
To: Water Committee

From: Paul Kohl, Director, Operations and Maintenance, Water Services

Date: May 27, 2020 Meeting Date: June 18, 2020

Subject: **2019 GVWD Dam Safety Program Annual Update**

RECOMMENDATION

That the Water Committee receive for information the report dated May 27, 2020, titled “2019 GVWD Dam Safety Program Annual Update”.

EXECUTIVE SUMMARY

GVWD owns and operates five drinking water supply dams that are regulated by the Ministry of Forests, Lands, Natural Resource Operations and Rural Development Dam Safety Branch. The Water Services Dam Safety Program is fully compliant with the requirements outlined in the Provincial Dam Safety Regulation (BC Reg. 40/2016) as required for all dam owners in British Columbia. There were no significant concerns identified from the 2019 routine surveillance, monitoring, or formal dam inspections.

PURPOSE

To provide the Water Committee with an annual update on dam safety activities associated with the Cleveland, Seymour Falls, Palisade, Burwell, and Loch Lomond dams.

BACKGROUND

The Water Services dam safety team monitors and reviews the performance of the five GVWD water supply dams to ensure they remain safe and continue to provide reliable sources of drinking water. A dam surveillance consultant is retained to carry out third party review and reporting on dam monitoring and inspection activities. The dam safety team supports the goals and initiatives of the Board Strategic Plan and Drinking Water Management Plan through contribution to the provision of clean, safe drinking water, and ensuring the long-term financial and functional resilience of the water supply dams.

GVWD WATER SUPPLY DAMS

Cleveland Dam and Seymour Falls Dam

Cleveland Dam (CLD) is a 92 m high concrete gravity dam that impounds Capilano Reservoir, while Seymour Falls Dam (SFD) is a 30 m high composite concrete and earthfill dam that impounds Seymour Reservoir. Both dams include outlets to release water downstream to their respective rivers, as well as water supply intakes to convey water for treatment at the Seymour Capilano Filtration Plant. The reservoir areas upstream of the dams are kept clear of debris with a series of booms, which float on the reservoir surface and prevent the passage of debris towards the dams.

Alpine Lake Dams

The Alpine Lake Dams range in height from 5.8 m to 8.2 m. Palisade and Burwell Dams are rockfill dams with concrete slabs on the upstream faces, while Loch Lomond Dam is a concrete dam. All three alpine lake dams include spillways and outlets that allow for the release of water to their respective downstream reservoirs. Palisade Lake discharges to the Capilano Reservoir, while Burwell and Loch Lomond Lakes discharge to the Seymour Reservoir. The Alpine Lakes are used to augment summertime demand from the two water supply reservoirs.

GVWD DAM SAFETY COMPLIANCE

Cleveland Dam and Seymour Falls Dam fall under the Extreme Consequence classification of the Provincial Dam Safety Regulation, while the three Alpine Lake Dams fall under the Significant Consequence classification. The following work was completed in 2019 to ensure continued compliance with the Dam Safety Regulation:

- Weekly site surveillance, at a minimum, was carried out at CLD and SFD, as required at Extreme Consequence dams.
- Monthly site surveillance is typically required at Significant Consequence dams, unless otherwise specified in the Operation, Maintenance, and Surveillance (OMS) Manual. The Alpine Lake Dams were inspected routinely by Metro Vancouver staff, as per the OMS Manual, between June and September only, due to their remote locations and winter helicopter access restrictions.
- Semi-annual formal inspections were carried out at CLD and SFD, as required for Extreme Consequence dams. Annual formal inspections were carried out at the Alpine Lake Dams, as required for Significant Consequence dams.
- Annual test operation of mechanical, electrical, and communication components were carried out at all five dams, as required for Extreme and Significant Consequence dams.
- Annual collection, analysis, and interpretation of readings from instrumentation is required for Extreme and Significant Consequence dams. CLD and SFD instrumentation readings were collected at various intervals from daily to annually. The data from instrumentation at the Alpine Lake Dams is reviewed at least annually.
- Annual review of contact information in the Emergency Response Plan (ERP), and if necessary, revision and submission to the Provincial Dam Safety Officer is required for Extreme and Significant Consequence dams. The internal and external contact information for all five dams was reviewed and re-submitted to the Dam Safety Officer in the winter of 2019.
- The OMS Manual and ERP for Extreme Consequence dams should be reviewed every seven years and revised and reported to the Dam Safety Officer, if necessary. The CLD and SFD documents were reviewed in the fall of 2019, and revised and submitted to the Dam Safety Officer.
- The OMS Manual and Ancillary Response Plan (ARP) for Significant Consequence dams should be reviewed every ten years and revised and reported to the Dam Safety Officer, if necessary. The

Alpine Lake Dams documents were last reviewed and reported in July 2016. The next review and submission should occur before July 2026. A review is in progress.

- A formal dam safety review should be carried out, with the report submitted to the Dam Safety Officer, every seven years for Extreme Consequence dams. The last dam safety reviews for CLD and SFD were completed in 2016 and 2014, respectively, and the next reviews will be carried out in 2023 and 2021. No unsafe or unacceptable conditions in relation to the design, construction, or operation were identified for either dam.
- A formal dam safety review is not required for Significant Consequence dams. Regardless, a dam safety review was carried out for the Alpine Lake Dams in 2012, with results indicating the dams are being operated and maintained in a satisfactory manner. Another dam safety review will be carried out following completion of on-going assessments and related follow-up activities.

ALTERNATIVES

This is an information report. No alternatives are presented.

FINANCIAL IMPLICATIONS

There are no financial implications arising from this report.

CONCLUSION

The Water Services Dam Safety Program is compliant with all dam safety regulatory requirements and continues to meet or exceed requirements of the Provincial Dam Safety Regulation. No significant concerns were identified by the Metro Vancouver Dam Safety team or dam surveillance consultant from the 2019 routine surveillance, monitoring, or formal dam inspections.

Attachment

Photos of the GVWD Water Supply Dams

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Cleveland Dam



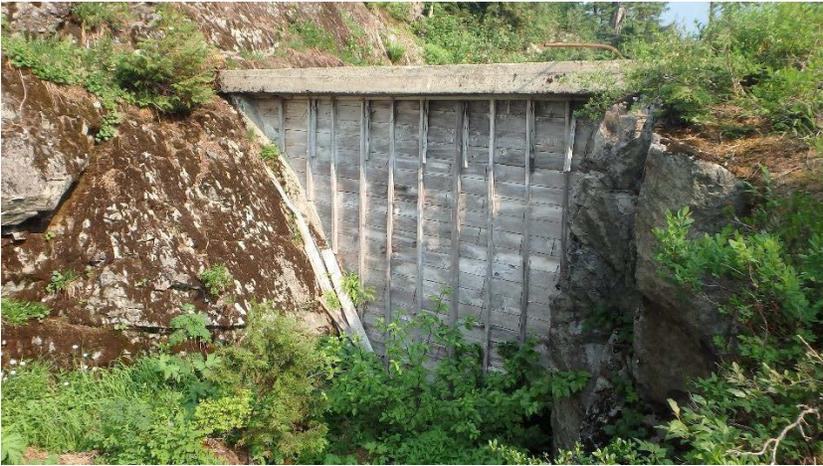
Seymour Falls Dam



Palisade Dam



Burwell Dam



Loch Lomond Dam

To: Water Committee

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

Date: May 26, 2020 Meeting Date: June 18, 2020

Subject: **GVWD Watershed Wildfire Preparedness Update**

RECOMMENDATION

That the Water Committee receive for information the report dated May 26, 2020 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 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, resource sharing agreements, and monitoring stations ready for the 2020 fire season.

PURPOSE

To provide the Water Committee with an annual update on watershed wildfire preparedness in advance of the 2020 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 protected 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 40 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.

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. An annual helicopter use contract for fire response and other operations is managed by Water Services. This contract ensures 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.

A recent initiative between District of North Vancouver Fire & Rescue Services and Metro Vancouver focused on cross training opportunities, situational awareness, and sharing equipment; resulting in strengthened wildfire preparedness for both the watershed lands and local forested public areas.

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 neighbouring 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 2020 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. Preparedness, Planning, and Equipment Photos
2. Deployment Photos

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Image 1: Preparedness exercise



Image 2: Initial Attack response truck at Bone Creek Operations Centre



Image 1: Metro Vancouver crews working on behalf of the BCWS near Harrison Lake



Image 2: North Shore Interagency Wildfire "Dry Lightning" Exercise 2019