City of Parksville

2024

ANNUAL WATER REPORT

City of Parksville
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arrowsmith WATER SERVICE | englishman river WATER SERVICE

Executive Summary

This report summarizes the City of Parksville, Arrowsmith Water Services, and Englishman River Water Service waterworks activities and program outcomes for 2024. It provides a summary of the ongoing efforts to achieve excellence through continued responsible operation, monitoring, evaluation, and management of the water system.

Parksville consistently meets the necessary sustainable delivery of safe, reliable, and aesthetically pleasing potable water. This report provides information on:

- Water source and treatment;
- Water distribution;
- Water quality;
- Water conservation;
- Maintenance programs;
- Projects; and
- Climate change.

This report is also meant to help increase public awareness of water systems and services and enables the community to provide educated input on the direction and focus of future initiatives. With understanding and support from the community, the City can continue to work towards objectives such as enhancing water quality, addressing climate change realities, and improving operational efficiency.

The City is regulated by Island Health for its activities as a potable water supplier. The City must meet the requirements set out in the BC Drinking Water Protection Act and Regulation, and Canadian Drinking Water Guidelines to maintain its operating permit and manage the community's drinking water system. This report has been submitted to Island Health and is available on the City of Parksville website.

Table of Contents

Useful Websites

City of Parksville	Parksville.ca
Water System	parksville.ca/cms.asp?wpID=375
AWS	parksville.ca/cms.asp?wpID=664
ERWS	parksville.ca/cms.asp?wpID=593
Water Service System Bylaw No. 1320	parksville.civicweb.net/filepro/documents/108/?expanded=130,1150&preview=1068
Cross Connection Control Bylaw No. 1529	parksville.civicweb.net/filepro/documents/?preview=23308
Sampling Results	parksville.ca/cms.asp?wpID=374
Island health	islandhealth.ca
Island Health Drinking Water Results	inspections.myhealthdepartment.com/island-health/program-drinking-water-sample

Acronyms and Abbreviations

AO	Aesthetic Objective
AWS	Arrowsmith Water Service
BCDWPA	*British Columbia Drinking Water Protection Act*
BCDWPR	*British Columbia Drinking Water Protection Regulation*
CDA	Canadian Dam Association
CFU	Colony Forming Units
CIP	Clean-in-place
CI2	Chlorine
CWL	Conditional Water Licence
DFO	Fisheries and Oceans Canada
E. coli	Escherichia coli
EFN	Environmental Flow Needs
ERP	Emergency Response Plan
ERWS	Englishman River Water Service
GCDWQ	Guidelines for Canadian Drinking Water Quality
HAA	Haloacetic Acid
HMI	Human Machine Interface
IDF	Inflow Design Flood
LRV	Log Removal Value
MAC	Maximum Acceptable Concentration
ML/d	Megaliters per Day
MoE	Ministry of Environment
NTU	Nephelometric Turbidity Unit
OMS	Operation, Maintenance and Surveillance
pH	Measure of acidity or basicity; pH 7 is neutral
PLC	Program Logic Controller
PMF	Probable Maximum Flood
POR	Provisional Operating Rule
RDN	Regional District of Nanaimo
SCADA	Supervisory Control and Data Acquisition
TDS	Total Dissolved Solids
THM	Trihalomethane
UF	Ultrafiltration
UV	Ultraviolet
UVT	Ultraviolet Transmittance
WLRS	Ministry of Water, Land and Resource Stewardship
WSC	Water Survey of Canada
WTP	Water Treatment Plant

Introduction

The City of Parksville has roughly 4,730 water connections serving over 14,400 permanent residents as well as supplying water to the Regional District of Nanaimo (Nanoose Bay Peninsula system). The City has four reservoirs, one at the southeast end near Top Bridge Park and three at Springwood Station on the southwest end of the City.


Roughly 4,730 water connections.


Four reservoirs.


English River is the main source of water.


Sixteen wells.

The City operations targets consist of:

- Carrying out deactivation of micro-organisms and viruses through disinfection process.
- Meeting or exceeding the Canadian Drinking Water Quality Guidelines.
- Having a minimum 0.20 mg/L free chlorine and no positive bacteria results in the distribution system.

The City gets water from the Arrowsmith Dam through the English River, English River, and well fields (Springwood and Railway well fields).

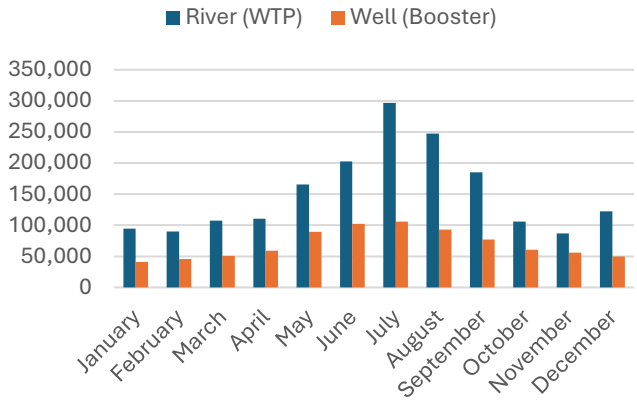
The water from the English River goes through the English River Water Treatment Plant (WTP), which can treat up to 16 megaliters per day (ML/d) by way of intake screens, sand separators, coagulation, fine strainers, primary and secondary ultrafiltration (UF) membranes, ultraviolet (UV) disinfection and chlorination. The plant focuses on addressing biological contaminants such as bacteria, Cryptosporidium, Giardia, and viruses.

The water treatment plant meets the 4-3-2-1-0 drinking water objective. Water suppliers are required to reach the goal of 4 log inactivation of viruses, 3 log removal of inactivation of Giardia and Cryptosporidium, 2 treatment processes for all surface drinking water systems, 1 NTU of turbidity or less, with a target of 0.1 NTU, and 0 total and fecal coliforms and E.coli.

Well water is disinfected with liquid chlorine before being pumped to the reservoirs where it is mixed with the treated water from the treatment plant. It is then distributed through the water distribution system.

Figure 1 shows the total treated volume produced in 2024, from the Englishman River WTP and the Railway and Springwood wells.

Figure 1. 2024 Monthly System Output (m^3).

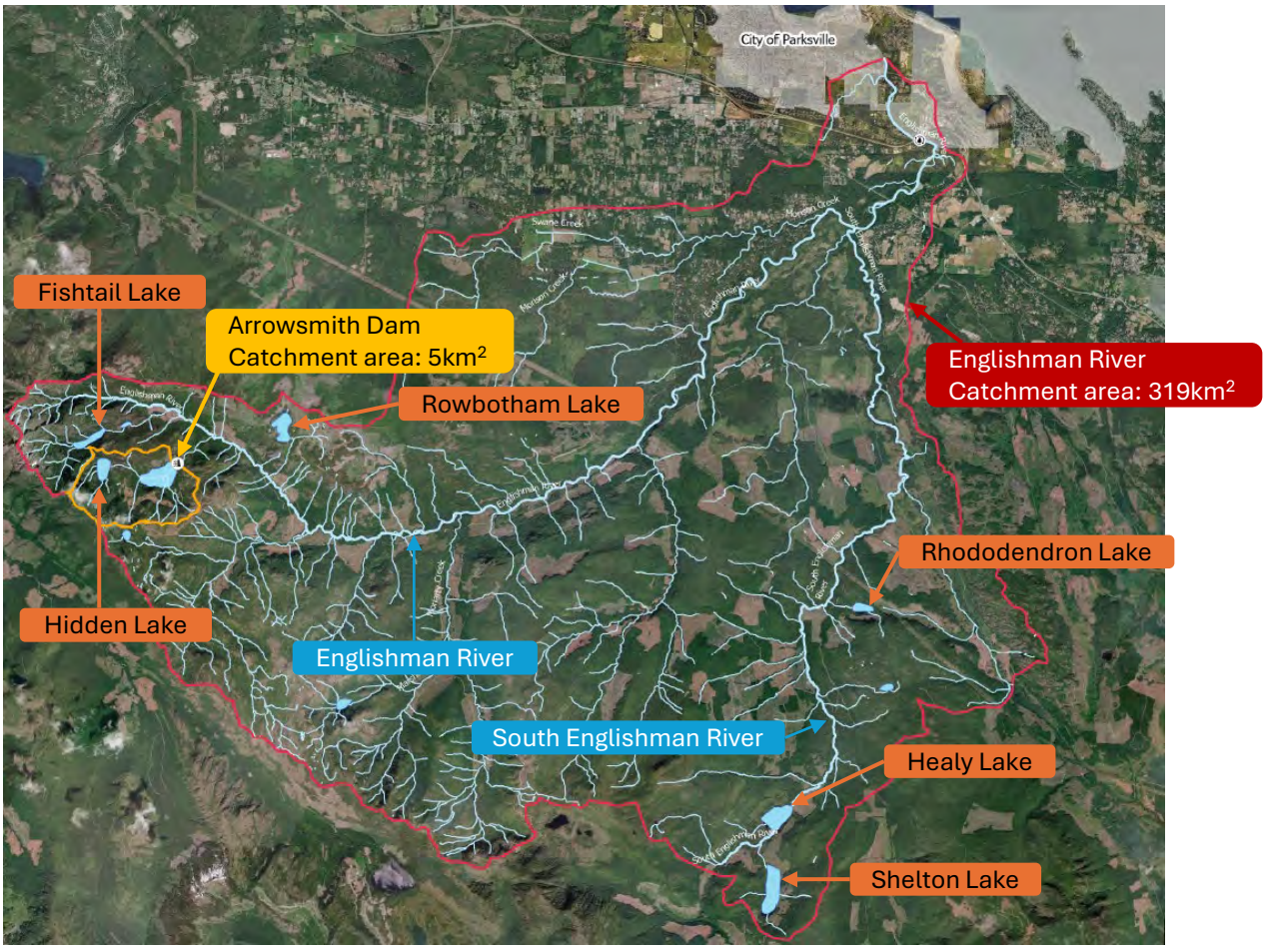


Watershed

The Englishman River flows in an easterly direction from Mount Arrowsmith and discharges into the Strait of Georgia. The watershed has a drainage area of 319 km^2, and the highest elevation is at Mount Arrowsmith at 1,819 m. The largest tributary of the Englishman River is the South Englishman River, which has a watershed area of 77.8 km^2, roughly 24% of the Englishman River Watershed.

The water demand happens in the lower section of the Englishman River, where water is used in rural and urban areas. The upper part of the watershed is made up of privately managed forestry lands (managed by MOSAIC Forest Management), heavily forested with Douglas Fir, Western Hemlock, and Red Cedar.

The largest lakes in the watershed are Arrowsmith, Hidden, Fishtail, Rowbotham, Healy, Shelton, and Rhododendron. There are notable parks in the watershed which include Mt. Arrowsmith Massif Regional Park, Englishman River Regional Park, Top Bridge Community Park, and Englishman River Falls Provincial Park. This region is rich with cultural significance, being within the traditional territories of the Snaw-naw-as First Nation and Qualicum First Nation.



Membrane Control Panel

Supervisory Control and Data Acquisition (SCADA)

The water treatment plant, Arrowsmith Dam, the water distribution system and wells are controlled by a supervisory control and data acquisition system (SCADA). This system allows the operators to monitor water treatment plant functions, reservoir levels, flows, chlorine residuals, etc. Operators can check the system remotely, which allows for full time monitoring. Alarms are automatically called out to City staff who monitor the system 24 hours a day, 7 days a week. The water distribution SCADA hardware (PLC) was purchased in 2024, and the installation and programming are to take place in 2025 through 2027.

Figure 2. Distribution System HMI.

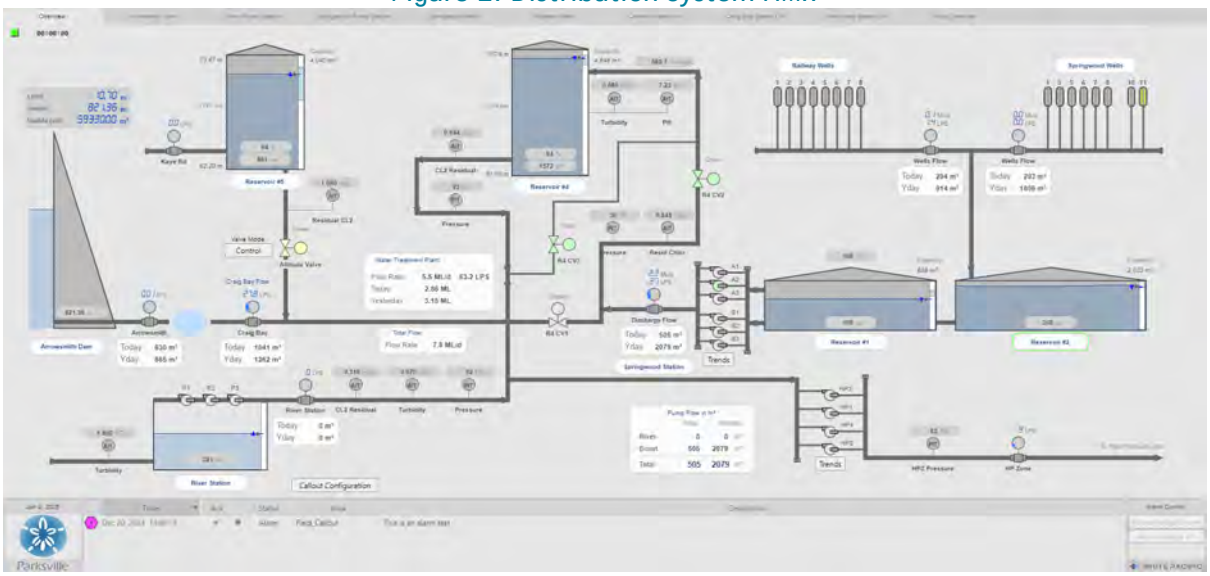
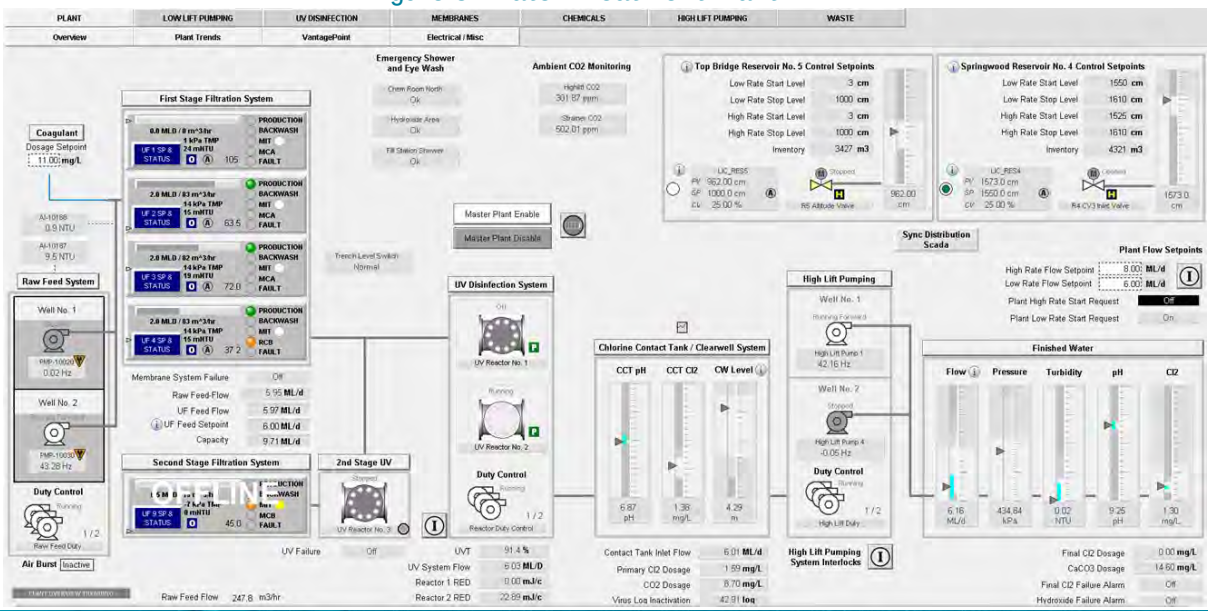


Figure 3. Water Treatment Plant HMI.



Arrowsmith Dam

Arrowsmith Water Service (AWS)

The City of Parksville, the Regional District of Nanaimo, and the Town of Qualicum Beach are partners in the Arrowsmith Water Service (AWS). The concrete gravity dam, commissioned in 2000, is located at Arrowsmith Lake roughly 20 km SW of Parksville. The dam has a capacity of 9,000,000 m^3 and is operated and maintained by the City of Parksville utilities staff. Water is released to the Englishman River through a low-level (600mmø) and high-level outlet (900mmø). Flow and lake levels are monitored regularly by staff through the SCADA system.

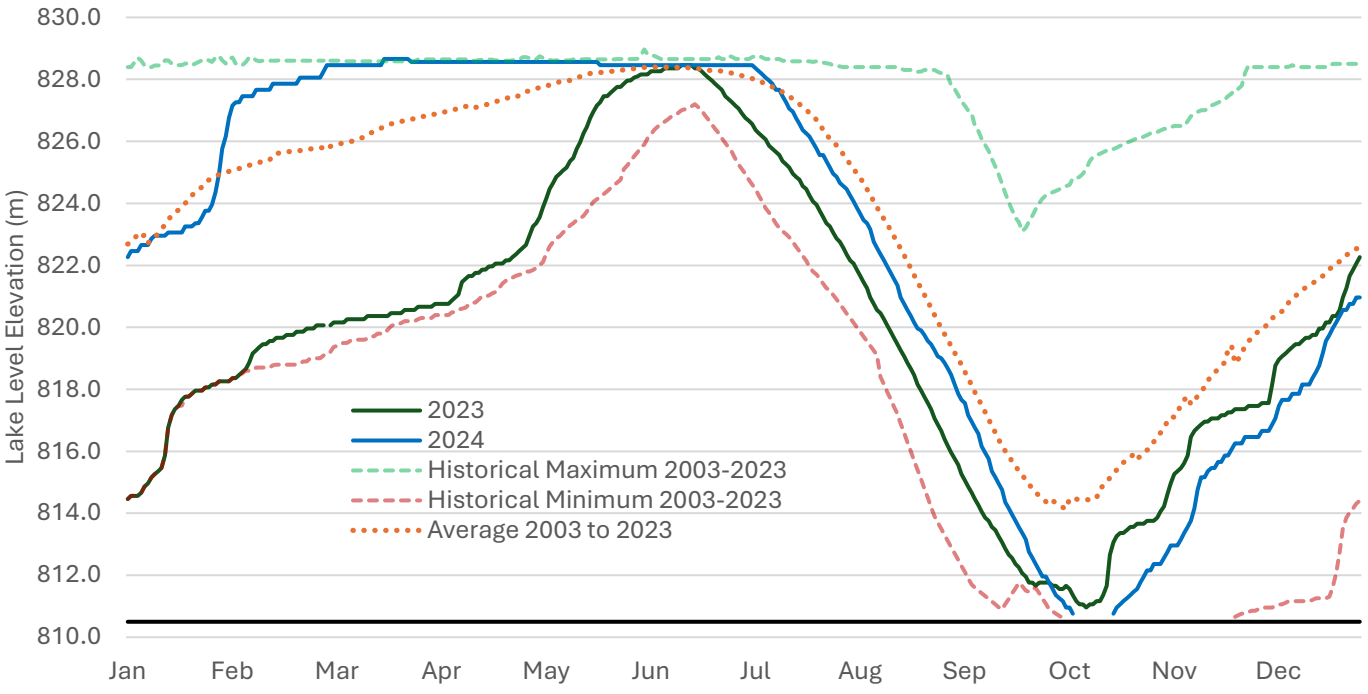
Figure 4 shows the Arrowsmith Dam lake levels. Each year, the Ministry of Water, Land and Resource Stewardship, Fisheries and Oceans Canada, and the Arrowsmith Water Service (AWS) may consider changes to the provisional operating rule (POR), to ensure water can continue to be released until the end of October. Due to Climate Change these changes are occurring more frequently in order to conserve water for critical fisheries rearing periods.

2024 Review and Data Analysis

The dam valves were opened on July 2 in order to maintain a flow of 1.6 m^3/s at the Englishman River. The valves were shut off on October 19.

The average river baseflow for July, August, and September, were substantially lower than the historical average baseflow. Through the summer, the lake level was slightly below historical average, until mid September, when it rapidly declined due to lack of rainfall.

Figure 4. Arrowsmith Dam Lake Level.



In 2024, Oceanside once again reached a level of extreme drought (level 5), which happened mid August, only lasting 2 weeks due to welcoming rainfall that brought the drought conditions down to level 4.

Staff was in contact with the province, on a weekly basis, during the summer and fall, as droughts now often affect regular operations of the dam.

On July 16, 2024, an order under the Water Sustainability Act was issue to authorize a reduction in flow at the Englishman River hydrometric gauge 08HB002. This order allowed for a flow reduction of less than 1.6 m^3/s but not less than 1.0 m^3/s at hydrometric gauge 08HB002. This reduction was put in place to ensure a flow of 1.0 m^3/s could be maintained for the remainder of the flow release period, which ends October 31 each year. This is to ensure availability of water to maintain fish habitat. The order also required that stage 3 water restriction be in place when flows dropped below 1.6 m^3/s, and stage 4 when flows dropped below 1.2 m^3/s. Stage 3 water restriction was put in place as soon as the order was received on July 16, and stage 4 began September 23, 2024.

2024 Updates, Operations and Maintenance

January

Due to low snowpack levels, crews were able to drive to the dam to clean and adjust the cameras, and pump water out of the chambers.

February

Dam started spilling on February 29. Snowpack was significantly lower than historical levels.

Debris accumulated over the winter.

March

While the last stretch of the road to Arrowsmith Dam was not accessible due to snow, the piezometer readout was sent to RST Instruments for annual calibration to ensure accurate readings during inspection. The Dam Inundation Study was awarded to Tetra Tech.

April

Arrowsmith Dam became accessible by truck, allowing the backhoe to complete work on last stretch of the road. Snowpack levels continued to be significantly below average.

Tetra Tech staff toured Arrowsmith Dam and visited various sites along Englishman River.

The Arrowsmith Dam Emergency Plan and Arrowsmith Dam Operation, Maintenance, and Surveillance Manual (OMS) were fully updated, and the OMS manual was submitted to the Ministry of Water, Land & Resource Stewardship. The 2023 Dam Safety Inspection report completed by Tetra Tech was received.

May

It was found that the piezometer readout instrument was consistently leaking gas. A temporary instrument was received and the City owned instrument was sent for repair. Operations staff meet with the province to discuss the Provisional Operation Rule (POR).

Arrowsmith Dam Emergency Plan and the Dam Safety Review were submitted to the Ministry of Water, Land & Resource Stewardship. A presentation detailing the structure of the Dam Emergency Plan and the specific locations of critical information was given to utilities staff to ensure familiarity with the plan.

June

Debris cleanup and brush cutting took place at the Dam. Utilities staff participated in a dam emergency mock exercise addressing a level 2 emergency.

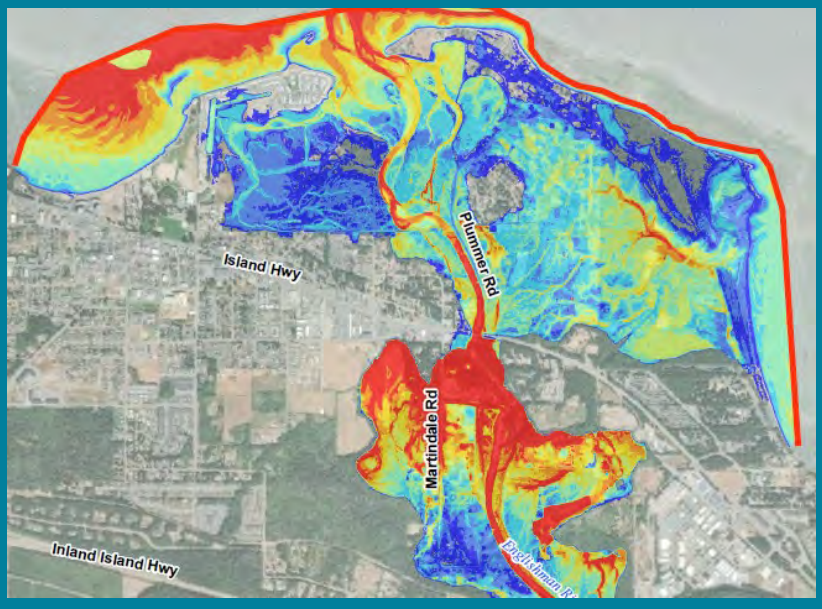
July

On July 2, the dam valves were opened, to allow for water release to maintain flow at Hydrometric Gauge 08HB002.

A fence was installed around the antenna repeater, the generator fuel was replenished, and the fire extinguisher was serviced. Inspections started taking place weekly.

Tetra Tech submitted the Dam Breach Inundation Study to be reviewed by City of Parksville staff and AWS members. KWL completed and submitted the Arrowsmith Dam Operating tool for use by City staff. The tool generates a projected water level based on current dam conditions, allowing staff to plan for extended droughts.

Inundation Study IDF Breach Flood Depth.



Modelled Depth Flow (m)

- >3.0
- 3.0 – 3.5
- 2.5 – 3.0
- 2.0 – 2.5
- 1.5 – 2.0
- 1.0 – 1.5
- 0.5 – 1.0
- 0 – 0.5

The Inflow Design Flood (IDF) event considered for the inundation study was 2/3 between the Probable Maximum Flood (PMF) and the 1/1,000-year flood.

August

Woody debris were collected and piled for fall burning. Weir drains were cleaned, and a new foundation drain was added to Block A to separate two zones.

Tetra Tech finalized and submitted the Dam Breach Inundation Study to City of Parksville staff, which then was distributed to the head of the Dam Safety Section and AWS members. With the completion of the study, inundation maps in the Arrowsmith Dam Emergency Plan were updated.

September

The remainder of the woody debris was collected and piled for fall burning. Valve positions were verified to ensure the correct volume is displayed on SCADA. The orifice plate was removed from the siphon line to increase flow, and a crack on the upstream side of block A was assessed and filled.

The dam lake level was nearing historical minimum level and the City moved from stage 3 to stage 4 water conservation measures on September 23rd due to river flow dropping below 1.2 m^3/s.

October

Wood piles were burnt. Main valves were closed, and lines were drained. Diesel and propane tanks were filled and the generator serviced. The road was cross ditched to prevent erosion.

KWL, which was awarded the Water Use Planning and Management Study, along with City staff visited the dam.

A dam emergency exercise addressing a level 3 emergency, which is the most severe type of emergency, took place in October. City of Parksville utilities staff, along with the emergency coordinator from Parksville and the RDN, and members from the Parksville Fire Department participated in this exercise.

November

Staff inspected the dam only once due to snow.

December

Due to snowmelt, staff was able to complete an inspection. Inspection reports were sent to Tetra Tech in order to have the Annual Dam Safety Inspection completed.

New Foundation Drain, August.

Dam Release from Siphon, September.

High Level Intake, October.

Projects

Arrowsmith Dam Breach Inundation Study

Completed by: Tetra Tech (TT)
Presented to: Arrowsmith Water Service (AWS)
Issued for use: August 27, 2024

The scope of the study included a site reconnaissance, document review, hydrologic assessment to estimate the Inflow Design Flood (IDF), dam breach parameter estimation and hydraulic modeling to determine inundation and develop inundation maps, hazard assessment, and a review of the consequences of failure.

The site visit was conducted on May 1st, 2024. During the visit, the dam structure and surrounding watershed were visually inspected, as well as the downstream conditions and areas at risk in the City of Parksville and the Regional District of Nanaimo (RDN).

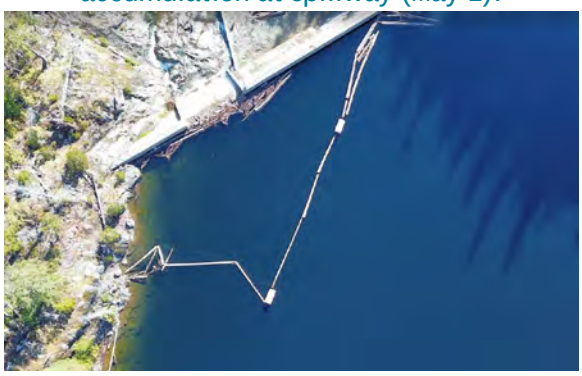
Because the Arrowsmith Dam is classified as very high consequence, the assessment was completed using the corresponding criteria listed in *Hydrotechnical Considerations for Dam Safety* published by the Canadian Dam Association (CDA).

Two breach scenarios were examined: IDF breach and sunny-day breach. The IDF breach occurs during the IDF event, whereas the sunny-day breach occurs during regular operations. The IDF event considered was 2/3 between the Probable Maximum Flood (PMF) and the 1/1,000-year flood.

A hydraulic model was constructed to route the breach outflow and determine the inundation extent and depth. The inundation assessment also evaluated the resulting loss of life, economic losses, and environmental and cultural impacts.

It was recommended that AWS install climate stations to collect data at the Arrowsmith Dam as well as install hydrometric stations at Arrowsmith Creek and along the Englishman River to better monitor flow conditions, if feasible. It was also recommended that AWS clear the debris build-up along the spillway inlet and repair the log boom to prevent more debris from approaching the spillway, which were both completed in 2024.

Log boom configuration and debris accumulation at spillway (May 1).



Englishman River Estuary (May 1).

Provisional Operating Tool

Completed by: Kerr Wood Leidal (KWL)
Presented to: Arrowsmith Water Service (AWS)
Issued for use: July 16, 2024

The COP, Qualicum Beach and RDN hold conditional water licence (CWL) C134068 which authorizes storage of 9,000,000 m^3 of water per year at Arrowsmith Dam for community water supply and conservation flows in the Englishman River. The provisional operating order (POR) for CWL134068 states that:

1. "The licensee shall release adequate water from storage in Arrowsmith Lake during the period of June 1 to October 31 to fully support the diversion of water from the Englishman River for the waterworks purpose.", and

2. "The diversion of water authorized under this licence may be regulated at any time by an order in writing from the Water Manager under the Water Sustainability Act in order to maintain a minimum flow in the stream."

To ensure compliance, KWL conducted a review of the POR for Arrowsmith Dam including a review of the Environmental Flow Needs (EFN) for the Englishman River, a review of the reliability of storage at Arrowsmith Dam to support EFN and community water supply withdrawals at the Englishman River Water Intake, and a review of the operational plans for the summer of 2024.

During this project, KWL developed a tool to assist with operational decisions for Arrowsmith Dam during summer/fall operations. The tool carries out water balance calculations to forecast the volume of water needed to be released from Arrowsmith Dam to support estimated community water supply withdrawals and a specified EFN.

The tool allows City staff to input current Arrowsmith Dam water level, the withdrawal flow rate at the Englishman River Water Intake, and the discharge at the Water Survey of Canada (WSC) hydrometric gauge 08HB002. The tool then carries out a simulation of Arrowsmith Dam operations to forecast reservoir levels over the summer/early fall operation period (typically July 1 to October 31) based on the assumed water withdrawal volumes and a specified EFN.

Recommendations included weekly tool updates to monitor how the conditions compare with projections, and the provision of regular updates to WLRS, MoE, DFO and Snaw-naw-as First Nation on the status of the reservoir levels, and river flows.

Intake & Raw Water Intake Building

Englishman River Water Service (ERWS)

The ERWS is a joint venture between the City of Parksville and the Regional District of Nanaimo, formed to secure water supply from the Englishman River. This regional partnership supplements existing well supply sources owned and operated by the City of Parksville and Nanoose Bay Peninsula Water Service Area. The percentages of interest are 74% for the City of Parksville, and 26% for the Regional District of Nanaimo.

The water treatment plant currently has capacity to treat up to 16 megaliters per day (ML/d), through fine strainers, primary and secondary ultrafiltration (UF) membranes, ultraviolet (UV) disinfection and chlorination.

Englishman River Water Treatment Plant.

Raw Water Intake, Coagulant and Strainers

The Englishman River Water Treatment Plant (WTP) draws water from the northern bank of the Englishman River, just upstream of the Inland Island Highway (#19) bridge. This is the location of the intake screens, as well as the raw water intake building that houses an air burst system for screen cleaning, low lift pumps, sand separators, and a surge tank.

The intake structure has screens to protect fish and other aquatic life from entering the intake, and to keep debris from entering the system. One of the two low lift pumps push screened water from the river through one of the two sand separators and up to the WTP. The sand separators remove sand and heavy suspended solids during high turbidity events.

The raw water is dosed with coagulant as needed; this occurs at an injection point in the pipe that carries the screened raw water from the raw water intake building to the treatment plant. This allows sufficient mixing time for particles to clump together for ease of removal at the strainers and membranes.

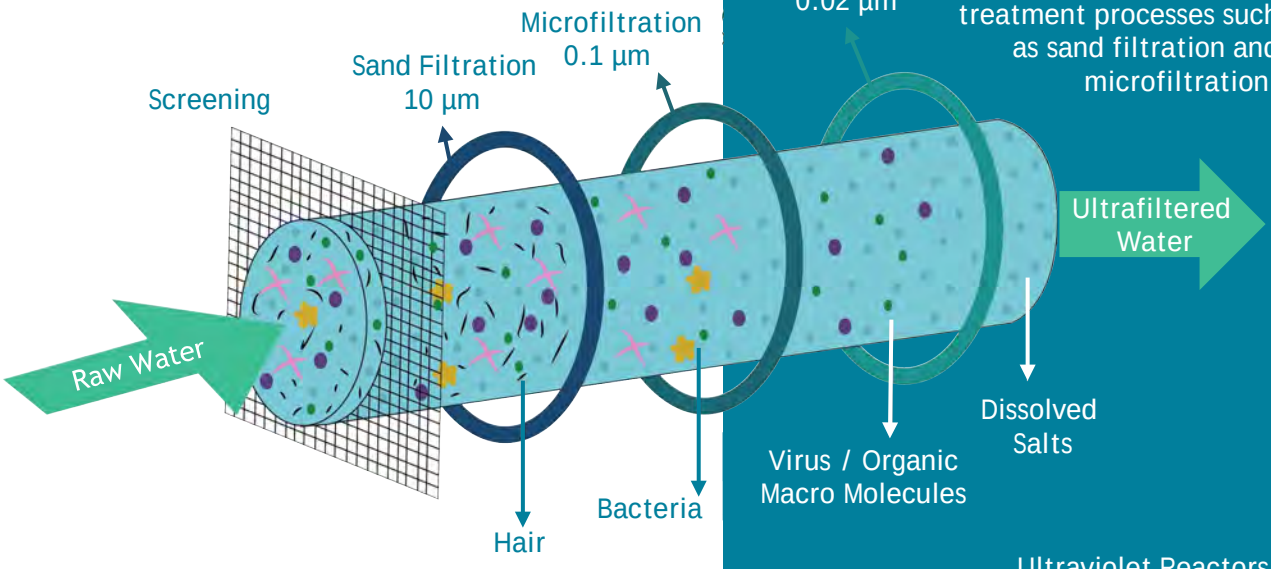
Once the water enters the WTP it first flows through the strainers, which removes suspended solids and helps protect the ultrafiltration (UF) membrane trains that follow.

The strainers are equipped with a backflushing system to help remove accumulated solids. Strainers can remove material greater than 200 microns (0.2mm) in size, which helps protect the membranes from heavy solids and large particles.

Ultrafiltration Membranes

The water from the strainers flow to the UF membrane trains. The UF membranes act as a physical barrier to suspended matter which include contaminants such as bacteria, viruses and parasites. Once enough contaminants accumulate on the feed side of the membrane, a cleaning process occurs to bring the membrane back to a good working pressure. This cleaning process is done with periodic backwashes and chemically enhanced clean cycles.

Ultrafiltration Membrane Trains.



Ultraviolet and Chlorination Disinfection

Both ultraviolet (UV) and chlorination are used in the disinfection process. The water from the membrane trains flow to one of the UV reactors, which inactivates Cryptosporidium, Giardia, and viruses by altering the DNA or RNA of pathogens destroying their ability to reproduce. The UV disinfected water then flows to the contact tank, where it is dosed with sodium hypochlorite as a secondary disinfection, and CO_2 for pH adjustment.

Ultraviolet Reactors.

From the contact tank the treated water flows to a clearwell, where it can be dosed with sodium hydroxide, for pH adjustment, and more sodium hypochlorite, to maintain sufficient chlorine residual in the distribution system.

Secondary UF Membranes and Geobags

A secondary UF membrane train was designed to treat wastewater from the primary treatment process in order to increase the recovery rate. The secondary train has not been in use since the fall of 2020 because of operational issues that have not been resolved.

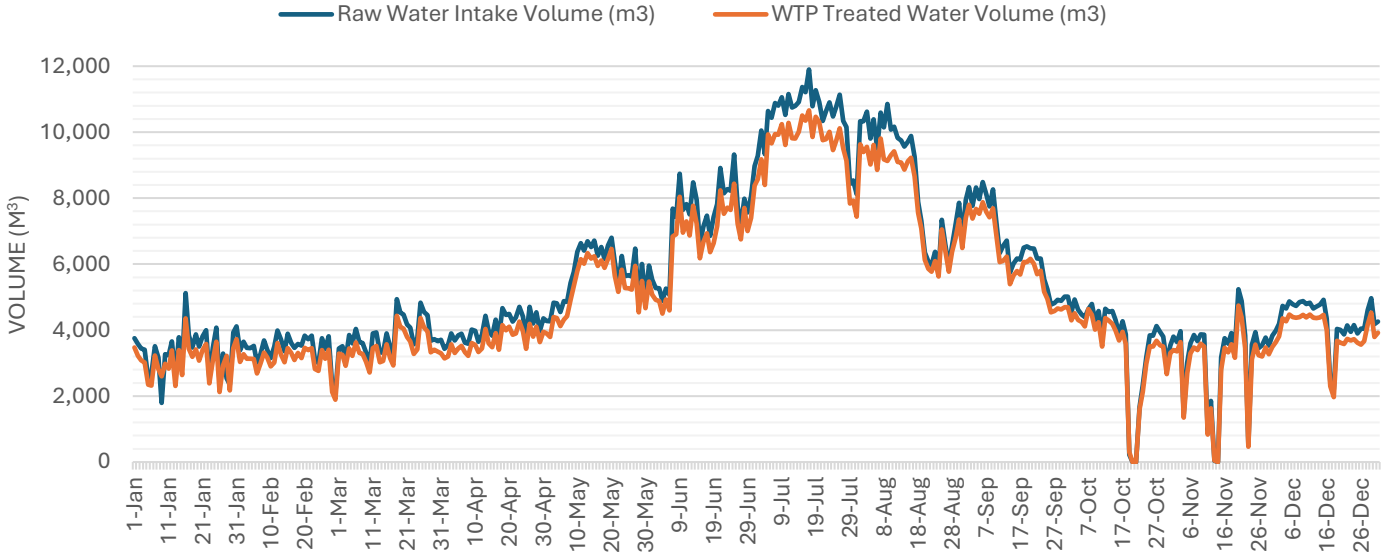
The wastewater produced from the backwashing of the membranes are filtered on site using Geobags. These dewatering cells, along with the addition of a polymer, bind the small particles from the waste into larger ones, which are then filtered out. The solids stay in the bags and the water percolates out. When these bags are full the material is taken to the landfill to be used as cover material.

2024 Review and Data Analysis

In 2024, 1,968,850 m^3 of water was pumped from the Englishman river, and the Englishman River Water Treatment Plant produced 1,813,830 m^3 of potable water, which represents roughly 92% of the water pumped from the river. 1,226,184 m^3 of the treated water was distributed through the City of Parksville while the remaining 587,646 m^3 was supplied to the RDN.

The highest production month was July, with 296,630 m^3 of water treated, and the highest production day was July 17 where 10,660 m^3 of water was treated. From January to April and October to December, the average daily production was roughly 3,370 m^3 per day, from May to September, which were the highest consumption months in 2024, the daily WTP production average was roughly 7,170 m^3 per day.

Figure 5. 2024 Water Treatment Intake and Treated Water Volume.



Routine Maintenance

Routine maintenance helps protect water quality, ensure efficient and proper operation of the system, protect and prolong the life of the system, and reduce the risk of costly and disruptive malfunctions. The table below shows the different types of maintenance and inspections related to the ERWS:

ERWS Routine Maintenance	
Raw Water Pump Station	Clean intake structure from debris buildups. Service sand separator, raw water pumps, and analyzers. Record power consumption usage and test power generator.
Strainers & Coagulant	Monitor coagulant dosing. Flush and clean the coagulant line when not in use. Monitor strainer's differential pressure and check for leaks. Service and conduct strainer maintenance as needed. Service analyzers.
Ultrafiltration Membranes	Check blowers and backwash pumps. Carryout recovery cleans. Service turbidity analyzers.
Disinfection System	Monitor the ultraviolet transmittance trend to ensure it meets log removal requirements. Service ultraviolet units. Service chlorine injector and analyzer.
Finished Water System	Conduct vibration monitoring for high lift pumps. Service and inspect high lift pumps.
Chemical & Auxiliary Systems	Inspect, service, and repair chemical pumps and lines. Check and service exhaust fans. Inspect and test emergency showers, and eyewash stations. Check chemical tank levels and refill as needed.
Mechanical & Electrical Equipment	Clean motor control centre (MCC) area. Exercise and adjust valves as needed.

2024 Updates, Operations and Maintenance

January

Water treatment plant operators started Fiix training, which is the new maintenance software used to optimize asset performance. As part of the preventative maintenance program, a contractor was brought on site for electrical inspection and to service high lift pumps, backwash pumps, low lift pumps and CIP pumps. Operators exercised high lift room valving.

The focus for January was on the chemical room CIP systems, optimizing chemical use, and membrane health. This was achieved by:

- Implementing a flow-based scheduler for each individual membrane train. This allowed for better control to adjust the cleaning schedule for seasonal changes;
- Calibrating all CIP pumps and implementing better control of chemical dosing with SCADA, by utilizing feedback from the chemical pumps;
- Servicing the hydroxide pumps.

February

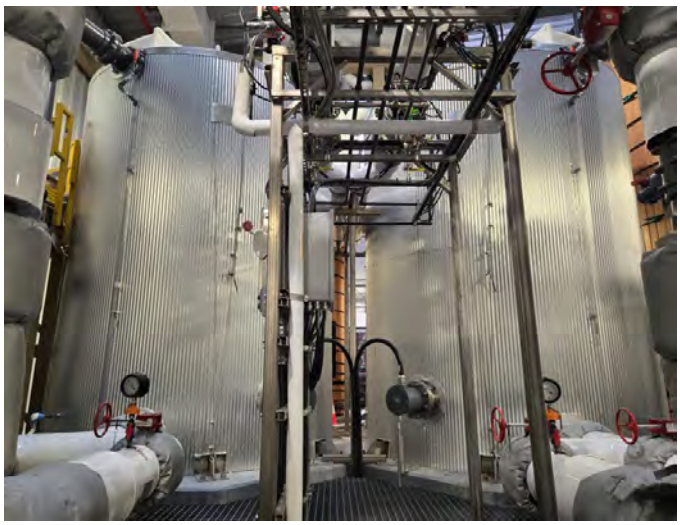
SCADA software was updated. Operators changed coagulant supplier and are now using a slightly different ACH (Aluminum Chlorohydrate). Water treatment plant operators had their second day of training on Fiix.

March

Water treatment plant operators had their third day of training on Fiix. Acid and base recovery cleans were performed on all UF trains. Improvements were made to the CIP system including:

- Calibration of CIP dosing pumps;
- Improvements to SCADA programming;
- Solution found for bleeding air off before recovery cleans;
- Improvements to CIP sample lines;
- Optimization of chemical dosing.

WTP Chemical Room CIP tanks.



Improvements were made to recovery clean record keeping in order to track performance for future optimization.

April

Staff focused on the UF cleaning system and optimization for the month of April, this included updates to interface with improved operation and increased trending and tracking of cleans, and improvement of controls to schedule cleans more effectively based off the information in the trends and tracking. Lab work now include in-house calculations of the Langelier Saturation Index (LSI) to gather more detailed information to guide the corrosion control program.

Air from off-gassing in the sodium hypochlorite dosing system had been causing inconsistent dosing, new venting lines were added to the system to release the off gas.

May

Operators primarily focused on optimizing plant operations as summer approached, as steadily increasing flows started early May due to warm and dry conditions. The team reviewed summer operations and started increasing process recovery rates with a focus on reducing waste flows and optimizing cleaning processes to accommodate seasonal changes and cleaning requirements.

CIP pump 2 had a spool replaced on the discharge side of the pump. A contractor was on-site for pump vibration analysis, including the raw water low lift, finished water high lifts, and CIP pumps.

June

Efforts taken to optimize plant operations to improve membrane health and reduce waste resulted in an increase in plant recovery.

The Nanoose plant went down in June which caused an increase in water demand from the RDN until the end of the year.

Temperature loggers for the 5-year fish monitoring program were installed at the Englishman River by EDI staff. City owned loggers, used for this project, were installed at the River by City staff.

Rive intake: Location of daily checks for fish impingement.

July

Operators were busy responding to increased water production demand due to hot weather. Efforts to optimize flow included river intake screen cleaning with a qualified professional on site for turbidity monitoring and annual intake chamber cleaning and visual inspection.

Daily checks for fish impingement started July 2 for the 5-year fish monitoring program, along with weekly download and data check for the City owned turbidity and temperature logger.

August

Operators were busy responding to increased summer water demands. Efforts to improve plant performance included adjustments to sand separator operation in order to reduce callouts and unexpected shutdowns, and optimization of CIP system aeration cleaning step to enhanced cleaning efficiency and safety.

Operators identified valves in need of adjustment or repair. Daily checks for fish impingement were completed for the 5-year fish monitoring program, along with weekly check of data logger casing, data download and review for turbidity and temperature. Weekly data reviews allowed for prompt calibration of the turbidity probe when needed.

September

Backup generator was load tested by a contractor. Backflow assemblies were tested at the intake building and at the water treatment plant by City staff.

The UFs had lower than expected LRVs on all units but remained above the license requirements. This was due to increased backwash aeration and drain times to deal with solid buildup. Once set points were returned to normal, so did the LRVs. Operators conducted visual checks during this period to ensure the integrity of the treatment.

A kickoff meeting and walkthrough took place with a contractor, All North Engineering, for a safety audit. This project is meant to enhance safety in the chemical room and address needed upgrades and deficiencies.

EDI was on site to assess the river for salmonid enumeration and densities as part of the 5-year fish monitoring program.

WTP Chemical Room backflow preventers.

Operators started to shift focus in order to deal with upcoming changing river conditions due to seasonal storms.

October

First major storm/atmospheric river led to significant river flushing of organics and a spike in NTU, which caused the plant to shut down. Thorough maintenance was conducted on the strainers before the plant was restarted.

Issues with the finished water chlorine analyzer led to the replacement of the colorimetric cell. Routine bi-annual servicing of the UV reactors was performed by a contracted service technician to ensure proper operation and longevity of the reactors. The remainder of the backflow assemblies were tested.

All North Engineering collaborated with operations and conducted a detailed safety audit of the chemical room. This project resulted in recommendations regarding chemical storage, tank replacement, as well as many other safety issues related to the chemical room.

City staff and EDI removed water monitoring probes that gathers data for the 5-year fish monitoring program.

November

Heavy rains and windstorms lead to loss in production due to lack of pre-treatment options. The plant was shut down during storm events as a precautionary measure to reduce the negative impacts on equipment and membrane health. Daily total dissolved solids samples were added to the sampling program.

December

Operators installed blow-offs for pressure transmitters on the UF, simplifying line cleaning. SCADA changes made to prevent pressure build-up during the membrane's standby mode. Enhanced tracking and monitoring of Cl2 readings to minimize drift. Reviewed and updated confined space and lockout procedures.

Over 2024, improvements to the plant operations and SCADA programming led to a significant increase in plant performance when compared to 2023. Some of the performance highlights include:

- 38% increase in run hours;
- 46% increase in finished water flow;
- 1.4% increase in plant recovery rate.

Projects

5-Year Fish and Fish Habitat Monitoring Program

Being carried out by: Environmental Dynamics Inc. (EDI)
Presented to: City of Parksville, ERWS, DFO
Issued for use: Year 1, 2022 - March 2023
Drought Year, 2023 – March 2024
Year 2, 2024 – Expected March 2025
To be completed by: Year 3, 2025 – March 2026
Year 4, 2026 – March 2027

Steelhead trout parr captured during study.

The Englishman River Water Intake was commissioned in December 2019. The Habitat Offsetting Plan (LGL and KWL 2015) for this project outlined potential impacts to fish and fish habitat associated with the intake operations. The habitat offsetting plan predicted a reduction to fish habitat and density and increased water temperature downstream of the intake because of lower water flows. As a result, Fisheries and Oceans Canada (DFO) requested a five-year fish and fish habitat monitoring program under *Fisheries Act* Authorization (15-HPAC-00781). The annual report has to be submitted to the DFO by March 31 of the following year.

The monitoring program includes effectiveness monitoring during the four-month low flow period (July to October) when intake operations have the greatest potential to impact fish and their habitat. Water discharge, temperature, turbidity, fish habitat as weighted usable area (WUA), fish density, fish impingement, and ramping rate effects on fish stranding are being monitored. Ramping rates are required for two of the five years.

This program includes one year that meets the 1-in-10-year drought defined as the Critical Period Stream Flows (CPSF) which is a flow of less than 1 m^3/s for July, August, or September, and less than 0.9 m^3/s for October. The drought year occurred during the second year of the study (2023).

Water Treatment Plant Chemical Room.

Chemical Room Safety Audit

Being carried out by: All North Engineering
To be presented to: Englishman River Water Service (ERWS)
To be completed by: Spring 2025

The scope of the study was to conduct an engineering and safety assessment of the ERWS WTP chemical room. The audit included a review of drawings and documents from the contractor construction turnover package, on site investigation of mechanical and process hazards, risk ranking of identified hazards, non-capital project recommendations, capital project recommendations, class 5 cost estimate, and a summary report.

This audit took place due to two tank failures that have occurred since the plant was commissioned in 2020. Additionally, operators identified potential safety concerns that were also investigated.

Pre-Treatment

Being carried out by: Associated Engineering (AE)
To be presented to: Englishman River Water Service (ERWS)
To be completed by: Summer 2025

The scope of the study includes identifying and assessing options to improve silt removal from incoming water and improve membrane operation.

AE will be selecting treatment processes to pilot, including recommendations for what pilot equipment to rent, and details on service connection requirements. They will also review of the existing water treatment plant and current operational practices, to determine whether there are opportunities to optimize plant operation that would improve membrane longevity and thereby reduce the level of new pre-treatment infrastructure required.

Railway Well #6

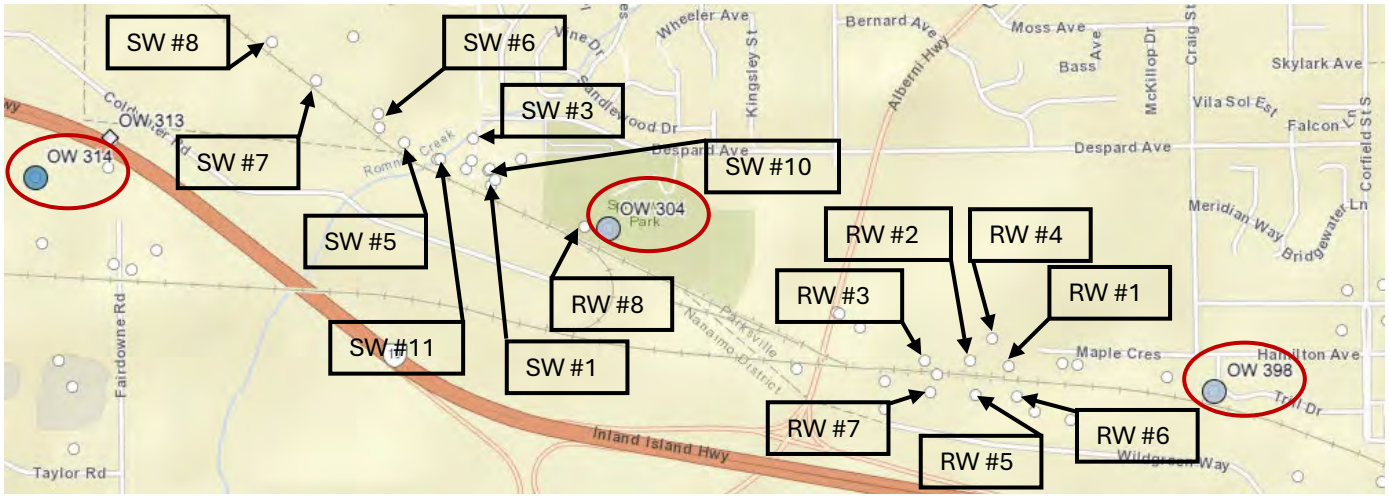
Groundwater and Wells

The City of Parksville currently has 16 production wells that draw from Aquifer 216, a sand and gravel aquifer. Groundwater demand from aquifer 216 is high, as it is used for multiple purposes including domestic, agricultural, industrial, and municipal water supply.

City wells run alongside the railway tracks from Trill Drive to the City's boundary in the southwest. An additional well, Springwood Well #9, located NE of SW #7, had the casing installed in 1997 but was never completed for production. This well no longer meets the installation requirements and will likely be decommissioned in the next few years.

A Provincial Groundwater Observation Well Network program is in place to provide monitoring of the water table and groundwater chemistry of aquifers and basins to support the management, protection and sustainable use of our groundwater resources and associated ecosystems.

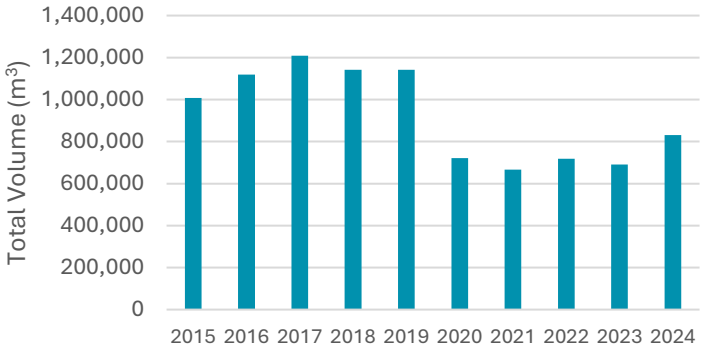
Location of Observation Wells (OW), Railway Wells (RW), and Springwood Wells (SW).



2024 Review and Data Analysis

When comparing well production data pre (2019 and earlier) and post (2020 forward) ERWS WTP production, it is clear that the construction of the WTP led to a significant reduction in the volume being pumped by the wells. This is due to ERWS allowing for river water to be pumped and treated year round and at a higher volume than the previous intake, which did not have the same capacity, and the appropriate treatment for winter conditions.

Figure 6. Yearly well production (m^3)



Railway Well #8 was affected by a storm on New Years Day of 2020, it was out of service for some time, waiting for a pump install. Once it was back into production, it had issues recording the volume. The loss of data for RW #8 happened between January 2020 and July 2024.

Railway Well #9 is set to be decommissioned because abandoned and unused wells can deteriorate over time and become a threat to groundwater.

The following table shows the annual production for each individual well.

Well Name	2024 Annual Production (m^3)
Springwood Well #1	25,833
Springwood Well #3	44,671
Springwood Well #5	65,270
Springwood Well #6	71,029
Springwood Well #7	107,934
Springwood Well #8	106,372
Springwood Well #9	Casing in place.
Springwood Well #10	56,476
Springwood Well #11	14,935
Railway Well #1	29,887
Railway Well #2	48,171
Railway Well #3	30,479
Railway Well #4	47,430
Railway Well #5	90,523
Railway Well #6	87,703
Railway Well #7	66,222
Railway Well #8	34,384
Industrial Well	Irrigation only, not metered.

Observation wells 304, 398, and 314 are the closest to the City owned wells that are on the same aquifer. OBS Well 304 was declining from 1988 until 2015, increasing from 2017 to 2023, and declined again in 2024. OBS Well 314 declined until 2004 and has either remained stable or had an increased in water level since. OBS Well 398 was declining until 2015, increasing from 2015 to 2022 and has remained somewhat stable since.

Figure 7. Observation Well 304: Water level below ground.

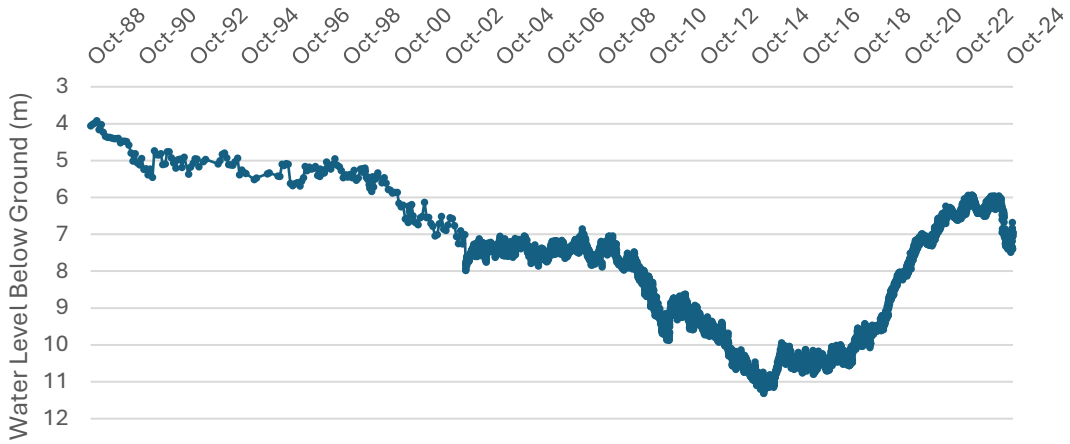
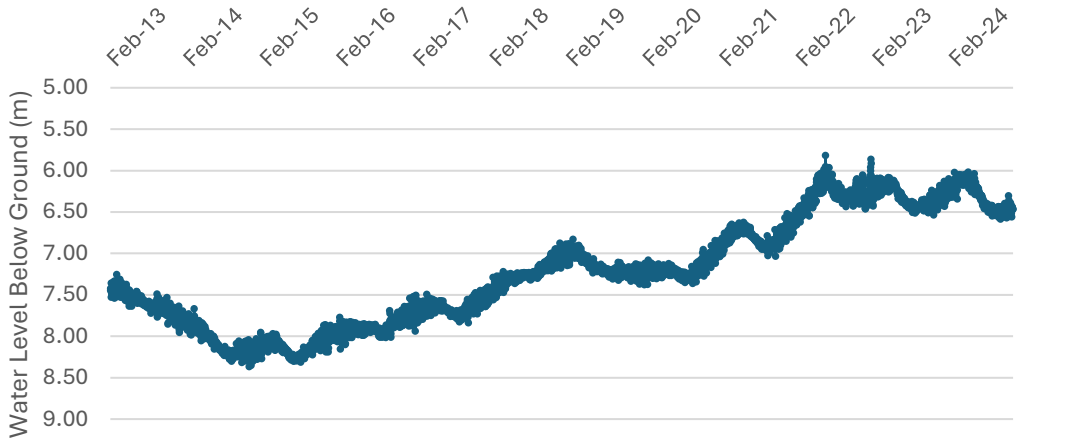


Figure 8. Observation Well 398: Water level below ground.



Routine Maintenance

Routine maintenance and inspection of the wells helps ensure proper operation of the system, protect and prolong the life of the system, and reduce the risk of disruptive malfunctions. The table below shows the maintenance and inspection related to the wells.

Well Routine Maintenance
Rehabilitation as needed. Inspection and replacement of pumps and motors as needed. Refill of Springwood Well #1 chlorine tank. Water testing. Calibration of flow meters and level transducers. General cleaning. Heat source over winter months.

Springwood Pump Station

Distribution System

Springwood Water Complex

The Springwood Water Complex receives all pumped water from the Railway and Springwood well fields. It also receives water, as needed, from the ERWS WTP. Water from both well fields is first pumped to reservoir #2, then reservoir #1, before it goes through the pump station, where it gets chlorinated with liquid chlorine, and pumped to reservoir #4 before distribution.

Some chlorination happens at Springwood Well #1, to ensure disinfection takes place at reservoirs #1 and #2. At reservoir #4, well water gets mixed with treated water from the WTP, and it is then distributed through the distribution system.

Springwood Water Complex.

Pressure Zones

The City of Parksville is divided into a low and a high-pressure zone. The low pressure is gravity-fed based on the elevation of Reservoirs #4 and #5. This zone gives a range of 55 psi to 85 psi throughout the system, depending on the geographic location.

The high-pressure system provides for areas with higher elevation, that do not have sufficient pressures to meet firefighting flows and service pressures. The zone is supplied from four pumps, a 15 hp, two 40 hp and a 100 hp. These pumps, located in the Springwood Pump Station, are controlled through SCADA which automatically monitors flows and turns on the pumps it needs to meet the flow requirements.

To maintain a balance between high and low pressures but keep a safe pressure in the

high-pressure system, a pressure reducing valve (PRV) is in place to reduce the high pressure from 80 psi to 60 psi.

Reservoir

Treated water from the Englishman River and wells is stored in four reservoirs. Reservoir #1, #2 and #4 are located at the Springwood Water Complex on Despard Avenue, while reservoir #5 is located at the Top Bridge Park.

The reservoirs at Springwood are concrete structures with two being partially below ground and one above ground. The Top Bridge reservoir is a glass fused steel tank.

Reservoirs #1 and #2 are emptied and cleaned yearly, while reservoirs #4 and #5 are cleaned every five years, by divers. Sustaining valves are cleaned monthly.

Reservoir	Location	Capacity	Type	Date
1	Springwood	616 m^3 (135,500 Imp. gal)	Concrete	1967
2	Springwood	2,023 m^3 (445,000 Imp. gal)	Concrete	1968
4	Springwood	4,559 m^3 (1,000,000 Imp. gal)	Concrete	1979
5	Top Bridge	4,300 m^3 (950,000 Imp. gal)	Glass Fused Steel	2007

Reservoir 1

Reservoir 4

Reservoir 2

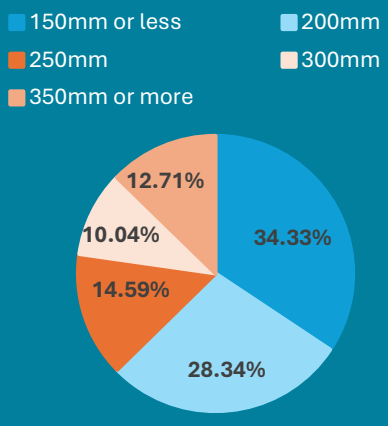
Reservoir 5

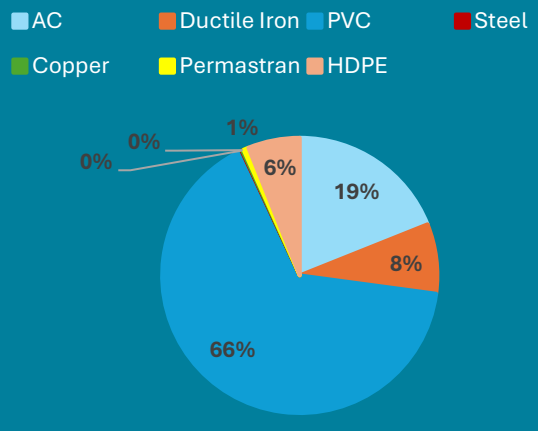
Underground Infrastructure and Pressure Zones

The distribution system consists of over 113 kms of pipe. Sizes range from 100mm (4”) to 400mm (16”). There are 592 fire hydrants and one pressure reducing valve (PRV). The aging infrastructures are replaced through capital and development work.

Watermain Diameter Proportions.

Diameter	Distance (km)	Percentage
150mm or less	38.93	Distribution Main 62.7%
200mm	32.13	
250mm	16.54	Supply Main 37.3%
300mm	11.38	
350mm or more	14.41	
Total	**113.39**	



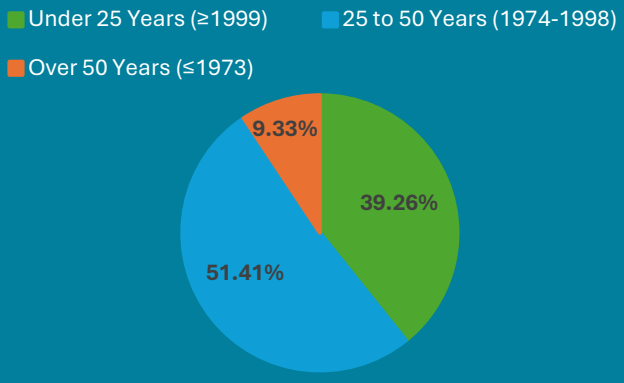


Watermain Material Proportions.

Material Type	Distance (km)
AC	21.47
Ductile Iron	9.27
PVC	74.68
Steel	0.1
Copper	0.21
Permastran	0.69
HDPE	6.9

Watermain Age Proportions.

Age	Distance (km)
Under 25 Years (≥1999)	44.57
25 to 50 Years (1974-1998)	58.36
Over 50 Years (≤1973)	10.63



2024 Review and Data Analysis

The following figure shows the production volume for the wells and the ERWS WTP. The WTP production is separated into Parksville and RDN share. With the water treatment plant online since the end of 2019, the yearly average well water production has decreased significantly as more water is pulled from the Englishman River during the high river flow months.

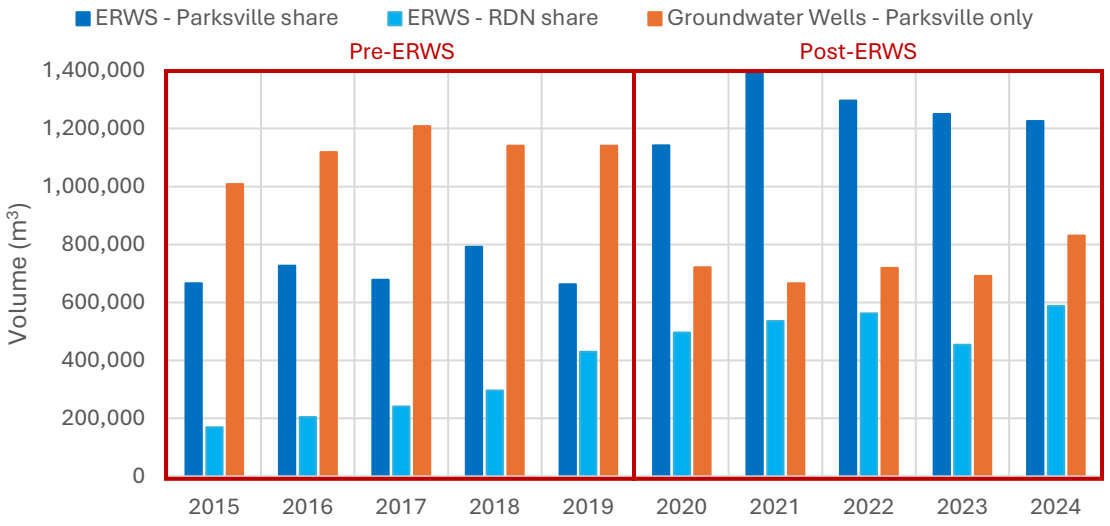


Figure 9 Shows monthly Parksville consumption from 2015-2024, and figure 10 shows the total system production, which included RDN's share of the ERWS WTP.

Figure 11 shows conservation stages (stages 2-4), total daily Parksville consumption (m^3) and rainfall (mm) from July to October. It is evident that reduction during stage 3 was only significant during rain events, and later in the season due to a period of constant rainfall near the end of August.

Routine Maintenance

Routine maintenance and inspection of the water system helps protect water quality, ensure efficient and proper operation of the system, protect and prolong the life of the system, and reduce the risk of costly and disruptive malfunctions.

The following table shows the routine maintenance and inspections that take place at Parksville's water system.

Distribution System Routine Maintenance	
Distribution	Unidirectional flushing of watermains. Cleaning of air relief valves. Cleaning of fire line meters. Fire hydrant inspection. Testing and repair of backflow prevention devices.
Reservoirs	Cleaning reservoir. Cleaning sustaining valves.
Pump Station	Inspection of pumps. Inspection of chlorination system. Calibration of chlorine analyzers. Calibration of turbidity and pH meters.

Figure 9. Parksville total consumption (m^3)

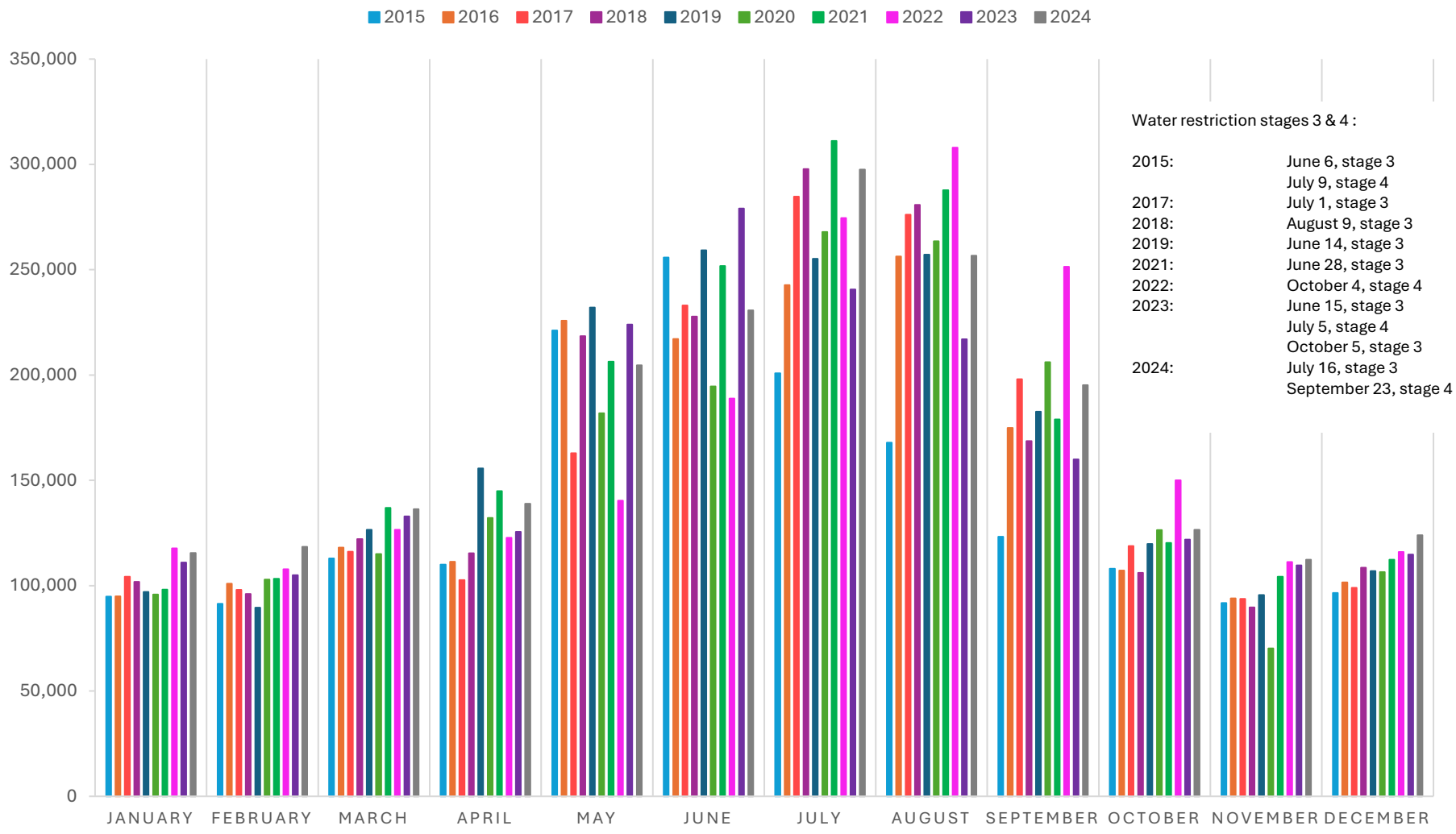


Figure 10. Total system output (m^3), including RDN portion of ERWS.

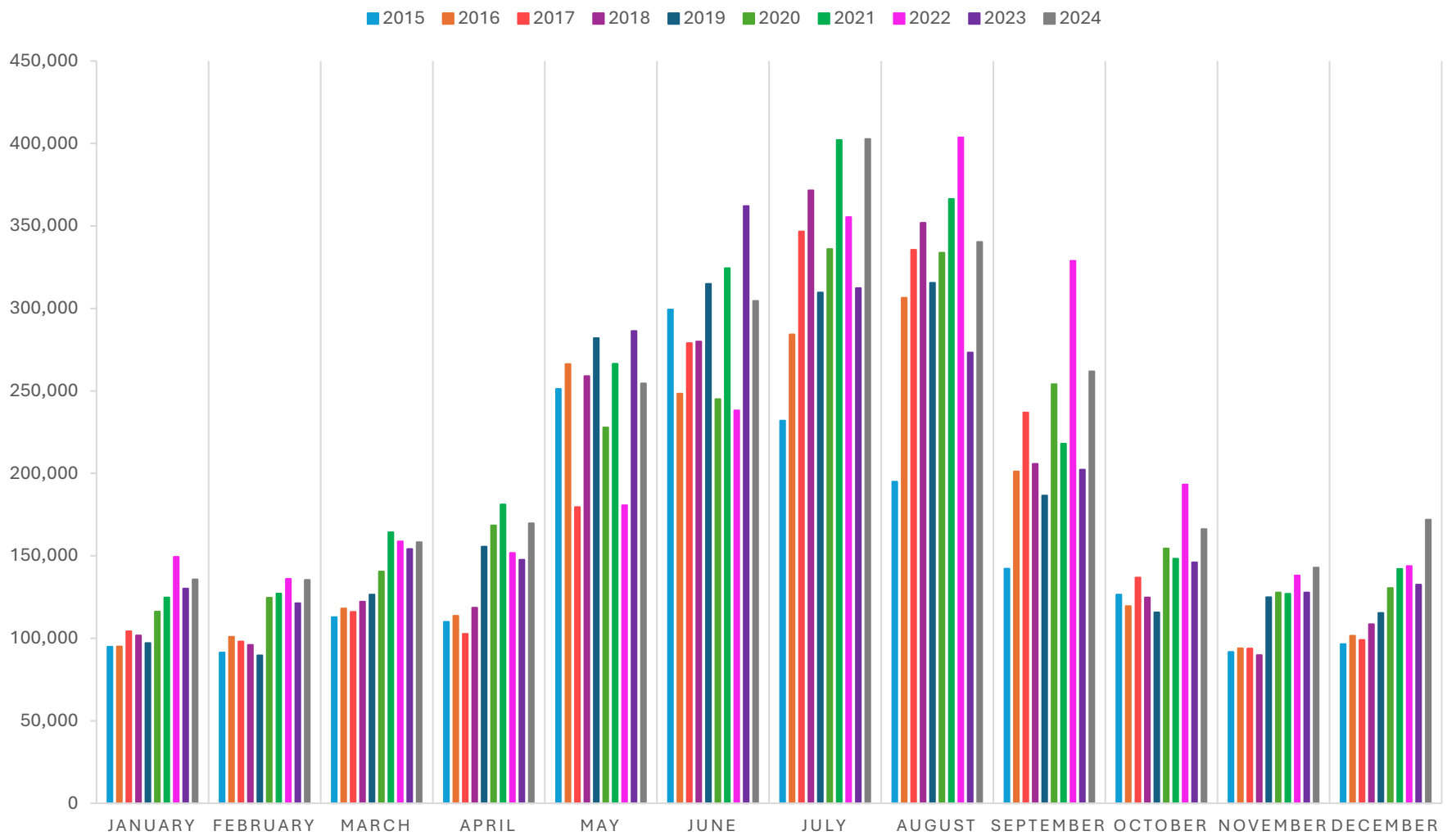
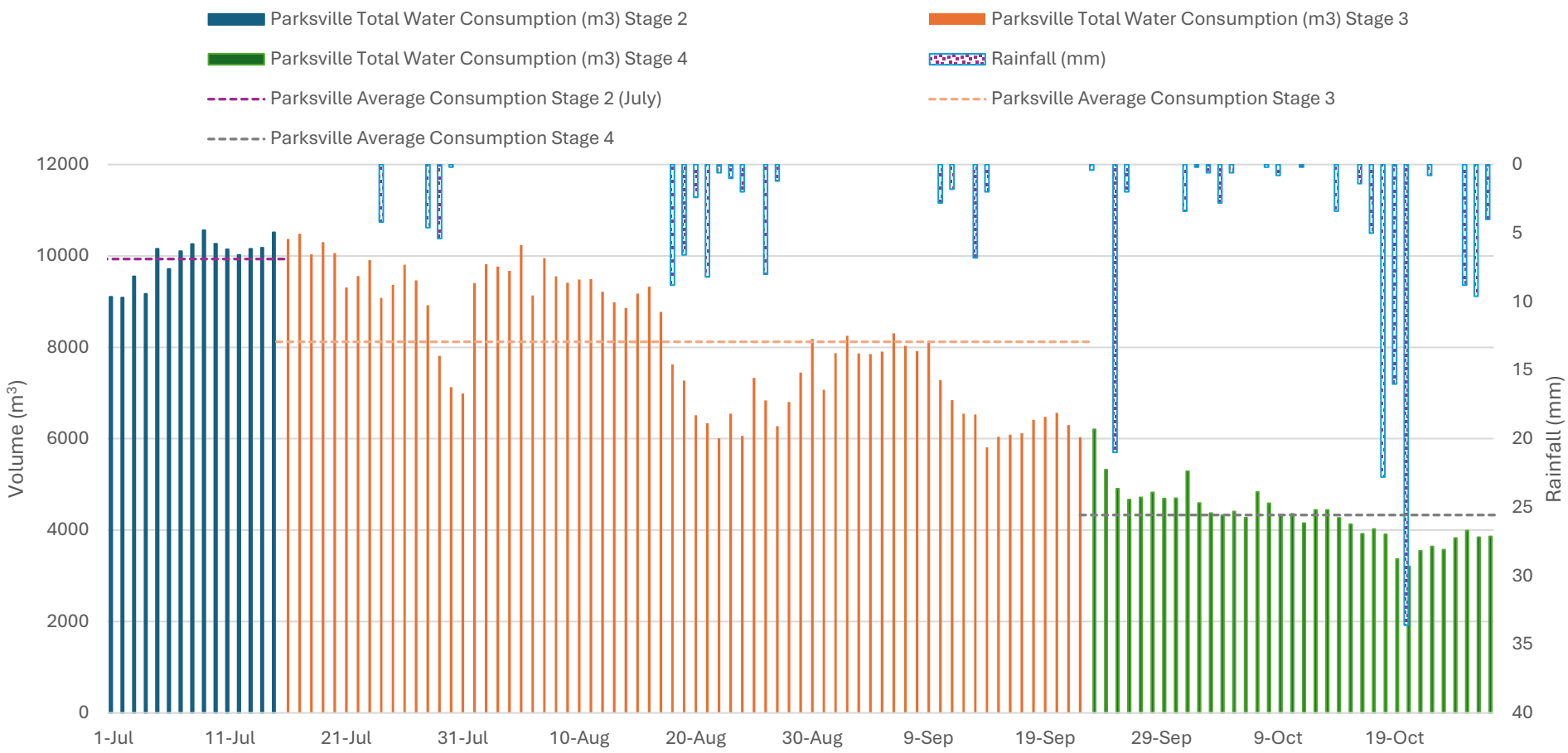


Figure 11. Parksville consumption during water conservation stage 2 to 4.

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Standard Methods

Water Quality Testing and Results

The water quality monitoring program covers the entire system, from source to tap. The sample results are shared with the Island Health Authority which oversees compliance with drinking water standards, and with City staff who rely on the information to properly operate and maintain the system. Water quality monitoring serves several purposes, including:

- Ensuring compliance with the standards for surface and ground water source.
- Ensuring treatment is effective.
- Verifying and understanding the quality of the water being distributed through the system.
- Detecting aesthetic concerns that could pass through the system.
- Addressing concerns or questions posed by the public.

The table below shows the frequency and type of samples that are taken over the year.

Category	Parameter	Sample Sites
Bacteriological	E. coli	16 test ports a month (3- 5 per week). WTP weekly.
	Total Coliform	
Chemical	Free Chlorine	16 test ports a month (3- 5 per week). WTP daily. Englishman River daily for pH only.
	pH	
Physical	Temperature	Railway wells (blended), springwood wells (blended), railway well #1, 3-5 test ports weekly for temperature and turbidity. WTP and Englishman River daily for all parameters.
	Turbidity	
	TDS	
	UVT	
Disinfection By-product	Haloacetic Acids	4-5 test ports and WTP quarterly.
	Trihalomethanes	
Metals	Variety	3-5 wells, reservoir #4, Englishman River, and 1-4 test ports semi-annually.
Aesthetic	Odour and taste	Odour and taste on a complaint basis. Colour is tested daily at the WTP and Englishman River.
	Colour	
Enteric Protozoa	Cryptosporidium	WTP and Englishman River semi-annually.
	Giardia	

Bacteriological Analysis

All water suppliers in BC are required to monitor drinking water for total coliforms and Escherichia coli (E.coli) regularly. City staff takes bacteriological samples from 16 test ports located all over the city and samples from the water treatment plant every month. These samples are tested by Island Health.

No E.coli should be detectable per 100 ml of water sample. Coliforms are considered acceptable if at least 90% of samples do not have any detectable Coliform per 100ml of water, and no sample has more than 10 total Coliform per 100ml of water.

Bacteriological results can be found below and through the following link: *https://www.islandhealth.ca/learn-about-health/drinking-water/water-sampling-results*

Date	Location	Total Coliform	E. Coli
Jan. 2	Parksville MHP	LT1	LT1
Jan. 2	Island Hwy by Temple	LT1	LT1
Jan. 2	770 Soriel	LT1	LT1
Jan. 2	271 Chestnut	LT1	LT1
Jan. 2	ERWTP 1116 Herring Gull	LT1	LT1
Jan. 9	Works Yard	LT1	LT1
Jan. 9	Top of Corfield	LT1	LT1
Jan. 9	Despard @ Moilliet	LT1	LT1
Jan. 9	613 Chinook	LT1	LT1
Jan. 9	ERWTP 1116 Herring Gull	LT1	LT1
Jan. 16	ERWTP 1116 Herring Gull	QRWRT	QRWRT
Jan. 23	186 Shelly	LT1	LT1
Jan. 23	Community Park	LT1	LT1
Jan. 23	450 Wisteria	LT1	LT1
Jan. 23	Daffodil @ Camas	LT1	LT1
Jan. 23	330 Parkview	LT1	LT1
Jan. 23	193 Memorial	LT1	LT1
Jan. 23	ERWTP 1116 Herring Gull	LT1	LT1
Jan. 30	382 Kingsley	LT1	LT1
Jan. 30	855 Temple	LT1	LT1
Jan. 30	ERWTP 1116 Herring Gull	LT1	LT1
Feb. 6	Parksville MHP	LT1	LT1
Feb. 6	Island Hwy by Temple	LT1	LT1
Feb. 6	770 Soriel	LT1	LT1

Date	Location	Total Coliform	E. Coli
Feb. 6	271 Chestnut	LT1	LT1
Feb. 6	ERWTP 1116 Herring Gull	LT1	LT1
Feb. 13	Works Yard	LT1	LT1
Feb. 13	Top of Corfield	LT1	LT1
Feb. 13	Despard @ Moilliet	LT1	LT1
Feb. 13	613 Chinook	LT1	LT1
Feb. 13	ERWTP 1116 Herring Gull	LT1	LT1
Feb. 20	186 Shelly	LT1	LT1
Feb. 20	Community Park	LT1	LT1
Feb. 20	450 Wisteria	LT1	LT1
Feb. 20	Daffodil @ Camas	LT1	LT1
Feb. 20	ERWTP 1116 Herring Gull	LT1	LT1
Feb. 27	330 Parkview	LT1	LT1
Feb. 27	193 Memorial	LT1	LT1
Feb. 27	382 Kingsley	LT1	LT1
Feb. 27	855 Temple	LT1	LT1
Feb. 27	ERWTP 1116 Herring Gull	LT1	LT1
Mar. 6	Parksville MHP	LT1	LT1
Mar. 6	Island Hwy by Temple	LT1	LT1
Mar. 6	770 Soriel	LT1	LT1
Mar. 6	271 Chestnut	LT1	LT1
Mar. 6	ERWTP 1116 Herring Gull	LT1	LT1
Mar. 12	Works Yard	LT1	LT1
Mar. 12	Top of Corfield	LT1	LT1
Mar. 12	Despard @ Moilliet	LT1	LT1
Mar. 12	613 Chinook	LT1	LT1
Mar. 12	ERWTP 1116 Herring Gull	LT1	LT1
Mar. 19	186 Shelly	LT1	LT1
Mar. 19	Community Park	LT1	LT1
Mar. 19	450 Wisteria	LT1	LT1
Mar. 19	Daffodil @ Camas	LT1	LT1
Mar. 19	ERWTP 1116 Herring Gull	LT1	LT1
Mar. 26	330 Parkview	LT1	LT1
Mar. 26	193 Memorial	LT1	LT1
Mar. 26	382 Kingsley	LT1	LT1
Mar. 26	855 Temple	LT1	LT1

Date	Location	Total Coliform	E. Coli
Mar. 26	ERWTP 1116 Herring Gull	LT1	LT1
Apr. 2	Parksville MHP	LT1	LT1
Apr. 2	Island Hwy by Temple	LT1	LT1
Apr. 2	770 Soriel	LT1	LT1
Apr. 2	271 Chestnut	LT1	LT1
Apr. 2	ERWTP 1116 Herring Gull	LT1	LT1
Apr. 9	Works Yard	LT1	LT1
Apr. 9	Top of Corfield	LT1	LT1
Apr. 9	Despard @ Moilliet	LT1	LT1
Apr. 9	613 Chinook	LT1	LT1
Apr. 9	ERWTP 1116 Herring Gull	LT1	LT1
Apr. 16	186 Shelly	LT1	LT1
Apr. 16	Community Park	LT1	LT1
Apr. 16	450 Wisteria	LT1	LT1
Apr. 16	Daffodil @ Camas	LT1	LT1
Apr. 16	ERWTP 1116 Herring Gull	LT1	LT1
Apr. 23	855 Temple	LT1	LT1
Apr. 23	330 Parkview	LT1	LT1
Apr. 23	ERWTP 1116 Herring Gull	LT1	LT1
Apr. 30	193 Memorial	LT1	LT1
Apr. 30	382 Kingsley	LT1	LT1
Apr. 30	ERWTP 1116 Herring Gull	LT1	LT1
May. 7	Parksville MHP	LT1	LT1
May. 7	Island Hwy by Temple	LT1	LT1
May. 7	770 Soriel	LT1	LT1
May. 7	271 Chestnut	LT1	LT1
May. 7	ERWTP 1116 Herring Gull	LT1	LT1
May. 14	Works Yard	LT1	LT1
May. 14	Top of Corfield	LT1	LT1
May. 14	Despard @ Moilliet	LT1	LT1
May. 14	613 Chinook	LT1	LT1
May. 14	ERWTP 1116 Herring Gull	LT1	LT1
May. 21	186 Shelly	LT1	LT1
May. 21	Community Park	LT1	LT1
May. 21	450 Wisteria	LT1	LT1
May. 21	Daffodil @ Camas	LT1	LT1

Date	Location	Total Coliform	E. Coli
May. 21	ERWTP 1116 Herring Gull	LT1	LT1
May. 28	330 Parkview	LT1	LT1
May. 28	193 Memorial	LT1	LT1
May. 28	382 Kingsley	LT1	LT1
May. 28	855 Temple	LT1	LT1
May. 28	ERWTP 1116 Herring Gull	LT1	LT1
Jun. 4	Parksville MHP	LT1	LT1
Jun. 4	Island Hwy by Temple	LT1	LT1
Jun. 4	770 Soriel	LT1	LT1
Jun. 4	271 Chestnut	LT1	LT1
Jun. 4	ERWTP 1116 Herring Gull	LT1	LT1
Jun. 11	Works Yard	LT1	LT1
Jun. 11	Top of Corfield	LT1	LT1
Jun. 11	Despard @ Moilliet	LT1	LT1
Jun. 11	613 Chinook	LT1	LT1
Jun. 11	ERWTP 1116 Herring Gull	LT1	LT1
Jun. 18	186 Shelly	LT1	LT1
Jun. 18	Community Park	LT1	LT1
Jun. 18	450 Wisteria	LT1	LT1
Jun. 18	Daffodil @ Camas	LT1	LT1
Jun. 18	ERWTP 1116 Herring Gull	LT1	LT1
Jun. 25	330 Parkview	LT1	LT1
Jun. 25	193 Memorial	LT1	LT1
Jun. 25	382 Kingsley	LT1	LT1
Jun. 25	855 Temple	LT1	LT1
Jun. 25	ERWTP 1116 Herring Gull	LT1	LT1
Jul. 2	Parksville MHP	LT1	LT1
Jul. 2	Island Hwy by Temple	LT1	LT1
Jul. 2	770 Soriel	LT1	LT1
Jul. 2	271 Chestnut	5	LT1
Jul. 2	ERWTP 1116 Herring Gull	LT1	LT1
Jul. 9	Works Yard	LT1	LT1
Jul. 9	Top of Corfield	LT1	LT1
Jul. 9	Despard @ Moilliet	LT1	LT1
Jul. 16	613 Chinook	LT1	LT1
Jul. 16	186 Shelly	LT1	LT1

Date	Location	Total Coliform	E. Coli
Jul. 16	Community Park	ESTCT 20	LT1
Jul. 16	ERWTP 1116 Herring Gull	LT1	LT1
Jul. 23	450 Wisteria	LT1	LT1
Jul. 23	Daffodil @ Camas	LT1	LT1
Jul. 23	330 Parkview	LT1	LT1
Jul. 23	ERWTP 1116 Herring Gull	LT1	LT1
Jul. 30	193 Memorial	QRWRT	QRWRT
Jul. 30	382 Kingsley	QRWRT	QRWRT
Jul. 30	855 Temple	QRWRT	QRWRT
Jul. 30	ERWTP 1116 Herring Gull	QRWRT	QRWRT
Aug. 6	Parksville MHP	LT1	LT1
Aug. 6	Island Hwy by Temple	LT1	LT1
Aug. 6	770 Soriel	LT1	LT1
Aug. 6	271 Chestnut	LT1	LT1
Aug. 6	ERWTP 1116 Herring Gull	LT1	LT1
Aug. 13	Works Yard	LT1	LT1
Aug. 13	Top of Corfield	LT1	LT1
Aug. 13	Despard @ Moilliet	LT1	LT1
Aug. 13	613 Chinook	LT1	LT1
Aug. 13	ERWTP 1116 Herring Gull	LT1	LT1
Aug. 20	186 Shelly	LT1	LT1
Aug. 20	Community Park	LT1	LT1
Aug. 20	450 Wisteria	LT1	LT1
Aug. 20	Daffodil @ Camas	LT1	LT1
Aug. 20	ERWTP 1116 Herring Gull	LT1	LT1
Aug. 27	330 Parkview	LT1	LT1
Aug. 27	193 Memorial	LT1	LT1
Aug. 27	382 Kingsley	LT1	LT1
Aug. 27	855 Temple	LT1	LT1
Aug. 27	ERWTP 1116 Herring Gull	LT1	LT1
Sept. 3	Parksville MHP	LT1	LT1
Sept. 3	Island Hwy by Temple	LT1	LT1
Sept. 3	770 Soriel	LT1	LT1
Sept. 3	271 Chestnut	LT1	LT1
Sept. 3	ERWTP 1116 Herring Gull	LT1	LT1
Sept. 10	Works Yard	LT1	LT1

Date	Location	Total Coliform	E. Coli
Sept. 10	Top of Corfield	LT1	LT1
Sept. 10	Despard @ Moilliet	LT1	LT1
Sept. 10	613 Chinook	LT1	LT1
Sept. 10	ERWTP 1116 Herring Gull	LT1	LT1
Sept. 17	186 Shelly	LT1	LT1
Sept. 17	Community Park	LT1	LT1
Sept. 17	450 Wisteria	LT1	LT1
Sept. 17	Daffodil @ Camas	LT1	LT1
Sept. 17	ERWTP 1116 Herring Gull	LT1	LT1
Sept. 24	330 Parkview	LT1	LT1
Sept. 24	193 Memorial	LT1	LT1
Sept. 24	382 Kingsley	LT1	LT1
Sept. 24	855 Temple	LT1	LT1
Sept. 24	ERWTP 1116 Herring Gull	LT1	LT1
Oct. 1	ERWTP 1116 Herring Gull	LT1	LT1
Oct. 2	Parksville MHP	LT1	LT1
Oct. 2	Island Hwy by Temple	LT1	LT1
Oct. 2	770 Soriel	LT1	LT1
Oct. 2	271 Chestnut	LT1	LT1
Oct. 8	Works Yard	LT1	LT1
Oct. 8	Top of Corfield	LT1	LT1
Oct. 8	Despard @ Moilliet	LT1	LT1
Oct. 8	ERWTP 1116 Herring Gull	LT1	LT1
Oct. 15	613 Chinook	LT1	LT1
Oct. 15	186 Shelly	LT1	LT1
Oct. 15	Community Park	LT1	LT1
Oct. 15	ERWTP 1116 Herring Gull	LT1	LT1
Oct. 22	450 Wisteria	LT1	LT1
Oct. 22	Daffodil @ Camas	LT1	LT1
Oct. 22	330 Parkview	LT1	LT1
Oct. 23	ERWTP 1116 Herring Gull	LT1	LT1
Oct. 29	193 Memorial	LT1	LT1
Oct. 29	382 Kingsley	LT1	LT1
Oct. 29	855 Temple	LT1	LT1
Oct. 29	ERWTP 1116 Herring Gull	LT1	LT1
Nov. 5	Island Hwy by Temple	LT1	LT1

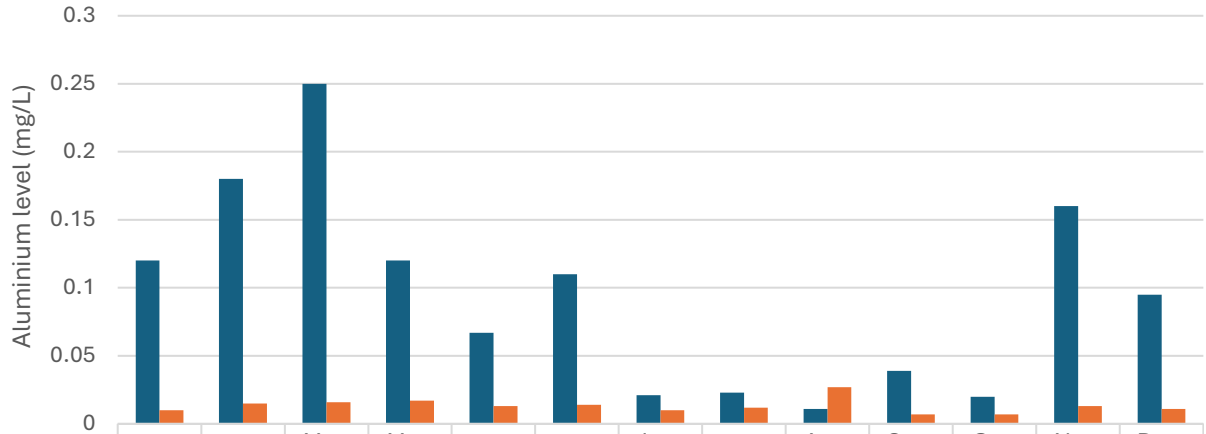
Date	Location	Total Coliform	E. Coli
Nov. 5	770 Soriel	LT1	LT1
Nov. 5	271 Chestnut	LT1	LT1
Nov. 5	ERWTP 1116 Herring Gull	LT1	LT1
Nov. 19	Works Yard	LT1	LT1
Nov. 12	Top of Corfield	LT1	LT1
Nov. 12	Despard @ Moilliet	LT1	LT1
Nov. 12	Parksville MHP	LT1	LT1
Nov. 12	613 Chinook	LT1	LT1
Nov. 12	ERWTP 1116 Herring Gull	LT1	LT1
Nov. 19	186 Shelly	LT1	LT1
Nov. 19	Community Park	LT1	LT1
Nov. 19	450 Wisteria	LT1	LT1
Nov. 19	ERWTP 1116 Herring Gull	LT1	LT1
Nov. 26	Daffodil @ Camas	LT1	LT1
Nov. 26	330 Parkview	LT1	LT1
Nov. 26	193 Memorial	LT1	LT1
Nov. 26	382 Kingsley	LT1	LT1
Nov. 26	855 Temple	LT1	LT1
Nov. 26	ERWTP 1116 Herring Gull	LT1	LT1
Dec. 3	Parksville MHP	LT1	LT1
Dec. 3	Island Hwy by Temple	LT1	LT1
Dec. 3	770 Soriel	LT1	LT1
Dec. 3	271 Chestnut	LT1	LT1
Dec. 3	ERWTP 1116 Herring Gull	LT1	LT1
Dec. 10	Works Yard	LT1	LT1
Dec. 10	Top of Corfield	LT1	LT1
Dec. 10	Despard @ Moilliet	LT1	LT1
Dec. 10	613 Chinook	LT1	LT1
Dec. 10	186 Shelly	LT1	LT1
Dec. 10	Community Park	LT1	LT1
Dec. 10	ERWTP 1116 Herring Gull	LT1	LT1
Dec. 17	450 Wisteria	LT1	LT1
Dec. 17	Daffodil @ Camas	LT1	LT1
Dec. 17	330 Parkview	LT1	LT1
Dec. 17	193 Memorial	LT1	LT1
Dec. 17	382 Kingsley	LT1	LT1

Date	Location	Total Coliform	E. Coli
Dec. 17	855 Temple	LT1	LT1
Dec. 17	ERWTP 1116 Herring Gull	LT1	LT1

LT1 - Less than 1
ESTCT - estimated count
QRWRT - Sample exceeded 30 hours from time of collection

Aluminum Analysis

Aluminum samples are taken monthly at the Englishman River and the WTP to ensure the coagulant does not elevate aluminum levels above the MAC of 9.5 mg/L. Results are shown below.



	Jan. 2, 2024	Feb. 5, 2024	Mar. 12, 2024	Mar. 18, 2024	Apr. 9, 2024	May. 6, 2024	Jun. 17, 2024	Jul. 16, 2024	Aug. 20, 2024	Sep. 16, 2024	Oct. 17, 2024	Nov. 19, 2024	Dec. 11, 2024
Englishman River (mg/L)	0.12	0.18	0.25	0.12	0.067	0.11	0.021	0.023	0.011	0.039	0.02	0.16	0.095
WTP Treated (mg/L)	0.01	0.015	0.016	0.017	0.013	0.014	0.01	0.012	0.027	0.007	0.007	0.013	0.011

Full Spectrum Analysis

The City sends samples for full spectrum analysis to an accredited lab twice a year. Results include parameters such as total metals, conventional parameters (pH, turbidity, hardness), and microbiological analysis.

The high turbidity events at Springwood Well #6 and #8 on September 11 were likely due to a sudden flush of the well when samples were taken. After lab results were received by City staff, turbidity samples were taken in house to confirm turbidity levels were below 1NTU. Springwood Well #5 and #8 showed less than 0.1 NTU at the time of re-sample.

Manganese levels above the aesthetic objective were only seen at the source (SW#3, SW#5, RW#1, RW#3, RW#8), and not at the samples of treated water such as the water treatment plant, Reservoir #4, and test ports on PWY, Memorial, and Temple.

2024	Englishman River		WTP Finished		RW #1		RW #3	RW #7	RW #8	SW #3	SW #5	SW #6	SW #8	PWY		Memorial		Temple	Res #4
	18-Mar	11-Sep	18-Mar	21-May	18-Mar	4-Sep	18-Mar	4-Sep	4-Sep	18-Mar	11-Sep	18-Mar	11-Sep	18-Mar	21-May	18-Mar	11-Sep	21-May	11-Sep
Inorganic Nonmetallic Parameters																			
Cyanide (mg/L)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Calcium (mg/L)	5.7	12	5.7	8.4	35	36	38	45	41.00	31	46	33	42	5.4	8.8	25	26	31	12
Magnesium (mg/L)	0.78	1.5	0.73	0.98	19	17	19	22	19	15	22	16	20	0.78	1.00	12	10	13	1.3
Potassium (mg/L)	0.09	0.2	0.09	0.15	0.84	0.84	0.78	0.99	0.67	0.84	1.10	0.83	0.97	0.07	0.13	0.57	0.53	0.64	0.16
Silicon (mg/L)	2.7	2.3	2.6	2.2	11	11	12	12	11	12	14	13	12	2.8	2.4	8.9	7.5	9.6	2.1
Sodium (mg/L)	2.1	5.7	11	12	8.2	8.3	10	13	8.0	9.5	12	8.3	7.7	11	13	11	12	11	14
Mercury (mg/L)	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Microbiological Analysis																			
Total Coliforms (MPN/100ml)	101.2	>2,419.6	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Escherichia coli (MPN/100ml)	1.0	71.7	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Physical & Aggregate Properties																			
Colour (Colour unit)	6	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Turbidity (NTU)	0.95	1.42	1.02	<0.10	0.32	0.11	<0.10	<0.10	<0.10	0.12	1.30	0.18	2.15	<0.10	0.16	0.11	0.12	0.21	0.3
Routine																			
pH	6.95	7.22	7.79	7.99	7.59	7.99	7.61	7.86	7.91	7.33	7.37	7.35	7.65	7.68	7.99	7.48	7.60	7.94	8.1
Electrical Conductivity (us/cm)	40	103	80	113	337	368	369	475	398	289	453	303	393	78	112	248	270	310	139
T-Alkalinity (mg/L)	14	26	30	41	123	122	127	145	127	114	181	134	160	29	40	96	92	118	40
Chloride (mg/L)	2.62	13.8	5.86	9.95	32.1	30.8	43.0	54	37.1	19.2	19.3	16.2	20	6.40	9.76	18.9	23.8	22.4	16.7
Fluoride (mg/L)	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.1	0.02	<0.01	0.01	<0.01	0.02	<0.01	<0.01	<0.01	0.01	<0.01	<0.01
Nitrate - N (mg/L)	0.03	0.03	0.03	0.03	1.23	1.16	1.03	2.1	0.68	1.22	1.97	0.89	1.46	0.04	0.02	0.84	0.71	1	0.02
Nitrite - N (mg/L)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sulfate (SO4) (mg/L)	1.5	1.7	1.5	1.6	7.3	6.9	3.8	6	10.8	7.5	8.6	5.3	9.5	1.5	1.6	4.9	5.0	5.7	1.6
Hardness (mg/L)	16	34	16	27	160	153	170	200	173	136	200	170	190	16	26	108	107	128	34
Total Dissolved Solids (mg/L)	27	56	50	65	209	204	226	268	222	188	261	213	233	50	63	155	156	183	75
Langelier Index	-2.5	-1.6	-1.3	-0.8	-0.2	0.2	-0.1	0.2	0.2	-0.5	-0.1	-0.3	0.06	-1.5	-0.8	-0.5	-0.4	0.09	-0.6
Trace Metal Totals																			
Aluminum (mg/L)	0.12	0.059	0.017	0.013	0.001	0.087	<0.001	0.001	<0.001	<0.001	0.001	0.001	0.063	0.017	0.018	0.005	0.004	0.004	0.012
Antimony (mg/L)	0.00002	<0.00002	<0.00002	0.00002	0.00002	0.00003	<0.00002	0.00003	<0.00002	<0.00002	<0.00002	0.00002	<0.00002	<0.00002	0.00002	0.00002	<0.00002	0.00005	<0.00002
Arsenic (mg/L)	0.0002	0.0002	<0.0001	0.0002	0.0004	0.0005	0.0004	0.0005	0.0004	0.0005	0.0004	0.0003	0.0005	<0.0001	0.0002	0.0003	0.0003	0.0003	0.0002
Barium (mg/L)	0.0039	0.007	0.0034	0.0120	0.018	0.018	0.0090	0.018	0.0110	0.0074	0.014	0.0070	0.0089	0.0040	0.0110	0.0092	0.0095	0.018	0.0061
Boron (mg/L)	0.005	0.015	0.006	0.012	0.013	0.014	0.011	0.019	0.007	0.011	0.014	0.010	0.011	0.005	0.012	0.011	0.013	0.014	0.016
Cadmium (mg/L)	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	0.00002	0.00003	<0.00001	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	<0.00001
Chromium (mg/L)	0.00027	0.00018	0.00015	0.00012	0.00097	0.00100	0.00060	0.00071	0.0008	0.00057	0.00032	0.00056	0.0013	0.00032	0.00012	0.023	0.0004	0.00061	0.00006
Copper (mg/L)	0.0012	0.0007	0.0004	0.0011	0.0026	0.0008	0.0007	0.0018	0.0005	0.0024	0.0013	0.0078	0.0014	0.0028	0.0028	0.015	0.020	0.013	0.0005
Iron (mg/L)	0.12	0.14	0.003	0.020	0.095	0.028	0.011	0.018	0.013	0.018	0.120	0.040	0.38	0.011	0.011	0.22	0.01	0.019	0.005
Lead (mg/L)	0.00004	0.00001	<0.00001	0.00002	0.00046	0.00011	0.00015	0.00057	0.00025	0.00049	0.00033	0.00099	0.00002	0.00012	0.00020	0.00032	0.00082	0.0005	0.00002
Manganese (mg/L)	0.003	0.012	0.001	0.004	0.140	0.006	0.035	0.007	0.027	0.040	0.045	0.010	0.018	0.001	0.003	0.006	0.004	0.004	0.003
Selenium (mg/L)	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Strontium (mg/L)	0.021	0.049	0.021	0.038	0.10	0.11	0.12	0.14	0.110	0.086	0.14	0.095	0.11	0.021	0.037	0.074	0.081	0.095	0.048
Uranium (mg/L)	0.00001	<0.00001	<0.00001	<0.00001	0.00033	0.00033	0.00034	0.00028	0.00025	0.00015	0.00026	0.00013	0.00038	<0.00001	<0.00001	0.00015	0.00016	0.0002	<0.00001
Zinc (mg/L)	0.0006	<0.0005	<0.0005	0.054	0.012	0.011	0.013	0.0058	0.003	0.011	0.0100	0.12	0.0028	0.015	0.062	0.015	0.008	0.093	<0.0005

Trihalomethane and Haloacetic acids Analyses

The city collects samples to analyze for trihalomethanes (THMs), and haloacetic acid (HAA) four times a year. THMs and HAAs are a type of disinfection by-products that form when chlorine is added to water containing natural organic matter.

All results were within the maximum acceptable concentration (MAC) of 0.1 mg/L for THMs, and 0.08 mg/L for HAA, set by the Canadian Drinking Water Quality Guidelines.

2024	Community Park				Temple			
	February	May	August	November	February	May	August	November
Total THM (ug/L)	50.2	25.4	38.5	34.4	25.6	17.5	44.2	-
Bromodichloromethanes (ug/L)	2.9	4.4	10.8	8.3	3.8	4.2	12.3	-
Bromoform (ug/L)	<0.5	0.7	0.6	0.6	0.6	1.1	0.5	-
Chloroform (ug/L)	47.2	18	23.8	22.7	19.1	8.9	27.8	-
Dibromochloromethane (ug/L)	<0.5	2.3	3.4	2.8	2.1	3.3	3.7	-
Toluene-d8 (%)	100	113	114	107	102	115	111	-
Bromoflurobenzene (%)	100	109	104	113	97	102	107	-
Monochloroacetic Acid (ug/L)	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	-
Monobromoacetic Acid (ug/L)	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	-
Dichloroacetic Acid (ug/L)	17.7	8.3	7	11.5	9	4.3	8.1	-
Trichloroacetic Acid (ug/L)	13.7	4.8	4.2	4.6	6.7	2.6	5.3	-
Bromochloroacetic Acid (ug/L)	<2.0	<2.0	2.3	<2.0	2	<2.0	2.6	-
Dibromoacetic Acid (ug/L)	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	-
Total Haloacetic Acids HAA6 (ug/L)	31.5	13.1	13.5	16.1	17.8	7	16.1	-
2,3-Dibromopropionic Acid (%)	87	81	65	99	87	81	64	-

2024	Ermineskin				Public Works			
	February	May	August	November	February	May	August	November
Total THM (ug/L)	20.8	16.2	-	19.3	38.2	44.1	74	55.7
Bromodichloromethanes (ug/L)	2.8	3.2	-	3.8	2.4	4.7	14.6	5
Bromoform (ug/L)	0.7	0.9	-	0.7	<0.5	<0.5	<0.5	<0.5
Chloroform (ug/L)	15.4	9.6	-	12.5	35.8	39.4	57.8	50.7
Dibromochloromethane (ug/L)	1.9	2.6	-	2.3	<0.5	<0.5	1.7	<0.5
Toluene-d8 (%)	102	116	-	108	130	115	111	107
Bromoflurobenzene (%)	96	109	-	105	94	104	100	113
Monochloroacetic Acid (ug/L)	<2.0	<2.0	-	<2.0	<2.0	<2.0	<2.0	2.6
Monobromoacetic Acid (ug/L)	<2.0	<2.0	-	<2.0	<2.0	<2.0	<2.0	<2.0
Dichloroacetic Acid (ug/L)	6.5	4.5	-	4.8	15.2	15.1	13.8	17.4
Trichloroacetic Acid (ug/L)	5	2.7	-	2.1	11.9	8.3	6.3	7.1
Bromochloroacetic Acid (ug/L)	<2.0	<2.0	-	<2.0	<2.0	<2.0	2.6	<2.0
Dibromoacetic Acid (ug/L)	<2.0	<2.0	-	<2.0	<2.0	<2.0	<2.0	<2.0
Total Haloacetic Acids HAA6 (ug/L)	11.5	7.2	-	6.9	27	23.4	22.7	27.1
2,3-Dibromopropionic Acid (%)	90	80	-	100	88	81	68	97

2024	Water Treatment Plant				Corfield			
	February	May	August	November	February	May	August	November
Total THM (ug/L)	30.6	15.3	21.3	28.7	-	-	45.2	26.8
Bromodichloromethanes (ug/L)	1.8	1.9	4.9	2.7	-	-	12.3	6.3
Bromoform (ug/L)	<0.5	<0.5	<0.5	<0.5	-	-	0.5	<0.5
Chloroform (ug/L)	28.8	13.5	15.8	26	-	-	28.7	18.3
Dibromochloromethane (ug/L)	<0.5	<0.5	0.6	<0.5	-	-	3.7	2.2
Toluene-d8 (%)	113	119	112	107	-	-	114	110
Bromoflurobenzene (%)	108	95	105	113	-	-	106	111
Monochloroacetic Acid (ug/L)	<2.0	<2.0	<2.0	<2.0	-	-	<2.0	<2.0
Monobromoacetic Acid (ug/L)	<2.0	<2.0	<2.0	<2.0	-	-	<2.0	<2.0
Dichloroacetic Acid (ug/L)	9.6	7.8	5.2	11.7	-	-	8.1	9.1
Trichloroacetic Acid (ug/L)	6.5	3.8	3.1	6.2	-	-	5.2	4.1
Bromochloroacetic Acid (ug/L)	<2.0	<2.0	<2.0	<2.0	-	-	2.6	<2.0
Dibromoacetic Acid (ug/L)	<2.0	<2.0	<2.0	<2.0	-	-	<2.0	<2.0
Total Haloacetic Acids HAA6 (ug/L)	16.1	11.6	8.2	17.9	-	-	15.9	13.2
2,3-Dibromopropionic Acid (%)	81	86	69	98	-	-	67	93

Cryptosporidium and Giardia Analysis

The City tests for cryptosporidium (oocysts) and giardia (cysts) twice a year. There were no cysts found in the treated water, and 1.25 giardia cysts/100L found in the Englishman River sample.

Sample	Cysts/100L	Organisms Identified	Comments
1 Treated WTP #1	ND	Giardia (cysts)	-protozoan; enteric parasite
08Apr24 10:50	ND	Cryptosporidium (oocysts)	-protozoan; enteric parasite
4 gal/min			
2 River - Raw Water #2	1.25	Giardia (cysts)	-protozoan; enteric parasite
08Apr24 12:10	ND	Cryptosporidium (oocysts)	-protozoan; enteric parasite
3.25 gal/min			

Detection Limit = 1 per 100L *
Lab Test Recovery = 94.6%
* test is strongly influenced by volume collected, amount & type of sediment present

ND = none detected

Sample	Cysts/100L	Organisms Identified	Comments
High Lift Pump Room	ND	Giardia (cysts)	-protozoan; enteric parasite
25Nov24 12:09 1445L	ND	Cryptosporidium (oocysts)	-protozoan; enteric parasite

The second set of samples for the year was originally taken on September 23. Due to a mix up of the samples, an additional sample for the finished water, taken at the high lift pump room, was sent to the lab for testing.

Englishman River Estuary

Climate Change

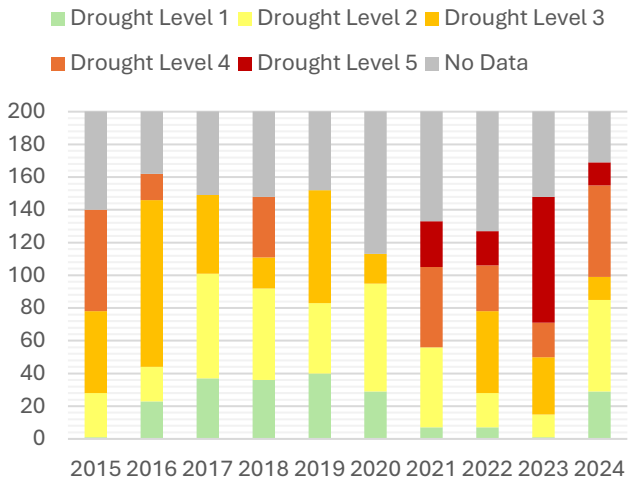
Climate change is accelerating at an unprecedented rate. Record-breaking heat, extreme droughts, extreme wildfires and storms, devastating hurricanes are happening all over the world and it is clear that changes are also happening locally. Climate science shows that the warmer the atmosphere is, more moisture it can hold, which leads to more extreme downpours and intense droughts.

A recent NASA-led study that looked at how crops and forests are responding to changing rainfall patterns showed that how rain falls in a given year is nearly as important to vegetation as annual rainfall totals. Even in year with similar total rainfall volume, plants fare differently when water comes in fewer, heavier bursts. Broadleaf forests and rain forests, like we have here, fare worse with these changes, as vegetation tends to not tolerate long dry spells.

The recent droughts in our area, are a good indicator of how fast the climate is changing. In a relatively short period of time, the frequency where drought level 4 occurred in a year went from 50% to yearly, and the number of drought level 5 occurrences in a year went from never to yearly. The past 4 years (2021-2024), show significant changes to our climate, as seen below.

Figure 12. Shows a decline in number of days where the drought level is below 3, and a significant increase in the number of days where the drought level is 4 or 5. This data was collected from the BC Ministry of Water, Land and Natural Resource Stewardship Drought Portal.

	Drought Level 1	Drought Level 2	Drought Level 3	Drought Level 4	Drought Level 5
Average # of drought days (2015-2020)	27.7	46.2	51.0	19.2	0.0
Average # of drought days (2021-2024)	11.0	35.0	24.8	38.5	35.0
Decline in # of drought days (% change)	60.2	24.2	51.5	-	-
Increase in # of drought days (% change)	-	-	-	100.9	infinite



Drought Level 1	Adverse impacts to socio-economic or ecosystem values are rare.
Drought Level 2	Adverse impacts to socio-economic or ecosystem values are unlikely.
Drought Level 3	Adverse impacts to socio-economic or ecosystem values are possible.
Drought Level 4	Adverse impacts to socio-economic or ecosystem values are likely.
Drought Level 5	Adverse impacts to socio-economic or ecosystem values are almost certain.

Project

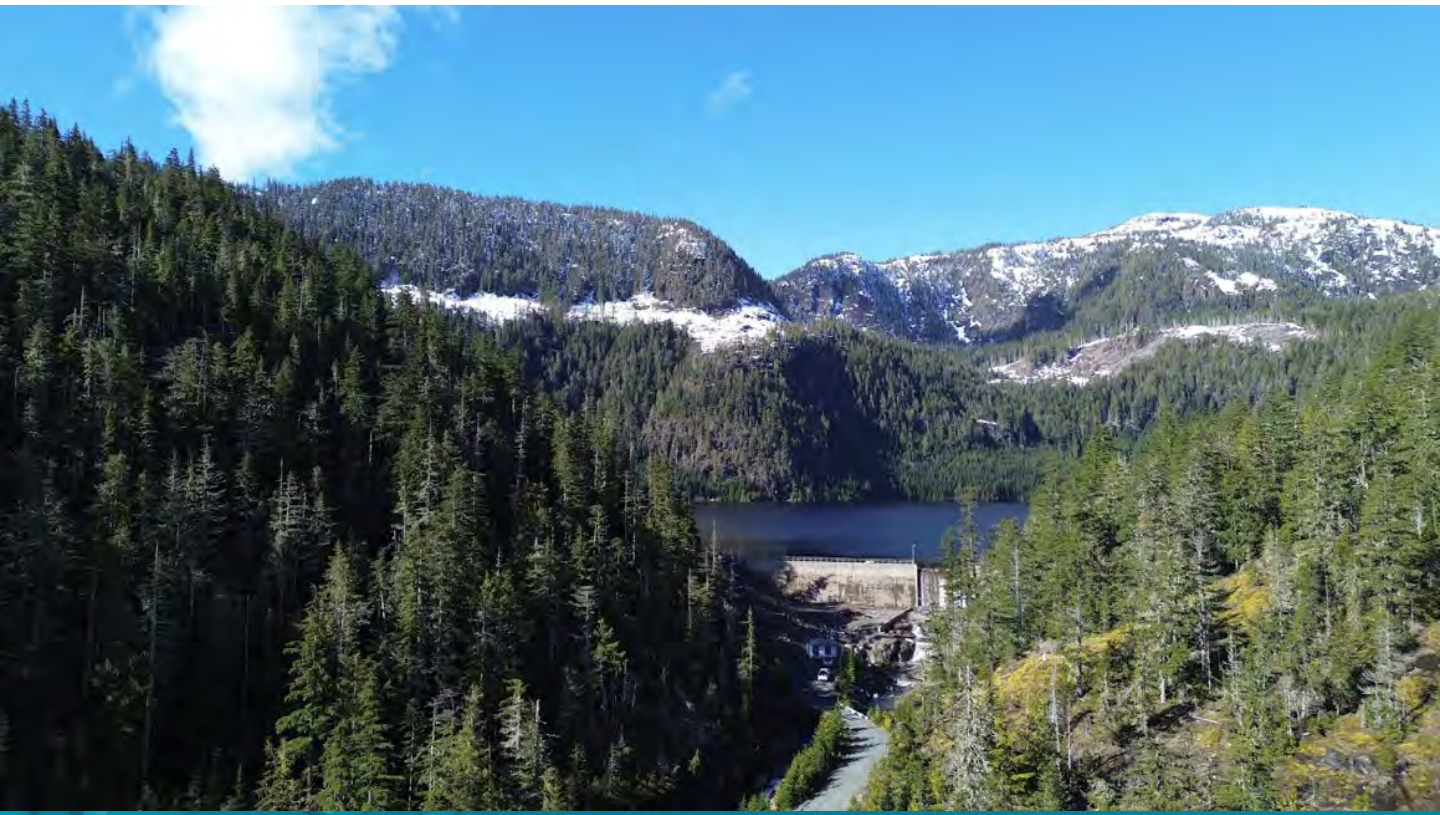
Water Use Planning and Management Study

Being carried out by: Kerr Wood Leidal (KWL)
To be completed by: Spring 2025

In this project, KWL will prepare a capacity analysis and conduct a review of system limitations, look at future water supply and demand scenarios that incorporate climate change impacts and growth, as well as review the financial health of the water utility, to determine the needs Parksville faces. They will also evaluate current water supply, storage and demand management options to help staff prioritize activities to meet future needs, identify opportunities to offset project costs, and look at the potential for power generation projects for the water system.

This project is being done to ensure the City has a long-term water supply sustainability plan and will provide more certainty about the effects of climate change and population growth on the City's water supply and identify options for building resilience into the future.

Arrowsmith Dam.



Fire Hydrant

Programs

Emergency Response Program (ERP)

The City of Parksville has three ERPs pertaining to the water system and a supplemental Drought Response Plan. The plans are the following:

- Arrowsmith Dam Emergency Response Plan (fully updated in 2024).
- Parksville Water System Emergency Response Plan.
- Englishman River Water Treatment Plant Emergency Plan.

All plans are part of the corporate emergency framework. These documents outline the strategies to deal with events such as contamination of water supply, loss of source, pump failures, earthquakes, security threats, etc.

As of 2024, staff participates in drills at a minimum once a year. Drills help City staff and other participants (emergency management, fire fighters) gain and maintain familiarity with the documents. Post-drill discussions tend to lead to improvements to the plans.

Cross Connection Control Program

The Cross Connection Program is in place to help protect our water supply system by identifying and addressing potential hazards from all users. The program is made up of three primary areas:

- Compliance checks and testing.
- Audits administered by a trained Cross Connection Control inspector.
- Education and outreach about responsibilities, regulations, and requirements.

A tracking program called FAST (MTS) is used to track registered devices (both city owned and privately owned devices). A number of local companies, with certified backflow assembly testers on staff, frequently send test reports to the City within 30 days of testing a device. Test reports are checked and entered in the tracking program. Roughly one audit is completed a month since inspections started.

Property owners are required to submit annual test reports to the City and are responsible for any cost related to the installation, replacement, and testing of approved backflow devices. Additional information can be found under the Frequently Asked Questions section of this report.

Double check valve assembly.

Watershed Protection Program

The Englishman River flows in an easterly direction from Mount Arrowsmith and discharges into the Salish Sea, north of Craig Bay. The highest elevation in the watershed is Mount Arrowsmith, at 1819 meters and has a drainage area of 324 km^2.

The South Englishman River, Swane Creek, Morison Creek, Shelly Creek, and Centre Creek all drain into the Englishman River. The Englishman River is an important fisheries river and through the Arrowsmith Water Service, provides water supply for the City of Parksville and the Nanoose Peninsula. Water is stored at a dam at Arrowsmith Lake and released as needed as per the Ministry of Forests Provisional Operating Rule. Fish in the Englishman River includes trout, steelhead, and salmon. The Englishman River is identified as a 'sensitive stream' requiring special management attention under the *Fisheries Protection Act*.

The city is part of the Regional District of Nanaimo Drinking Water and Watershed Protection program. This program is tasked with helping to protect the region's water resources. Through this program we learn more about the water in the region with data collection, analysis and studies, use this information to make important decisions, and help protect the environment by providing information/education.

A number of drinking water and watershed protection educational videos can be found here: RDN Get Involved.

Fire Hydrant Inspection Program

Fire hydrants are completely disassembled and inspected on a three-year rotation and painted as needed. As part of the annual fire hydrant inspection program, which helps ensure proper operation, all hydrants in the system receive some levels of service which are:

- A Service: Pressure test only.
- B Service: Full tear down.

One third of the hydrants receive B service, and two thirds of the hydrants receive A service every year. Through the preventative maintenance program and construction projects, 13 hydrants were added to the system in 2024.

Watermain Flushing Program

The watermain flushing program is an important piece of waterworks maintenance that runs from February to April, between the hours of 7:30 am to 3:30 pm, except for two weeks of graveyard shift to avoid disruptions of the highway during the day. It takes roughly twelve weeks to flush the whole system.

Some water discoloration, and intermittent drops in water pressure is likely to happen in areas that were recently flushed. This is temporary and can be cleared by running cold water for a few minutes.

Main Flushing

Requests, Complaints and Incidents

Below is a general description of requests, complaints, and incidents along with a percentage of calls for each type.

Water shutoff:

- Notifications are distributed prior to construction work when water shutoff happens during scheduled watermain tie-ins.
- Emergency shutoff due to private water line breaks and leaks.

Water leaks:

- Mostly from services or water meters. Repairs are carried out accordingly.

Pressure drop:

- Faulty PRV is the main cause of pressure drop on private property. The homeowner is responsible for their PRV.

Water quality:

- Water quality calls are sometimes followed by watermain flushing or fire hydrant maintenance. Residents notice “brown or dirty” water and crews respond by either re-flushing the mains through a hydrant or a flush out or advising the homeowner to run an outside tap for a few minutes to clear the water.
- Taste of chlorine in the water. Chlorine residuals are tested weekly throughout the system and are kept at a safe level.
- Water hardness. Mostly from new homeowners from other municipalities who are used to different water composition.
- Buildup in washing machines and toilet bowls although the water is only considered “moderately hard” on the hardness scale.

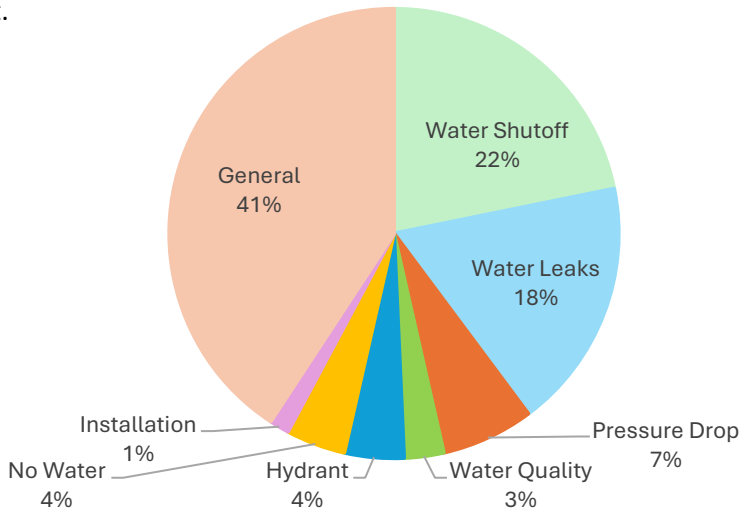
Hydrant:

- Generally related to maintenance after the fire department uses a hydrant.

No water:

- Meter not turned on after install.
- Complete PRV failure.

Percentage of water related requests, complaints and incidents.



PRV and Backflow Preventers

Frequently Asked Questions

Water Pressure

My water pressure is too high. What can I do?

It is a good practice to install a pressure reducing valve (PRV) to control the pressure in your home or business. PRV's are required for buildings where pressure is expected to be greater than 80 psi.

What is a pressure reducing valve? Do I have a PRV? Where would it be? What does it look like?

A pressure reducing valve is an assembly installed in a plumbing system to regulate water pressure. Most homes should be equipped with a PRV as per the BC Plumbing Code.

To locate or to determine if you have a PRV, first locate where your water service line comes into your home or business. There should be a water shutoff valve and the water piping could branch out with one going to the outdoor and the other leading into the internal plumbing; a PRV would be located right before it splits up. It may be in a crawl space or near your hot water tank.

Household PRV's are about 3" tall and generally look like this:

I don't have a PRV. How do I find out if I need one?

If you are experiencing significant pressure fluctuations or water flow from fixtures appear lower than normal, you may need a PRV. Contact a plumber to inspect and carryout the work accordingly.

How do I know if my existing PRV has failed?

The most common signs that a PRV is beginning to fail are:

- Water pressure surges.
- Noted increase/decrease in pressure at fixtures.
- Flow rate of fixtures is higher than flow rating for fixture.
- Frequent leaks or dripping faucets (high water pressure can wear out valves and cause leaks).
- Sudden loss of water pressure or flow (an adjustment to the PRV may resolve the issue).

Can my PRV be adjusted or repaired?

You can contact a plumber to have your PRV adjusted or repaired. However, if your PRV is older, it may be difficult or impossible to adjust. You should then consider replacing your PRV.

Water Leaks

How do I know if I have a water leak?

Drainage problems are often mistaken for water leaks. If water is coming out of the ground after heavy or continuous rainfall, it is unlikely to be a water leak. If the weather has been dry, the water coming up could be a water leak.

Is the leak on my property or the City's?

Leaks that are between the water main and property lines are the City's responsibility. Crews will turn off the water at the property shut-off valve to determine where the leak is. If the leak stops after closing the property shut-off valve, then the leak is on the homeowner's side. The City does not repair leaks on private property.

Meters have a tell tail on their screen. If water is flowing through the meter either a triangle will spin, or a plus sign will flash.

Watermain Flushing

How will water main flushing affect me?

Usually, you will not be aware that flushing is even taking place in your neighborhood. Flushing is generally conducted during work hours. However, to minimize service disruption to the downtown core and/or highly developed areas, nighttime flushing is also carried out by City crews.

When flushing is underway, short periods of low pressure and discolored water may occur. Both will be temporary, and water remains safe to use and drink. Please minimize your water use if discolored water is noticed as the sediments may stain your laundry or plug your household PRV. To clear your water lines, turn on your cold water tap until the water runs clear.

Why is my water cloudy after flushing?

Water is cloudy when air gets in it and makes tiny bubbles. These bubbles are harmless and will disappear once the water sits for a few minutes.

Water Quality

How will flushing affect me?

Usually, you will not be aware that flushing is even taking place in your neighborhood. Flushing is generally conducted between February and April.

How would people be notified if a water quality problem arose?

If the quality of our drinking water presented a health risk, the City would immediately issue a notice to the community through social media, media and other available resources. The City would coordinate with all available agencies such as Island Health, RDN, and the fire department to ensure the community is aware of any health risks.

How do I know my water is safe to drink?

To ensure our drinking water is clean and safe to drink, the City monitors the source waters and the distribution system with both online instrumentation at points of disinfection and a comprehensive sampling program. Weekly samples are taken at various locations throughout the City and submitted to Island Health for bacterial analysis. The City also tests for water quality according to the *BC Drinking Water Protection Act* and *Guidelines for Canadian Drinking Water Quality*.

Why does my water sometimes look brown?

Brown water from your tap is usually caused by a change to the normal flow in a watermain. The change can occur from opening or closing a watermain valve, opening a fire hydrant, or a watermain break. The brown colour is from normal sediment in the pipes coming off and flowing with the water to your tap. Try flushing out the brown water by running your cold water for 10 to 15 minutes. If the brown water doesn't clear, it may be caused by old, rusty pipes inside the building or from a failing hot water tank.

Why does my water sometimes look "milky" and "cloudy"?

Cloudy water is usually the result of air in the watermains. Air may be introduced into the mains during repairs or from opening fire hydrants. Although it is temporary, it may take several hours for the air to dissipate. To check, fill a glass of water and leave it on the counter for a few minutes. The water should clear. This type of cloudy water is safe to drink.

Why do my toilet and bathroom tiles sometimes turn pink?

According to the American Water Works Association (AWWA), the pink residue is likely associated with naturally occurring airborne bacteria that produces a pinkish film and sometimes a dark gray film, on surfaces that are regularly moist, including toilet bowls, showerheads, sink drains and tiles. The problem is more common in humid regions. Regular cleaning is the best solution to keep these surfaces free from the bacterial film.

Cross Connection

What is a Cross Connection and Backflow?

A cross connection is a temporary or permanent connection between the potable water system and any other source which may contain any substance that will degrade the quality of the water (e.g. chemicals, pathogens, non-potable water).

Backflow is a hydraulic condition in the water piping system which causes water to flow in the reverse direction. There are two types of backflow conditions, back-siphonage and backpressure.

Back-siphonage is caused by pressure drop in the supply system. Examples that would cause a pressure drop include water main break or repair, hydrant flushing, firefighting, etc. When the pressure drops, the water line acts like a straw sucking liquid or gas back into the system.

Backpressure is caused when a potable water system is connected to a non-potable water system operating under higher pressure such as heating and pump systems. Heat creates pressure as hot water expands, and pump systems create pressure to move water to higher elevations or for other high pressure uses. Examples include booster or recirculating pumps, boiler or heating systems, elevated piping, holding tanks, etc.

Why are private properties being inspected for cross connection?

To ensure appropriate backflow preventers are in place to protect Parksville's water system, a cross-connection control inspector will inspect all industrial, commercial, institutional, and multi-residential properties. After inspection, a report will be completed and submitted to the property owner, manager, or other representative. The report may include requirements that will need to be addressed promptly to bring the system up to the standards outlined by the BC Plumbing Code, CSA B64.10, and the Cross Connection Bylaw No.1529.

Where can I find more information on Cross Connection?

You can find more information on the website, under Department – Operations – Water System – Cross Connection, or by emailing bsilenieks@parksville.ca.

Englishman River

Appendix A

Water Supply System Operating Permit

island health

ENVIRONMENTAL PUBLIC HEALTH

PERMIT

to OPERATE

A WATER SUPPLY SYSTEM

Water System Name: Parksville WWS

Premises Number: 1310814

Premises Address: 1116 Herring Gull Way
Parksville, BC V9P 1R2

Water System Owner: City of Parksville

This system is hereby permitted to operate the above potable water supply system and is required to operate this system in accordance with the *Drinking Water Protection Act* and in accordance with the conditions set out in this operating permit and conditions established as part of any construction permit.

The water supply system for which this operating permit applies is generally described as:

Service Delivery Area:	City of Parksville and Nanoose Bay Peninsula Water Supply System
Source Water:	Springwood & Railway Wells and ERWTP
Water Treatment methods are:	See Appendix A
Water Disinfection methods are:	See Appendix A
Number of Connections:	301 - 10,0000 Connections

Operating conditions specific to this water supply system are in Appendix A.

Date: September 16, 2024

Issued By: _____
Environmental Health Officer

This permit must be displayed in a conspicuous place and is not transferable

Place Decal Here

APPENDIX A

WATER SYSTEM OPERATING CONDITIONS FOR

Parksville WWS
1310814
1116 Herring Gull Way
Parksville, BC V9P 1R2

The permit holder is advised that the following Terms and Conditions are in addition to other legislated responsibilities and obligations outlined in the Drinking Water Protection Act, ([SBC 2001] Chapter 9) and B.C. Reg. 200/2003 O.C. 508/2003 Drinking Water Protection Regulation

1. Authorized Waterworks System

The water supply system owner is authorized to operate two groundwater source wellfields, a treated water intake from the Englishman River Water Treatment Plant, chlorine disinfection using liquid sodium hypochlorite, instrumentation, controls and SCADA system and other related appurtenances to treat and disinfect water from the two groundwater source wellfields, and a distribution system consisting of storage and transmission facilities to supply potable water for domestic purposes to the City of Parksville.

2. Performance Standards

The wells from the Railway Wellfield were assessed in accordance with the British Columbia Ministry of Health "Guidance Document for Determining Ground Water at Risk of Containing Pathogens (GARP), Version 3, September 2017" and a determination of "At Risk (GARP-viruses only)" was made.

The water supply system owner shall ensure the chlorine disinfection system shall be operated in a manner to achieve the minimum overall treatment and disinfection standards of 4-log (99.99% reduction) inactivation of viruses based on the Hepatitis-A virus;

3. Performance Objectives

The finished water leaving Reservoir 4 shall:

- have no detectable Escherichia coli bacteria per 100 mL; and
- have no detectable total coliform bacteria per 100 mL
- have a turbidity level not greater than 1 NTU.
- have a free chlorine residual of no less than 0.25mg/L.
- have trihalomethane (THM) levels not greater than 0.1 mg/L and haloacetic acid (HAA) levels not greater than 0.08 mg/L based on the average of quarterly sample results
- have a pH value within the range of 7.0-10.5 The water within the distribution system shall:
- have a minimum chlorine residual as outlined in the "Guidelines for Canadian Drinking Water Quality: Guideline Technical Document - Chlorine" (Water, Air and Climate Change Bureau, Healthy Environments

Date: September 16, 2024

Issued By: _____
Environmental Health Officer

APPENDIX A

WATER SYSTEM OPERATING CONDITIONS FOR

Parksville WWS
1310814
1116 Herring Gull Way
Parksville, BC V9P 1R2

and Consumer Safety Branch, Health Canada, Ottawa, Ontario. (Catalogue No H129-1/09-58E), and/or the "British Columbia Guidelines (Microbiological) on Maintaining Water Quality in Distribution Systems, Version 1 / August 2016 (or most recent editions).

4. Distribution System Operation and Maintenance
The water supply system owner shall ensure that a Cross Connection Control Program covering assessment for risk areas, mitigation measures for known or identified risks, installation and maintenance of cross connection control infrastructure, and any other pertinent factors is implemented.

5. Monitoring and Reporting Requirements

4.1. Chemical, Physical, Protozoan and Bacteria Monitoring
The water supply system owner shall provide and maintain suitable sampling ports to obtain raw and finished water samples.
The water supply system owner shall maintain a water quality monitoring plan outlining the parameters to be monitored and the frequencies at which those parameters will be monitored. This plan must include, at minimum chemical analyses of all raw water sources, every 5 years, in accordance with the list of parameters specified in the Island Health Source Water Assessment Guideline, Appendix B: Minimum Sampling Parameters for Groundwater Sources and quarterly THM and HAA testing throughout the distribution system. This plan is to be submitted for approval by the Drinking Water Officer.
The water supply system owner must create and execute an action plan to remediate water quality if parameters are found to be elevated above the maximum acceptable concentration outlined in the Guidelines for Canadian Drinking Water Quality.

4.2. Turbidity
Turbidity of raw water will be monitored weekly and as required by the Drinking Water Officer.

4.3. CT
The water supply system owner shall determine the CT value on a daily basis where CT is the product of C and T, where C, represents the residual disinfectant concentration in mg/L and T, represents the contact time in minutes.
Once per day, at maximum hourly flow, the water supply system owner shall monitor the temperature of

Date: September 16, 2024 **Issued By:** _____
Environmental Health Officer

APPENDIX A

WATER SYSTEM OPERATING CONDITIONS FOR

Parksville WWS
1310814
1116 Herring Gull Way
Parksville, BC V9P 1R2

the disinfected water, the residual disinfectant concentration, C, and the pH at the sampling point. The sampling point should be located before or at the first customer. Also at the peak hourly flow, the water supply system owner shall measure the contact time, T, based on the time of travel that the water takes to reach the first customer from the disinfection point. The contact time, T, will be based on the travel time within the pipelines and retention time in Reservoirs, 1, 2, and 4.
Virus reduction will be based on the CT tables listed in the document "Guidelines for Canadian Drinking Water Quality: Guideline Technical Document - Enteric Viruses", Water, Air and Climate Change Bureau, Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa, Ontario. (Catalogue No H129-6/2011E), 2011.

4.4. Reporting
Submit a monthly report acceptable to the Drinking Water Officer via email to HPES.Parksville@islandhealth.ca for review.

6. Operators
Provide an operator with training acceptable to the Drinking Water Officer to operate the water system at all times.

Date: September 16, 2024

Issued By: _____
Environmental Health Officer

Appendix B

Englishman River WTP Operating Permit

island health

HEALTH PROTECTION

PERMIT

to OPERATE

A WATER SUPPLY SYSTEM

Water System Name:	**ENGLISHMAN RIVER WATER TREATMENT PLANT**
Premises Number:	BSTD-BHPUV6
Premises Address:	1116 Herring Gull Way Parksville, BC V9P 2H3
Water System Owner:	Englishman River Water Services

Englishman River Water Services is hereby permitted to operate the above potable water supply system and is required to operate this system in accordance with the Drinking Water Protection Act and in accordance with the conditions set out in this operating permit and conditions established as part of any construction permit.

The water supply system for which this operating permit applies is generally described as:

Service Delivery Area:	Parksville
Source Water:	Surface Water
Water Treatment methods are:	Membrane Filtration
Water Disinfection methods are:	Chlorination, Ultraviolet
Number of Connections	1 DWQ

Operating conditions specific to this water supply system are in Appendix A.

Date: Nov 8, 2019

Issued By: Stacy Hewa
Environmental Health Officer

This permit must be displayed
in a conspicuous place and is not transferable

APPENDIX A

WATER SYSTEM OPERATING CONDITIONS FOR

ENGLISHMAN RIVER WATER TREATMENT PLANT
1116 Herring Gull Way
Parksville, BC, V9P 2H3

The permit holder is advised that the following Terms and Conditions are in addition to other legislated responsibilities and obligations outlined in the Drinking Water Protection Act, ([SBC 2001] Chapter 9) and B.C. Reg. 200/2003 O.C. 508/2003 Drinking Water Protection Regulation

1. Authorized Waterworks System

The water supply system owner is authorized to operate a raw water screened intake and a pump station with sand separators, a 16 ML/d Water Treatment Plant (WTP) consisting of coagulation, fine strainers, four primary stage Toray HFU-2020N ultrafiltration membrane modules installed in parallel, one secondary stage Toray HFU-2020N ultrafiltration membrane module and ultraviolet disinfection unit treating reject water from the primary membrane modules, two ultraviolet disinfection units installed in parallel, chlorine disinfection using liquid sodium hypochlorite, a 345 cubic metre chlorine contact tank, chemical storage and metering facilities, clean-in-place membrane cleaning system, backwash pumps, a waste equalization tank, corrosion control using carbon dioxide and sodium hydroxide, a high lift pump station, instrumentation, controls and SCADA system and other related appurtenances to treat and disinfect water from the Englishman River and a distribution system consisting of storage and transmission facilities to supply potable water for domestic purposes to the City of Parksville.

2. Performance Standards

The water supply system owner shall ensure:

The primary ultrafiltration membranes, primary ultraviolet disinfection system, and chlorine disinfection system shall be operated in a manner to achieve the minimum overall treatment and disinfection standards of 4-log (99.99% reduction) inactivation of rotavirus and 3-log (99.9% reduction) inactivation of protozoan based on meeting the following:

- A turbidity level of less than or equal to 0.1 NTU in at least 99% of the measurements per operational filter period or per month. Measurements greater than 0.1 NTU for a period of greater than 15 minutes from an individual membrane unit should immediately trigger an investigation of the membrane unit integrity;
- The primary membranes shall ensure a minimum of 3 – log reduction (99.9% removal) of *Giardia lamblia* cysts and of *Cryptosporidium* oocysts;
- The primary ultraviolet disinfection system shall ensure a minimum of 1 – log reduction (90% inactivation) of *Giardia lamblia* cysts and *Cryptosporidium* oocysts;
- The chlorine disinfection system shall ensure a minimum of 4 – log reduction (99.99% inactivation) of rotavirus;

The secondary ultrafiltration membranes, secondary ultraviolet disinfection unit, primary ultraviolet disinfection unit, and chlorine disinfection system shall be operated in a manner to

April 3 2019
Effective Date

Stacey Sowa, CPHI(C)

achieve the minimum overall treatment and disinfection standards of 5.4-log (99.9996% reduction) inactivation of rotavirus and 4.4-log (99.996% reduction) inactivation of protozoan based on meeting the following:

- a turbidity level less than or equal to 0.1 NTU in at least 99% of measurements per operational filter period or per month. Measurements greater than 0.1 NTU for a period of greater than 15 minutes from an individual membrane unit should immediately trigger an investigation of the membrane unit integrity.
- The secondary membranes shall ensure a minimum of 3 – log reduction (99.9% removal) of *Giardia lamblia* cysts and of *Cryptosporidium* oocysts;
- The secondary ultraviolet disinfection system shall ensure a minimum of 1.4 – log reduction (96% inactivation) of *Giardia lamblia* cysts and *Cryptosporidium* oocysts and rotavirus;
- The chlorine disinfection system shall ensure a minimum of 4 – log reduction (99.99% inactivation) of rotavirus;

The finished water leaving the clearwell shall:

- have no detectable *Escherichia coli* bacteria per 100 mL; and
- have no detectable total coliform bacteria per 100 mL
- have a turbidity level not greater than 1 NTU.
- have trihalomethane (THM) levels not greater than 0.1mg/L and haloacetic acid (HAA) levels not greater than 0.08mg/L based on the average of quarterly sample results
- have a running annual average aluminum concentration not greater than 0.1 mg/L based on months when an aluminum containing coagulant is in use.
- have a pH value within the range of 7.0-10.5

3. Monitoring and Reporting Requirements

3.1. Chemical, Physical, Protozoan and Bacteria Monitoring

The water supply system owner shall provide and maintain suitable sampling ports to obtain raw and finished water samples.

The water supply system owner shall maintain a water quality monitoring plan outlining the parameters to be monitored and the frequencies at which those parameters will be monitored. This plan is to be submitted for approval by the Drinking Water Officer.

The water supply system owner must create and execute an action plan to remediate water quality if parameters are found to be elevated above the maximum acceptable concentration outlined in the Guideline for Canadian Drinking Water Quality.

3.2. Turbidity

An online turbidity monitoring system shall be in place for raw water, permeate discharge water from each individual first and second stage membranes, and finished water.

Turbidity shall be recorded at a minimum of 5 minute intervals.

May 8, 2015
Effective Date

Stacey
Stacey Sowa, CPHI(C)

3.3. Aluminum

Aluminum levels shall be monitored in finished water at a minimum of one time per month when the aluminum containing coagulant is in use. A running annual average shall be calculated based on monthly samples during those months in the previous 12-month period when a coagulant was used.

3.4. UV Dose

The water supply system owner shall determine the minimum dose achieved for the ultraviolet disinfection units on a daily basis (measured in mJ/cm^2).

Protozoan reduction will be based on the dose tables listed in the document "Guidelines for Canadian Drinking Water Quality: Guideline Technical Document — Enteric Protozoa: Giardia and Cryptosporidium", Water, Air and Climate Change Bureau, Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa, Ontario, (Catalogue No H129-23/2013E-PDF), 2012.

3.5. CT

The water supply system owner shall determine the CT value on a daily basis where CT is the product of C and T, where C, represents the residual disinfectant concentration in mg/L and T, represents the contact time in minutes.

Once per day, at maximum hourly flow, the water supply system owner shall monitor the temperature of the disinfected water, the residual disinfectant concentration, C, and the pH at the sampling point. The sampling point should be located before or at the first customer. Also at the peak hourly flow, the water supply system owner shall measure the contact time, T, based on the time of travel that the water takes to reach the first customer from the disinfection point. The contact time, T, will be based on the travel time within the pipelines and retention time in the clearwell.

Virus reduction will be based on the CT tables listed in the document "Guidelines for Canadian Drinking Water Quality: Guideline Technical Document – Enteric Viruses", Water, Air and Climate Change Bureau, Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa, Ontario. (Catalogue No H129-6/2011E), 2011.

3.6. Membrane Integrity Testing

Integrity testing of the membrane shall be conducted no less than one time per day. The corresponding log-reduction value calculated form the integrity testing shall be determined on a daily basis.

3.7. Reporting

Submit a monthly report acceptable to the Drinking Water Protection Officer via email to HPES.Parksville@viha.ca for review.

4. Operators

Provide an operator with training acceptable to the Drinking Water Officer to operate the water system at all times.

Effective Date

Stacey Sowa, CPHI(C)

For questions related to this report, please contact the Utilities Technician at:

Phone: 250 951-2489

E-mail: BSilenieks@Parksville.ca