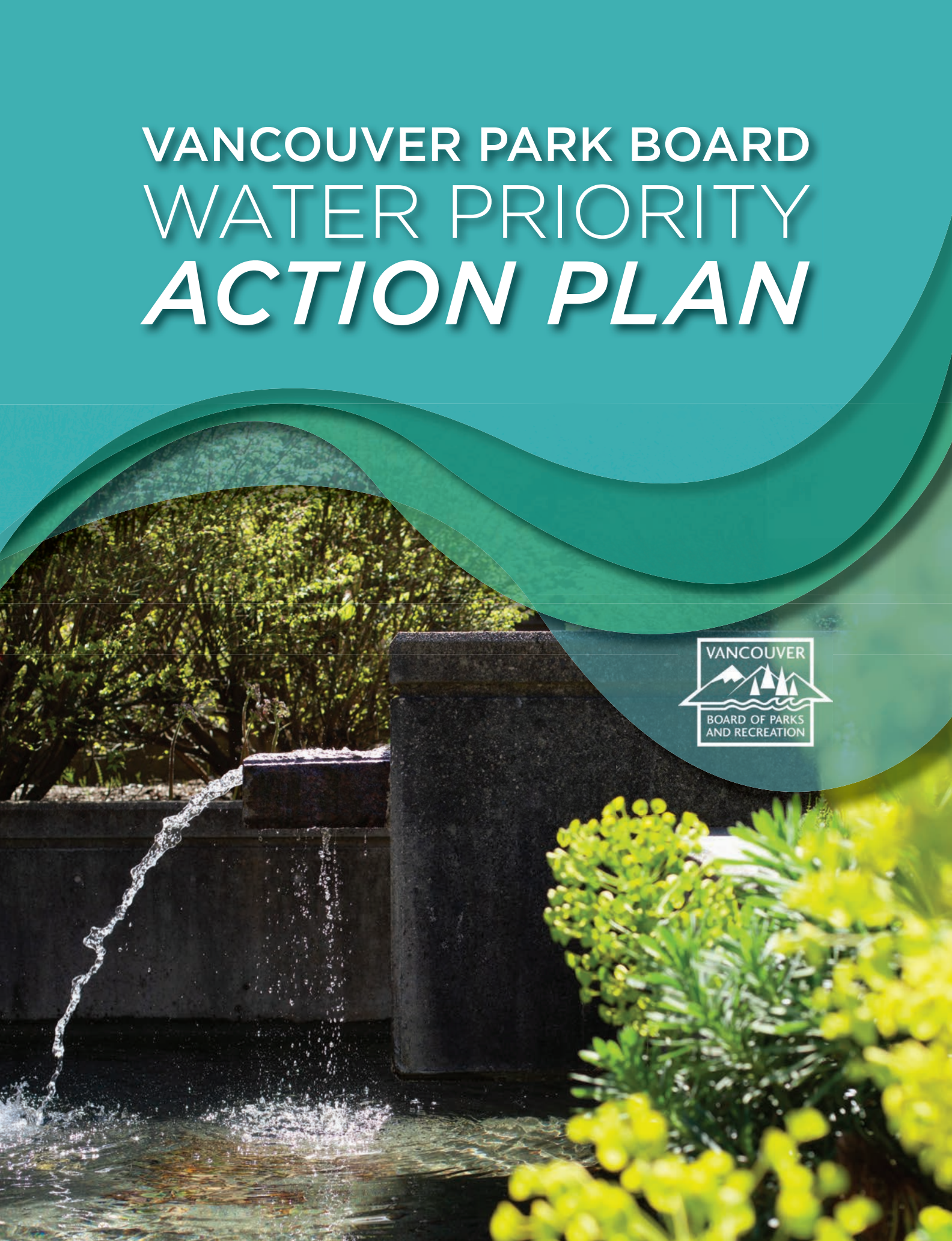
VANCOUVER PARK BOARD
WATER PRIORITY
ACTION PLAN



Seymour Reservoir *Photo credit: Metro Vancouver*

Executive Summary

Our drinking water supply is a limited and strained resource. It is obtained from reservoirs in the Capilano, Seymour and Coquitlam watersheds, and distributed to Metro Vancouver's member jurisdictions of 21 municipalities, one Electoral Area and one Treaty First Nation throughout the Lower Mainland. These reservoirs are fed by rainfall and melting snowpack from the surrounding mountains and have a limited storage capacity.

The Vancouver Park Board used approximately 1.1 billion litres in 2021, making it the City of Vancouver's largest civic user of potable water. Within the park system, drinking water is used for irrigation, water features, facilities, and emergency response. Some water features are mainly aesthetic and decorative in value, while others are essential for public health, sport, tree watering, human hydration and emergency response. Given the reality of limited water resources and increasingly frequent summer droughts, the Park Board must thoughtfully prioritize how water is used throughout the Park System.

The seven main drivers to the development of this action plan are: population driven water demand, climate change and associated drought conditions, the need to comply with municipal by-laws and regulations from other government bodies, changes in how the Park Board will be required to pay for water consumption, and ageing infrastructure. Other municipalities in Vancouver also face these drivers, and all member jurisdictions must cooperate and take initiative to conserve our shared water resources. This means that the City and Park Board will need to develop and implement long-term sustainable solutions to reduce overall water consumption at the local level.

Drinking Fountain

Demand for water is growing, but our water supplies are not. The regional population of Metro Vancouver is projected to increase by approximately 1 million by the year 2050. This will further increase demand on our limited reservoir water. Additionally, the City of Vancouver is already experiencing the effects of climate change, and we can expect greater environmental changes in years to come. Vancouver will see effects

such as: hotter and drier summers with more heat waves and water supply shortages; increasing vectors for disease; increasingly intense and frequent heavy rain events and other storms; decreased snow pack; sea level rise; and damage from storm surges. This "new normal" of extreme weather and water supply shortages obliges us to find efficiencies and adjust our water consumption habits so that we can meet growing demand for emergency response measures, such as irrigation to reduce fire risk, drinking fountains, and water-smart play features such as spray parks that can help residents stay cool and hydrated during heat waves.

Second Beach Outdoor Pool

Many of our water features are aging and in poor condition, causing them to consume water at an unsustainable rate and violate local, regional and federal regulations. The majority of Park Board water features were designed during a time when our population was smaller, and climate change and water scarcity were not well-understood. Some of our fountains, ponds and spray parks, for example, operate as "once-through" systems, meaning they do no not recycle water within the feature. Others were designed to conserve or recycle water, but are in poor condition and lose water through leaks, cracks and equipment malfunctions. Regardless of whether they waste water by design or due to breakages, such features violate the City's municipal by-laws. In addition, some water features release chlorine into marine environments or fish habitats, which contravene the federal Fisheries Act. Finally, Vancouver Coastal Health (VCH) has regulations on spay parks and other features where humans interact with water to ensure that residents are not exposed unnecessarily to waterborne pathogens.

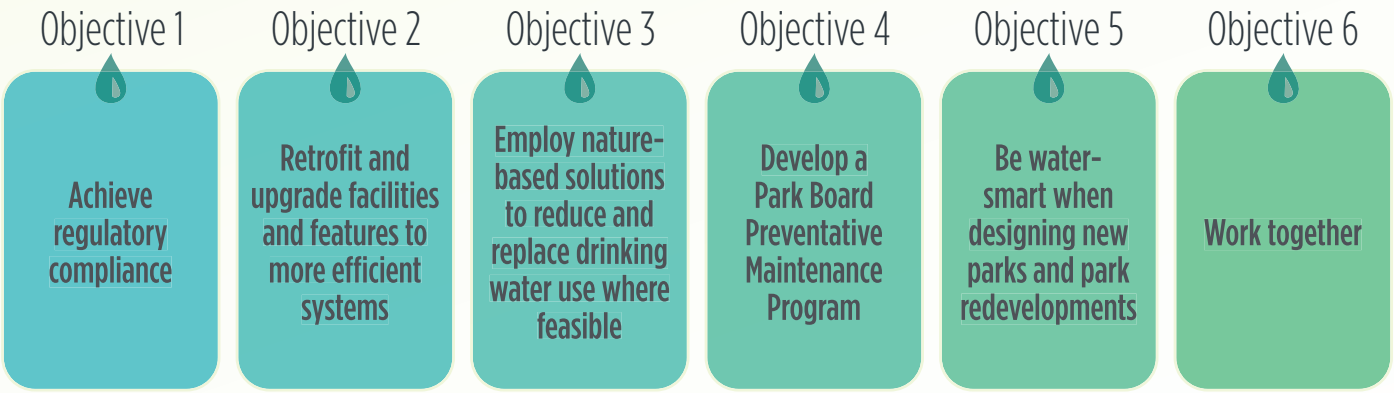
In 2023, 64 Park Board water features were assessed by contractors to determine an inventory and a condition status of each asset. Their report to the Park Board included approximate cost projections to bring these features into compliance with all relevant regulations. While retrofitting these features with re-circulation systems would bring some of them into compliance, it is also important to consider the large financial investment and increased staff maintenance requirements of recirculating features. Additionally, further investment would still be needed in most cases to repair breakages, overflows and malfunctions that cause water leakage. In some cases it may be more financially sustainable to convert them into other valued community amenities such as plantings, seasonal wetlands, green rainwater infrastructure features, or public art.

QE Park Pond

The Park Board will soon be required to pay for the water it uses. By the end of 2025, the City of Vancouver expects to have completed its transition to a full civic user-

pay billing system. Presently only a portion of Park Board facilities, mostly those that are revenue generating, are billed for their water and sewer utilities. Developing reference tools, such as a water budget, a prioritization framework, and preventative maintenance plans can inform efficient and sustainable water consumption in parks. Such tools can help to prevent future leaks and breaks that result in water loss, and can support long-term financial stewardship of our water assets. Having a preventative maintenance plan in place also allows for more accurate financial projections and overall budgeting to maintain our water features.

This 2023-2028 update to the Water Priority Action Plan strives to reduce potable water use by 10% from a 2019 baseline, in alignment with the City of Vancouver's Green Operations Plan 2.0. It presents 6 objectives and 13 embedded actions to guide drinking water conservation and management throughout a 2023-2028 timeline:



These objectives are grounded in the commitments that the Park Board has made towards conserving water, financial sustainability, and enhancing environmental quality through a series of other Park Board and City of Vancouver plans, such as: VanPlay, the Climate Emergency Action Plan, the Rain City Strategy, Climate Change Adaptation Strategy and the previously mentioned Green Operations Plan 2.0.

The actions in this WPAP emphasize an integrative management approach. If implemented, they will ensure compliance with City by-laws and federal acts, demonstrate Park Board leadership of civic water conservation, and help us to achieve a healthier, more resilient city.

Acknowledgments

The Vancouver Board of Parks and Recreation acknowledges that it is situated on the unceded traditional territories of the xʷməθkʷəy̓əm (Musqueam Indian Band), Sḵwx̱wú7mesh (Squamish Nation), and səlilwətaɬ (Tsleil-Waututh Nation).

The project team would like to extend their gratitude to all staff from various City and Park Board teams whose input has helped to shape this plan, including staff from:

City of Vancouver

Real Estate and Facilities Management

Engineering Services - Water Conservation Implementation Unit

Park Board

Planning, Policy and Environment

Park Operations

Park Development

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Coquitlam Reservoir

Introduction

Water supply and distribution

The City of Vancouver and the Vancouver Park Board's water supplies are provided by Metro Vancouver and come from three source reservoirs in the Capilano, Seymour and Coquitlam watersheds (Figure 1). Metro Vancouver is a federation comprised of 21 municipalities, 1 electoral area, and 1 Treaty First Nation, all of which share the same limited water resources. These reservoirs are fed by rainfall and melting snowpack from the surrounding mountains and have a limited storage capacity. While there is significant rainfall in the Lower Mainland during the winter months, drinking water availability and storage capacity is becoming increasingly limited due to frequent summer drought, changes in precipitation patterns, temperature increases, decreased snowpack size, increased demand from a growing population, and urbanization.

Figure 1: *Regional water supply reservoirs and their watersheds.*

The Metro Vancouver regional government manages, treats and distributes this water to member jurisdictions, and establishes policies to responsibly manage this water. As a member jurisdiction, the City of Vancouver must cooperate with regional water conservation policies and demonstrate responsible water consumption.

The Park Board is the City of Vancouver's largest civic user of potable drinking water, using an estimated 1,138,969,000 liters[1] of potable water on average per year under normal conditions. As in Figure 2, water is used within the park system for many purposes including irrigation of trees, turf and horticulture areas, decorative water features, recreation facilities, and emergency cooling measures.

Did you know?

Under average conditions, it is estimated that the Park Board uses 1,138,969,000 liters of potable water per year. That's enough water to fill about 455 Olympic-sized swimming pools!

In years where we have hotter and drier summers, consumption can exceed that amount due to increased use of cooling, hydrating and irrigating features.

Aerial view of downtown Vancouver

[1] Estimate for 2022 rate of consumption. Note that this is a projection and may under-represent actual water use in 2022 due to the heat and drought conditions experienced that summer.

Park Board potable water users


Irrigation


Drinking Fountains


Outdoor Pools


Aesthetic Water Features


Community Gardens


Spray Parks & Wading Pools


Restaurants & Concessions


Fieldhouses & Facilities


Community Centres

Figure 2: *Visual list of Park Board potable water users, both facilities and features.*

Drivers for Responsible Water Management

While demand for potable water is increasing due to a growing population, our resources are becoming increasingly strained due to climate change, urbanization, and our limited reservoir storage capacity. End-of-life infrastructure is also affecting the utilization efficiency of our distribution network through water losses in the system. Proper maintenance and stewardship of our purchased drinking water is vital to efficiently conserve our limited resource.

Population Driven Water Demand

The City of Vancouver and surrounding region has seen a steady increase in population growth over the past decade (see Figure 3). While housing density and urbanization has continued to increase, our water supply and reservoir storage capacity has not. In an effort to further manage our limited water supply, in conjunction with Metro Vancouver's own policies and regulations, the City of Vancouver has developed strategies and action plans to lessen our per capita demand on source water.

Because our source water supply serves all of Metro Vancouver, population driven water demand must be considered at the regional scale. According to Metro Vancouver population growth projections, the region's population is expected to grow by approximately one million residents between 2016 and 2050.[2]

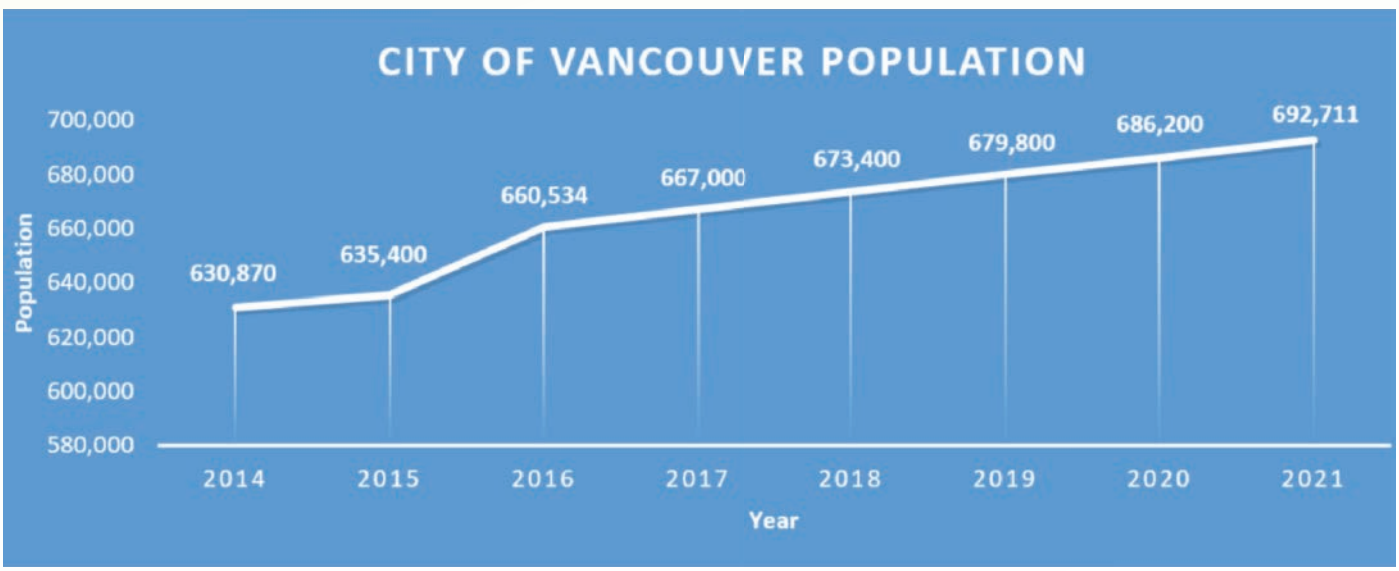


***Figure 3**: Population of the City of Vancouver, 2014-2021.*

[2] Metro Vancouver's annual growth projections assume that the existing regional growth policy framework remains in place and that external factors (i.e. climate, politics, economy and migration) remain consistent to the baseline year. In 2016 there was a baseline population of 2,570,000 people living in Metro Vancouver, which is projected to increase to 3,600,000 by the year 2050. Source: http://www.metrovancouver.org/services/regional-planning/PlanningPublications/OverviewofMetroVancouversMethodsinProjectingRegionalGrowth.pdf

Climate Change

As described in Vancouver's Climate Change Adaptation Strategy, our city is expected to experience myriad climate impacts, including hotter and drier summers with more heat waves, water supply shortages, increasing vectors for disease and respiratory illnesses resulting from rising temperatures, increasingly intense and frequent heavy rain events and other storms, and sea level rise including damage resulting from storm surge and erosion.

Vancouver residents and ecosystems are already experiencing these changes. In 2021, Vancouver saw its hottest and driest summer on record since 1958: 52 days passed without rain, and hundreds of residents, thousands of animals, and innumerable plants in our region died as a result of extreme heat events. During the week of June 25th -July 1st 2021, the BC Coroners Service reported 619 heat-related sudden deaths.[3] In 2022 and 2023, again, British Columbia experienced historic drought conditions, with parts of the Lower Mainland reaching Level 5 drought conditions in the late summer and autumn in both years. At Level 5 drought conditions, according to the Province, adverse impacts on both communities and ecosystems are almost certain.[4] In 2023, record low rainfall caused Metro Vancouver to enact Level 2 watering restrictions for the first time since 2015, and provincially, it was the most expensive and destructive wildfire season ever recorded.[5]

Did you know?

In the "heat dome" of 2021, several temporary water stations were deployed across the city in critical areas to prevent heat-related illnesses. These stations included 11 temporary handwashing stations, 10 temporary drinking fountains, and 13 temporary misting stations. These stations were attached to fire hydrants in each area and monitored daily to adhere to health and safety protocols. The City is continually evaluating water access and comparing coverage to climate and population data to identify new areas for permanent fountains.

Temporary Water Stations

[3] BC Coroners Service Report: Extreme Heat and Human Mortality: A Review of Heat-Related Deaths in B.C. in Summer 2021: https://www2.gov.bc.ca/assets/gov/birth-adoption-death-marriage-and-divorce/deaths/coroners-service/death-review-panel/extreme_heat_death_review_panel_report.pdf

[4] British Columbia Drought Information Portal. Retrieved from: https://www2.gov.bc.ca/gov/content/drought

[5] Watering restriction details retrieved from Vancouver.ca: https://vancouver.ca/news-calendar/vancouver-watering-restrictions-escalate-to-stage-2-on-august-4.aspx

Wildfire statistics retrieved from BC Wildfire Service: https://wildfiresituation.nrs.gov.bc.ca/currentStatistics

As a result of these changes, Vancouver is facing demand for more urban cooling features to promote improved public health outcomes during the summer months. As mentioned, however, our drinking water is a relatively finite and constrained resource. In order to meet this growing demand for spray and mist parks, water fountains and other such cooling features, the Park Board must address system inefficiencies and create space in its "water budget" for emerging needs.

Water Waste and Regulations

Metro Vancouver supplies water from the three regional reservoirs to its member jurisdictions, including the City of Vancouver. The City then manages and distributes this purchased water supply to civic users. Metro Vancouver's regional policies regarding responsible water use are incorporated into the City's municipal by-laws, notably Waterworks By-law No. 4848 and the Drinking Water Conservation By-law No. 12086. Each of these by-laws have sections outlining the maintenance requirements of piping systems, as well as prohibitions against wasting water.

The Waterworks By-Law 4848 defines what is considered "wasteful" in terms of civic water consumption, and prohibits the City and Park Board from indulging these uses. Under Section 3.7, water uses are considered to be wasteful if they:

- Freely discharge or permit flow of water from premises, on or into a sanitary sewer, watercourse, storm drain, street or adjacent premises;
- Leak water from appliances, devices, machines, equipment, systems (including irrigation systems), ponds, fountains or water features;
- Do not have a recirculation device;
- Irrigate an impervious surface; or,
- Use a water hose that is not equipped with an automatic shut-off device.

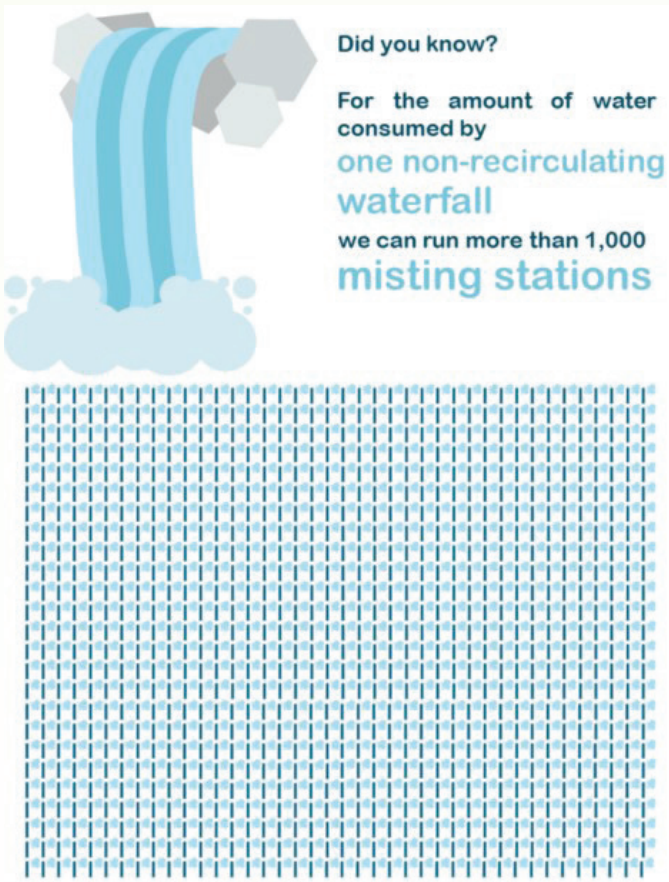


Figure 4: *An average non-recirculating waterfall consumes more water than 1,000 misting stations (see footnote for parameters).*[6]

[6] The consumption estimate for a non-recirculating waterfall was calculated based on the average water use of decorative waterfalls at Queen Elizabeth Park and Charleson Park, which are non-recirculating. Misting station consumption estimates were based on calculations involving industrialized standards, as well as our city-made emergency push-button and timer-operated misting stations. This estimate was assuming operation for 12 hours per day for the duration of 5 months. This estimate is highly conservative; misting stations are expected to be highly utilized only during extreme heat events.

Park Board's most wasteful features are primarily decorative in nature. Such decorative features may provide aesthetic value to residents, but compared to purpose-built features such as misting stations, most do not contribute substantially to urban cooling, sport, climate resilience, or ecology. When broken or once-through features continue to operate despite inefficiencies, that wasted water cannot be used to meet other community needs such as hydration, cooling, or irrigation. For example, one average non-recirculating waterfall can use as much water in a year as 1000 emergency response misting stations (Figure 4).

The Drinking Water Conservation By-law 12086 is adopted from Metro Vancouver's Drinking Water Conservation Plan, a regional strategy directed at municipalities to ensure proper management of the drinking water supply. Through activation of staged water restrictions (stages 1-4) from May 1st until October 15th each year, and in response to current weather conditions and reservoir levels, this by-law enforces use of potable water during peak season when the region experiences a 50% increase in potable water use, attributed primarily to lawn watering. The Drinking Water Conservation By-law compliments year-round policy outlined in By-law 4848 regarding water wastage and operational requirements.

Waterworks By-law 4848 applies to all water services within the City of Vancouver, both municipal and private. Private, residential and industry buildings are all billed for their water use and fined when by-laws are contravened. The Park Board has a responsibility to ensure that all of their water services are adhering to City by-laws to ensure that public facing features are conserving potable water and leading by example.

Key point:

Council amended Waterworks By-law 4848 in 2011 in response to the Water Shortage Plan to include well-defined prohibitions against "wasting water". Enforcement of By-law 4848 is becoming increasingly important due to water stressors such as population growth and climate change.

In addition to local and regional policies, some water features in the Park Board's system have operated in contravention of the federal Fisheries Act. Though our drinking water is treated with chlorine at safe concentrations for human consumption, many fish and amphibians can be harmed by the chlorine in our drinking water. As such, Subsection 36(3) of the Fisheries Act (F-14)[7] prohibits the deposit of deleterious substances into water frequented by fish, or in any place where it may enter such water.

Definitions:

- *Deleterious substances* are anything that can be harmful to fish, fish habitat, or use of fish, in short or long-term exposure. They may cause short-term effects, permanent effects, non-observable effects or death. *Chlorine is listed as a deleterious substance.*

- *Fish* are defined as: fish of all species, shellfish, crustaceans, and marine animals, at all life stages (i.e. eggs, larvae).

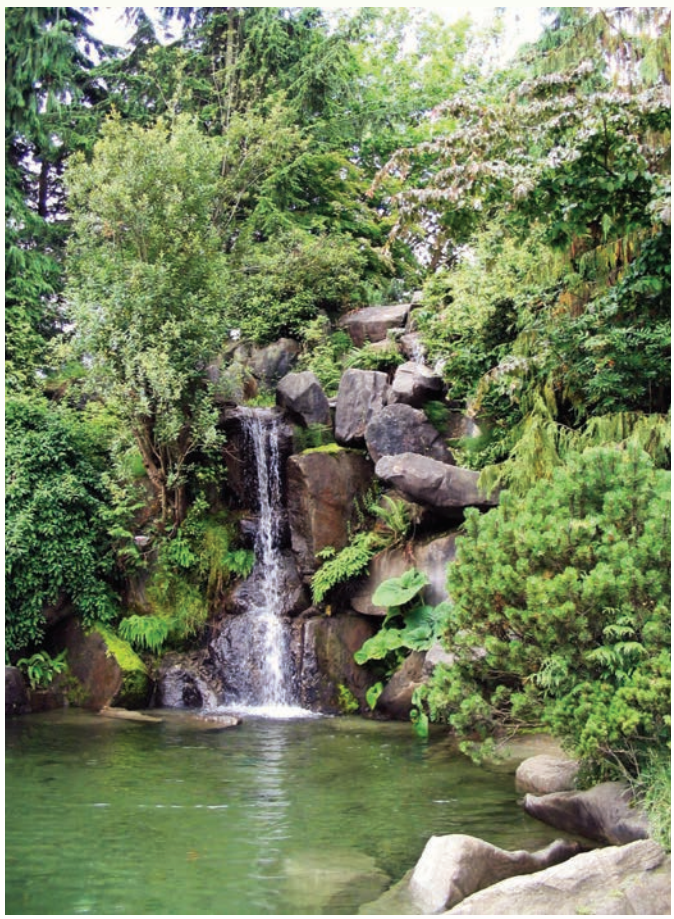
[7] Fisheries Act, R.S.C., 1985, c. F-14, website: https://laws-lois.justice.gc.ca/PDF/F-14.pdf

- *Water frequented by fish* includes: lakes, rivers, streams, small creeks, tributaries, and non-permanent waterways that dry up or freeze solid, if they are ever occupied by fish.

Non-compliant Water Features

As described in Waterworks By-law 4848, any water feature, fountain, or swimming pool which does not have a water recirculation device (or an input control device for pond systems) is not in compliance with the by-law. Other by-law contravening acts include: the free discharge of water from the premises, the use of a hose without an automatic shut off, the use of an irrigation system on an impervious surface, and running water as a form of freeze protection. A water feature that was designed in compliance with regulations may still become non-compliant if it develops breaks, system malfunctions, if it is improperly programmed, or if it is not manufactured and installed according to its design. Because of this, the list of non-compliant water features in parks is a fluid list.

In 2023, the Park Board engaged an external consultant to assess the condition of 64 water features, including fountains, ponds, waterfalls, spray parks, and wading pools. Staff and the consultant team examined the state of repair for each of these features, checked their level of compliance with pertinent regulations, and estimated the cost of rehabilitating features that were found deficient. The assessment report provides a list of rehabilitation options, cost projections to bring features into working order and compliance. The Water Features Condition Assessment and Rehabilitation report explains that it is not possible to rehabilitate and continue to operate all of the deficient water features in the Park Board system given current capital and operational budget constraints. Furthermore, there may be long-term cost savings and sustainability benefits to re-imagine or even decommission certain features that have reached the end of their design life. For example, it may be possible to repurpose some decorative ponds into seasonal wetlands or other habitat features, or to convert an aging fountain into sculptural art.



Charleson waterfall - a bylaw non-compliant (non-recirculating) water feature

Although retrofitting features can help to achieve compliance in the short term, recirculating features have higher maintenance requirements compared to non-recirculating features. Any decision to retrofit a once-through feature to make it a recirculating one must hence be made with an understanding of the increased operational

costs tied to that decision. For example, increasing the number of recirculating features could mean needing to hire additional maintenance staff to accommodate more frequent site visits to each feature, and more parts to service and replace over time.

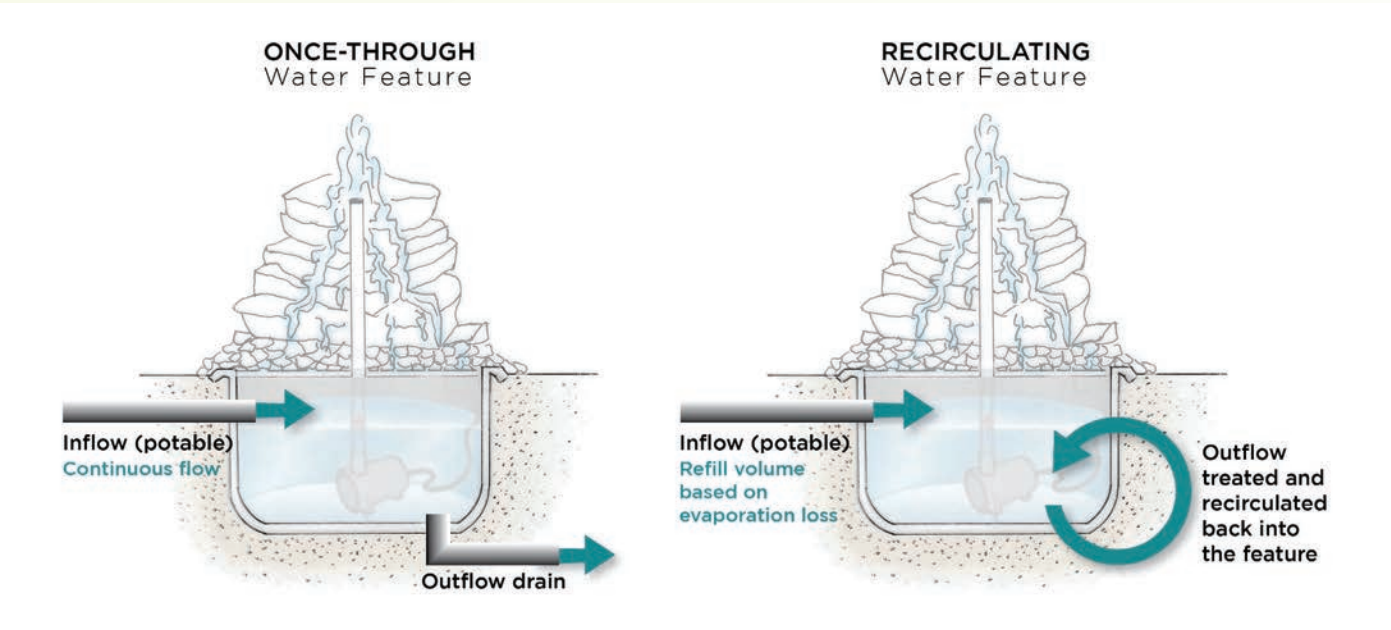


***Figure 6a**: Diagram of once-through (non compliant) and recirculating water features.*

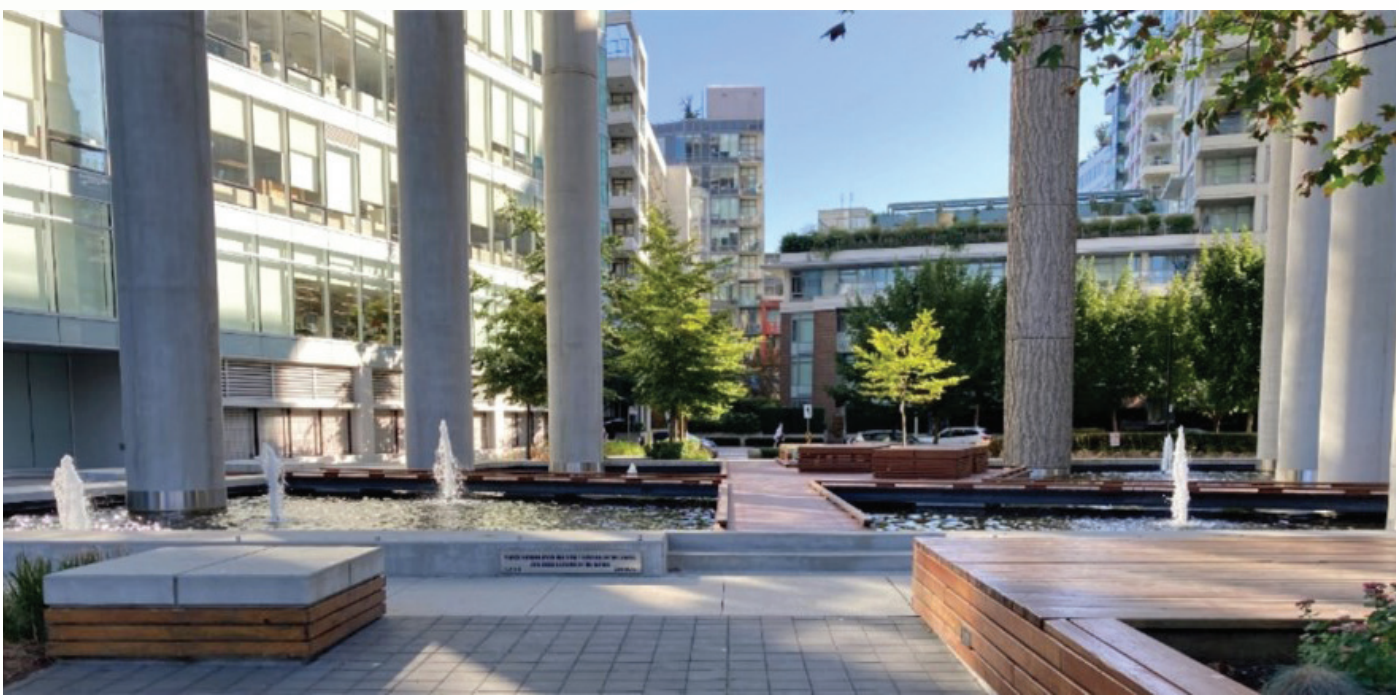


***Figure 6b**: A large private, recirculating fountain near Main Street in Vancouver.*

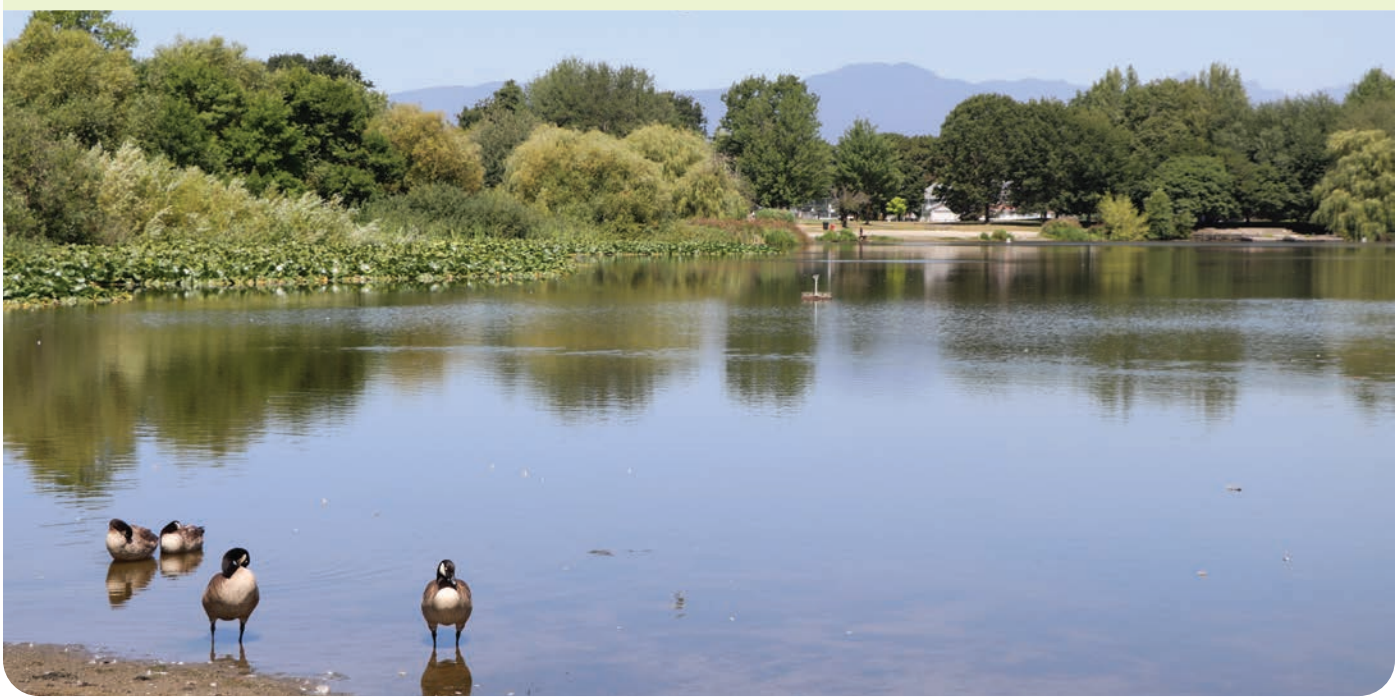
Case Study: Trout Lake

Trout Lake has historically been one of the largest by-law non-compliant potable water features in the Park Board system. The lake level is maintained using the addition of potable drinking water. An average of 220 million litres of water was used to top up the lake each year (2012-2014). In 2014, a sensor was installed to control the potable water top-up, which led to a water savings of 180 million litres per year.

It was thought, at the time, that this retrofit made Trout Lake by-law compliant; however, this sensor was installed without any analysis to determine the appropriate water level for Trout Lake. As a result, the sensor was set to top Trout Lake up to a water level that was higher than its outlet drain, and the lake continued to lose water even with the sensor installed.

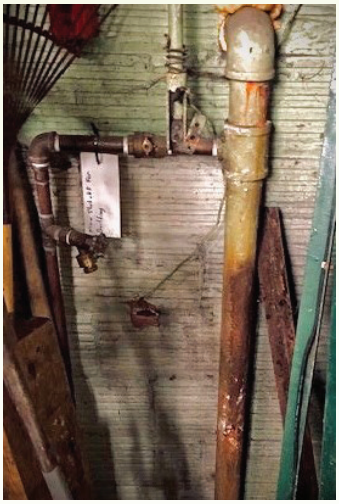
This continuous loss of water to the sewer system made the lake by-law non-compliant, as the sensor controlled top-up was filling up the lake beyond evaporative losses. In 2021, the sensor was adjusted, and Trout Lake became compliant with Bylaw 4848.

The case study of Trout Lake shares several lessons. First, it shows that small changes (like the addition of a sensor) can make a large impact on the savings of potable water. It also demonstrates that conducting a proper assessment and inventory before making these changes can maximize the effectiveness of retrofits. Action 4.1 in this WPAP is to conduct these types of analyses system-wide to support our Preventative Maintenance Program.



View of Trout Lake looking north

State of Infrastructure



Galvanized steel pipes

The underground infrastructure at the Park Board was largely installed within throughout the 1950s-1970s, and many sites have not undergone any kind of replacement or renewal. Because much of the Park Board's water infrastructure was installed around the same time, there is now a large amount of infrastructure reaching the end of its design life at once. For example, some Park Board facilities still use galvanized steel service lines, which leach lead into water as they degrade over time. Without a dedicated fund and schedule for infrastructure renewal, pipe replacement and other necessary upgrades have been completed opportunistically as infrastructure fails. These works are currently funded through the capital budget. A preventative program with a dedicated funding mechanism could ensure the replacement of aging infrastructure to support human health, and to prevent large-scale breaks that can be costly and damaging to the surrounding environment.

Old Park Board infrastructure in need of replacement

Forthcoming User-Pay System and the Need for a Water Budget

The Park Board consumed an estimated 1.14 billion liters of potable water in 2022. The Park Board has not historically shouldered most of the cost of its water consumption, as instead the City of Vancouver's Engineering Department has been paying these expenses, which amounted to roughly $1.9 million in unbilled water use in 2021. The City has begun to transition to a user-pay system for water and sewer disposal utility fees across all civic departments, an action that was outlined in the approved Green Operations Plan 2.0. To date, only revenue-collecting Park facilities have been paying for their utilities. This transition will bring an opportunity to assess the largest sources of drinking water consumption, and to develop a "water budget" that accurately reflects what financial resources are available to spend on water.

A ***water budget*** is a tool to account for the total amount of water that enters and leaves a system. A Park Board water budget could be calculated by quantifying the total amount of inputs (volume of water that we can reasonably purchase, which becomes the "budget") and comparing that against the outputs (volume of water that we consume). The difference between our outputs and our inputs can help highlight how much we need to reduce our water consumption in order to achieve financial and environmental sustainability goals.

If the exercise to develop a water budget reveals that we are spending beyond our means, then the Park Board is faced with challenging decisions about how to prioritize investment. Determining which features are most "valuable" and worthy of investment is challenging because every resident in the city will likely value different things; for example, some residents may highly prioritize the decorative value of a feature, while another resident might feel that cooling and recreational features are more important. Prioritization frameworks can be developed to help mitigate some of this subjectivity by considering multiple different kinds of values at once. One example of a prioritization framework was offered in the Water Features Condition Assessment and Rehabilitation report.

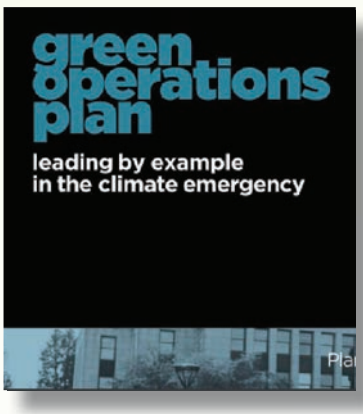
Case Study: Golf Course Water Budget Agreements

Public golf courses in the Park Board system are already using water budgets to inform their water management. Reducing overall water consumption is not exclusively about reducing the number of features that consume water, it can also be accomplished by being more precise about where and when water is being used. The McCleery, Fraserview and Langara Golf Courses have modeled leadership in this regard by prioritizing irrigation in areas where high moisture levels are required for active play, and reducing irrigation of less active areas of the course, such as naturalized meadows and golf course rough.

Since 2016, all public and private golf courses in Vancouver hold annual Water Use Agreements with the City of Vancouver Engineering Department. Each agreement is uniquely developed for each golf course and calculated based on course size, irrigation system design and other factors. They specify the allowable volume of potable water (water budget) to be used for irrigation, maintenance and facilities at each site during the irrigation months of May until October. In exchange for staying within their water budget, courses are exempted from Metro Vancouver's watering restrictions. Golf course managers are able to keep within their water budgets by using a combination of strategies including careful monitoring of weather conditions, programming of sprinkler systems, using alternative water sources such as groundwater, and increasing the amount of no-mow areas to support biodiversity.

Related Policies

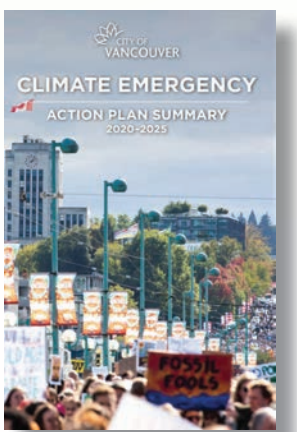
In an effort to move forward with a feasible action plan, we examined the foundation upon which other water conservation efforts have taken place throughout the city. While the Sports Field Strategy is currently in development, 5 plans have been identified (see Figure 7) within the City and Park Board that include actions and strategic direction related to water conservation. A full list of relevant actions from each plan is provided as a summary table in Figure 8.



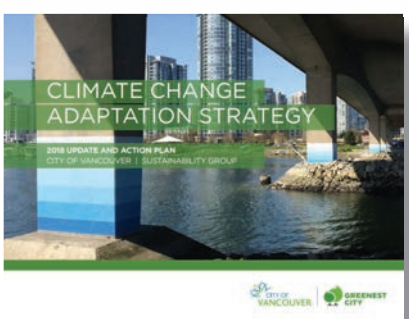
Green Operations Plan: Reduce corporate potable water use, provide healthy habitat, and demonstrate leadership in sustainable civic operations

Van Play: Enhance the resilience, quantity and quality of our natural areas, and provide access to nature for residents

Climate Emergency Action Plan: Prioritize solutions that store carbon (nature-based solutions)



Rain City Strategy: Leverage green infrastructure and rainwater capture to support biodiversity, heat resilience and access to



Climate Change Adaptation Strategy: Provide critical services such as cooling, drinking water and irrigation during (and beyond) extreme heat and drought events

***Figure 7**: Overview of existing Park Board and City of Vancouver Strategies and Action Plans that are relevant to the WCAP.*

Areas of Alignment

Green Ops 2.0 – 2020

- By 2030, reduce corporate potable water use by 10% by 2030, as compared to a 2019 baseline.
- By 2030, 40% of all city-owned lands will provide healthy habitat and contribute to healthy ecosystems.
- Install operational water meters at all City-owned or controlled buildings and facilities by 2025.
- In addition to the installation of water pressure reduction equipment at City-owned or controlled buildings and facilities, adjust water pressure to a lower setting wherever possible in an effort to conserve water and prevent leaks.
- Implement a departmental user pay system for water on all City-owned or controlled buildings and facilities.
- Park Board to develop and implement an updated Water Conservation Action Plan 2020-2025, with a focus on potable water savings.
- Restore or enhance 30ha of natural area within parks, with a view to increase the portions of parks which are 'naturally managed' (including ecological horticulture, pollinator meadows, and forest with unmown understory).
- Showcase water conservation projects in public places e.g., via signage, demonstration projects, art etc. to educate and train staff on water conservation.

VanPlay – 2019

- Protect and enhance the integrity of foreshores, waterways and beaches.
- Protect Vancouver's freshwater resources through ecological restoration, green infrastructure, and water conservation.
- Nurture, protect and connect the city's ecological network and natural areas.
- Provide access to a naturally managed area of at least 0.2 ha within a 10 minute walk of all residents.
- Incorporate environmental education and interpretive signage into the park system in collaboration with Musqueam, Squamish and Tsleil-Waututh First Nations.

Climate Emergency Action Plan - 2020

- Prioritize solutions that can sequester carbon.

Rain City Strategy - 2018

- Increase Vancouver's resilience through sustainable water management.
- Enhance Vancouver's livability by improving natural and urban ecosystems.
- Increase total green area that treats urban rainwater runoff.
- Mitigate urban heat island effect.
- Harvest and reuse water.
- Capture (infiltrate, evapotranspirate, and/or reuse) and clean (treat) a minimum of 90% of Vancouver's average annual rainfall volume.
- (Parks and Beaches Action Plan) Green Rainwater Infrastructure integration into Park Development Standards.
- (Parks and Beaches Action Plan) Protect and Enhance Park Service Levels through Green Rainwater Infrastructure Retrofits.
- (Parks and Beaches Action Plan) Non-potable Water Systems and Water Conservation & Efficiency.
- (Parks and Beaches Action Plan) Enhanced Park Biodiversity Program.

Climate Change Adaptation Strategy – 2012

- Enhance the long-term health and vigor of blue spaces, green spaces, trees and biodiversity.
- Improve water quality of local water bodies.
- Continue to provide critical services and programming that enable residents and local biodiversity to survive climate-related drought and heat events.

Figure 8: *Summary table of relevant actions from each Strategy and Action Plan.*

Capilano Reservoir *Photo credit: Metro Van*

Actions to guide water prioritization: 2023-2028

The Action Plan update herein provides a practical framework to identify and prioritize activities that can help the Park Board reduce its use of potable water. The plan recommends a variety of operational changes and investments that will help manage water and water assets in more financially and environmentally sustainable ways.

An implementation target is provided for each action. Many of our short-term actions emphasize bringing the Park Board into compliance with local by-laws and regulations as a necessary first step in reducing water waste, promoting health and safety of people and the environment, and improving the efficiency of our current system. Medium and longer term actions focus on ongoing measures that the Park Board can take to become a leader and innovator in municipal water conservation, and manage water collaboratively with other departments. In addition, we also considered the various services offered by differing categories of water features.

S	**Short-term**	1-3 year horizon. We know how to make these changes, and they should be implemented as quickly as possible to support regulatory compliance, environmental sustainability, and public health. In some cases, these actions may need to be completed first in order to proceed with mid-term and long-term actions.
M	**Mid-term**	3-5 year horizon. These actions are achievable within the tenure of the plan, but require thoughtfulness, inter-departmental collaboration, and system-building within our organization to do the work well.
L	**Long-term**	May take 5+ years or more to implement (beyond the tenure of this plan), and/or will be ongoing work. These are transformative actions that take time to implement. They come with capacity-building needs and system change.

The following 6 Objectives and corresponding Actions detail the approach we will take to achieve this Water Priority Action Plan.

Objective 1

Achieve regulatory compliance

Action 1.1
Convert, upgrade or remove by-law non-compliant facilities and features

1.1.1 Retrofit or convert once-through features

1.1.2 Oversee that fire lines at Burrard Civic Marina and Heather Civic Marina are no longer running freeze protection in the winter

Action 1.2
Prevent Fisheries Act violations

1.2.1 Redirect water line discharge from marinas into sewers

1.2.2 Clarify protocol for reporting leaks and breaks

1.2.3 Prevent discharge of potable water from aesthetic and play features

Objective 2

Retrofit and upgrade facilities and features to more efficient systems

Action 2.1
Develop and implement a Park Board Facilities Upgrade Schedule

Action 2.2
Implement maximum pressure and water use standards for park facilities

Objective 3

Employ nature-based solutions to reduce and replace drinking water use where feasible

Action 3.1
Review area and frequency of irrigation

3.1.1 Transition turf and horticulture areas to plant assemblages with reduced irrigation needs

3.1.2: Develop site-specific irrigation reduction plans

Action 3.2
Naturalize or convert pond and waterfall features that currently consume potable water

3.2.1 Identify pilot sites for pond naturaliz ation and green rainwater infrastructure implementation

Action 3.3
Transition to alternative sustainable water feeds or repurpose features

Objective 4

Develop a Park Board Preventative Maintenance Program

Action 4.1
Conduct an Inventory and Analysis of all Park Board water infrastructure

Action 4.2
Develop and Resource a Preventative Maintenance Schedule

Objective 5

Be water-smart when designing new parks and park redevelopments

Action 5.1
Develop a water budget

Objective 6

Work together

Action 6.1
Foster and maintain inter-departmental communication via a working group

Action 6.2
Support partnerships to monitor and steward transformed and naturally managed water features

Action 6.3
Develop and implement a public communications plan to share information about converted water features and water conservation

Figure 9: *Detailed list of Actions for each Objective in the WCAP.*

Objective 1: Achieve regulatory compliance

Champion Team:
Planning and Park Development, REFM and Park Operations, with support from Engineering Water Design

Several amenities and facilities managed by the Park Board do not comply with City of Vancouver by-laws, or in some cases, the federal Fisheries Act. A top priority is to bring the Park Board into total compliance within these frameworks.

Action 1.1 Convert, upgrade or remove by-law non-compliant facilities and features

Timeline: **Short term**
Contributes to goal from: **All plans**

Some facilities and features within the Park Board system consume water in ways that are "wasteful", according to the City of Vancouver Waterworks By-law 4848. In light of climate change and a transition to a user-pay system, it is both expensive and wasteful of our limited water resources to continue operating these features and facilities in this way. The following actions aim to prevent water waste and to bring the Park Board into full compliance with Waterworks By-law 4848, Drinking Water Conservation By-law 12086, the Fisheries Act, and public health guidelines.

1.1.1: Retrofit or convert once-through features

The Park Board currently maintains several water features that are "once-through", which means that water passes through the feature only one time and is not continually re-used by that feature. This type of system is prohibited by the City of Vancouver Waterworks By-law 4848. A list of identified by-law non-compliant features can be found in the Water Features Condition Assessment and Rehabilitation Planning Report (2023).

The Park Board does not possess the financial resources that would be necessary to repair and continue operating all non-compliant and degraded features. As such, the Park Board must selectively invest in repairs and recirculation systems high-priority features, while others may need to be converted into alternative structures or decommissioned.

1.1.2: Oversee that fire lines at Burrard Civic Marina and Heather Civic Marina are no longer running freeze protection in the winter

The potable water lines at Heather Civic Marina (see Appendix I) that supply the live-aboard section are left dripping throughout the evenings when the temperature drops below freezing, so that the water lines do not freeze and that the residents continue to have access to water. Running water as a form of freeze protection is against City Waterworks Bylaw 4848 and the Federal Fisheries Act.

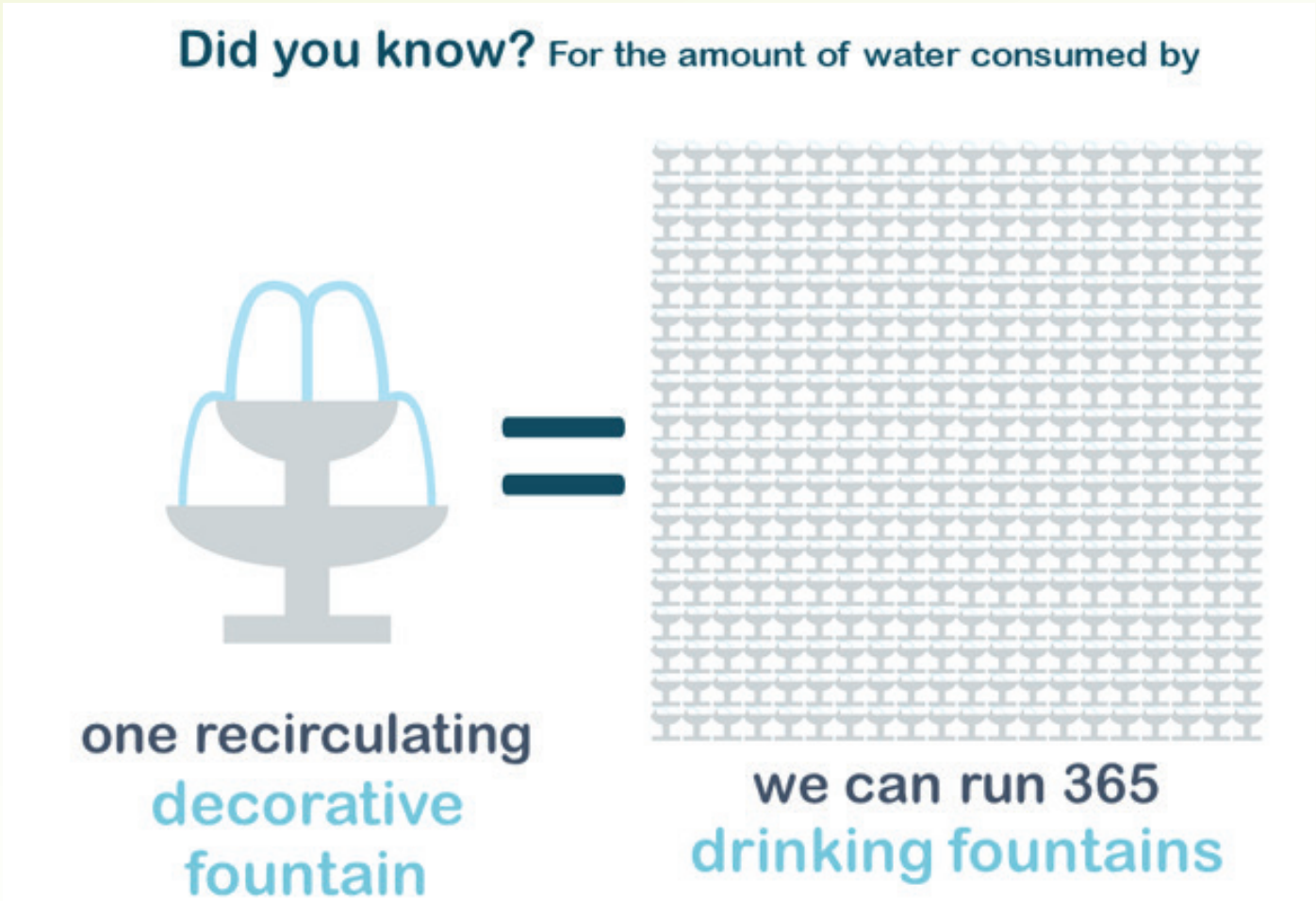


***Figure 10**: An average recirculating decorative fountain consumes as much water as 365 drinking fountains (see footnote for parameters).*[8]

Action 1.2: Prevent Fisheries Act violations

Timeline: **Short term**

Contributes to goal from: **Green Ops 2.0, VanPlay, Climate Change Adaptation Strategy**

Some Park Board managed facilities and features have discharged chlorinated drinking water into nearby waterways or the ocean.

Chlorine is considered to be toxic to fish and other aquatic wildlife. The federal Fisheries Act prohibits the discharge of deleterious substances, including chlorine, into any body of water that is ever occupied by fish. It requires that in such instances a report be sent to relevant provincial and federal authorities; and that a failure to comply, is a punishable offence under the Fisheries Act. Accordingly, the following sub-actions target scenarios and sites where the discharge of potable water into waterways is known to occur within the Park Board system.

[8] The water consumption estimate for a recirculating decorative fountain is based on limited data from metered Park Board recirculated decorative fountains; it is also assuming an average size. For drinking fountains, we have assumed average visitation frequency at a park, based on existing drinking fountains.

1.2.1: Redirect water line discharge from marinas into sewers

The Park Board owns and operates two public marinas: Heather Civic Marina and Burrard Civic Marina (see Appendix I). Neither Marina has adequate infrastructure for year-round water access due to piping that is not freeze protected. Each winter the marinas drain all fire lines on the docks to winterize the system, which is a several day draining process. The potable water is released directly into the ocean, which is a contravention of the federal Fisheries Act.

As an action, the Park Board marinas will coordinate with the City's Sewers and Drainage division as needed to re-direct potable water into a sewer line rather than into the ocean.

1.2.2: Clarify protocol for reporting leaks and breaks

Municipalities are required to report leaks and breaks that could result in the discharge of deleterious substances, including chlorinated water, into fish habitat. Official policy and standardized procedures allows for the quick action of the City to prevent further environmental damage in the case of severe leaks or breaks in the system. The Park Board does not currently have a clear protocol for reporting and remediating known water leaks. As an action, staff will develop and adhere to a reporting protocol, as required by the federal Fisheries Act.

1.2.3: Prevent discharge of potable water from aesthetic and play features

Some aesthetic and water play features discharge potable water directly into the ocean or into nearby freshwater sources. This violates the Fisheries Act and causes local environmental harm. As an action, the Park Board will identify priority features for investing in retrofits to achieve compliance, and decommission features that cannot be brought up to compliance.

Objective 2: Retrofit and upgrade facilities and features to more efficient systems

Champion Team:
REFM, Park Operations, Planning and Park Development, and Engineering Water Design

Park Board managed facilities contain sinks, showers, toilets, faucets and other equipment that dispense water. Updating our infrastructure to low-flow technologies that are durable enough to function well in a public setting can create substantial water savings.

Action 2.1: Develop and implement a Park Board Facilities Upgrade Schedule

Timeline:	**Mid-term**
Contributes to goal from:	**Green Operations 2.0, VanPlay, Rain City Strategy, Climate Change Adaptation Strategy**

Action 2.1 involves establishing an implementation plan, including clear timelines and budgets, for retrofitting Park Board facilities with water-use reducing technology such as low-flow and pressure reducing equipment, or grey water harvesting and reuse. This will include taking a complete inventory of our existing equipment, identifying facilities with aging or high-consumption equipment and prioritizing upgrades according to water budgets.

Completion of the inventory and schedule should take place before the next capital planning cycle, with implementation to follow shortly thereafter with consideration for available funds. The inventory process can be completed alongside or following completion of the Civic Metering Project by City of Vancouver Engineering staff in order to gain a complete picture of water usage across facilities and features.

Action 2.2: Implement maximum pressure and water use standards for park facilities

Timeline:	**Mid-term**
Contributes to goal from:	**Green Operations 2.0, VanPlay, Rain City Strategy, Climate Change Adaptation Strategy**

The Park Board will establish a standard maximum water pressure in its facilities (i.e. must be less than 70 psi), once the project to install pressure and flow reduction equipment at all City-owned or controlled buildings and facilities is complete. Once a threshold is identified, retrofits can be scheduled for any identified problem sites where equipment does not meet the water pressure standards.

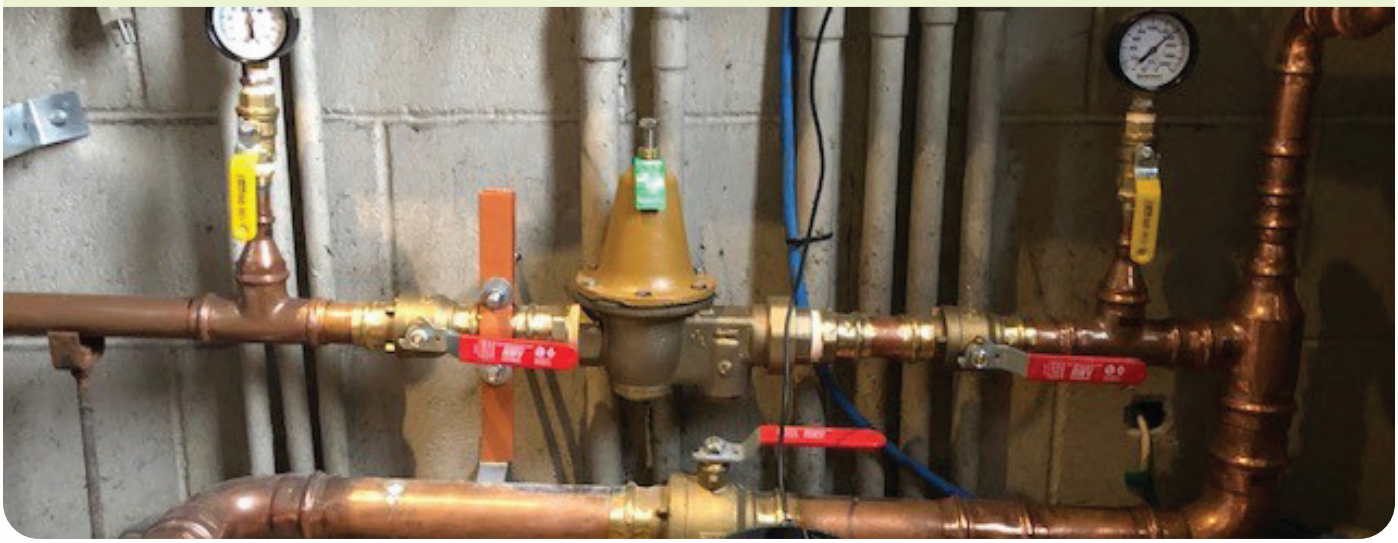
Case Study: Pressure Reducing Valves in Park Board Fieldhouses

Pressure reducing valves (PRVs) are the first water conservation valve in a water distribution system. They operate by reducing the water flow rate and result in the restriction of water pressure to the set amount indicated on the pressure gauge. PRVs are a requirement of the Vancouver Building By-law Plumbing Code (VBBL), which states that each property is required to have a PRV where the static pressure exceeds 80 PSI. Residential landscape irrigation systems are also required to have a PRV where the static pressure exceeds 60 PSI.

In some Park Board facilities and fieldhouses, the water pressure is greater than 130 PSI; as a result, all fieldhouses were inspected for the presence of PRVs and the water pressure in each location was recorded and adjusted to 50 PSI. Permits were acquired for the installation of all new PRVs in fieldhouses. In total, 67 fieldhouses required PRVs or adjustments; 40 required new PRVs to be installed, and 27 fieldhouses needed their previously installed PRVs adjusted to 50 PSI. While all fieldhouses with PRVs resulted in less water and energy consumption, 47% of the inspected fieldhouses (32 locations) resulted in a 33% measurable savings in water and sewer disposal utility costs, 11% savings in water heating costs and a reduction in carbon greenhouse gas emissions.

In addition to Park Board fieldhouses, there are a number of other Park Board facilities and irrigation systems that do not have PRVs installed and/or do not have their systems properly adjusted to an acceptable water pressure; this will be the focus of future PRV projects in the parks system.

system-wide to support our Preventative Maintenance Program.



Objective 3: Employ nature-based solutions to reduce and replace drinking water use where feasible

Champion Team:
Planning and Park Development, with engagement from Park Operations, Engineering and other teams

Many Vancouver residents appreciate spending their time beside duck ponds and waterfalls throughout the city, but few realize that these systems consume millions of litres of potable water each year. Through natural planting, green infrastructure and other interventions, it may be possible to keep some of what we love about these features and places (i.e. habitat, recreation, access to nature) while also curbing our water consumption.

Action 3.1: Review area and frequency of irrigation

Timeline:	**Long-term**
Contributes to goal from:	**All Plans**

Irrigation is necessary within the Park Board system as it keeps plants and fields alive, particularly during times of drought. There are many strategies to reduce irrigation needs while still maintaining a high level of service and good environmental conditions. For example, simply by being more targeted and precise about when and where they irrigate, the Park Board's golf courses have been able to consistently remain within their annual water budgets.

Playing fields can be of a variety of turf types and some landscaping solutions require more irrigation than others. By balancing needs of sport and lawn areas with high community use, turf requirements, landscaping design and water conservation initiatives, we can create solutions that will make our urban ecosystems more resilient to climate change and also free up more water in our water budget for other important uses such as recreation and urban cooling.

3.1.1: Transition turf and horticulture areas to plant assemblages with reduced irrigation needs

Many public spaces in the Park Board system currently have high irrigation needs. Xeriscaping is a type of landscaping that aims to reduce or eliminate the need for watering. Xeriscaping accomplishes water reductions by choosing drought-tolerant plants, and strategically arranging them to take advantage of the site's natural drainage. Implementing xeriscaping can help to reduce water consumption and thereby save money, but it also has other benefits such as increasing the summertime beauty and resilience of horticulture beds, and providing foraging habitat for pollinators.

3.1.2: Develop site-specific irrigation reduction plans

Each site in the Park Board's system has different local conditions and planning goals – some parks and facilities have a

strong emphasis on sport and recreation, while others provide tranquil experiences in nature. As such, a one-size-fits-all approach to reducing irrigation is not suitable. As an action, staff will develop irrigation reduction plans for a number of high-irrigation parks in Vancouver, and collaborate interdepartmentally to identify plans and experiments to gradually reduce irrigation dependence where possible.

Action 3.2: Naturalize or convert pond and waterfall features that currently consume potable water

Timeline: **Short to Long-term**

Contributes to goal from: **All Plans**

The Park Board currently maintains several decorative ponds and wetlands. Although these features may appear natural-looking, and do provide certain benefits including decorative value for residents, they are artificial features that have historically been filled using chlorinated water supplies. Some larger urban wildlife such as ducks, raccoons, bats and coyotes are known to use such decorative features for drinking or foraging, but other kinds of wildlife such as fish and amphibians cannot survive in pools of chlorinated water. As such, these ponds are not providing their full potential in terms of habitat value, and are also consuming unsustainable volumes of potable water.

Naturalizing these features can involve turning off the potable water feed, and then either finding alternative natural water sources to recharge the pond, or allowing ecological succession to transform it into a new and different habitat.

3.2.1 Identify pilot sites for pond naturalization and green rainwater infrastructure implementation

The Water Features Condition Assessment and Rehabilitation Planning Report offers an analysis of several ponds in the Park Board system that consume excessive water. At some sites, it may be possible to adjust or work with surrounding drainage conditions to transform these ponds into green rainwater infrastructure features such as rain gardens or constructed wetlands. Such converted features may not look exactly as they did historically, since conversion would involve removing the potable water feed and allowing the feature to recharge naturally in relation to local hydrological conditions.

Converting decorative ponds into green rainwater infrastructure can reduce water consumption and associated costs while also creating new benefits such as addressing flood and drainage issues in the neighbourhood, improving habitat for biodiversity, and enhancing downstream water quality. Such conversions require interdepartmental collaboration, notably Park Operations staff who maintain the features, the City's Engineering – Green Infrastructure Implementation Branch who provide technical expertise on green stormwater management, and Park Board's Environment and Sustainability team who develop appropriate planting plans and liaise with local environmental stewards.

Case Study: Transitioning to seasonal wetlands

In an effort to conserve water during consecutive years of intense drought, in 2022 and 2023, staff disabled the potable water feeds to several decorative ponds. Seasonal wetlands are natural ecosystems that fill with rainwater during the winter months and dry out each summer. They provide habitat for native biodiversity and are more resistant to invasive species like the American Bullfrog. All transitioned water features were City bylaw non-compliant, as they used "once-through" potable water systems with no recirculation device or input control on the water service. Transitioned sites receive updated planting and site management plans to continue to provide aesthetic value for residents, while improving the habitat value for urban wildlife including amphibians, fish, birds and pollinators. In addition to these recently transitioned features, there are other water feature in the city that have been operating as seasonal wetlands for many years, including Avalon Pond at Everett Crowley Park and the pond at Jericho Beach Park.

Charles Park Pond

Pond at McCleery golf cource

Action 3.3: Transition to alternative sustainable water feeds or repurpose features

Timeline:	**Short to Mid-term**
Contributes to goal from:	**Green Operations 2.0, VanPlay, Rain City Strategy, Climate Change Adaptation Strategy**

Green rainwater infrastructure may be a viable conversion approach for some decorative ponds in the Park Board system, but other features such as decorative fountains and waterfalls may require a different approach. For example, in cases where a decorative fountain is located nearby another Park Board facility, it may be possible to collect and recycle grey water for circulation in the water feature.Rainwater could be a potential (largely seasonal) source in some cases / green infrastructure features, and groundwater is already being used for irrigation at Langara Golf Course.

In other cases, it may be the case that there is no alternative water feed available and retrofitting to achieve by-law compliance may not be technically or financially feasible. In those cases, features might be transformed into other community amenities such as seating features or sculptural art.

Objective 4: Develop a Park Board Preventative Maintenance Program

Champion Team:
Park Operations, REFM and Finance

Much of the Park Board's water infrastructure is aging and in need of repair or replacement. Currently, the Park Board does not have a Preventative Maintenance Program, so these aging systems are vulnerable to severe breaks, leaks, and resource inefficiencies. Evaluating the condition of the piping systems in each park and scheduling deadlines for when these systems should be inspected, repaired, and/or replaced would help ensure that all park systems are operating properly and efficiently. It would also reduce the overall financial expenses to properly maintain systems before they reach end-of-life rather than repairing or replacing based solely on a reactionary response when a severe break occurs.

Action 4.1: Conduct an Inventory and Analysis of all Park Board water infrastructure

Timeline: **Short to Long-term**

Contributes to goal from: **Green Operations 2.0, VanPlay, Rain City Strategy, Climate Change Adaptation Strategy**

A necessary first step in developing a maintenance program is having an understanding of the current state of the water system at the Park Board.

A first step toward this analysis was completed in 2023, as the Water Features Condition Assessment and Rehabilitation Planning report explored 64 decorative and recreational features. Future assessments could focus on identifying the condition and repair needs for aging plumbing and dock infrastructure at marinas, underground water infrastructure at golf courses and parks, and plumbing condition and infrastructure at community centres and fieldhouses. A preliminary state of repair assessment (completed in 2021) for marinas is provided in Appendix I.

For example, the City of Vancouver has 24 community centres which offer recreational, cultural and social activities for residents. Some of these community centres, such as Hillcrest and Killarney, are the top users of potable water at the Park Board. A full assessment of each facility could help to identify easy-win opportunities to improve efficiency, such as shower upgrades or timers, while also identifying certain foreseeable system breaks before they happen.

Water feature at VanDusen Gardens

Case Study: Water Assets Condition Assessment and Rehabilitation Planning

The Park Board hired consultants in late 2022 to conduct condition assessments for 64 decorative and recreational features operated and maintained by the Park Board. The final report from this work, titled the Water Features Condition Assessment and Rehabilitation Planning Report, includes both short and long-term rehabilitation recommendations and financial estimates for each feature. The water assets chosen as part of this project were decorative fountains, decorative waterfalls, ponds, spray parks, wading pools and children's water play features. The results of this project will assist in the development of a broader park feature inventory, rehabilitation cost estimates, and maintenance recommendations. The findings will also will help guide Park Board prioritization of retrofits, conversions and overall water consumption.

Action 4.2: Develop and Resource a Preventative Maintenance Schedule

Timeline: **Mid to Long-term**

Contributes to goal from: **Green Operations 2.0, VanPlay, Rain City Strategy, Climate Change Adaptation Strategy**

Building on findings from the Inventory and Analysis, staff will develop a schedule to maintain and replace near or end-of-life infrastructure prior to severe system breaks. This will include identifying timelines and budgets for ongoing and urgent maintenance, and will require prioritization of short-term changes that can be made within the current capital planning term. Preventative maintenance is an operating need, and one that is not currently accommodated within the current operating budget. Having a preventative maintenance plan and schedule that spans into the future can help the Park Board to make accurate budget requests with each new budget cycle.

Objective 5: Be water-smart when designing new parks and park redevelopments

Champion Team:
Planning and Park Development, Strategic Operations and Board Relations (Facilities team), with involvement from City Engineering and Park Operations.

Complying with by-laws and fixing water inefficiencies helps the Park Board to show leadership in water conservation practises. However, for this WPAP to be successful, the Park Board must also carefully consider future water consumption when creating and redesigning parks and facilities, and when adding new features to parks.

Water feature at Marine Square

Action 5.1: Develop a water budget

Timeline: **Short term**
Contributes to goal from: **All plans**

Staff will develop a Park Board-wide water allocation budget to guide park development, re-development and operations. This action will involve forecasting future water demands, costs, supply and environmental changes, and other considerations that could influence the availability, price, and sustainability of water. This water allocation budget can help to guide the development, retrofit, replacement and decommissioning of all Park Board water assets. It should occasionally be re-visited as the knowledge about climate change, drought, and the cost of water changes with time.

Objective 6: Work together

Champion Team:
Collaborative: Planning and Park Development, REFM, Park Operations, Engineering

Many departments collaborate to provide and maintain water infrastructure in parts. Some of the main players include Engineering, Planning and Park Development, Park Operations and Real Estate and Facilities Management (REFM). Engineering owns the service line infrastructure that supplies the water to the park water features and monitors use, the Park Board owns these water feature structures, and Park Operations and REFM maintain those features. REFM operates under a service agreement with the Park Board and supplies all trades personnel; while Park Operations performs non-trade maintenance in parks.

DEPARTMENT/AGENCY	JURISDICTION OVER WATER FEATURES IN PARKS
BOARD OF PARKS AND RECREATION	Custodianship (planning, governance and strategic direction) of water features, parks and recreation facilities, and Park Board community gardens.
ENGINEERING	Supplies water to parks and features by way of engineering infrastructure (i.e. plumbing and drainage). Monitors and analyzes potable water consumption throughout the city.
REAL ESTATE AND FACILITIES MANAGEMENT	Supplies trade-specific maintenance personnel (as directed by the Park Board) to respond to maintenance requests.
PARK OPERATIONS	Supplies non-trade maintenance personnel. Responsible for monitoring asset condition and submitting maintenance requests to REFM as needed.
STREETS	Ownership (planning, governance and strategic direction) of right-of-way.
ENGINEERING - GREEN INFRASTRUCTURE	Planning and design of green rainwater infrastructure. Coordinates with the Park Board for rainwater integration in parks.
METRO VANCOUVER	Supplies water to Metro Vancouver member jurisdictions. Bills each city/municipality for their water consumption.

This division of supply, ownership, and maintenance provides challenges when managing water features, as there is not one specific person or department that is entirely accountable for overseeing all aspects of a given water feature. In the past, deficient inter-departmental communication, monitoring, maintenance, and documentation has resulted in many of the challenges addressed in this WPAP. Moving forward, improved coordination and collaboration can harmonize our efforts and enhance our successes.

Inter-departmental Collaboration Case Study: Civic Metering Project

City of Vancouver Engineering staff are currently installing operational water meters at all City-owned and controlled buildings and facilities, as per the Green Operations 2.0 Plan priority actions. Within park boundaries, this Engineering installation work is being completed alongside Park Board operations staff.

This project is known as the "Civic Metering Project". Unmetered civic facilities are continuously being re-evaluated to determine if any require the installation of additional meters. While most of the large users have now been metered, the more water meters that are installed and closely monitored, the more accurately we can analyze our systems for efficiencies and detect underground leaks. This project continues to shed light on the amount of water being consumed at a number of facilities at the

Inter-departmental Collaboration Case Study: Fieldhouse Urinal Retrofit Project

In some Park Board facilities there are continuously running urinals that waste our valuable potable drinking water. These urinals are equipped with tanks that have a continuous fill rate and flush entirely when full. Retrofits were completed by COV Engineering Water Design and REFM staff at four test sites in 2018 to investigate the water savings resulting from the installation of motion activated sensors to control urinal flushing. These retrofits were found to yield a significant water savings at each fieldhouse location, while still allowing for safe urinal hygiene.

Following the success at each of the test sites, Engineering identified an additional 23 fieldhouses in the park system that had continuously running urinal tanks.

These fieldhouse locations were retrofitted over two project phases, where 15 fieldhouse locations were retrofitted in 2021 and 8 fieldhouse locations were retrofitted in 2022, in collaboration between Engineering and REFM Electrical. These retrofits resulted in a 99% water savings (~250,000 L/ of potable water per year) for each urinal tank and the payback period for these retrofits were less than one year.

In addition to Park Board fieldhouses, there are a number of other facilities that use the same urinal system and may benefit from retrofits. Some of these facilities are: community centers, pools, ice rinks, golf courses, transfer stations, city works yards and other REFM managed properties. Many of these facilities will be investigated and urinal sensors installed in 2023.

Action 6.1: Foster and maintain inter-departmental communication via a working group

Timeline: **Short to Long-term**
Contributes to goal from: **All Plans**

Staff will create an inter-departmental working group including staff from the Planning and Park Development, Park Operations, REFM, and Engineering. Led by Planning and Park Development, the goal of this group will be to meet regularly (e.g. twice per year) to discuss the progress of water prioritization and conservation efforts in parks.

Increased interdepartmental communication has already resulted from the development of this WPAP, and semi-regular working group meetings provide a structure for staff to coordinate efforts and keep plan implementation on the radar.

Action 6.2: Support partnerships to monitor and steward transformed and naturally managed water features

Timeline: **Underway and Long-term**
Contributes to goal from: **All Plans**

The Park Board already supports many partnerships with environmental stewardship groups, urban Indigenous people, and the Musqueam, Squamish and Tsleil-Waututh nations. In many cases, stewarding transformed ponds and streams may be a natural extension of their existing work in parks, which may include removing invasive plants, monitoring biodiversity, and planting native plants.

Initial support may be required to orient existing community leaders to the transformed water features, and to explore new opportunities in parks where stewardship is not taking place. Longer-term, these partnerships may be maintained within the scope of the Environment team's regular work.

Action 6.3: Develop and implement a public communications plan to share information about converted water features and water conservation

Timeline: **Underway and Long-term**
Contributes to goal from: **All Plans**

The Park Board uses educational and interpretive signage, social media posts, web updates, events, informational videos and other public communications to share information with members of the public about our work. Under this action, we will develop a communications plan to help the public understand and interpret the changes they're seeing to water features in parks.

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APPENDIX I: Overview, state of repair and recommendations for Park Board marinas

The Vancouver Board of Parks and Recreation owns and operates two public marinas: Heather Civic Marina and Burrard Civic Marina. Heather Civic Marina is open year-round, with an option for live-aboard mooring. Burrard Civic Marina does not allow for live-aboard mooring and is not open throughout the winter months. Neither Marina has adequate infrastructure for year-round water access due to piping that is not freeze protected. Each winter the marinas drain (winterize) all fire lines on the docks, which is a several day draining process, where the potable water is released into the ocean.

The potable water lines at Heather Civic Marina that supply the live-aboard section are left dripping throughout the evenings when the temperature drops below freezing so that the water lines do not freeze and the residents continue to have access to water. When the evenings are no longer below freezing and the sailing season is about to begin, the fire lines along the docks are again primed, which is a three day filling process.

The majority of the dock and plumbing infrastructure at Heather Civic Marina is near or past end-of-life. Several hose bibs and

Wooden dock and plumbing infrastructure at Heather Civic Marina

hose attachments are leaking into the ocean. While some newer piping has been installed along the main dock, all of the old and broken pipes have been left attached to the dock system and are still open to the elements (not capped). Much of the wooden dock structure is also rotting or broken.

The plumbing and dock infrastructure at Burrard Civic Marina is in varying condition. Some of the main dock structure has been recently replaced, with the new piping laid inside the structure. There are also makeshift attachment walkways connecting the new dock structure to the old dock structure.

In an effort to stop the draining of fire lines every winter into the ocean and priming them again in the spring, it is recommended to upgrade the plumbing to insulated piping so the water lines will not freeze. This would also allow for year-round water access to the marinas for fire suppression purposes, human health and hygiene purposes, as well as to protect the ocean environment from large scale chlorinated water releases. The majority of the plumbing and dock infrastructure at the marinas is also at or near end-of-life and should be replaced. The old infrastructure also needs to be removed as some old and broken piping is hazardous. These recommendations may be expensive in cost (several million); however, they are vital to ensure regulatory compliance, protect the environment from large scale releases of chlorinated water, and to maintain the safety of users at the marinas.

APPENDIX II: Overview of the Park Board WCAP 2017-2020

The first Park Board Water Conservation Action Plan (WCAP) was approved by the Board of Commissioners in 2017. The Action Plan made recommendations on six priority water conservation projects, as well as had an overall goal of reducing potable water use in parks by 33% from a 2006 baseline. While many of the specified actions from the previous WCAP were not implemented, the overarching goal of reducing potable water in parks by 33% from a 2006 baseline was achieved. This was a result of other projects that were completed prior to the development of the initial action plan. In fact, by the time that the 2017 goal was in place, there had already been a 21% reduction in potable water use due to actions unrelated to the 2017-2020 WCAP. Some of these actions were:

ACTIONS THAT RESULTED IN A POTABLE WATER REDUCTION OF 33%	TIMELINE
A lake level sensor control was installed at Trout Lake to control the water input. The potable water input has since been used as a controlled top-up, so the lake maintains the same visual level. (see page "Case Study: Trout Lake")	**Lake level sensor installed in 2014**
A push button was installed at Stanley Park Spray Park (Lumberman's Arch) to ensure that the spray features could operate in compliance with 2015 water use restrictions	**Activation push button installed in 2015**
The water input feed at the Stanley Park Mini Train ponds was throttled down to minimize the amount of water flowing over the waterwheel, into the ponds below.	**Water input turned down in 2015**
The waterfall input feed at Charleson Park was throttled down to minimize the amount of water flowing over the waterfall.	**Water input turned down in 2015**
A timer was installed on the potable water input at Queen Elizabeth Park Waterfall. This water input feed was throttled down to reduce the amount of water flowing over the waterfall.	**Timer installed in 2019**
The Zoo Stream in Stanley Park was turned off. When operating, this once-through water feature did not adhere to City bylaws nor to the Federal Fisheries Act, due to the continuous release of chlorinated water into Burrard Inlet.	**Stream off since 2019**

The six priority actions from the 2017-2020 Water Conservation Action Plan were:

PRIORITY ACTIONS FROM 2017-2020 PLAN	STATUS
Convey outflow water from Stanley Park's Spray Park to the Miniature Train ponds, which flow to Beaver Lake.	**NOT COMPLETED**
Recirculate the waterfall and waterwheel at the Stanley Park Miniature Train ponds.	**NOT COMPLETED**
Recirculate Charleson Park Waterfall and Pond.	**NOT COMPLETED**
Recirculate the pond system at VanDusen Botanical Garden; as well as, identify and address water losses and explore groundwater supply potential.	**NOT COMPLETED** (groundwater supply potential was explored)
Explore irrigation efficiency opportunities.	**NOT COMPLETED**
Address once-through water features.	**NOT COMPLETED**