



Apex Mountain Resort
Water System Annual Update Report
2023



This report is available for public viewing at www.apexresort.com

Drinking Water Supply System: Keremeos Creek/ Nickel Plate Lake

Water Suppliers Name: Apex Mountain Resort (1997) Ltd

1.0 Introduction

This report was prepared in compliance with the requirements under the British Columbia *Drinking Water Protection Act* (DWPA) and Apex Mountain Resorts Operating Permit. This document includes an overview of the treatment and distribution system within the resort, a summary of total water consumption and water quality analysis within the system, and a recap of projects and related operations. The report has been provided to Interior Health and posted on the Resort's website for public reading.

Apex Mountain Resort recognises that we operate on the traditional, unceded territory of the Sylix First Nation.

2.0 Drinking Water System Description

2.1 Source Water

The Resort's water system draws primarily from Nickel Plate Lake with a secondary source coming from Keremeos Creek which are both surface water sources.

2.2 Treatment System

The Resort operates a single treatment facility where the water is passed through a 25µm mechanical filter, followed by both a 5µm sock filter and a 1µm cartridge filter. The water is treated using a bank of 4 UV filters before having chlorine added to it. This all contributes to meeting and exceeding the requirements found in the *Drinking Water Treatment Objectives (Microbiological) for Surface Water Supplies in British Columbia*.

2.3 Distribution System

Initially the water is stored in a 120,000 US Gallon upper reservoir which supplies the upper water system through a series of 8" and 6" PVC water mains. Due to the drop in elevation there is a Pressure Reducing Valve (PRV) located in the upper system. The upper system feeds the 240,000 US gallon lower reservoir which in turn

supplies the lower water system through 8” and 6” PVC water mains. Additional chlorine can be added to the lower reservoir as needed. The water mains vary in age from 40 years to 20 years so the first portions will be due for replacement in approximately 2050.

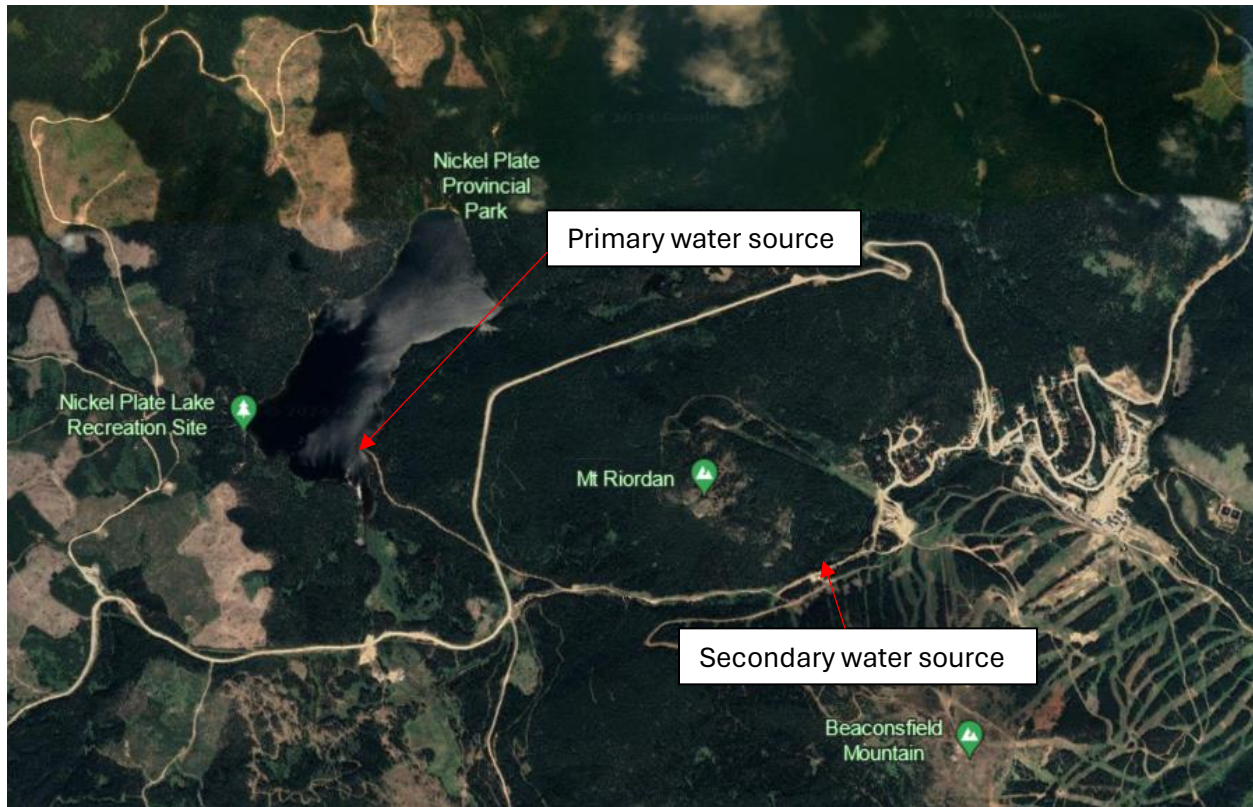


Figure 1 – Water Sources

3.0 Water Quality Sampling Program and Results

The Resort monitors Water Quality in line with both the Health Canada *Guidelines for Canadian Drinking Water Quality* (GCDWQ) and BC's *Drinking Water Protection Regulation* (DWPR). Weekly samples are taken allowing the Resort to monitor water quality for immediate and long-term trends.

3.1 Quality Assurance and Quality Control Program

As directed by the DWPA and DWPR, a water supplier is required to have its bacteriological analysis completed by a certified laboratory that is approved by the Provincial Health Officer. The Resort uses a certified third-party laboratory to analyze weekly bacteriological samples.

Staff taking samples are trained in the proper sampling methods to ensure accuracy of our results and to protect the quality of our water. Samples are alternated between 3 different locations – Filtration, Apex Maintenance Shop on the upper system and the Apex Office on the lower system – to ensure that we monitor our water quality throughout the system.

All samples are collected and shipped in accordance with the Standard Methods for the Examination of Water and Wastewater.

3.2 Water Quality Testing

The Resort performs in house daily water quality tests to monitor the treatment process.

3.2.1 pH

pH is a measure of the activity of the hydrogen ion in water. It represents the acidity or basicity of water. The pH scale goes from 0 – 14, with anything smaller than 7 being acidic and anything greater than 7 being basic. 7 is a neutral pH. Drinking water is regulated to fall between a pH of 6.5 and 8.5 under the GCDWQ.

3.2.2 Turbidity

Turbidity is a measure of the clarity of the water. It is also directly related to the colloidal material in the water. Turbidity is measured by passing a beam of light through the sample and measuring the amount of light that is refracted at a 90° angle. The units applied are called nephelometric turbidity units (NTU). The GCDWQ state drinking water should have a turbidity of less than 1 NTU. The Resort desires that water leaving the treatment plant should not have a turbidity greater than 0.5 NTU.

3.2.3 Free Chlorine

Chlorine levels are important in water treatment to ensure that water is safe throughout the distribution system. The Resort uses sodium hypochlorite to treat the water. Free chlorine measures the amount of hypochlorite in our water. The Resort targets a minimum residual free chlorine level of 0.2 mg/l at the end of the distribution system.

Monthly Averages 2023					
	Residual Free Chlorine (mg/l)			Turbidity (NTU)	pH
	Filtration	Shop	Office		
January	2.09	1.01	0.78	0.10	7.52
February	2.01	0.83	0.52	0.11	7.46
March	2.04	0.84	0.52	0.12	7.43
April	2.15	1.08	0.27	0.12	7.34
May	1.67	0.60	0.24	0.14	7.37
June	1.79	0.74	0.26	0.13	7.63
July	1.82	1.01	0.51	0.12	7.81
August	1.73	1.14	0.57	0.14	7.97
September	2.05	1.16	0.41	0.15	7.99
October	2.21	1.16	0.41	0.13	7.81
November	2.07	1.20	0.47	0.15	7.84
December	1.84	1.04	0.52	0.14	7.80

Figure 2 – Monthly Averages for Distribution System

3.3 Distribution System Bacteriological Monitoring

The Resort is committed to providing safe drinking water to its customers. The distribution system is sampled weekly at one of 3 locations. These samples are analyzed for total coliforms and E. coli.

3.3.1 Coliform Bacterial Monitoring

Coliform bacteria are a large group of bacteria found in water, in soil, on vegetation and in the faeces of mammals. Most of these bacteria are not harmful to humans, the ease of testing of these bacteria makes for a good indicator of contamination.

In water treatment systems, there is a zero-threshold allowance for coliforms within water samples. If a sample shows up positive for coliforms the site is immediately resampled. If coliforms are found again, Interior Health is notified, and a boil water advisory is put in place.

3.3.2 E. coli Bacterial Monitoring

E. coli bacteria are a subsection of coliform bacteria. While generally not harmful to human health, specific strains can cause serious health issues and even death in some instances. The bacteria are also found almost exclusively in the faeces of mammals; therefore, they are a definite sign of

contamination. Any positive counts for E. coli result in an immediate resampling and may result in cleaning of the affected area and boil water advisories.

3.3.3 Bacteriological Monitoring Results

In 2023, bacteriological testing was performed 54 times over 3 locations in the distribution system. On 2 occasions there were positive tests for total coliforms (1 CFU/100 ml and 13 CFU/100 ml), the sites were resampled and showed <1 CFU/100 ml.

3.4 Distribution Water Quality Analysis in 2023

The following water quality analysis results were completed by a provincially accredited lab from within the distribution system weekly. The samples were taken by Resort staff and sent to CARO Analytical Services (CARO) in Kelowna, BC. The results of these analyses are shown in figure 3.

Date	Sample Location	Total Coliform	E. Coli	Comments
Jan 4, 2023	Apex Office	<1	<1	
Jan 9, 2023	Apex Shop	<1	<1	
Jan 16, 2023	Filtration	<1	<1	
Jan 26, 2023	Apex Office	<1	<1	
Jan 31, 2023	Apex Shop	<1	<1	
Feb 7, 2023	Apex Office	<1	<1	
Feb 15, 2023	Apex Office	<1	<1	
Feb 21, 2023	Apex Shop	<1	<1	
Feb 28, 2023	Filtration	<1	<1	
March 7, 2023	Apex Shop	<1	<1	
March 8, 2023	Apex Office	<1	<1	
March 28, 2023	Filtration	<1	<1	
March 30, 2023	Apex Shop	<1	<1	
April 10, 2023	Apex Office	<1	<1	
April 10, 2023	Filtration	<1	<1	
April 19, 2023	Apex Office	<1	<1	
April 24, 2023	Apex Shop	<1	<1	
May 5, 2023	Apex Shop	<1	<1	
May 5, 2023	Filtration	<1	<1	
May 17, 2023	Apex Office	<1	<1	
May 23, 2023	Apex Shop	<1	<1	
May 30, 2023	Filtration	<1	<1	
June 6, 2023	Apex Shop	<1	<1	

Date	Sample Location	Total Coliform	E. Coli	Comments
June 13, 2023	Apex Office	<1	<1	
June 21, 2023	Apex Office	<1	<1	
June 28, 2023	Filtration	<1	<1	
July 4, 2023	Apex Shop	<1	<1	
July 10, 2023	Apex Office	<1	<1	
July 17, 2023	Filtration	<1	<1	
July 26, 2023	Apex Shop	1	<1	Result received at 4pm on Friday. Plans were put in place to send two samples on Saturday morning
July 29, 2023	Apex Office	<1	<1	
July 29, 2023	Apex Shop	<1	<1	
Aug 1, 2023	Apex Filtration	<1	<1	
Aug 9, 2023	ApexSshop	>13	<1	This sample was past the 24hr testing window. We were not notified and the email was sent after the Aug 16th test. When we got the email test results we resampled the shop. This testing was done Aug 21.
Aug 16, 2023	Apex Office	<1	<1	
Aug 21, 2023	Apex Shop	<1	<1	
Aug 21, 2023	Apex Filtration	<1	<1	
Aug 29, 2023	Apex Office	<1	<1	
Sept 6, 2023	Apex Shop	<1	<1	
Sept 13, 2023	Apex Filtration	<1	<1	
Sept 18, 2023	Apex Shop	<1	<1	
Sept 25, 2023	Apex Office	<1	<1	
Oct 6, 2023	Apex Filtration	<1	<1	
Oct 17, 2023	Apex Shop	<1	<1	
Oct 17, 2023	Apex Office	<1	<1	
Oct 25, 2023	Apex Office	<1	<1	
Nov 8, 2023	Apex Office	<1	<1	
Nov15, 2023	Apex Filtration	<1	<1	
Nov 24, 2023	Apex Shop	<1	<1	
Nov 28, 2023	Apex Office	<1	<1	
Dec 6, 2023	Apex Shop	<1	<1	
Dec 15, 2023	Filtration	<1	<1	
Dec 20, 2023	Apex Shop	<1	<1	
Dec 27,2023	Filtration	<1	<1	

Figure 3 – Water Quality Analysis Results

4.0 Evolving Guidelines

There have been no new guidelines introduced in the last year.

5.0 Water System Risks

5.1 Source to Tap Risks

5.1.1 Power Failure

The lake pumphouse is currently the only essential part of the water system not covered by back up power. In the event of complete power failure there would be a complete loss of access to the lake water and be completely reliant on what is in the reservoirs and what can be drawn out of Keremeos Creek.

5.1.2 No Cross-Connection Control Program

The Resort does not currently have any cross-connection control program in place.

5.2 Mitigation Measures

5.2.1 Implementation of a Cross-Connection Control Program

The resort is aiming to implement a cross-connection control program within the next couple of years. This will include educating customers so that they can avoid cross connection on their property.

5.3 System Improvements and Next Steps

5.3.1 Installation of a Generator at the Nickel Plate Pumphouse

The Resort is working on installing an emergency generator at the Nickel Plate pumphouse to ensure continued water systems operation in the event of a power failure.

6.0 Water Use and Water Conservation

6.1 Water Use

The Resorts Water Filtration Building has meters to record consumption from both Nickel Plate lake and Keremeos Creek. In 2023 there was 11,859,690 US gallons of water drawn from the lake by the water system and 4551 US gallons from the creek.

The calculated maximum day demand was 3.6L/s and the calculated average day demand was 1.4L/s. The below graph shows the calculated flow in l/s for the last 3 years.

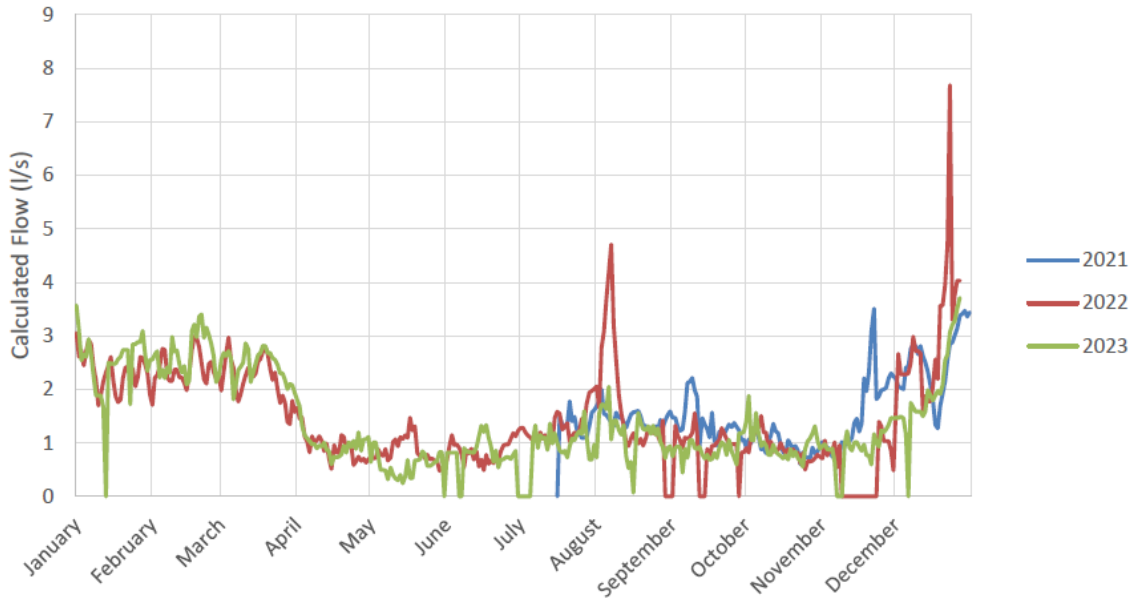


Figure 4 - Calculated Flow (L/s)

6.2 Water Conservation Program

Signage is erected throughout the resort and adverts are posted in a local publication encouraging customers to conserve water with the tag line ‘Every Drop Counts’. We also have a section on our website that discusses water conservation and how customers can help. The Resort itself is in the process of replacing bathroom fixtures and sinks with lower flow solutions.

Irrigation is of little to no concern in the Apex Mountain community when it comes to water use.

7.0 Source Water Protection

Apex water system shares Nickel Plate lake with the Cawston Irrigation District and works closely with them to help protect the lake from contamination and maintain a good lake level. Recreation Sites and Trails BC and BC Parks have campgrounds on the shores of the lake so are also important partners in protecting our main source water.

8.0 Emergency Response & Contingency Plan Summary

Apex Mountain Water Utility has an Emergency Response Plan in place to deal with all perceived water system emergencies. This plan is updated annually and is available to all water system operators employed by the utility.

9.0 Water System Management

9.1 Asset Management Program

The Resort had a depreciation report completed in 2023 for the entire water system and it identified that a program to raise capital was required to replace key infrastructure over the next few decades. This will be updated on an as need basis.

9.2 Operations and Maintenance Program

Resort staff carry out daily water quality checks and as part of this is filter replacement as and when needed. We operate a weekly, monthly and annual maintenance program on the system.

9.3 Capital Program

There were no capital works projects completed in 2023. The utility plans to install a backup generator at the lake pumphouse in the foreseeable future. This will ensure continued operation of the pumps in the event of power failure.