

BEAVER CREEK WATER SYSTEM

ANNUAL REPORT
2025



**ALBERNI-CLAYOQUOT
REGIONAL DISTRICT**

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1.0 Background

Purpose of the Annual Report

This annual report offers a comprehensive overview of the Alberni-Clayoquot Regional District's (ACRD) Beaver Creek Water System (BCWS). As part of our commitment to the community, the ACRD provides this report to ensure transparency and keep residents informed. It serves as a resource for water consumers to better understand the status of their individual water system and stay updated on the annual activities and services provided.

Regulating Authority

The Province of British Columbia's Drinking Water Protection Act and Regulation prescribes the required performance of drinking water suppliers. Island Health is responsible for overseeing water systems within the ACRD, with the primary goal of minimizing health risks to the public and ensuring safe drinking water is supplied to communities. In accordance with these regulations, water systems are required to have operators certified by the Environmental Operators Certification Program (EOCP) at a classification level that aligns with the system's requirements.

Management

The ACRD's Community Services Department is responsible for the overall management of the BCWS. An advisory committee, consisting of the Beaver Creek Electoral Director and volunteer community members, provides guidance and recommendations to ACRD management on matters regarding infrastructure improvements, bylaws and costs.

Beaver Creek Water System Overview

Beaver Creek is a community of 2,946 (2021 Census) which borders the City of Port Alberni (CPA) on the south, the Beaufort Electoral Area on the north and east, and the Sproat Lake Electoral Area on the west. The Stamp and Somass Rivers form the western boundary of Beaver Creek. The Beaver Creek Improvement District converted into a local service area of the ACRD on June 1st, 2012.

The majority of the BCWS was built in the 1960's, originally using asbestos cement pipe, with newer upgrades constructed using polyvinyl chloride (PVC). The system's original source was the Stamp River, but it now receives water from the CPA under a bulk water agreement. CPA water is chlorinated and enters Beaver Creek at the Strick Road Booster Pump Station, where it is rechlorinated before distribution.

The system is certified as a Level Two Water Distribution System by the Environmental Operators Certification Program (EOCP). It is operated and maintained by three full-time staff members, two of whom are certified Level Two Operators and one who is certified as a Level One Operator.

The Beaver Creek Water System includes:

- Concrete reservoir on Kitsuksis Road, volume of 1,135 cubic meters
- Bolted steel reservoir on Beaver Creek Road, volume of 273 cubic meters
- Glass fused reservoir on Kitsuksis Road, volume of 1,135 cubic meters
- Strick Road Pump Station
- Darnley Road Pump Station
- North Reservoir Pump Station
- Stamp River Pump Station and Intake (currently not active)
- Number of Services (Customers): 1,083 (2 new connections in 2025)
- Number of water parcels: 1,058
- Population: 3,096 (BC Stats 2021)
- Total length of mains: 45 kilometers
- Total number of fire hydrants: 131
- The majority (52%) of the distribution system is Asbestos Cement (AC)
- Total bulk water consumption for 2025: 362, 987 cubic meters
- Average daily flow for 2025: 994 cubic meters

2.0 Goal and Targets

It is our mission to provide potable, cost-effective and reliable drinking water through continuous improvements

To achieve this mission, measurable targets for potability, cost-effectiveness and reliability have been set.

Potable Targets:

- 1) No E. coli, no total coliform in any water samples
- 2) Minimum 0.20 mg/L chlorine residual throughout the distribution system
- 3) Less than 1 NTU turbidity in the water
- 4) Meet the Canadian Drinking Water Quality Guidelines for all parameters (including DBPs)

Regular potability sampling of drinking water is conducted for physical, chemical and biological parameters. This testing ensures the water meets the Canadian Drinking Water Quality Guidelines and remains safe for consumption. Each water system operates under an Operational Certificate issued by Island Health, which may specify testing requirements and sampling frequencies.

Potable Target 1 – No E. coli and No Total Coliform in any water samples

Bacteriological testing is conducted weekly at multiple locations throughout the distribution system

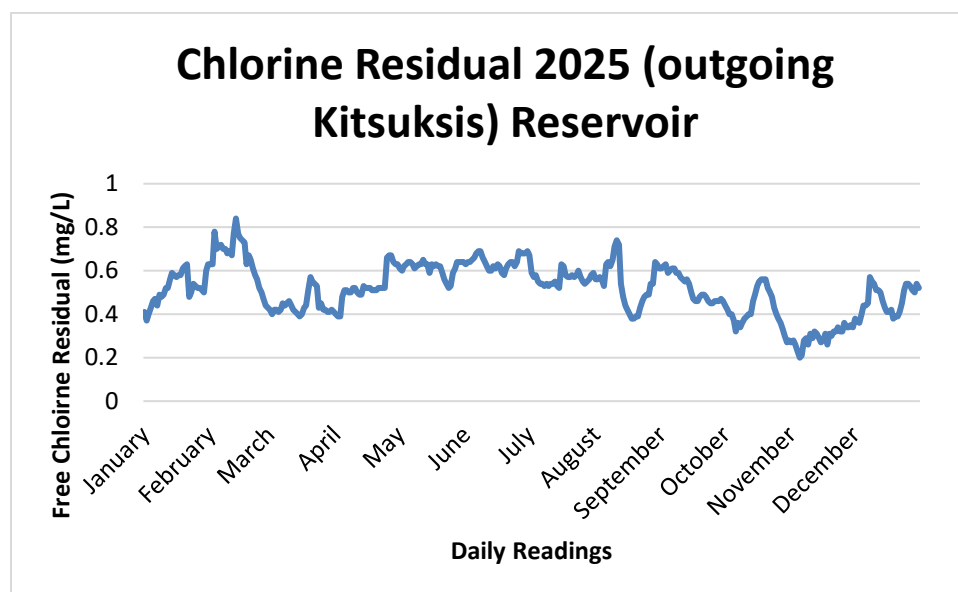
to monitor for total coliforms and E. coli. Sampling locations are selected to ensure broad coverage and a representative assessment of system-wide water quality. Total coliforms and E. coli are used as indicator organisms, as they are practical to monitor and can provide early warning of potential contamination.

According to Island Health's Facility Sampling History, all samples collected in 2025 were confirmed negative for total coliforms and E. coli. A small number of initial results returned false positives. Follow-up sampling was completed in accordance with regulatory requirements, and all resamples met acceptable standards.

Potable Target 2 - Minimum 0.20 mg/L Chlorine Residual

To support water quality throughout the distribution system, water mains are regularly flushed to remove accumulated sediment by increasing flow velocity and scouring the pipes. As water moves through the system, chlorine residual is gradually reduced through reactions with organic matter and materials that may be present within the pipes. Monitoring chlorine residual provides a quick and effective indication of water quality.

While the absence of chlorine residual does not necessarily mean the water is unsafe, confirmatory testing such as bacteriological analysis requires three to four days for results. Low or absent chlorine residuals can indicate reduced water circulation and may signal the need for additional flushing. The graph below shows the chlorine residual as water exits the Kitsuksis Reservoir and enters the distribution system.



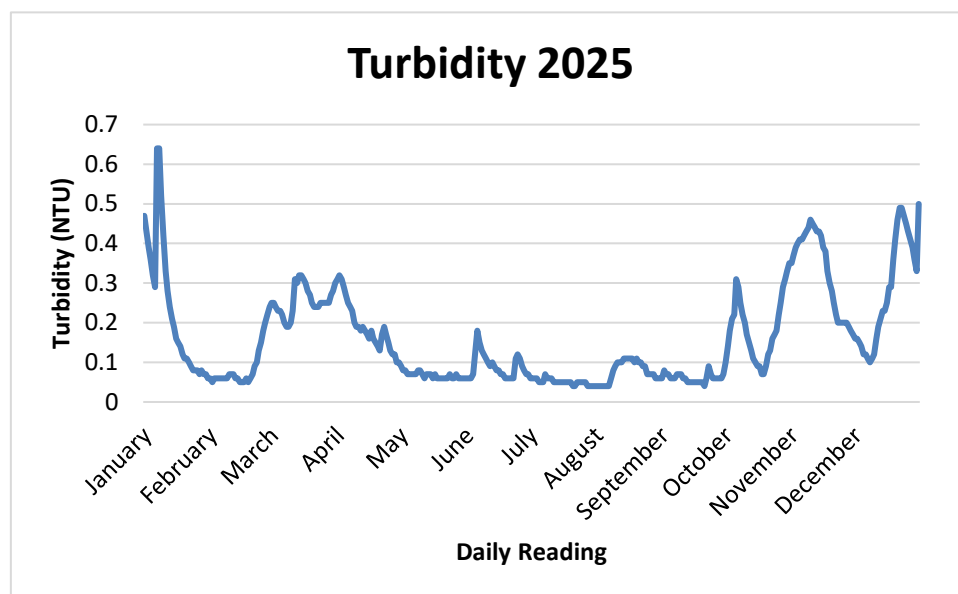
Water system operators regularly monitor free chlorine residuals to maintain a target range of 0.4 to 0.6 mg/L within the reservoirs and at least 0.2 mg/L at the outer limits of the distribution system. Chlorine residuals are generally more stable during the winter months, as chlorine dissipates more quickly in warmer water and under higher flow conditions typically seen in the summer. The data presented reflects chlorine levels measured as water leaves the Kitsuksis Reservoir. In previous years, monitoring was conducted at the

Strick Road Pumphouse. The transition to the Kitsuksis Reservoir provides a more representative measure of chlorine levels within the distribution system.

Variations in chlorine residuals were observed at several points throughout the year. These fluctuations were primarily influenced by changes in source water quality supplied by the City of Port Alberni, requiring ongoing adjustments to maintain consistent disinfection levels. Additional variation occurred during routine calibration and cleaning of the Kitsuksis chlorine analyzer. A temporary decrease to approximately 0.2 mg/L in early November coincided with required repairs to the disinfection system and higher turbidity associated with seasonal rainfall. Throughout these periods, the minimum required free chlorine residual of 0.2 mg/L was maintained within the system, and follow-up dead-end flushing was completed once higher residuals were re-established.

Potable Target 3 - Less than 1 NTU Turbidity in the water

Turbidity is the cloudiness or haziness of a fluid caused by suspended particles. It often increases in lakes and rivers after heavy rainfall, when soil and other materials are washed into the water. This parameter is continuously monitored as high turbidity can reduce the effectiveness of chlorine disinfection.



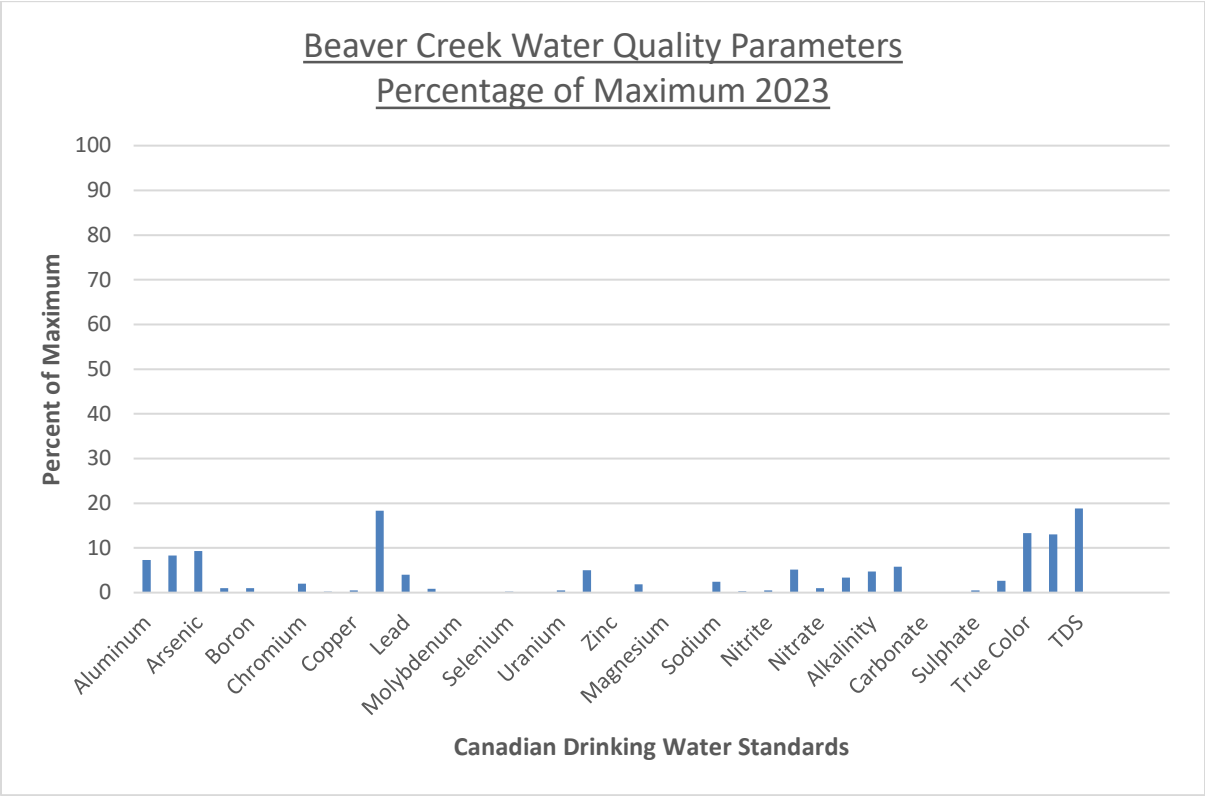
Turbidity monitoring is conducted at the Kitsuksis Road site. This location provides a representative measure of turbidity as water moves through the distribution system. Turbidity levels can be influenced by events in both the City of Port Alberni's system and the BCWS, including water main breaks and changes in source water conditions. These events can alter flow patterns and increase velocities, which may disturb and resuspend sediment within the pipes.

Seasonal increases in turbidity are typically observed during the fall and winter months and are associated with heavy rainfall, which can increase sediment runoff from surrounding watersheds into the source supply. When turbidity entering the system exceeds acceptable levels, automated controls at the pump house can temporarily suspend pumping to protect water quality. While China Creek, the

primary source, generally maintains low turbidity and minimal dissolved organics, significant rainfall events can cause turbidity to exceed the maximum guideline of 1 NTU. During these periods, the system may temporarily switch to the backup source at Bainbridge Lake.

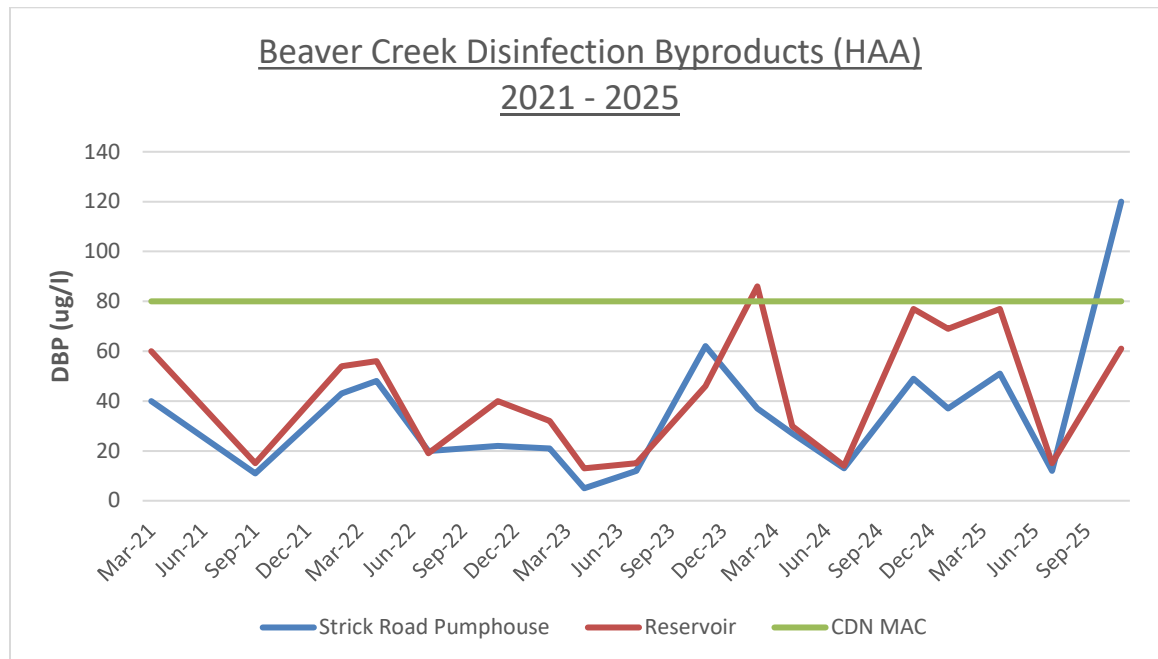
Potable Target 4 - Meet the Drinking Water Quality Guidelines

The ACRD routinely tests the water system to ensure it meets the Canadian Guidelines for Drinking Water Quality (CDWQG). The most recent sampling results are displayed in the graph below. In 2025, routine bacteriological and disinfection byproduct sampling was completed as required. The full potability and chemical analysis, which is conducted on a multi-year cycle, did not occur in 2025 and is scheduled for 2026.



The CDWQG set the maximum acceptable concentration (MAC) for Haloacetic Acids (HAA) at 80 ug/L, based on a quarterly running average. In 2023, all samples collected from the reservoirs and pump houses were well below this limit.

The two disinfection byproducts monitored under the CDWQG are Trihalomethanes (THMs) and Haloacetic Acids (HAAs), which are tested on a quarterly basis. These byproducts form when chlorine reacts with dissolved organics in the source water. Testing in November 2025 showed temporary increases in both parameters during a period of elevated free chlorine levels at the North Reservoir while the system was operating on Bainbridge Lake water during winter rain events. Bainbridge Lake contains higher colour and natural organics, which can lead to increased byproduct formation under these conditions. In response, the chlorine system at the reservoir was taken offline, and levels returned to normal. No further exceedances were recorded.



Cost-Effective Targets:

- 1) Average Water Demand less than 350 lpcd
- 2) Peak Demand Ratio of less than 2:1 PDD:ADD
- 3) O&M cost per customer less than \$400

There are several factors that influence the cost-effectiveness of a system's operation. Efficient management and planning, bulk water procurement and varying water demands all play a crucial role in determining system costs.

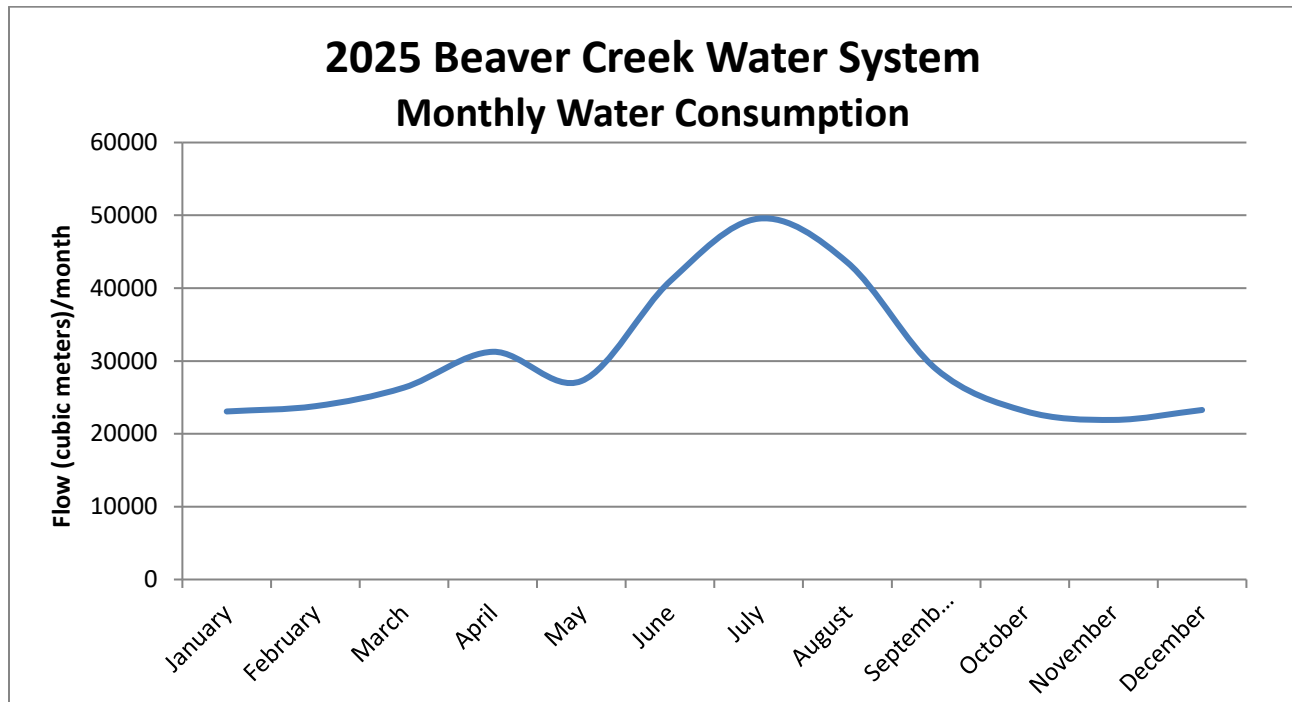
Cost-Effective Target 1 - Average Water Demand less than 350 lpcd

The BCWS purchased bulk water from the City of Port Alberni at a rate of \$0.58 per cubic meter in 2025. This water is treated and distributed to meet system demand. With a service population of 3,096 and total annual consumption of 379,748 m³, the average daily use is approximately 336 litres per person per day (lpcd). This is below the system target of 350 lpcd, as well as last year's average of 341 lpcd, and remains significantly lower than the 2016 UBC survey's provincial average of 494 lpcd.

Efforts to manage demand will continue in 2026 through ongoing public education and routine system monitoring, with the goal of maintaining per capita consumption below the established target.

Cost-Effective Target 2 - Peak Demand Ratio of less than 2:1 PDD:ADD

A water system must be designed to accommodate both peak demand and fire flow requirements. When peak demand is too high, larger water mains may be required, increasing capital costs and creating operational challenges, especially when maintaining water quality during periods of lower use. In this system, peak summer demand is approximately 1,456 m³/day, compared to an average daily demand of 994 m³/day, resulting in a peak-to-average ratio of 1.47:1. This remains well within the acceptable target of 2:1.



Cost-Effective Target 3 – O&M cost per customer less than \$400

Total operating costs for the system were \$636,341 in 2025, excluding capital expenditures, bulk water purchases, and new service installation costs. With 1,083 water service connections, this represents an average operating cost of \$588 per customer. This is a slight increase from \$585 per customer in 2024 and remains above the target. The target of less than \$400 per customer was set in 2019 and has not been reviewed and updated since this time.

Reliability Targets:

- 1) Non-revenue water loss to be less than 15%.
- 2) Maximum # of breaks less than 5/year.
- 3) Annual contribution to capital meets AMP targets of \$768/year

Reliability Target 1 – Non-revenue water less than 15%.

In 2025, the City of Port Alberni supplied 379,748 m³ of water to the Beaver Creek Water System under a metered bulk water agreement. Of this total, 230,881 m³ was recorded through customer meters. The difference between water supplied and metered consumption is reported as Non-Revenue Water (NRW), representing water that enters the system but is not billed. This includes system losses, meter inaccuracies, unauthorized consumption, and authorized unbilled uses. This approach aligns with current industry standards for reporting system performance.

Of the total water supplied, 148,867 m³ is classified as NRW, including 19,874 m³ used for essential operations and 128,993 m³ categorized as unaccounted-for water. The unaccounted-for portion represents 34% of the total volume entering the system, an increase from 20% in 2024, and highlights ongoing challenges in tracking and managing system losses. During the transition to a new meter reading system, data transfer issues affected the accuracy of some customer consumption records, and portions of billing were estimated using historical averages, which likely influenced the overall totals.

As a result, Beaver Creek purchased 148,867 m³ of non-revenue water from the city at a cost of \$86,343. This represents an increase from 2024, when 91,114 m³ was purchased at a cost of \$45,557.

Reliability Target 2 – Maximum # of breaks less than 5/year

In 2025, the BCWS recorded three water main breaks and ten service line breaks. Most incidents were linked to aging infrastructure and ongoing deterioration. These results highlight the need for continued investment in asset renewal and proactive replacement to reduce failures and associated repair costs. Two service line breaks occurred during summer ditching activities when Mainroad Contracting, on behalf of the Ministry of Transportation and Transit, struck BCWS infrastructure.

System pressure can also contribute to breaks, particularly during low-demand periods such as overnight hours when pumping increases pressure within the network. To reduce this risk, pumping is scheduled during periods of higher demand, allowing reservoirs to be refilled while maintaining more stable system pressures.

Reliability Target 3 – Annual contribution to capital meets AMP targets

Since its adoption in 2019, the Beaver Creek Water System Asset Management Plan (AMP) has guided long-term infrastructure renewal by assessing asset condition, replacement costs, and timing. It supports strategic investment decisions to reduce service disruptions, manage risk, and control costs, while helping evaluate whether current funding is sufficient to support proactive replacement.

In 2025, there were 1058 parcels, each contributing \$292.00 in parcel tax, generating a total of \$308,936. The Financial Plan shows a 2025 contribution to the capital fund of \$268,823 for the Beaver Creek Water System. This equates to approximately \$254 per parcel. According to the Asset Management Plan, the funding required to support future infrastructure renewal is estimated at \$768 per parcel (based on 2019 figures, not adjusted for inflation). This figure represents an ideal fully funded scenario rather than an immediate target. For a system of this size, reaching this level in the near term would place a significant burden on ratepayers. Instead, it serves as a reference point that illustrates the scale of long-term funding needs and supports a phased approach to increasing contributions over time, while balancing system sustainability with affordability.

Summary of Target Results for 2025

	Target	2025 BCWS
Bacteria Results	0	0
Chlorine Residual	> 0.20 mg/l	> 0.20 mg/l
Turbidity	< 1.0 NTU	<1.0 NTU
CDWQG	< 100%	100%
Average Demand	< 350	336
Peak Demand Ratio	< 2	1.47
Cost per customer	\$300-\$400	\$588
Capital Contribution	\$768	\$254
Water Loss	< 15%	34%

Breaks	< 5	13
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3.0 Improvement Plan

2025 Projects Completed

Lower Kitsuksis Watermain Replacement

The Lower Kitsuksis Watermain Replacement was identified as a priority capital project and tendered in early 2025. The tender process aligned with the ACRD's ongoing strategy for watermain replacement, which continues to help reduce overall project costs. Bowerman Construction was selected as the successful proponent and worked collaboratively with Koers Engineering and the ACRD to complete the project ahead of schedule. Construction was completed in July 2025, representing another successful investment in long-term system sustainability, reliability, and cost effectiveness.

North Reservoir Replacement Conceptual Design

The conceptual design for the North Reservoir replacement was completed in 2025 by Koers Engineering. This work was undertaken to determine the most effective approach to replacing the existing reservoir, which is expected to require replacement within the next five years. Given the complexity and scale of the project, several design approaches were evaluated. Following this review, the Beaver Creek Water Advisory Committee recommended proceeding with an epoxy coated steel tank on a raised concrete foundation. Completion of the conceptual design has enabled the project to move into detailed design, which will continue through 2026. Advancing this work also positions the ACRD to better pursue future grant funding opportunities.

North Reservoir Pumphouse SCADA Improvements

SCADA upgrades at the North Reservoir pumphouse were successfully completed in 2025. This project represents the second phase of a four-year initiative to modernize each pumphouse facility. The upgrades replaced aging infrastructure with updated technology, helping to ensure long term system reliability and compatibility with current programming standards.

Danger Tree Removal

Hazardous trees surrounding the Beaver Creek Waterworks compound were assessed and removed in early 2025 by Northwest Tree Services. This work reduces the risk of damage to infrastructure and improves safety for staff working on site. The project reflects a proactive approach to maintaining a safe and reliable operating environment.

Meter Reading Equipment Upgrade

New meter reading equipment was purchased in 2025 to replace the existing system, which is no longer supported by the supplier and was becoming less reliable. A budget of \$50,000 was allocated for the replacement, with the final cost coming in under budget. The upgraded system improves reliability and supports continued accuracy in both system monitoring and billing processes.

BCWS Alternate Water Supply Study

A feasibility study was completed in 2025 to determine cost estimates for construction of a water treatment plant in Beaver Creek. As outlined in the report, further discussion will follow completion of the City of Port Alberni Water Utility Master Plan. A long-term bulk water rate is needed to complete the cost comparison prior to allocating funding for any preliminary design work.

Upcoming Projects

North Reservoir Replacement Detailed Design

Koers Engineering will complete the detailed design for the North Reservoir replacement in 2026. This is a complex replacement project, and advancing the design work will help position the ACRD to compete for future grant opportunities. Once completed, the design will be presented to the Beaver Creek Water Advisory Committee.

Kitsuksis Pumphouse SCADA Upgrades

SCADA upgrades at the Kitsuksis pumphouse are scheduled for completion in Q3 2026. This project is the third phase of the four-year SCADA modernization program. As with previous phases, the work will replace outdated systems with updated technology to ensure continued reliability and compatibility with current programming standards.

Kitsuksis Reservoir Crack Sealing

Minor leaks have been identified in the concrete reservoir at Kitsuksis. Following a competitive process, Knappett Industries has been selected to complete crack sealing repairs in October 2026. This work will help maintain structural integrity and prevent further deterioration of the reservoir.

Truck Replacement

The replacement of the 2009 Ford F-250 is scheduled due to increasing maintenance costs and reliability concerns. A budget of \$75,000 has been allocated from the vehicle replacement fund. The procurement process will proceed through a tender in Q2 2026.

Leak Detection Equipment Purchase

The purchase of in-house leak detection equipment has been identified for 2026. This investment will allow staff to proactively identify leaks within the system, reducing reliance on external contractors and supporting ongoing efforts to minimize non-revenue water losses.

Water Emergency Response plan (WERP) Update

Staff will be updating the Water Emergency Response plan (WERP), to ensure that procedures remain current and aligned with best practices. Regular updates help incorporate lessons learned from past events, changes in system infrastructure, and evolving regulatory expectations. This ensures that staff have clear, reliable guidance when responding to incidents, supporting timely decision-making and coordinated action across internal teams and external partners. Maintaining an up-to-date WERP strengthens overall preparedness by improving response efficiency, reducing uncertainty during emergencies, and helping to minimize service disruptions. It also supports continuity of operations and reinforces a structured approach to protecting public health and maintaining system integrity during unforeseen events.