

# Annual Drinking Water Report 2018

Resort Municipality of Whistler



# Contents

- 1.0 Executive Summary ..... 4
- 2.0 General Description..... 6
- 3.0 Water Sources ..... 7
- 4.0 Treatment & Distribution Systems ..... 9
  - 10.1 Community System.....9
  - 10.2 Emerald Estates System ..... 11
  - 10.3 System Maintenance and Upgrades ..... 11
- 5.0 Standards & Testing Results..... 13
  - 11.1 Sampling Program – Sources (Raw)..... 13
  - 11.2 Sampling Program – Distribution System (Treated)..... 13
  - 11.3 Bacteriological Sampling..... 13
  - 11.4 Physical and Chemical Parameters..... 17
  - 11.5 Water Stability..... 17
- 6.0 Other Conditions of Permit to Operate ..... 17
  - 12.1 Cross-Connection Control Plan ..... 17
  - 12.2 Uni-Directional Flushing Program ..... 17
- 7.0 Significant Events & Public Notification ..... 17
  - 13.1 Drinking Water Advisory/Boil Water Advisory ..... 17
- 8.0 Operator Qualifications and Training..... 18
- Appendix A – Consumption and Sampling Data ..... 19
  - Monthly Consumption Summary 2018..... 19
  - Source Water Summary 2018..... 21
  - Annual Water Sampling Results 2018..... 23
- Appendix B –Emergency Response and Contingency Plan ..... 1

|     |  |           |
|-----|--|-----------|
| 1   | Executive Summary .....  | 3         |
| 1.1 | Emergency Response & Contingency Plan .....  | 5         |
| 1.2 | Roles and Responsibilities.....  | 6         |
| 1.3 | Emergency Situations.....  | 7         |
| 1.4 | Public Notification.....   | 12        |
| 1.5 | Appendix A – Contact List .....  | 14        |
| 1.6 | Appendix B – RMOW Notices.....   | 16        |
| 1.7 | Appendix C – Emergency Operations Centre Activation.....                                 | 19        |
| 1.8 | Appendix D - Watermain Break Response .....  | 20        |
|     | <b>Appendix C – Permits to Operate a Water Supply System .....</b>                       | <b>23</b> |
|     | <b>Appendix D – Maps of Water System .....</b>   | <b>26</b> |
|     | <b>Appendix E – Emerald Water UV Facility – Summary of Field Commissioning<br/>.....</b> | <b>29</b> |

## 1.0 EXECUTIVE SUMMARY

This report summarizes the Resort Municipality of Whistler's (RMOW) drinking water quality program for 2018. 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 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 Operations 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 2018. Any actions needing to be taken, would have occurred immediately once the results were available.

Sampling at water sources (raw) was performed 40 times across 3 sources in the Emerald Estates System and 236 times at 12 sources in the Community System throughout 2018. 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 45 times at 3 locations in the Emerald Estates System and 451 times over 25 Sampling Stations in the Community System throughout 2018. 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 451 bacteriological samples were submitted in 2018 indicating the minimum sampling frequency (as specified in the permit to operate) was exceeded. Only 1 out of the 451 samples had to be re-tested to confirm that there were no coliform concerns.

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 indicate that the water supplied has pH levels between 6.5 and 7.5. As a result, the water in the Whistler system sometimes falls outside the current guidelines for this parameter (please see Section 5.5 for further discussion).

No Drinking Water Advisory/Boil Water Advisories were issued in 2018.

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 | <a href="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">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</a>           |
| Water Sustainability Act                       | Province of British Columbia | <a href="https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/laws-rules/water-sustainability-act">https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/laws-rules/water-sustainability-act</a>   |
| Ground Water Protection Regulation             | Province of British Columbia | <a href="https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/laws-rules/groundwater-protection-regulation">https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/laws-rules/groundwater-protection-regulation</a>   |
| Permit to Operate                              | Vancouver Coastal Health     | <a href="http://www.vch.ca/public-health/environmental-health-inspections/drinking-water">http://www.vch.ca/public-health/environmental-health-inspections/drinking-water</a>   |
| Guidelines for Drinking Water Quality          | Province of British Columbia | <a href="https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-quality/water-quality-guidelines">https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-quality/water-quality-guidelines</a>   |
| Guidelines for Canadian Drinking Water Quality | Health Canada                | <a href="https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/water-quality/guidelines-canadian-drinking-water-quality-summary-table.html">https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/water-quality/guidelines-canadian-drinking-water-quality-summary-table.html</a> |

The RMOW completed several operational and capital improvements in 2018, each of which will increase system reliability and ensure long-term availability.

## 2.0 GENERAL DESCRIPTION

In Whistler there are two private water distribution systems, Function Junction (Van West Water Utility) which was acquired by the RMOW for 2019, and 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:

- One (1) surface water intake;
- Fifteen (15) groundwater wells;
- 13 storage reservoirs;
- 20 individual pressure zones;
- Nine (9) Pump stations;
- 9 Treatment locations
- a Supervisory Control and Data Acquisition (SCADA) monitoring system;
- approximately 177 km of water pipes;
- approximately 10,156 Residential water service connections and 190 commercial and other water service connections and;
- 516 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.

In 2018 the RMOW supplied water to the private Van West Water Utility in Function Junction and operated the system. The Van West Water Utility System operates under a different Permit to Operate and the Annual Drinking Water Report is submitted separately. The Whistler Blackcomb system operates independently by acquiring its water supply from eight wells located on the mountain<sup>1</sup>.

---

<sup>1</sup> Data sourced from Whistler Blackcomb Mountain Drinking Water system summary, 2016

### 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 Well (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 37% of the water used in the distribution system in 2018, making it the largest single source. The Community water system, of which the Twenty-One Mile Creek intake is a part, supplied 94% of Whistler's potable water in 2018 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 VCA for an extension of the NTU limit from one (1) to two (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.

#### ***Protection Program***

Maintenance 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 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 approximately July each year. For 2018 no changes were made to the 2017 work plan which resulted in the continuance of a summer ranger program to monitor watershed use compliance. In addition, meetings were held in later 2018 by Forest Lands and Natural Resource Operations staff and the snowmobile community (private and public) to discuss compliance with the prohibition of snowmobiling in the

watershed. As a result of these discussions, it appears that for the winter of 2018/2019, a decrease in snowmobile activity in the watershed was observed.<sup>2</sup>

The SWPP is available on the RMOW's website.

## **Blackcomb Creek**

The Blackcomb Creek source may not be used without consent of VCH and was not used in 2018. 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. This plan is being reviewed internally during 2019.

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 A. Groundwater Resource Protection Plan Framework

| <b>Groundwater Resource Protection</b> |  |
|--|--|
| 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 on the RMOW Source Water Map in Appendix D |
| 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.   |

<sup>2</sup> Aerial photos supplied to Gillian Woodward by FLNRO



### ***Monitoring Program***

The groundwater sources are monitored annually by geotechnical & hydrogeological consultants. The RMOW's Groundwater Resource 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 2017 Groundwater Monitoring Summary by Piteau Associates submitted in July 2018 concludes that concentrations of potential contaminants in groundwater collected from monitoring wells and water supply wells at Function Junction are in compliance with Guidelines for Canadian Drinking Water Quality and standards for the protection of groundwater used for drinking water, and drinking water standards from the BC Contaminated Sites Regulation. Minor water quality concerns include low pH (<7) at both W212-1 and W217. In 2017, all water quality analyses results were within the GCDWQ except for pH in all wells and one sample for turbidity at well W213.

W201-3 in the Emerald System was removed from service in late 2014 due to GARP concerns. These concerns have been addressed through the construction of a UV treatment facility which was commissioned in June 2018. This well has been returned to service.

## **4.0 TREATMENT & DISTRIBUTION SYSTEMS**

### **10.1 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).

#### ***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. Water levels in this aquifer at TW04-2, which is an observation well screened within this aquifer, have been continuously recorded since June 2004 (Piteau, 2017).

### ***Improvements***

Pump #2 was overhauled at station P247 (Community Booster Pump and PRV).

## ***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.

### ***Improvements***

The Alpine Reservoir Level Control (E108) project will result in better utilization of the gravity-fed 21 Mile Creek water supply, rather than pumping well water from Alpine Meadows wells. This project was substantially completed in 2017. Some minor deficiency and communications items were completed in 2018 with some final improvements slated for completion in 2019.

The scope of this project includes the necessary design, materials, installation and programming in order to automatically control the connection between the Alpine Meadows water system and the Whistler Village system with a series of new valves, an altitude valve sensor and automated communications and control system.

## ***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. Its use 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 not operated in 2018. An application for an environmental assessment exemption for the use of W219 in conjunction with W218, during a specific time of year and for a specific period, is a 2019 project.

### ***Improvements***

An electrical cable to W219 was replaced, and the W218 and W219 electrical safety interlock systems were reviewed.

## ***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 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.

## **10.2 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. Prior to 2018, W201-3 was run infrequently and only for the purpose of testing. It now provides drinking water in addition to W201-1 and W201-2. The wells are all screened in the fan of Rideau Brook. Due to the shallow depths and absence of confining materials, groundwater resources at Emerald Estates are considered to be "vulnerable to contamination" which has led to system improvements, summarized in this section.

#### ***Improvements***

##### **Chlorination Plan**

In 2014 VCHA recommended maintaining a minimum free chlorine residual of 0.4 mg/l. This level has been maintained since 2014 and is being tested for levels three times a week. These levels have been consistent since implementing this plan and no detectable contamination has been noted.

##### **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 in addition to chlorine disinfection. This facility was commissioned in June 2018.

## **10.3 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 2018:

### ***Upgrade – Emerald UV disinfection***

As per the Permit to Operate A Water Supply System for the Emerald Estates Water System the RMOW has obtained P.Eng sign-off by July 1, 2019 on UV treatment installed (See Appendix E).

### ***Maintenance – Unidirectional Flushing***

Each year the RMOW performs unidirectional flushing throughout the municipality. This program does not run during periods of high water usage or elevated stages of water conservation.

### ***Maintenance – Hydrants***

Each year the RMOW contracts a service provider to inspect and maintain the fire hydrants.

## ***Maintenance – Reservoirs***

Each year the RMOW contracts a service provider for reservoir inspections.

## ***Program – Reservoir Chlorine Decay Rate***

Due to a combination of the fire storage requirement, and low turn-over rates in the Stonebridge, Sunridge, and 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.

## ***Upgrade - Utilities SCADA***

It was identified in 2015 that the Utilities SCADA HMI software system required a significant upgrade to bridge software versions. This was substantially completed in 2017, but uncovered further issues relating to volume of data being sent across the radio network. These volume issues were addressed with the implementation of data loggers at SCADA sites across the system. Two (2) new SCADA sites at sewer lift stations S120 and S114 were installed in the continued expansion of the monitoring system.

## ***Incident – Lorimer Road***

In the afternoon of August 14<sup>th</sup> 2018, a major break occurred on the 600mm diameter water supply main located at Lorimer Road and Crabapple Drive. This supply line runs from the 21 Mile System pump station (P280) to Whistler Village. The break occurred in combination with high tourist visitation and hot, dry weather. Loss of the ability to move water from the 21 Mile system impacted the ability to maintain water storage levels required for fire suppression overnight. The supply system was rerouted.

On August 15<sup>th</sup> the RMOW proceeded to notify the community of the need for Stage 4 water conservation, which included turning off all irrigation. Reservoir levels were above fire storage levels 24 hours after Stage 4 water conservation was put into place.

Pipe repair was completed by August 17<sup>th</sup> and bacteriological testing for E. Coli and Total Coliform was performed. As of August 18<sup>th</sup> the normal supply configuration was restored.

## 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.

### 11.1 Sampling Program – Sources (Raw)

In 2018, site P290 in the Emerald Estates Water System was included for sampling to replace site R238.

Table B 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   |

### 11.2 Sampling Program – Distribution System (Treated)

The DWPR 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.

In 2018, the following water sampling sites were added: S103, P278, P264, R228 and P283.

Table C 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   |

### 11.3 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  |
| <i>Escherichia coli</i>                   | No detectable <i>Escherichia coli</i> 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 |

Table D Summary of bacteriological testing results for 2018

| Water Sample Location                                     | Raw or Treated | Water System  | # Samples | Escherichia Coli |     |     | Total Coliforms |     |     |
|---|----------------|---------------|-----------|------------------|-----|-----|-----------------|-----|-----|
|   |                |               |           | Min              | Max | Avg | Min             | Max | Avg |
| W201-1  | Raw            | Emerald       | 13        | <1               | <1  | n/a | <1              | <1  | n/a |
| W201-2  | Raw            | Emerald       | 13        | <1               | 2   | 0.2 | <1              | 2   | 0.3 |
| W201-3  | Raw            | Emerald       | 14        | <1               | <1  | n/a | <1              | 1   | <1  |
| 9225 Lakeshore Drive - S131 - SS#403                      | Treated        | Emerald       | 24        | <1               | <1  | n/a | <1              | <1  | n/a |
| 9525 Emerald Drive - R238 - SS#406                        | Treated        | Emerald       | 11        | <1               | <1  | n/a | <1              | <1  | n/a |
| 9525 Emerald Drive - P290                                 | Treated        | Emerald       | 10        | <1               | <1  | n/a | <1              | <1  | n/a |
| Alpine Meadows 8319 Mountainview Dr.- P245 - SS#412       | Treated        | Whistler Main | 25        | <1               | <1  | n/a | <1              | <1  | n/a |
| Alpine Meadows 8330 Rainbow Dr.- S101 - SS#421            | Treated        | Whistler Main | 20        | <1               | <1  | n/a | <1              | <1  | n/a |
| Alta Vista 3333 Carleton Way - S104 - SS#459              | Treated        | Whistler Main | 20        | <1               | <1  | n/a | <1              | <1  | n/a |
| Athlete's Village 1300 Mount Fee Rd. SS491                | Treated        | Whistler Main | 20        | <1               | <1  | n/a | <1              | <1  | n/a |
| Athlete's Village 1010 Janes Lake Rd. P278, SS495         | Treated        | Whistler Main | 6         | <1               | <1  | n/a | <1              | <1  | n/a |
| Blackcomb Benchlands 4700 Glacier Dr. - P256 - SS#441     | Treated        | Whistler Main | 21        | <1               | <1  | n/a | <1              | <1  | n/a |
| Function Junction Aquifer 1397 Alpha Lake Road            | Treated        | Whistler Main | 25        | <1               | <1  | n/a | <1              | <1  | n/a |
| Function Junction Aquifer 1092 Millar Creek Road S107     | Treated        | Whistler Main | 25        | <1               | <1  | n/a | <1              | <1  | n/a |
| Millar's Pond 2773 Cheakamus Way S121 SS#477              | Treated        | Whistler Main | 20        | <1               | <1  | n/a | <1              | <1  | n/a |
| Nicklaus North 8407 Golden Bear Pl. P266/S123 SS#424      | Treated        | Whistler Main | 20        | <1               | <1  | n/a | <1              | <1  | n/a |
| Nordic Estates 2642 Whistler Road P264 SS#462             | Treated        | Whistler Main | 5         | n/a              | n/a | n/a | n/a             | n/a | n/a |
| Rainbow 8925 Hwy. 99 - S137                               | Treated        | Whistler Main | 20        | <1               | <1  | n/a | <1              | <1  | n/a |
| Rainbow Baxters Creek P283                                | Treated        | Whistler Main | 5         | <1               | <1  | n/a | <1              | <1  | n/a |
| Spring Creek 1559 Spring Creek Road. P273/S132 SS#480     | Treated        | Whistler Main | 20        | <1               | <1  | n/a | <1              | <1  | n/a |
| Spruce Grove 7314 Blackcomb Way P267/S126 SS#427          | Treated        | Whistler Main | 21        | <1               | <1  | n/a | <1              | <1  | n/a |
| Stonebridge 5483 Stonebridge Dr. P275                     | Treated        | Whistler Main | 20        | <1               | <1  | n/a | <1              | <1  | n/a |
| Sunridge Plateau 3840 Sunridge Drive P265 SS#456          | Treated        | Whistler Main | 20        | <1               | <1  | n/a | <1              | <1  | n/a |
| Tapley's Farm 6671 Crabapple Dr. S103 SS#433              | Treated        | Whistler Main | 6         | <1               | <1  | n/a | <1              | <1  | n/a |
| Twin Lake / Tamarisk 1300 Block Alta Lake Rd. SS#482      | Treated        | Whistler Main | 21        | <1               | <1  | n/a | <1              | <1  | n/a |
| Upper Taluswood 2400 Taluswood Pl. P270 SS#465            | Treated        | Whistler Main | 26        | <1               | <1  | n/a | <1              | <1  | n/a |
| Whistler Cay Heights 6295 Palmer Dr. Snowflake Prk SS#430 | Treated        | Whistler Main | 20        | <1               | <1  | n/a | <1              | <1  | n/a |

|  |         |               |    |    |      |     |    |          |      |
|--|---------|---------------|----|----|------|-----|----|----------|------|
| Whistler Creek 2149 Lake Placid Rd - S106 - SS#471           | Treated | Whistler Main | 20 | <1 | <1   | n/a | <1 | <1       | n/a  |
| Whistler Creek 2601 Gondola Way - R228 SS#474                | Treated | Whistler Main | 5  | <1 | <1   | n/a | <1 | <1       | n/a  |
| Whistler Village 4297 Mountain Square - Mountain Ln - SS#453 | Treated | Whistler Main | 20 | <1 | <1   | n/a | <1 | <1       | n/a  |
| Whistler Village 4335 Main Street - Main St. - SS#450        | Treated | Whistler Main | 20 | <1 | <1   | n/a | <1 | <1       | n/a  |
| 19 Mile Ck Aquifer; Well No. W202 SS#418                     | Raw     | Whistler Main | 20 | <1 | <1   | n/a | <1 | <1       | n/a  |
| 19 Mile Ck Aquifer; Well No. W210 SS#419                     | Raw     | Whistler Main | 18 | <1 | <1   | n/a | <1 | <1       | n/a  |
| 19 Mile Ck Aquifer; Well No. W213 SS#420                     | Raw     | Whistler Main | 20 | <1 | <1   | n/a | <1 | <1       | n/a  |
| 21 Mile Creek; R-231 SS#436                                  | Raw     | Whistler Main | 23 | <1 | 4.1  | <1  | <1 | 1,119.90 | 110  |
| Alta Lake Aquifer, Well No. W218                             | Raw     | Whistler Main | 20 | <1 | <1   | n/a | <1 | <1       | n/a  |
| Athlete's Village Aquifer, W217                              | Raw     | Whistler Main | 21 | <1 | <1   | n/a | <1 | <1       | n/a  |
| Blackcomb Creek, R-232/ SS#439                               | Raw     | Whistler Main | 16 | <1 | 16.1 | 2.2 | <1 | 206.3    | 42.7 |
| Fitzsimmons Creek Aquifer, W205-1 SS#444                     | Raw     | Whistler Main | 20 | <1 | <1   | n/a | <1 | <1       | n/a  |
| Fitzsimmons Creek Aquifer, W205-2 SS#445                     | Raw     | Whistler Main | 17 | <1 | <1   | n/a | <1 | <1       | n/a  |
| Fitzsimmons Creek Aquifer, W205-3 SS#446                     | Raw     | Whistler Main | 20 | <1 | <1   | n/a | <1 | <1       | n/a  |
| Fitzsimmons Creek Aquifer, W211 SS#447                       | Raw     | Whistler Main | 20 | <1 | <1   | n/a | <1 | <1       | n/a  |
| Function Junction Aquifer W212 SS#483                        | Raw     | Whistler Main | 21 | <1 | <1   | n/a | <1 | <1       | n/a  |



## 11.4 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 annually at each of the sampling stations in the distribution system and at the sources. The results of the laboratory reports for 2018 are included in Appendix A – Water Consumption and Sampling.

## 11.5 Water Stability

The 2017 VCH Evaluation Report requested *“Please provide a report outlining which of the RMOW sources do not meet these guideline and outline any remediation strategies under consideration”*.

The RMOW commissioned this report in 2018 and a draft of this report was provided to the RMOW in March 2019 and is under review. Once the report is finalized there will be follow up dialogue with VCH regarding next steps.

## 6.0 OTHER CONDITIONS OF PERMIT TO OPERATE

### 12.1 Cross-Connection Control Plan

For the Community System

- The Cross-Connection Control Program is an ongoing project and the RMOW continues to work with community stakeholders to install necessary back-flow prevention devices and comply with necessary premise isolation requirements.

For the Emerald System

- The RMOW continues to work with community stakeholders to install necessary back-flow prevention devices and comply with necessary premise isolation requirements.

### 12.2 Uni-Directional Flushing Program

This annual flushing program begins in May each year generally completing by the end of September. In 2018, unidirectional flushing was performed on the available water lines in 10 areas/neighbourhoods. These areas were flushed in sections and can be identified as the following: AltaVista, Tapley's, Taluswood, Creekside, Bayshore's, Spring Creek and Function Junction. 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

### 13.1 Drinking Water Advisory/Boil Water Advisory

No Drinking Water Advisory/Boil Water Advisories were required in 2018.

## 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 E Operations Staff EOCP Certifications 2018.

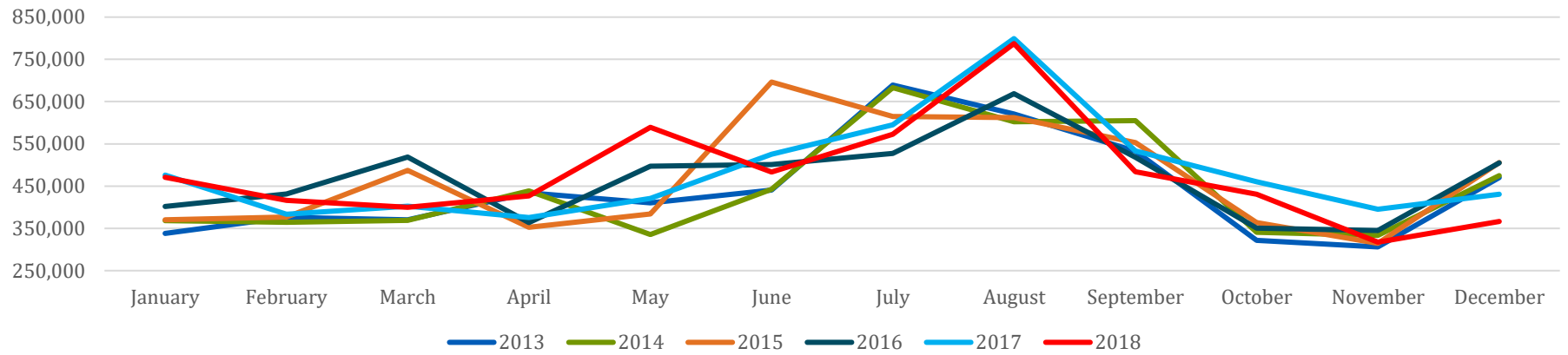
| Certification | Number of Employees Certified |
|---------------|-------------------------------|
| WD - IV       | 3                             |
| WD - III      | 2                             |
| WD - II       | 4                             |
| WD - I        | 2                             |
| WWC - III     | 3                             |
| WWC - II      | 5                             |
| WWC - I       | 2                             |
| None          | 1                             |

## APPENDIX A – CONSUMPTION AND SAMPLING DATA

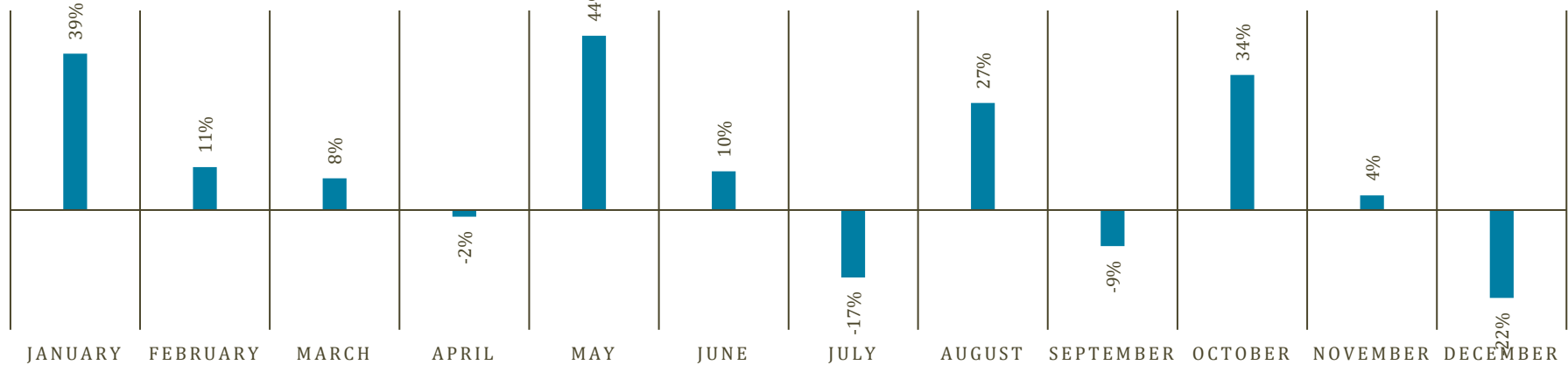
### Monthly Consumption Summary 2018

| Source Water Sites          | 2018           |      | 2017           |      | 2016           |      | 2015           |      | 2014           |      | 2013           |      |
|-----------------------------|----------------|------|----------------|------|----------------|------|----------------|------|----------------|------|----------------|------|
|                             | m <sup>3</sup> | %    | m <sup>3</sup> | %    | m <sup>3</sup> | %    | m <sup>3</sup> | %    | m <sup>3</sup> | %    | m <sup>3</sup> | %    |
| R231 21 Mile Creek          | 2,093,835      | 37%  | 2,241,453      | 39%  | 2,303,292      | 41%  | 2,520,437      | 45%  | 2,522,414      | 47%  | 2,794,284      | 53%  |
| R232 Blackcomb Creek        | -              | -    | -              | -    | -              | -    | -              | -    | -              | -    | -              | -    |
| Total Surface Water         | 2,093,835      | 36%  | 2,241,453      | 39%  | 2,303,292      | 41%  | 2,520,437      | 45%  | 2,522,414      | 47%  | 2,794,284      | 53%  |
| W201-1 Emerald Estates      | 87,772         | 2%   | 118,471        | 2%   | 124,349        | 2%   | 105,350        | 2%   | 311,469        | 6%   | 304,014        | 6%   |
| W201-2 Emerald Estates      | 86,230         | 2%   | 156,417        | 3%   | 148,678        | 3%   | 142,423        | 3%   | 45,724         | 1%   | 35,562         | 1%   |
| W201-3 Emerald Estates      | 85,942         | 1%   | 1,129          | 0%   | 1,964          | 0%   | 11,354         | 0%   | 3,552          | 0%   | 1,608          | 0%   |
| W202 Alpine                 | 327,306        | 6%   | 288,532        | 5%   | 301,268        | 5%   | 298,432        | 5%   | 335,077        | 6%   | 387,681        | 7%   |
| W210 Alpine                 | 153,250        | 3%   | 153,501        | 3%   | 158,422        | 3%   | 220,204        | 4%   | 99,707         | 2%   | 127,192        | 2%   |
| W213 Meadow Park            | 147,963        | 3%   | 127,437        | 2%   | 175,818        | 3%   | 168,999        | 3%   | 149,543        | 3%   | 90,657         | 2%   |
| W205 & W211 Community Wells | 865,370        | 15%  | 792,672        | 14%  | 497,866        | 9%   | 380,922        | 7%   | 349,257        | 7%   | 300,409        | 6%   |
| W212-1 Function Junction    | 447,225        | 8%   | 351,841        | 6%   | 312,097        | 6%   | 279,604        | 5%   | 225,673        | 4%   | 143,678        | 3%   |
| W212-2 Function Junction    | 0              | 0%   | 0              | 0%   | 0              | 0%   | 0              | 0%   | 0              | 0%   | 0              | 0%   |
| W217 Cheakamus Crossing     | 229,303        | 4%   | 251,282        | 4%   | 252,352        | 4%   | 220,290        | 4%   | 247,466        | 5%   | 268,295        | 5%   |
| W218 21 Mile Well #1        | 1,221,006      | 21%  | 1,316,459      | 23%  | 1,354,525      | 24%  | 1,294,719      | 23%  | 1,071,915      | 20%  | 856,687        | 16%  |
| W219 21 Mile Well #2        | 0              | 0%   | 0              | 0%   | -              | -    | -              | -    | -              | -    | -              | -    |
| Total Ground Water          | 3,651,368      | 64%  | 3,556,612      | 61%  | 3,325,375      | 59%  | 3,110,943      | 55%  | 2,835,831      | 53%  | 2,515,783      | 47%  |
| Total Water                 | 5,745,203      | 100% | 5,798,065      | 100% | 5,628,667      | 100% | 5,631,380      | 100% | 5,358,245      | 100% | 5,310,067      | 100% |

### Monthly Water Consumption 2018 (m3)

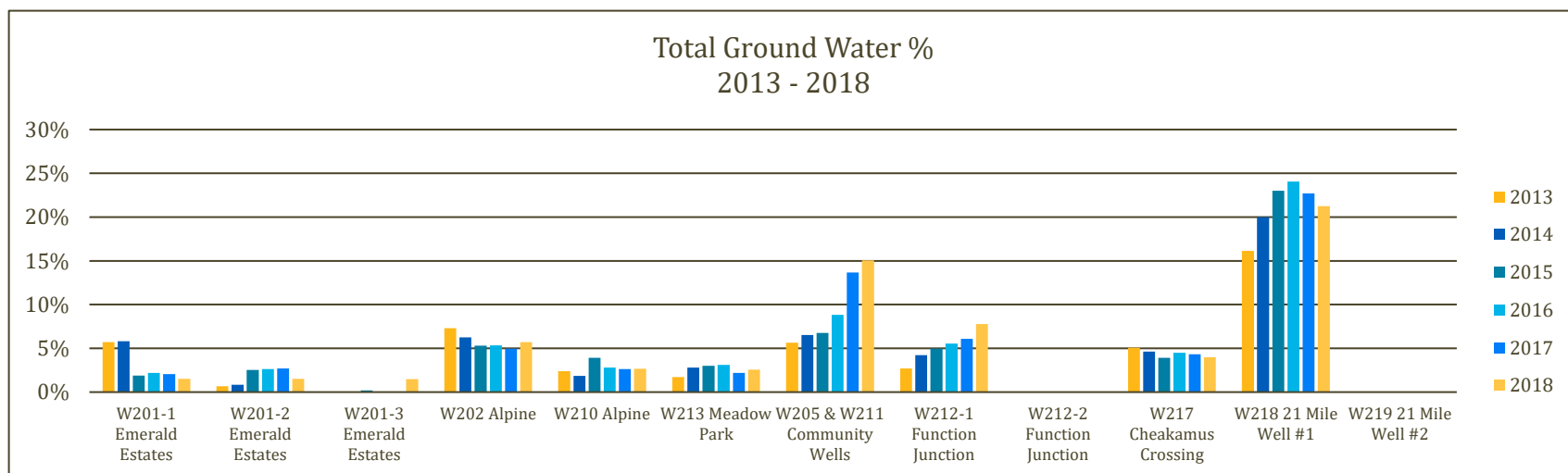
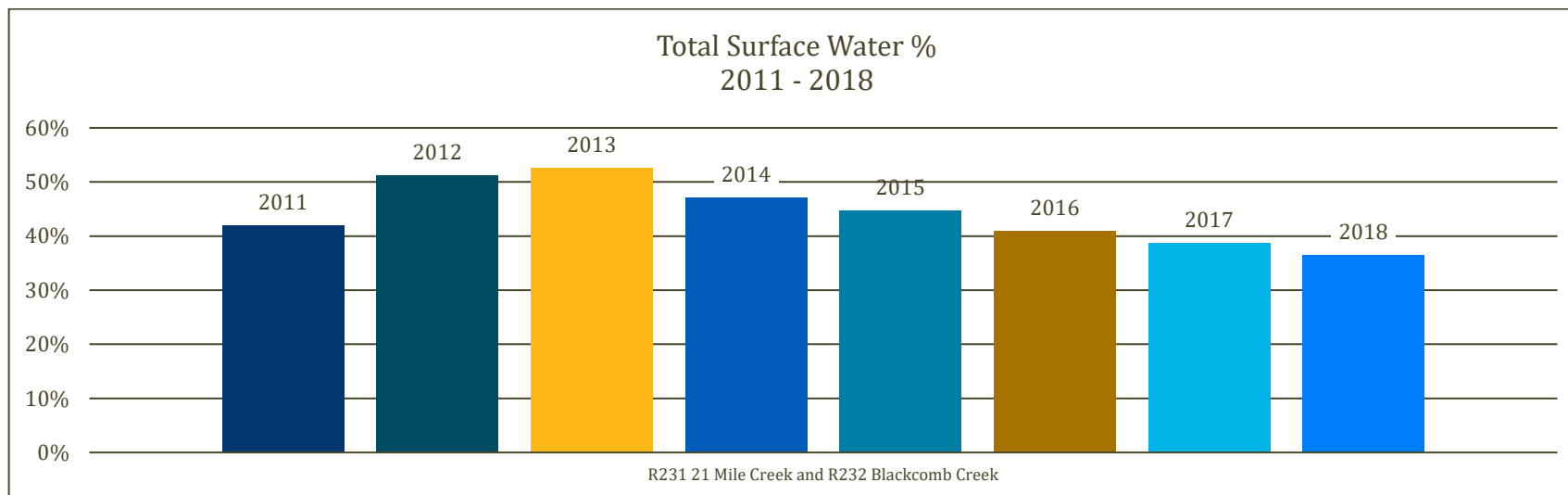


### TOTAL PERCENT CHANGE 2013 - 2018



## Source Water Summary 2018

| Source Water Sites          | 2018           |      | 2017           |      | 2016           |      | 2015           |      | 2014           |      | 2013           |      |
|-----------------------------|----------------|------|----------------|------|----------------|------|----------------|------|----------------|------|----------------|------|
|                             | m <sup>3</sup> | %    | m <sup>3</sup> | %    | m <sup>3</sup> | %    | m <sup>3</sup> | %    | m <sup>3</sup> | %    | m <sup>3</sup> | %    |
| R231 21 Mile Creek          | 2,093,835      | 37%  | 2,241,453      | 39%  | 2,303,292      | 41%  | 2,520,437      | 45%  | 2,522,414      | 47%  | 2,794,284      | 53%  |
| R232 Blackcomb Creek        | -              | -    | -              | -    | -              | -    | -              | -    | -              | -    | -              | -    |
| Total Surface Water         | 2,093,835      | 36%  | 2,241,453      | 39%  | 2,303,292      | 41%  | 2,520,437      | 45%  | 2,522,414      | 47%  | 2,794,284      | 53%  |
| W201-1 Emerald Estates      | 87,772         | 2%   | 118,471        | 2%   | 124,349        | 2%   | 105,350        | 2%   | 311,469        | 6%   | 304,014        | 6%   |
| W201-2 Emerald Estates      | 86,230         | 2%   | 156,417        | 3%   | 148,678        | 3%   | 142,423        | 3%   | 45,724         | 1%   | 35,562         | 1%   |
| W201-3 Emerald Estates      | 85,942         | 1%   | 1,129          | 0%   | 1,964          | 0%   | 11,354         | 0%   | 3,552          | 0%   | 1,608          | 0%   |
| W202 Alpine                 | 327,306        | 6%   | 288,532        | 5%   | 301,268        | 5%   | 298,432        | 5%   | 335,077        | 6%   | 387,681        | 7%   |
| W210 Alpine                 | 153,250        | 3%   | 153,501        | 3%   | 158,422        | 3%   | 220,204        | 4%   | 99,707         | 2%   | 127,192        | 2%   |
| W213 Meadow Park            | 147,963        | 3%   | 127,437        | 2%   | 175,818        | 3%   | 168,999        | 3%   | 149,543        | 3%   | 90,657         | 2%   |
| W205 & W211 Community Wells | 865,370        | 15%  | 792,672        | 14%  | 497,866        | 9%   | 380,922        | 7%   | 349,257        | 7%   | 300,409        | 6%   |
| W212-1 Function Junction    | 447,225        | 8%   | 351,841        | 6%   | 312,097        | 6%   | 279,604        | 5%   | 225,673        | 4%   | 143,678        | 3%   |
| W212-2 Function Junction    | 0              | 0%   | 0              | 0%   | 0              | 0%   | 0              | 0%   | 0              | 0%   | 0              | 0%   |
| W217 Cheakamus Crossing     | 229,303        | 4%   | 251,282        | 4%   | 252,352        | 4%   | 220,290        | 4%   | 247,466        | 5%   | 268,295        | 5%   |
| W218 21 Mile Well #1        | 1,221,006      | 21%  | 1,316,459      | 23%  | 1,354,525      | 24%  | 1,294,719      | 23%  | 1,071,915      | 20%  | 856,687        | 16%  |
| W219 21 Mile Well #2        | 0              | 0%   | 0              | 0%   | -              | -    | -              | -    | -              | -    | -              | -    |
| Total Ground Water          | 3,651,368      | 64%  | 3,556,612      | 61%  | 3,325,375      | 59%  | 3,110,943      | 55%  | 2,835,831      | 53%  | 2,515,783      | 47%  |
| Total Water                 | 5,745,203      | 100% | 5,798,065      | 100% | 5,628,667      | 100% | 5,631,380      | 100% | 5,358,245      | 100% | 5,310,067      | 100% |



# Annual Water Sampling Results 2018

| Test Parameter             | GCDWQ Standard | Units | W-213      |            | W-201-1    | W-201-2    | W-201-3    | W-202      |            | W-210      |            | W-213 SS#420 |            | R-231 SS#436 |            |
|----------------------------|----------------|-------|------------|------------|------------|------------|------------|------------|------------|------------|------------|--------------|------------|--------------|------------|
|                            |                |       | 05-09-2018 | 12-03-2018 | 05-02-2018 | 05-02-2018 | 05-02-2018 | 05-08-2018 | 11-01-2018 | 05-08-2018 | 11-01-2018 | 05-09-2018   | 12-03-2018 | 05-02-2018   | 12-04-2018 |
| Aluminum                   | <0.1           | mg/L  | <0.0050    | <0.0050    | 0.0113     | <0.0050    | 0.0052     | <0.0050    | <0.0050    | <0.0050    | 0.0085     | <0.0050      | <0.0050    | 0.183        | 0.0434     |
| Antimony                   | 0.006          | mg/L  | <0.00020   | <0.00020   | <0.00020   | <0.00020   | <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   | <0.00050     | <0.00050   | <0.00050     | <0.00050   |
| Barium                     | 1              | mg/L  | 0.0302     | 0.0304     | 0.0073     | <0.0050    | <0.0050    | 0.0294     | 0.0167     | 0.0138     | 0.0160     | 0.0302       | 0.0304     | 0.0067       | 0.0076     |
| Boron                      | 5              | mg/L  | 0.144      | <0.0050    | 0.0077     | <0.0050    | <0.0050    | <0.0050    | 0.0062     | <0.0050    | <0.0050    | 0.144        | <0.0050    | <0.0050      | 0.0113     |
| Cadmium                    | 0.005          | mg/L  | 0.000017   | 0.000011   | <0.000010  | 0.000011   | <0.000010  | 0.000032   | 0.000027   | 0.000011   | <0.000010  | 0.000017     | 0.000011   | <0.000010    | <0.000010  |
| Calcium                    | -              | mg/L  | 38.6       | 30.3       | 17.8       | 17.5       | 16.2       | 26.6       | 17.6       | 12.0       | 11.5       | 38.6         | 30.3       | 3.30         | 5.00       |
| Chloride                   | 250            | mg/L  | 8.54       | 12.1       | 15.5       | 9.96       | 7.69       | 16.4       | 4.39       | 1.98       | 0.59       | 8.54         | 12.1       | 0.15         | 0.27       |
| Chromium                   | 0.05           | mg/L  | <0.00050   | <0.00050   | <0.00050   | <0.00050   | <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   | <0.00010   | <0.00010   | <0.00010   | <0.00010   | <0.00010   | <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       | <5.0         | <5.0       | <5.0         | 9.2        |
| Conductivity               | -              | µS/cm | 227        | 198        | 164        | 135        | 119        | 218        | 107        | 79.6       | 68.6       | 227          | 198        | 21.2         | 34.1       |
| Copper                     | ? 1            | mg/L  | 0.00868    | 0.00922    | 0.0395     | 0.0245     | 0.0175     | 0.00794    | 0.0138     | 0.00068    | 0.00063    | 0.00868      | 0.00922    | 0.00118      | <0.00040   |
| Fluoride                   | 1.5            | mg/L  | <0.10      | <0.10      | <0.10      | 0.13       | 0.12       | <0.10      | <0.10      | <0.10      | <0.10      | <0.10        | <0.10      | <0.10        | <0.10      |
| Hardness CaCO <sub>3</sub> | -              | mg/L  | 101        | 79.6       | 47.7       | 46.6       | 43.1       | 70.1       | 46.2       | 32.0       | 30.5       | 101          | 79.6       | 9.10         | 13.5       |
| Iron                       | 0.3            | mg/L  | <0.010     | 0.028      | <0.010     | <0.010     | 0.013      | <0.010     | <0.010     | <0.010     | <0.010     | <0.010       | 0.028      | 0.136        | 0.016      |
| Lead                       | 0.01           | mg/L  | 0.00032    | 0.00046    | 0.00024    | <0.00020   | <0.00020   | 0.00060    | 0.00078    | <0.00020   | <0.00020   | 0.00032      | 0.00046    | <0.00020     | <0.00020   |
| Magnesium                  | -              | mg/L  | 1.02       | 0.963      | 0.792      | 0.684      | 0.617      | 0.854      | 0.519      | 0.484      | 0.449      | 1.02         | 0.963      | 0.209        | 0.249      |
| Manganese                  | 0.05           | mg/L  | 0.00049    | 0.00060    | 0.00033    | 0.00023    | 0.00034    | 0.00027    | <0.00020   | <0.00020   | <0.00020   | 0.00049      | 0.00060    | 0.00377      | 0.00084    |
| Mercury                    | 1              | µg/L  | <0.010     | <0.010     | <0.010     | <0.010     | <0.010     | <0.010     | <0.010     | <0.010     | <0.010     | <0.010       | <0.010     | <0.010       | <0.010     |
| Nitrate                    | 10             | mg/L  | 0.166      | 0.236      | 0.233      | 0.084      | 0.027      | 0.237      | 0.104      | 0.030      | 0.024      | 0.166        | 0.236      | 0.032        | 0.021      |
| Nitrite                    | 1              | mg/L  | <0.010     | <0.010     | <0.010     | <0.010     | <0.010     | <0.010     | <0.010     | <0.010     | <0.010     | <0.010       | <0.010     | <0.010       | <0.010     |
| pH                         | 7.0 - 10.5     | -     | 6.84       | 6.84       | 6.76       | 6.92       | 6.96       | 6.68       | 6.68       | 7.09       | 7.09       | 6.84         | 6.84       | 7.90         | 7.46       |
| Potassium                  | -              | mg/L  | 1.35       | 1.23       | 0.62       | 0.41       | 0.26       | 0.78       | 0.48       | 0.50       | 0.43       | 1.35         | 1.23       | 0.27         | 0.38       |
| Selenium                   | 0.01           | mg/L  | <0.00050   | <0.00050   | <0.00050   | <0.00050   | <0.00050   | <0.00050   | <0.00050   | <0.00050   | <0.00050   | <0.00050     | <0.00050   | <0.00050     | <0.00050   |
| Sodium                     | 200            | mg/L  | 5.28       | 5.30       | 11.5       | 6.74       | 6.06       | 13.6       | 3.76       | 1.11       | 1.10       | 5.28         | 5.30       | 0.47         | 0.79       |
| Sulphate                   | 500            | mg/L  | 63.3       | 43.8       | 13.6       | 11.7       | 10.3       | 40.8       | 18.2       | 10.7       | 10.6       | 63.3         | 43.8       | 1.8          | 3.0        |
| Turbidity                  | 1              | NTU   | 0.13       | 0.32       | <0.10      | <0.10      | 0.15       | <0.10      | <0.10      | <0.10      | <0.10      | 0.13         | 0.32       | 1.77         | 0.18       |
| Uranium                    | 0.02           | mg/L  | 0.000027   | <0.000020  | <0.000020  | <0.000020  | <0.000020  | <0.000020  | <0.000020  | <0.000020  | <0.000020  | 0.000027     | <0.000020  | 0.000046     | 0.000051   |
| Zinc                       | 5              | mg/L  | 0.0086     | 0.0081     | 0.0145     | 0.0060     | 0.0074     | 0.0146     | 0.0226     | <0.0040    | <0.0040    | 0.0086       | 0.0081     | 0.0044       | <0.0040    |

|                |                |       | R-232 SS#439 | W205-1 SS#444 |            | W205-2 SS#445 |            | W205-3 SS#446 |            | W211 SS#447 |            | R228 - SS#474 |            |
|----------------|----------------|-------|--------------|---------------|------------|---------------|------------|---------------|------------|-------------|------------|---------------|------------|
| Test Parameter | GCDWQ Standard | Units | 12-03-2018   | 05-03-2018    | 11-15-2018 | 05-03-2018    | 11-15-2018 | 05-03-2018    | 11-15-2018 | 05-03-2018  | 11-15-2018 | 05-09-2018    | 11-01-2018 |
| Aluminum       | <0.1           | mg/L  | 0.0501       | <0.0050       | <0.0050    | <0.0050       | <0.0050    | <0.0050       | 0.0102     | <0.0050     | <0.0050    | 0.0062        | <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   | <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   | <0.00050      | <0.00050   |
| Barium         | 1              | mg/L  | 0.0085       | 0.0245        | 0.0198     | 0.0443        | 0.0528     | 0.0326        | 0.0115     | 0.0365      | 0.0120     | 0.0344        | 0.0283     |
| Boron          | 5              | mg/L  | <0.0050      | 0.0069        | 0.0178     | 0.0169        | 0.0115     | 0.0072        | 0.0097     | 0.0061      | 0.0071     | 0.163         | 0.0070     |
| Cadmium        | 0.005          | mg/L  | <0.000010    | 0.000025      | 0.000019   | 0.000041      | 0.000032   | 0.000026      | 0.000016   | 0.000035    | 0.000013   | 0.000028      | <0.000010  |
| Calcium        | -              | mg/L  | 9.74         | 68.6          | 49.8       | 106           | 117        | 77.1          | 31.0       | 74.1        | 41.5       | 14.4          | 12.3       |
| Chloride       | 250            | mg/L  | 0.16         | 45.8          | 35.4       | 94.7          | 131        | 72.6          | 10.5       | 40.6        | 4.64       | 41.5          | 32.7       |
| Chromium       | 0.05           | mg/L  | <0.00050     | <0.00050      | <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      | <0.00010   | <0.00010      | <0.00010   | <0.00010    | <0.00010   | <0.00010      | <0.00010   |
| Colour         | ≤15            | TCU   | 6.0          | <5.0          | -7.6       | <5.0          | <5.0       | <5.0          | <5.0       | <5.0        | <5.0       | <5.0          | <5.0       |
| Conductivity   | -              | µS/cm | 55.2         | 441           | 372        | 792           | 857        | 566           | 225        | 478         | 237        | 224           | 191        |
| Copper         | ≤1             | mg/L  | 0.00055      | 0.0208        | 0.0131     | 0.00726       | 0.00903    | 0.0183        | 0.0248     | 0.00636     | 0.00616    | 0.0239        | 0.0334     |
| Fluoride       | 1.5            | mg/L  | <0.10        | <0.10         | <0.10      | <0.10         | <0.10      | <0.10         | <0.10      | <0.10       | <0.10      | <0.10         | <0.10      |
| Hardness CaCO3 | -              | mg/L  | 25.5         | 177           | 129        | 274           | 304        | 199           | 80.4       | 193         | 108        | 43.4          | 37.6       |
| Iron           | 0.3            | mg/L  | 0.023        | <0.010        | <0.010     | <0.010        | <0.010     | <0.010        | <0.010     | <0.010      | <0.010     | 0.038         | 0.016      |
| Lead           | 0.01           | mg/L  | <0.00020     | 0.00039       | 0.00041    | 0.00088       | 0.00185    | 0.00098       | 0.00064    | 0.00097     | 0.00065    | 0.00426       | 0.00144    |
| Magnesium      | -              | mg/L  | 0.284        | 1.44          | 1.13       | 2.16          | 2.75       | 1.61          | 0.698      | 1.83        | 0.978      | 1.81          | 1.65       |
| Manganese      | 0.05           | mg/L  | 0.00067      | <0.00020      | 0.00022    | 0.00123       | 0.00123    | 0.00149       | 0.00109    | 0.00104     | 0.00093    | 0.0443        | 0.0296     |
| Mercury        | 1              | µg/L  | <0.010       | <0.010        | <0.010     | <0.010        | <0.010     | <0.010        | <0.010     | <0.010      | <0.010     | <0.010        | <0.010     |
| Nitrate        | 10             | mg/L  | 0.030        | 0.252         | 0.169      | 0.768         | 1.30       | 0.902         | 0.127      | 0.446       | 0.042      | 0.117         | 0.066      |
| Nitrite        | 1              | mg/L  | <0.010       | <0.010        | <0.010     | <0.010        | <0.010     | <0.010        | <0.010     | <0.010      | <0.010     | <0.010        | <0.010     |
| pH             | 7.0 - 10.5     | -     | 7.41         | 6.54          | 6.54       | 6.57          | 6.57       | 6.60          | 6.60       | 6.56        | 6.56       |               | 6.46       |
| Potassium      | -              | mg/L  | 0.27         | 1.43          | 1.21       | 1.78          | 2.28       | 1.35          | 0.71       | 1.40        | 0.69       | 2.17          | 1.60       |
| Selenium       | 0.01           | mg/L  | <0.00050     | <0.00050      | <0.00050   | <0.00050      | <0.00050   | <0.00050      | <0.00050   | <0.00050    | <0.00050   | <0.00050      | <0.00050   |
| Sodium         | 200            | mg/L  | 0.86         | 18.3          | 16.7       | 41.3          | 55.7       | 29.6          | 8.78       | 21.1        | 4.72       | 27.2          | 22.3       |
| Sulphate       | 500            | mg/L  | 4.2          | 100           | 89.7       | 183           | 146        | 102           | 51.6       | 121         | 62.2       | 13.3          | 11.7       |
| Turbidity      | 1              | NTU   | 0.36         | <0.10         |            |               | <0.10      | <0.10         |            | <0.10       | <0.10      | 0.48          | <0.10      |
| Uranium        | 0.02           | mg/L  | 0.000028     | 0.000034      | 0.000025   | 0.000088      | 0.000075   | 0.000050      | <0.000020  | 0.000039    | <0.000020  | <0.000020     | <0.000020  |
| Zinc           | 5              | mg/L  | <0.0040      | 0.0126        | 0.0156     | <0.0040       | 0.0050     | 0.0057        | 0.0056     | 0.0066      | 0.0075     | 0.246         | <0.0040    |



| Test Parameter | GCDWQ Standard | Units | W-212 SS#483 |            | W212-2     | W217       |            | W218       |            |
|----------------|----------------|-------|--------------|------------|------------|------------|------------|------------|------------|
|                |                |       | 05-02-2018   | 11-15-2018 | 11-15-2018 | 05-02-2018 | 11-15-2018 | 05-02-2018 | 11-15-2018 |
| Aluminum       | <0.1           | mg/L  | 0.0060       | 0.0106     | 0.0400     | 0.0073     | 0.0099     | <0.0050    | <0.0050    |
| Antimony       | 0.006          | mg/L  | <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   |
| Barium         | 1              | mg/L  | 0.0379       | 0.0285     | 0.0202     | 0.0143     | 0.0172     | 0.0167     | 0.0147     |
| Boron          | 5              | mg/L  | <0.0050      | 0.0093     | 0.0126     | <0.0050    | 0.0074     | 0.0067     | 0.0104     |
| Cadmium        | 0.005          | mg/L  | 0.000028     | 0.000020   | 0.000096   | <0.000010  | 0.000012   | <0.000010  | <0.000010  |
| Calcium        | -              | mg/L  | 13.5         | 10.6       | 13.6       | 10.7       | 12         | 13.7       | 11.2       |
| Chloride       | 250            | mg/L  | 44.2         | 33.5       | 40.2       | 7.5        | 6.54       | 2.38       | 1.71       |
| Chromium       | 0.05           | mg/L  | <0.00050     | <0.00050   | <0.00050   | <0.00050   | <0.00050   | <0.00050   | <0.00050   |
| Cobalt         | -              | mg/L  | <0.00010     | <0.00010   | <0.10      | <0.00010   | <0.00010   | <0.00010   | <0.00010   |
| Colour         | ≤15            | TCU   | <5.0         | <5.0       | <5.0       | <5.0       | 7.9        | <5.0       | <5.0       |
| Conductivity   | -              | µS/cm | 241          | 194        | 243        | 89.6       | 96.5       | 100        | 85.3       |
| Copper         | ≤1             | mg/L  | 0.00579      | 0.00216    | 0.00578    | 0.00115    | 0.00115    | 0.00149    | 0.00130    |
| Fluoride       | 1.5            | mg/L  | 0.11         | <0.10      | <0.10      | <0.10      | <0.10      | <0.10      | <0.10      |
| Hardness CaCO3 | -              | mg/L  | 41.8         | 33.1       | 43.7       | 29.6       | 33.2       | 37.6       | 30.8       |
| Iron           | 0.3            | mg/L  | 0.135        | 0.208      | 0.141      | <0.010     | <0.010     | <0.010     | <0.010     |
| Lead           | 0.01           | mg/L  | <0.00020     | 0.00098    | 0.00024    | <0.00020   | 0.00031    | <0.00020   | <0.00020   |
| Magnesium      | -              | mg/L  | 1.96         | 1.57       | 2.35       | 0.67       | 0.757      | 0.812      | 0.656      |
| Manganese      | 0.05           | mg/L  | 0.0744       | 0.0599     | 1.06       | 0.00022    | 0.00025    | 0.00036    | 0.00027    |
| Mercury        | 1              | µg/L  | <0.010       | <0.010     | <0.010     | <0.010     | <0.010     | <0.010     | <0.010     |
| Nitrate        | 10             | mg/L  | 0.121        | 0.092      | 0.042      | 0.117      | 0.162      | 0.030      | 0.024      |
| Nitrite        | 1              | mg/L  | <0.010       | <0.010     | <0.010     | <0.010     | <0.010     | <0.010     | <0.010     |
| pH             | 7.0 - 10.5     | -     | 6.49         | 6.49       | 6.49       | 6.54       | 6.54       | 6.72       | 6.72       |
| Potassium      | -              | mg/L  | 2.24         | 1.74       | 2.66       | 0.72       | 0.75       | 0.87       | 0.75       |
| Selenium       | 0.01           | mg/L  | <0.00050     | <0.00050   | <0.00050   | <0.00050   | <0.00050   | <0.00050   | <0.00050   |
| Sodium         | 200            | mg/L  | 28.9         | 21.4       | 27.2       | 4.02       | 3.78       | 2.06       | 1.88       |
| Sulphate       | 500            | mg/L  | 12.2         | 12.3       | 7.8        | 11.3       | 14         | 25.6       | 23.8       |
| Turbidity      | 1              | NTU   | 0.61         |            | <0.10      | <0.10      |            | 0.11       |            |
| Uranium        | 0.02           | mg/L  | <0.000020    | <0.000020  | <0.000020  | 0.000025   | 0.000028   | <0.000020  | <0.000020  |
| Zinc           | 5              | mg/L  | <0.0040      | <0.0040    | 0.0063     | <0.0040    | <0.0040    | <0.0040    | <0.0040    |

## **APPENDIX B –EMERGENCY RESPONSE AND CONTINGENCY PLAN**

# Water Systems Emergency Response and Contingency Plan

Resort Municipality of Whistler 2018



# 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

|   |    |
|---|----|
| Executive Summary .....                                   | 3  |
| Emergency Response & Contingency Plan.....                | 5  |
| Roles and Responsibilities.....                           | 6  |
| Emergency Situations .....                                | 6  |
| Public Notification .....                                 | 12 |
| Appendix A – Contact List .....                           | 14 |
| Appendix B – RMOW Notices and Boil Water Policy .....     | 16 |
| Appendix C – Emergency Operations Centre Activation ..... | 19 |

## 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. Do 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 Supervisor***

Once apprised of the potential emergency situation by operations staff, the Utilities Supervisor (**Chris Wike**) 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 Supervisor will contact the Utilities Group Manager (**Gillian Woodward**). The Supervisor 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 Supervisor 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 Supervisor 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 Supervisor, 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 Supervisor reports a spill or chemical/biological contamination that may threaten drinking water quality:

1. Determine the Emergency Level.

2. Immediately notify the Supervisor 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 plum 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 rests 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 Supervisor assesses the situation and determines the level of emergency.
2. Utilities Supervisor 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 Supervisor assesses the situation and determines the level of emergency.
2. Utilities Supervisor 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 Supervisor 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   |
| Chris  | Wike      | Utilities Supervisor                    |                 | 604-935-8321 | 604-932-0873 | <a href="mailto:cwike@whistler.ca">cwike@whistler.ca</a>         |
| Bill   | Harvey    | Utilities Chief Operator                |                 | 604-935-8317 | 604-935-5903 | <a href="mailto:bharvey@whistler.ca">bharvey@whistler.ca</a>     |
| Scott  | Morphet   | Equipment Operator Leadhand             |                 | 604-935-8316 | 604-905-8944 | <a href="mailto:smorphet@whistler.ca">smorphet@whistler.ca</a>   |
|  |           | On-call Operator                        | 604-905-8725    |              |              |  |
|  |           | Back-up Operator                        | 604-935-9472    |              |              |  |
|  |           | After-Hours Answering Service           | 604-935-8320    |              |              |  |
| Gillian  | Woodward  | Utilities Group Manager                 |                 | 604-935-8315 | 604-679-8681 | <a href="mailto:gwoodward@whistler.ca">gwoodward@whistler.ca</a> |
| Erin   | Marriner  | Emergency Program Coordinator           |                 | 604-935-8473 | 604-967-2153 | <a href="mailto:emarriner@whistler.ca">emarriner@whistler.ca</a> |
| Michele  | Comeau    | Communications Manager                  |                 | 604-935-8152 | 604-932-0833 | <a href="mailto:mcomeau@whistler.ca">mcomeau@whistler.ca</a>     |
| James  | Hallisey  | Infrastructure Services General Manager |                 | 604-935-8196 | 604-905-8907 | <a href="mailto:jhallisey@whistler.ca">jhallisey@whistler.ca</a> |

| 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 | <a href="mailto:Dan.Glover@vch.ca">Dan.Glover@vch.ca</a>     |
| James   | Whalen    | Back-up Health Contact, Drinking Water Officer | 604-935-5318 | 604-698-5422 |              | <a href="mailto:James.Whalen@vch.ca">James.Whalen@vch.ca</a> |
| Mark  | Ritson    | Manager HP                                     | 604-983-6751 | 604-219-7359 |              | <a href="mailto:Mark.Ritson@vch.ca">Mark.Ritson@vch.ca</a>   |
| Dr. Geoff   | McKee     | Medical Health Officer                         | 604-983-6715 | 604-842-2357 |              | <a href="mailto:Geoff.McKee@vch.ca">Geoff.McKee@vch.ca</a>   |





## 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 804-935-XXXX.

Visit [www.whistler.ca](http://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 804-935-XXXX.

Visit [www.whistler.ca](http://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.

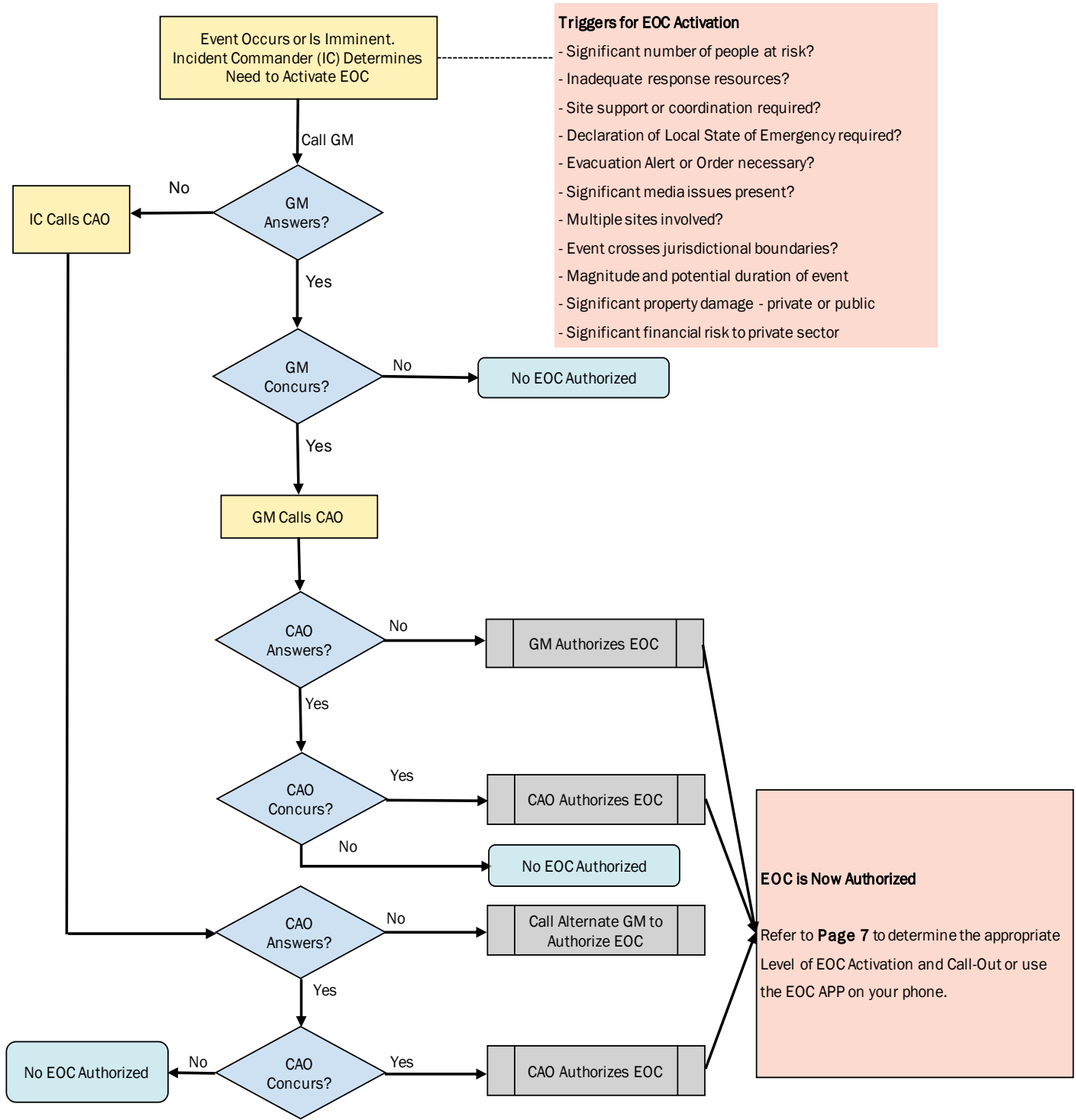
For more information, please contact: \_\_\_\_\_ at the RMOW on \_\_\_\_\_  
(Name of person) (Phone number)  
or the \_\_\_\_\_ at 604-935-XXXX.

Visit [www.whistler.ca](http://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



### 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) |
| <b>Procedure</b>  | <b>Procedure</b>   | <b>Procedure</b>   |
| 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 visually 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 depressurization is larger than the treated area     |

## APPENDIX C – PERMITS TO OPERATE A WATER SUPPLY SYSTEM





## 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



Drinking Water Officer

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

## 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

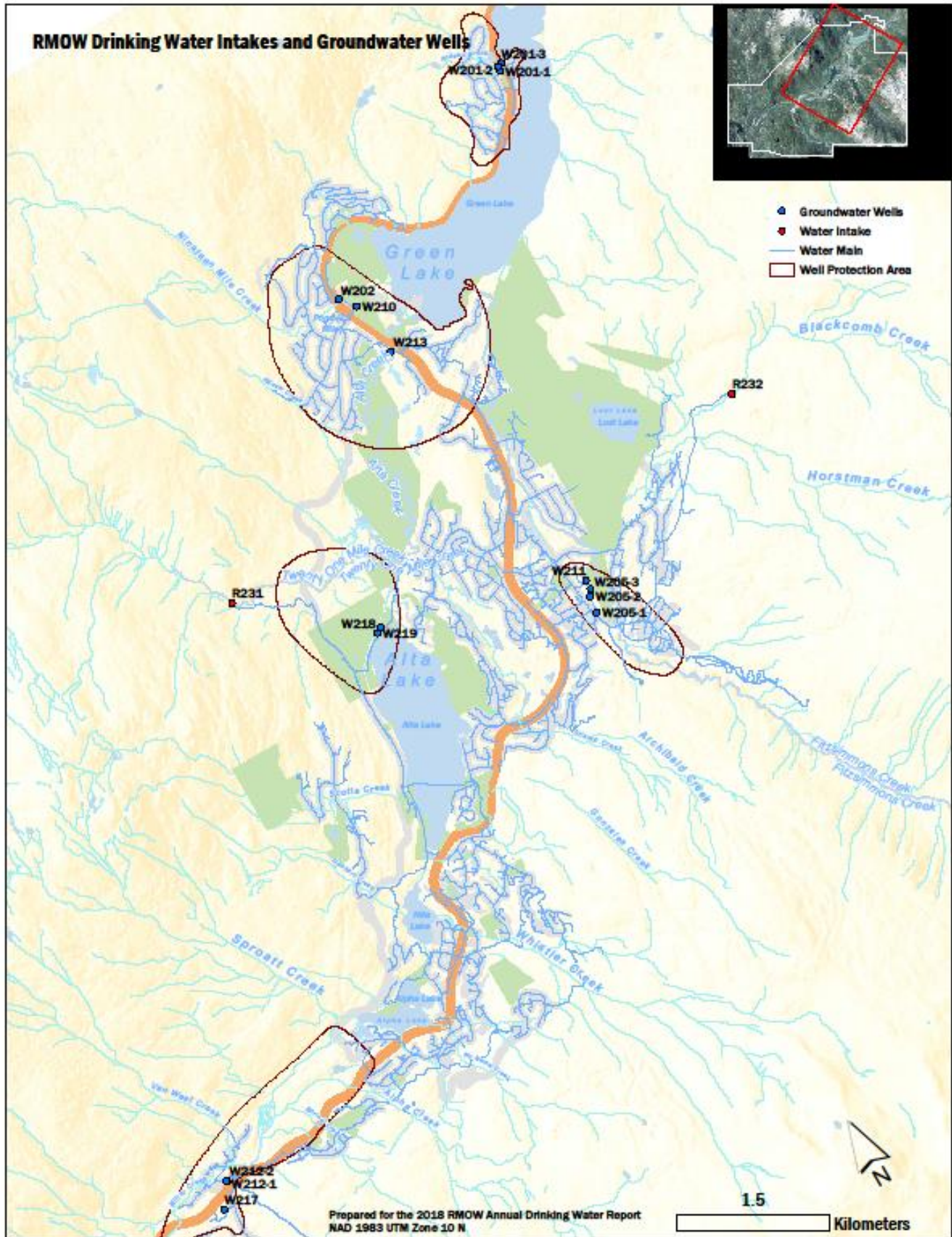


Drinking Water Officer

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



Prepared for the 2018 RMOW Annual Drinking Water Report  
NAD 1983 UTM Zone 10 N

1.5

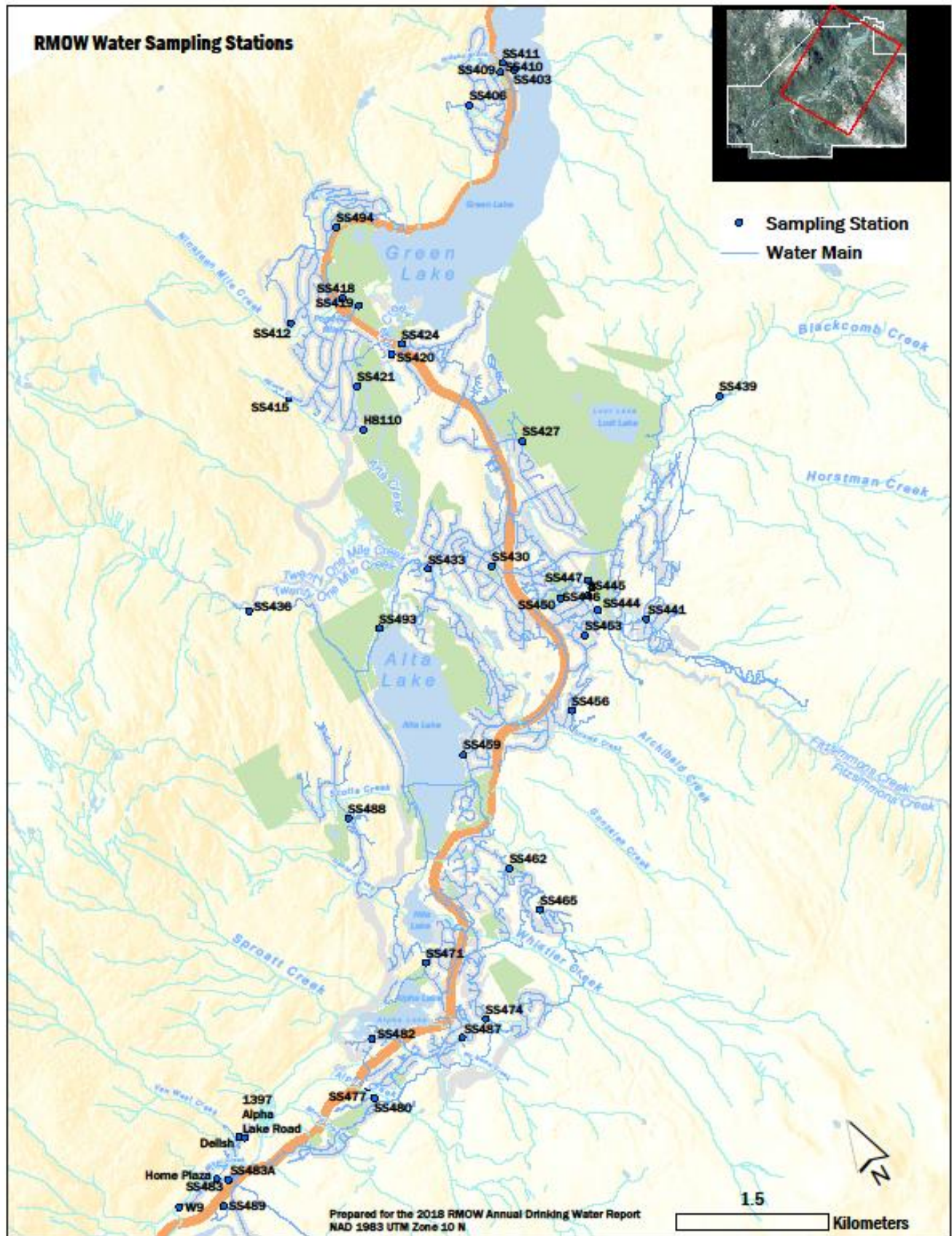
Kilometers



# RMOW Water Sampling Stations



- Sampling Station
- Water Main



Prepared for the 2018 RMOW Annual Drinking Water Report  
NAD 1983 UTM Zone 10 N

## APPENDIX E – EMERALD WATER UV FACILITY – SUMMARY OF FIELD COMMISSIONING



June 20, 2019

Resort Municipality of Whistler  
325 Blackcomb Way  
Whistler, BC V0N 1B4

Attention: Tammy Shore, Project Manager

Dear Ms. Shore:

**Subject: Emerald Water UV Facility - CP VCH-17-015A  
Summary of Field Commissioning**

The Emerald UV Facility was commissioned in the spring of 2018 by WSP staff in coordination with RMOW staff and specialists from BJ Purewater, Prominent pumps and Trojan UV. Equipment testing occurred on March 28<sup>th</sup>, 2018 and involved equipment calibration, alarm conditions, PLC control and shutdown operation. Attached test forms are provided for reference including field test checks and UV start-up confirmation.

On May 5<sup>th</sup> and 6<sup>th</sup>, 2018 further operational testing was completed to confirm the overall system operation with the Emerald pump station in preparation for the start of the 2-week operational testing period. Field checklist are included for reference of completed tests. The results of the field work confirmed the system was providing the treatment requirements and was suitable for operational testing.

Following operational testing, and during the first year of operation, we have not been advised of any performance concerns or deviations from the intended mode of operation and functional control strategy.

Yours sincerely,

A circular professional engineer seal for W. G. Bayless, P. Eng. is stamped over a handwritten signature. The seal contains the text 'PROFESSIONAL ENGINEER', 'W. G. BAYLESS', 'P. ENG.', and '20000'. The signature is in black ink and appears to be 'W. G. Bayless'.

W. G. Bayless, P. Eng.  
Project Manager

WGB:b  
Encl.

WSP ref: D-175A5.00