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SERVICES AND SOLUTIONS FOR A LIVABLE REGION

To: Water Committee

From: Kevin Brown, Superintendent, Watershed Protection, Water Services
Mike Mayers, Division Manager, Watershed and Environmental Management, Water Services

Date: April 12, 2021 Meeting Date: May 13, 2021

Subject: **GVWD Watershed Wildfire Preparedness Update**

RECOMMENDATION
That the Water Committee receive for information the report dated April 12, 2021 titled "GVWD Watershed Wildfire Preparedness Update".

EXECUTIVE SUMMARY
Metro Vancouver provides clean, safe drinking water to 2.7 million residents. An integral component of this service is management of the forested lands surrounding Capilano, Seymour and Coquitlam Reservoirs. These water supply lands are closed to the public for protection from pollution and fire, and to ensure they are solely used for drinking water supply.

The watersheds have a historically low incidence of fire due in large part to these restrictions. Consequently, the primary cause of fire is from lightning strikes during periods of moderate to high fire danger. Most fires are extinguished quickly and without incident due to rapid discovery made possible by real-time lightning detection, staff patrols, local air traffic, and public reports.

The Water Services Protection Program (Protection Program) has staff with expertise in wildfire management, equipment available for strategic deployment, a resource sharing agreement, and monitoring stations ready for the 2021 fire season.

PURPOSE
To provide the Water Committee with an annual update on watershed wildfire preparedness in advance of the 2021 fire season.

BACKGROUND
A watershed is a geographic term to describe a water collection and drainage area from mountain top to convergence with another larger body of water. The Capilano, Seymour and Coquitlam watersheds collect and drain water from mountain ridgetops to Burrard Inlet and the Fraser River respectively. The GVWD water supply areas encompass the mid and upper portions of the Capilano, Seymour, and Coquitlam watersheds and include approximately 60,000 ha of forested lands. Access into these lands is controlled and limited through the *Watershed Access Policy.* The principle of protecting the watersheds by restricting access is a fundamental component of the multiple barrier approach to drinking water quality protection.

The requirements for fire protection on GVWD's watershed lands dates back to the 1927 and 1942 provincial crown land leases. These 999-year leases require Metro Vancouver to protect the lands from wildfire and retain qualified and trained staff for this purpose.

Historically, in the 1920s and 1930s, the watersheds, particularly Seymour and Capilano, experienced large scale, human caused fires due to industrial activities. As the GVWD policy enforcing restricted access came into effect, the primary cause of wildfires shifted to lightning strikes. The Protection Program responded by implementing a system that decreased response times and increased effectiveness in fighting these types of fires. The current Protection Program, based on an Initial Attack (IA) model, utilizes three-person IA fire crews, in conjunction with helicopters, for rapid deployment of resources to fire sites. In addition, Metro Vancouver maintains a resource sharing agreement with the BC Wildfire Service that ensures seamless communications with the Province and allows for additional resource requests should they be needed.

In addition to providing wildfire response within the three water supply areas and the Lower Seymour Conservation Reserve (LSCR), the GVWD Protection Program is also the primary wildfire response for Electoral Area A, and assists the Greater Vancouver Regional District Parks system as required.

WATERSHED WILDFIRE PREPAREDNESS

Preparedness

The Protection Program currently has two dedicated three-person IA fire crews and approximately 25-30 additional Watershed and Environmental Management (WEM) staff trained to a basic fire response level. Drills of varying complexity are conducted throughout the season to maintain proficiency in fire response skill sets and to ensure equipment readiness.

Equipment

For mobile deployment, the Protection Program maintains one dedicated IA truck that is supported by two 4-wheel drive water tankers. These vehicles are staged in North Vancouver and Coquitlam as the fire danger increases within the watershed lands.

The majority of wildfire response equipment (pumps, hoses, hand tools) is stored at the Bone Creek Operations Centre in the LSCR, with strategic cache locations in each watershed.

In 2020, in consideration of protecting reservoir water quality, staff installed three "Heli-well" tanks (one per watershed) that allow helicopters to decontaminate and fill water buckets without directly drawing from the main or alpine reservoirs. The Heli-well tanks are strategically located throughout the watersheds at points that would improve water delivery response time. Lightning strike fires often occur in steep terrain inaccessible by vehicle. Helipads, strategically located throughout the water supply lands, are maintained to support the initial air attack of emerging wildfire in these situations. A helicopter use contract for fire response and other operations is in place to ensure necessary helicopter resources are available throughout the busy fire season.

Resource Sharing Agreement

Metro Vancouver maintains an agreement with the BC Wildfire Service (BCWS) in which fire-fighting resources are shared between both parties. This agreement is the basis for a strong and positive

relationship which is of great benefit to both groups when assistance is required. Metro Vancouver crews routinely backfill BCWS resource shortfalls throughout the Coastal Fire Centre and, as required, BCWS crews can be stationed at the Bone Creek Operations Centre to provide additional support to GVWD response efforts. This arrangement has been in place since 1997 and has been effective for regional response to fire situations.

Interagency Preparedness

Staff work with various municipal partners, including the North Shore Interface Wildfire Working Group, Coquitlam Fire & Rescue, and the Metro Vancouver Wildfire Conditions Task Group, to ensure preparedness and coordinated response across the region. Groups meet throughout the fire season to discuss communications, planning, specific critical issues, drills, and equipment availability.

Specifically, District of North Vancouver Fire & Rescue Services and Metro Vancouver staff continue to share cross training opportunities. Metro Vancouver staff have been taking part in various Incident Command System and interface wildfire training hosted by the District.

Monitoring

Water Services staff carry out extensive fire weather monitoring and publish a weekly Fire Weather Report. This report utilizes data from eight weather stations located throughout the water supply lands and the Metro Vancouver region. Municipal fire chiefs, regional/municipal parks staff, and the emergency planning community rely on this information to determine the fire danger rating for their jurisdictions and the appropriate public activity restrictions.

Staff continue to investigate and monitor the current state of forest health within the watersheds and to track changes over time associated with climate change. Working with neighboring watershed managers in the Pacific Northwest, a shared goal is to better understand wildfire and water quality implications from changing forest health trends.

Interface Areas and Fuels Management

Forest fuel management along the residential interface areas of the Capilano Watershed (British Properties) have been completed and are now in a maintenance phase. Interface fuel management for Seymour and Coquitlam falls to other jurisdictions. Other interface areas, including around Water Treatment facilities, are inspected on an annual basis and maintenance treatments (pruning, brushing, etc.) are used as required.

ALTERNATIVES

This is an information report. No alternatives are presented.

FINANCIAL IMPLICATIONS

There are no financial implications.

CONCLUSION

Although the extent, duration, and intensity of the 2021 fire season is unknown, the Protection Program is well positioned to effectively react to wildfires within the water supply lands and the region. Strong relationships built over many years with the BC Wildfire Service, local fire departments,

and other emergency services ensures a rapid and well-coordinated response should additional resources be required to respond to a large scale wildfire.

Attachments

1. Heli-well Installation, Interagency Equipment Showcase Photos
2. Single Tree Fire Photo

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Heli-well Installation in Seymour Watershed

North Shore Interagency Equipment Showcase – Pre-COVID

Single Tree Fire in the Seymour Watershed – 2017

To: Water Committee

From: Paul Kohl, Director, Operations and Maintenance, Water Services
Lucas Pitts, Acting Director, Policy, Planning and Analysis, Water Services

Date: May 6, 2021 Meeting Date: May 13, 2021

Subject: **Water Supply Forecast and Water Consumption Update for Summer 2021**

RECOMMENDATION
That the Water Committee receive for information the report dated May 6, 2021, titled "Water Supply Forecast and Water Consumption Update for Summer 2021".

EXECUTIVE SUMMARY
This report summarizes the current state of source water supply and trends in water use and reflect current plans for operating the source reservoirs and water system this summer and fall.

The existing snowpack, overall precipitation in the form of rainfall, and expected full source lake storage will be sufficient to ensure adequate water supply for the 2021 summer season. Peak day and winter water use continue to decrease while average day water use is starting to stabilize, indicating the importance of continued conservation initiatives. System improvements have increased the capacity of the transmission system to meet peak summer demands.

PURPOSE
To provide the Committee and Board with the annual update on the current water supply and water consumption situation in advance of the approaching summer peak demand period.

BACKGROUND
As per the Committee's 2021 Work Plan, and those of previous years, water supply and water consumption status reports are brought forward to the Committee and Board each spring. These reports are developed based on the current state of source water supply and trends in water use and reflect current plans for operating the source reservoirs and water system this summer and fall.

CURRENT SOURCE WATER SUPPLY SITUATION

Snowpack
Snowpack measurements are routinely conducted at sample sites across the Capilano, Seymour and Coquitlam watersheds. The April 1, 2021 survey results indicate that the depth and water equivalent of the current snow pack are respectively 124% percent and 120% percent of the historical average for this time of year. These survey results indicate an above average spring runoff from snowmelt.

While snowpack is important, it should be noted that the region's water supply is not solely dependent on snowpack. Overall precipitation in the form of rainfall contributes to the water levels in the three primary source reservoirs that serve Metro Vancouver.

Stored Water - Source Reservoirs

a) Capilano Reservoir: currently being managed under the spring operating protocol with the reservoir currently at 71 percent of full summer storage capacity. The GVWD expects the drum gate to be returned to service by June and anticipates that the reservoir will be at full capacity by early summer.

b) Seymour Reservoir: currently being managed under the spring operating protocol with the reservoir currently at 81 percent of full summer storage capacity. The reservoir is expected to be at full capacity by early summer.

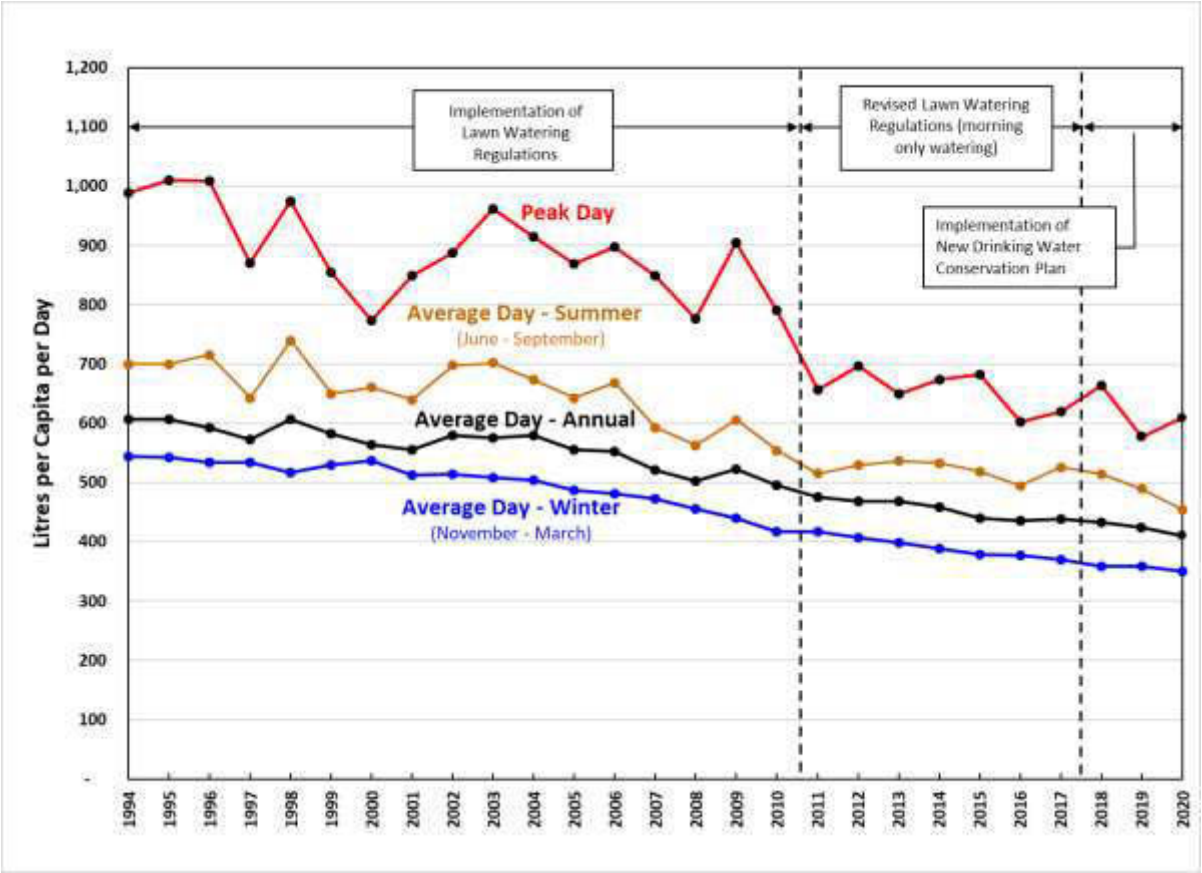
c) Coquitlam Reservoir: controlled by B.C. Hydro within criteria established by agreement with the GVWD. It is expected that BC Hydro will have Coquitlam reservoir sufficiently full to provide for adequate regional summer water supply and the necessary allocation for fisheries flows in the Coquitlam River. BC Hydro is upgrading their tunnel gates in the fall and there will be no impact to the summer water supply.

d) Alpine Lakes: GVWD's three alpine lakes, Palisade, Burwell and Loch Lomond, which are used as reserves for Capilano and Seymour reservoirs during the summer period, are all expected to be at full capacity by early summer.

Trends in Water Consumption/Use

This section discusses trends in water consumption/use, as well as some of the factors affecting water use. Figure 1 shows water use in the region in litres per capita per day for the years 1994 to 2020.

Figure 1 – Peak Day, Average Day and Winter Day Per Capital Water Use in the Region



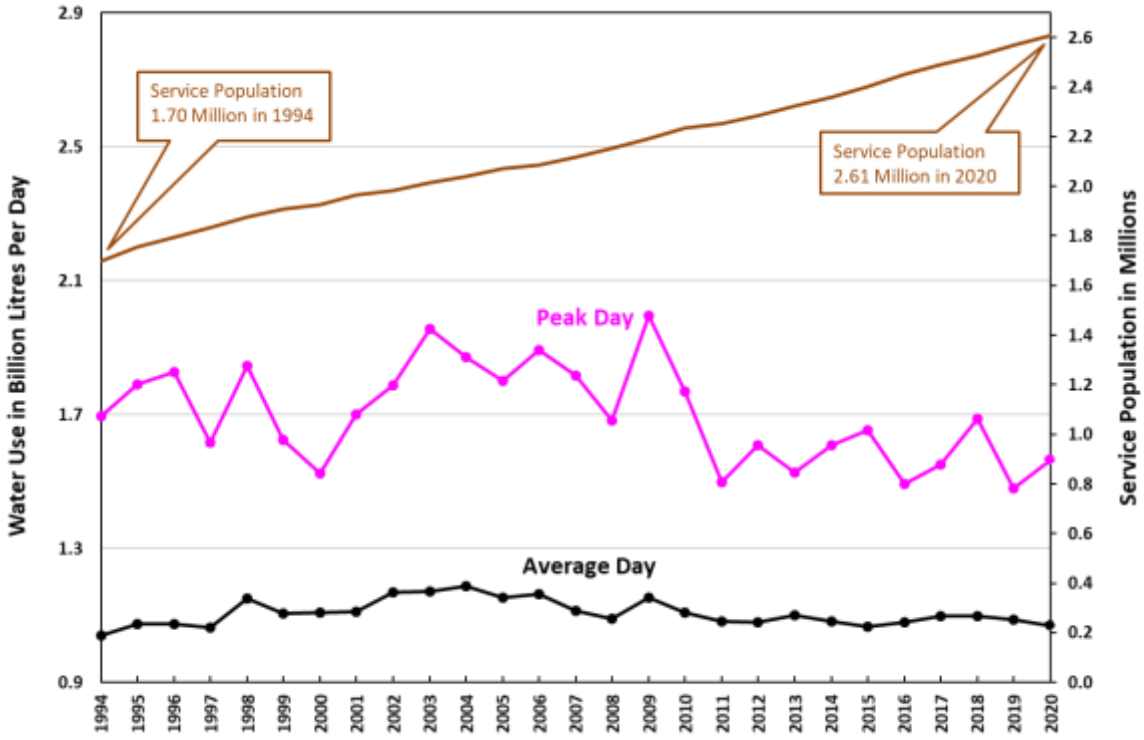
The upper (red) line in Figure 1 shows peak day water use over the 26-year period. Historically, the peak day usage occurs on a hot and dry summer day when many people in the region are watering their lawns. The *Drinking Water Conservation Plan* (DWCP) includes annual implementation of Stage 1 restrictions on May 1 that limit lawn watering for residential and non-residential properties to two mornings a week. In 2018, the Board endorsed *Region-wide Guide for Enforcement of Metro Vancouver's Drinking Water Conservation Plan* as a resource for member jurisdictions. Key performance metrics on education and enforcement of the DWCP were first collected from member jurisdictions in Summer 2018 and continue to be monitored. This information is helpful in moving the region toward more consistent best practices for enforcement of the DWCP regulations.

The middle (black) line in Figure 1 shows the average day per capita water use over the 26-year period. This represents the overall regional water use on a per capita basis, which has been gradually trending downwards. In more recent years, there are indications that per capita water use is stabilizing, indicating the importance of continued water conservation initiatives. Metro Vancouver staff will work with staff at member jurisdictions on possible revisions to the Drinking Water Conservation Plan to allow implementation of region-wide summertime lawn watering bans in drought years. This could allow for the deferral of some supply expansion projects if supported by robust water conservation communications and active local bylaw enforcement to ensure compliance with regulations. Without this support, growing demand for water from an expanding population and the effects of climate change (less snowpack and longer, drier summers) will put a significant strain on our ability to supply drinking water to the region.

The lower (blue) line in Figure 1 shows winter per capita water use steadily declining between 1994 and 2020, in part due to recent water efficiency and conservation policies. During the winter months of November to March, outdoor water use is generally low with little fluctuation due to weather conditions, making winter water use on a per capita basis a good measure for comparing baseline water use from year to year. Metro Vancouver's Drinking Water Management Plan (DWMP), first approved in 2005 and updated in 2011, includes water conservation actions for Metro Vancouver and member local governments. Work is currently underway to modernize and update the DWMP from its 2011 version. During 2021 Metro Vancouver will be working collaboratively with our partners to update the document.

Figure 2 shows service population and total water use in billions of litres per day. Although total water use has stabilized in recent years, it is expected to increase as the effect of population growth on water demand begins to exceed per capita water use reductions due to water efficiency. During 2020 annual water use decreased 3% from the forecasted consumption figures. Metro Vancouver is unsure at this time whether the reduction is as a result of COVID-19 or larger economic impacts in the Region.

Figure 2 – Population Growth and Daily Water Use



SYSTEM OPERATIONS OUTLOOK FOR SUMMER 2021

Water usage patterns will be monitored and adjustments made to withdrawals from each of the three main sources and within the transmission system to meet the regional water demand through the summer and fall. Additional withdrawals from Coquitlam Reservoir have been secured from BC Hydro for 2021. The three alpine lakes will also be utilized within their refillable storage limits, as required.

Hot and dry summer weather conditions drive demands and may create challenges for the transmission system to meet service levels in parts of the region, most notably in the southern and eastern parts that are both geographically furthest from the sources and are experiencing the fastest population growth rates. Systems upgrades such as the Barnston Maple Ridge Pump Station, Port Mann Main #2, the Port Mann Water Supply Tunnel, Clayton Reservoir and the South Delta Main No. 1 Replacement (Phases 1 and 2) have all contributed to additional transmission system capacity to meet summer peak demands in both the eastern and southern jurisdictions and will continue to benefit the regional transmission system in summer 2021.

In the event that summer water storage supplies become stressed, Metro Vancouver will introduce upgraded water restrictions in accordance with the Drinking Water Conservation Plan.

ALTERNATIVES

This is an information report; no alternatives are presented.

FINANCIAL IMPLICATIONS

During the hotter and drier months, the demand for water increases significantly over that in the winter, putting additional stress on the water supply system. Metro Vancouver's seasonal pricing reflects the cost of building larger infrastructure and higher operating costs such as increased pumping to meet peak summer demands. Historically water rate increases have been spread equally between the peak (summer) and non-peak rates (winter). As part of the Region's commitment to water conservation the 2021 water rate increase was applied only to the peak rate.

CONCLUSION

The existing snowpack, overall anticipated precipitation in the form of rainfall, and expected source storage will be sufficient to ensure adequate water supply for the 2021 summer season.

Although the region's population continues to grow; historically, overall water demand has remained relatively steady, generally offset by conservation measures. However, overall water use is increasing gradually as the effect of the rate of population growth on water demands begins to exceed the per capita water use reductions. Outdoor watering regulations, along with our regional partners' implementation of the Region-wide Guide for Enforcement of the DWCP, are expected to help manage water demands during the upcoming peak season.

System improvements have increased the capacity of the transmission system to meet peak summer demands.

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To: Water Committee

From: Daniel Roberge, Director, Water Services

Date: May 3, 2021 Meeting Date: May 13, 2021

Subject: **Update on Cleveland Dam Safety Enhancements Program**

RECOMMENDATION

That the Water Committee receive for information the report dated May 3, 2021, titled "Update on the Cleveland Dam Safety Enhancements Program".

EXECUTIVE SUMMARY

Metro Vancouver is updating the public warning system along the Capilano River downstream of the Cleveland Dam. This includes installing audible and visible alarms, installing new signage, evaluating access areas, and enhancing our communications and education. Starting May 13, the first of two phases of public engagement will begin, during which the public, stakeholders, and First Nations will be invited to provide input on various themes to help inform the design of the long-term enhanced public warning system.

This work is in addition to extensive internal reviews of our dam operations and procedures.

PURPOSE

To report on the status of Metro Vancouver's initiatives to enhance public safety along the Capilano River downstream of the Cleveland Dam.

BACKGROUND

On Thursday, October 1, 2020, the spillway gate at the Cleveland Dam released a large volume of water into the Capilano River while it was undergoing maintenance. Metro Vancouver recognizes the impact that this had on everyone involved and is committed to ensuring this never happens again. As part of the commitment to make improvements, enhancements are being made to the public-facing warning systems, including the installation of new signage as well as audible and visible alarms.

CLEVELAND DAM SAFETY ENHANCEMENTS PROGRAM

Metro Vancouver is installing an interim alarm system in Capilano River Regional Park intended to be operational for up to two years, with a long-term system to be designed over the next two years with input from North Shore municipalities, First Nations, stakeholders, and through two rounds of public engagement. The goal is to have the interim alarm system in place in advance of returning the spillway gate at the Cleveland Dam back into service to raise the reservoir level to ensure there is sufficient drinking water supply to last through the summer and fall.

Project Timeline

- Spring 2021: Install public-facing warning alarms with visible and audible signals;

- June 2021: Cleveland Dan spillway gate is returned to service and water is stored in the reservoir for use during the summer season;
- May – July: First phase of public engagement on enhanced public warning system;
- 2021: Design long-term options for enhanced public warning system;
- Spring 2022: Second phase of public engagement on enhanced public warning system; and
- Fall 2022: Construction of long-term public warning system enhancements.

Locations of the Interim Public-Facing Alarms
Construction of the audible and visible alarms will take place mid-April–May 2021. The alarms will be installed at six locations along the Capilano River (see Attachment):

- Cleveland Dam Screen Room;
- Capilano Salmon Hatchery;
- Trans-Canada Highway Bridge;
- Fullerton Bridge;
- Marine Drive Bridge; and
- Taylor Way Bridge on Squamish Nation's reserve lands.

The locations were chosen based on research of industry best practices, assessment of the Cleveland Dam and the Capilano River, preliminary input from representatives of Squamish Nation and the North Shore municipalities, and input by dam public safety experts. Locations will be further refined for the long-term design based on input from external partners and stakeholders over the next year.

Public Engagement
During the public engagement process, the goal is to share how the interim alarm locations were developed, understand any issues, and generate suggestions that will help improve the options for development of the long-term public warning system.

Starting on May 13, 2021, the first of two phases of engagement will begin to help inform the long-term solution for the enhanced public warning system. Phase 2 of engagement will take place once the draft design for the long-term system is complete. The results of the initial public engagement process will be combined with the expertise of third-party engineering consulting firms and shared with the pubic and other partners for further input to inform long-term public warning system enhancements before the design is finalized.

Engagement will include Squamish Nation, Tsleil-Waututh Nation, the North Shore municipalities, and groups who are known to be active along the river to learn of their experiences with the interim system.

Next Steps and Ongoing Collaboration
Metro Vancouver will continue to work closely and collaborate with staff from North Shore municipalities and Squamish Nation throughout this process to ensure technical and permitting requirements are being considered. This will help in the evaluation of the interim measures and in developing opportunities to hear from the community as options for the long-term enhanced public warning system are refined.

ALTERNATIVES
This is an information report; no alternatives are presented.

FINANCIAL IMPLICATIONS
The costs of these actions are contained within the Water Services Minor Capital program. The budget for the permanent long-term Public Warning System will be presented later this year as part of the 2022 budget submission.

CONCLUSION
A set of public-facing alarms will be installed along the Capilano River downstream of the Cleveland Dam. The installation of these alarms is a direct response to public, stakeholder, and First Nations input following the Cleveland Dam event of October 1, 2020. The alarms are the first step in a two-year program intended to result in an enhanced public warning system along the Capilano River. The long-term public warning system will be informed by technical expertise from third-party experts, the dam safety best practices, and by two phases of engagement, during which Metro Vancouver will actively seek feedback on various public safety enhancement options along the river.

Attachment
Location of new public-facing alarms

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ATTACHMENT


LOCATION OF NEW PUBLIC-FACING ALARMS
N
Capilano Watershed NO ACCESS
Capilano Lake
SITE 1
Cleveland Dam Screen Room
Capilano River Regional Park
SITE 2
Capilano River Fish Hatchery
DISTRICT OF WEST VANCOUVER
DISTRICT OF NORTH VANCOUVER
SITE 3
Trans-Canada Highway Bridge
SITE 4
Fullerton Bridge
SITE 5
Marine Drive Bridge
SITE 6
Taylor Way Bridge