# Annual Drinking Water Report 2021

Resort Municipality of Whistler

WHISTLER

# Contents

# 1.0 EXECUTIVE SUMMARY

This report summarizes the Resort Municipality of Whistler's (RMOW) drinking water quality program for the 2021 report period. The two municipal systems, Community and Emerald Estates, are administered under separate Permits to Operate a Water Supply System. As in previous years, the RMOW has satisfied the conditions for the Permits to Operate.

The Community and Emerald Water systems are operated and maintained by the RMOW's Water Utility Group and are monitored 24 hours/365 days per year via the Supervisory Control and Data Acquisition (SCADA) system to ensure optimal functionality. In addition, the RMOW administers programs relating to leak detection, cross connection control, unidirectional flushing, water conservation and sampling.

The sampling program forms the backbone of regulatory compliance with the Permits to Operate. The sampling data are monitored by the RMOW and Vancouver Coastal Health (VCH) as soon as they are processed by the laboratory. This report provides a summary of the sampling results from the report period. Any actions needing to be taken, would have occurred immediately once the results were available.

Sampling at water sources (raw) was performed 76 times across 3 sources in the Emerald Estates System and 202 times at 15 sources in the Community System throughout the report period. Water samples were taken every other week and were tested for:

- E. coli and total coliform bacteria.
- Turbidity
- pH
- Temperature

Sampling in the distribution system (treated) was performed 51 times at 2 locations in the Emerald Estates System and 365 times over 25 Sampling Stations in the Community System throughout the report period. Water samples were taken every other week and were tested for:

- E. coli and total coliform bacteria
- Turbidity
- pH
- Temperature
- Free Chlorine Residual

Sampling at both the source and throughout the distribution system for additional physical and chemical parameters is conducted annually. Bi-products of disinfection are tested once every quarter at distribution sites.

For the Community System a total of 554 bacteriological samples were submitted during the report period indicating the minimum sampling frequency (as specified in the permit to operate) was exceeded. For the Emerald System a total of 72 bacteriological samples were submitted during the period indicating the minimum sampling frequency (as specified in the permit to operate) was exceeded.

In 2016, the Guidelines for Canadian Drinking Water Quality (GCDWQ) with respect to pH were updated from an Aesthetic Objective of 6.5 – 8.5 to an Operational Guideline of 7 – 10.5. The samples taken throughout the distribution system during the report period indicate that the water supplied has pH levels on a monthly average of between 6.5 and 7.5. As a result, the water in the Whistler system sometimes falls outside the current guidelines for this parameter. See *Section 5.0 – Water Stability* for further discussion.

One Drinking Water Advisory was issued during the report period whilst no Boil Water Advisories were issues during the reporting period. Further information on the Drinking Water Advisory issued in the reporting period is available in Section 7.0: Significant Events & Public Notification.

*Table 1 The RMOW's water supply and distribution system are governed by the following regulations*

| Regulation | Jurisdiction | Link |
|---|---|---|
| Drinking Water Protection Act and Regulation | Province of British Columbia | https://www2.gov.bc.ca/gov/content/health/about-bc-s-health-care-system/office-of-the-provincial-health-officer/laws-related-to-health-in-bc/drinking-water-protection-act |
| Water Sustainability Act | Province of British Columbia | https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/laws-rules/water-sustainability-act |
| Ground Water Protection Regulation | Province of British Columbia | https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/laws-rules/groundwater-protection-regulation |
| Permit to Operate | Vancouver Coastal Health | http://www.vch.ca/public-health/environmental-health-inspections/drinking-water |
| Guidelines for Drinking Water Quality | Province of British Columbia | https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-quality/water-quality-guidelines |
| Guidelines for Canadian Drinking Water Quality | Health Canada | https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/water-quality/guidelines-canadian-drinking-water-quality-summary-table.html |

The RMOW completed several operational and capital improvements during the report period, each of which will increase system reliability and ensure long-term availability.

# 2.0 GENERAL DESCRIPTION

In Whistler there is one private water distribution system at Whistler Blackcomb, and two municipal (RMOW) managed systems, Community and Emerald Estates.

The two municipal systems, Community and Emerald Estates are administered under separate Permits to Operate. These water systems are Class IV Water Distribution Facilities, as classified by the Environmental Operators Certification Program (EOCP). The systems consist of:

- 1 active surface water intake;
- 15 groundwater wells;
- 14 storage reservoirs;
- 20 individual pressure zones;
- 9 Pump stations;
- 9 Treatment locations
- 1 Supervisory Control and Data Acquisition (SCADA) monitoring system;
- 177 km of water pipes (approximately);
- 13,202 residential water service connections (approximately) and 3,600 commercial and other water service connections (the methodology used to count service connections has been updated as of the 2021 report period) and;
- 577 municipal fire hydrants.

The benefit of having many sources of clean drinking water means that the RMOW has very good redundancy at a source level. However to meet the demand for treated water, there are infrastructure management challenges that drive the need for water conservation and investment in the water system, for example:

- More prescriptive drinking water guidelines;
- Due to the location of public and private infrastructure relative to interface zones, the need to be adequately prepared for wildfire emergencies;
- Increased human presence in and around the 21 Mile Creek watershed;
- The impact of climate change on source waters if the glaciers recede and snowpack is lower than usual;
- Although the infrastructure is “relatively new” it is aging, and ongoing replacement is necessary;
- Vulnerability of overall supply to meet peak demand requirements in case of service interruptions due to unforeseen emergencies.

Function Junction is a relatively new operational area for the RMOW as it was incorporated into the Community System as of 2019.

The Whistler Blackcomb system operates independently by acquiring its water supply from eight wells located on the mountain[1].

[1] Data sourced from Whistler Blackcomb Mountain Drinking Water system summary, 2017

# 3.0 WATER SOURCES

The Resort Municipality of Whistler has the ability to obtain its water from numerous sources:

*Surface Water*

- Twenty-One Mile Creek
- Blackcomb Creek (not used for Drinking Water, taken offline and locked out in 2012)

*Groundwater*

- Emerald Estates Wells (3):
- Community Wells (4):
- Alpine Meadows Wells (3):
- Twenty-One Mile Creek Aquifer Wells (2);
- Function Junction Wells (2);
- Cheakamus Crossing Well (1).

The RMOW uses both a surface water intake, and groundwater wells to provide domestic drinking water and fire protection supply for the municipality. The Twenty-One Mile Creek surface water intake comprised 27% of the water used in the distribution system during the report period, making it the largest single source. The Community water system, of which the Twenty-One Mile Creek intake is a part, supplied 93% of Whistler's potable water during the report period with the remainder being supplied by the Emerald Estates water system.

## *Surface Water - Twenty-One Mile Creek*

When online, the surface water from Twenty-One Mile Creek is the largest single source of RMOW's drinking water. The use of this source is limited by periods of high turbidity. Turbidity is continuously monitored, and the intake is suspended at greater than 1 NTU. In times of high demand coinciding with an NTU of greater than 1, the RMOW will submit a request to VCH for an extension of the NTU limit from 1 to 2. This change is applied once approval from a VCH Drinking Water Officer is received and is returned back once the risk to supply has subsided.

The NTU limit was extended once during the 2021 reporting period due to a combination of high temperatures and large snow melt coupled with high water demand. Further details of this temporary extension can be found in Section7.0: Significant Events & Public Notification.

### *Protection Program*

The update and implementation of the Source Water Protection Plan (SWPP) is a requirement of the Permit to Operate. The objective of the SWPP is to ensure that exposure to unacceptable concentrations of contaminants in the source water are minimized and to implement procedures and policies that will support the long-term sustainability of the surface water resource.

The Source Water Protection Plan (SWPP) is available on the RMOW's website.

The SWPP was completed in September 2015 and contains recommendations for annual work programs. The work program is updated annually based on the results of the previous year's monitoring and the results of a watershed hike that takes place in the summer months of each year.

An update to the 21 Mile Creek Source Water Assessment was undertaken in 2021 by Urban Systems. This update was finalized in early 2022 and the findings and recommendations from this will form the basis for the 2022 update of the SWPP.

The Technical Advisory Committee met in 2020 and hiked into the watershed in order to review trail management & completed initiatives. The Technical Advisory Committee did not hike into the watershed in 2021.

There were trail works completed on the ridgeline above Rainbow Lake in 2021. This included:

- Sproatt Overlook Viewing Platform completed top of Happy Hour
- Substantial trail upgrades on Rush Hour and Happy Hour
- Rainbow Lake enforcement signage replaced
- Rainbow Lake containment fences replaced with rebar stakes and rope to promote revegetation in sensitive worn areas
- Sproatt Ranger Cabin interior living space, deck, stairs solar panel and Urine Diversion Outhouse completed

*Image 1: Sproatt Overlook Viewing Platform completed top of Happy Hour*

*Image 2: Sproatt Ranger Cabin*

*Image 3: Sproatt Ranger Cabin Urine Diversion Outhouse completed*

The ranger program has continued to monitor watershed use summer compliance during the report period.

- Program started on Rainbow in 2016
- Sproatt was added in 2018
- Rainbow coverage 7days/week 9.5hr days
- 42 km of alpine trail now patrolled
- Enforcement by presence and education
- Wildlife observations and notice posting
- Trail user surveys and data collection
- Trail maintenance

- Outhouse cleaning/stocking
- Ambassador for Whistler and Recreation
- Comms and training with SAR and COS
- First aid/assistance to trail users

Recommendations from the Ranger Program from 2021 include:

- Replace Beverly to Ninja Lakes trail bridge and connect trail. Include watershed chicane and signage to match Rainbow/Hanging Pass junction
- Improve and update all Rainbow and Sproatt kiosk maps and Ranger information boards
- Install Grizzly Bear and Ranger Hut Interpretive Panels on Rainbow Hiking, Skywalk and Sproatt trails
- Paula's bench rest area/viewpoint and spur trail improvement (Rainbow Trail)
- Purchase and install EcoVisio cellular transmission Trail counter for VanWest bridge on Into The Mystic
- Purchase and install EcoVisio manual counter on LESS
- Update Hanging Lake Campground No Fires policy. Install signage and update all info

User data from the alpine ranger program is detailed below:

| Year | User Numbers / Operational days | Average User Count | Operational Period | Dogs (prohibited) | Bikes (prohibited) | SAR Calls |
|---|---|---|---|---|---|---|
| 2016 | - | - | - | 10 | 6 | - |
| 2017 | - | - | - | 10 | 12 | 1 |
| 2018 | 5945 users / 76 days | 78 users/day | June 30 - September 14 | 4 | 1 | 1 |
| 2019 | 4534 users / 140 days | 32 users/day | June 13 - October 31 | 5 | 3 | 1 |
| 2020 | 6930 users / 101 days | 69 users/day | June 23rd – October 2nd | 7 | 0 | 0 |
| 2021 | 5486 users/48 days | 114 users/day | July 15th – August 31st | 0 | 4 | 2 |

On August 30th 2021 a public sighting of a grizzly bear was reported to the Sproatt Ranger at the ranger cabin. The RMOW follows Conservation Officer Service (COS) direction and the RMOW's own Grizzly Bear Conflict Mitigation Strategy and closed all Sproatt and Rainbow Alpine trails on August 31st. Trails did not reopen for the 2021 season.

Environmental Stewardship assists in public information updates and monitoring. Rangers continued with enforcement, updating signage and monitoring for signs of grizzly bears. Trail cameras picked up numerous photos of a grizzly bear, likely the same grizzly bear. Numerous grizzly bear footprints and scat were observed over the next six weeks. Notably there were almost no black bear sightings in the typical alpine food source areas.

## *Blackcomb Creek*

The Blackcomb Creek surface water source may not be used without consent of VCH and was not used within the report period. The RMOW would only consider using this source in an emergency (e.g. wildfire) situation, and would follow the Emergency Response and Contingency Plan (ERCP) to deploy it. If activated, a Boil Water Order would be necessary.

## Groundwater - Wells

### Protection Program

Maintenance of the Groundwater Water Protection Plan (GPP) is a requirement of the Permit to Operate. Completed in 2008 the plan is comprised of several measures designed to facilitate enhanced protection of the quantity and quality of groundwater used for Whistler's drinking water. A review of this plan internally began in 2019 and is continuing.

The primary objectives are:

1. To ensure exposure to unhealthy concentrations of contaminants in the drinking water is minimized; and
2. To implement procedures and policies that support long-term sustainability of the groundwater resource.

*Table 2 Groundwater Resource Protection Plan Framework*

| Groundwater Resource Protection | |
|---|---|
| Wellhead Protection Area Initiative | Identifies areas that have a higher potential risk of contamination and targets these areas for enhanced management and protection of the long term water quality and sustainability of the groundwater supply. These are visible in *Appendix D – Maps of Water System*. |
| Groundwater Pollution Areas of Concern | Identifies the potential groundwater pollution risk factors, providing an assessment of the areas of concern. |
| Management Options | Promotes public awareness, formulates appropriate well decommissioning procedures, and addresses legislative considerations, provincial regulations, bylaws, municipal policies, and community plans. |
| Contingency and Spill Response Plans | Groundwater monitoring plan is in place and is maintained by geotechnical and hydrological consultants. Emergency situation response to pollutant/contaminant spill and aquifer contamination are also incorporated. |
| Water Quality Monitoring | Regular sampling, review, and reporting procedures are in place to ensure safe and clean groundwater supply. |

### Monitoring Program

The RMOW's Source Water Protection Plan requires annual analysis of groundwater from W212-1, W217, W218, W205-1, W205-2, W205-3, W211, and monitoring wells (MW) for potable water quality parameters and Potential Contaminants of Concern (PCOCs).

The Groundwater Monitoring Summary, last completed by Piteau Associates, is presently on hold as the RMOW evaluates what information is needed. The level of monitoring required will be reviewed in the updated Groundwater Resource Protection Plan (2008). The review of this plan was started in 2019, but not yet completed.

# 4.0 TREATMENT & DISTRIBUTION SYSTEMS

## Community System

### *Surface Water - Twenty-One Mile Creek*

#### *Treatment*

Water drawn from the Twenty-One Mile Creek surface water source undergoes primary disinfection by means of UV treatment. The water then receives primary and secondary disinfection (chlorine sourced from an on-site sodium hypochlorite generation system is added to the water for the purpose of either destruction or inactivation of pathogens and for protecting the distribution system).

The water treatment facility has been classified as a Level 1 by the EOCP as of November 28, 2017.

### *Groundwater - Wells*

#### *Treatment*

The wells are combined into single treatment points where feasible. The water then receives secondary disinfection (chlorine sourced from calcium hypochlorite added to the water for the purpose of protecting the distribution system).

The following sections contain more details at each of the specified well sites.

### *Community Wells*

#### *Aquifer*

The Village Wells W205-1, W205-2, W205-3 and W211 are located in the day skier parking lots off Blackcomb Way. The wells are all screened in channels of fill sediments deposited by Fitzsimmons Creek. The capacity of the aquifer appears to be limited by the maximum rate of recharge from the creek.

### *Alpine Meadows Wells*

#### *Aquifer*

Alpine Meadows is supplied by wells W202, W210 and W213 and is also integrated with the surface water supply for the Community System. Wells W202 and W210 have their screens placed in alluvial sediments deposited by Nineteen Mile Creek.

### *Twenty-One Mile Creek Aquifer Wells*

#### *Aquifer*

The Twenty-One Mile Creek Aquifer Wells W218 and W219 are located on the Valley Trail in between Rainbow Park and Lorimer Road. The former was constructed in 2007 and put into service in 2009. The combined extraction rate of both wells is restricted to a flowrate of 74.9L/s. Well W219, located 50m to the west, draws from the same aquifer. This second well, constructed in 2013, was only operated for sampling during the report period.

On August 27th 2019 the RMOW submitted an application for an environmental assessment exemption for the use of W219 in conjunction with W218. The intention is that W219 would be used alternatively to W218, but could be operated in tandem during times of high demand when the 21 Mile Creek surface water supply is

offline due to turbidity. These periods of high demand coincide with high surface water turbidity throughout the year but most often during the months of April, May, June, October and November.

The operation of well W219 in conjunction with W218 exceeds the *Reviewable Projects Regulation* of 75 L/s for groundwater extraction, and thus an Environmental Assessment Certificate under the BC *Environmental Assessment Act* or exclusion of such under s.10 (1)(b) is required. The Resort Municipality of Whistler seeks an exemption under s.10 (1)(b). In addition to this exemption request the Resort Municipality of Whistler is continuing with its water conservation initiatives and will further investigate other infrastructure upgrades to maintain a reliable supply of drinking water to the community.

This application was approved in 2021, with well W219 granted approval to operate when high turbidity levels in 21 Mile Creek (resulting in it being offline) coincide with high demand, to reduce Whistler's supply deficit. The final step prior to operating W219 on a routine basis was the approval of the "Operations Management Plan" by the Environmental Assessment Office. This plan received approval in March of 2022.

### *Function Junction Well*

#### *Aquifer*

Production well W212-1 is located in Function Junction and was drilled for Intrawest in 2000 as part of a program to supply additional water to Whistler South in support of their Spring Creek development. The well has subsequently been taken over by RMOW. It is screened in coarse gravel and coarse sand. Well 212-1 is tested multiple times a year for high levels of Iron and Manganese. In 2021, this well did not exceed the GCDWQ recommended levels of Iron but did exceed the guideline for Manganese. Well W212-2 is still active but does not supply water to the system due to high levels of Manganese. This well is run to waste when it is used for monitoring purposes.

### *Cheakamus Crossing Well*

#### *Aquifer*

Production well W217 was commissioned in 2008 to supply the Olympic Athlete's Village. This well supplies groundwater from the same aquifer as the Function Junction wells.

## Emerald Estates System

#### *Aquifer*

The community of Emerald Estates is located on the west shores of Green Lake and is serviced by a local water distribution system supplied by three groundwater wells identified as W201-1, W201-2 and W201-3. Due to water quality concerns for a period of time prior to 2018, W201-3 was run infrequently and only for the purpose of testing. With the completion of the Emerald UV and Treatment Facility it now provides drinking water in addition to W201-1 and W201-2. The wells are all screened in the fan of Rideau Brook.

#### Emerald UV Treatment Facility

To address any potential vulnerability to contamination, a water treatment facility was constructed to perform treatment on groundwater from W201-1, W201-2 and W201-3 using ultra-violet light as a primary disinfection and chlorine treatment as secondary disinfection. This facility was commissioned in June 2018 and obtained Professional Engineer sign-off on June 20th, 2019 as per the Drinking Water Permit requirement.

The water treatment facility was classified to Level 1 by the EOCP on November 28, 2017.

### Chlorination Plan

In 2014 VCHA recommended maintaining a minimum free chlorine residual post-reservoir of 0.4 mg/l, this is also a condition of the Permit to Operate a Water System. This level has been maintained since 2014 and is being tested biweekly for levels at each sample station in the distribution system. These levels have been consistent since implementing this plan and no detectable contamination has been noted.

## System Maintenance and Upgrades

The Resort Municipality of Whistler maintains and continues to improve its water distribution system to provide the best service possible. The following were some of the key successes from this report period.

### *Project – Alta Vista Services Upgrade*

In 2020 a project to upgrade aging service infrastructure in the Alta Vista neighborhood commenced. This project is the construction of water, sanitary, drainage and roadworks improvements including a PRV station and water appurtenances.

New water mains on Tyrol Crescent and St. Anton Way were commissioned in 2020, with other water mains upgraded and commissioned in 2021. The water main upgrades portion of the Alta Vista services upgrade are complete.

As part of this project, PRV Station P244 in Alta Vista was replaced with a new facility at the same location.

### *Project – South Whistler Water Supply Project*

In 2021 the RMOW awarded the contract for assessment and design of the South Whistler Water Supply Project. This project will assess current conditions of infrastructure, design and implement infrastructure upgrades, and inform the long-term corrosion control treatment of Whistler's water supply.

This project aims to determine the best solution for upgrading the current water supply in south Whistler while meeting the future demand for housing, development and water conservation and quality goals in the Function Junction and Cheakamus Crossing neighborhoods.

### *Project – Water Main Upgrades*

Various upgrades occurred to watermains including valves, fittings, pipes, appurtenances, removals and temporary services. In 2021 this included:

- Lorimer Road Water Main Upgrade
- Lake Placid Road Point Repair
- Muirfield Crescent Point Repair
- Kathleen Place Water Main Upgrade
- Lynham Road Water Main Extension

### *Project – PRV Station Upgrades*

Design was undertaken in 2021 for PRV station upgrades, including decommissioning of redundant PRV stations and upgrades of existing stations. This includes

<u>Decommissioning:</u>

- P249 4001 Highway 99, Golf Course

- P253 3001 Brio Entrance
- P272 5801 Alta Lake Road

Upgrade:

- P241 7146 Nesters Road
- P243 Lake Placid Road
- P252 2135 Whistler Road

Design works for these upgrades and decommissions commenced in 2021, with construction expected to take place in the following years.

## *Program – Volumetric Water Metering Pilot Project*

A contract was awarded in early October 2019 for a pilot project to implement volumetric water billing to Industrial, Commercial & Institutional (ICI) properties via water meter in the neighbourhood of Function Junction. The new system will encourage water conservation, improve leak detection and ensure rate equitability. Function Junction was chosen for the pilot project due to its nature as an isolated system as well as RMOW having recently become their official water utility service provider through the acquisition of the Van West Water Utility that serviced the neighbourhood.

In 2020 water meters were installed or upgraded at the vast majority of Function Junction ICI properties. The project experienced some delays due to municipal shutdowns at the onset of the COVID-19 pandemic however meter installation work was completed in July 2020. Data gathering is now underway to track & analyze consumption at various types of ICI properties via the Neptune 360 AMI software.

In 2021 the pilot project was expanded to include ICI properties outside of Function Junction and Whistler Village. A select number of these ICI properties experienced water meter upgrades or installations, with the remaining ICI properties to be upgraded in 2022.

## *Maintenance – Hydrants*

Each year the RMOW contracts a service provider to inspect and maintain the fire hydrants. 571 hydrant inspections were performed during this report period.

## *Maintenance – Reservoirs*

Reservoirs are visually inspected multiple times per year to compare water levels to those being shown on the level transmitters.

## *Program – Reservoir Chlorine Decay Rate*

Due to a combination of the fire storage requirement, and low turn-over rates in the Stonebridge, Sunridge, and the Taluswood reservoirs, sometimes the chlorine residual values are lower than the target for the serviced distribution system. The RMOW is continuing to explore methods to address the chlorine decay rate in these reservoirs. One such method is lowering the pump set points to encourage more turnover in reservoirs.

## *Upgrade - Utilities SCADA*

Upgrades to the SCADA HMI Software system uncovered issues relating to the volume of data being sent across the radio network. These volume issues were addressed with further implementation and the resolving of technical issues relating to data loggers at SCADA sites across the system. Work on the radio software and network has already shown quantifiable improvements to SCADA communication failure rates as these fell to 3.5% in December from 12% in June 2019.

In 2020 obsolete radios were replaced with new radios that support higher speed and better network configuration, in the first step toward improving the speed and efficiency of the SCADA radio network. Improving this network will increase data resolution and level of service of water and sewer services around Whistler.

Further upgrades to the radio network occurred in 2021, including additional of cell to problem communication sites and a new licensed radio frequency repeater to water assets in the Function Junction and Cheakamus areas.

Additional upgrades also occurred to the SCADA infrastructure hardware in 2021 to replace obsolete and high-risk server equipment. Delays were experienced due to supply chain constraints and the project is expected to continue into 2022.

### *Van West Infrastructure Decommissioning*

It has been recommended to decommission unused water system infrastructure that had become part of the RMOW's water system with the acquisition of the Van West Water System in Function Junction. These include an old reservoir, surface water intake and one (1) groundwater well. The RFP process has been initiated in late 2019 but contracts have not yet been awarded. This decommissioning project stalled in 2020 due to the COVID-19 pandemic, but was continued in 2021. The well site and reservoir site were both decommissioned in 2021.

# 5.0 STANDARDS & TESTING RESULTS

The Community and Emerald Estates Systems are operated under separate Permits to Operate. These permits include conditions that must be met in order to maintain these permits including sampling parameters and frequency which is what this section focuses on.

A copy of the permits are included in *Appendix C – Permits to Operate a Water Supply System*.

## Sampling Program – Sources (Raw)

*Table 3 RMOW Water Source Sampling Program*

| Sample Period | Testing Parameter |
|---|---|
| Two Weeks | pH, Temperature, Turbidity, E. Coli, Total Coliforms |
| Quarterly | Total Organic Carbon (TOC), Heterotrophic Plate Count (HPC), Polycyclic Aromatic Hydrocarbons (PAH), Iron and Manganese |
| Annually | Water Chemistry |

## Sampling Program – Distribution System (Treated)

The Drinking Water Regulation states that the water supplier (RMOW) must monitor its drinking water source and system at a frequency established by the regulations laid out in its operating permit. The RMOW is required to sample its distribution system 25 times per month (300 times per year) for the Community Water System and 4 times per month (48 times per year) for the Emerald Estates Water System. The RMOW has established a water quality sampling and testing program that samples the potable water supply quality at 37 locations throughout the municipality.

*Table 4 RMOW Water Distribution Sampling Program*

| Sample Period | Testing Parameter |
|---|---|
| Two Weeks | pH, Temperature, Turbidity, Free CL2 (Residual Chlorine), E. Coli, Total Coliforms |

| | |
|---|---|
| Quarterly | Total Organic Carbon (TOC), Heterotrophic Plate Count (HPC), Trihalomethane (THM), Polycyclic Aromatic Hydrocarbons (PAH), Iron and Manganese |
| Annually | Water Chemistry (two randomly chosen sites annually) |

## Bacteriological Sampling

The RMOW must complete a minimum bacteriological sampling frequency of 25 per month in the Community Water System distribution system and a frequency of 4 per month in the Emerald Estates Water System distribution system.

The sampling intervals and standards for bacteriological testing are as follows:

***Drinking Water Protection Act***

**DRINKING WATER PROTECTION REGULATION**

[includes amendments up to B.C. Reg. 352/2005, December 9, 2005]

| Parameter: | Standard: |
|---|---|
| Fecal coliform bacteria | No detectable fecal coliform bacteria per 100 ml |
| *Escherichia coli* | No detectable *Escherichia coli* per 100 ml |
| Total coliform bacteria | |
| (a) 1 sample in a 30 day period | No detectable total coliform bacteria per 100 ml |
| (b) more than 1 sample in a 30 day period | At least 90% of samples have no detectable total coliform bacteria per 100 ml and no sample has more than 10 total coliform bacteria per 100 ml |

A summary of the bacteriological sampling results can be found in *Appendix A – Consumption and Sampling Data.*

## Physical and Chemical Parameters

Water is tested for a wide range of physical and chemical parameters to ensure that the potable water delivered meets the *Guidelines for Canadian Drinking Water Quality (GCDWQ)*.

In the RMOW systems, sampling for these parameters occurs at each of the raw water sources and at two random sampling stations in the distribution system. The results of the laboratory reports for the report period are included in *Appendix A – Water Consumption and Sampling Data*.

## Water Stability

The 2017 VCH Water System Evaluation Report contained the following request: *"Please provide a report outlining which of the RMOW sources do not meet these guideline and outline any remediation strategies under consideration".* Water sampling results relating to Water Stability can be found in *Appendix A Table Annual Water Sampling Results*.

A corrosion control conceptual technical design memo was commissioned and received by the RMOW in October 2019. This draft included an overview of corrosion control requirements for drinking water supplies as well as

cost estimates to provide corrosion control to eight (8) existing water facilities in Whistler. These eight (8) facilities include: the Emerald UV Facility (P290), the Alpine Meadows well sites, the 21 Mile Creek UV Station, Community Pump Station, Function Junction Wells and the Cheakamus Pump Station. The status of the RMOW's water stability and subsequent options for addressing issues pertaining to this were presented to council in January 2020.The recommendations to address corrosion in drinking water typically induced by water with low pH and hardness values are to invest in infrastructure that would potentially mitigate some of these issues by introducing chemical dosing at these locations.

The RMOW is continuing to investigate and study proposals to and water systems for mitigation of the low pH and hardness values, and no concrete decisions were made by council in 2020. The studies will continued on into 2021 including the South Whistler Water Supply Project which examines the water demand for the Function Junction & Cheakamus Crossing neighborhoods as well as analysis of options for additional water treatment to increase water stability.

# 6.0 CONDITIONS OF PERMIT TO OPERATE

The RMOW holds two Permits to Operate a Water Supply System. One (1) for the RMOW Community Water System and one (1) for the RMOW- Emerald Estates Water System. See *Appendix C - Permits to Operate a Water System*.

## Bacteriological Sampling

See *Section 5.0 Standards & Testing Results*. The Conditions for both RMOW Permits to Operate were met for the report period.

## Water Resource Protection Plan

Both RMOW Permits to Operate require an update and implementation of the Source Water Protection Plans. Refer to *Section 3.0 Water Sources* for reference to the Water Protection and Monitoring Programs.

## Cross-Connection Control Plan

Statutory requirement set forward by provincial legislation requires water suppliers to ensure provisions are in place to protect the potable water distribution system from contamination. The Cross Connection Control (CCC) Bylaw No. 2233, 2019 was adopted by Council on September 3, 2019. This bylaw provides the RMOW with the capacity to enforce compliance with the Cross Connection Control Program.

In 2021, the Cross Connection Control Program's inventory included 1321 customers with a total of 3113 assets. Of the total inventory, the program was successful in surveying all High Hazard Facilities. Currently, 44 of the 46 facilities are compliant and works are in progress for the remaining 2 facilities. The RMOW has now shifted its focus to Mediums Hazard Facilities.

## Uni-Directional Flushing Program

This annual flushing program begins in May each year generally completing by the end of September. This program does not run during periods of high water usage or elevated stages of water conservation.

Table 5 below shows the neighborhoods that uni-directional flushing was performed in.

*Table 5: Selected neighborhoods for Uni-Directional Flushing Program*

| 2021 | 2020 | 2019 | 2018 |
|---|---|---|---|
| Bayshores | Blueberry | Alpine Estates | Alta Vista |
| Cheakamus | Brio | Benchlands | Bayshores |
| Creekside | Function Junction | Cheakamus Crossing | Creekside |
| Millar's Pond | Nesters | Emerald Estates | Function Junction |
| Nordic | Nicklaus North | Rainbow Estates | Spring Creek |
| Spring Creek | Spruce Grove | | Taluswood |
| Tapley's Farm | Stonebridge | | Tapley's Farm |
| Whistler Cay Heights | Westside Rd | | |
| | Whistler Village | | |
| | White Gold | | |

Several pipe lines are not flushed since they achieve the minimum flushing velocity required several times throughout the year and therefore are considered self-cleaning. There are also a few small sections of pipe that do not have the necessary connections/equipment required to be flushed.

# 7.0 SIGNIFICANT EVENTS & PUBLIC NOTIFICATION

## Drinking Water Advisory/Boil Water Advisory

Water quality advisory:

Due to the unseasonably high temperatures and heatwave ("heat dome") experiences in BC in late June 2021 (24th June onwards) Whistler experienced a very high water demand.

The high temperatures also contributed to a large snow melt event meaning Whistler's primary water source 21 Mile Creek had a Nephelometric Turbidity Unit (NTU) exceeding the limit of 1.0. Normal operation in this event is to operate the groundwater water wells until the NTU decreases to below 1.0 however due to the high water demand being experienced in this heatwave the current daily demand exceeded the capacity of water well extraction. As a result of high demand, fire storage levels in reservoirs were also compromised.

To meet demand, the RMOW was required to utilize the 21 Mile Creek source (whilst the NTU exceeded 1) in addition to the water well system. The NTU limit was temporarily raised from 1.0 to 2.0 during this period. This was granted approval by Vancouver Coastal Health.

On June 27th a Water Quality Advisory was communicated to the public that those with compromised immune systems should boil their water. The Water Quality Advisory was lifted on July 5th.

No Boil Water Advisories were required during the report period.

# 8.0 OPERATOR QUALIFICATIONS AND TRAINING

According to the Drinking Water Protection Regulation, under the *Drinking Water Protection Act*, staff working within the water system must have a minimum level of certification under the Environmental Operators Certification Program (EOCP). This ensures that the RMOW's staff are adequately trained to operate, maintain and repair the water supply and distribution systems in order to maintain the safety and quality of drinking water.

*Table 6: Operations Staff EOCP Certifications*

| Certification | Number of Employees Certified |
|---|---|
| WT-1 | 5 |
| WD - IV | 3 |
| WD - III | 2 |
| WD - II | 3 |
| WD - I | 3 |

# APPENDIX A – CONSUMPTION AND SAMPLING DATA

## Bacteriological Testing Summary

*Table 7: Summary of bacteriological testing results 2021*

| Water Sample Location | Raw or Treated | Water System | # Samples | Total Coliforms | | | E. Coli | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Min | Max | Avg | Min | Max | Avg |
| W201-1 – SS409 | Raw | Emerald | 23 | <1 | <1 | n/a | <1 | <1 | n/a |
| W201-2 – SS410 | Raw | Emerald | 25 | < 1 | 7.3 | 2.0 | <1 | <1 | n/a |
| W201-3 – SS411 | Raw | Emerald | 24 | <1 | 7.1 | 1.0 | <1 | <1 | n/a |
| 9225 Lakeshore Drive - S131 - SS403 | Treated | Emerald | 25 | < 1 | < 1 | n/a | < 1 | < 1 | n/a |
| 9525 Emerald Drive – P290 | Treated | Emerald | 23 | <1 | <1 | n/a | <1 | <1 | n/a |
| Alpine Meadows 8319 Mountainview Dr.- P245 - SS412 | Treated | Whistler Main | 24 | <1 | <1 | n/a | <1 | <1 | n/a |
| Alpine Meadows 8330 Rainbow Dr.- S101 - SS421 | Treated | Whistler Main | 12 | <1 | <1 | n/a | <1 | <1 | n/a |
| Alta Vista 3333 Carleton Way - S104 - SS459 | Treated | Whistler Main | 12 | <1 | <1 | n/a | <1 | <1 | n/a |
| Athlete's Village 1300 Mount Fee Rd. SS491 | Treated | Whistler Main | 12 | <1 | <1 | n/a | <1 | <1 | n/a |
| Athlete's Village 1010 Janes Lake Rd. P278, SS495 | Treated | Whistler Main | 12 | <1 | <1 | n/a | <1 | <1 | n/a |
| Blackcomb Benchlands 4700 Glacier Dr. - P256 - SS441 | Treated | Whistler Main | 13 | <1 | <1 | n/a | <1 | <1 | n/a |
| Function Junction Aquifer 1397 Alpha Lake Road - SS500 | Treated | Whistler Main | 23 | <1 | <1 | n/a | <1 | <1 | n/a |
| Function Junction Aquifer 1092 Millar Creek Road S107 – SS803 | Treated | Whistler Main | 25 | <1 | <1 | n/a | <1 | <1 | n/a |
| Millar's Pond 2773 Cheakamus Way S121 - SS477 | Treated | Whistler Main | 12 | <1 | <1 | n/a | <1 | <1 | n/a |
| Nicklaus North 8407 Golden Bear Pl. P266/S123 - SS424 | Treated | Whistler Main | 13 | <1 | <1 | n/a | <1 | <1 | n/a |
| Nordic Estates 2642 Whistler Road P264 - SS462 | Treated | Whistler Main | 12 | <1 | <1 | n/a | <1 | <1 | n/a |
| Rainbow 8925 Hwy. 99 - S137 – SS494 | Treated | Whistler Main | 12 | <1 | <1 | n/a | <1 | <1 | n/a |
| Rainbow 8522 Ashleigh McIvor Drive – P283 – SS496 | Treated | Whistler Main | 12 | <1 | <1 | n/a | <1 | <1 | n/a |
| Spring Creek 1559 Spring Creek Road. P273/S132 - SS480 | Treated | Whistler Main | 12 | <1 | <1 | n/a | <1 | <1 | n/a |
| Spruce Grove 7314 Blackcomb Way P267/S126 - SS427 | Treated | Whistler Main | 14 | <1 | <1 | n/a | <1 | <1 | n/a |
| Stonebridge 5483 Stonebridge Dr. P275 - SS488 | Treated | Whistler Main | 11 | <1 | <1 | n/a | <1 | <1 | n/a |
| Sunridge Plateau 3840 Sunridge Drive P265 - SS456 | Treated | Whistler Main | 12 | <1 | <1 | n/a | <1 | <1 | n/a |
| Tapley's Farm 6671 Crabapple Dr. S103 - SS433 | Treated | Whistler Main | 11 | <1 | <1 | n/a | <1 | <1 | n/a |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Twin Lake / Tamarisk 1300 Block Alta Lake Rd. SS482 | Treated | Whistler Main | 12 | <1 | <1 | n/a | <1 | <1 | n/a |
| Upper Taluswood 2400 Taluswood Pl. P270 - SS465 | Treated | Whistler Main | 23 | <1 | <1 | n/a | <1 | <1 | n/a |
| Whistler Cay Heights 6295 Palmer Dr. Snowflake Prk SS#430 | Treated | Whistler Main | 11 | <1 | <1 | n/a | <1 | <1 | n/a |
| Whistler Creek 2149 Lake Placid Rd - S106 - SS471 | Treated | Whistler Main | 12 | <1 | <1 | n/a | <1 | <1 | n/a |
| Whistler Creek 2601 Gondola Way - R228 SS474 | Treated | Whistler Main | 11 | <1 | <1 | n/a | <1 | <1 | n/a |
| Whistler Village 4297 Mountain Square - Mountain Ln - SS453 | Treated | Whistler Main | 11 | <1 | <1 | n/a | <1 | <1 | n/a |
| Whistler Village 4335 Main Street - Main St. - SS450 | Treated | Whistler Main | 11 | <1 | <1 | n/a | <1 | <1 | n/a |
| 19 Mile Ck Aquifer; Well No. W202 SS418 | Raw | Whistler Main | 13 | <1 | 4.1 | 4.1 | <1 | <1 | n/a |
| 19 Mile Ck Aquifer; Well No. W210 SS419 | Raw | Whistler Main | 11 | <1 | <1 | n/a | <1 | <1 | n/a |
| 19 Mile Ck Aquifer; Well No. W213 SS420 | Raw | Whistler Main | 12 | <1 | <1 | n/a | <1 | <1 | n/a |
| 21 Mile Creek; R-231 SS#436 | Raw | Whistler Main | 22 | 2 | 488.4 | 33.1 | < 1 | 8.5 | 2.9 |
| Alta Lake Aquifer, Well No. W218 SS498 | Raw | Whistler Main | 12 | <1 | <1 | n/a | <1 | <1 | n/a |
| Alta Lake Aquifer, Well No. W219 SS498 | Raw | Whistler Main | 12 | <1 | <1 | n/a | <1 | <1 | n/a |
| Athlete's Village Aquifer, W217 | Raw | Whistler Main | 12 | <1 | <1 | n/a | <1 | <1 | n/a |
| Blackcomb Creek, R-232/ SS439 | Raw | Whistler Main | 8 | 8.4 | 108.6 | 29.5 | < 1 | 2.0 | 1.1 |
| Fitzsimmons Creek Aquifer, W205-1 SS444 | Raw | Whistler Main | 12 | <1 | <1 | n/a | <1 | <1 | n/a |
| Fitzsimmons Creek Aquifer, W205-2 SS445 | Raw | Whistler Main | 12 | <1 | <1 | n/a | <1 | <1 | n/a |
| Fitzsimmons Creek Aquifer, W205-3 SS446 | Raw | Whistler Main | 12 | <1 | <1 | n/a | <1 | <1 | n/a |
| Fitzsimmons Creek Aquifer, W211 SS447 | Raw | Whistler Main | 11 | <1 | <1 | n/a | <1 | <1 | n/a |
| Function Junction Aquifer W212-1 SS483 | Raw | Whistler Main | 12 | <1 | <1 | n/a | <1 | <1 | n/a |

# Monthly Consumption Summary

*Table 8 Monthly Consumption Summary 2021*

| Monthly Water Consumption Percent Change Year on Year | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **2021** | **% Change** | **2020** | **% Change** | **2019** | **% Change** | **2018** | **% Change** | **2017** | **% Change** | **5 year percentage change** |
| January | 365,822 | -14% | 428,823 | -3% | 441,443 | -6% | 470,942 | -1% | 476,162 | 20% | **-23%** |
| February | 319,566 | -20% | 400,987 | 0% | 399,185 | -5% | 416,576 | 8% | 383,694 | -13% | **-17%** |
| March | 363,098 | -3% | 375,613 | -13% | 427,692 | 7% | 399,575 | -1% | 402,808 | -24% | **-10%** |
| April | 320,505 | 5% | 301,203 | -18% | 378,067 | -13% | 426,676 | 14% | 375,703 | 3% | **-15%** |
| May | 362,815 | -4% | 379,341 | -15% | 468,358 | -29% | 589,158 | 34% | 420,654 | -20% | **-14%** |
| June | 390,679 | -6% | 420,429 | -23% | 531,249 | 9% | 483,165 | -8% | 525,266 | 3% | **-26%** |
| July | 580,158 | 7% | 536,420 | -12% | 605,811 | 6% | 572,737 | -4% | 594,848 | 11% | **-2%** |
| August | 637,505 | 3% | 619,448 | -2% | 633,560 | -19% | 787,377 | -2% | 799,142 | 21% | **-20%** |
| September | 422,830 | -14% | 489,721 | 3% | 475,086 | -2% | 484,112 | -10% | 533,518 | 3% | **-21%** |
| October | 490,526 | 34% | 370,860 | 4% | 354,793 | -17% | 430,794 | -8% | 460,326 | 30% | **7%** |
| November | 372,552 | 15% | 324,601 | 0% | 323,498 | 2% | 317,409 | -23% | 395,108 | 16% | **-6%** |
| December | 391,537 | 6% | 366,790 | -10% | 404,678 | 9% | 366,681 | -13% | 430,903 | -15% | **-9%** |
| **Total Water Consumption ($m^3$)** | **5,017,594** | **0%** | **5,014,234** | **-7%** | **5,443,420** | **-5%** | **5,745,203** | **-1%** | **5,798,132** | **3%** | **-13%** |

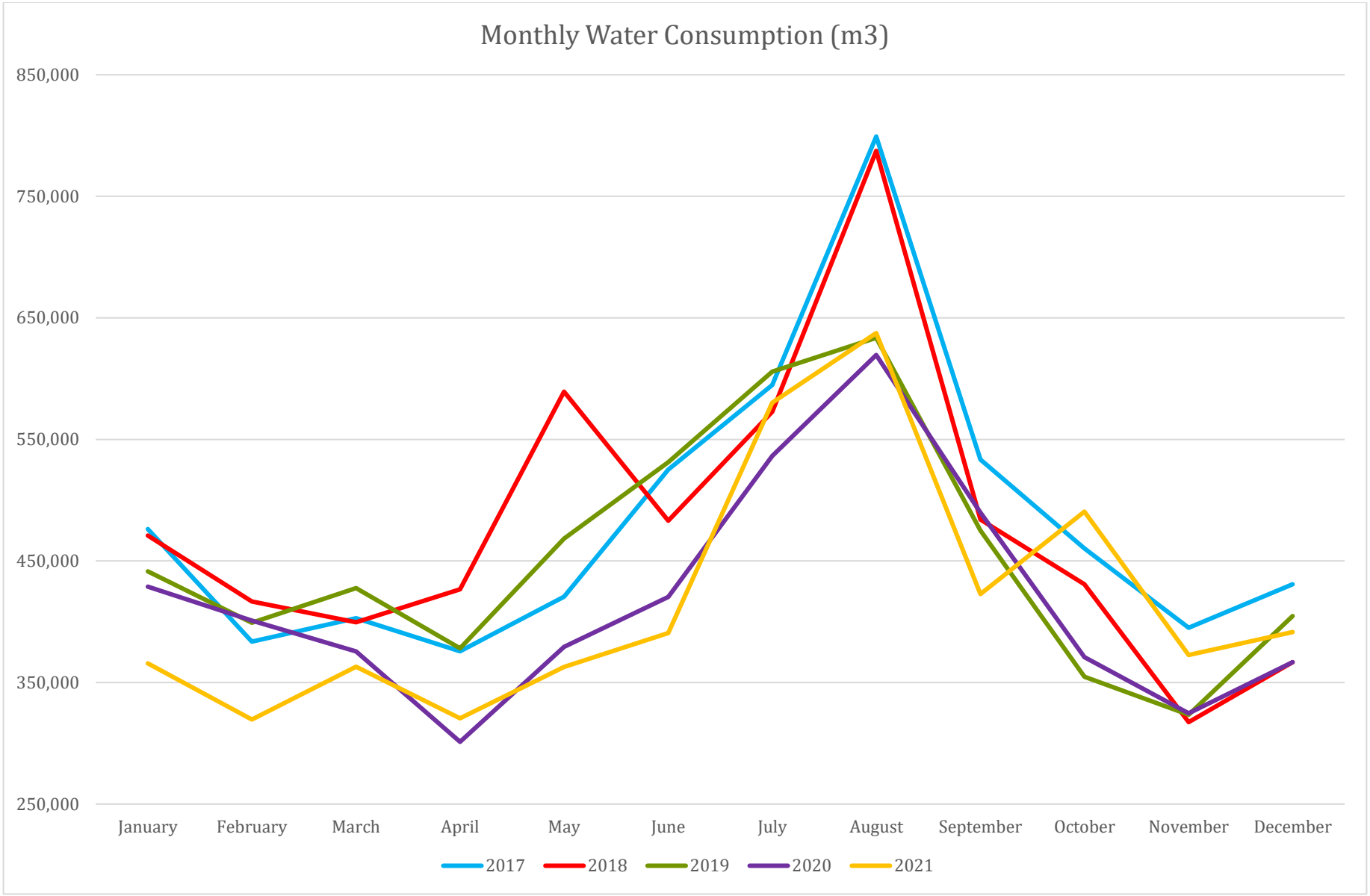



*Figure 1: Monthly Water Consumption 2017 - 2021 (m3)*

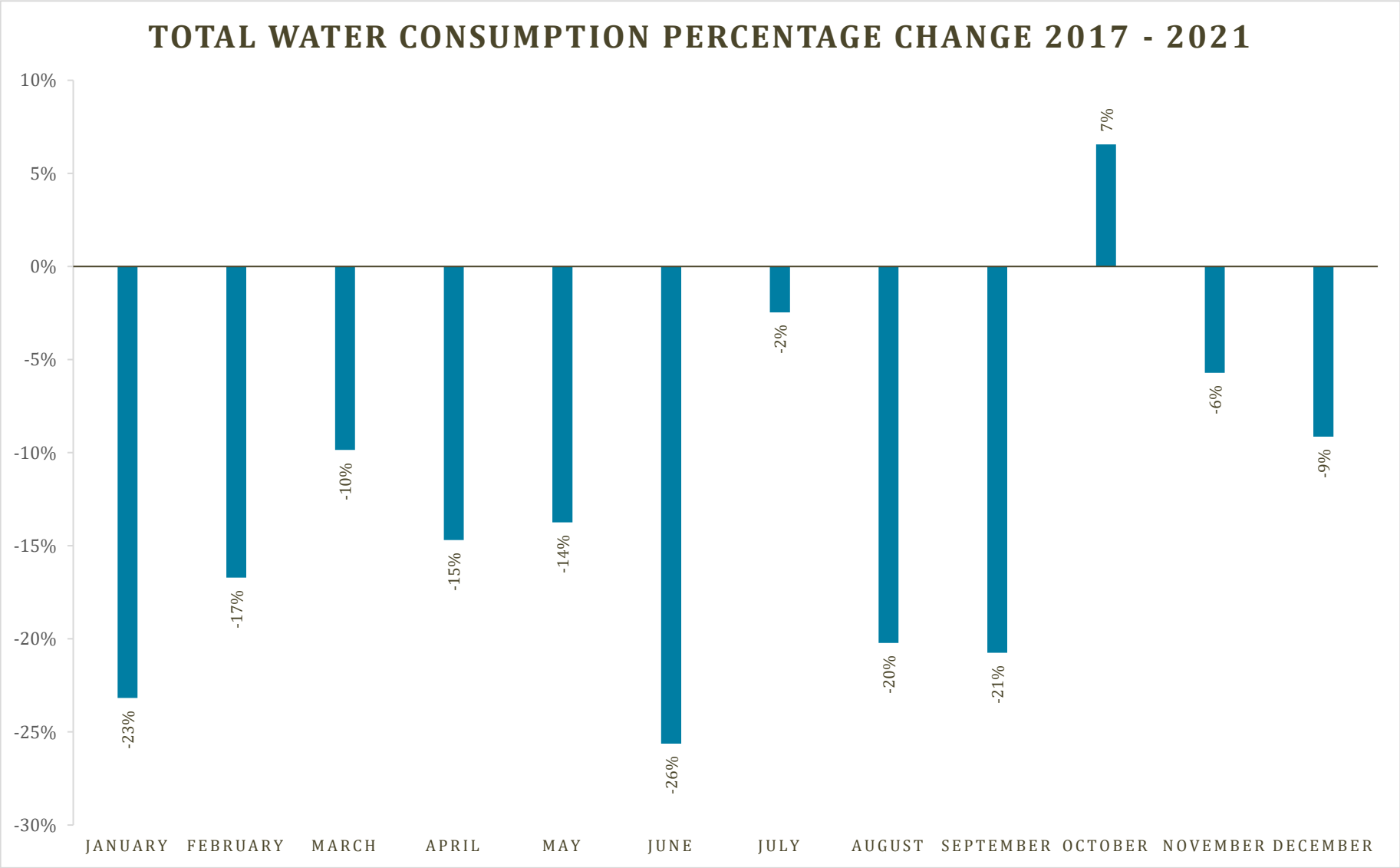



*Figure 2: Total Percent Change 2017 - 2021*

# Source Water Summary

*Table 9: Source Water Summary 2021*

| Source Water Sites | 2021 | | 2020 | | 2019 | | 2018 | | 2017 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | $m^3$ | % | $m^3$ | % | $m^3$ | % | $m^3$ | % | $m^3$ | % |
| R231 21 Mile Creek | 1,356,080 | 27% | 1,976,510 | 37% | 2,310,513 | 42% | 2,093,835 | 36% | 1,356,080 | 27% |
| R232 Blackcomb Creek | - | - | - | - | - | - | - | - | - | - |
| Total Surface Water | 1,356,080 | 27% | 1,976,510 | 37% | 2,310,513 | 42% | 2,093,835 | 36% | 1,356,080 | 27% |
| Emerald Wells W201 1-2-3 | 360,450 | 7% | 322,263 | 6% | 255500 | 5% | 259,944 | 5% | 360,450 | 7% |
| W202 Alpine | 216,894 | 4% | 226,554 | 4% | 143,799 | 3% | 327,306 | 6% | 216,894 | 4% |
| W210 Alpine | 108,984 | 2% | 130,039 | 2% | 185,090 | 3% | 153,250 | 3% | 108,984 | 2% |
| W213 Meadow Park | 114,149 | 2% | 120,543 | 2% | 174,281 | 3% | 147,963 | 3% | 114,149 | 2% |
| W205 & W211 Community Wells | 575,745 | 11% | 563,791 | 11% | 656,830 | 12% | 865,370 | 15% | 575,745 | 11% |
| W212-1 Function Junction | 438,354 | 9% | 358,875 | 7% | 412,625 | 8% | 447,225 | 8% | 438,354 | 9% |
| W212-2 Function Junction | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% |
| W217 Cheakamus Crossing | 320,840 | 6% | 386,961 | 7% | 252,650 | 5% | 229,303 | 4% | 320,840 | 6% |
| W218 21 Mile Well #1 | 1,526,097 | 30% | 1,223,524 | 23% | 1,051,873 | 19% | 1,221,006 | 21% | 1,526,097 | 30% |
| W219 21 Mile Well #2 | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% |
| Total Ground Water | 3,661,514 | 73% | 3,332,550 | 63% | 3,132,648 | 58% | 3,651,368 | 64% | 3,661,514 | 73% |
| Total Water | 5,017,594 | 100% | 5,309,060 | 100% | 5,443,161 | 100% | 5,745,203 | 100% | 5,017,594 | 100% |

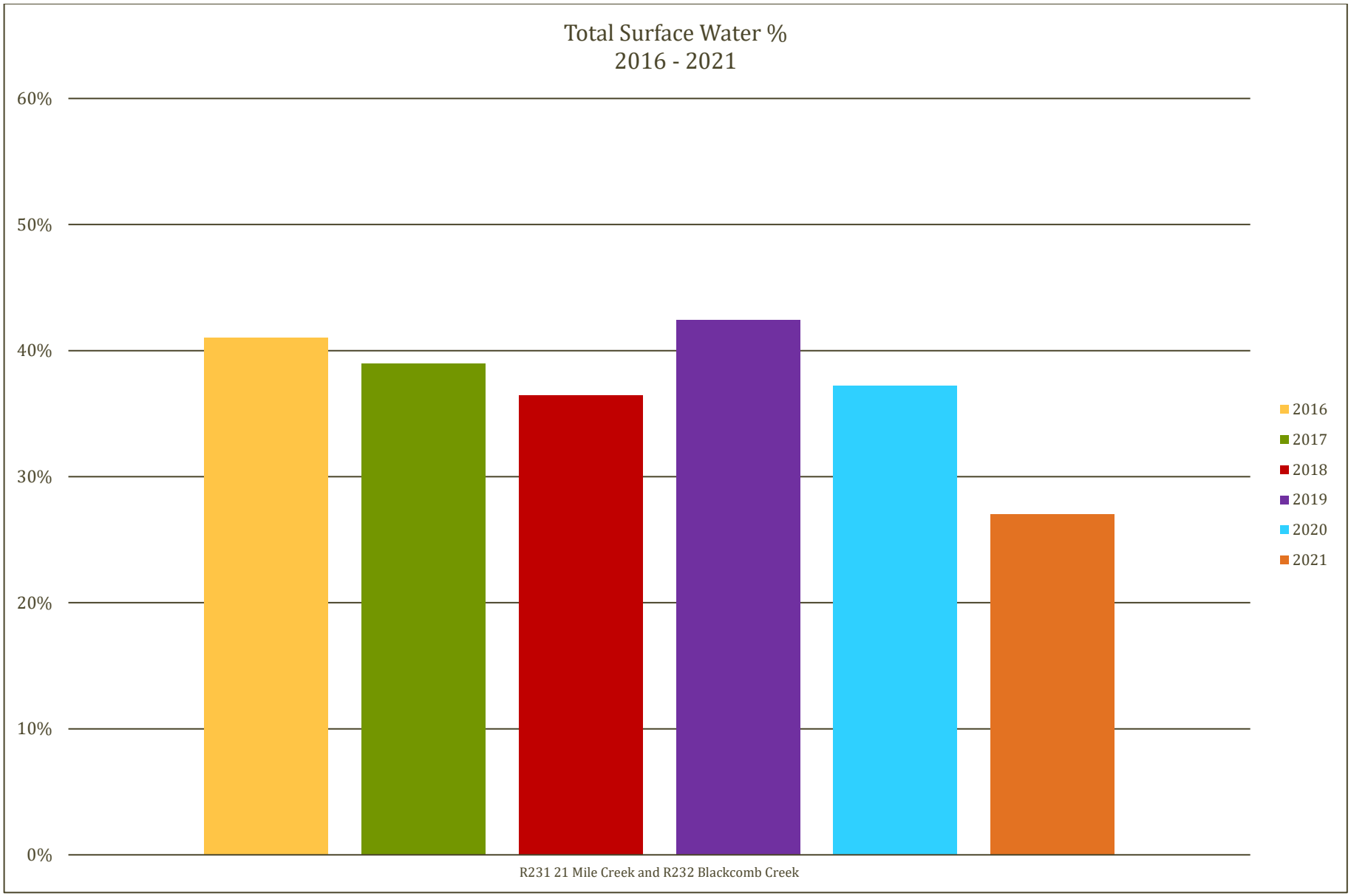



*Figure 3 Surface Water Percentage (%) of Total Water Consumption 2016 - 2021*

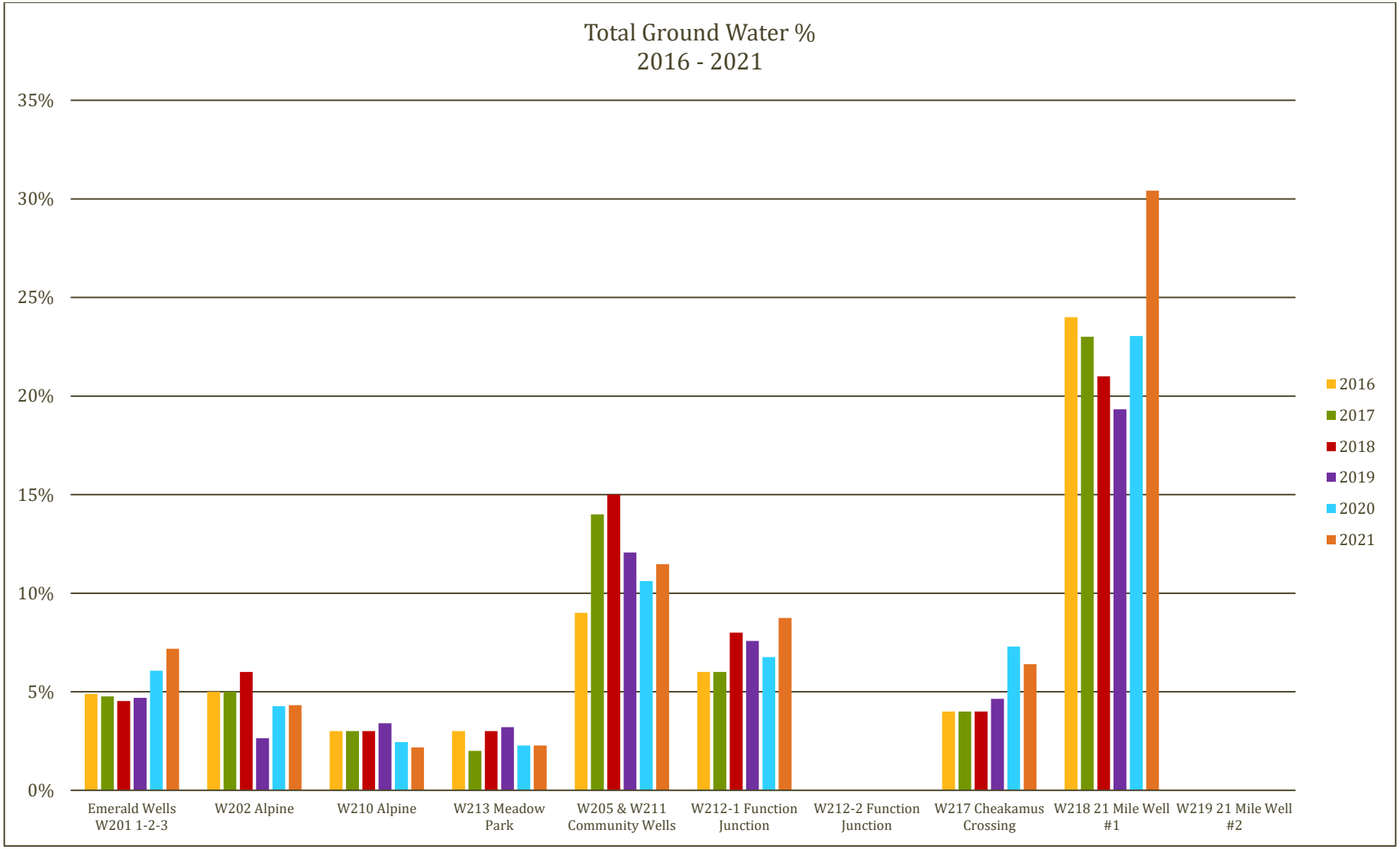



*Figure 4: Ground Water Percentage (%) of Total Water Consumption 2016 - 2021*

# Annual Water Sampling Results

*Table 10.1 Annual Water Sampling Results 2021*

| | | | R228 | R231 | R232 | W202-1 | W201-2 | W201-3 | W202 | W205-1 | W205-2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Test Parameter | GCDWQ Standard | Units | 2021-11-04 | 2021-11-16 | 2021-11-04 | 2021-11-04 | 2021-11-23 | 2021-11-23 | 2021-11-23 | 2021-11-04 | 2021-11-09 |
| Aluminum | < 0.1 | mg/L | 0.0163 | 0.12 | 4.19 | 0.0314 | 0.0102 | 0.0086 | 0.0094 | 0.0076 | <0.0050 |
| Antimony | 0.006 | mg/L | <0.00020 | <0.00020 | <0.00020 | <0.00020 | <0.00020 | <0.00020 | <0.00020 | <0.00020 | <0.00020 |
| Arsenic | 0.01 | mg/L | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 |
| Barium | 2 | mg/L | 0.0307 | <0.0050 | 0.0689 | 0.016 | 0.0142 | 0.0083 | 0.0105 | 0.0413 | 0.0243 |
| Boron | 5 | mg/L | <0.0500 | <0.0500 | <0.0500 | <0.0500 | <0.0500 | <0.0500 | <0.0500 | <0.0500 | <0.0500 |
| Cadmium | 0.005 | mg/L | 0.000052 | <0.000010 | <0.000010 | 0.00001 | 0.000017 | 0.000017 | 0.000015 | 0.000031 | 0.000022 |
| Calcium | - | mg/L | 15 | 2.83 | 7 | 13.1 | 32.2 | 31.8 | 26 | 34.7 | 57.3 |
| Chloride | 250 | mg/L | 35.1 | 0.14 | 0.11 | 5.45 | 49.1 | 14.5 | 30.6 | 23.1 | 46.2 |
| Chromium | 0.05 | mg/L | <0.00050 | <0.00050 | 0.00343 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 |
| Cobalt | - | mg/L | <0.00010 | <0.00010 | 0.00237 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 | <0.00010 |
| Colour | ≤ 15 | TCU | <5.0 | <5.0 | 46 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 |
| Conductivity | - | µS/cm | 200 | 15.9 | 25.7 | 88.6 | 283 | 196 | 229 | 242 | 478 |
| Copper | ≤ 1 | mg/L | 0.0231 | 0.00086 | 0.0117 | <0.00040 | <0.00040 | 0.00095 | 0.00113 | 0.0116 | 0.0112 |
| Cyanide | 0.2 | mg/L | <0.0020 | <0.0020 | <0.0020 | <0.0020 | <0.0020 | <0.0020 | <0.0020 | <0.0020 | <0.0020 |
| Fluoride | 1.5 | mg/L | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 |
| Hardness CaCO3 | - | mg/L | 45.5 | 7.79 | 28.5 | 36.4 | 86.6 | 84.7 | 70.1 | 91.9 | 149 |
| Iron | 0.3 | mg/L | 0.031 | 0.066 | 4.04 | 0.018 | <0.010 | 0.017 | <0.010 | <0.010 | <0.010 |
| Lead | 0.01 | mg/L | 0.00127 | <0.00020 | 0.00022 | <0.00020 | <0.00020 | <0.00020 | <0.00020 | 0.00081 | 0.0003 |
| Magnesium | - | mg/L | 1.96 | 0.176 | 2.67 | 0.858 | 1.47 | 1.28 | 1.22 | 1.24 | 1.33 |
| Manganese | 0.05 | mg/L | 0.0393 | 0.00233 | 0.0883 | 0.00046 | 0.00065 | 0.00071 | <0.00020 | 0.00021 | <0.00020 |
| Mercury | 1 | µg/L | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 |
| Molybdenum | - | mg/L | 0.00277 | 0.0003 | 0.00038 | 0.00191 | 0.00022 | 0.00025 | 0.00029 | 0.00015 | 0.00086 |
| Nickel | - | mg/L | 0.00153 | <0.00040 | 0.00248 | 0.00279 | <0.00040 | <0.00040 | <0.00040 | <0.00040 | <0.00040 |
| Nitrate | 10 | mg/L | 0.068 | <0.010 | <0.010 | 0.125 | 0.503 | 0.141 | 0.164 | 0.346 | 0.145 |
| Nitrite | 1 | mg/L | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 |
| Potassium | - | mg/L | 2.15 | 0.32 | 1.28 | 0.84 | 1 | 0.63 | 0.74 | 0.98 | 1.43 |
| Selenium | 0.01 | mg/L | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 |
| Sodium | 200 | mg/L | 26.2 | 0.54 | 0.91 | 4.75 | 19.9 | 6.81 | 18.5 | 11.8 | 22.2 |
| Solid, Total Dissolved | ≤ 500 | mg/L | 113 | 7.73 | 18.9 | 51.2 | 149 | 110 | 128 | 140 | 242 |
| Strontium | 7 | mg/L | 0.167 | 0.0161 | 0.0313 | 0.109 | 0.203 | 0.186 | 0.179 | 0.248 | 0.34 |
| Sulphate | 500 | mg/L | 11.5 | <1.0 | <1.0 | 9.9 | 13.2 | 14.2 | 14.6 | 38 | 82.4 |
| Turbidity | 1 | NTU | 0.1 | 0.74 | 75.5 | <0.10 | 0.22 | 0.24 | <0.10 | 0.34 | <0.10 |
| Uranium | 0.02 | mg/L | 0.000034 | 0.000041 | 0.000052 | 0.000036 | <0.000020 | 0.000032 | 0.000027 | <0.000020 | 0.000025 |
| Zinc | 5 | mg/L | 0.0454 | <0.0040 | 0.0149 | <0.0040 | <0.0040 | <0.0040 | <0.0040 | 0.0404 | 0.0118 |

*Table 11.2 Annual Water Sampling Results 2021*

| | | | W205-3 | W210 | W211 | W212-1 | W212-2 | W213 | W217 | W218 | W219 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Test Parameter | GCDWQ Standard | Units | 2021-11-09 | 2021-11-04 | 2021-11-09 | 2021-11-16 | 2021-11-16 | 2021-11-04 | 2021-11-16 | 2021-11-23 | 2021-11-23 |
| Aluminum | < 0.1 | mg/L | <0.0050 | 0.018 | <0.0050 | 0.0079 | 0.222 | <0.0050 | 0.0095 | 0.0052 | 0.0064 |
| Antimony | 0.006 | mg/L | 0.00032 | <0.00020 | 0.00037 | <0.00020 | <0.00020 | <0.00020 | <0.00020 | <0.00020 | <0.00020 |
| Arsenic | 0.01 | mg/L | 0.00105 | <0.00050 | 0.00078 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 |
| Barium | 2 | mg/L | 0.0523 | 0.0156 | 0.0164 | 0.0279 | 0.0266 | 0.0304 | 0.0179 | 0.0119 | 0.0164 |
| Boron | 5 | mg/L | <0.0500 | <0.0500 | <0.0500 | <0.0500 | <0.0500 | <0.0500 | <0.0500 | <0.0500 | <0.0500 |
| Cadmium | 0.005 | mg/L | 0.000037 | <0.000010 | 0.000025 | 0.000029 | 0.000095 | <0.000010 | 0.000011 | <0.000010 | 0.000012 |
| Calcium | - | mg/L | 113 | 13.3 | 42.5 | 13.8 | 14.1 | 30.4 | 17.2 | 11.6 | 15.4 |
| Chloride | 250 | mg/L | 134 | 0.5 | 14.3 | 26.4 | 40.3 | 9.57 | 2.01 | 1.04 | 3.04 |
| Chromium | 0.05 | mg/L | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 |
| Cobalt | - | mg/L | <0.00010 | <0.00010 | <0.00010 | <0.00010 | 0.00034 | <0.00010 | <0.00010 | <0.00010 | <0.00010 |
| Colour | ≤ 15 | TCU | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 |
| Conductivity | - | µS/cm | 992 | 74.1 | 305 | 171 | 251 | 201 | 108 | 85.3 | 113 |
| Copper | ≤ 1 | mg/L | 0.00846 | <0.00040 | 0.00513 | 0.00227 | 0.00654 | 0.00856 | 0.00124 | 0.00122 | 0.0248 |
| Cyanide | 0.2 | mg/L | <0.0020 | <0.0020 | <0.0020 | <0.0020 | <0.0020 | <0.0020 | <0.0020 | <0.0020 | <0.0020 |
| Fluoride | 1.5 | mg/L | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 |
| Hardness CaCO3 | - | mg/L | 291 | 36 | 111 | 41.5 | 44.9 | 80.4 | 47 | 32.8 | 42.6 |
| Iron | 0.3 | mg/L | 0.011 | <0.010 | <0.010 | 0.56 | 1.13 | <0.010 | 0.028 | <0.010 | 0.035 |
| Lead | 0.01 | mg/L | 0.00087 | 0.00043 | 0.00034 | 0.00082 | 0.00026 | 0.00045 | <0.00020 | <0.00020 | 0.00025 |
| Magnesium | - | mg/L | 2.25 | 0.644 | 1.1 | 1.69 | 2.36 | 1.06 | 0.946 | 0.945 | 0.995 |
| Manganese | 0.05 | mg/L | 0.00114 | 0.00032 | 0.00092 | 0.0665 | 1.59 | <0.00020 | 0.00055 | 0.00135 | 0.00267 |
| Mercury | 1 | µg/L | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 | <0.000010 |
| Molybdenum | - | mg/L | 0.00081 | 0.0005 | 0.00138 | 0.00474 | 0.0261 | 0.00053 | 0.00038 | 0.00027 | 0.00029 |
| Nickel | - | mg/L | <0.00040 | <0.00040 | <0.00040 | 0.0185 | 0.00057 | <0.00040 | <0.00040 | <0.00040 | 0.00111 |
| Nitrate | 10 | mg/L | 0.85 | <0.010 | 0.139 | 0.066 | 0.026 | 0.118 | <0.010 | <0.010 | 0.01 |
| Nitrite | 1 | mg/L | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 |
| Potassium | - | mg/L | 1.98 | 0.68 | 1.01 | 1.77 | 2.82 | 1.41 | 0.91 | 1.08 | 0.97 |
| Selenium | 0.01 | mg/L | <0.00050 | <0.00050 | <0.00050 | <0.00050 | <0.00050 | 0.00057 | <0.00050 | <0.00050 | <0.00050 |
| Sodium | 200 | mg/L | 50.4 | 1.8 | 10.2 | 20.9 | 36.7 | 6.6 | 2.64 | 2.13 | 3.33 |
| Solid, Total Dissolved | ≤ 500 | mg/L | 508 | 44.1 | 168 | 96.6 | 135 | 119 | 62.9 | 47 | 63.4 |
| Strontium | 7 | mg/L | 0.706 | 0.0665 | 0.21 | 0.155 | 0.169 | 0.178 | 0.103 | 0.0847 | 0.0949 |
| Sulphate | 500 | mg/L | 154 | 10.9 | 68 | 9.9 | 7.4 | 44.8 | 29.2 | 19.4 | 28.8 |
| Turbidity | 1 | NTU | 0.13 | 0.18 | <0.10 | 2.14 | 1.85 | 0.36 | 0.19 | <0.10 | 0.24 |
| Uranium | 0.02 | mg/L | 0.000088 | <0.000020 | <0.000020 | <0.000020 | 0.000091 | <0.000020 | <0.000020 | <0.000020 | <0.000020 |
| Zinc | 5 | mg/L | 0.0041 | <0.0040 | <0.0040 | 0.0082 | 0.0061 | 0.0082 | 0.0043 | <0.0040 | 0.0126 |

# Annual pH Sampling Results

*Table 11: Annual pH Sampling Results 2021*

| Water Sample Location | Raw or Treated | Water System | # Samples | pH | | |
|---|---|---|---|---|---|---|
| | | | | Min | Max | Avg |
| W201-1 – SS409 | Raw | Emerald | 27 | 6.25 | 6.98 | 6.63 |
| W201-2 – SS410 | Raw | Emerald | 28 | 6.43 | 7.28 | 6.86 |
| W201-3 – SS411 | Raw | Emerald | 28 | 6.42 | 7.31 | 6.81 |
| 9225 Lakeshore Drive - S131 - SS4039 | Treated | Emerald | 28 | 6.51 | 7.22 | 6.80 |
| 9525 Emerald Drive – P290 | Treated | Emerald | 21 | 6.68 | 7.00 | 6.85 |
| Alpine Meadows 8319 Mountainview Dr.- P245 - SS412 | Treated | Whistler Main | 24 | 6.09 | 7.12 | 6.63 |
| Alpine Meadows 8330 Rainbow Dr.- S101 - SS421 | Treated | Whistler Main | 11 | 6.21 | 6.91 | 6.60 |
| Alta Vista 3333 Carleton Way - S104 - SS459 | Treated | Whistler Main | 13 | 6.05 | 7.40 | 6.55 |
| Athlete's Village 1300 Mount Fee Rd. SS491 | Treated | Whistler Main | 12 | 6.23 | 6.67 | 6.41 |
| Athlete's Village 1010 Janes Lake Rd. P278, SS495 | Treated | Whistler Main | 14 | 5.81 | 6.96 | 6.42 |
| Blackcomb Benchlands 4700 Glacier Dr. - P256 - SS441 | Treated | Whistler Main | 14 | 5.99 | 7.02 | 6.52 |
| Function Junction Aquifer 1397 Alpha Lake Road - SS500 | Treated | Whistler Main | 24 | 5.96 | 7.11 | 6.26 |
| Function Junction Aquifer 1092 Millar Creek Road S107 – SS803 | Treated | Whistler Main | 27 | 5.99 | 7.26 | 6.41 |
| Millar's Pond 2773 Cheakamus Way S121 - SS477 | Treated | Whistler Main | 12 | 6.22 | 6.61 | 6.39 |
| Nicklaus North 8407 Golden Bear Pl. P266/S123 - SS424 | Treated | Whistler Main | 13 | 6.31 | 7.34 | 6.65 |
| Nordic Estates 2642 Whistler Road P264 - SS462 | Treated | Whistler Main | 13 | 6.43 | 7.50 | 6.72 |
| Rainbow 8925 Hwy. 99 - S137 – SS494 | Treated | Whistler Main | 13 | 6.22 | 7.42 | 6.59 |
| Rainbow 8522 Ashleigh McIvor Drive – P283 – SS496 | Treated | Whistler Main | 11 | 6.27 | 7.00 | 6.65 |
| Spring Creek 1559 Spring Creek Road. P273/S132 - SS480 | Treated | Whistler Main | 11 | 6.12 | 6.79 | 6.30 |
| Spruce Grove 7314 Blackcomb Way P267/S126 - SS427 | Treated | Whistler Main | 14 | 6.30 | 7.60 | 6.74 |
| Stonebridge 5483 Stonebridge Dr. P275 - SS488 | Treated | Whistler Main | 13 | 6.32 | 7.39 | 6.59 |
| Sunridge Plateau 3840 Sunridge Drive P265 - SS456 | Treated | Whistler Main | 11 | 6.40 | 7.53 | 7.01 |
| Tapley's Farm 6671 Crabapple Dr. S103 - SS433 | Treated | Whistler Main | 14 | 0.00 | 7.83 | 6.49 |
| Twin Lake / Tamarisk 1300 Block Alta Lake Rd. SS482 | Treated | Whistler Main | 14 | 6.07 | 7.20 | 6.56 |
| Upper Taluswood 2400 Taluswood Pl. P270 - SS465 | Treated | Whistler Main | 27 | 6.30 | 7.45 | 6.74 |
| Whistler Cay Heights 6295 Palmer Dr. Snowflake Prk SS#430 | Treated | Whistler Main | 11 | 6.27 | 7.31 | 6.59 |
| Whistler Creek 2149 Lake Placid Rd - S106 - SS471 | Treated | Whistler Main | 13 | 6.12 | 7.17 | 6.38 |
| Whistler Creek 2601 Gondola Way - R228 SS474 | Treated | Whistler Main | 12 | 6.09 | 7.28 | 6.35 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Whistler Village 4297 Mountain Square - Mountain Ln - SS453 | Treated | Whistler Main | 12 | 6.22 | 7.40 | 6.52 |
| Whistler Village 4335 Main Street - Main St. - SS450 | Treated | Whistler Main | 12 | 6.24 | 7.46 | 6.68 |
| 19 Mile Ck Aquifer; Well No. W202 SS418 | Raw | Whistler Main | 14 | 6.22 | 7.22 | 6.47 |
| 19 Mile Ck Aquifer; Well No. W210 SS419 | Raw | Whistler Main | 14 | 6.26 | 7.31 | 6.82 |
| 19 Mile Ck Aquifer; Well No. W213 SS420 | Raw | Whistler Main | 14 | 6.41 | 7.41 | 6.70 |
| 21 Mile Creek; R-231 SS#436 | Raw | Whistler Main | 23 | 6.33 | 7.82 | 7.15 |
| Alta Lake Aquifer, Well No. W218 SS498-W218 | Raw | Whistler Main | 14 | 6.10 | 7.10 | 6.45 |
| Alta Lake Aquifer, Well No. W219 SS498-W219* | Raw | Whistler Main | 13 | 5.98 | 7.08 | 6.38 |
| Fitzsimmons Creek Aquifer, W205-1 SS444 | Raw | Whistler Main | 12 | 6.27 | 7.24 | 6.52 |
| Fitzsimmons Creek Aquifer, W205-2 SS445 | Raw | Whistler Main | 12 | 6.27 | 7.47 | 6.50 |
| Fitzsimmons Creek Aquifer, W205-3 SS446 | Raw | Whistler Main | 12 | 6.24 | 7.31 | 6.55 |
| Fitzsimmons Creek Aquifer, W211 SS447 | Raw | Whistler Main | 12 | 6.17 | 7.38 | 6.49 |
| Function Junction Aquifer W212-1 SS483 | Raw | Whistler Main | 14 | 6.07 | 7.02 | 6.34 |
| Function Junction Aquifer W212-2 SS483-2 | Raw | Whistler Main | 1 | 7.37 | 7.37 | 7.37 |
| Athlete's Village Aquifer W217 SS489 | Raw | Whistler Main | 15 | 5.96 | 7.09 | 6.37 |
| Blackcomb Creek; R232 SS439* | Raw | Whistler Main | 12 | 0.00 | 7.62 | 6.15 |

**R232 and W219 were not used as water sources in 2021*

# APPENDIX B –EMERGENCY RESPONSE AND CONTINGENCY PLAN

# Water Systems Emergency Response and Contingency Plan

Resort Municipality of Whistler 2021

WHISTLER

# 1 Executive Summary

The Drinking Water Protection Regulation (B.C. Reg. 200/2003) requires all purveyors of water systems to have an emergency response and contingency plan which can be referred to in case of an emergency which might cause a disruption in service or present a threat to the health of people drawing water from the system. This Water System Emergency Response Plan fulfills this requirement.

The Water System Emergency Response Plan details the plan of action for staff to prepare for and respond to emergency situations and disruptions in service to the water system. The Plan provides staff with an understanding of the resources available to them, instructions on when to open the Emergency Operations Centre (EOC) and identifies external resources that can be called upon if required.

The plan outlines Utilities emergency procedures for potentially hazardous situations such as, extended loss of BC Hydro electrical supply, failure of SCADA system, failure of disinfection system, primary water main failure, bacteriological contamination of the distribution system, utilities building fire, water source high turbidity readings and spills or chemical/ biological contamination.

This plan follows a standardized emergency management concept known as the Incident Command System for managing and coordinating emergency responses. The plan will be available to RMOW Utilities staff and management, the RMOW Emergency Program Coordinator, the RMOW Communication's Officer and the Vancouver Coastal Health Drinking Water Officer.

## Table of Contents

## 1.1 Emergency Response & Contingency Plan

### *Purpose of the Plan*

The RMOW is responsible for providing adequate supplies of clean potable water to its residents. In addition, the municipality maintains water storage volumes in the reservoirs for the provision of fire-fighting for dwellings/structures within the developed areas of the Whistler. Disruptions in water quality and delivery may result from emergencies such as natural disasters (such as, floods, forest fires and/or earthquakes), accidents, or intentional acts. The municipality maintains effective response and recovery practices in the event of an emergency through Emergency planning and coordinated communication planning.

This ERCP was prepared in accordance with Section 13 of the Drinking Water Protection Regulation (BC Reg. 200/2003). The document summarizes possible emergencies, staff roles and responsibilities, and the procedures that are in place to effectively and adequately respond to emergencies that significantly threaten the municipal water distribution system.

The ERCP is intended to guide municipal management, staff, and response agencies in the best practices in the event of an emergency. These practices include:

- Early response guidelines;
- Ensuring that the highest levels of water quality and public health are maintained;
- Ensuring the highest levels of safety for employees and first responders;
- Ensuring that adequate water levels are maintained for fighting fires;
- Safeguarding of drinking water distribution infrastructure;
- Restoring normal water system operations as soon as possible;
- Protecting the environment from potential impacts associated with system operation during emergency event response.

Emergency Response and Contingency Plans must be accessible to every staff member and must be readily available in an emergency. A copy of this plan must also be sent to the Drinking Water Officer and be updated at least once a year to reflect changes in personnel, contact information, and system operation. A synopsis or summary of this plan must be available for public access.

### *Steps undertaken in an Emergency*

1. Assess the situation. Can the situation be remedied as part of normal operations, or will the emergency response plan be initiated? Is there a possible threat to drinking water quality? Consult with Drinking Water Officer.
2. Protective life and limb. Evacuation may take precedence over repairs. No not attempt to respond to an emergency or undertake repairs until it is safe to do so.

3. **Reduce the potential for further damage or threat to water quality**. The threat may be removed; parts of the system may be shut down.
4. **Inform the public**. Public notices may be issued to prevent further contamination or threat to public health.
5. **Perform repairs based on priority**. Priority is determined by the Supervisor in conjunction with VCH.
6. **Return system to normal levels of operation**. Evaluate the situation as the water system returns to normal. Do not remove any public advisories until the water is declared safe to drink, but provide updates on a regular basis to keep the public informed.
7. **Evaluate plan and emergency response**. During and after operations, note communications gaps, operational difficulties, or anything that affected the utility's ability to restore services to normal levels.
8. **Revise plan if necessary**. Make changes to the plan, and be sure to update it after any improvements or changes to the system, including changes in personnel.

Every water system has key components that are essential to its continued operation.

These include:

1. **Administration** – personnel, records, emergency plans, computers, SCADA system.
2. **Source** – watershed, wellhead area.
3. **Intakes** – pumps and pump houses, intake structures.
4. **Transmission** – pumps, piping and valves.
5. **Storage** – reservoirs, standpipes, pump stations.
6. **Treatment** – chlorination, stations, filtration plants, other treatment
7. **Distribution** – piping, pumps, valves, hydrants.
8. **Facilities and equipment** – buildings or warehouses, works yards, spare parts, vehicles and construction equipment, etc.
9. **Communications** – phone system, radio, computers and e-mail, signals transmission from reservoirs or pump stations.

## 1.2 Roles and Responsibilities

### *Operators*

The RMOW Utilities Department Operators are the personnel most likely to discover a situation that may present a threat to the municipal water supply; Utilities is most likely to receive calls from residents about tastes, odours, lack of pressure and/or other indications of a problem in the water system. When responding

to a potential emergency situation the operators are required to notify the Chief Operator and Supervisor as soon as possible.

## *Utilities Superintendent*

Once apprised of the potential emergency situation by operations staff, the Utilities Superintendent (**Wayne Dennien**) must decide if there is a potential threat to the drinking water supply; and whether the necessary response falls under normal operating procedures or if additional staff and/or contractor resources will be required to contain the situation. If public notification is required or extraordinary measures are implemented, the Superintendent will contact the Utilities Group Manager (**Chris Wike**). The Superintendent will also contact the Utilities Group Manager if the situation exceeds the capacity of the operations department and other departments or agencies are required for assistance. The Superintendent will also monitor general operating conditions, weather conditions, maintain a safe working environment, and ensure that staff has appropriate equipment and necessary resources to effectively respond to the emergency.

## *Utilities Group Manager*

If the Supervisor has indicated a potential threat to the drinking water supply (either quality or quantity) the Utilities Group Manager will determine the next steps which may include:

- Determining the emergency level and evaluating whether or not it exceeds the utility departments capacity to respond effectively and if so, notify the General Manager of Infrastructure Services. The RMOW Emergency Operations Centre Activation Flowchart is provided in Appendix C.
- Contacting the Drinking Water Officer and working with them to issue the necessary public notifications.
- Authorizing the contact of priority water users to make them aware of the possibility of a problem with the water quantity or quality, in order for them to initiate their own emergency response plans.
- Coordinate with the Utilities Superintendent to ensure that the response team have all the appropriate equipment and training in order to respond to the emergency situation.

## *Drinking Water Officer*

The Drinking Water Protection Regulation (BC Reg. 200/2003) and the Drinking Water Protection Act give the Drinking Water Officer (DWO) significant authority over removing potential and real threats to drinking water supplies. The DWO must be informed of anything that may present a potential threat to drinking water quality.

During an emergency, the DWO and other health authority staff can provide advice about public notification and assistance with monitoring water quality and outbreaks of waterborne disease. It is assumed that the RMOW Communications Department will take the lead role as spokesperson for media enquiries and releases. Sample public notification templates are provided in Appendix B.

## 1.3 Emergency Situations

### Defining Emergency Levels

In this plan there are three categories of severity with different response actions, the category of severity for each emergency situation can be used to determine appropriate response actions.

- **Alert Condition:** considered to be routine emergencies, such as distribution line breaks, short power outages, and minor mechanical issues.
- **Emergency Condition:** more significant emergencies. These types of emergencies usually require the issuing of a Boil or Do Not Use Water Advisory Notice to protect the public.
- **Disaster Conditions:** emergency situations that have a significant impact on the system. These are serious emergencies and require immediate notification of the Utilities Group Manager. If deemed necessary the Utilities Group Manager will contact the General Manager to activate the RMOW Emergency Operations Centre (EOC).

### Vandalism/Security Issues

If vandalism occurs or there are security concerns at any facility that threaten drinking water quality:

1. Determine the Emergency Level.
2. Contact the facility concerned to alert regarding the vandalism / security issue
3. Contact the RCMP
4. Contact the Superintendent , Utilities Group Manager and advise the Drinking Water Officer or Medical Health Officer
5. If the Utilities Group Manager and the DWO agree there is a threat to drinking water quality, issue "Boil Water" alerts for suspected microbiological contamination or "Do Not Drink the Water" alert for suspected chemical or unknown contamination.
6. Implement appropriate measures for cleaning / decontaminating facilities
7. Do not remove the public advisories until instructed by the Drinking Water Officer
8. Complete a post-incident response report

**NOTE: Notify the Drinking Water Officer or Medical Health Officer of any vandalism or deliberate acts of contamination to any part of the water system.**

The Drinking Water Protection Act prohibits any person from introducing anything into domestic water source, a well recharge zone, or an area adjacent to a drinking water source that will or is likely to result in a health hazard related to drinking water or destroying, damaging, or tampering with any part of a domestic water system if that would limit the use of the water system on the basis that there may be a risk of a health hazard.

### Spills or Chemical/Biological Contamination

When an Operator or Superintendent reports a spill or chemical/biological contamination that may threaten drinking water quality:

1. Determine the Emergency Level.
2. Immediately notify the Superintendent and Utilities Group Manager.
3. Assess nature of contaminant, soil and weather conditions to determine best course of action to address the spill situation. Deploy appropriate remedial action, which may include hydro-excavation to remove contaminants as soon as possible.
4. Contact the Drinking Water Officer or Medical Health Officer and divide level of risk.
5. Contact the **Spill Reporting Centre: 1-800-663-3456**
6. Utilities Group Manager to issue a "Do Not Drink the Water" alert for the affected part of system. Arrange for trucked / bottled water if necessary.
7. If spill enters or is near a fish-bearing stream, contact the Department of Fisheries and Oceans and the BC Ministry of Environment.
8. If the spill is near a well(s), have monitoring wells installed to monitor contaminant plume and take action to mitigate impacts of spill on aquifer. Contact a hydro geologist for assistance. Review wellhead protection plan.
9. If a reservoir is contaminated, it must be drained, cleaned, disinfected, refilled and disinfected a second time. Re-sample the water. Flush and disinfect any downstream piping.
10. Confirm water quality is acceptable to Drinking Water Officer before removing public notices.

If a sample analyzed by the British Columbia Centre for Disease Control tests positive for chemical/biological Contamination:

1. Utilities personnel and Drinking Water Office will be notified via an alert from the laboratory.
2. All outstanding samples will be examined immediately.
3. Repeat samples will be collected immediately.
4. Chlorine residual for the sample will be reviewed to determine if a localized loss of disinfectant residual has occurred.
5. Utilities staff will determine if an interruption of source water disinfection occurred.
6. Utilities staff will determine if localized flushing and/or temporary increase in disinfectant residual dosage is warranted.
7. Turbidity, pH, and temperature values for the affected sample will be reviewed to determine other possible factors which may have contributed to the event.

8. The need for a Boil Water Advisory will be evaluated, and if deemed necessary the RMOW will carry out various means to inform the public.
9. The municipality will coordinate with the Drinking Water Officer on the extent of the Boil Water Advisory.
10. Confirm water quality is acceptable to Drinking Water Officer before removing public notices.
11. Complete a post-incident report.

### Floods

Floods may affect water sources by depositing debris and silt in the water or by contaminating wells with surface water. In addition, facilities and equipment may be damaged or rendered inoperable by flood waters. Staff may not be able to gain access to some facilities due to high water.

In the event of a major flood mostly likely the EOC would be activated:

1. Utilities Superintendent assesses the situation and determines the level of emergency.
2. Utilities Superintendent confirms which facilities are functional and accessible.
3. When confirmed that a well is flooded, notify the Utilities Group Manager and the DWO, who will assume it has been contaminated by untreated surface water and will issue a “Boil Water” alert. If chemical storage or application occurred in the vicinity, issue a “Do Not Drink the Water” alert.
4. If there are damaged facilities and lack of water, issue a “Water Use Restriction” Order.
5. Once flood waters have receded, have affected facilities checked for structural integrity. Contact a structural engineer for assistance.
6. Implement appropriate measures for cleaning/ decontaminating facilities.
7. Have water quality in affected wells tested and do not remove public notices until instructed by the drinking water officer.
8. Consider flood proofing affected facilities and ensure wells are sealed and flood proofed.
9. Complete a post-incident response report.

### Earthquakes

Earthquakes can be particularly destructive to both above ground and underground infrastructure. Pipes and well casings can be bent, twisted, or sheared off completely. Reservoirs or storage tanks can be damaged by water sloshing back and forth or by weakening of their foundations or structure. Soils with high water content can liquefy and damage buildings and underground pipes; other types of soils tend to compact, causing similar damage. Unstable slopes may slide, sending debris into a water course or across an access road. Earthquakes often cause ruptured gas mains and fires, so increased demand can be placed on a water system that is under stress. Because many other agencies will be involved it will be essential to coordinate all efforts to most effectively deal with the situation.

In the event of an Earthquake most likely the EOC would be activated.

1. Utilities Superintendent assesses the situation and determines the level of emergency.

2. Utilities Superintendent confirms which facilities are functional and accessible, which may be damaged and whether water quality is affected.
3. Maintain liaison with DWO and, if necessary, issue public alerts and provide bottled/trucked water if possible.
4. Contact the Fire Department and Emergency Operations Centre as required.
5. If there are damaged facilities and lack of water, issue a Water Use Restriction Order.
6. If there is potential for backflow into the system, assume it has been contaminated by untreated surface water and issue a Boil Water Advisory. If chemical storage or application occurred in the vicinity, issue a Do Not Drink Water Advisory.
7. If surface sources are degraded by landslide, switch to alternate sources.
8. If wells are destroyed, switch to backup sources and investigate locations for new wells.
9. Contact a structural engineer for assistance in assessing significant damage to facilities.
10. Make a damage assessment, prepare a plan to begin repairs and identify a schedule to resume normal operations.
11. Have water quality in affected wells tested and do not remove public notices until instructed by the drinking water officer.
12. Complete a post-incident response report.

### Wildfires

During a forest fire reservoirs, pump stations or other facilities may be damaged or destroyed by fire. Increased demands may be placed on the system, disrupting normal operations. Chemicals used in fire suppression may enter water courses and the distribution system. The hydrology of a watershed changes after a forest fire, so source waters may become more turbid or coloured. Long term effects may include stream flow alteration and excessive algal growth.

In the event of a Wildfire most likely the EOC would be activated.

1. Report wildfire to **BC Wildfire Service, 1-800-663-5555 or *5555 from a cell phone.**
2. Utilities Superintendent assesses the situation and determines the level of emergency
3. Request regular status information on the situation and possible water contamination
4. If possible, isolate threatened facilities and switch to backup sources to maintain system pressure and supply.
5. If fire suppression activities occur, contact BC Forest Service and Fire Department to determine nature of suppressants used.

6. If surface waters are affected by fire suppressants, issue a Do Not Drink the Water Advisory or apply appropriate treatment approved by the drinking water officer to render the water safe to drink.
7. If long-term impacts to surface waters occur, consider finding alternate sources or installing treatment.
8. If wells are destroyed, switch to backup sources and investigate locations for new wells.
9. Provide bottled / trucked water if required / possible.
10. Once danger of fire has passed, contact a structural engineer for assistance in assessing significant damage to facilities.
11. Make a damage assessment, prepare a plan to begin repairs and identify a schedule to resume normal operations.
12. Have water quality in affected wells tested and do not remove public notices until instructed by the drinking water officer.
13. Complete a post-incident response report.

## 1.4 Public Notification

There are numerous emergency situations that could trigger the RMOW to advise the public to limit their water use. For example the flooding of a well, a backflow incident, or reservoir contamination could result in a Boil Water Advisory or a Do Not Use Advisory (sample notices provided in Appendix D). In some cases boiling the water may render it safe, and in other cases the public may be advised to not use the water at all. In a situation where public health is at risk from a contaminated water supply the responsibility falls to the Drinking Water Officer, who will assist the RMOW and provide recommendations on the steps required to mitigate the threat and restore the municipal water system to a safe level.

***NOTE:*** *The information stated here are guidelines only, the Drinking Water Officer has the authority to undertake actions at variance with the guidelines where necessary.*

### "Boil Water" Advisory

The RMOW will administer a Boil Water Advisory when there is a significant enough public health threat posed by the water quality in the distribution system that can effectively be mitigated through sufficient water boiling. Precautionary boil water advisories are issued routinely to buildings affected by any water system maintenance work that has the potential to contaminate the water.

If it is suspected that the water supply is contaminated with pathogenic micro-organisms or volatile chemicals (that can be safely evaporated), then the RMOW will notify and consult with the Drinking Water Officer to issue a Boil Water Advisory. It is possible to make water contaminated by microbiological contaminants safe by bringing the water up to a rolling boil **and** maintaining a rolling boil for **at least** two minutes. While a boil water advisory is in effect the water may safely be used for laundry, and for bathing or showering as long as no water is swallowed. The water should **not** be used for cooking, food preparation, or brushing teeth without first being boiled.

### "Do Not Drink Water" Advisory

The RMOW will administer a Do Not Drink Advisory when there is a significant public health threat posed by ingesting contaminated water from the drinking water supply, and the nature of the threat is one that cannot be effectively mitigated by a Boil Water Advisory. The RMOW will notify the Drinking Water Officer and issue a Do Not Drink Water Advisory as soon as possible after discovering the threat.

Residents are instructed not to drink water or use it for cooking, food preparation, brushing teeth, or bathing. In this situation bottled/trucked water will be provided to residents.

### "Do Not Use Water" Advisory

The RMOW will administer a Do Not Drink Advisory when a significant public health threat exists in relation to the water supply system and the threat cannot be adequately addressed by a Do Not Drink Advisory or a Boil Water Advisory. If this threat level is reached the RMOW will notify the Drinking Water Officer and issue a Do Not Use Water Advisory to notify the public to not drink the water or use it for any domestic purpose. Under these conditions bottled/trucked water is provided to residents by the RMOW.

If the contaminant is unknown, confirmed, or suspected to be a toxic chemical or mineral, then boiling is not recommended as it may have a concentrating effect on the substance rather than making the water safe. Chemical contaminants may have various negative health effects including skin irritation and respiratory problems, and should be avoided as much as possible. Under a Do Not Use Water Advisory distribution water should not be used for drinking, cooking, food preparation, bathing or brushing teeth.

### Public Premises Notice

Due to its unique nature as a resort municipality, the RMOW has numerous restaurants, hotels, and other public establishments. The locations of these public facilities are documented by the RMOW as part of the Drinking Water Protection Regulation, but it is the responsibility of the owner of the public premises to notify the public of any drinking water advisories either verbally and/or by posting a sign at every sink and drinking water source accessible to the public.

It is important to ensure that public premises such as hotels, inns, restaurants, bars, convention centres and sports facilities are made aware of current advisories that effect the water quality so signage can be posted and appropriate action taken. It is the responsibility of the RMOW to post easily visible signs/notices at public water fountains located within municipal owned public facilities.

## 1.5 Appendix A – Contact List

| Resort Municipality of Whistler Emergency Contacts | | | | | | |
|---|---|---|---|---|---|---|
| First Name | Last Name | Position | 24 Hour Contact | Office Phone | Cell Phone | E-mail |
| Wayne | Dennien | Utilities Superintendent | | 604-935-8314 | 604-932-7610 | wdennien@whistler.ca |
| Bill | Harvey | Chief Operator - Water | | 604-935-8317 | 604-935-5903 | bharvey@whistler.ca |
| Scott | Morphet | Equipment Operator Foreman | | 604-935-8316 | 604-905-8944 | smorphet@whistler.ca |
| | | On-call Operator | 604-905-8725 | | | |
| | | Back-up Operator | 604-935-9472 | | | |
| | | Utilities After-Hours Emergency | 604-935-8320 | | | |
| Chris | Wike | Utilities Group Manager | | 604-935-8321 | 604-932-0873 | cwike@whistler.ca |
| Ryan | Donohue | Emergency Program Coordinator | | 604-935-8473 | 604-698-6380 | rdonohue@whistler |
| Gillian | Robinson | Communications Manager | | 604-935-8104 | 604-697-3030 | grobinson@whistler.ca |
| James | Hallisey | Infrastructure Services General Manager | | 604-935-8196 | 604-905-8907 | jhallisey@whistler.ca |

| Vancouver Coastal Health Authority Emergency Contacts | | | | | | |
|---|---|---|---|---|---|---|
| First Name | Last Name | Position | Office Phone | Cell Phone | Home Phone | E-mail |
| Dan | Glover | Drinking Water Officer | 604-815-6846 | 604-815-3128 | 604-414-4005 | Dan.glover@vch.ca |
| James | Whalen | Back-up Health Contact, Drinking Water Officer | 604-935-5318 | 604-698-5422 | | James.whalen@vch.ca |
| Phil | Muirhead | 2nd Back-up Contact Drinking Water Specialist, DWO | 604-983-6756 | 604-306-2717 | | Phil.muirhead@vch.ca |
| Mark | Ritson | Manager HP | 604-983-6751 | 604-219-7359 | | Mark.ritson@vch.ca |
| Dr. Geoff | McKee | Medical Health Officer | 604-983-6715 | 604-842-2357 | | Geoff.mckee@vch.ca |

## 1.6 Appendix B – RMOW Notices

RESORT MUNICIPALITY OF WHISTLER

### BOIL WATER NOTICE

Coliform exceedance in _____ water
(Name of Water Distribution System)

# BOIL YOUR WATER BEFORE USING

**Bring tap water to a rolling boil, boil for one minute, and cool before using.** Boiled or bottled water should be used for drinking, making ice, washing dishes, brushing teeth, and preparing food until further notice.

This Boil Water Notice applies to _____.
(Describe area or attach map)

**Bottled/trucked water will be available at the following locations:** _____
(Insert locations)

**What Happened?**

Regular monitoring showed a violation for total coliform bacteria in your drinking water. During _____ (month) _____ (year), _____ (number or percentage) of the samples taken tested positive, including _____ repeat sample(s) taken on _____ (date).

*Coliform bacteria are naturally present in the environment and are used as an indicator that potentially harmful microbes may be present. Harmful microbes in drinking water can cause diarrhea, cramps, nausea, headaches, or other symptoms and may pose a special health risk for infants, some elderly, and people with severely compromised immune systems. But these symptoms are not just caused by microbes in drinking water. If you experience any of these symptoms and they persist, you should seek medical advice.*

**What is being done?** _____

_____
(Describe corrective actions)

It is likely that you will need to boil water for the next _____days _____ hours until the problem is fixed. You will be informed when tests show that you no longer need to boil your water.

**For more information, please contact:** _____ at the RMOW on _____
(Name of person) (Phone number)
or the _____ at 604-935-XXXX.

Visit www.whistler.ca for further updates or listen to FM 102.1 / FM 101.5

*Please share this information with other people who drink this water, especially anyone who may not get this notice directly (for example, people in strata buildings, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.*

Water System Facility #: _____ Date distributed: _____

RESORT MUNICIPALITY OF WHISTLER

## BOIL WATER NOTICE

High turbidity levels found in _____ water
(Name of Water Distribution System)

# BOIL YOUR WATER BEFORE USING

**Bring tap water to a rolling boil, boil for one minute, and cool before using.** Boiled or bottled water should be used for drinking, making ice, washing dishes, brushing teeth, and preparing food until further notice.

This Boil Water Notice applies to _____.
(Describe area or attach map)

**Bottled/trucked water will be available at the following locations:**_____
(Insert locations)

**What Happened?**

Your water is routinely monitored for turbidity (cloudiness) to determine if it is being properly filtered. Water samples taken on _____ (date) had turbidity levels of _____ turbidity units. This is above the allowable standard of _____ turbidity units. Because of the elevated turbidity, there is an increased chance that your drinking water may contain harmful microbes.

*Turbidity alone has no health effects. But it can interfere with disinfection, allow harmful microbes to grow, and may indicate the presence of harmful microbes, including bacteria, viruses, and parasites. These can cause diarrhea, cramps, nausea, headaches, or other symptoms and may pose a special health risk for infants, some elderly, and people with severely compromised immune systems. But these symptoms are not just caused by microbes in drinking water. If you experience any of these symptoms and they persist, you should seek medical advice.*

**What is being done?** _____

_____
(Describe corrective actions)

It is likely that you will need to boil water for the next _____ days _____ hours until the problem is fixed. You will be informed when tests show that you no longer need to boil your water.

**For more information, please contact:** _____ at the RMOW on _____
(Name of person) (Phone number)
or the _____ at 604-935-XXXX .

Visit www.whistler.ca for further updates or listen to FM 102.1 / FM 101.5

*Please share this information with other people who drink this water, especially anyone who may not get this notice directly (for example, people in strata buildings, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.*

Water System Facility #: _____ Date distributed: _____

RESORT MUNICIPALITY OF WHISTLER

# BOIL WATER NOTICE

*E.coli* bacteria found in _____ water
(Name of Water Distribution System)

## BOIL YOUR WATER BEFORE USING

**Bring tap water to a rolling boil, boil for one minute, and cool before using.** Boiled or bottled water should be used for drinking, making ice, washing dishes, brushing teeth, and preparing food until further notice.

This Boil Water Notice applies to _____.
(Describe area or attach map)

**Bottled/trucked water will be available at the following locations:**_____
(Insert locations)

**What Happened?**

*E. coli* bacteria were found in the drinking water on _____(date).
The RMOW considers any confirmed *E. coli* positive sample as a public health hazard and a violation of drinking water standards.

*The presence of Escherichia coli (E. coli) bacteria indicates that the water may be contaminated with human or animal wastes. Harmful microbes in these wastes, including E. coli, can cause diarrhea, cramps, nausea, headaches, or other symptoms. These may pose a special health risk for infants, some elderly, and people with severely compromised immune systems. But these symptoms are not just caused by harmful microbes in drinking water. If you experience any of these symptoms and they persist, you should seek medical advice.*

**What is being done?** _____

_____
(Describe corrective actions)

It is likely that you will need to boil water for the next _____days _____ hours until the problem is fixed. You will be informed when tests show that you no longer need to boil your water.

**For more information, please contact:** _____ at the RMOW on_____
(Name of person) (Phone number)
or the _____ at 604-935-XXXX .

Visit www.whistler.ca for further updates or listen to FM 102.1 / FM 101.5

*Please share this information with other people who drink this water, especially anyone who may not get this notice directly (for example, people in strata buildings, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.*

Water System Facility #: _____ Date distributed: _____

RESORT MUNICIPALITY OF WHISTLER

# DO NOT USE WATER NOTICE

_____ contamination in _____water
(Name of Water Distribution System)

# DO NOT USE WATER

**Do not use tap water. The water issue cannot be addressed by boiling water.** Trucked or bottled water should be used for drinking, making ice, washing dishes, brushing teeth, preparing food, bathing and all domestic use until further notice.

This Do Not Use Water Notice applies to _____.
(Describe area or attach map)

**Bottled/trucked water will be available at the following locations:**_____
(Insert locations)

**What Happened?**

_____ was found in the drinking water on _____(date)
The RMOW considers any _____ positive sample as a public health hazard and a violation of drinking water standards.

*Details of the contaminant* _____
*Potential adverse health effects from drinking the water (e.g. diarrhea)* _____
*Population affected including subpopulations which may be particularly vulnerable (e.g. may pose a special health risk for infants, some elderly, and people with severely compromised immune systems)*
*If you experience any of these symptoms and they persist, you should seek medical advice.*

**What is being done?** _____

_____
(Describe corrective actions)

It is likely that you will need to BOTTLED / TRUCKED water for the next _____days _____ hours until the problem is fixed. You will be informed when tests show that you no longer need to do this.

**For more information, please contact:** _____ at the RMOW on_____
(Name of person) (Phone number)
or the _____at _604-935-XXXX_.

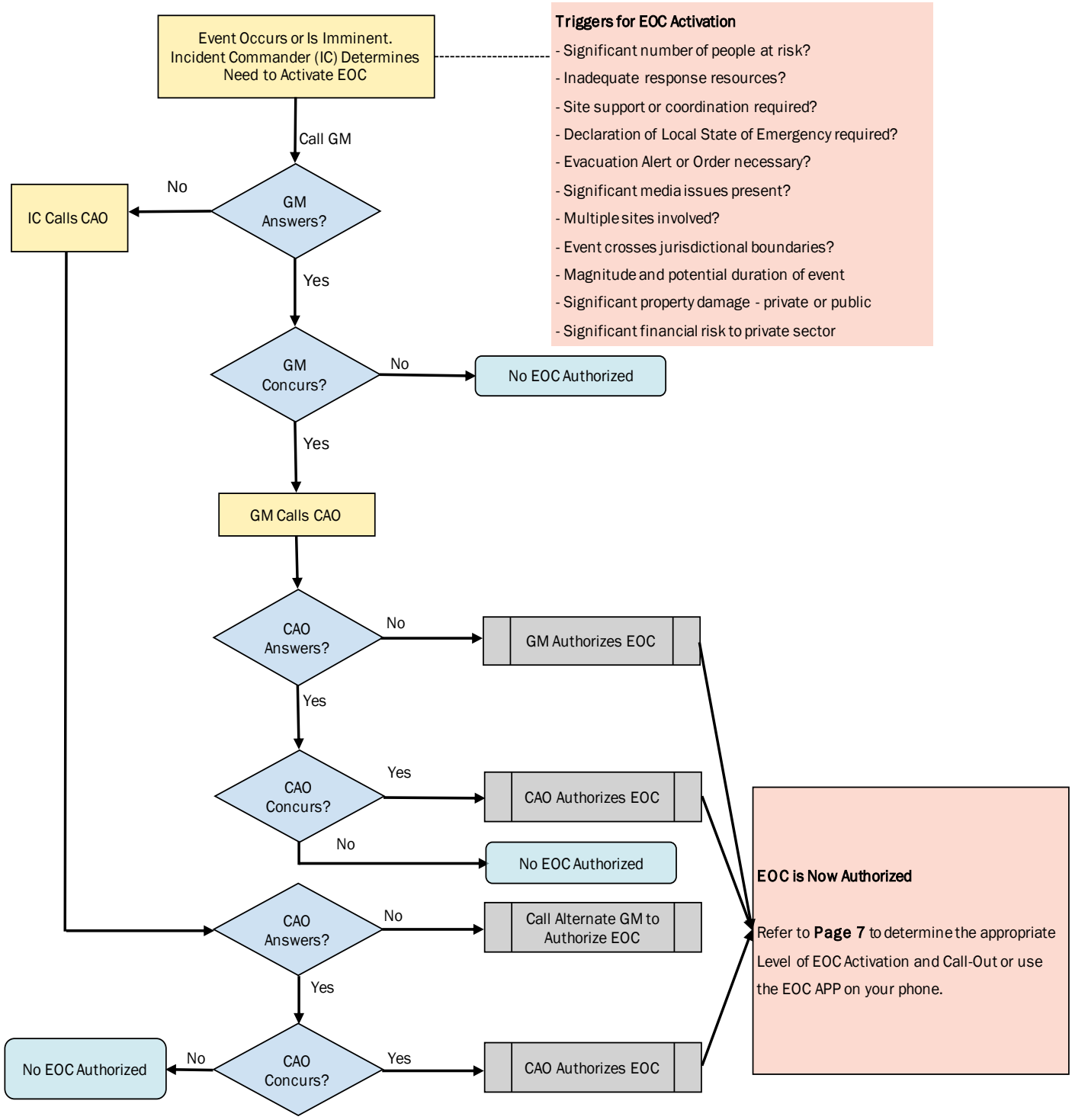
Visit www.whistler.ca for further updates or listen to FM 102.1 / FM 101.5

*Please share this information with other people who drink this water, especially anyone who may not get this notice directly (for example, people in strata buildings, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.*

Water System Facility #: _____ Date distributed: _____

.

## 1.7 Appendix C – Emergency Operations Centre Activation



## 1.8 Appendix D - Watermain Break Response

Vancouver Coastal Health
*Promoting wellness. Ensuring care.*

**Watermain Break Responses – Guidelines for DWO's in VCH**

| Type 1 Break | Type 2 Break | Type 3 Break |
|---|---|---|
| Controlled pipe repair | Controlled pipe repair | Uncontrolled pipe repair |
| Positive pressure maintained during break | Positive pressure maintained during break | Loss of pressure at break site/possible local depressurization adjacent to the break (<20 psi) |
| Pressure maintained during repair (full shutdown is not needed) | Pressure maintained until controlled shutdown (shutdown after the repair site is secured against soil/water contamination) | Partial or uncontrolled shutdown |
| No signs of contamination intrusion | No signs of contamination intrusion | Possible contamination intrusion (muddy water entering the pipe or leaking sewer pipe in the trench) |
| **Procedure** | **Procedure** | **Procedure** |
| Notify the DWO if necessary, see Note 1 | Notify the DWO if necessary, see Note 1 | Notify the DWO If necessary, see Note 1 |
| Excavate to below break | Excavate to below break | Excavate to below break |
| Maintain trench water level below break | Maintain trench water level below break | Maintain trench water level below break |

| | | |
|---|---|---|
| Repair under pressure | Controlled shutdown for repair | Uncontrolled shutdown for repair |
| | | Isolate section of pipe in which the break is located with all service connections shut off |
| Clean and disinfect repair site by spraying or swabbing with minimum 1% chlorine solution | Clean and disinfect repair site by spraying or swabbing with minimum 1% chlorine solution | Clean and disinfect repair site by spraying or swabbing with minimum 1% chlorine solution |
| Disinfect repair parts by spraying or swabbing with minimum 1% chlorine solution | Disinfect repair parts by spraying or swabbing with minimum 1% chlorine solution | Disinfect repair parts by spraying or swabbing with minimum 1% chlorine solution |
| Flush to obtain three volumes of water turnover (and until flushed water is visually clear) | Scour flush (at 3 ft/s) to obtain three volumes of water turnover (and until flushed water is visuallv clear) | Scour flush (at 3 ft/s) to obtain three volumes of water turnover (and until flushed water is visually clear) |
| | | Follow disinfection procedures for new pipe installation, If possible. Alternatively, keep chlorine residual of 4 mg/L for at least 16 hours or 300 mg/L for 15 minutes, then flush |
| Check residual chlorine level until typical levels are restored | Check residual chlorine level until typical levels are restored | Check residual chlorine level until typical levels are restored |

| | | |
|---|---|---|
| | | Check with bacteriological testing (DWO to decide if service may be restored before results), see Note 2 |
| Return watermain to service | Return watermain to service | Return watermain to service |
| No bacteriological samples | Check with bacteriological testing (no need to wait for results), see Note 2 | Instruct customers to flush premise plumbing upon return to service |
| No BWN | No BWN | BWN if area of depressurizatlon is larger than the treated area |

# APPENDIX C – PERMITS TO OPERATE A WATER SUPPLY SYSTEM

Vancouver Coastal Health
*Promoting wellness. Ensuring care.*

## HEALTH PROTECTION

# PERMIT TO OPERATE

### A Water Supply System

**Purveyor: Resort Municipality Of Whistler**
**Facility Name: RMOW Community Water System**

## Conditions of Permit

Minimum bacteriology sampling frequency is 25 per month (distribution).
Update and implement the Source Water Protection Plans (ground water and surface water).
Implement your Cross-Connection Control Program.
Maintain the uni-directional flushing program annually.
Review the Emergency Response Plan and update at least annually.
Blackcomb Creek source may not be used without prior authorization from VCH.

**July 1, 1992**
**Effective Date**
**March 18, 2019**
**Revised Date**

Vancouver Coastal Health
*Expires March 2023*
22049

**Drinking Water Officer**

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

Vancouver Coastal Health
*Promoting wellness. Ensuring care.*

## HEALTH PROTECTION

# PERMIT TO OPERATE

### A Water Supply System

**Purveyor: Resort Municipality Of Whistler**
**Facility Name: RMOW - Emerald Estates Water System**

## Conditions of Permit

Maintain FAC level at 0.4 ppm minimum post reservoir.
Update and implement the Ground Water Resource Protection Plan.
Minimum bacteriology sampling frequency is 4 per month (distribution).
Implement the Cross-Connection Control Program.
Maintain the Uni-Directional Flushing Program.
Review the Emergency Response Plan and update annually.
Obtain P. Eng. sign-off by July 01, 2019 on UV treatment system installed.

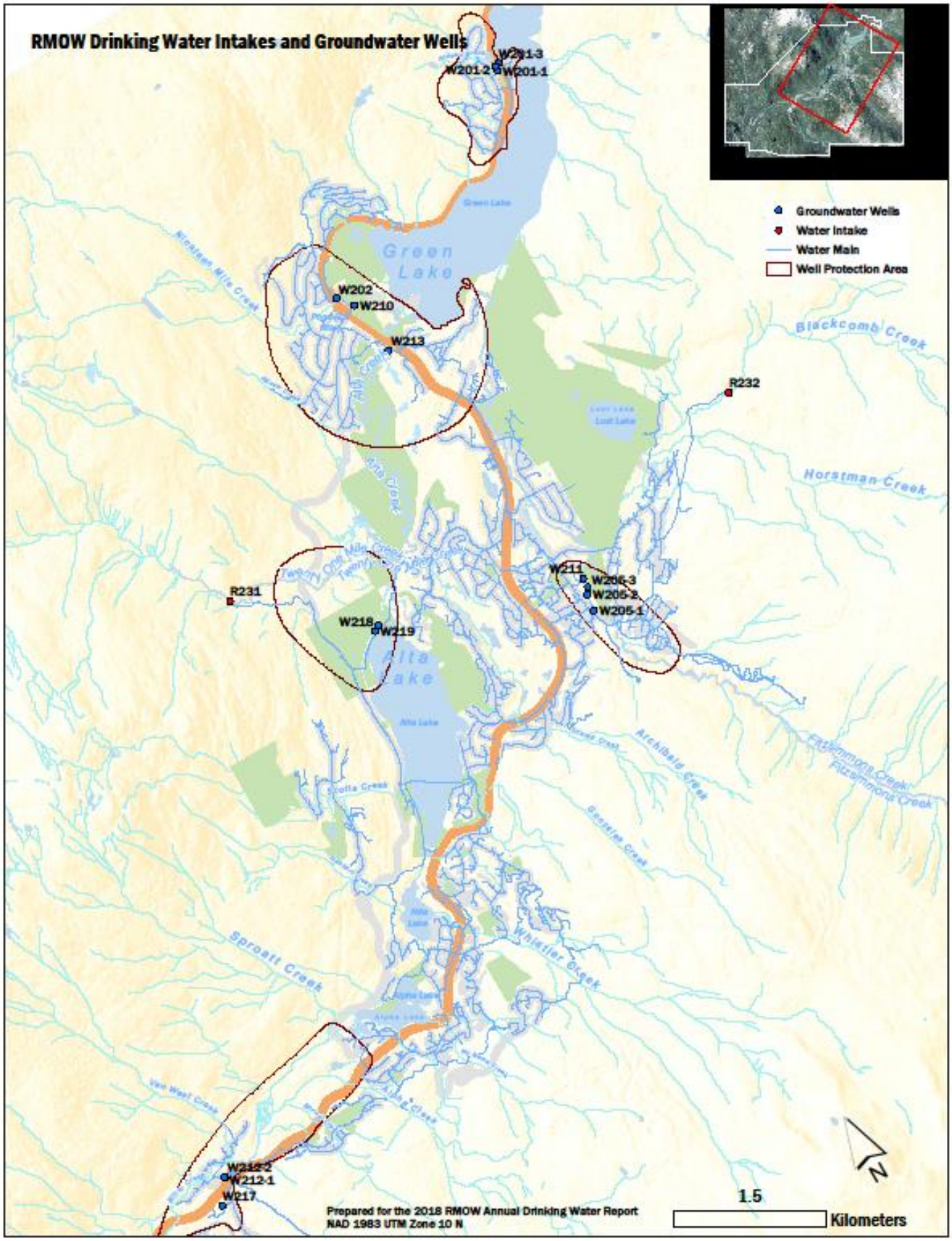
**July 1, 1992**
**Effective Date**
**March 18, 2019**
**Revised Date**

Vancouver Coastal Health
*Expires March 2023*
22048

**Drinking Water Officer**

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

# APPENDIX D – MAPS OF WATER SYSTEM


RMOW Drinking Water Intakes and Groundwater Wells
W201-3
W201-2
W201-1
Green Lake
Nicklaus North Golf Course
W202
W210
W213
Blackcomb Creek
R232
Horstman Creek
W211
W205-3
W205-2
W205-1
R231
W218
W219
Alta Lake
Archibald Creek
Fitzsimmons Creek
Scotia Creek
Rainbow Creek
Whistler Creek
Sproatt Creek
W215-2
W212-1
W217
Groundwater Wells
Water Intake
Water Main
Well Protection Area
N
1.5
Kilometers
Prepared for the 2018 RMOW Annual Drinking Water Report
NAD 1983 UTM Zone 10 N


RMOW Water Sampling Stations
SS411
SS410
SS403
SS409
SS406
SS496
SS494
Green Lake
SS418
SS419
SS412
HWY 99
SS420
SS424
SS421
SS415
SS502
SS439
SS427
SS433
SS430
SS447
SS446
SS450
SS444
SS441
SS436
SS497
SS493
SS453
SS498
SS456
Alta Lake
SS459
SS488
SS462
SS465
SS471
SS474
SS482
SS487
HWY 99
SS477
SS480
SS500
SS831
SS832
SS803
SS489
SS495
SS491
N
2
Kilometers
Esri Canada, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/
NASA, USGS, EPA, USDA, NRCan, Parks Canada, RMOW 2020