



**INFRASTRUCTURE COMMITTEE MEETING  
OF THE VILLAGE OF LIONS BAY  
HELD ON THURSDAY, APRIL 18, 2024 AT 6:00 PM  
COUNCIL CHAMBERS, 400 CENTRE ROAD, LIONS BAY  
AND VIA ZOOM VIDEO CONFERENCE**

ZOOM INVITE LINK: [HTTPS://US02WEB.ZOOM.US/J/2780145720](https://us02web.zoom.us/j/2780145720)  
TO JOIN VIA PHONE, DIAL 778-907-2071 | MEETING ID: 278 014 5720

**AGENDA**

- 1. Call to Order**
- 2. Approval of the Agenda**
- 3. Public Questions & Comments**
- 4. Approval of Minutes**
  - A. Infrastructure Committee Meeting Minutes – March 21, 2024 *(to follow)*
- 5. Business Arising from the Minutes**
- 6. Unfinished Business**

Identifier	Description	Responsible	Status
23087	Locate previous PWM’s update report to the IMP indicating the projects that are completed.	PWM	
23092	Solicit Village resident technical expertise for each working sub group.	All	
23111	All I.C. members will be provided with a copy of the IMP and the enhanced Asset Management Plan. The document is complicated and requires a dedicated I.C. meeting to fully understand the implications for the Village.	KB/PWM	
23112	Convene a February I.C. Round Table Meeting to focus on a 10 and 20 year horizon plan to identify the new and replacement infrastructure requirements and related expenses.	NTA/All	
23113	CAO and/or Council to be asked to allow members of the I.C. to have selective access to the PW document library.	PWM	

## Agenda – Infrastructure Committee – April 18, 2024

Village of Lions Bay

Page 2 of 3

23117	BU will review the SCADA system on behalf of the I.C. and work with the PWM to up-grade the hardware and software. A Requirements Document is anticipated at mid 2024.	BU/PWM	Partial
23118	Assist the PWM in determining the best option for the replacement of the Highway Water Tank. ASG to solicit the expertise of a competent and responsive engineer to allow this project to proceed.	ASG	
23122	ASG to assist the PWM in preparing REQ/RFP documentation for estimate for the supply and installation of an alkalinity feed system for each WTP. ASG to assist the PWM and CAO in reviewing submissions once received.	ASG/PWM	
23124	Meet with members of the CAC to see if and where the common ground is with respect to water metering in the Village, allowing for possible coordinated recommendations.	NTA/ASG/BU	
23125	ASG to find vendors who can supply portable WTP on short notice, in the event of a local wildfire in the watersheds, for rent for up to 36 months.	ASG	
23126	ASG with PWM and crew to get a handle of the practicality, within the realities of priorities.	AGS/PWM	
23127	AGS to approach bigger vendors regarding portable water treatment plants	AGS	
23128	Arrange for a Long-Term Planning Meeting in May 2024.	All	

**7. New Business**

- A. Discussion around short-term solutions to looming water shortage.
- B. Update Water metering – Request for Council
  - i. Review of proposed new water bylaw: (page 4)
- C. Options for Alberta Intake
  - i. Alberta intake upgrade and overland pipeline to Harvey Creek intake or Harvey WTP.
  - ii. Intake upgrade with local WTP supply to - existing Phase V tanks or directly to distribution system.
- D. Drilling Program – short or long-term?
  - i. Proposed locations
  - ii. Treatment options
- E. Brainstorming session any other ideas for short term solutions?

Agenda – Infrastructure Committee – April 18, 2024

Village of Lions Bay

Page 3 of 3

---

**8. Public Questions & Comments**

**9. Adjournment**

**10. Next Meeting – May 16, 2024**

---

**DATE:** April 11, 2024  
**TO:** CAO Ross Blackwell MAP, MCIP, RPP  
**FROM:** PWM Karl Buhr  
**RE:** **STAFF REPORT: A NEW WATER BYLAW**

---

## **RECOMMENDATION**

THAT Council gives first reading to a proposed new bylaw, Water Bylaw No. 633, 2024 and further direct staff as to its development.

## **DISCUSSION**

1. Proposed Water Bylaw No. 633, 2024 is intended to replace Water Fees and Regulation Bylaw No. 2, 1971, which focussed on connecting new users to a new water system. The new bylaw focusses on allowed and disallowed uses of water, leakage prevention and metering. Legal counsel recommended that an entirely new bylaw be promulgated to accommodate needs that did not exist in the Lions Bay of 53 years ago. To produce it, effort was expended to draw on other communities' lessons learned; Burnaby was particularly helpful. Metro was consulted, and they also provided the appended best practices guide. Text was amalgamated, with the help of AI, from three BC municipalities' modern water bylaws.

The text presented here has gone through one round of legal review, been reviewed by senior Public Works staff, been reviewed by our preferred metering vendor, and is being presented here for a first reading to get Council's input early in the drafting process.

2. Salient features of the new Bylaw
  - a. With private-side service connections now the primary cause of leakage in Lions Bay, the Bylaw stipulates materials and installation practices downstream of the municipal curb stop.
  - b. Additional sources of cross-connection are addressed.
  - c. Allowed and disallowed uses of water are addressed.
  - d. Metering, although addressed and allowed under Bylaw No. 2, is laid out in detail. Counsel was particular that we provide for metering reasonably and non-prejudicially, which this Bylaw does. With 90% of water costs non-variable, what we charge for water must ultimately recover costs, regardless of how much water is delivered. Up to now, properties of the same class have shared equally in the cost of water, regardless of use. For a metered rate, we have struck a balance between a fixed base rate paid by every metered account to also contribute to fixed costs and

pay for “non-revenue” water (leakage), a meter service charge based on service line size to cover the cost of their installation and replacement, and a volume charge that incentivises conservation when supply is tight, and allows users who are prepared to pay for higher use to do so.

- e. User and public impact on the water system overall is regulated.
  - f. Charges are better defined, as is non-payment.
  - g. Data protection, unheard of in 1971, is covered.
  - h. Liability, remedy, offenses and penalties are updated for modern legal needs.
3. As implied, staff are implementing a trial automated metering pilot, primarily to provide near-realtime leak detection in time for late summer. The merits of metering are not the subject of this report, but beyond leak detection they include equity<sup>1</sup>, choice<sup>2</sup> and self-incentivising conservation<sup>3</sup>. Particularly in Lions Bay, where supply of drinking water depends on it being in the creeks on demand, such benefits are seen to be worth the cost, admin overhead and revenue variability of metering. Staff anticipate many users will *request* to be metered; in that case, since with limited funding the municipality cannot install metering everywhere at once, the Bylaw allows for users paying the upfront cost of meter installation and have it rebated from their bill over ten years.

### **FINANCIAL CONSIDERATIONS**

This report is for the introduction of the new Bylaw, not the cost of the metering pilot, which also does not necessarily reflect the economies-of-scale cost of installing and operating universal metering in Lions Bay. However, for Council’s and the public’s information, the anticipated pilot’s capital cost is \$78,000, plus annual operating costs of \$5300 before increased internal staff time, minimal for the pilot. This spend will be drawn from a combination of the SCADA budget, the drought contingency budget and the water maintenance budget, as always subject to Lions Bay Purchasing Policy.

### **LEGAL CONSIDERATIONS**

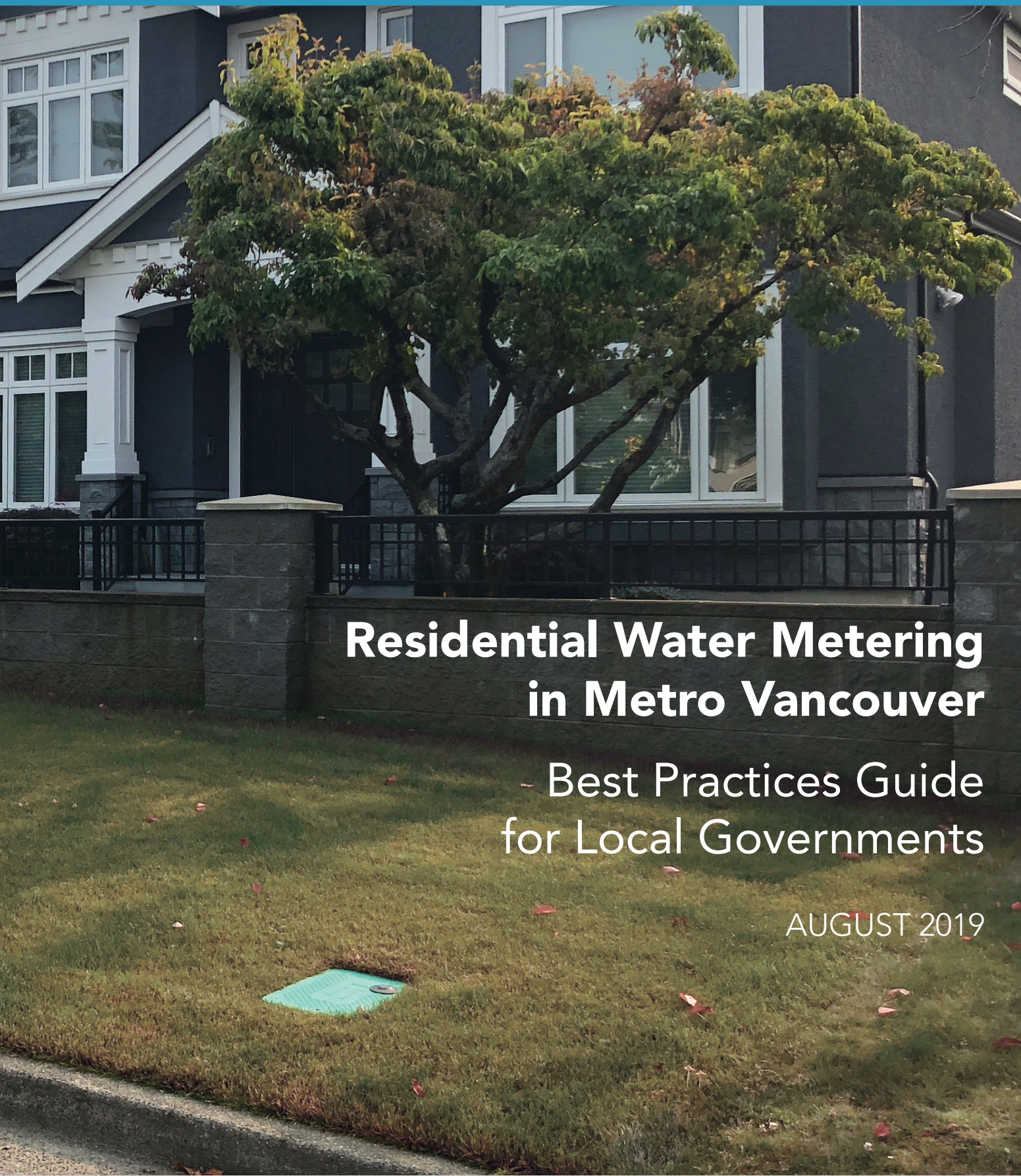
Fees Bylaw No. 497, 2016 will need to be updated to add the Fees and Fines anticipated in the new Water Bylaw.

---

<sup>1</sup> Metering enables charging customers based on their consumption, as there can be a significant difference in use depending on indoor and outdoor consumption patterns, water-related behavior, and household size.

<sup>2</sup> Metering provides customers the ability to pay less for their water bill. If they choose to use less water. With flat rates, customers have no financial incentive to use less water and pay a smaller bill.

<sup>3</sup> Metering allows rates are tiered for high volume consumers, and for use in low-supply months.



# Residential Water Metering in Metro Vancouver

## Best Practices Guide for Local Governments

AUGUST 2019





# Contents

1. Water Metering as a Best Management Practice	5
2. Introduction	6
Purpose of the Guide	6
Residential Water Metering in Action	6
Benefits of Residential Water Metering at a Glance	7
3. Regional Assessment of Residential Water Metering Overview	8
Context	8
Purpose and Approach of the Assessment	8
Study Findings	9
Metering Scenarios Explored	10
4. Metering Benefits to Local Governments	12
Water Conservation	12
Detecting and Reducing Leaks	13
Advising Residents about Leaks in their Water System	13
Moving Toward Better Systems Management	13
Improving Relationships with Residents	13
5. Metering Benefits to Residents	14
Equitable Billing	14
Empowering Residents to Make Their Own Decisions	15
6. Considerations for Local Governments Developing a Water Metering Program	16
Planning and Implementing a Water Metering Program	16
Practical Considerations	18
Financial Considerations	19
Resource Considerations	21
Public Outreach Considerations	22
7. Key Findings from Case Studies	23
City of Richmond	25
City of Surrey	28
City of Vancouver	30
District of West Vancouver	32
City of Abbotsford and District of Mission	34
City of Calgary	38
City of Toronto	39
City of Seattle	41
New York City	43
London, England	45
South East Queensland, Australia	46
References	48

# WATER CONSERVATION



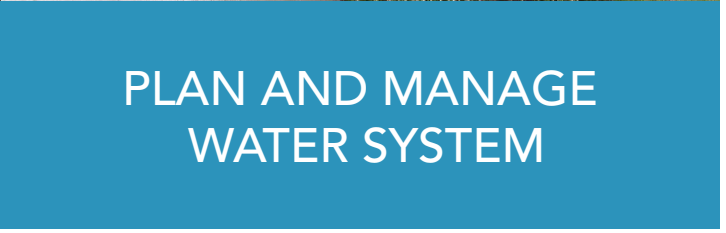
# EQUITABLE BILLING



# DETECT LEAKS



# PLAN AND MANAGE WATER SYSTEM



## Water Metering as a Best Management Practice

# 1. Water Metering as a Best Management Practice

### Water Metering in Metro Vancouver

Metro Vancouver meters all water delivered to local governments and bills each local government for the amount of water consumed. Local governments are responsible for decision making on water metering of residences and businesses.

Generally, all industrial, commercial, and institutional water users are fully metered in Metro Vancouver. The approach to metering multi-family buildings and single-family homes varies greatly across the region. Some local governments have implemented metering for all homes, while homes in other local governments are unmetered.

Metro Vancouver supports water metering as a best management practice and encourages local governments in the region to move towards universal metering.

Implementation of residential water metering programs over an accelerated timeline by all local governments will yield the highest benefits to the region. However, Metro Vancouver recognizes the need of local governments to determine an approach to water metering that best meets their own objectives and requirements.

### Associations Supporting Water Metering

Water metering is recognized as a best practice by the BC Water and Waste Association, the Federation of Canadian Municipalities, the American Water Works Association, and the Canadian Water and Wastewater Association. Residential water metering contributes to achieving water conservation goals, improves billing equity, helps with leak detection and reduction, and helps with planning and managing of water systems.

“A water meter is a device used to measure the precise volume of water consumed at a particular location, such as a single-family home, a multi-family building or a business facility. Water meters provide vital information to utility managers about water consumption, water loss and system efficiency.” – BC Water and Waste Association (2012)

“Metering how much water we draw, treat, distribute, and consume is now widely recognized in North America and around the world as a best management practice.” – Federation of Canadian Municipalities (2003)

“The American Water Works Association (AWWA) recommends that every water utility accurately meter all water taken into its system and all water distributed from its system at its customers’ points of service. Meters should be read at sufficiently frequent intervals appropriate to support the utility’s understanding of volume of production, rate structures and to provide accurate bills and feedback to its customers.” – American Water Works Association (2014)

## RESIDENTIAL WATER METERING IN METRO VANCOUVER: BEST PRACTICES GUIDE FOR LOCAL GOVERNMENTS

## Introduction

## 2. Introduction

### Purpose of the Guide

This guide presents key considerations for local governments in Metro Vancouver interested in residential water metering. The decision to meter is ultimately determined by local governments and hence this guide has been developed by Metro Vancouver as a resource for local government staff to use to determine optimal water metering programs for single-family homes in their jurisdictions.

The guide has been informed by the results of a triple-bottom-line regional assessment of residential water metering conducted by Metro Vancouver, local and international case studies and other resources that outline best practices for water metering program implementation.

This guide is intended to provide local governments with the best water metering information available to support decision makers, including:

- The importance of residential water metering to local water conservation efforts
- The benefits of residential water metering to local governments and the public
- Approaches to implementing a residential water metering program
- Practical, financial, resource, and public outreach considerations for implementing a residential water metering program

**NOTE:** *While this guide is intended to be relevant region-wide, local variances in current water metering practices, utility operations, water use characteristics, and housing type may necessitate individual local governments to implement appropriate alternatives.*

### Residential Water Metering in Action

In North America and around the world, including in Metro Vancouver, many local governments have implemented residential water metering to measure the volume of drinking water used by their residents.

Cities such as Calgary, Toronto, and New York have had varying levels of residential water metering for many decades, and in recent years have successfully transitioned to universal metering. The City of Seattle and the City of Portland have been universally metered since the 1920s.

Many local governments in Metro Vancouver have residential water metering programs currently in place. This Guide profiles the City of Richmond, the City of Surrey, the City of Vancouver, the District of West Vancouver, the City of Abbotsford, the District of Mission, and other cities around the world. These programs vary in scope and concentration, and each consists of a different combination of metering program approaches.

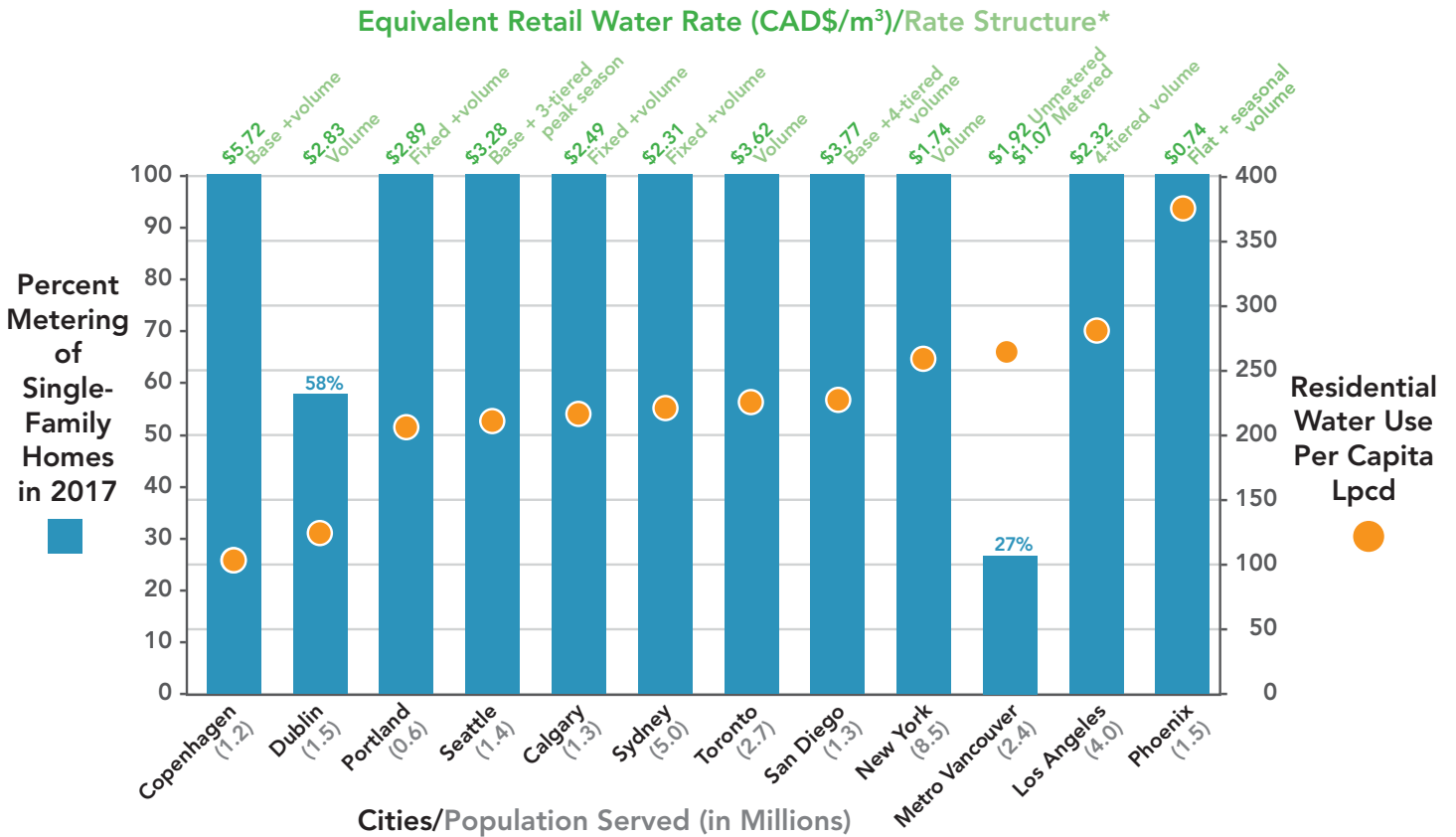
Figure 1 shows a comparison of the level of residential single-family metering, water use per capita, and average water rates for select cities from around the world. Most of the cities compared are fully metered, although water use and average water rates vary.



# RESIDENTIAL WATER METERING IN METRO VANCOUVER: BEST PRACTICES GUIDE FOR LOCAL GOVERNMENTS

## Introduction

FIGURE 1: RESIDENTIAL WATER METERING AROUND THE WORLD



\* For information about the different rate structures, see Section 6.

### Benefits of Residential Water Metering at a Glance:



Residential water metering helps local governments to move toward their water conservation goals.



Residential water metering offers residents equitable billing: the more water residents use, the more they pay.



Residential water metering provides an effective detection system for leaks and water loss, thus reducing costs for residents and local governments when these leaks are promptly repaired.



Residential water metering enables local governments to better plan and manage their utility systems by providing data on water usage.

## RESIDENTIAL WATER METERING IN METRO VANCOUVER: BEST PRACTICES GUIDE FOR LOCAL GOVERNMENTS

### Regional Assessment of Residential Water Metering Overview

## 3. Regional Assessment of Residential Water Metering Overview

### Context

Metro Vancouver and its local governments work together to supply clean, safe drinking water to more than 2.5 million residents and businesses in the Metro Vancouver region. The region is expected to grow by 35,000 people per year over the next several decades (MV, 2017) and as such, Metro Vancouver is taking steps to conserve drinking water in alignment with global water conservation efforts.

One of the goals of Metro Vancouver's Drinking Water Management Plan is to ensure the sustainable use of water resources for the growing population (MV, 2011). Metro Vancouver's 2019–2022 Board Strategic Plan includes a strategic direction to “provide guidance on implementing residential water metering in the region as a best management practice.”



### Purpose and Approach of the Assessment

Metro Vancouver conducted a regional assessment of residential water metering (the Regional Assessment) to evaluate the overall costs and benefits of water metering for single-family and duplex homes.

**The purpose of this study was to evaluate the economic, social, and environmental aspects of water metering from a regional perspective to provide local governments with an adaptable methodology and tools to conduct their own assessment.**

A triple-bottom-line evaluation assessed the impacts of water metering over a 50-year timeframe to capture multiple water meter lifecycles.



As part of this study, a water metering evaluation tool was developed for local governments to conduct localized triple-bottom-line evaluations using the same approach as the regional evaluation. Local governments can add or modify information to capture conditions specific to their local areas that may impact decision making.

The Regional Assessment investigated a variety of approaches for implementing residential water metering. These approaches are described in the next section (Study Findings).

# RESIDENTIAL WATER METERING IN METRO VANCOUVER: BEST PRACTICES GUIDE FOR LOCAL GOVERNMENTS

## Regional Assessment of Residential Water Metering Overview

Financial impacts were evaluated through life cycle costs of the metering programs. These impacts included meter installation, operations and maintenance costs including greenhouse gas emissions, as well as the potential to defer infrastructure upgrades through water savings.

Other considerations, that could not be translated into financial impacts, were evaluated qualitatively on a per meter basis. These considerations included several environmental impacts, billing equity, and construction impacts on residents.

### Study Findings

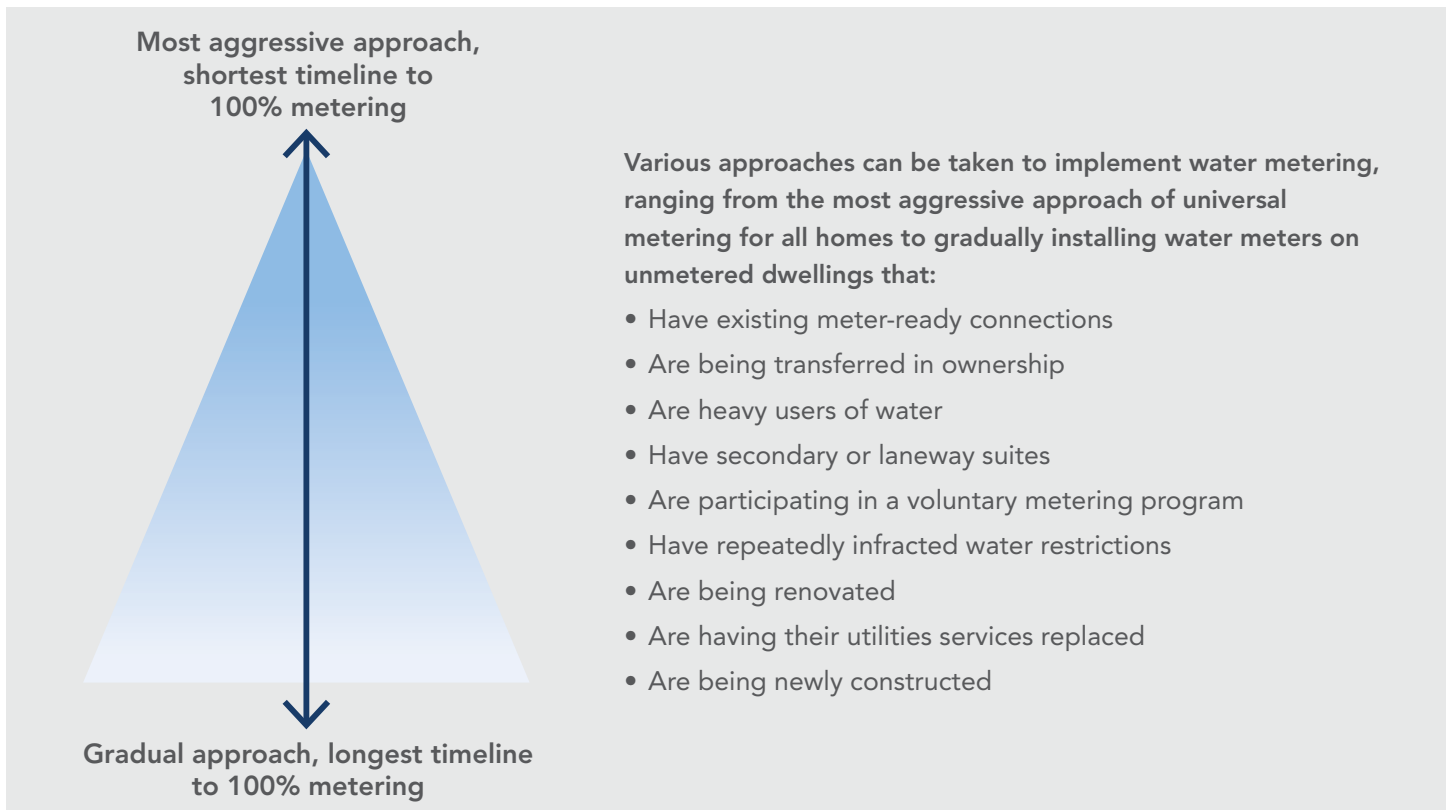
For local governments considering implementing residential water metering programs, there are a range of approaches with differing timelines and varying costs and benefits.

**Results of the Regional Assessment showed that the greatest overall financial and non-financial benefits are achieved by implementing universal metering on all residential dwellings over an accelerated timeline.**

While the Regional Assessment found that a 10-year approach to universal metering provides optimal benefits, it is a large investment that may require substantial up-front funding, staffing, maintenance, and commitment.

Recognizing that some local governments may prefer to take a smaller-scale or more gradual approach to residential water metering, the triple-bottom-line evaluation found that financial and non-financial benefits may also be achieved by implementing one or more of the approaches listed in Figure 2 below.

FIGURE 2: APPROACHES TO WATER METERING



## RESIDENTIAL WATER METERING IN METRO VANCOUVER: BEST PRACTICES GUIDE FOR LOCAL GOVERNMENTS

# Regional Assessment of Residential Water Metering Overview

### Metering Scenarios Explored

To evaluate the regional impacts of water metering, the Regional Assessment designed various metering scenarios to represent differing approaches, illustrated in Figure 3.

The Regional Assessment explores a range of scenarios: Low Hanging Fruit (the most gradual and low effort approach), Targeted Approach (adds metering programs targeting heavy water users and a voluntary option), Concentrated Effort (adds additional programs), and finally Full Commitment (the highest level of effort and commits to achieving universal metering in 10 years). Financial savings from water metering include the deferral of growth-based infrastructure upgrades and system operations savings, which are largely influenced by overall water use reductions. Financial costs include water meter installation costs as well as meter reading/maintenance costs, both of which vary based on each metering program and meter installation efficiencies (such as bulk meter purchases or neighbourhood-wide installations). The net financial impacts of each metering scenario are expressed as net present values over 50 years. Variations in net financial impacts between the scenarios are due to how fast meters are installed over the 50-year timeline. The metering programs within the Targeted Approach have higher reading/maintenance costs, leading to a higher net financial cost. Full Commitment achieves the greatest net financial savings due to the efficiencies and benefits from achieving universal metering at an accelerated pace.

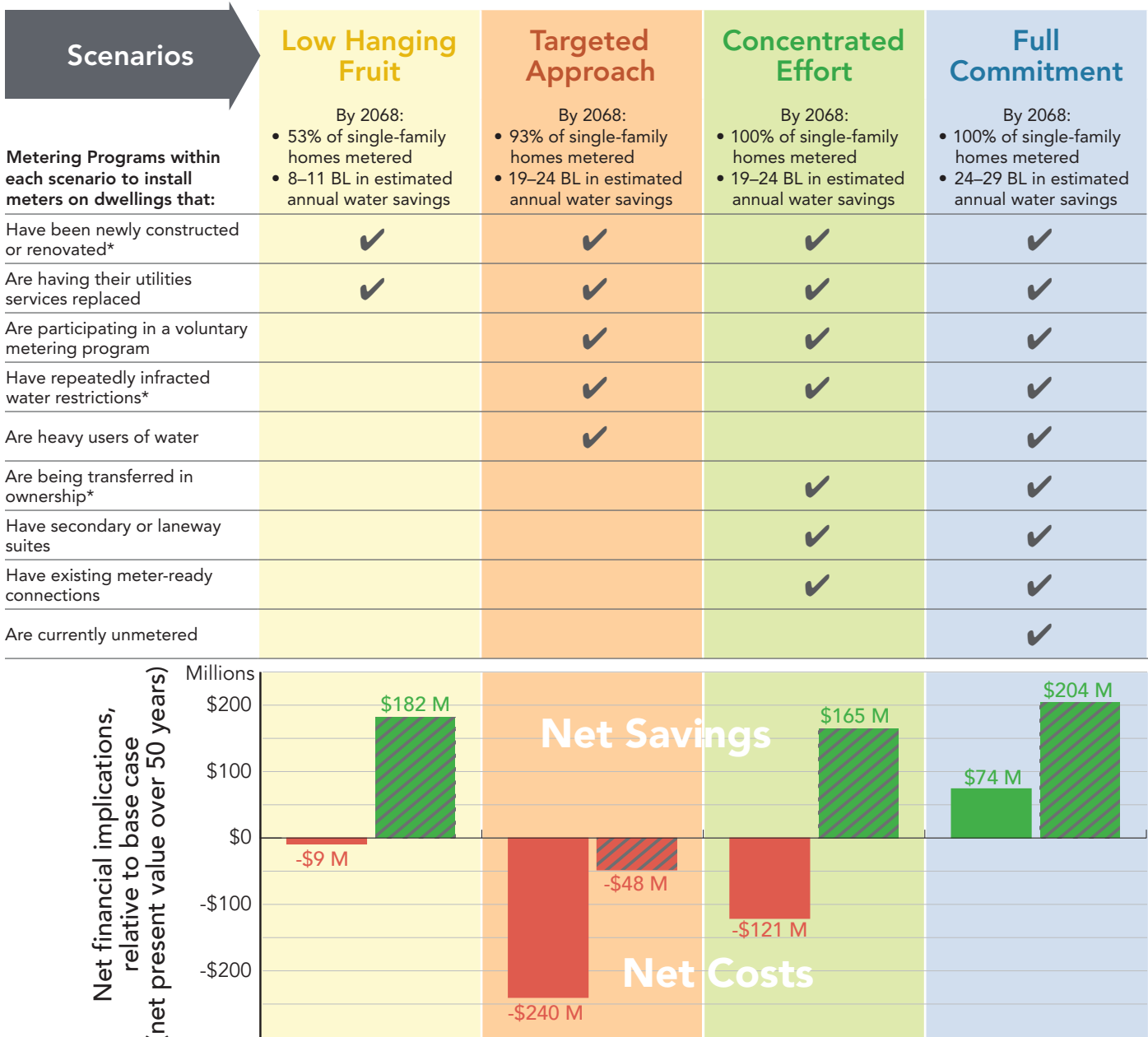
The outcomes of the metering scenarios apply to Metro Vancouver as a whole under the evaluation assumption that the region as a whole implements residential water metering as defined in each metering scenario. These regional findings are intended to be viewed as high-level guidance on the expected costs and benefits of water metering, to be used in conjunction with localized triple-bottom-line evaluations to determine projected outcomes for their individual local governments.



# RESIDENTIAL WATER METERING IN METRO VANCOUVER: BEST PRACTICES GUIDE FOR LOCAL GOVERNMENTS

## Regional Assessment of Residential Water Metering Overview

FIGURE 3: SCENARIOS EXPLORED IN THE REGIONAL ASSESSMENT OF RESIDENTIAL WATER METERING



**LEGEND**

- Financial implications for Metro Vancouver, local governments, and developers/home builders/homeowners
- Financial implications for Metro Vancouver and local governments only

\* Many cities across North America reduce local government costs by shifting the initial meter installation costs for these metering programs to developers/home builders/homeowners.

# RESIDENTIAL WATER METERING IN METRO VANCOUVER: BEST PRACTICES GUIDE FOR LOCAL GOVERNMENTS

## Metering Benefits to Local Governments

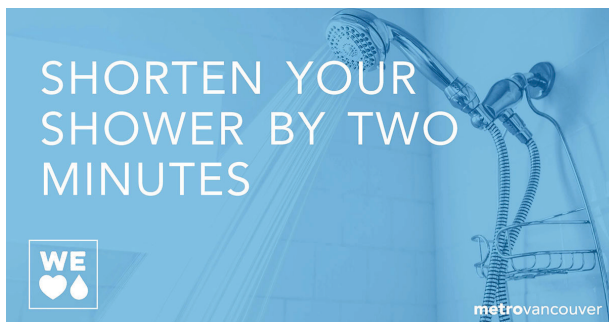
### 4. Metering Benefits to Local Governments

#### Water Conservation

Water metering initiatives in Metro Vancouver and in other areas have made significant positive impacts on water conservation efforts. Conservation success is due in part to the financial incentives that come along with water metering, as a reduction in water consumption generally results in a decrease in household water bills. Local governments have found that water meters and water conservation programs benefit one another when adopted in conjunction with one another.

The following real-world examples show the relationship between water metering and water conservation:

- The installation of water meters was coordinated with water conservation efforts to encourage and support water wise behaviour adaptations in the **City of Richmond**. Free educational materials and water conservation kits containing high efficiency fixtures were offered to residents that volunteered for water meters.
- In the **City of Surrey**, where 70% of single-family homes are metered, the purchase of water from Metro Vancouver over the last 15 years has remained constant while the population has grown by around 45%.
- While the **City of Abbotsford** is fully metered and the **District of Mission** remains largely unmetered, the two local governments participate together for their water conservation campaigns through a shared website. Abbotsford is able to better engage with residents through a free irrigation audit that shows water use differences before and after using metered data.
- In the **City of Calgary**, which implemented mandatory water metering in 2002, the water withdrawn from the Bow and Elbow Rivers measured 18% less in 2016 than it did in 2003, despite a population growth of 30%.
- **New York City**, which established drastic metering incentives in 1999, has seen a steady downward trend in water consumption since the 1990s, beginning with a 15 to 17% reduction in residential water use in the first two years after the initial round of water meter installations.



# RESIDENTIAL WATER METERING IN METRO VANCOUVER: BEST PRACTICES GUIDE FOR LOCAL GOVERNMENTS

## Metering Benefits to Local Governments

### Detecting and Reducing Leaks

Efficient operations and management of drinking water systems rely on the accurate measurement of water use and water loss. Water meters provide essential information needed to evaluate the performance of these systems.

Many local governments use data from water metering to monitor prolonged spikes in consumption, indicating possible leaks. In the **City of Richmond**, staff report that leaks within homes can make up a significant portion of household water use, and water meters have allowed for the detection and reduction of these leaks.

### Advising People About Leaks in Their Residential Water System

If a leak is detected by reviewing water metering data, local governments can efficiently convey this information to residents to prompt repairs, prevent water waste, and reduce costs to the water system.

Some local governments, such as the **District of West Vancouver** and the **City of Richmond**, provide leak detection rebates to encourage residents to fix leaks in a timely manner.



### Moving Toward Better Systems Management

Without water meters, it is difficult to accurately measure water in a distribution system. Water meters provide data that can be used to make decisions related to upgrading, refining, and optimizing distribution system operations, such as for water audits, pressure management, and reservoir filling optimization. The data can also be used to identify water use patterns and spatial variations in consumption for systems planning.

In the **City of Surrey**, staff report that the implementation of water metering has helped to reveal consumption patterns in specific areas of the city to better inform the planning of capital programs.

### Improving Relationships with Residents

Providing water metering data to customers allows them to see exactly how much water they are using. This empowers customers to make their own decisions on how they pay based on their water use habits, which builds trust with the customer base and reduces customer complaints to local governments.

The water metering program in the **City of Richmond** was initiated by public interest. The City received many requests for water meters from residents who asked to be billed for their water consumption in an equitable manner.

# Metering Benefits to Residents

## 5. Metering Benefits to Residents

### Equitable Billing

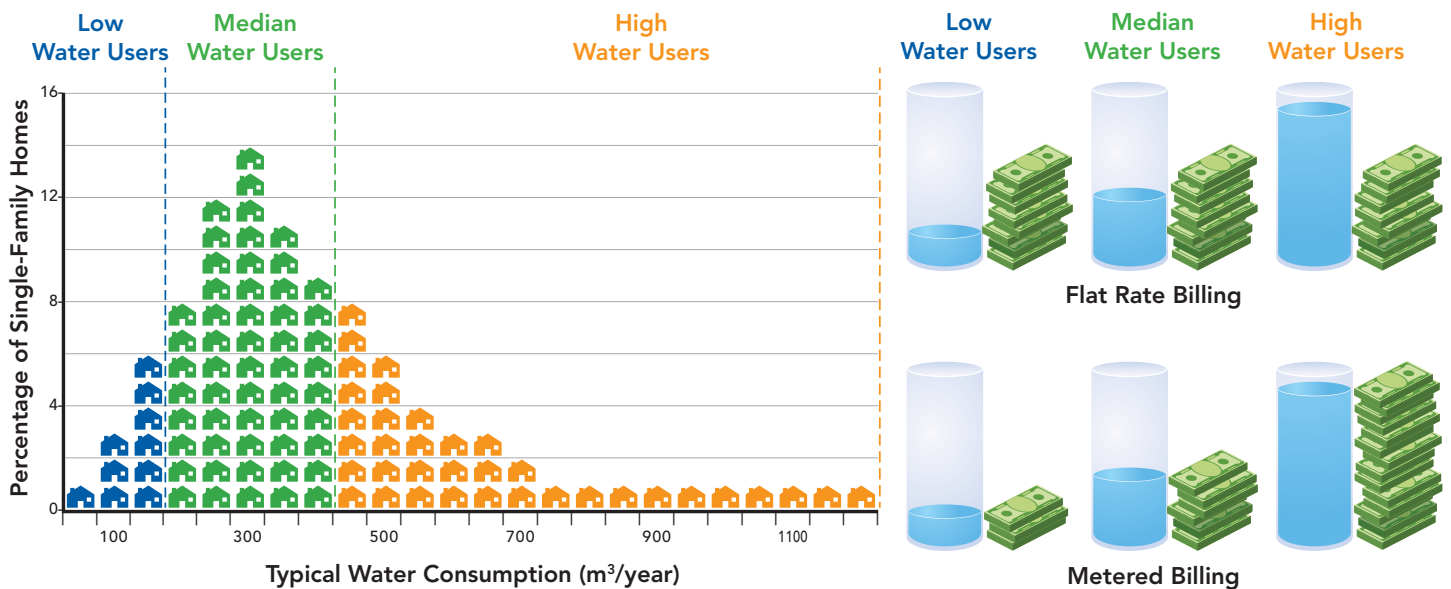
Residents with water meters are billed according to the volume of water they use, rather than a flat rate. This ensures an equitable distribution of costs that precisely reflects the amount of water consumed by each individual household.

Metro Vancouver conducted a public attitudes survey in September 2017 to gauge the perceptions and attitudes towards water metering in the region. The survey findings showed that **86% of respondents support the concept of paying for water based on usage versus a flat rate** (Mustel Group, 2017).

The results of a metering pilot study in the **District of Mission** found that 80% of homes with a meter installed, use less water than the average consumption volume that determines the District’s flat rate of water billing.

Figure 4 shows the typical distribution of single-family water consumption. The water flat rate for unmetered households is typically influenced by a few high water users. This results in the majority of water users (median or low) paying more for their share of water use, since without water meters, flat rates are determined based on the average unmetered water use. All users pay the same rate regardless of use. With water meters, volumetric billing allows for users to be charged based on the volume used.

FIGURE 4: TYPICAL DISTRIBUTION OF RESIDENTIAL WATER USE



## RESIDENTIAL WATER METERING IN METRO VANCOUVER: BEST PRACTICES GUIDE FOR LOCAL GOVERNMENTS

## Metering Benefits to Residents

### Empowering Residents to Make Their Own Decisions

When local governments provide their residents with household water use data, residents are empowered to make their own decisions about how much water to use. It has been demonstrated that this approach works in favour of regional water conservation goals and improved customer relations.

The **City of Toronto** has had success in setting up an online portal where residents with water meters can log in and view their water usage in real time. Because of the transparency that it provides to the public about water consumption, the portal has led to a decrease in disputes for high water bills (from 200 to 300 per year to 80 per year), has provided residents with a tool for informed decision making about water usage, and has helped the city to build trust with its customer base.

The **City of Abbotsford** is launching a similar web portal in 2018 for residents to access water use information online. This portal will allow customers to set alarms for leaks and monitor hourly water use.

When residents have metered water connections, they are more likely to make decisions in favour of water conservation. Environment Canada produces statistics on localized water use and pricing in Canada through the Municipal Water and Wastewater Survey of local governments across the country. Survey results since 1991 have consistently indicated that local governments with universal metering and volume-based water rates tend to have significantly lower household water use compared to local governments with no metering and flat rates or taxes (EC, 2011).



## RESIDENTIAL WATER METERING IN METRO VANCOUVER: BEST PRACTICES GUIDE FOR LOCAL GOVERNMENTS

### Considerations for Local Governments Developing a Water Metering Program

## 6. Considerations for Local Governments Developing a Water Metering Program

There are many factors to consider related to residential water metering programs including planning and implementation, the type of water meter and meter reading system, meter locations, the approach to measuring and monitoring, rate structures, staffing and resources, and public communications.

### Planning and Implementing a Water Metering Program

#### DETERMINING AN APPROACH TO WATER METERING

Metro Vancouver local governments are diverse and may have different drivers and constraints for water metering. There are a number of approaches that local governments can take to implement residential water metering programs.

Some local governments decide at the outset to install meters on all residential properties within a specified time frame, thus implementing a universal metering program.

Other local governments take a more gradual approach, designing voluntary metering programs for residents and/or requiring meters to be installed during the construction of new homes and during major renovations. Local governments that choose these approaches may opt to shift to universal residential water metering after evaluating their initial metering efforts and public response.

Local conditions will inform the best approach to residential water metering for your community. Staff may choose to:

- **Investigate public support and explore approaches with residents:** The Metro Vancouver public attitudes survey offers a high level overview of public support for water meters. Additional local outreach and public

involvement may provide valuable information on what approach is best for residents in your community.

- **Investigate water conservation and loss management goals:** Water meters are essential for accurate water measurement. Local government goals for conservation and water loss management are often drivers for water metering and may inform the best implementation approach.
- **Account for growth and development:** Several residential water metering programs, such as meters for newly constructed homes and meters when utilities services are replaced, have lower installation costs. Growing communities or communities with redevelopment plans should consider such opportunities to install water meters at lower costs.
- **Consider existing metering programs currently in place:** The staffing and resource requirements, water metering benefits, and public perception of existing programs may impact future decision making on water metering.



## RESIDENTIAL WATER METERING IN METRO VANCOUVER: BEST PRACTICES GUIDE FOR LOCAL GOVERNMENTS

### Considerations for Local Governments Developing a Water Metering Program

#### APPROACHES TO WATER METERING IN PRACTICE

Various approaches can be taken to implement water metering, ranging from the most aggressive approach of universal metering for all homes to gradually installing water meters on unmetered dwellings that:

- Have existing meter-ready connections
- Are being transferred in ownership between residents
- Are heavy users of water
- Have secondary or laneway suites
- Are participating in a voluntary metering program
- Have repeatedly infringed water restrictions
- Are being renovated
- Are having their utilities services replaced
- Are being newly constructed

In Metro Vancouver and around the world, local governments have used unique combinations of metering programs as strategies to implement residential water metering programs.

As each local government may have unique circumstances, local governments are encouraged to select an approach or combination of approaches to water metering that best aligns with their localized triple-bottom-line assessment outcomes. To read case study examples of residential water metering approaches implemented by several local governments in Metro Vancouver and other cities in North America, the United Kingdom and Australia, please see the Appendix (Case Studies).

#### LOCAL APPROACHES TO WATER METERING

An example of a local government that decided in the initial planning phases to implement universal water metering is the **District of West Vancouver**, where mandatory meters were installed on all unmetered homes (around 80% of all homes at the time) between 2005 and 2007. The District's reasons for choosing this approach were to ensure that all of its residents had access to equitable billing based on the volume of water they consumed.

In addition, West Vancouver determined that the bulk purchase of water meters offered competitive pricing when compared with the cost of purchasing fewer meters for a voluntary metering program.

The **City of Richmond** is an example of a local government that has taken a gradual, 15-year approach to universal residential water metering. The City started off with a voluntary water metering program in 2003 spearheaded by public interest in equitable billing. In 2005, new bylaws required water meters for all newly constructed single-family and multi-family homes and for certain renovation activities. The City achieved 70% metering of single-family homes in 2014 due to the popularity of the voluntary metering program and has now completed the path toward universal residential metering by mandating that all remaining unmetered residences become metered.

#### INTERNATIONAL APPROACHES TO WATER METERING

Water metering is widespread in many developed parts of the world, such as the United States, Australia, and Europe (Boyle et al., 2013, OECD, 1999). In general, single-family homes are metered in most major metropolitan areas. However, there are several countries such as the UK and Ireland, where the extent of water metering varies from one region to the next.

#### COMPLETING A TRIPLE-BOTTOM-LINE ASSESSMENT

To determine a metering approach that is right for their community, Metro Vancouver recommends using the water metering evaluation tool, developed as part of the *Regional Assessment of Residential Water Metering* (Urban Systems, 2019).

Local governments can use the water metering evaluation tool to understand the full costs and benefits of residential water metering programs, compare metering programs to select the most appropriate approach(es) for their jurisdictions, and generate cost estimates and water savings forecasts to support decision making.

# RESIDENTIAL WATER METERING IN METRO VANCOUVER: BEST PRACTICES GUIDE FOR LOCAL GOVERNMENTS

## Considerations for Local Governments Developing a Water Metering Program

### Benefits of Universal Water Metering



Increased savings happen more quickly



Installing meters all at once is more efficient than a gradual approach and saves money



Achieves comprehensive leak detection and full systems management



In line with the utility industry best management practices

### Practical Considerations

#### CHOOSING WATER METERS AND METER READING SYSTEMS

Selecting appropriate water meters, meter reading systems, and data management software is an important consideration that may impact the overall costs and benefits of water metering for a local government.

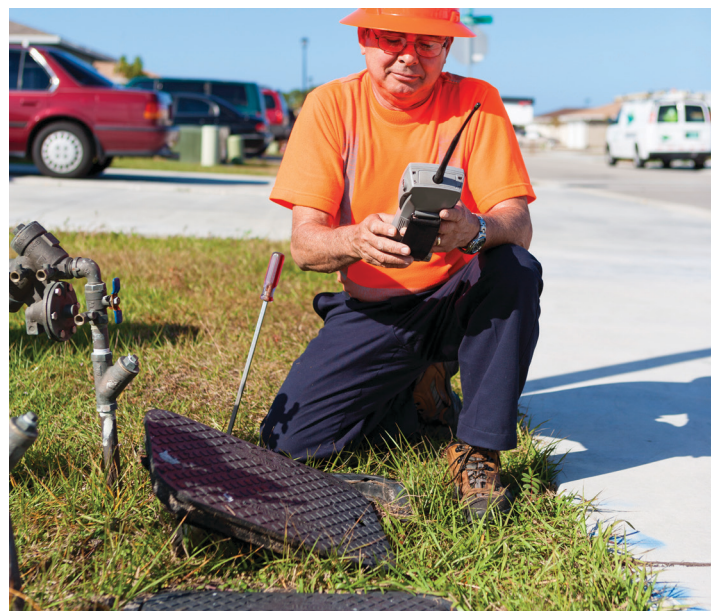
Water meters and reading systems have advanced over recent years. Many cities are considering an upgrade from traditional manual and touch-read systems, which require staff to collect data through handheld devices and vehicle units, to radio read and advanced metering infrastructure (AMI) systems, which electronically collect and transmit data to the utility office.

More information about the various metering technologies currently available can be found in the *Regional Assessment of Residential Water Metering* report produced by Urban Systems (2019).



### INSTALLING WATER METERS

Meter installation is another important aspect to consider when designing metering programs. Within the Metro Vancouver region, the general preference has been to place water meters in outdoor pits located at property lines. This practice allows utilities staff to easily access and maintain the meters. Other options include installing the meters in local government boulevards, inside the property lines near the home, or indoors where the service lines enter the home.



## RESIDENTIAL WATER METERING IN METRO VANCOUVER: BEST PRACTICES GUIDE FOR LOCAL GOVERNMENTS

### Considerations for Local Governments Developing a Water Metering Program

The *American Water Works Association M6* (2012) manual provides detailed guidance on water meter installation, testing, and maintenance.

#### MEASURING AND MONITORING WATER USAGE

When deciding on the type of water meter reading system to implement, key considerations include the speed, efficiency, and cost at which the system can measure and monitor water.

In 2011 the **City of Abbotsford** transitioned to an advanced metering infrastructure (AMI) system which allows for automatic collection and transmission of meter data through remote fixed-base systems. The shift to AMI was motivated by water supply constraints and a desire to reduce overall water consumption. The AMI system has increased the efficiency of leak detection, resulting in prompt repairs that contribute to water conservation goals.

The **City of Toronto** found that implementing an AMI system significantly reduced costs. The AMI system eliminated the need for meter-reading staff (a savings of \$5 million per year). The City of Toronto has also used AMI data to provide customers with near real-time water use monitoring through a web-based portal.

## Financial Considerations

#### FINANCING OPTIONS FOR WATER METERING PROGRAMS

In Metro Vancouver, water meters are typically installed in outdoor pits located at property lines with installation costs ranging from \$1,000 to \$1,500 per connection. Although outdoor installations are sometimes preferred in

temperate climates, many cities in North America install meters indoors due to colder climates and reduced costs of installation.

While water metering for new construction is almost always financed by homebuilders and developers, financing methods for other metering programs can vary across local governments. There are a variety of funding strategies that local governments can access to acquire the initial capital for water metering programs.

The most common of these include:

- Creating a universal metering reserve fund using annual revenues
- Charging users for upfront installation costs
- Acquiring third-party financing through private suppliers
- Accessing provincial and federal funding programs

In Metro Vancouver, gradual metering programs, such as voluntary programs, have typically been funded through annual local government water utility programs (operating funds). For example, the **City of Surrey** allocates approximately \$3 million per year to fund meter and installation costs for single-family homes.

Larger-scale universal metering programs have been funded by a combination of third-party financing, government funding programs and user-pay options. The capital cost of the **District of West Vancouver's** universal metering program was borrowed from the Municipal Finance Authority of BC. The District estimates that by saving 15-20% of their water expenditures through metering, they will recover the full cost of the program in approximately 12 years.

*Balancing the Books: Financial Sustainability for Canadian Water Systems* (2018) is a resource published by the Canadian Water Network that can guide local governments on financial planning for water metering investments and cost recovery. This publication includes case studies from several local governments.

# RESIDENTIAL WATER METERING IN METRO VANCOUVER: BEST PRACTICES GUIDE FOR LOCAL GOVERNMENTS

## Considerations for Local Governments Developing a Water Metering Program

### ESTABLISHING RATE STRUCTURES

By creating appropriate rate structures, local governments can ensure that they obtain adequate revenues and full cost recovery from water metering programs.

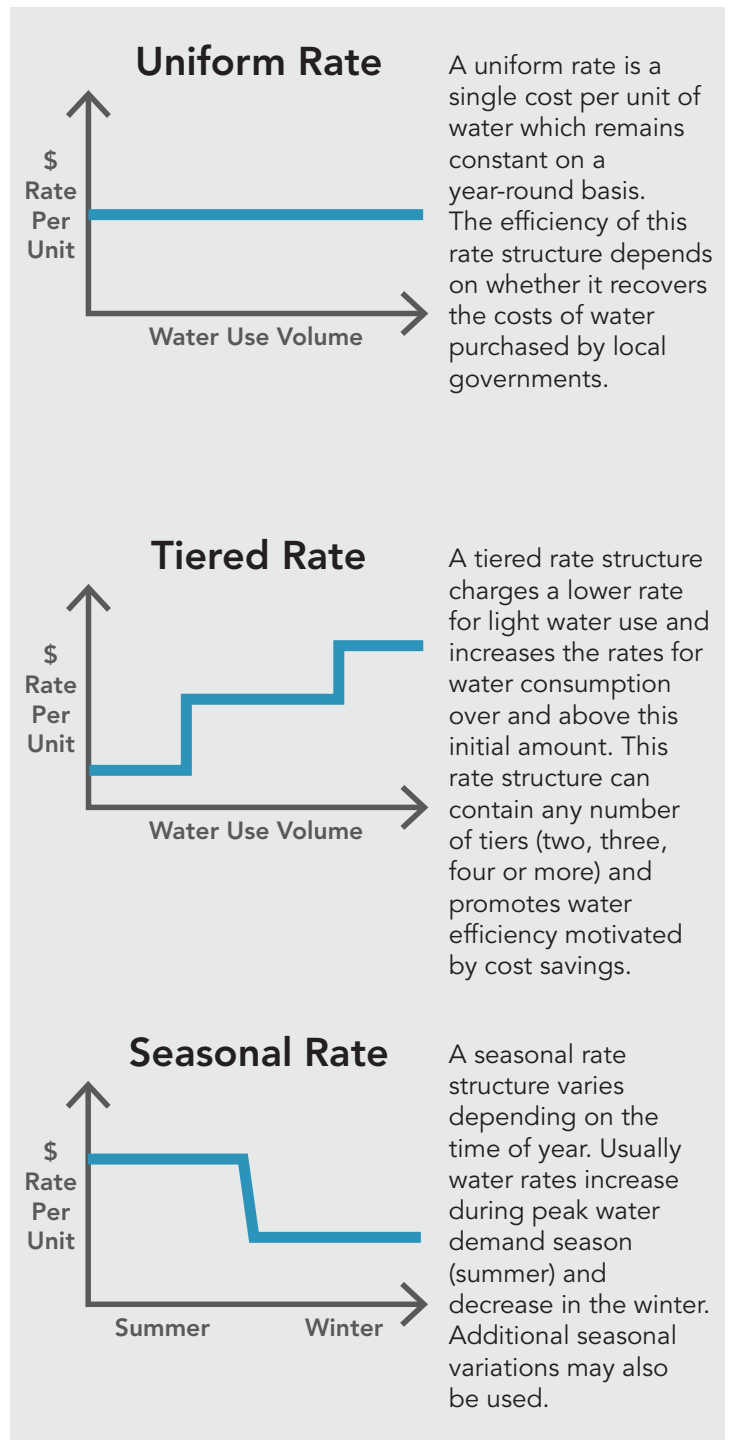
Volume-based water bills typically consist of two components: a fixed charge and a variable charge. The fixed charge is constant and helps to cover costs for services such as meter maintenance and replacement. The variable charge reflects the total volume of water the customer has consumed during the billing period, as measured by the water meter.

Local governments in Metro Vancouver use diverse approaches to determine the variable rate component of a metered customer’s water bill. These approaches include:

- Charging uniform rates for each unit of water consumed, as implemented by the **City of Surrey** and the **City of Richmond**
- Charging tiered rates, in which the unit rate increases depending on the level of consumption (light users are charged the lowest unit rates, moderate users are charged a somewhat higher unit rate, etc.), as implemented by the **District of West Vancouver**
- Charging seasonal rates that vary between summer and winter, as implemented by the **City of Vancouver** and the **City of North Vancouver** (Urban Systems, 2019)

Figure 5 demonstrates the differences between uniform, tiered and seasonal rates.

FIGURE 5: OVERVIEW OF THE APPROACHES USED TO DETERMINE THE RATE CHARGED ON A METERED SYSTEM



## RESIDENTIAL WATER METERING IN METRO VANCOUVER: BEST PRACTICES GUIDE FOR LOCAL GOVERNMENTS

### Considerations for Local Governments Developing a Water Metering Program

As overall water use may decrease when water metering programs are introduced, local governments will need carefully designed water rate structures to ensure full cost recovery (Urban Systems, 2019).

At the same time, in order to build customer morale and trust, local governments will often break in newly-metered households with a period of “mock billing.” This allows for a financially low-risk period where customers can adjust their water use habits to suit the new rate structure (Urban Systems, 2019). In the **City of Richmond**, for example, a first-year price guarantee program allows residents to apply for credit if the first year of billing with a water meter exceeds the flat rate.

#### Some helpful resources for determining rate structures include:

- *Regional Assessment of Residential Water Metering*, prepared for Metro Vancouver by Urban Systems (2019)
- *Only the Pipes Should be Hidden: Best Practices for Pricing and Improving Municipal Water and Wastewater Services* by Ecofiscal Commission (2017)
- *Manual of Water Supply Practices: M1 Principles of Water Rates, Fees and Charges, 7th Edition* by American Water Works Association (2017)
- *Building Better Rates for an Uncertain World: Balancing Revenue Management, Resource Efficiency and Fiscal Sustainability* by Alliance for Water Efficiency (2014)

## Resource Considerations

### STAFFING

To implement a water metering program, local government staff need to plan for coordination between departments involved in planning, implementing, and maintaining water meters, including engineering, IT, billing, finance, corporate services, and development services.

Staff should establish clear dialogue between departments and solicit inter-departmental support to help build the program. It is a best practice for local governments to create detailed multi-year project plans that include staffing and resourcing needs for water metering programs.

Many local governments outsource water metering programs to third-party companies that often offer a full package of support including public outreach, advertising, water meters and installation, as well as billing and data management.

Many local governments within Metro Vancouver have transitioned from using third-party contracts to local government resources for ongoing water meter operations and maintenance, after the initial installation phase. The transfer of knowledge between third-party and local government staff is another important aspect to consider when outsourcing water metering programs.

## RESIDENTIAL WATER METERING IN METRO VANCOUVER: BEST PRACTICES GUIDE FOR LOCAL GOVERNMENTS

### Considerations for Local Governments Developing a Water Metering Program

## Public Outreach Considerations

### IDENTIFYING PUBLIC ATTITUDES FOR WATER METERING PROGRAMS

When developing a water metering program, it is important to assess public attitudes toward metered water. This assessment will allow local governments to anticipate potential public concerns and create effective communication campaigns to accompany meter installation efforts.

Methods for gauging public support for water metering include consultation initiatives, such as surveys, and attentiveness to unsolicited requests from residents for equitable billing, as was the case in the **City of Richmond**.

### PREPARING TO COMMUNICATE EARLY AND TAILORING MESSAGES TO MEET THE NEEDS AND INTERESTS OF PUBLIC AUDIENCES

Successful water metering programs rely on well-planned public education and awareness communications that begin well in advance of water meter installations.

Local governments should ensure open communication with the public on the details of a given water metering program, with emphasis on education and awareness of water consumption and water use habits.

The successful water metering communication strategy from the **City of Richmond**, for example, publicized that residents can use available data from meters to manage the cost of their water bills. The City also paired meter installation with the distribution of educational materials on water conservation and the offer of efficient fixtures to residents.

### METRO VANCOUVER PUBLIC EDUCATION AND OUTREACH SUPPORT FOR WATER METERING PROGRAMS

Metro Vancouver will support water metering programs by developing and distributing public education and outreach materials, messaging and other resources that can be used or adapted by local governments. All materials will incorporate international and localized best practices and research, and Metro Vancouver will collaborate with local governments to determine the most effective messaging and methods for promoting water metering programs.

### CREATING EDUCATIONAL MATERIALS AND PROGRAMS AROUND WATER CONSERVATION

Many local governments report the mutual benefits of water metering and water conservation programs by linking educational messaging around water consumption habits, financial impacts, and water conservation efforts.

The ability to provide customers with their individual consumption data encourages more accountability and recognition of household water use behaviours and also presents an opportunity to connect customers to water conservation education and outreach programs.

To better support water use habit changes, it is recommended that educational material on water conservation and efficiency accompany water bills.

**Metro Vancouver creates educational resources, water conservation messaging, and promotional artwork that can be used or adapted by local governments.**



# RESIDENTIAL WATER METERING IN METRO VANCOUVER: BEST PRACTICES GUIDE FOR LOCAL GOVERNMENTS

## Key Findings from Case Studies

### 7. Key Findings from Case Studies

#### INTRODUCTION

The intent of the case studies is to:

- Explore real-world applications of the approaches to residential water metering studied in the Regional Assessment.
- Explore the factors that motivate local governments to implement residential water metering programs.
- Hear from local governments about the planning, practical, financial, resource, and public outreach strategies and lessons learned involved in implementing residential water metering programs in order to inform best practices and key considerations.

The case studies that follow were developed through a series of phone interviews with local government staff conducted between December 2017 and March 2019. These case studies feature examples of residential water metering programs that have been implemented throughout Metro Vancouver and the world.

#### THE CASE STUDIES

The first five case studies explore residential water metering in four Metro Vancouver local governments and two neighbouring local governments:

- **City of Richmond**
- **City of Surrey**
- **City of Vancouver**
- **District of West Vancouver**
- **City of Abbotsford/District of Mission**

Further case studies describe residential water metering programs in:

- **City of Calgary**
- **City of Toronto**
- **City of Seattle**
- **New York City**
- **London, England**
- **South East Queensland, Australia**



## RESIDENTIAL WATER METERING IN METRO VANCOUVER: BEST PRACTICES GUIDE FOR LOCAL GOVERNMENTS

## Key Findings from Case Studies

The case studies revealed several common themes:

### 1. Drivers for Water Metering

- Billing equity was the main driver for many local governments. Water meters allow local governments to bill based on water use in a fair manner and gives residents the ability to make their own decisions on how much to pay for water.
- Water meters are often viewed as an essential component of water conservation goals. Water meters provide data to monitor water use, support conservation campaigns, and provide pricing incentives to reduce consumption.

### 2. Benefits of Meters

- The ability to improve leak detection and reduction was a major benefit for local governments that have recently adopted water metering.
- Water meters empower residents by providing information on individual water use behaviour to allow household decision-making on water use impacts to bills, with the added benefit of improving communications between city and residents.

### 3. Approaches to Metering

- Some local governments choose to implement several of these approaches at once when planning and designing water metering programs, or they may decide to stagger a number of approaches over an extended time period.

### 4. Public Perception

- Local governments report overall positive public reaction to water metering programs, even though there may be a small contingent of residents resistant to meters. Well-planned communication and outreach campaigns, along with fair water rate structures, help to illustrate the benefits of meters to residents.

### 5. Staffing and Resources

- It is important to coordinate between local government departments on water metering initiatives. Local governments report that various departments such as engineering, IT, finance, and billing may be involved in water metering efforts.
- Most local governments use third-party contractors to begin larger scale metering efforts, but eventually transition to internal crews and staff for ongoing maintenance and support once programs are established or completed.

### 6. Installation

- In Metro Vancouver, local governments install meters in outdoor pits at property lines. This provides ease of access to the meters without the need to enter private properties.
- Elsewhere in North America, meters are typically installed indoors due to colder climates that require deeper pipe burial depths and lower costs of installation.

RESIDENTIAL WATER METERING IN METRO VANCOUVER: BEST PRACTICES GUIDE FOR LOCAL GOVERNMENTS

City of Richmond



WATER METERING IN RICHMOND AT A GLANCE

Estimated level of single-family metering (as of 2018): 100%

Single-family residential metering programs in place:

- Voluntary (2003)
- New construction (2005)
- Major renovations (2005)
- Watermain replacement (2005)
- Mandatory metering (2014)

Main drivers for water metering:

- Equitable billing and fairness
- Leak reduction
- Water conservation
- Improved systems management



OVERVIEW OF WATER METERING

All institutional, commercial, and industrial (ICI) water users have been fully metered within the City of Richmond since the 1970s.

In 2003, a voluntary program to install water meters for single-family homes was created. Multi-family buildings were included in this program in 2010.

In 2005, new bylaws were enacted to require water meters for all newly constructed single-family and multi-family homes, as well as for single-family homes when fronting water mains are being upgraded or replaced.

These single-family metering programs enabled the City of Richmond to achieve 70% metering of all single-family homes by 2014. This prompted the decision to require mandatory meters for the remaining unmetered homes.

The City of Richmond’s mandatory water metering program is expected achieved universal metering of single-family homes in 2017. Currently, around 40% of multi-family buildings are metered.

PLANNING AND DECISION MAKING FOR WATER METERS

The main driver for water meters in Richmond has been the desire for **equitable billing and fairness**, which has largely been led by public interest.

The City of Richmond received many requests from residents interested in having water meters installed in their homes. In 2003, city staff implemented a voluntary metering program to satisfy requests from residents and test the potential for future programs.

This voluntary program was very popular with residents. Public support for water meters led the adoption of other water metering programs including meters for newly constructed single-family and multi-family homes, and meters installed during water main repairs.

Around 70% of single-family homes were metered through these programs and **a decision was made in 2014 to require mandatory water meters** for the remaining 30% of single-family homes. This decision was made due to the declining participation rates in the voluntary program and the City’s focus on equitable billing for all residents.

A similar voluntary program for multi-family buildings was initiated in 2010. However, multi-family meter installations are often complex and much costlier compared to single-family meter installations. The City of Richmond is currently

## RESIDENTIAL WATER METERING IN METRO VANCOUVER: BEST PRACTICES GUIDE FOR LOCAL GOVERNMENTS

## City of Richmond

investigating options for increasing the level of multi-family metering in the future.

### PROGRAM FUNDING

Richmond's metering initiatives have been funded through the water utility program, estimated at about 2% to 4% of the total annual program budget. Staff note that the gradual implementation of water meters has helped to spread costs and ease budget concerns.

Meter installations for single-family homes under the voluntary and retrofit programs are paid for by the city, meters for newly constructed homes (single-family and multi-family) are homeowner/developer paid, and meters for multi-family buildings under the voluntary programs are partially funded by the city.

Costs for meter maintenance and replacements are covered by fixed fees on metered water rates, for all metered connections.

### RATE STRUCTURES AND BILLING

Based on billing equity as the main driver, water rate structures at the City of Richmond are set up so that the average water consumption results in equivalent fees on a metered rate or a flat, unmetered rate.

The City has found that the vast majority (around 80% of single-family and 96% of multi-family) of residents saved money with metered services compared to the flat rate, due to flat rate billing based on water consumption averages being skewed by a few excessive users.

The gradual shift to water metering has led to steady changes in consumption behaviour, allowing rates to adjust smoothly without much variability in annual budgets.

### Focus on Billing Incentives: Overcoming Barriers

The City of Richmond identified two potential barriers to residents signing up for voluntary metering: residents fearing the unknown because of lack of information on water use as well as the financial burden of being billed for leakage.

With this information in hand, staff developed two incentives to help overcome these potential barriers:

- A **leak rebate program** that offers a credit for the excess volume billed after an identified leak has been fixed.
- A **first-year price guarantee program** that allows residents to apply for credit that covers the difference if the first year of billing with a water meter exceeds the flat rate. This program was put in place to encourage residents develop better water use habits without fear of penalization during the adjustment process.

These initiatives encouraged residents to sign up for the voluntary program while minimizing the financial risks involved. City staff attribute a large component of the success of the voluntary program to careful planning and consideration of residents' concerns.

### THE POTENTIAL FOR METER READING SYSTEMS UPGRADES

With the universal metering of single-family homes, the City of Richmond has set its sights on moving towards a full advanced metering infrastructure (AMI) system. Rather than relying on staff to collect meter readings, AMI electronically collects and transmits data from water meters to the utility office.

The motivation to switch to AMI is to **identify leaks faster** and to **speed up billing communication and response times**. Since 2014, the City has been monitoring a Fixed Base Network pilot program, in which meters are

## RESIDENTIAL WATER METERING IN METRO VANCOUVER: BEST PRACTICES GUIDE FOR LOCAL GOVERNMENTS

## City of Richmond

continually read through radio towers called gateways. This pilot program has revealed that around 8% of homes monitored have detectable, continuous leaks.

Faster meter read frequencies will allow the City to provide better customer service and leak detection assistance. Richmond is aiming for city-wide meter reads every 15 minutes, which will help save money for the City as well as residents.

Richmond completed an economic evaluation which concluded that water savings through leak reduction will generate enough funds to pay for a universal AMI system. Furthermore, AMI is anticipated to significantly speed up the meter reading process to improve overall systems management and allow for more accurate water balance calculations.

Fixed-base receivers will be installed in 2018 to 2019 and the remaining stock of touchpad read meters will be switched out within two to three years.

### INSTALLATION OF WATER METERS

In 2003, the City of Richmond contracted Neptune Technology Group to operate the water metering programs, including advertising, public outreach, communications, voluntary program signup, meter installation, and residential meter reading.

Meter installations that were potentially difficult, such as those with landscaping complications, were performed by City staff. The original contract with Neptune expired in 2016, after the transition from the voluntary to the mandatory metering program. A decision was made to transition all meter installations to City staff due to the added potential of difficult installations for the remaining unmetered connections.

### FEEDBACK FROM RESIDENTS

Throughout the metering process, a key message to residents was that residents now have control over how

much money they want to save on their water bills with water consumption information now available through metering.

Public outreach for water meters was also combined with water conservation messaging. New meter installations were followed up with the distribution of free education material and efficient fixtures. The success of this water conservation campaign led to the extension of water conservation material to the remaining flat rate customers, with the idea that water conservation initiatives should target all residents.

City staff note that there was overall positive public response to water meters, as the majority of residents signed up for water meters voluntarily. Once this critical mass was achieved, potential political concerns over public disapproval of water meters were avoided and City Council decided to proceed with universal metering on the basis of equitable billing for all water users.

### KEY REFLECTIONS ON RESIDENTIAL WATER METERING IN THE CITY OF RICHMOND

- City staff note that public interest for water meters was vastly underestimated in the beginning stages of the voluntary program. Approximately 2,000 to 3,000 residents attended the first open house to advertise the voluntary metering program.
- A major revelation for city staff through the metering programs was the ability for meters to detect leakage issues, especially private side leaks. The City found that indoor leakage played a significant role in residential water use, potentially due to the historic lack of price signal to fix leaks with flat rate billing systems.
- Staff estimate that leak detection and reduction in the City of Richmond has led to savings equivalent to the costs of the metering programs. Staff also note that the leak rebate program and first year price guarantee program played an important role in ushering in long-term behaviour changes.

RESIDENTIAL WATER METERING IN METRO VANCOUVER: BEST PRACTICES GUIDE FOR LOCAL GOVERNMENTS

City of Surrey



WATER METERING IN SURREY AT A GLANCE
Estimated level of single-family metering (as of 2017): 73%
Single-family residential metering programs in place: <ul style="list-style-type: none"> <li>• New construction (1999)</li> <li>• New service connections (1999)</li> <li>• Major renovations (1999)</li> <li>• Residents with repeat water restriction infractions (1999)</li> <li>• Voluntary (2002)</li> </ul>
Main drivers for water metering: <ul style="list-style-type: none"> <li>• Equitable billing and fairness</li> <li>• Water conservation</li> <li>• Improved systems management</li> </ul>



OVERVIEW OF WATER METERING

Since the 1980s, the City of Surrey has metered most institutional, commercial, and industrial (ICI) water users and 100% ICI metering was achieved by 2000.

Surrey City Council approved a metering strategy to **improve customer billing equity** and in 1999 new bylaws were enacted to require water meters for all newly constructed homes, major renovations over \$400,000, new service connections, and when property owners do not fix private side leaks.

In 2002, a voluntary metering program was introduced for all single-family and multi-family homes. Currently, all ICI connections, approximately 73% of single-family homes, and approximately 40% of multi-family buildings within the City of Surrey are metered through the existing metering programs.

PLANNING AND DECISION MAKING FOR WATER METERS

In 1999, the City of Surrey’s metering strategy established a goal for eventual universal metering of all water users. The main drivers for water metering are: **equitable billing and fairness, water conservation, and systems management and data collection.**

The City of Surrey introduced voluntary water metering to showcase the benefits of metering while giving residents the ability to make their own decisions. The new construction and major renovation programs ensure that the number of unmetered properties decreases over time.

The City of Surrey continues to evaluate the overall impacts of water metering and determine how to reach its metering strategy goals.

PROGRAM FUNDING

The current metering programs are under a 10 year funding plan, at approximately \$1.8 million per year. funded through annual budget allocations. Under the single-family voluntary metering program, meter and installation costs of approximately \$1,000 per meter are fully funded by the City. For new construction homes and those undergoing major renovations, meter and installation costs are paid for by homeowners and developers through the building and permitting process, then installed by the City. Meters for multi-family buildings are installed on a cost-share basis between the city and the property owner.

Costs for meter maintenance, billing, testing, and replacements are covered by meter base charge fixed fees that are meter size dependent on metered water rates for all metered connections.

## RESIDENTIAL WATER METERING IN METRO VANCOUVER: BEST PRACTICES GUIDE FOR LOCAL GOVERNMENTS

## City of Surrey

**INSTALLATION OF WATER METERS**

Currently, meters for single-family homes are installed in outdoor pits located at property lines. This allows for staff to easily access and maintain the meters. Meters for multi-family buildings are mostly located indoors.

Water meter installation, maintenance, and testing is completed by third-party contractors. City staff are responsible for billing, customer support, and water meter maintenance.

Water meter installations through the City's voluntary metering program averaged between 6,000 to 7,000 installations per year from 2003 to 2005. Since then, participation has steadily declined to around 1,000 installations per year in 2015.

**THE POTENTIAL FOR METER READING SYSTEMS UPGRADES**

The City of Surrey is planning a two-year advanced metering infrastructure (AMI) pilot project to begin in 2018. Rather than relying on staff to collect meter readings, AMI electronically collects and transmits data from water meters to the utility office.

An AMI reading system will be installed to monitor approximately 100 homes in order to gain insights on how this technology may benefit both residents and the City. In particular, staff will investigate the potential for AMI systems to assist with leak detection, improvements to customer service, water conservation, and water use education.

**FEEDBACK FROM RESIDENTS**

Residents are generally supportive of current water metering programs, although City staff are aware of some residents who are opposed to metering.

**KEY REFLECTIONS ON RESIDENTIAL WATER METERING IN THE CITY OF SURREY**

- Over the past 5 years, the City of Surrey's water purchase from Metro Vancouver has been constant despite population growth in the City. This indicates that the per capita consumption has been decreasing year after year.
- Water metering has helped the City better manage its water systems, understand consumption patterns in particular areas, and better plan its capital programs.
- After metering, households better understand the cost of their water use.

RESIDENTIAL WATER METERING IN METRO VANCOUVER: BEST PRACTICES GUIDE FOR LOCAL GOVERNMENTS

City of Vancouver



WATER METERING IN VANCOUVER AT A GLANCE
Estimated level of single-family metering (as of 2016): 6%
Single-family residential metering programs in place: <ul style="list-style-type: none"> <li>• Large lots over 0.5 acres (1970s)</li> <li>• New construction, including laneway homes (2012)</li> <li>• Major renovations (2012)</li> <li>• Residents with repeat water restriction infractions (2016)</li> </ul>
Main drivers for water metering: <ul style="list-style-type: none"> <li>• Equitable billing and fairness</li> <li>• Water conservation</li> <li>• Leak reduction</li> <li>• Improved systems management</li> </ul>



OVERVIEW OF WATER METERING

Since the 1970s, the City of Vancouver has metered all institutional, commercial, and industrial (ICI) water users, all multi-family buildings, and single-family homes with lot sizes larger than 0.5 acres.

In 2012, a new bylaw was enacted to require water meters for all newly constructed homes and homes undergoing major renovations, including new laneway homes.

As part of the City’s leak reduction program, water meters may be installed when residents fail to repair detected leaks.

Currently, all ICI connections, multi-family buildings, and approximately 6% of single-family/duplex homes within the City of Vancouver are metered through the existing metering programs.

PLANNING AND DECISION MAKING FOR WATER METERS

The Greenest City Action Plan was approved by Vancouver City Council in 2011 and included a goal to **reduce water consumption per capita by 33%** in 2020 when compared with 2006 levels.

This **water conservation** goal was the main driver for investigating additional water metering as a bold step towards water use reduction. Other drivers include

**leak reduction** and **systems management**. In recent years, **customer equity and fairness** has emerged as another strong driver for water metering of residential properties.

High level business cases for various approaches to water metering were put forward to Council, along with other initiatives to reduce water consumption. In 2012 Council decided to take a gradual approach to water metering, with the **eventual goal of establishing universal metering** in the City.

Since 2012, water meters have been installed on all newly constructed homes and those undergoing major renovations, including new laneway homes. A parallel initiative was created around the same time to meter all city accounts, including community centres, fire halls, and parks facilities.

A current water meter pilot program is helping the City determine the impacts of water meters on water consumption and provide leakage estimates. This pilot program will inform decision making on how to proceed with the City’s goal of universal metering.

PROGRAM FUNDING

Under current metering programs, meter and installation costs are paid for by homeowners and developers through the building and permitting process. Costs for meter maintenance and replacements are covered by fixed fees on metered water rates, for all metered connections.

## RESIDENTIAL WATER METERING IN METRO VANCOUVER: BEST PRACTICES GUIDE FOR LOCAL GOVERNMENTS

## City of Vancouver

## RATE STRUCTURES AND BILLING

When determining water rate increases, the City of Vancouver applies the same changes to both flat and volumetric rates. In 2012, the City began charging metered customers **seasonal rates** to reflect the seasonal changes to Greater Vancouver Water District (GVWD) bulk water rates. Unmetered, flat rate customers are currently not affected by seasonal rate changes.

## INSTALLATION OF WATER METERS

Through new construction and major renovations, the City currently installs around 1,000 new meters per year on single-family/duplex homes. Currently, meters are installed outdoors at property lines. Water meter installation work is currently completed by city staff, who are also responsible for billing and customer support.

The City has established meter installation standards to balance impacts to service, safety, and costs.

## THE POTENTIAL FOR METER READING SYSTEMS UPGRADES

The City of Vancouver's ultimate goal is to achieve universal metering and as such, a decision was made in 2012 to make the existing metered system "smart-ready" for a future fixed-base reading system. Currently, all water meters (ICI and residential) are radio-read with drive-by collection with a range of two to three kilometres.

## FEEDBACK FROM RESIDENTS

Public feedback received to date has been generally supportive of water metering programs.

In recent years, there has been an increase in public interest for retrofit water meters on existing homes from residents with a desire for billing equity and cost savings.

## KEY REFLECTIONS ON RESIDENTIAL WATER METERING IN THE CITY OF VANCOUVER

- The current pilot program has encountered some difficult retrofit meter installations due to mature trees and lot limitations, which has affected installation costs in some instances. If the City were to consider retrofit programs in the future, indoor meters may be investigated as an alternative option in instances when outdoor installations are too costly.
- Although many brands of water meters are marketed as compatible with various reading systems, the City has encountered some growing pains when changing meter suppliers.
  - Hardware and installation modifications are typically required for each brand of water meter, and the resources required should be taken into account when establishing meter standards.

RESIDENTIAL WATER METERING IN METRO VANCOUVER: BEST PRACTICES GUIDE FOR LOCAL GOVERNMENTS

District of West Vancouver



WATER METERING IN WEST VANCOUVER AT A GLANCE
Level of single-family metering: 100%
Single-family residential metering programs in place: <ul style="list-style-type: none"> <li>• Universal mandatory metering since 2007</li> <li>• New construction (1999)</li> </ul>
Main drivers for water metering: <ul style="list-style-type: none"> <li>• Water conservation</li> <li>• Long-term financial and environmental investment in the local water supply</li> <li>• Equitable billing and fairness</li> </ul>



OVERVIEW OF WATER METERING

Since the 1980s, the District of West Vancouver has metered all institutional, commercial, and industrial (ICI) water uses and all multi-family buildings.

In 1999, a new bylaw was enacted to require water meters for all newly constructed single-family homes.

In 2005, the District implemented **mandatory residential water metering** of all remaining unmetered homes and achieved universal metering in 2007.

PLANNING AND DECISION MAKING FOR WATER METERS

One of the main drivers of water metering in West Vancouver was to improve the **public perception of West Vancouver’s residential water use**. This decision arose from media attention given to the high per capita consumption rates of West Vancouver residents.

An additional driver of water metering was to make a **long-term investment** in the local water supply. The District has made a decision to invest in improving, maintaining and conserving their own Eagle Lake water source while decreasing their reliance on water supplied by Metro Vancouver. By initiating this shift, the District’s intent was to control cost increases and improve system resiliency.

Metering was a key component of West Vancouver’s water **conservation strategy**. The strategy took a holistic

approach to conservation by introducing a metering rate structure that encourages customers to save water. The District has also complemented its metering program with water conservation education, outreach, and incentives.

The District decided to implement a universal metering program from the start. The universal program ensured **billing equity and fairness** for customers and allowed the city to access a competitive bulk rate when purchasing meters.

PROGRAM FUNDING

The capital cost of the universal metering program was borrowed through the Municipal Finance Authority of BC (MFABC). A key financial aim of the program is to save **15 to 20% in water expenditures** to recoup the cost of universal metering.

The District determined that full remuneration for the program could be achieved in 12 years. Since the meters have a lifecycle of 15 years, West Vancouver has projected that the program will pay itself back three years ahead of schedule.

The cost of meter installation was funded by customers. These costs were not absorbed into the water utility charge, but appear as a separate charge on the utility bill. As meters had already been installed in some newer homes and on a trial basis since the 1990s, the District ensured that these already-metered residents were not billed for new meter installations through the general water utility.

## RESIDENTIAL WATER METERING IN METRO VANCOUVER: BEST PRACTICES GUIDE FOR LOCAL GOVERNMENTS

### District of West Vancouver

The charge is billed as a “meter fee” and has been amortized over 15 years at the same rate as the District’s MFABC loan. Most residents opted to pay the lump sum charge upfront. Separating the meter fee from the ongoing water utility charge was very beneficial in getting buy-in from customers.

#### RATE STRUCTURES AND BILLING

West Vancouver’s water rate structure was designed to help achieve its 15 to 20% water use reduction target.

The District initially used a **three-block inclining structure** for single-family homes. This is a tiered rate structure in which the unit rate increases depending on the level of consumption. The sewer utility rate is tied to winter water use (reflective of indoor water use) to further encourage conservation.

The rates were reviewed in 2017 and a new **four-block rate structure** was introduced in 2018. The first block was split into two separate rate structures to motivate customers to use less water. With this new rate structure, households who use minimal water are rewarded by staying at the same rate, and second-block customers have a financial incentive to get back to the first block.

To address the issue of leaks, the bylaw included a section that stipulates that if a leak is found that the owner was aware of and they had a timely response to fix it, the District would provide “leak adjustments,” or a relief on the water bill.

#### INSTALLATION OF WATER METERS

The District developed the following protocol for water meter installation:

- The first preference was to install the meter in an outdoor pit, at property line.
- The second preference was to install it in the municipal boulevard.
- The third preference was to install it inside the property but still outside.

- The fourth preference was an indoor installation, paired with close monitoring of the meter to see if a movement to the outdoors was possible.

This protocol enabled the District to achieve its goal of universal metering, despite site constraints.

#### FEEDBACK FROM RESIDENTS

The District has found that delivering public messaging on equitable billing and fairness is more effective than highlighting cost savings as a benefit of water metering.

Some residents have provided the feedback that they thought they were going to save money with the implementation of universal metering, but their bills have increased. The District has responded by noting that while water bills are indeed on the rise, they are rising at a slower rate than they would if the meters had not been installed.

#### KEY REFLECTIONS ON RESIDENTIAL WATER METERING IN THE DISTRICT OF WEST VANCOUVER

- The metering program identified significant water wastage and leaking on the private side service connections. Most of the leaks were due to older service connection and old or faulty irrigation systems. Leak detection was a major benefit of universal metering.
- Considerable resources and efforts are needed to implement a universal water metering program, including meter reading, billing, and operational systems.
- The program required an adjustment to internal staff resources, including a balance between finance capabilities and engineering data collection needs.
- There were construction impacts and issues because of the high visibility and intrusive nature of the installation. The District was well prepared with good public relations and messaging to respond to and manage concerns.

# RESIDENTIAL WATER METERING IN METRO VANCOUVER: BEST PRACTICES GUIDE FOR LOCAL GOVERNMENTS

## City of Abbotsford and District of Mission



WATER METERING IN ABBOTSFORD AND MISSION AT A GLANCE	
Abbotsford	Mission
Estimated level of single-family metering (as of 2016): 100%	Estimated level of single-family metering (as of 2016): 13%
Single-family residential metering programs in place: <ul style="list-style-type: none"> <li>• Universal metering since 1995</li> </ul>	Single-family residential metering programs in place: <ul style="list-style-type: none"> <li>• New construction</li> <li>• Pilot program for single-family metering</li> </ul>
Main drivers for water metering: <ul style="list-style-type: none"> <li>• Systems management</li> <li>• Equitable billing</li> <li>• Leak reduction</li> <li>• Water conservation</li> </ul>	Main drivers for water metering: <ul style="list-style-type: none"> <li>• Systems management</li> <li>• Equitable billing</li> <li>• Leak reduction</li> <li>• Water conservation</li> </ul>

### OVERVIEW OF WATER METERING

The City of Abbotsford has been **universally metered since 1995**, when the District of Matsqui and the District of Abbotsford amalgamated to form the City of Abbotsford. After amalgamation, a decision was made to install water meters on all unmetered dwellings to consolidate water services operations within the newly formed city.

In contrast, the District of Mission is **partially metered**. In 2009, the District required water meter installation on all newly-constructed single-family homes, resulting in a current estimate of 13% metering in single-family dwellings. Additionally, there was a period in the 1970's when development included the installation of meters. However, these meters were never used for billing purposes. In 2015, these meters were replaced and used in the development of a **pilot study** to investigate the potential water savings that could be achieved with universal metering for single-family homes. The results of the study will inform Council on how to proceed with water metering within the District.

### PLANNING AND DECISION MAKING FOR WATER METERS

The City of Abbotsford and the District of Mission share a **regional system for water and sewer services**, with a combined service population of approximately 160,000 residents. Abbotsford, as the larger local government body, is responsible for regional water supply operations, with financial contributions from Mission.

Abbotsford and Mission are collectively responsible for regional water and sewer decision making through the Abbotsford/Mission Water and Sewer Commission. Localized water issues, such as water metering, are decided upon individually by each local government.

In 2006 and 2007, peak water demands in the Abbotsford/Mission area approached supply capacity and several options were considered by the Commission to improve water security more intensive water conservation efforts were initiated in 2008, such as two days a week, morning only lawn watering regulations. Mission decided not to proceed with funding new water supplies and Abbotsford declared a referendum to decide the feasibility of a public-private partnership (P3) project.

## RESIDENTIAL WATER METERING IN METRO VANCOUVER: BEST PRACTICES GUIDE FOR LOCAL GOVERNMENTS

### City of Abbotsford and District of Mission

The Abbotsford referendum in 2011 for supply infrastructure spending was overturned, dissolving plans to build a new supply and treatment facility at Stave Lake. In the meantime, major water conservation efforts were also underway.

Automatic Metering Infrastructure (AMI) was installed on all meters in Abbotsford in an effort to reduce peak water use, improve customer service, and increase billing frequency.

**The focus on water conservation led to noticeable decreases in water use**, which has improved water supply in the region.

As the region continues to grow and plan for the future, the sustained focus on water conservation has successfully maintained a decrease in water use, allowing for flexibility in the exploration of further water supply options.

### City of Abbotsford – A Case Study in Advanced Metering Infrastructure (AMI)

#### IMPLEMENTING METER READING SYSTEMS UPGRADES IN THE CITY OF ABBOTSFORD

In 2011 the City of Abbotsford **transitioned their metered accounts to an AMI system** for reading and billing. Rather than relying on staff to collect meter readings, AMI electronically collects and transmits data from water meters to the utility office. This shift to AMI was motivated by water supply constraints and a desire to reduce overall water consumption.

Prior to the implementation of the AMI system, water metering data was read manually and water bills issued annually as a component of the homeowner's annual tax bill. AMI allowed for a unified meter reading system, eliminated time consuming and labour intensive manual reads, and enabled automatic monthly reads and bi-monthly bills to encourage water conservation.

AMI has also improved customer service and leak detection. City staff estimate that 3,000 to 6,000 leak notification postcards per year are sent to residences when leaks are detected.

#### FINANCING AND IMPLEMENTING AN AMI SYSTEM

The AMI system upgrades and software were funded through a combination of grant funding and City operating funds. Itron, a third-party contractor, was hired to install all related AMI hardware, set up software, and ensure integration with City operations.

Various departments within the City were heavily involved in the transition to AMI, including engineering, operations, IT, billing, and finance teams.

#### DEMONSTRATED BENEFITS OF AMI

Abbotsford staff noted that two of the greatest benefits of transitioning to an AMI system are **leak detection** and the **enhancement of customer service**.

Through the leak detection program, there has been a significant amount of water saved. Although the City was universally metered prior to AMI, reading and billing occurred annually, which made it difficult to detect leaks and report to customers in a timely manner.

With monthly AMI meter reads and bi-monthly billing cycles, the City is now able to detect increases in water use, indicating leaks, and notify customers accordingly. In addition to reducing water loss, this process encourages **public trust in a fair billing system** and improves customer service.

#### DEVELOPING A WEB PORTAL FOR RESIDENTS

The City of Abbotsford is continuously working to educate residents on water conservation and efficiency. To complement existing water conservation and leak detection efforts, the WaterWise web portal was launched in March 2018 so that residents can access water use information online.

This web portal allows users to set alarms for leaks and monitor hourly water use. The objective of the portal is to enhance the overall customer experience and further educate users.

## RESIDENTIAL WATER METERING IN METRO VANCOUVER: BEST PRACTICES GUIDE FOR LOCAL GOVERNMENTS

### City of Abbotsford and District of Mission

#### FEEDBACK FROM RESIDENTS ON AMI AND RATE STRUCTURES

City staff note that the timing of the AMI upgrades collided with peak summer water use and water supply upgrades, in addition to the failure of the water supply infrastructure spending referendum and the local government elections in 2011. This timing, coupled with a general lack of public awareness of water metering, led to some initial public outcry over the new AMI system.

A new inclining tiered billing rate structure was initially implemented as AMI was launched. However, City Council reversed the decision after the first summer of using this rate structure due to customer complaints.

#### KEY REFLECTIONS ON AMI IN THE CITY OF ABBOTSFORD

- There are practical, public outreach, and billing considerations involved when transitioning to an AMI system:
  - Although suppliers and third-party contractors may advertise AMI installations as “plug and play,” the transition requires considerable efforts and resources from City staff departments. **Effective communication between teams** and detailed knowledge transfer between contractors and City staff are integral to the success of AMI.
  - Although public education campaigns about the new AMI system were launched in advance of billing changes, City staff reflect that a more **gradual transition to AMI** may have lessened public concerns.
  - City staff recommend **gradual changes to billing structure**, to ease the transition to separate bi-monthly water bills from annual tax bills.

#### District of Mission: A Case Study in Developing a Water Metering Pilot Study

##### BACKGROUND

As the District continues to investigate future supply planning, **water conservation** has been identified as an effective means of reducing demand. Water conservation is an attractive strategy because it costs less than developing additional water supply infrastructure.

Under Mission’s, new construction metering program, all single-family homes built since 2009 are metered and pay a volumetric rate for water usage, currently making up around 13% of single-family homes in the District. Water metering options for the remaining unmetered homes are being explored as a means of conserving water and **improving billing equity** amongst customers.

Staff have been conducting a pilot study to gather information on the costs and benefits of water metering and available metering options. The pilot study is based on monthly ‘drive-by’ readings that provide monthly water usage information by customer. If further investigation is required for a specific customer, Mission staff are able to obtain hourly meter data for a one month period, but directly connecting to a meter. The results of the pilot study will inform District Council on **how best to proceed with water metering** in Mission.

##### SCOPE AND RATE STRUCTURES

The main purpose of the pilot study is to determine the potential water savings that can be achieved through universal water metering.

The pilot study, consisting of approximately 500 meters, began in 2015 with 500 single-family homes that had water meters installed. The selected homes continued to be billed a flat rate regardless of their water use. During the initial years of the study, water use information was not provided to residents, thus establishing a blind assessment of unmetered water consumption behaviour.

## RESIDENTIAL WATER METERING IN METRO VANCOUVER: BEST PRACTICES GUIDE FOR LOCAL GOVERNMENTS

### City of Abbotsford and District of Mission

In late 2017, Council made the decision to transition pilot study participants to a metered water rate structure with water use and corresponding billing information provided to residents.

#### RESULTS OF THE PILOT STUDY SO FAR

The pilot study has now gathered three years of data that represent unmetered water use behaviour in single-family homes.

This current data set reveals that **over 80% of the selected homes are using less water than the average consumption that determines the District's flat rate for water billing**. These results indicate that the majority of these pilot study homes would see financial savings once they transition to volumetric water billing. Furthermore, this demonstrates that the majority of flat rate customers are subsidizing the small percentage of high water users.

The ongoing pilot will now inform residents on their water use through an educational campaign. Pilot meter customers currently pay an annual flat rate, but will be transitioned to a volumetric rate in 2019 (with customers given the option to switch sooner if desired). After the transition to volumetric billing, staff will continue to monitor the pilot study data to establish a comparative data set of metered water use behaviours. Additional staff resources have been allocated to the monthly review of water usage trends in order to identify and rectify leakage issues.

Another notable finding from the pilot meter study was the scale of water leakage that was identified. In one case, an in-ground, service line leak increase to a rate of 77 m<sup>3</sup> per day. This highlighted two important aspects:

- Large leaks on the service line can go undetected if situated in porous ground conditions; and
- Metering at the property line is necessary to identify service line leaks (some municipalities install meters in-house to reduce cost).

The before and after comparison of the impacts of water metering on water use will inform a business case and action plan on water metering in Mission.

#### FUTURE DECISION MAKING ON WATER METERING IN THE DISTRICT OF MISSION

Mission staff are planning to review the pilot results with Council through a workshop to discuss the costs and benefits of water metering and the various implementation options available.

RESIDENTIAL WATER METERING IN METRO VANCOUVER: BEST PRACTICES GUIDE FOR LOCAL GOVERNMENTS

City of Calgary



WATER METERING IN CALGARY AT A GLANCE	
Level of single-family metering:	98-99%
Single-family residential metering programs in place:	<ul style="list-style-type: none"> <li>• Universal mandatory metering since 2008</li> </ul>
Main drivers for water metering:	<ul style="list-style-type: none"> <li>• Water conservation</li> <li>• Equitable billing</li> </ul>



OVERVIEW OF WATER METERING

All industrial and commercial buildings are metered in the City of Calgary and 98-99% of residential households have water meters installed.

The City of Calgary held a plebiscite in 1989 to assess public interest in residential water metering to **conserve water** and **introduce equitable billing**. Based on the outcome of this plebiscite, the City implemented a voluntary residential water metering program in 1991.

In 2002, a new bylaw required all newly constructed buildings to install water meters. The City of Calgary made the decision to implement a mandatory residential water metering program in 2008, with 2015 as a target for meters to be installed on all households.

PROGRAM FUNDING

All initial costs for water meters and installation are funded by the City through water utility rates. These costs are then integrated into water utility bills.

RATE STRUCTURES AND BILLING

Residents with water meters installed, which constitute the majority of the City’s water utility customer base, receive bills containing both a flat-rate water service charge and a variable charge that reflects their water usage.

Rates for unmetered customers (1 to 2% of residents) are determined based on the square footage of their dwellings. Unmetered customers are subject to a minimum charge and typically have higher bills than metered customers.

The City completes a cost-of-service study every four years to determine the billing rate for both metered and unmetered water users.

INSTALLATION OF WATER METERS

In Calgary, water meters are installed in basements where service lines enter the home.

THE POTENTIAL FOR METER READING SYSTEMS UPGRADES

The City of Calgary currently uses an automatic meter reading (AMR) system. Meters are read with handheld AMR device reads. The City is currently exploring an advanced metering infrastructure (AMI) program, with the possibility of initiating the transition to AMI within the next year.

KEY REFLECTIONS ON RESIDENTIAL WATER METERING IN THE CITY OF CALGARY

- Residential water metering has contributed to the conservation of the local water supply. In 2016, **annual water withdrawn from the Bow and Elbow Rivers was 18% less than the 2003 benchmark**, despite a population growth of 30% since 2003.

RESIDENTIAL WATER METERING IN METRO VANCOUVER: BEST PRACTICES GUIDE FOR LOCAL GOVERNMENTS

City of Toronto



WATER METERING IN TORONTO AT A GLANCE
Level of single-family metering: Nearly 100%
Single-family residential metering programs in place: <ul style="list-style-type: none"> <li>• Universal advanced metering infrastructure (AMI) water metering program</li> </ul>
Main drivers for water metering: <ul style="list-style-type: none"> <li>• Consistency across amalgamated areas</li> <li>• Equitable billing</li> <li>• Systems efficiency</li> </ul>



OVERVIEW OF WATER METERING

In 1998, six boroughs amalgamated to form the City of Toronto. Metering policies and technologies used to differ between the boroughs and after amalgamation there was a desire to centralize and simplify the mix of billing and metering systems to **ensure customer equity** and **system efficiency**. In response, Toronto Water was created to manage the water supply of the newly joined region.

Water meters were installed in the 1920s to 1940s in the five outer boroughs. However, about 15% of single-family homes in the old City of Toronto did not have water meters at the time of amalgamation.

After amalgamation, a business case for universal water metering in Toronto was completed from 2002 to 2003. The Water Meter Program, a capital project to install advanced metering infrastructure (AMI) water meters on all homes and businesses in the City of Toronto, was approved by City Council in 2008. The implementation of this program took place between 2010 and 2016.

In 2016, the City of Toronto launched the MyWaterToronto online portal for residential customers. The portal allows customers to log in and view their daily water usage.

PLANNING AND DECISION MAKING FOR WATER METERS

Amalgamation in 1998 resulted in an inconsistent mixture of billing systems and water meter reading technologies in the City of Toronto. As a result, water billing varied depending on where each resident lived in the city.

After amalgamation, some residents paid a flat rate for water, whereas others were metered. Many older meters were under registering. Some residents were allowed to phone in their water meter reading, while other meters were manually read.

As water meters are located indoors in the City of Toronto, staff visited each individual dwelling to read the meters. If residents were not home, bills were subject to estimates that were often proven to be inaccurate once the actual readings were taken.

The City of Toronto decided to pursue a universal metering program with advanced metering infrastructure (AMI) to unify metering practices in the region, address billing issues and improve customer service, eliminate meters that gave inaccurate reads, and increase system efficiency.

PROGRAM FUNDING

Water meter replacement costs and installation, as well as the installation of meters for unmetered homes, were paid for by the City as part of the universal AMI water metering capital program. The budget for this program was 200 million dollars.

The savings from eliminating manual reading systems was five million dollars per year. Improving the efficiency and accuracy of meters resulted in a revenue recovery of 28 million dollars per year. **In total, universal AMI metering resulted in a savings of 33 million dollars per year, recovered across five to six years.**

## RESIDENTIAL WATER METERING IN METRO VANCOUVER: BEST PRACTICES GUIDE FOR LOCAL GOVERNMENTS

## City of Toronto

## RATE STRUCTURES AND BILLING

The City's water rates factor in operating and capital costs, as well as water meter acquisition and installation. Toronto Water requested from City Council a 9% increase in water rates for a duration of nine years in order to financially support the implementation the AMI water metering program.

Rather than split water billing into a fixed charge and a variable charge, the City integrates all of its water operations and maintenance costs into one variable rate.

## INSTALLATION OF WATER METERS

In the City of Toronto, meters are installed indoors because of the cold climate. From 2010 to 2016, water meter upgrades and installations were completed in each of Toronto's 44 wards.

At the onset of program implementation, the City installed AMI water meters one ward at a time. Once staff became comfortable with the meter installation process, they began to work within seven wards simultaneously.

## FEEDBACK FROM RESIDENTS

The City of Toronto launched a comprehensive public education and communication program prior to the water meter installations. City staff note that proactively offering

information to residents about the installation expectations and offering a rationale for the project was helpful in increasing public support.

Some residents resisted the new program because of concerns about the health impacts of AMI transmitters. In response to these concerns, the City worked with health officials to promote the safety of the meters. In-field testing was conducted on AMI meters, and results were shared with the public.

The public reaction to the MyWaterToronto online portal was very positive, as this system initiated a customer service interaction that wasn't in place previously.

## KEY REFLECTIONS ON RESIDENTIAL WATER METERING IN THE CITY OF TORONTO

- Prior to the implementation of universal water metering, the City was charging a flat rate for unmetered customers based on an estimate of 300 cubic metres of water per year. Once meters were installed in these dwellings, **the average bill dropped by approximately 15%.**
- Many residents who contacted the City to complain about water metering came around to the idea after staff explained the rationale for the change. The City's proactive approach to informing residents about the meter installation process and expectations was also helpful in building public trust.

## The MyWaterToronto Online Portal

In February 2016, the City launched the MyWaterToronto online portal. The purpose of the portal is to make all water use data available online to residents and businesses. Customers can log in to the portal, view their daily water use, and make choices about their water consumption based on the information that they view.

MyWaterToronto has helped to improve and diversify customer service. During the first five or six months after the portal launch, the City responded to 1,000 to 1,500 emails from customers, opening up dialogue with residents beyond the water bill.

City staff have observed that increasing transparency with customers through the portal has helped to build public trust in the water utility system. Since the creation of MyWaterToronto, the number of water service complaints has gone down. The City used to manage 200 to 300 bill disputes per year. With the implementation of the portal, the number of customer disputes has decreased to approximately 80 per year.

RESIDENTIAL WATER METERING IN METRO VANCOUVER: BEST PRACTICES GUIDE FOR LOCAL GOVERNMENTS

City of Seattle



WATER METERING IN SEATTLE AT A GLANCE	
Level of single-family metering:	100%
Single-family residential metering programs in place:	<ul style="list-style-type: none"> <li>• Universal mandatory metering since 1920</li> </ul>
Main drivers for water metering:	<ul style="list-style-type: none"> <li>• Equitable billing</li> <li>• Systems efficiency</li> </ul>



OVERVIEW OF WATER METERING

The city of Seattle began a gradual program of metering in the early 1890s before adopting a policy to universally meter all connections in 1908. Seattle has had universal metering in place since July 1, 1920. Under the 2003 Municipal Water Law, the State of Washington requires all municipalities in the state to meter their customers.

The main drivers for water metering were **billing equity**, and to provide customers with an incentive to conserve water and not waste it.

PLANNING AND DECISION MAKING FOR WATER METERING

Seattle Public Utilities (SPU) is focused on balancing equity, efficiency, and financial stability as it continues to supply metered water to the City of Seattle.

Over the next six years, water rate increases will be driven primarily by inflation and the cost of several new capital projects. Current water demand forecasts indicate that during this period, water use will remain fairly constant followed by slightly increasing demand in the years to follow.

PROGRAM FUNDING

The primary source of funding for The City of Seattle’s water utility is revenue derived from wholesale and retail sales of treated drinking water. To finance capital water treatment facilities, the City relies primarily on borrowing. Seattle also receives contributions from developers, though this funding source accounts for only a small portion of capital financing.

Originally, the City of Seattle paid for meters and installation costs. This policy has changed, and now the customer pays for the meter and the meter installation. Once the meter is in place, the City pays for testing, maintenance, repair, and replacement.

RATE STRUCTURES AND BILLING

The rate structure for residential customers includes two components: a fixed monthly charge and a seasonally differentiated variable charge.

To encourage conservation in the summer months, the residential variable charge has a three-tier structure. The first tier, up to five hundred cubic feet (CCF), is designed to meet basic residential water needs. The second tier, from 5 to 18 CCF, is billed at a higher rate than the first. The third tier, above 18 CCF, is set at an even higher rate to discourage the use of very large volumes of water for activities such as irrigation.

Seattle has high fixed costs and very low variable costs because of its gravity-fed system.

INSTALLATION OF WATER METERS

Most water meters are installed outdoors. For single-family homes they are placed at the property line in the right-of-way.

## RESIDENTIAL WATER METERING IN METRO VANCOUVER: BEST PRACTICES GUIDE FOR LOCAL GOVERNMENTS

## City of Seattle

KEY REFLECTIONS ON WATER CONSERVATION  
EFFORTS IN THE CITY OF SEATTLE

- One of the key misconceptions about water conservation is that conservation causes rates to increase. This misconception misses two key facts: unit rates may increase but bills do not necessarily increase proportionally because residents have reduced their water use and can control how much they pay. Secondly, conservation saves money in the long-term because it helps postpone or avoid the high costs of expanding supply which leads to much more substantial water rate increases.
- Now that conservation has created a comfortable cushion between demand and supply for Seattle, there is less reason to invest as heavily in conservation programs. Water use efficiency is projected to continue improving as customers replace appliances and fixtures with ever more efficient models provided by the market and/or required by code. Seattle's conservation program now concentrates mostly on reinforcing current practices and maintaining the conservation ethic so that conservation savings already achieved are maintained.

RESIDENTIAL WATER METERING IN METRO VANCOUVER: BEST PRACTICES GUIDE FOR LOCAL GOVERNMENTS

New York City



WATER METERING IN NEW YORK CITY AT A GLANCE

Level of single-family metering: Nearly 100%
Single-family residential metering programs in place: <ul style="list-style-type: none"> <li>• Mandatory metering in place since 2000, with a 100% surcharge on flat rates for residents who do not comply</li> </ul>
Main drivers for water metering: <ul style="list-style-type: none"> <li>• Water conservation</li> <li>• Equitable billing</li> </ul>



OVERVIEW OF WATER METERING

The New York City has required the installation of water meters on all businesses since 1937. Faced with **the need to conserve water due to a shortage of supply**, New York City Council passed a local law in 1985 requiring that water meters be installed on all new construction and substantially renovated dwellings.

In the mid-1980s, the New York City Water Board designed regulations that provided the legal basis for metering existing residential properties.

From 1992 to 1998, the City installed approximately 500,000 new residential water meters. Along with implementing the metering program, the City spearheaded a toilet replacement program involving more than 1.3 million fixtures and 120,000 properties.

Starting in 2000, unmetered residential customers were required to install water meters. Residents who did not comply were assessed a 100% surcharge on their annual flat rate bills. At the beginning of this initiative, 36,000 residential accounts were surcharged, but this number has decreased to about 4,800 today.

PLANNING AND DECISION MAKING FOR WATER METERS

The decision to implement water metering was driven by the need to conserve water. New York’s water supply was limited and wastewater treatment projects needed to be developed and expanded.

Prior to implementing mandatory water metering, it was only during drought emergencies that the City was able to motivate residents to decrease their water use. However, once the emergency was over, residents went back to their old habits and consumption rates increased again.

By implementing water metering and increasing water rates by more than double, the City generated the urgency required for people to pay attention to their water use. Residents were encouraged to minimize their water consumption, fix leaks, and make the shift to “waterwise” fixtures.

PROGRAM FUNDING

The New York City issued capially funded contracts with water and sewer funds to implement mandatory water metering. Had water metering not been selected as a water management strategy, the City would have spent significantly more than the capital investment cost on expanding water supply and infrastructure.

RATE STRUCTURES AND BILLING

The New York City has increased their water rates steadily over the last 20 years, which has helped to keep consumption low. There is an argument that metering is more effective now than when it was first introduced because of these rising rates.

## RESIDENTIAL WATER METERING IN METRO VANCOUVER: BEST PRACTICES GUIDE FOR LOCAL GOVERNMENTS

# New York City

### INSTALLATION OF WATER METERS

As of the mid-1980s, the City's intention was to work toward universal water metering, with the understanding that this goal would take many years to accomplish. In order to manage the magnitude of the plan, water meters were installed in stages.

The first round of residential water meter installations occurred between 1988 and the mid-1990s. A second round took place from the mid-1990s to the early 2000s, and by 2002 about 90% of residential buildings had meters installed.

### KEY REFLECTIONS ON RESIDENTIAL WATER METERING IN THE NEW YORK CITY

- There was a **15 to 17% reduction in water use** in the first two years after meter installation. The City has seen a steady downward trend in water consumption since the 1990s, which has been driven by improvements in appliance efficiency and the introduction of water metering.

# RESIDENTIAL WATER METERING IN METRO VANCOUVER: BEST PRACTICES GUIDE FOR LOCAL GOVERNMENTS

## London, England



### WATER METERING IN LONDON AT A GLANCE

#### Level of single-family metering:

- The majority of households in London have water meters
- 53% of England is metered (as of 2016)

#### Single-family residential metering programs in place:

- Private water suppliers can mandate water metering in London and other areas of serious water stress, and on change of occupier

#### Main drivers for water metering:

- Water scarcity and conservation

### OVERVIEW OF WATER METERING IN LONDON AND ENGLAND AS A WHOLE

The water and sewerage industry in England and Wales was privatized in 1989. There are currently 25 private water suppliers covering England, Scotland and Wales, with Thames Water being the main water company or supplier in London.

Water metering efforts began in London in the later part of the 2000s, with the main driver being **water scarcity**. As of 2016, 53% of households were metered in England.<sup>1</sup> Most of London is currently metered.

The southeast part of England has higher metering rates because this area has been classified by the Environment Agency as an area of serious water stress. The regulatory framework in the United Kingdom allows private water suppliers to mandate metering to all of their customers in areas that have been given this designation.

The extent and timeline of metering program implementation depends on each water supplier. Water companies pay for upfront meter costs, which are then recovered through customer water bills.

### WATER METERING REGULATORY FRAMEWORK IN THE UNITED KINGDOM

Water companies in the United Kingdom can charge metered customers by volume if they live in a new home, use large amounts of water, or live in water stressed areas.

For homes that do not meet the prescribed conditions above, water companies can install meters on residential properties, but only insist that new occupiers pay for their water by volume. Residential customers can voluntarily opt for a meter.

### KEY REFLECTIONS ON RESIDENTIAL WATER METERING IN ENGLAND

- From 2015 to 2016 in England, metered households consumed an average of 125 litres of water per day, whereas unmetered households consumed an average of 155 litres of water per day.
- From 2015 to 2016, the average Londoner consumed 164 litres of water per day, about 20 litres per day above the national average.<sup>2</sup>

1 Retrieved from Delving into Water 2016: Performance of the water companies in England and Wales 2011-12 to 2015-16: <https://www.ccwater.org.uk/wp-content/uploads/2016/11/Delving-into-water-2016.pdf>

2 Retrieved from Delving into Water 2016: Performance of the water companies in England and Wales 2011-12 to 2015-16: <https://www.ccwater.org.uk/wp-content/uploads/2016/11/Delving-into-water-2016.pdf>

## RESIDENTIAL WATER METERING IN METRO VANCOUVER: BEST PRACTICES GUIDE FOR LOCAL GOVERNMENTS

### South East Queensland, Australia



#### WATER METERING IN SOUTH EAST QUEENSLAND AT A GLANCE

<ul style="list-style-type: none"> <li>• Level of single-family metering: 100%</li> </ul>
Single-family residential metering programs in place: <ul style="list-style-type: none"> <li>• Universal metering since the early 2000s</li> </ul>
Main drivers for water metering: <ul style="list-style-type: none"> <li>• Water conservation</li> <li>• System efficiency</li> <li>• Equitable billing</li> <li>• Responsible water utility management</li> </ul>



#### OVERVIEW OF WATER METERING IN SOUTH EAST QUEENSLAND

Queensland Urban Utilities (QUU) was established in 2010 as a statutory body to provide retail water services to more than 1.4 million people within the Brisbane, Ipswich, Lockyer Valley, Scenic Rim, and Somerset council areas in South East Queensland.

Water meters are mandatory for all users. The QUU service area is universally metered and most of the region has been so for several decades. South East Queensland became more serious about this issue in the early 1990s and Brisbane Water (making up most of what would become the QUU service area) became universally metered by about 1998. The rest of the service area was fully metered by the early 2000s. Two decades later, QUU is working on replacement of its fleet of water meters for the second and third time under a continuous change out program.

#### PLANNING AND DECISION MAKING FOR WATER METERS

In Australia, water metering is viewed as a baseline as part of responsible water systems management. Average residential consumption in the QUU service area is around 160 litres per capita per day (Lcpd) and has remained stable for many years, since the record-breaking “Millennium Drought” of the mid-2000s.

The vast majority of meters in the current fleet are a conventional (manual read) design. Conventional meters

are currently read quarterly at a cost of about AU\$0.10 per read, which remains the most cost-effective approach in the short term. As a benchmark, QUU can purchase conventional residential meters at a cost of about AU\$51 per unit compared to AU\$175 to AU\$300 for an AMI unit (note that the price for the conventional units excludes installation and is based on volume purchasing for a very large utility).

Meanwhile, QUU has implemented a pilot project in Rocklea, a large suburb south of Brisbane, using drive-by data collection technology. More advanced AMI technology with radio transmitters is also required for new large non-residential and multi-residential development in anticipation of it becoming universal in the future.

#### PROGRAM FUNDING

QUU currently replaces about 5,000 or 6,000 meters per year under a normal capital renewal program. This work is funded through ordinary capital budgets with costs ultimately recovered through customer water rates.

#### RATE STRUCTURES AND BILLING

The QUU bill includes both fixed and variable charges. Fixed charges include a water access charge (currently AU\$54.12 per quarter) and a sewer access charge (currently AU\$134.46 per quarter). The variable component includes a bulk charge (reflecting cost of bulk supply from the State Government) and an inclining block two-tiered

## RESIDENTIAL WATER METERING IN METRO VANCOUVER: BEST PRACTICES GUIDE FOR LOCAL GOVERNMENTS

### South East Queensland, Australia

consumption charge. Consumption charges vary across council services areas. As an example, in the Brisbane area (with the largest population), consumption under 74 m<sup>3</sup> per quarter is charged at AU\$0.768/m<sup>3</sup>, while consumption over this threshold is charged at AU\$1.489/m<sup>3</sup>. The variable bulk charge is an additional AU\$2.915/m<sup>3</sup>. Altogether, a household consuming an average of 80 m<sup>3</sup> in a 90-day period would have a bill of AU\$487.44 including both water and sewer charges.

#### INSTALLATION OF WATER METERS

Developers are responsible for installation of meters on new properties according to a standard specification. This specification follows one set out by the Water Services Association of Australia (WSAA) for approved meter types. Meters are installed outdoors at property boundaries following conventional configurations.

Maintenance and replacement work are completed by QUU, usually employing outside contractors.

Universal metering in Queensland is supported by various state level regulatory requirements. For example, the service provider has the power to install meters and enter properties to read them under the *Water Supply (Safety and Reliability) Act 2008* (s. 35, s. 37). Sub-metering has also been required in certain types of development such as gated strata properties since 2008.

#### FEEDBACK FROM RESIDENTS

Residential water metering is a standard practice and QUU staff report that there is no push back whatsoever against the ongoing replacement program.

QUU provides information on its website about related topics including how to locate and read meters, replacement, advice on how to find usage information on bills, and how to get a test if a resident believes their readings are not accurate.

QUU conducts regular customer surveys as part of normal operations. This research finds that residents continue to view environmental management as an important issue. Residents are supportive of QUU's environmental leadership, are interested in water conservation, and want to avoid future spending on water infrastructure projects such as construction of new dams. Lessons learned from the drought remain top of mind for residents, including water restrictions and symbols of conservation that became commonplace (e.g., shower timers). Sustainable water management is highly valued by the community.

Where there is push back from residents, it is typically about charges and bills. Water services remain expensive as QUU continues to pay for the substantial costs of major drought-related infrastructure constructed in the past 15 years (desalination plants, new dams, large pipelines, etc.).

#### KEY REFLECTIONS ON RESIDENTIAL WATER METERING IN QUU

Metering is a broadly accepted best management practice both within the water industry and by the general public across Australia. After decades of living with water meters, residents do not imagine it any other way.

Water services are highly valued in South East Queensland and per capita consumption is exceptionally low by Canadian standards. Historically, metering contributed to this situation. Unfortunately, it also took a major crisis in the form of a record breaking drought that reached near emergency proportions.

## RESIDENTIAL WATER METERING IN METRO VANCOUVER: BEST PRACTICES GUIDE FOR LOCAL GOVERNMENTS

## References

## References

- Alliance for Water Efficiency, AWE. (2014). *Building Better Rates for an Uncertain World: Balancing Revenue Management, Resource Efficiency and Fiscal Sustainability*.
- American Water Works Association, AWWA. (2017). *Manual of Water Supply Practices: M1 Principles of Water Rates, Fees and Charges*, 7th Edition.
- American Water Works Association, AWWA. (2012). *Manual of Water Supply Practices: M6 Water Meters – Selection, Installation, Testing and Maintenance*, 5th Edition.
- American Water Works Association, AWWA. (2014). Policy Statement on Water Metering. Retrieved from <https://www.awwa.org/about-us/policy-statements/policy-statement/articleid/206/metering-and-accountability.aspx>
- BC Water and Waste Association, BCWWA. (2012). Position Statement on Water Metering. Retrieved from <https://bcwwa.org/resources/position-statements.html>
- Boyle, T., Giurco, D., Mukheibir, P., Liu, A., Moy, C., White, S., & Stewart, R. (2013). Intelligent Metering for Urban Water: A Review. *Water*, 5(3), 1052-1081. doi:10.3390/w5031052.
- Canadian Water Network, CWN. (2018). *Balancing the Books: Financial Sustainability for Canadian Water Systems*. Retrieved from <http://www.cwn-rce.ca/assets/resources/pdf/2018-Financial-Sustainability-Report/CWN-Balancing-the-Books-Report-Web-EN.pdf>
- Ecofiscal Commission. (2017). *Only the Pipes Should be Hidden: Best Practices for Pricing and Improving Municipal Water and Wastewater Services*. Retrieved from <https://ecofiscal.ca/reports/pipes-hidden-best-practices-pricing-improving-municipal-water-wastewater-services/>
- Econics. (2019). *Queensland Urban Utilities Water Metering Case Study*. Prepared for Metro Vancouver, Water Services Department.
- Environment Canada. (2011). 2011 Municipal Water Use Report – Municipal Water Use 2009 Statistics. Retrieved from [https://www.ec.gc.ca/doc/publications/eau-water/COM1454/survey4-eng.htm#chart5\\_toc](https://www.ec.gc.ca/doc/publications/eau-water/COM1454/survey4-eng.htm#chart5_toc)
- Federation of Canadian Municipalities and National Research Council, FCM & NRC. (2003). *Establishing a Metering Plan to Account for Water Use and Loss*.
- Metro Vancouver. (2011). *Metro Vancouver Drinking Water Management Plan*. Retrieved from <http://www.metrovancouver.org/services/water/WaterPublications/DWMP-2011.pdf>
- Metro Vancouver. (2017). *Regional Growth Strategy. Metro Vancouver 2040: Shaping Our Future*. Retrieved from <http://www.metrovancouver.org/services/regional-planning/PlanningPublications/RGSAdoptedbyGVRDBoard.pdf>

## RESIDENTIAL WATER METERING IN METRO VANCOUVER: BEST PRACTICES GUIDE FOR LOCAL GOVERNMENTS

## References

- Mustel Group. (2017). Water Metering Opinion Research. Prepared for Metro Vancouver, Water Services Department.
- OECD (1999), *The Price of Water: Trends in OECD Countries*, OECD Publishing, Paris, <https://doi.org/10.1787/9789264173996-en>.
- Urban Systems. (2019). *Regional Assessment of Residential Water Metering*. Prepared for Metro Vancouver, Water Services Department.
- US Department of Energy, US DOE. (2015). *Metering Best Practices: A Guide to Achieving Utility Resource Efficiency*, Release 3.0.
- US Environmental Protection Agency, US EPA. (2016). *Best Practices to Consider When Evaluating Water Conservation and Efficiency as an Alternative for Water Supply Expansion*.
- Water Research Foundation, WRF. (2011). *Advanced Metering Infrastructure: Best Practices for Water Utilities*. Retrieved from <http://www.waterrf.org/Pages/Projects.aspx?PID=4000>









**Water Bylaw  
No. 633, 2024**



The Village of  
**LIONS  
BAY**

PO Box 141, 400 Centre Road  
Lions Bay, British Columbia  
V0N 2E0, CANADA  
604-921-9333  
office@lionsbay.ca  
www.lionsbay.ca

WATER BYLAW  
NO. 633, 2024

*A Bylaw to regulate the provision of municipal water.*

WHEREAS the Lions Bay Municipality produces potable water; and

WHEREAS such water requires regulation as to distribution and use;

NOW THEREFORE the Council of the Village of Lions Bay in open meeting assembled enacts as follows.

PART 1 – INTERPRETATION

- 1 This Bylaw may be cited as “Water Bylaw, No. 633, 2024.”
- 2 In this Bylaw the following words and terms have the meanings herein assigned to them unless the context requires otherwise, in order of definition:
  - 2.1 Municipality, Municipal means or refers to the municipality of the Village of Lions Bay;
  - 2.2 Water means potable water produced and supplied by the Municipality;
  - 2.3 Meter means a device used to measure, record and transmit the volume of Water passing through it, including cables, antennas, batteries and in- or above-ground installation box;
  - 2.4 Water System means the Municipality’s owned or controlled source intakes, treatment plants, pipes, valves of all kinds, fittings, connections, measuring devices, blowoffs and bleeds, and all materials necessary and used to supply Water;
  - 2.5 User means a person using Water supplied by the Water System;
  - 2.6 Curb Stop means the Municipally-owned valve, apparatus, sleeve, cap and Meter (if installed), connected to the Water System, that serve as the public-private boundary of the Water System;
  - 2.7 Leak means any unintended use of Water;
  - 2.8 Premise means any building or structure or part thereof used or intended to be used as a residence (including but not limited to single-family dwelling structures, multi-family dwelling structures whether or not owned by a strata, cottages within the meaning of Zoning and Development Bylaw No. 520, 2017, but excluding secondary suites); or as a business (including but not limited to shops, offices, stores, cafes, breweries, distilleries, roasters, growers and marinas); or as an institution (including but not limited to schools and daycares);
  - 2.9 Service Connection means a User’s piping and apparatus connecting a Curb Stop to a Premise;
  - 2.10 Cross Connection means any circumstance which does or might permit or allow anything other than Water, including but not limited to non-potable water, used water, wastewater, or any chemical liquid, gas or other substance, to enter the Water System or Service Connection;

- 2.11 Council means the elected council of the Municipality;
- 2.12 Staff means the Chief Administrative Officer, Corporate Officer, Financial Officer, Approving Officer, Director of Operations, Public Works Manager, Fire Chief, Building Inspector, Bylaw Enforcement Officer or their equivalents or their designees, as appropriate to the role required where such term is used;
- 2.13 Hydrant means a device equipped with special threaded connections within a highway or municipal right-of-way or easement or on municipal property, connected to the Water System, intended to draw Water from the Water System other than from a Curb Stop;
- 2.14 Fee and Fine means a charge in a given section of this Water Bylaw No. 633 and laid out in Fees Bylaw No. 497, 2016.

PART 2 – CONNECTING TO THE WATER SYSTEM

- 3 Applying for Water System access
  - 3.1 A person wanting to connect a Premise to the Water System must apply to the Municipality in the form prescribed and pay the Fee required.
    - 3.1.1 Unless waived by Council for the purpose of subdivision, the Municipality shall have no obligation to provide Water System access to a Premise on a property which does not have road frontage.
    - 3.1.2 The Municipality shall have no obligation to provide Water System access through a private easement.
    - 3.1.3 An application for a Water Connection that requires a Water System extension must be approved by Council.
- 4 If approved, the applicant becomes a User, and the Municipality shall provide one Water System connection to the parcel on which the Premise exists by installing a Curb Stop (unless such already exists).
  - 4.1 If one Curb Stop is found to serve more than one Premise, the Municipality may disconnect each or any Premise until each is directly connected to the Water System.
  - 4.2 Water System extensions for which the Village bears any portion of the costs, shall only proceed provided the costs are:
    - 4.2.1 recoverable in part or whole from each of the existing as well as future parcels of lands that will be served by the Water System extension; and
    - 4.2.2 within the limit of the funds allocated for these purposes; and
    - 4.2.3 not excessive, as determined by Council.
- 5 The User shall provide a Service Connection from the Curb Stop to the Premise.
  - 5.1 A Service Connection Permit must be obtained upon payment of a Fee, and all work inspected by the Municipality before backfilling.
    - 5.1.1 Subject to Fine and Fee, the Municipality shall have the right to require the User to expose a Service Connection if it was backfilled before inspection.
    - 5.1.2 Subject to Fee and Fine, if the Service Connection is found to not be as required in this

section 5, the Municipality may order it to be replaced at the User's expense.

6 Materials

- 6.1 Service Connections shall use fittings of brass, copper or other material approved by the Municipality.
    - 6.1.1 For avoidance of doubt, iron, steel (except 316 stainless steel), plastic (including sharkbite-type) and rubber fittings of any kind are prohibited hereunder.
  - 6.2 Service Connections shall use piping of copper, HDPE, PEX or other material approved by the Municipality.
    - 6.2.1 For avoidance of doubt, polybutylene, PVC and LDPE piping are prohibited hereunder.
    - 6.2.2 Piping shall be rated for 200 psi (approximately 1400 kPa) service at minimum.
    - 6.2.3 Piping shall be at least 19 mm (3/4") diameter for non-sprinklered single-family residential Premises, at least 38 mm (1 1/2") diameter for sprinklered single-family residential Premises, and of such size as determined by the Municipality for all other Premises.
  - 6.3 The Service Connection must:
    - 6.3.1 run at least 900 mm beneath open ditches, culverts and driveways or 600 mm below the surface otherwise; and
    - 6.3.2 be properly protected and backfilled so as to avoid damage from freezing, traffic, ground movement, vegetation growth, or any other reasonably expected natural or human cause.
  - 6.4 If non-metallic piping is used, tracing wire must be wrapped around the piping or laid within 100 mm of it for its entire run.
- 7 The Service Connection shall in all aspects comply with the BC Plumbing Code, including but not limited to providing at a minimum:
- 7.1 a shut-off valve at the first point where the Service Connection enters the Premise; and
  - 7.2 a pressure reducing valve if the usual Water pressure at the shut-off valve can be expected to exceed 80 psi (approximately 550 kPa); and
  - 7.3 a backflow preventer if not integrated with the pressure reducing valve; and
  - 7.4 vacuum relief valves on all hot water tanks on the property.

PART 3—CROSS-CONNECTION CONTROL AND BACKFLOW PREVENTION

- 8 A person must not cause or allow a Cross Connection.
- 9 All Service Connections must have backflow prevention in accordance with applicable regulations.
- 10 If the Municipality reasonably believes that a Cross Connection may exist, Staff may without notice enter the property and Premise for inspection and if deemed necessary, shut off supply, apply Fines if any, and notify the User that:
  - 10.1 the Cross Connection must be removed; and

- 10.2 a backflow prevention device must be installed; and
- 10.3 any other works or actions that the Municipality deems necessary be performed at the User's expense, all before supply will be turned on, for a Fee.

#### PART 4— WATER USES

- 11 A User may use Water:
  - 11.1 inside a Premise; and
  - 11.2 outdoors, subject to Outdoor Water Use Bylaw No. 484; and
  - 11.3 non-residential purposes, subject to Zoning and Development Bylaw 520, including but not limited to:
    - 11.3.1 institutions, including but not limited to schools and daycares; and
    - 11.3.2 businesses, including but not limited to shops, offices, stores, cafes, breweries, distilleries, roasters, growers and marinas.
- 12 A User must ensure that all taps, fittings, fixtures and other apparatus inside or outside a Premise connected to the Water System are adequate, installed in accordance with applicable regulations, and properly maintained.
  - 12.1.1 A private fire service standpipe connected to the Water System must be maintained in accordance with the British Columbia Fire Code.
- 13 A User must not:
  - 13.1 allow Water to Leak from defective or improper taps, pipes, fixtures, appliances and other devices using or carrying Water, whether indoors or outdoors; or
  - 13.2 sell Water or allow it to be taken, used or applied to or for a use or benefit other than the User's own; or
  - 13.3 use Water for:
    - 13.3.1 power generation; or
    - 13.3.2 once-through cooling or heating of appliances, machines or devices; or
    - 13.3.3 once-through indoor or outdoor water features, including but not limited to aquariums.
  - 13.4 Upon notification by the Municipality of a violation of this section 13 Users must permanently discontinue the violation within one hour or face disconnection from the Water System.
    - 13.4.1 Such notification does not preclude issuance of a Fine.
    - 13.4.2 Reconnection to the Water System is subject to a Fee.
- 14 Municipal use of water for firefighting, irrigation, flushing or any other use is exempt from consideration under this PART 4— WATER USES.

#### PART 5— METERS & METERING

- 15 The Municipality may install a Meter after a Curb Stop, with the cost to be recouped through a service charge as laid out in Schedule A hereto, as follows.
  - 15.1 When an application is made to redevelop a parcel, including where there is a proposed change in use or density on the parcel.
  - 15.2 When a swimming pool system or hot tub or irrigation system is installed.
  - 15.3 When any element of the Water System is exposed for renewal or repair.
  - 15.4 When a change to a Service Connection is required, such as but not limited to upsizing for installation of fire sprinkler service.
  - 15.5 Where in the reasonable determination of the Municipality there is a violation of any Municipal bylaw relating to use of Water.
  - 15.6 At properties where Service Connection breaks have occurred in the past and the Service Connection was not fully replaced.
  - 15.7 For any Premise where, in the judgement of the Municipality the average volume of Water being used may be 25 percent or more greater than the average volume of Water used by similar Premises.
  - 15.8 As part of a phased implementation of metering whether by neighbourhood, parcel size, local Water System age, local Water System pressure, or any other criterion.
- 16 A User may apply to the Municipality for metered service.
  - 16.1 The Municipality shall have no obligation to install a Meter or commence metered service.
  - 16.2 On acceptance of such application the User shall pay upfront ten times the current annual service charge in Schedule A hereto, to be rebated over the following ten years of metered billing in equal parts.
    - 16.2.1 If Meter installation and metered service does not take place within one year of such payment, the municipality shall refund of one tenth of the amount paid for each subsequent year installation does not take place.
    - 16.2.2 If subsequent grant or other funding for metering becomes available, the rebate will be increased pro rata to monies already paid by and rebated to the User, up to rebate of the full amount paid, but no more.
- 17 Type and arrangement of Meters
  - 17.1 The Municipality will determine the type, size and arrangement of Meters for metered service.
  - 17.2 A Meter may be installed on public or private property, including in a statutory right of way, in a registered or unregistered easement, or in an encroachment.
    - 17.2.1 On private property, Meters will be installed in accordance with the British Columbia Building Code – Book II (Plumbing Systems).
  - 17.3 Metering of multi-family dwelling units shall be the responsibility of the owning User.
  - 17.4 On a User's written application, the Municipality may change a Meter location.
- 18 The Municipality shall maintain, repair or replace a Meter at its cost where such is due to reasonable wear and tear; or at the User's cost where such is due to the action or inaction of the

User or their invitee.

19 Rereading, inspecting and testing of Meters

- 19.1 If a User questions the accuracy of a Meter, the Municipality must within one year have the Meter reread or reverified according to the technology in use.
- 19.2 The Municipality must, upon written request and deposit of a Meter testing Fee, test the Meter and have a report on it made.
  - 19.2.1 If the test discloses an error against the User of 5 percent or more of Water volume, the Municipality must refund the Meter testing Fee to the User, install a new Meter, and adjust the User's bill accordingly.
  - 19.2.2 If the test discloses an error against the User of less than 5 percent of Water volume, or an error in favour of the User, the Municipality shall retain the Meter testing Fee to cover part of the cost of testing, and not adjust the User's bill.

PART 6 – WATER SYSTEM

20 Only the Municipality may access and work on the Water System. No other person may operate, tamper with, obstruct or impede access to any aspect of the Water System, whether on public or private property.

- 20.1 The Municipality may remediate any damage to the Water System at the expense of the person who causes it.
- 20.2 Any structure, vegetation or obstruction blocking access or visibility to the Water System shall be removed by the owner of the adjacent property or properties, or failing that by the Municipality at the expense of such owners.

21 Turning Water on or off

- 21.1 A person must not apply to have Water service turned off at any Premise until any and all occupancy of the Premise ends.
- 21.2 A person shall not turn off a Water service that has been turned on by the Municipality.
- 21.3 A person shall not turn on a Water service that has been turned off by the Municipality.
  - 21.3.1 Service so turned on is considered for all purposes including but not limited to billing, to have been continued from the date on which it was turned off.

22 Use of Hydrants

- 22.1 A person must not open or use water from a Hydrant without a permit from the Municipality. This section 22 does not apply to a Municipal employee or contractor or to a duly authorised firefighter, in the course of their duties.
- 22.2 A person may apply for a permit to use Water from a Hydrant for the following purposes only:
  - 22.2.1 construction; and
  - 22.2.2 fire protection; and
  - 22.2.3 commercial landscaping.

- 22.3 A person who receives a permit to open and use water from a Hydrant must:
  - 22.3.1 pay a Fee and damage deposit; and
  - 22.3.2 keep an accurate record of:
    - 22.3.2.1 every date on which Water is taken; and
    - 22.3.2.2 the number of every Hydrant; and
    - 22.3.2.3 the quantity of Water taken; and
    - 22.3.2.4 the purpose for which Water was used; and
  - 22.3.3 forward the record to the Municipality within 30 calendar days of the expiry of the permit, or
  - 22.3.4 within 5 calendar days, upon request by the Municipality.
- 22.4 A person using a Hydrant must use authorized equipment and fittings.
  - 22.4.1 The Municipality may require a person who has been granted a permit to use a Hydrant to install a Meter and a backflow prevention device on any apparatus receiving water from a Hydrant.
  - 22.4.2 Unauthorized equipment and fittings attached to the Hydrant may be seized by the Municipality, and only retrieved by the owner upon payment of a Fine.
- 22.5 A permit to use a Hydrant expires no later than December 31 of the year it was issued.
- 22.6 The Municipality may, without liability for any resulting damage, temporarily or permanently open or close a Hydrant without notice, or revoke a permit issued for use of a Hydrant.
- 22.7 The Municipality may deduct from a damage deposit:
  - 22.7.1 a Water use charge; and
  - 22.7.2 damages resulting from the use of a Hydrant.

PART 7—CHARGES & BILLING

- 23 Users are charged by the Municipality for Water use. The Municipality may charge for Water at an annual Flat Rate or at a Metered Rate. Such rates are set out in Schedule A hereto.
- 24 The Flat Rate is charged to the User regardless of whether Water is used or not.
  - 24.1 Billing of Flat Rate charges shall occur annually at the Municipality's convenience, delivered by regular mail to User's address of record.
  - 24.2 Failure to receive a bill does not excuse payment for use of Water.
- 25 Metered Rates comprise three charges to the User.
  - 25.1 An Annual Base Charge, charged regardless of whether Water is used or not.
    - 25.1.1 In respect of the applicable Flat Rate previously paid by the User for a given year, a credit for this Annual Base Charge, prorated from January 1 to the date of

commencement of metered billing inclusive, shall apply.

25.1.2 In respect of the applicable Flat Rate previously paid by the User, a credit for such charge, prorated from the date of commencement of metered billing to December 31 inclusive, shall apply.

25.2 An Annual Service Charge based on the size of Service Connection, charged regardless of whether Water is used or not.

25.2.1 A credit for such charge, prorated from January 1 to the date of commencement of metered billing inclusive, shall apply.

25.3 A Usage Charge for volume of Water used based on a price set by Council.

25.3.1 Such price may be increased for low-supply months and reduced for high-supply months;

25.3.2 Such price may be further increased for Water use above a given threshold in a given period.

25.3.3 In the event metered Water is used by the Municipality for any purpose, a certificate for such use will be issued by the Municipality such that no User pays a Usage Charge for such use.

25.4 Water usage in the next year will be billed at the Metered Rates of the current year and adjusted on the first bill following the next year's rates being set by Council.

25.5 Billing of Metered Rate charges shall occur from time to time at the Municipality's convenience, delivered by regular mail to User's address of record.

25.5.1 Failure to receive a bill does not excuse payment for use of Water.

25.5.2 If the Municipality elects to mock-bill Metered Rate charges, whereby a User receives a bill for information purposes but with nothing owing, Flat Rate charges shall apply.

25.6 If any Meter fails to correctly indicate the quantity of Water, the Municipality may charge for such Water according to the average consumption for up to 12 months before the date when the Meter was last found to function properly.

25.7 For avoidance of doubt, Metered Rates do not supersede Outdoor Water Use Bylaw 484, 2017 or Secondary Suite regulations.

26 If a person fails to pay charges hereunder by the 31<sup>st</sup> day of December of the year in which the charges were incurred, the outstanding amount shall be deemed to be taxes in arrears on the parcel and dealt with in the same manner as Municipal taxes.

26.1 A 2% discount for payment within 30 calendar days of the date of any bill shall apply.

27 Data collection and storage

27.1 User and usage data shall be securely stored on Canada-based servers.

27.2 Data may be used for:

27.2.1 billing purposes; and

27.2.2 leak detection purposes; and

27.2.3 system planning purposes; and

27.2.4 reporting purposes, including without limitation a password-protected web service where Users may view their and only their own usage.

27.3 Personally identifiable User data shall not be used other than as in this section 27 without User authorization.

PART 8 – DISCONNECTION

28 A User who wants to disconnect their own Premise from the Water System must:

28.1 notify the Municipality in writing at least 7 days in advance, and

28.2 pay a disconnection Fee.

29 The Municipality may provide a User with notice and deadline for disconnection of Water service in person, in writing (affixed to the front door of the Premise), by email or by phone, for:

29.1 failure to repair or replace defective pipes, fittings, valves, tanks or appliances which are leaking or otherwise not in good repair; or

29.2 failure to repair or replace defective Service Connections; or

29.3 failure to pay Fees, Fines or rates.

30 A User may within one calendar week of receiving notice of disconnection request that Council considers the matter at its next meeting.

PART 9 – GENERAL

31 Whenever and wherever the Municipality supplies Water to persons and properties within the Municipality, the provisions of this Bylaw shall extend to and be binding upon such properties and persons so served.

32 Nothing in this Bylaw shall obligate the Municipality to supply water to any person or property when it deems the cost excessive, unless that person pays the Municipality the cost of necessary changes to the Water System.

33 Nothing in this Bylaw imposes a duty or obligation on the Municipality to provide a continuous supply of Water or to supply Water at a given pressure.

34 The Municipality may interrupt the supply of Water at any time to any User or Premise:

34.1 to maintain, repair or modify the Water System; or

34.2 for lack of source water; or

34.3 for reasons of Water quality.

35 The Municipality is not liable for:

- 35.1 failure of Water supply in consequence of accident or damage to the Water System; or
  - 35.2 excessive or insufficient Water pressure; or
  - 35.3 any stoppage of Water supply due to alterations or repairs, or due to negligence of any person in the employ of the Municipality or any other person, or due to deterioration or obsolescence of any of the Municipality's systems, or due to lack of source water, or otherwise.
- 36 Pursuant and subject to §16 of the *Community Charter (Authority to Enter On or Into Property)*, the Municipality may enter any property or Premise supplied with Water to confirm compliance with this Bylaw.

#### PART 10—OFFENCES AND PENALTIES

- 37 Every person who:
- 37.1 violates any of the provisions of this Bylaw; or
  - 37.2 suffers or permits any act or thing to be done in contravention of any of the provisions of this Bylaw; or
  - 37.3 neglects to do or refrains from doing anything required to be done by any of the provisions of this Bylaw; shall be deemed to be guilty of an infraction and liable to the Fines, Fee and other penalties imposed in this Bylaw.
- 38 If any person fails to carry out work required under any provision of this Bylaw, the Municipality may enter the affected parcel and Premise to undertake the required work and bill the owner for the actual cost incurred by the Municipality in carrying out the work. The costs shall be paid by the owner upon demand, and if remaining unpaid after the 31st day of December of the year in which the work is done, shall be deemed to be taxes in arrears on the parcel and will be dealt with in the same manner as Municipal taxes.
- 39 Every person who violates any of the provisions of this Bylaw, or who suffers or permits any act or thing to be done in contravention of this Bylaw, or who refuses, omits, or neglects to fulfill, observe, carry out, or perform any duty or obligation imposed by this Bylaw, is liable, on summary conviction, to a Fine as provided by Fees Bylaw No. 497, or a fine not exceeding the sum of \$10,000.00, whichever is less.
- 40 Where there is an offence that continues for more than one day, separate fines may be issued for each day or part thereof in respect of which the offence occurs or continues.
- 41 Any person who contravenes any provision of this Bylaw is liable to the Municipality for and must indemnify the Municipality from all costs, expenses, damages and injuries resulting from the contravention. Such liability does not in any way limit any other provision or remedy the Municipality may have under this Bylaw or otherwise at law.
- 42 The Municipality may enforce compliance with the stipulations within this Bylaw or non-payment of Fines by shutting off Water services to the User.
- 43 Nothing in this Bylaw limits the Municipality from utilizing any other remedy that is otherwise available to the Municipality at law.

#### REPEALED LEGISLATION

44 Water Use and Regulations Bylaw, No. 2, 1971 and all its amending Bylaws are repealed.

Read a first time on 16 April 2024

Read a second time on \_\_

Read a third time on \_\_

Adopted on \_\_

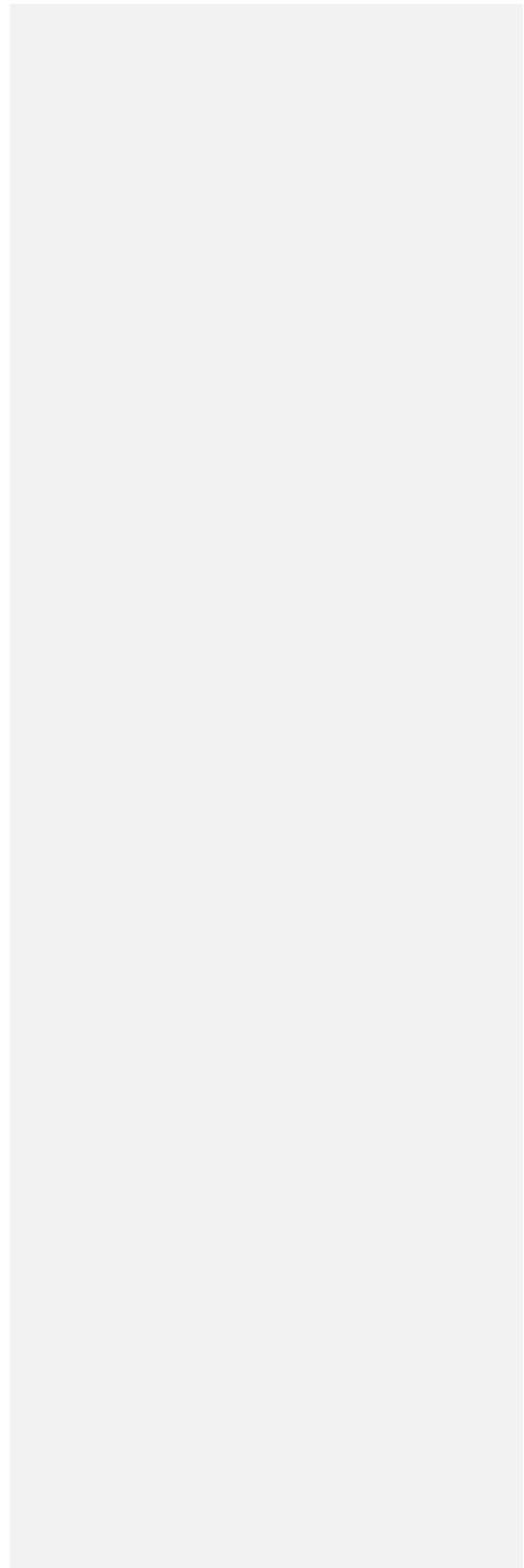
\_\_\_\_\_  
Mayor

\_\_\_\_\_  
Corporate Officer

Certified a true copy of Water Bylaw No. \_\_, 2024 as adopted.

\_\_\_\_\_  
Corporate Officer

DRAFT



Schedule A

1. FLAT RATE

PREMISE CATEGORY	ANNUAL CHARGE, SUBJECT TO PROMPT PAYMENT DISCOUNT PER §26.1
Single family dwellings	TBD in 2025
Multi-family dwellings, per unit	TBD in 2025
Marina businesses	TBD in 2025
Other businesses including but not limited to shops, offices, stores, cafes, breweries, distilleries, roasters and growers	TBD in 2025
School institutions with 12 or more occupants at any one time	TBD in 2025
Other institutions including but not limited to daycares	TBD in 2025

2. METERED RATES

- a. Per §25.1, the Annual Base Charge shall be \$600.00 per year, billed in equal quarterly instalments, subject to prompt payment discount per §26.1.
- b. Per §25.2, the Annual Service Charge shall be \$100 per ¼” of nominal Service Connection size, subject to prompt payment discount per §26.1:

Nominal Service Connection size	Annual service charge, billed in equal quarterly instalments
½”	\$200.00
5/8”	\$250.00
¾”	\$300.00
1”	\$400.00
1½”	\$600.00
2”	\$800.00
2½”	\$1000.00
3”	\$1200.00
4”	\$1600.00

- c. Per §25.3, the 2024 Usage Charge price shall be determined by dividing the 2024 Water Fund budget by the total deemed volume of Water produced in 2023:

$$\frac{\$1,100,000}{691,287 \text{ cubic meters}} = \$1.59 \text{ per cubic meter or part thereof}$$

Commented [KB1]: Placeholder

Such price shall be:

- i. Increased by 20% for July, August and September usage.
- ii. Reduced by 20% for January, February and March usage.
- iii. Increased by 10% for use past a standard use threshold set hereby at 3 cu.m per day.
- iv. Subject to prompt payment discount per §26.1.
- v. Utilised in 2025 until the 2025 rate is approved by Council and adjusted for on the next bill.

For convenience, Usage Charge prices are summarised in the following table (the prices above apply in the event of discrepancy):

PERIOD	USAGE CHARGE PRICE PER CUBIC METER (CU.M) OR PART THEREOF. 1 CU.M = 1000 LITRES OR APPROX 265 US GALLONS	
	FOR USE UP TO THE 3 CU.M PER DAY STANDARD USE THRESHOLD	FOR USE ABOVE THE 3 CU.M PER DAY STANDARD USE THRESHOLD
Jan – Mar 2024	\$1.33	\$1.46
Apr - Jun 2024	\$1.59	\$1.75
Jul – Sep 2024	\$1.91	\$2.10
Oct – Dec 2024	\$1.59	\$1.75
Jan-Mar 2025, prelim.	\$1.33	\$1.46
Apr – Jun 2025, prelim	\$1.59	\$1.75

DRAFT

