provided that metered water rates are established appropriately. Although initial water usage may drop below these levels at the point of introduction of a metering program, most municipalities have found that water usage may increase again after time, as people become more complacent about water use, and adjust to the new financial structure.

Table 2: Estimated Water Savings from Metering

	Total Estimated Annual Consumption	Estimated Usage: Reduction of 10%	Estimated Usage: Reduction of 20%
Litres	127,798,000	115,108,000	102,238,000

To determine the value of reducing water usage in the District, we developed a preliminary cost estimate for residential metering, and contrasted this with the current costs of water production.

COST OF RESIDENTIAL METERING PROGRAM

The cost of a metering program depends on a number of factors that will need to be taken into account in the design and implementation of a universal metering program. Costs for this program include: meter supply, related parts, installation and meter reading.

Pricing Considerations

The location of the meter installation will influence the costs of the programs. Some municipalities elect to install meters at the property line, so that the meter clearly remains within the control of the water system operator, rather than the customer. Another advantage of this choice is that customers may be more motivated to track and repair leaks on their side of the property line and meter, as this leakage will directly contribute to their water usage bill. Issues regarding damage or inconvenience sustained as a result of the meter installation are also minimized because most of the work occurs outside of the property boundary. However, installations at the property line are typically costlier that those installed in the building, due to the need to excavate to expose the service connection.

Installations inside the property, e.g. within the dwelling, or in a crawlspace, are typically less expensive since less excavation to expose the service connection is required. Inside installations may also offer weather protection for the meter. However, inside installations may result in reduced or restricted access to the units, making monitoring of the service more challenging. The ability to read the meter on a set schedule may also be impeded. If leaks occur between the meter and the property boundaries, customers may be less inclined to repair leaks, as these will have no impact on registered water use through the meter. Although internal installations are somewhat cheaper than external, they do not meet our needs and are not included further in the report.

Metering costs will also be influenced by how often and by what means the meters will be read. Radio frequency read meters are available that facilitate rapid reading of meters, through transmission between the meters and the reading device. These tend to be more expensive that simpler hand-held meter readers, which require more manual involvement and tend to be a slower method of reading.

Meter reading costs for radio read meters must be considered for costing purposes. Basic radio meter reading equipment & software costs vary from $2,000 to $12,000, depending on the meter manufacturer, and would allow all meters to be read in less than half a day. The units facilitate drive-by reading at about 5 km/hr, with a vehicle traveling slowly through the District. Using the larger reading equipment cost, the time saved in meter reading more than pays for itself. Amortized, the $12,000 initial cost would be about $1,400 yearly, substantially less than the difference of $2,592.00 saved in labor. Consider also the time saved by avoiding human error.

Table 3: Meter Reading Cost Comparison

Cost Comparison of Reading 290 Meters	Manual	Radio	Difference
Number of Meter Reads per Day @ 5 Minutes Each	96	all	
Person Days Required per Quarter to Read All Meters	3	0.3	
Estimated Cost per Quarter for Meter Reading*	$725.00	$72.00	
Annual Meter Reading Cost	$2,900.00	$288.00	$2,612.00

*Cost based on 1 FTE @ $30/hour working for an 8-hour day.

Parameters for Cost Estimate Development

In order to develop a cost for the universal metering program for The District, budget quotes were obtained on an "average" basis for supply and installation of residential meters. Sources for cost estimate include VAID's purchase & installation history, VAID's Water Operators knowledge of the products and procedures, GBID Phase 1 Water Meter Budget, and meter suppliers. Pricing was obtained for both manual and radio transmitter reading.

Finally, the number of meters that would be required was determined, based on a review of the water services customer listing. Some residences already have meters installed for informative purposes. In recent years, new connections require meter setters; it is estimated that around fifty services have setters. Meter setters are installed for two reasons: primarily for the added system safety of a check valve but also as preparedness for later meter installation. The following numbers were used:

Table 4: Number of Properties Requiring Meters

Current Residential Services	Meter Installed	Setter Only, No Meter	Meter & Setter Needed
191	4	50	141

Capital & Operating Cost Estimates

The table below summarizes projected capital costs for the metering program, based on the assumptions outlined above. Cost calculation sources are VAIDs previous meter installations, Sheret

online catalog, GBID meter project and meter distributors. Total costs were also amortized @ 3% over a ten-year period to provide an annualized capital cost estimate.

Table 5: Capital Costs for Residential Metering Program

MANUAL READ		EACH	TOTAL
137	all parts*	700	95,900
50	parts less setter	425	21,250
187	installation @ 4 hrs**	120	22,440
TOTAL		1,245	**139,590**

RADIO READ		EACH	TOTAL
137	all parts*	800	109,600
50	parts less setter	525	26,250
187	installation @ 4 hrs**	120	22,440
1	reader & software	10,000	10,000
TOTAL			**158,290**

* meter, setter, box, lid, connectors

**meter installation estimated at 4 hours per instance. There will be considerable variation due the age and location service connections.

Operating costs for a universal metering program include reading the meters, plus any extra billing that may be required. When metering, it is common for meters to be read on a quarterly basis such that customers, and municipalities, can relate to the amount of water being billed for; in turn allowing for better management of consumption if desired. As the majority of VAID's current customers are billed annually, a significant rise in the cost for producing bills may occur. The costs of reading meters was considered directly, that is by assuming the number of meters that can be read in a day and then calculating the cost of this, based on a real worker's wage. Meter reading costs were estimated as shown in Table 3.

Table 6: Summary of Estimated Metering Program Costs

	MANUAL READING	RADIO READING
Meter Reading Operations Cost	$2,900.00	$288.00
Billing Cost	$720.00	$720.00
Amortized annual cost	$16,166.97	$18,332.75
Total Annual Cost Estimate	**$19,786.97**	**$19,340.75**

Building on this understanding of the potential costs of implementing universal metering, we also undertook a review of the financial aspects of the existing water system, so as to quantify potential savings associated with water usage reductions. The 2020 Review Engagement Report was used to determine "water production costs" as distinct from overall "operational expenditures". It was

recognized that a considerable portion of the operating expenditures for the water system are fixed costs that do not change with a slight increase or decrease in water production. The real cost, or saving, associated with varying water production is associated with power consumption, chemical use and maintenance (including labour costs).

Table 7: Water Production Cost in 2020

Expense Line Item	Actual Cost in 2020	Assumed % Attributed to Water Production	Water Production Cost
WTP Maintenance – Equipment including filters			$15,810
Expendables: Chlorine & Salt			$10,964
Labour: Water Operator Wages & associated expenses	$88,866	80%	$71,091
Hydro			$10,928
TOTAL			$108,795

Application of this water production cost to the 2020 water production total of 106,312,000 litres resulted in a unit cost of water production of $1.01/1,000 litres. Applying the unit cost to the average annual use of 127,798,000 litres gives an average annual cost of $129,573.

When applied to the potential 10% -20% savings estimated to result from metering (from Table 2), the "value" of water saved through metering could be determined.

Table 8: Potential Savings in Water Production Costs from Universal Metering

Metering Effectiveness	Savings in Litres	Savings in $
10% Water Reduction	12,779,000	$12,957
20% Water Reduction	25,558,000	$25,915

When contrasted with the total annual costs for metering in Table 6, from $17,504.47 to $19,786.97, it can be seen that the cost of metering is approximately equal to the value of water saved with a 15% reduction on an annual basis. However, it is very likely that the final cost would be much higher, considering that some services may require much more than the fours hours estimated for installation labor, and the fact that parts costs are constantly increasing. It has also been noted by people experienced in the water service provision industry, that new metering programs seldom result in financial savings for the provider.

BENEFIT ANALYSIS

In addition to this financial analysis, we also considered the potential benefits that would accrue to the District under such a program, to provide a more comprehensive assessment of the value of implementing universal metering. This was evaluated in the context of the four main "reasons to meter" outlined in the Program Structure section above.

EQUITY

The ability to bill customers directly on the basis of their water consumption will create a financial incentive to reduce water consumption. However, it is important to note that there may be some negative reaction to a metered rate system, particularly from those users who currently are high consumers of water, and are in fact paying less that their "fair share" under the existing flat rate system. The District will need to consider the "value" of equity principles as part of the determination to move to universal metering.

It is also very important to note that achieving equity through metering comes not only from meter installations, but properly structured metered rates that produce the desired incentive effect. Equitable billing will therefore require extensive review and re-organization of billing rates to ensure fairness is achieved for all stakeholders. In addition, metered rates will need to account for at least partial cost recovery for the meter installation campaign, as it is unlikely that attempts to pass on up-front installation costs to customers would be feasible or supported by the community.

ECONOMIC BENEFITS

Consideration was also given to the potential benefits that metering could offer the District in terms of long-term capital infrastructure investment. While Van Anda's water resources (Priest Lake) are quite adequate to meet its current demand, the water treatment plant is struggling to meet peak demands. During the summer of 2021, water demand very nearly surpassed its supply capability since, on several occasions, the pump was in use for over 22 hours per day (operating between 90 and 100% of total supply capacity). The District is currently aware of this problem and is working towards the leak repair and replacement of ancient infrastructure. Many leaks have been repaired, which temporarily decrease water use, until the next leak.

WATER EFFICIENCY/CONSERVATION BENEFITS

In terms of the water conservation benefits, it is clear that any efforts to reduce the amount of water utilized by the District will achieve some environmental and conservation benefits. In terms of the

overall sustainability of the community, water consumption reduction could also translate into reduced energy consumption, e.g. less hot heating water requirements.

SYSTEM KNOWLEDGE BENEFITS

Metering will provide significant benefits for the District in terms of understanding how and where water is consumed, and assist in the identification of leaks or other system weaknesses. In addition, the installation of meters system-wide would also provide increased operational understanding, which could be leveraged to further optimize system operations.

FUTURE DEVELOPMENT

In the near future, the District may need to expand its water supply infrastructure to cope with increasing population growth. If water metering is implemented, and is able to provide a sustained reduction in water usage, then this will help to extend the life of existing assets (the water treatment plant) and postpone capital infrastructure upgrades.

The population of Van Anda has remained stable over many years, until recently. Government population statistics are outdated, with the 2016 census stating 297; we roughly estimated over 400 and so completed a more detailed count based on personal knowledge of the area. We can look at our current number of water service connections and consider the number of new connections requested in the last year, projected connections from developments currently underway and possible connections from future development.

Current population of Van Anda is estimated to be the equivalent of 475 people for 2021. VAID has potentially 30 new water service connection requests coming up or in process right now, with little data to count how many people for each of those undeveloped just yet properties. Assuming 60 brings us to 535 people for 2022/2023. Previous reports suggested that Van Anda would have 296 residents in 2027 and 313 residents in 2037 – the area has changed enough to make these reports unsuitable for VAID to base their potential water use on.

Recent purchases of properties adjoining the District have resulted in requests for boundary amendment for their inclusion; currently the owners/developers are being informed that we cannot promise water supply, and minimal fire protection only. We hope to be able to offer new water connections once systemic problems such as infrastructure leak repair and fine tuning of the water treatment plant operations have taken effect.

PLANNING FOR THE FUTURE

Due to the difficulties in determining future population, we looked to other sources of predicting population growth. In Gillies Bay, 20-year future population projections were forecast as a component of the Gillies Bay Master Water Plan (KWL, 2016). It was determined that utilizing a percent annual growth rate (or decline) was not appropriate to project the population for the 20-year planning period. Instead, a full build-out population was estimated by assuming all lots with the potential for development will be subdivided, and then by assuming all lots within the VAID service area will be connected at the end of the study period.

We considered using this method for Van Anda and note that on the map, there are several large lots of undeveloped land. Considering the geographical features that limit development within the District and the proposed developments neighbouring the District where applications have been made to amend the District boundaries, this method has little value for Van Anda. Accordingly, there are no time-based population projections in this report; we will however make calculations based on population.

CURRENT WATER DEMAND

VAID's current average per-capita daily water demand is 780 litres, which is significantly higher than the Canadian municipal benchmark values of 335 L. Nationally, the average daily residential use in 2013 was 250 L per capita[1]. Our usage in 2019 was 825 litres per person per day.

CLIMATE CHANGE ADAPTATION AND MITIGATION

Future weather in VAID is likely to continue becoming drier in the summer and wetter in the winter. According to the Pacific Climate Impacts Consortium (PCIC; plan2adapt.ca), by the 2050s, local precipitation is expected to change from current normals as follows (median of forecasts, and range of 10th to 90th percentiles):

- Annual +5% (0% to +11%
- Summer -8% (-19% to +3%)
- Winter +6% (-3% to +13%)

Extreme weather events (temperature and precipitation, drought and flooding) are expected to increase in frequency. Water demand targets should take these seasonal climate change impacts into account.

[1] https://www150.statcan.gc.ca/n1/daily-quotidien/170321/dq170321b-eng.htmnearly

FUTURE WATER DEMAND

Based on the uncertainty of how many water connections the District will use in the future, we considered two water use scenarios to predict future water use. The scenarios have been considered using population numbers instead of time, using the following factors:

- current population 475
- daily water use per person, using yearly totals divided among estimated population
- future population growing to double = 950
- WTP planned production = 317 litres per minute (L/min)
- WTP current production = fluctuates between 350-450 L/min
- WTP production may possibly be increased to 500 L/min, or higher
- Peak demand not shown as the data is unreliable for this purpose due to high amount of leakage

Scenario 1: Continuation of Current Water Demand as Population Grows

Scenario 1 assumes that per capita water usage remains constant over time, and therefore combines a range of average consumption amounts with an increasing population to show water demand. With the current rate of water consumption, the Water Treatment Plant will need production to increase if our population grows by more than 100, or even less if seasonal demands become more extreme.

With a twenty percent decrease in use from metering, the system as currently run could support 800 people. By combining the twenty percent decrease with a production increase to 500 litres per minute, the plant should be sufficient until the population has doubled.

Scenario 2: Best Case Scenario with Water Demand Reduction to Municipal Recommendation of 335 litres per day

Table 10 shows that when leaks are repaired and customers practice water conservation so that water use decreases to the Municipal suggestion, the Treatment Plant will not need upgrading, even if population is doubled.

Table 10: Change in Water Use Due to Metering, Education and Leaks Being Fixed

	POPULATION	WATER USE L/DAY	YEARLY CONSUMPTION LITRES
Current*	475	789	138,870,000
Future	950	335	116,161,000

*Current per capita water consumption was calculated by totalling the recorded water use from 2019 onwards, dividing that total by the number of days recorded, and dividing the daily result by the

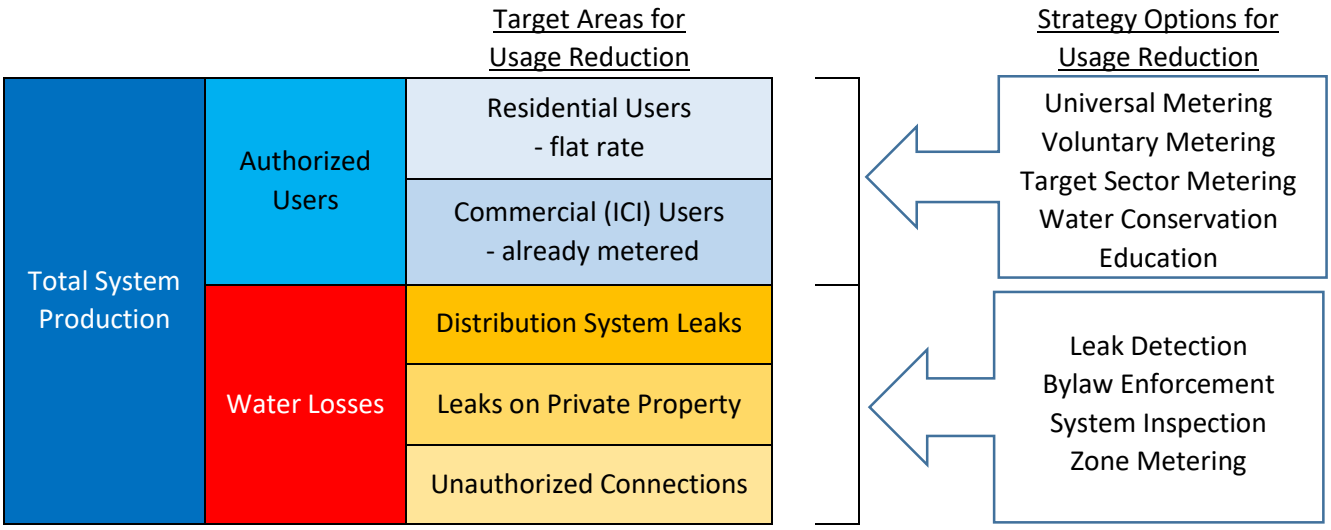
average population. Average population calculated using 2016 census of around 300, while in 2021 we counted 475, giving an average increase of 35 per year.

Latest usage figures: using WTP data for August & September 2021, per capita daily water volume is 815 litres. Still very high, but a huge improvement from February, when several days had per capita usage of around 1,330 litres.

APPROACH TO IMPLEMENTATION OF UNIVERSAL METERING

As the preceding sections demonstrate, universal metering may represent an increase in annual costs for the District. This however will need to be weighed against the potential advantages in terms of equity, economic benefits and system knowledge, as well as the options of delaying capital expenditures.

The District may also consider the approach of phasing in the universal metering program, and also considering how other strategies could be employed. Other options could include a voluntary metering program, as well as deeper analysis of targeted metering, for example of the ICI sector. The following sections outline some alternative approaches that may be considered, as outlined in the figure below.



The sections that follow provide greater detail on these options, including a description of the option, and its suitability as a water usage reduction strategy for Van Anda.

VOLUNTARY METERING

Under a voluntary metering program, customers may volunteer to have a meter installed on their service connection. Meters are typically offered at no charge to customers, and metered rates are structured to recover the cost of the meter and its installation over time. To be effective, a voluntary metering program should incorporate the following:

- Appropriately structured metered and flat rates, so that customers who opt for a meter are likely to save money, provided that they are applying water conservation practices consistently
- Clear understanding about the type, location and size of meter to be installed, as well as the meter reading process that will be applied, as all these factors will affect the costs of the program
- Commitment from the utility to read the meter on a regular basis in accordance with the billing schedule, and to bill the customer on a metered rate basis
- Long term objective to transition to universal metering, that will need to be reflected in progressively increasing flat rates, to encourage more customers to make the switch to a meter

Many municipalities in BC have voluntary metering programs, and these target primarily single family residential customers. Some, such as the City of Richmond, offer a program for multi- family customers, e.g. apartment buildings, as well.

Voluntary metering programs are a good way to encourage the expansion of metering within the system area, without having to commit to the upfront costs of a universal metering program. The overall benefits outlined above for universal metering will ultimately be realized, but may be delayed as the cumulative effects of voluntarily metered customers will only be felt once a “critical mass” of metered customers exists.

TARGET SECTOR METERING

Target sector metering focuses the application of metering to specific users or sectors within the customer base. A common target group is Industrial, Commercial and Institutional (ICI) users. These customers may be significant users of water, and therefore specific consumption information about these customers is desirable. Alternatively, these customers may be paying very high flat rates for water, while actual consumption is considerably lower. An example of this type of user would be a storage facility, which would likely only have a few bathrooms contributing to water consumption, but would be charged the high flat rate.

Within the District, it is recognized that most ICI customers are already being charged according to their metered water use. Collection of usage data at all ICI properties is necessary to have a clearer

understanding of water usage in this area, and allow cost recovery through billing to more accurately reflect water usage. The District needs to commit to regular reading of all customers, and consider whether the metered rates currently in the bylaw are appropriate, based on the levels of usage from the ICI customers.

WATER CONSERVATION EDUCATION

While metering and leak detection programs address the "hard" elements of the water system, water conservation education programs focus the "soft" aspects; customer awareness, knowledge and behaviour, as tools to reduce water usage. Water conservation programs can be designed to address these issues for all types of customers.

The most successful water conservation education programs create lasting behaviour change by first working to understand both barriers to and benefits of water conservation, as perceived by the target audience. Once these have been identified, program strategies should focus on sharing evidence to demonstrate potential benefits of water conservation. Pilot programs can also be utilized to generate interest and allow customers to experience benefits first-hand, e.g.:

- Distribution of dye tablets for toilet tanks to test for leaks
- Distribution of low flow showerheads or faucet aerators and follow-up consumption tracking to see savings
- Installation of water conservation devices in municipal buildings, to show how municipality "walks the talk"
- Voluntary low-flow toilet installations, provided through municipal resources
- Informing customers of their household's usage, by short term monitoring, if possible without meter installation

Once pilot programs have been tested, it is important to evaluate their success before full-scale implementation. Working with the communities impacted also helps build buy-in, e.g. forming a citizens' committee to provide suggestions from customers on how they would like to see the program unfold. On-going evaluation and reporting on performance also helps to reinforce successes.

LEAK DETECTION

Leaks may be occurring both within the main distribution system, as well as within a customer's property. Leaks have been found to contribute significantly to the total water losses; in some systems as much as 30 – 60% of the water produced can be lost to leaks. When comparing Van Anda's average water consumption to other areas, it is estimated that HALF of our treated water is being lost to leaks.

System-based leak detection programs can be effective at reducing water loss prior to usage, provided that the leak detection program is supported by appropriate response from the utility to repair the leaks. System surveys are typically used to detect leaks, and temporary meters may be used to isolate areas where leaks are suspected, so that leak location can be facilitated. It is important to note that system level meters, or zone meters, greatly assist the utility in location and quantification of leaks.

Leaks may also be occurring on private properties. Some municipalities take the approach of installing meters to make customers aware of water usage, and to also encourage leak repair in an effort to reduce high water bills. Where customers are unmetered, the case for private property leak detection may be harder to prove, as customers have little incentive to locate and repair leaks at their own expense.

ZONE METERING

Zone metering allows utilities to evaluate water losses from particular areas of the distribution system. Zones are typically defined by particular pressure zones, or other discrete areas of the system which can be isolated via meters. Once zone meters are installed, they provide significant system information about water usage and losses within the zone, pressure fluctuations or other parameters that can be used to optimize system operations.

BYLAW ENFORCEMENT AND SYSTEM INSPECTION

Bylaw enforcement is important in reducing illegal use of water and to preventing the illegal tapping of water lines. On-going system inspections to identify illegal connections or other unauthorized uses of water are also important. In addition to the water usage reduction benefits, bylaw enforcement and system inspection is also important to reduce water quality impacts, such as cross-connection or contamination due to illegal connections.

NEXT STEPS

This report is intended to present some basic information about universal metering options for the District, and identify the costs and benefits associated with implementation of such a program. Suggested next steps for the District may include:

- Confirmation of the intent to implement a universal metering program for the District
- Review and refinement of both metered and unmetered rate structures to leverage opportunities for demand side management through financial structures.

In the event that the District opts to delay implementation of a universal metering program, the benefits associated with enhanced system knowledge and “quick win” strategies should be explored, including:

- Consider bylaw requirement for new construction to include installation of meters
- Promotion to public of voluntary residential metering program
- Ensure all ICI customers connections are metered
- Develop a well-structured leak detection program
- Develop a water conservation education program.