

From: "Mochrie, Paul" <Paul.Mochrie@vancouver.ca>
To: "Direct to Mayor and Council - DL"
Date: 12/11/2023 6:11:35 PM
Subject: 2023 Provincial Drought Response and Water Demand Management Strategy Update
Attachments: ENG - WD - Council WDMS Update 2023.pdf

Dear Mayor and Council.

Please find attached a memo regarding the **2023 Provincial Drought Response and Water Demand Management Strategy Update** as a follow up to the weather conditions experienced in 2023 and impacts to the regional water supply and management. A short summary of the memo is as follows:

- The Province issued provincial drought declarations during the summer of 2023 and Metro Vancouver escalated water restrictions from Stage 1 to Stage2 on August 4th, due to early spring snowmelt and accelerated water reservoir drawdown
- The City of Vancouver's water conservation outreach and education programs, along with enforcement of the Drinking Water Conservation Bylaw, helped to limit Vancouver summer use increase by 25%, whereas other Metro Vancouver members saw increases of ~50-60%
- Staff updated the Vancouver's Water Demand Management Strategy (WDMS) which outlines the targets, goals and actions to address population growth pressures on water demand, the effects of climate change on source waters and to enhance equity and affordability of our water service

If you have any questions, please feel free to contact Lon LaClaire at 604-873-7336 or lon.laclaire@vancouver.ca

Best,
Paul

Paul Mochrie (he/him)
City Manager
City of Vancouver
paul.mochrie@vancouver.ca



The City of Vancouver acknowledges that it is situated on the unceded traditional territories of the x^wməθk^wəyəm (Musqueam), Skwxwú7mesh (Squamish), and səlilwətał (Tsleil-Waututh) Nations.

MEMORANDUM

December 8, 2023

TO: Mayor and Council

CC: Paul Mochrie, City Manager
Armin Amrolia, Deputy City Manager
Karen Levitt, Deputy City Manager
Sandra Singh, Deputy City Manager
Katrina Leckovic, City Clerk
Maria Pontikis, Chief Communications Officer, CEC
Teresa Jong, Administration Services Manager, City Manager's Office
Mellisa Morphy, Director of Policy, Mayor's Office
Trevor Ford, Chief of Staff, Mayor's Office

FROM: Lon LaClaire
General Manager, Engineering Services

SUBJECT: 2023 Provincial Drought Response and Water Demand Management Strategy Update

RTS #: N/A

This memo provides a review of the 2023 Provincial drought impacts on regional water supply performance, as well as Vancouver's seasonal response and continued investments to support sustainable water use through the **Water Demand Management Strategy (WDMS)** (Appendix A). Climate-driven impacts on water supply and demand emphasize the need for continued diligence, leadership and investment in drinking water demand management to build resilience to increasing pressures of population growth and the compounding effects of climate change.

2023 Province-wide Drought and Regional Water System Impacts

British Columbia experienced historic levels of drought in 2023; the Province urged residents and local utilities to conserve drinking water. Drought conditions, combined with early spring snowmelt and accelerated reservoir drawdown, resulted in Metro Vancouver escalating from Stage 1 to Stage 2 water use restrictions (August 4 to October 15) under the Drinking Water Conservation Plan. This escalation enabled reservoir levels to remain within seasonal operating capacity for summer 2023. However, before rains returned to recharge reservoirs in late September 2023, Metro Vancouver had 27% less drinking water available compared to the low levels experienced in 2022. Metro Vancouver's water supply withstood the pressures of provincially classified Level 4 and 5 drought conditions in 2023 through the escalation to Stage 2 water use restrictions, and collaboration on water conservation outreach, education and enforcement.

While there were regional reductions in drinking water demands with the activation of Stage 2 restrictions, Metro Vancouver's data indicated widespread lawn watering still occurred during the ban. Vancouver has a robust water enforcement program and typically issues more than 90% of water use violation tickets in the region. This trend continued in 2023 by issuing 805 education letters, 512 tickets and following up on 380 public reports of violations. The combination of enforcement and outreach, along with long standing water conservation programs and demand management investments, assisted the City to limit increases in seasonal demand compared to other regional jurisdictions. Average regional 2023 summer water use increased across Metro Vancouver by 50 - 60% compared to winter use, while Vancouver experienced a limited 25% summer increase. Metro Vancouver indicates that the success of water conservation and demand side management of drinking water will be essential in determining the timing of costly regional future water supply and system expansion upgrades (Appendix B).

Vancouver's Water Demand Management Strategy (WDMS)

In 2020, the City's Water Utility developed the *Water Demand Management Strategy (WDMS)* to continue to build on water conservation gains realized through the Greenest City Action Plan (GCAP) and improve long term resilience, affordability and equity of water resources. Recognizing the increasing and compounding effects of aging infrastructure, population growth and climate change on the drinking water system, the *WDMS* outlines a multi-year operational and investment plan to realize a further 15% reduction in per capita drinking water use by 2030, following the 24% decrease achieved through the GCAP from 2006 to 2020.

Detailed in Appendix A, the *WDMS* was first briefed to Council in October 2021. The strategy outlines targets, goals and actions to address population growth pressures on water demand, the effects of climate change on source waters, and to enhance equity and affordability. The strategy leverages industry best practices for water system and demand management through:

- Further drinking water use reduction targets;
- Advanced Metering Infrastructure (AMI - real-time meter reading technology);
- Accelerated residential metering for remaining unmetered properties;
- Comprehensive water rate review; and
- Policy updates for increased non-potable water use.

Annually, Vancouver purchases the most drinking water in the region (29% of MV production). Bulk water purchases are the largest cost driver and are on average 60% of the Water Utility's annual budget. Currently, all water services in Vancouver are metered except for single detached houses and duplex properties. Approximately 14% of single detached houses and duplexes are metered; the remainder are on flat rate billing. Meters currently capture about 55% of water use in the City, with the remaining 45% attributed to unmetered properties and leakage. To mitigate pressures facing the drinking water utility, and to support existing seasonal water use policy, \$23M was approved by Council in the 2023-2026 Capital Plan for replacement of the end of life water meter reading system with AMI and the addition of approximately 6000-7000 new water meters.

The City of Vancouver is seen as a regional leader in the efforts to better manage water demands and water use, allowing the City to successfully lower both seasonal and overall water use compared with other jurisdictions across the region. Investing in water meters and smart metering technology will continue to decrease Vancouver's per capita water consumption, help to stabilize bulk purchases in the future, and ensure equity in user-pay water billing. When paired with

drinking water offsets in future developments, the *WDMS* will realize further declines in Vancouver's bulk water purchase and mitigate the pressures of population growth and climate change.

If you have any questions, please contact me directly.

A handwritten signature in blue ink, appearing to read 'Lon LaClaire'.

Lon LaClaire, M.Eng., P.Eng.
General Manager, Engineering Services

604.873.7336 | lon.laclaire@vancouver.ca

Water Demand Management Strategy (2023 Update)

1.0 Background

Vancouver purchases bulk, treated drinking water from Metro Vancouver and the City is responsible for distribution and delivery to customers. The City's drinking water distribution network was built over the last 130 years and is valued at \$3.1 billion. The Waterworks Utility monitors and protects drinking water quality, maintains infrastructure in a good state of repair, ensures efficient use of drinking water, manages water system resiliency for emergencies and plans for the sustainable and equitable supply for future generations.

Industry best practices for water conservation and demand management are key to decreasing overall water demand and improving long term resilience, affordability and equity of water resources. The City of Vancouver has a strong history of water conservation, including over a decade of Council approved plans, policy and by-laws to reduce per capita water use and improve sustainability and reliability of the system. Detailed in Table 1, policy implementation, including water use reduction targets and actions outlined in the 2011-2020 Greenest City Action Plan (GCAP), resulted in a 24% decrease in per capita water consumption from 2006 to 2020 (Figure 1).

Table 1: Council Approved Actions Supporting Water Reduction

December 13, 2011	2011-2014 Greenest City Clean Water Work Plan	By-law revisions requiring residential water metering for all new single detached houses and duplex properties.
December 13, 2011	Rate Update	Implementation of seasonal volumetric rate for commercial and residential metered customer (low and high season).
November 27, 2012	Rate Update	Establishment of a peak and off-peak seasonal rate structure for all metered properties.
November 3, 2015	Greenest City Action Plan	Clean Water goal #6: Reduce per capita water consumption by 33% from 2006 levels.
April 12, 2017	Greenest City Action Plan	By-law amendments to expand the prohibition of non-recirculating uses of drinking water.
December 10, 2019	Rate Update	Alignment of peak season and off peak season water rates to match the water restriction periods set out in the Drinking Water Conservation By-law.
January 1, 2020	Greenest City Action Plan	Amendments to Waterworks By-law to prohibit the use of Once Through Cooling appliances.
December 9, 2020	GreenOps Plan 2.0	10% water consumption reduction target in civic facilities; accelerated civic facility water metering; and internal user-pay billing structure.

The City's Water Utility developed the **Water Demand Management Strategy (WDMS)** to build on the water conservation gains realized through GCAP across the next decade and beyond. Recognizing the increasing and compounding effects of aging infrastructure, population growth and climate change on the drinking water system and water resources, the *WDMS* outlines a multi-year operational and investment plan to achieve a further 15% reduction in per capita drinking water use by 2030. The *WDMS* target will surpass original GCAP targets of 390 liters of water per person per day, targeting a per capita water use of 379 litres per capita per day.

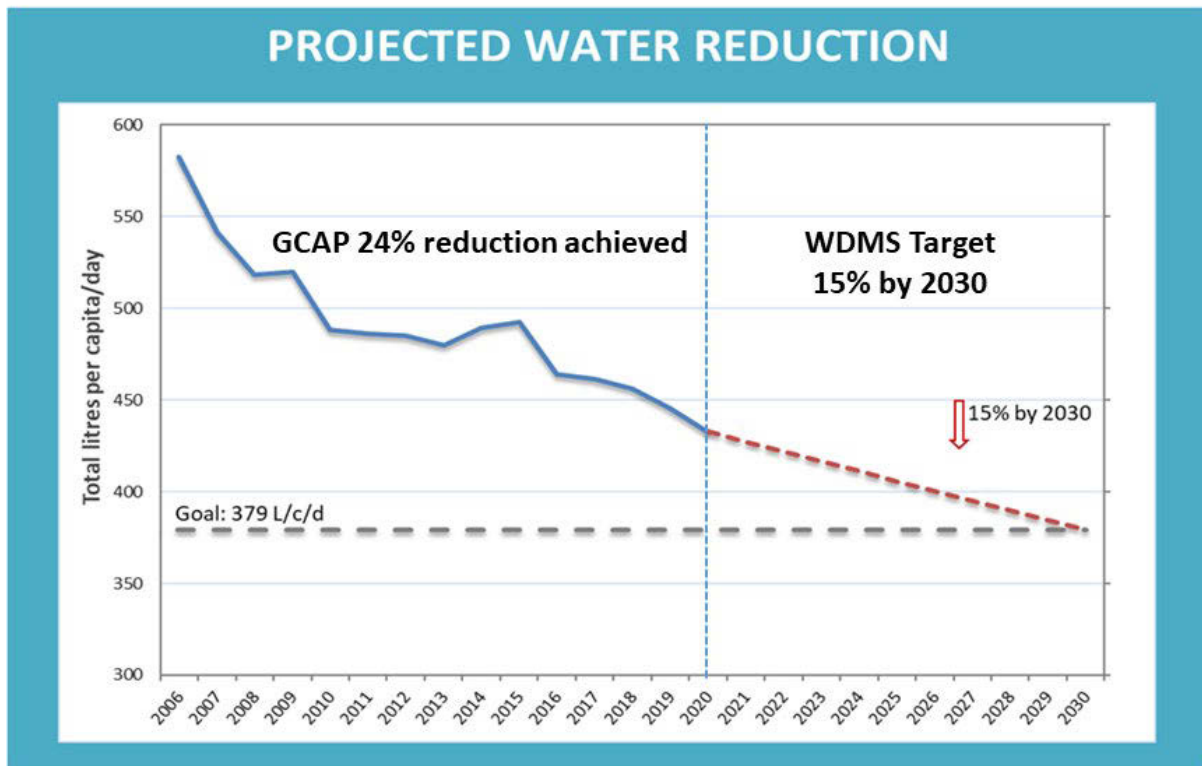


Figure 1: Vancouver's Per Capita Drinking Water Use Trends (2006 to 2030 Projected)

2.0 Water System Pressures and Drivers

2.1 Climate Change Impacts and Adaptation

With the urgency of climate change, the City of Vancouver declared a climate emergency in 2019, along with thousands of other cities around the world. Metro Vancouver's drinking water demands are already seasonally out of sync with rainfall and snow patterns that recharge the water reservoirs. Climate change is predicted to bring warmer, wetter winters and hotter, drier summers to the Metro Vancouver region. Decreased winter snowfall and snowpack in the watersheds, and increased extreme winter rain events, will reduce the amount of drinking water that can be captured for drinking water use. Compounded with increased water demand due to hotter, drier summers, climate change will strain existing regional drinking water supply during

the summer seasons when demand is greatest and the reservoirs do not recharge. Policies and investments supporting water demand management to reduce per capita consumption enable the sustainable and efficient use of drinking water resources and to improve water system resiliency during acute climate events.

2.2 Population Growth and Regional Water Supply

In 2023, Vancouver is home to 25% of the region's total population, 34% of the jobs, and 30% of the total housing units. Vancouver's approximately 693,000 residents are projected to increase to a population of about 920,000 by 2050, with Metro Vancouver providing drinking water to a 2050 regional population estimated at 3.6 million. Population growth in Vancouver follows compact development patterns and densification, where infrastructure is typically used more efficiently and results in less water use per person. However, population growth rates are projected to increase overall demand for water and outpace the reductions from traditional water conservation efforts. The effects of climate change on water supply and demand, combined with increasing population across the region, will strain existing regional water supplies. Metro Vancouver's Water Supply Outlook 2120¹ indicates the region will likely need additional water supply storage by the mid-to late 2030s to avoid seasonal supply shortages. Metro Vancouver is currently in the planning phase of the Coquitlam Lake Water Supply Project, valued at over \$4B, which will require an expanded treatment plant and will double the capacity to withdraw from Coquitlam Lake for drinking water.

Vancouver, as the largest member municipality of Metro Vancouver, currently purchases the most drinking water in the region annually (29% of MV production) and therefore is responsible for the largest share of regional water system costs. The regional water system costs to the City are reflected in the bulk water purchase cost, which currently makes up approximately 60% of the annual Water Utility Budget. Metro Vancouver indicates that the success of water conservation and demand management will be an essential factor in determining the timing of costly future water supply and system expansion and upgrades. Continued reduction in Vancouver's water demands will in turn reduce our portion of Metro Vancouver costs and costs for future source expansion.

2.3 Billing Equity and Affordability

With the growing pressures of climate change and population growth expected to strain the region's water resources, the resilience, sustainability, equity and affordability of drinking water will depend on applying best management practices for the current water supply resources before expanding to additional supply. Vancouver and other Metro Vancouver municipalities have some of the highest per capita water use in North America and remain among the few outstanding North American centres that do not have universal water metering to support the management of drinking water.

All water services in Vancouver are metered except for single detached houses and duplex zoned properties, of which only 14% are metered. Meters currently capture approximately 55% of Vancouver's annual water use, with the remainder attributed to unmetered residential properties and non-revenue water through loss and leakage (Figure 2). The City has slowly

¹ [Metro Vancouver Water Supply Outlook 2120](#)

increased the metered inventory through property redevelopment and capital projects so that roughly 12,000 of the 83,000 single detached house and duplex properties have meters. Metered customers pay a fixed metered service charge plus volumetric water charge based on how much water they use. Unmetered properties receive fixed flat rate billing irrespective of how much water the property uses.

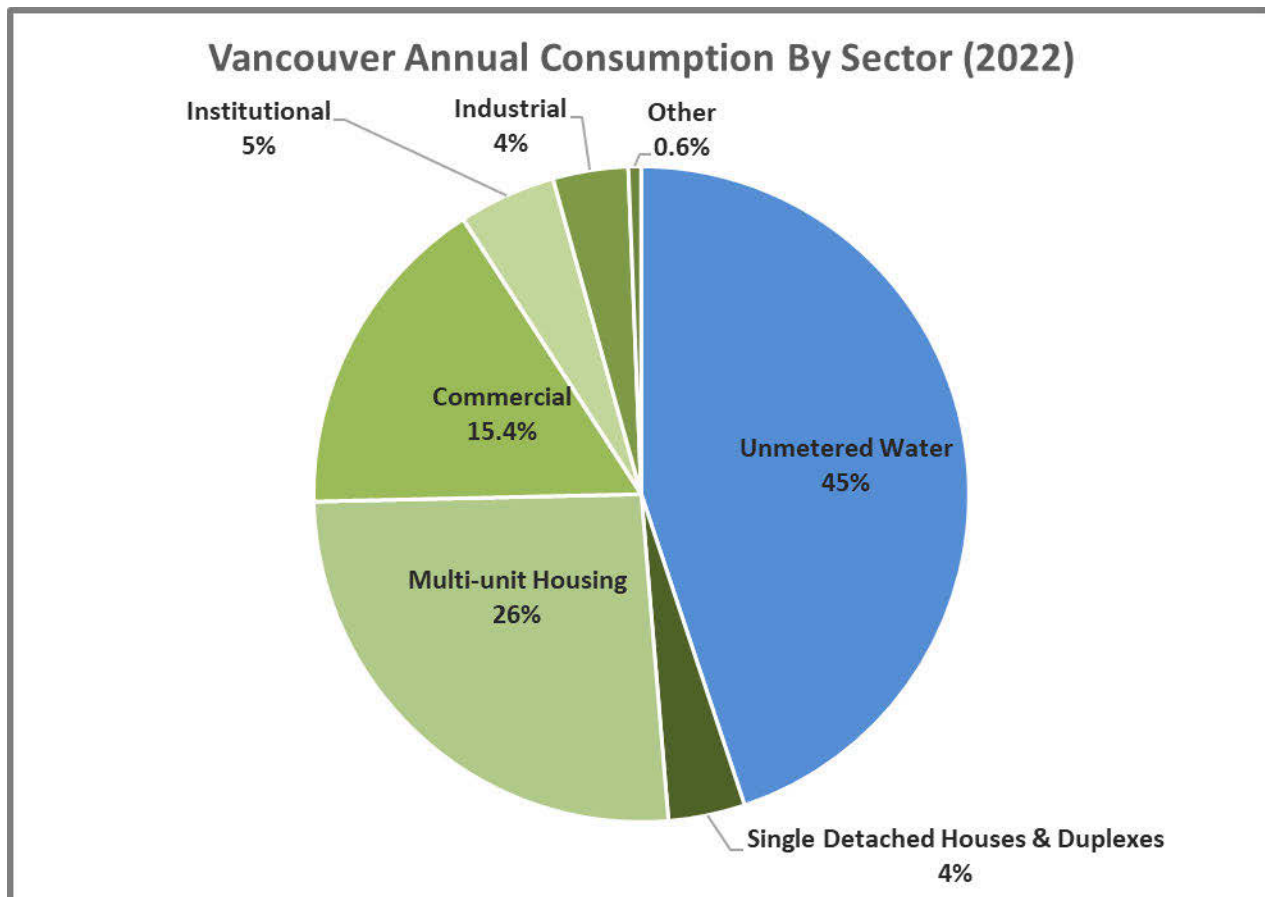


Figure 2: Annual Drinking Water Consumption by Sector (2022)

Water metering is a drinking water industry best management practice to support improved water system operational management, enable water conservation, create equitable billing and affordability, foster leak management, and allow effective near and long term planning for water systems. Through their Best Practices Guide for Local Governments on Residential Water Metering and Regional Assessment of Residential Water Metering (2019)², Metro Vancouver indicates that universal metering across the region could have a significant impact on achieving reductions in water use. The guide is accompanied by a Triple Bottom Line evaluation tool to assist local jurisdictions in evaluating the benefits and costs of metering through financial, environmental and social lenses. It recommends the greatest benefit with the lowest long term

² [Residential Water Metering in Metro Vancouver Best Practices Guide for Local Governments](#)

cost results from investing in universal metering by 2030 as a region. The evaluation takes into account that significant future water supply expansions could be deferred if the region is successful in making significant reductions in per capita, seasonal and overall water use.

3.0 WDMS Components

The *Water Demand Management Strategy* addresses pressures of population growth, densification, climate change and aging infrastructure and will improve affordability and billing equity through enhanced strategic drinking water conservation and additional investments in water demand management. To build on the water conservation gains realized through GCAP, the Water Demand Management Strategy sets a 2030 target to further reduce per capita drinking water use by 15% from 2019 levels. Implemented over the next decade, the *WDMS* creates a foundation of best management practices through:

- upgraded water meter reading technology to Advanced Metering Infrastructure (AMI);
- increased water meter coverage;
- equitable water rate structure to encourage drinking water conservation; and
- policy to require drinking water offsets in new developments.

Diagrammed in Figure 3, the *WDMS* components, considered best practices on their own, realize optimum benefits when used together to create a strong foundation of drinking water stewardship. The resulting water conservation achieved, combined with offsetting the use of drinking water with non-potable sources, supports resilient, equitable and sustainable drinking water management in order to achieve a 15% reduction in per capita water use by 2030.

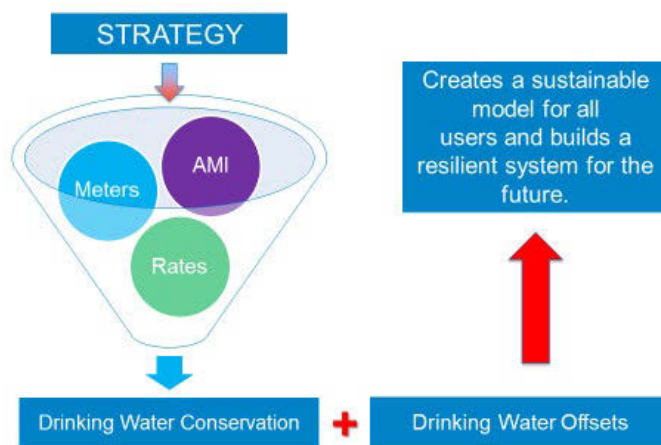


Figure 3: Water Demand Management Strategy Overview

3.1 Advanced Metering Infrastructure

The City currently uses a “drive-by” Automatic Meter Reading system (AMR) to collect water consumption data from the approximately 25,000 water meters across the City. Implemented in 2006, the AMR system is reaching the end of its useful service life. In 2020, the City engaged Urban Systems Ltd. to conduct an Advanced Water Metering Infrastructure Feasibility Study, examining the options and business case for upgrading from the City’s current AMR system to

an Advanced Metering Infrastructure system (AMI). AMI is a technological advancement that is considered industry best practice for utility management, allowing real time data collection through radio towers that can continuously detect signals from thousands of meters.

Based on quantitative analysis of 10- and 20-year life cycle costs and qualitative analysis of the benefits of AMI versus AMR, the financial business case to upgrade to AMI was strong. AMI is expected to reduce operating costs, improve data collection, increase customer service levels and improve leak detection and high/low consumption monitoring and warnings. Additionally, AMI supports the goal to eliminate Vancouver’s dependence on fossil fuels by reducing drive-by meter reading, and reducing the treatment and delivery of drinking water lost from leaks; both of which contribute to the reduction of greenhouse gas (GHG) emissions. Noted in the study, the benefits of AMI are maximized with universal metering but can be realized with smaller-scale deployments as well.

Detailed in Table 2, AMI provides several improvements over the current meter reading system at end of life.

Table 2: Benefits of Advanced Metering Infrastructure

AMI Benefit	Details
Data Collection Efficiency and Quality	<ul style="list-style-type: none"> • AMI offers more reliable, precise and accurate data collection and quickly identifies meter reading issues • Billing issues are identified quickly versus current read cycle delays (3-4 months for issues to be identified)
Reading and Billing Frequency	<ul style="list-style-type: none"> • Data collection can be hourly (currently every 2-3 months) • Increased accuracy in reading and billing cycles; option to bill more frequently • AMI has a lower failure rate compared to existing AMR system
Customer Service and Empowerment	<ul style="list-style-type: none"> • Meter data empowers the customer to understand water use and adjust water use behaviour to reduce costs • Ability to identify billing issues and leak cases efficiently and resolve immediately
Water Conservation and Leak Management	<ul style="list-style-type: none"> • Advanced leak detection and identification of non-revenue water • Metrics provide customer use patterns for targeted conservation strategies • Rates can be tiered to incentivize base-only consumption
Alignment with Corporate Goals	<ul style="list-style-type: none"> • AMR drive-by systems contribute to GHG and increase operating costs • Identifying and resolving leaks quickly supports regional water reduction goals • Non-revenue water identification improves user-pay billing and customer equity

3.2 Increased Water Metering

Universal water metering is recognized as a best practice by the British Columbia Water and Waste Association (BCWWA), the Federation of Canadian Municipalities (FCM), the American Water Works Association (AWWA), and the Canadian Water and Wastewater Association (CWWA). As a tool, water meters provide essential information on water consumption and demand for data-driven planning, water loss and leakage management and water system operation and optimization. Metro Vancouver conducted a public attitudes survey in September 2017 to gauge the region's perceptions and attitudes toward water metering. The survey found 86% of respondents support the concept of paying for water based on usage versus a flat rate. The survey also found that most residents (78%) do not know how much their household spends on water. Enabling residents to move toward water conservation goals and reduce water waste is significantly improved when both AMI and metering are paired with a pricing structure that reflects true consumption, creating billing awareness and incentivizing change.

In the absence of a fully metered water utility, it is difficult to understand the extent of system leaks, private-side leaks and to assign equitable water rates for cost recovery. Vancouver's industrial, commercial, institutional, multi-unit housing and mixed use properties have been fully metered since the 1990s. Vancouver has also required water meters for new single detached house and duplex properties built since 2012. Meters currently capture 55% of Vancouver's annual water use, with the remainder attributed to unmetered residential properties and non-revenue water through loss and leakage.

Approximately 70,000 residential properties remain unmetered. Installing residential meters at redevelopment has allowed the City to add approximately 700-1000 new residential meters each year; a rate that will take decades to achieve a fully metered system. Acceleration of residential metering for the remaining unmetered residential properties is required to realize the full benefits of water demand management, and to support sustainable and resilient water system management and equitable cost recovery for water services. In alignment with the recommendations of Metro Vancouver's Residential Metering Assessment and Best Practice Guide (2019), Vancouver targets additional investments in residential metering to achieve 85% meter coverage by 2030. Reliable metering brings transparency into the relationship between the City and the consumer, is endorsed by Metro Vancouver, and provides a multitude of benefits that support water use reduction targets while improving customer equity (Table 3).

Table 3: Benefits of Water Meters

Benefits of Meters	Details
<p>Leak Detection</p>	<ul style="list-style-type: none"> • Current level of water loss and leakage in Vancouver is unknown, but estimated to be between 10-25% • Meters, combined with AMI, can identify system leakage in real time; leaks are addressed quickly, reducing further water wastage • Without meters, private-side water leaks can be difficult to identify
<p>Targeted Conservation</p>	<ul style="list-style-type: none"> • Strategic investments and programming to sub-sectors that most benefit based on water use metrics (residential water use is currently estimated) • Allows targeted support for customers to reduce water billing costs • Provides per capita water use and leakage levels: currently, “unmetered water” makes up 45% of water purchases
<p>Customer Service</p>	<ul style="list-style-type: none"> • Meter data empowers the customer to adjust water use behaviour, and can allow them to reduce their costs • Metered customers can receive an alert if their water consumption becomes higher than average/typical • Water loss and leakage on private side can be identified before leaks escalate to significant water damage
<p>System Metrics, Optimization and Data-Driven Planning</p>	<ul style="list-style-type: none"> • Improves water supply planning and system management strategies • Improves water demand forecasting and long term water supply capacity forecasts
<p>Billing Equity through User Pay Model</p>	<ul style="list-style-type: none"> • Metered customers access a user-pay model to ensure they are billed base on the water they use • City-side leaks and non-revenue water is more accurately accounted for • Customers can reduce their water bill by choosing to reduce water use (for e.g. in the summer with lawn watering)
<p>Alignment with Corporate Goals</p>	<ul style="list-style-type: none"> • Enables strategic pricing with more equitable billing structure in place • Identifying leaks through metering supports regional water reduction goals • Improved customer equity by removing water costs associated with system leaks and non-revenue water

3.3 Water Rates

Various utility rate structures are employed across the water industry depending on key drivers and desired outcomes for the utility. While full-cost accounting and equitable cost recovery for water services is the primary goal, rate structures can also contribute to improvements in water conservation and demand management. BC's Auditor General for Local Government (AGLG) promoted the benefits of universal water metering and outlined common water rate structures, policies and strategies in their Sustainable Financing in Drinking Water Management (2020) report³, including:

- Single block rates
- Seasonal rates
- Tiered Rates
- Excess Use Rates
- Fixed charge versus variable charge
- Land use and industry based rates

Vancouver implemented seasonal water rates for metered customers in 2012 to encourage conservation during peak season; alignment with the water use restriction period from May 1 to October 15 implemented in 2019. Vancouver's metered water use charges are 25% higher per unit of volume for the peak summer water restriction period compared with non-peak winter period. Metro Vancouver also charges seasonal rates for bulk water purchase, applicable from June to September. Metro Vancouver has been increasing the difference between peak and non-peak rates with peak rates now 50% higher than non-peak rates.

In 2012, Vancouver also strategically set metered water rates to incentivize and promote metering, in anticipation of developing a voluntary metering program. Metered rates were set so that single detached home properties would experience an immediate benefit by volunteering to switch from flat rate billing to metered billing – *i.e.* typical, expected water use would result in a decreased water bill compared with the flat rate at the time. The voluntary meter program was ultimately not implemented, while metered and flat rate water service charges continued to follow this pattern for the last decade. As such, flat rate users have little incentive to improve water use efficiency because they pay the same charge irrespective of how much water is used. Unmetered properties that are proactive with water conservation and use less than a typical single detached house are paying more than the share of water based on their use. With an average of 45% of water consumption in the City unmetered, the cost recovery model must use assumptions for how much of this unmetered water is attributed to leakage compared with actual residential water use.

As the City shifts from primarily flat rate residential accounts to a fully-metered model, continuous water rate management is required to ensure sustainable cost recovery that is equitable to customers. The *WDMS* includes a comprehensive rate review to:

- assess and correct the current equity of water use charges for flat rate and metered customers (flat rate charge vs. metered rate for similar forecasted water use);
- best practice and industry standards regarding water rate structures, policies and strategies to support multiple utility objectives;

³ [Sustainable Financing in Drinking Water Management](#)

- evaluate and recommend the optimal rate structures for the transition period of shifting residential flat rate customers to metered rates; and
- evaluate and recommend rate structure options for long term equity, affordability and sustainability of water system financing while encouraging responsible use of existing drinking water supply.

4.0 WDMS Implementation Benefits

While each of the components of the *WDMS* (AMI, metering and strategic water rates) offer many advantages individually, when implemented together the cumulative benefits will more effectively reduce per capita drinking water use and bulk water purchase, and improve customer service and system planning and management. As shown in Figure 4, water metering creates a base that, when paired with AMI technology, supports water conservation, efficiency and improved system management. A sustainable and equitable rate strategy combines with the benefits of metering and AMI to elevate conservation, resilience, equity and customer service to its highest potential.

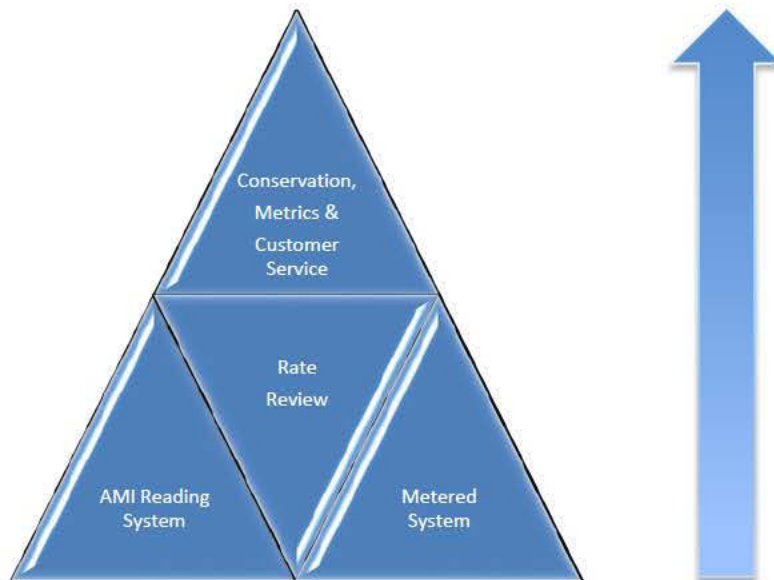


Figure 4: WDMS Components with Increasing Benefits

With the current meter reading system at end of life, the upgrade to AMI is first priority to implement a reliable meter reading system. It is prudent to confirm the meter reading technology before significantly accelerating meter coverage in order to minimize the potential need for significant retrofits. Accelerated meter installs will follow AMI technology selection, and concurrently, the comprehensive rate review will prepare for the transition to more meter coverage and leverage the full potential of meters and AMI.

The actions recommended in the Water Demand Management Strategy are expected to support a further 15% reduction in per capita water use from 2019 levels by 2030. However, population

growth rates are projected to increase overall demand for water and outpace the reductions from traditional water conservation efforts. Population growth and the compounding effects of climate change are expected to further strain existing water supply resources by exacerbating the disconnect between peak summer demands and recharge occurring during winter rains and spring snowmelt. Further efforts will be required to counter increased domestic water demands of a growing population and “flatten the curve” of increased seasonal water demands.

In addition to the demand management strategies identified to help customers change behaviours and reduce system leakage and water loss, there is also opportunity to further incentivize and support the reduction or elimination of drinking water for uses that do not require high quality, treated drinking water, such as irrigation, heating and cooling and toilet flushing. This is termed “fit for use” or “fit for purpose” water to indicate that not all domestic and commercial water uses require high quality drinking water. There is opportunity to more strategically conserve drinking water for where it is needed most, like drinking, cooking, cleaning, hygiene, health and safety.

The concept of “fit for use” water aligns with the City’s One Water approach which recognizes value in all types of water. The City’s rainwater management requirements for new buildings and development projects allow rainwater capture and re-use as an *option* to offset drinking water use for some applications. While re-use is encouraged as one of the most desirable methods of rainwater management, currently few developments implement this option. The *WDMS* recommends exploration of policy options to further incentivize and/or require properties to utilize alternatives to servicing properties with only drinking water, as well as exploring policy options to reduce seasonal discretionary use of drinking water. Offsetting drinking water use not only benefits water reduction targets, but also supports the stabilization of bulk annual water purchases in the future – an important objective as the cost of Metro Vancouver water continues to rise.

5.0 Work to Date & Strategy Timeline

The Greenest City Action Plan (GCAP) targetted a 33% reduction in per capita water use from 2006 levels by 2020. Investments throughout GCAP focused on increased outreach, education and enforcement of water conservation; enabling and funding water efficient appliance and fixture retrofits; increased water efficiency requirements for new developments; pilots to increase residential water metering; and the feasibility study for AMI. As of 2020, Vancouver’s per capita water demand was successfully reduced by 24% from 2006 levels. Post-GCAP, the development of the Water Demand Management Strategy sets a further water use reduction target of 15% less water used per capita, compared to 2019 levels⁴.

Funding for phases of Water Demand Management Strategy implementation is included in the 2023-2026 Capital Plan. These investments will support:

- Advanced Metering Implementation (AMI);
- Acceleration of residential water meter coverage (scale up over 2023-2026);
- Comprehensive rate structure review; and

⁴ 2019 baseline selected due to ‘atypical’ water use patterns in 2020 attributed to COVID-19 pandemic response.

- Policy work regarding drinking water offsets, fit-for-use water and alternative water sources.

Investments required to continue and complete the scope of work proposed for 2027 onwards would be proposed in future Capital Plans, aligned with the 10 Year Capital Strategic Outlook.

2019-2022 Capital Plan

\$8M in funding for Acceleration of Residential Water Metering and Water Conservation Capital Investments

- **2020:**
 - Conclusion of GCAP – 24% reduction in per capita water use achieved
 - Advanced Water Metering Infrastructure Feasibility Study (completed)
 - Water Demand Management Strategy development
- **2021:**
 - *WDMS* implementation plan scoping and collaboration with stakeholders
 - Council Briefing presentation on the *WDMS* and funding model
 - Residential metering acceleration for 0.4 acre and larger residential homes (completed)
- **2022:**
 - Meter Reading System Replacement: release AMI Request for Proposal (RFP)
 - Residential metering acceleration: Laneway Metering Project procurement & award (\$2M; 490 additional meters)
 - Water Demand Management considerations incorporated in City-wide initiatives including Green Operations 2.0, Climate Change Adaptation Strategy, Vancouver Plan, Area Plans, Healthy Waters Plan, Groundwater Strategy, RainCity Strategy, etc.

2023-2026 Capital Plan

Water Demand Management Strategy Funding: \$23M

- **2023:**
 - Meter Reading System Replacement: AMI procurement evaluation, testing and vendor selection
 - Residential metering acceleration: Laneway Metering Project implementation; meter acceleration implementation strategy development
 - Comprehensive Rate Review: Project Charter and Scope of Work
 - Policy review of current drinking water offset options explored (via Sustainability Pathways Study, Vancouver Building By-law options, Rainwater Management, Climate Change Adaptation Strategy, Groundwater Strategy)
- **2024:**
 - Meter Reading System Replacement: AMI vendor award & begin transition of AMR to AMI (new meter reading infrastructure and upgraded transceivers for 25,000 existing meters)

- Accelerated Metering 3-year procurement (\$18M; 6000 additional residential meters added 2024-2026, in addition to 3000 new meters through redevelopment)
 - Comprehensive Rate Review: Industry and Best Practice Research, options analysis and recommendations
 - Policy work regarding drinking water offset opportunities continues
- **2025-2026:**
 - Meter Reading System Replacement: Transition of AMR to AMI completed; all future meters AMI equipped; implement data management and data analytics to leverage AMI data for customer service, leakage management and system operation
 - Accelerated Metering: Installs continue; procurement process for next 3 years of meter installations
 - Comprehensive Rate Review: rate structure updated to reflect recommendations
 - Policy update for drinking water offsets and adoption into By-laws

2027-2030 Capital Plan and Beyond

Continued Water Demand Management Investments

- **2027– 2035:**
 - AMI: leverage consumption data to optimize Water Demand Management Programs
 - Accelerated Metering Installs continue at a rate of 5000+ per year
 - Policy requirements implemented for drinking water offsets

REGIONAL DRIVERS FOR DEMAND MANAGEMENT

Vancouver purchases bulk, treated drinking water from Metro Vancouver and the City is responsible for distribution and delivery to customers. Bulk water purchases make up a forecasted 62% of annual expenditures for 2023 for the Vancouver Water Utility. Not only is consumption the largest driver of costs, it also impacts regional water system performance and resiliency to population growth and climate change.

As the regional supplier of drinking water, Metro Vancouver must renew aging assets and is projected to require major system capacity upgrades to meet regional demand in the next 10 to 20 years. Metro Vancouver recently completed a long-term water supply study that identified requirements for system resiliency and continued supply and delivery of water over the next 100 years. Metro Vancouver's Water Supply Outlook 2120 indicates the region will likely need additional water supply storage by the mid-to late 2030s to avoid seasonal supply shortages that cannot be mitigated through water restrictions alone.

Metro Vancouver is currently in the planning phase of the Coquitlam Lake Water Supply Project, valued at approximately \$4B, which will double the capacity to withdraw water from Coquitlam Lake. The region is collectively working to defer the need for major supply upgrades by actively managing and reducing water demands. Vancouver's investments in reducing per capita consumption through water demand management can alleviate medium and long-term strains on regional supply, and reduce Vancouver's portion of regional consumption and associated regional upgrade costs.

Metro Vancouver's Regional Guide on Residential Water Metering (2019) indicates that universal metering across the region could have a significant impact on deferral of major water supply upgrades. The guide was based on a Regional Assessment of Residential Water Metering study, which evaluated the overall costs and benefits of residential water metering associated with various metering scenarios for single detached houses and duplexes, with extensive input from local government staff, regional advisory committees, the Water Committee, and the Greater Vancouver Water Board. Results showed that the greatest benefits are achieved by implementing residential water metering over an accelerated 10-year timeline.

Climate change, which affects rainfall and snowmelt patterns, directly impacts source water supply. It also contributes to increasing demand across the region, caused by hotter, drier summers and above average drinking water use across the region resulting in accelerated reservoir drawdown. Metro Vancouver, including City of Vancouver, automatically activate Stage 1 Water Use Restrictions each year from May 1 to October 15, in accordance with the Regional Drinking Water Conservation Plan, and implemented through local by-laws.

Stage 1 restrictions focus on limiting outdoor water use and lawn watering (one morning per week), since this is the most significant driver of increased drinking water use during the dry season. In 2022, due to a prolonged dry summer, Metro Vancouver extended water restrictions to the end of October; in 2023, seasonal water restrictions were increased from Stage 1 (enacted May 1) to Stage 2 (effective August 4 to October 15) in order to better conserve the

region's remaining supply of drinking water. Vancouver's investment in water demand management to reduce per capita consumption will support the sustainable and efficient use of drinking water resources, allow the water system to be more resilient to acute climate events, and continue to lower Vancouver's draw on regional drinking water resources.
