# Magic Lake Estates Water and Sewer System

# 2024 Annual Report

# CCD | Drinking Water and Wastewater

#### Introduction

This report provides a summary of the Magic Lake Estates (MLE) Water and Sewer Service for 2024 and provides a description of the water and sewer services including: summary of the water supply, demand and production, drinking water quality, wastewater treatment flows, effluent quality, operations highlights, capital project updates and financial report.

# WATER SYSTEM

#### Water Service Description

The community of Magic Lake Estates is primarily a rural residential development with some community properties located on Pender Island in the Southern Gulf Islands Electoral Area which was originally serviced by a private water utility and in 1981 the service converted to the Capital Regional District (CRD). The Magic Lake Estates water service is made up of 1,196 parcels, of which there are 1,072 single family equivalents (or approximately the same number of customers) obtaining service from the water system.



Figure 1: Map of Magic Lake Estates Water System

The Magic Lake Estates water system is primarily comprised of:

- Two raw water sources; Buck Lake (primary source) and Magic Lake (secondary source).
- Four earthen dam structures (two at Buck Lake and two at Magic Lake).
- Two raw water pump stations, one each related to the raw water supplies, with pretreatment oxidation equipment to treat and control dissolved manganese and iron in the raw water source.
- Centralized water treatment plant consisting of a dual process including dissolved air flotation (DAF), filtration, ultraviolet light disinfection, and chlorine disinfection.
- One booster pump station / pressure reducing station (Bosun).
- Two steel storage tanks, Frigate and Captains (volumes: Frigate 750 cubic meters or 200,000 USg and Captains 341 cubic meters or 90,000 USg).
- Supervisory Control and Data Acquisition (SCADA) system.
- Distribution system and supply pipe network (in excess of 27 kilometers of water mains).
- Other water system assets: water service connections and meters, approximately 70 fire hydrants, 6 pressure reducing valve stations, 100 gate valves and standpipes.

# Water Supply

Surface water supply monthly water levels are provided in Figures 2 and 3 for Buck Lake and Magic Lake respectively. It is important to note that under normal operating conditions, Buck Lake provides 80% and Magic Lake provides 20% of the annual raw water demand for the service. However, due to an algae event in Magic Lake, Buck Lake provided 100% of the raw water supply from August through November.



Figure 2: Buck Lake Monthly Water Level



Figure 3: Magic Lake Monthly Water Level

# Water Production and Demand

Referring to Figure 4, 236,423 cubic meters of water was extracted (water production) from both Buck Lake and Magic Lake water sources in 2024; a 12% increase from the previous year and a 9% increase in the rolling five-year average. Water demand (customer water billing) for the service totaled 130,145 cubic meters of water; essentially no change from the previous year and no change from the rolling five-year average.





The difference between annual water production and annual customer water demand is referred to as non-revenue water and can include water system leaks, water system maintenance and operational use (e.g. water main flushing, filter system backwashing), potential unauthorized use and fire-fighting use.

The 2024 non-revenue water (106,278 cubic meters) represents about 45% of the total water production for the service area. However, approximately 8,150 cubic meters of non-revenue water can be attributed to operational use. Therefore, the non-revenue water associated with system losses is approximately 41%, which is an increase from the previous year, is considered high for a water distribution system the size of Magic Lake Estates. Effort to determine the reason for the increase in non-revenue water including leak detection activities was initiated in 2024. Additional details of the leak detection activities are provided in the operations update section of the annual report.

Figure 5 below illustrates the monthly water production for Magic Lake Estates for the past five years. The monthly water production trends are typical for smaller water systems such as Magic Lake Estates. In review of water production for 2024 (highlighted below), the monthly trend for January through October is higher than the previous years and is the result of water system leak or leaks developing in the system. Monthly water production trends have returned to historical production rates starting in November.



Figure 5: Magic Lake Estates Water System Monthly Water Production.

# **Drinking Water Quality**

Two intake lines from Buck Lake and Magic Lake provided blended source water to the DAF treatment plant. The typical intake blending ratio in 2024 was 80/20 Buck/Magic Lake. From February until April, both Magic and Buck Lake were affected by a strong algal bloom with filter clogging potential. Magic Lake experienced a cyanobacteria bloom from August through November and during that event the system was supplied from Buck Lake to avoid adverse water quality impacts. No cyanotoxins were detected in the Magic Lake water throughout this algal event. The drinking water supplied to the service area was safe for consumption throughout the year.

The existing multi-barrier treatment system was able to deal with several algal events as well as high manganese events in both source lakes throughout the year.

The treatment system was also able to reduce the total organic carbon (TOC) concentration by nearly 50%; however, the high organic loading of the raw water still resulted in a high organic carbon concentration in the treated drinking water, which can have taste/odour/colour implications and can potentially lead to high disinfection by-product concentrations. Testing for total trihalomethanes in the treated water demonstrated levels in compliance with the Guidelines for Canadian Drinking Water Quality (GCDWQ). As in previous years, operations staff successfully mitigated localized adverse water quality events due to aging and stagnant water through spotflushing.

Overall Magic Lake Estates drinking water quality characteristics for 2024 are summarized below.

Raw Water:

- Both lake sources exhibited low concentrations of total coliform bacteria throughout the winter months but higher concentration during the warm water period. In Magic Lake, the total coliform bacteria concentration saw two unusually high spikes; at the beginning of May the coliform concentration reached a peak of 37,000 CFU/100 mL and in the middle of August of 63,000 CFU/100mL. In historical records, these concentrations never exceeded 6,000 CFU/100 mL before. The reasons for these anomalies are unknown. Buck Lake did not experience such extreme coliform spikes and coliform concentrations of up to 1,100 CFU/100 mL there were in line with previous summers.
- *E. coli* bacteria concentrations were generally low in both lakes throughout the year. During the summer months the concentrations were slightly higher than during the rest of the year. This is a typical pattern for lakes.
- Raw water from both sources was medium hard (57 67 mg/L CaCO3).
- Buck Lake exhibited a raw water turbidity range from 0.4 to 2.0 nephelometric turbidity units (NTU) with an annual median of 0.55 NTU, and Magic Lake a range from 0.8 to 9.2 NTU with an annual median of 1.6 NTU. The higher turbidity occurred typically during the winter period, but also occasionally in summer periods with algae blooms. The turbidity in both lakes was generally consistent with historical turbidity trends.
- Buck Lake, with an annual median total organic carbon (TOC) of 6.9 mg/L, and Magic Lake, with a median TOC of 9.7 mg/L, are considered mesotrophic lakes (medium productivity). TOC levels have been rising over the last few years, which could be an indication of increasing lake productivity.
- Buck Lake has higher colour results during the winter period. Magic Lake's water exceeds the aesthetic objective for water colour all year which correlates with the higher TOC values in this lake. The higher water colour is typically caused by elevated concentration of organics in the water.
- Both lakes exhibited seasonally elevated iron and manganese concentrations which reached peaks of 199 μg/L (Fe) in February and 53 μg/L (Mn) in August in Magic Lake, and 138 μg/L (Fe) in February and 158 μg/L (Mn) in October in Buck Lake. Buck Lake historically has higher seasonal manganese concentrations than Magic Lake. These recorded metal concentrations were in line with long term trends.

Treated Water:

- Treated water was safe to drink with no *E. coli* or total coliform bacteria found in the treated water.
- Treated water turbidity (cloudiness) was typically well below the GCDWQ limit of 1 NTU except for a very few isolated samples exceeding this limit, mostly associated with operational activities such as flushing or pipe repairs. On March 20, a sample collected at the treatment plant post treatment yielded a turbidity result of 10.9 NTU. An investigation did not find any

breakthrough or plant malfunction and SCADA monitoring data as well as resamples collected subsequently did not show any elevated turbidity leaving the plant. This anomalous result was likely due to a sampling error.

- TOC (TOC median 3.7 mg/L) was consistent with results in previous years. A nearly 50% reduction of TOC compared with the source water TOC concentrations indicates a satisfactory performance of the DAF plant. TOC concentrations of > 4 mg/L are considered a strong precursor for disinfection by-product formation and potential guidelines exceedance.
- Metals were below maximum acceptable concentration (MAC) and consistently below the aesthetic objective (AO) limits, confirming the efficacy of the potassium permanganate treatment system in removing in particular iron and manganese.
- Disinfection by-products such as total trihalomethanes (TTHM) were in compliance with the annual average requirement in the GCDWQ; no individual samples did exceed the GCDWQ limit of 100 μg/L. TTHM concentrations fluctuated between 55 and 96 μg/L for an annual average of 62 μg/L. Haloacetic acids (HAA) were not tested in 2024 but are typically low when TTHM are low.
- Periods with algal blooms or high algal activity in the source lakes affected occasionally the taste and odour of the drinking water.
- The water temperature exceeded the GCDWQ aesthetic limit of 15°C between June and October.
- The newly established GCDWQ MAC for aluminum was at no time exceeded in 2024.

The attached Table 1 and 2 provide a summary of the 2024 raw and treated water test results. Water Quality data collected from this drinking water system can be reviewed on the CRD website:

#### https://www.crd.bc.ca/about/data/drinking-water-quality-reports

#### Water System Operational Highlights

The following is a summary of the major operational issues that were addressed by CRD Infrastructure and Water Services staff:

- Water Treatment Plant:
  - Corrective maintenance computer network system.
  - Corrective maintenance electrical room ventilation system.
  - Replacement of failed chlorine analyzer equipment.
  - Replacement of failed clarification tank level transducer.
- Water system loss and leak detection/investigation efforts commenced in February. Work included:
  - The installation of real time pressure monitoring equipment at strategic locations within the water distribution system.
  - Creating a water loss management tool that was added to the Pender Island SCADA system which helped to track specific water distribution systems zones for water production.
  - Field zone leak detection that resulted in significant leak sites being located.
  - Using advanced leak detection technology that included the use of detectable tracer gas.
- Water system leak/break repairs:
  - Pirates Road January (water service line repair).
  - Bosuns Pump/Pressure Regulating Station.
  - Frigate Road May (water service line repair).

- Anchor Way July (auto flush site).
- Foc'sle Road July (significant leak located).
- Foc'sle Road August (second significant leak located).
- Galleon Way October.
- Spyglass Road (Buck Lake Dam) November.
- Schooner Way (x2) December.

# Water System Capital Project Updates

The Capital Projects that were in progress or completed in 2024 included:

- 1. Buck Lake Dam Repairs Phase 1 seepage weir design and fabrication initiated.
- 2. Electric Vehicle Charging Station completed.

# SEWER SYSTEM

#### **Service Description**

The community of Magic Lake Estates is primarily a rural residential development located on Pender Island in the Southern Gulf Islands Electoral Area which was originally serviced by a private sewer utility and in 1981 the service converted to the CRD. The sewer service is approximately 210 hectares in size and includes 730 parcels of which 651 are serviced. Some of the sewer infrastructure includes: 18.5 km of sewer pipe, 293 manholes, seven pump stations, and one treatment plant with an outfall into Swanson Channel. In the fall of 2024, Cannon wastewater treatment plant (WWTP) was replaced with a pump station and forcemain which now pumps to an upgraded Schooner WWTP. Cannon WWTP is, therefore, no longer in service.



Figure 5: Map of Magic Lake Estates Sewer System

#### **Wastewater Flows**

The total monthly and 8-year total annual flows are shown in Figures 6 and 7 below. Cannon Pump Station was commissioned on November 5, 2024, with all flow subsequently directed to the Schooner WWTP. The resulting change in flow for Cannon WWTP is visible in Figure 6. The graphs indicate that the 2024 wastewater flows were about 5% higher than in 2023, and about the same as the 10-year average. The monthly flows show lowest flows in the summer months when there is less rain, but the more significant variation occurs in the winter due to inflow and infiltration (where January had two-times the flow as July).

The Municipal Wastewater Regulation (MWR) contains requirements for the treatment, reuse and discharge of municipal wastewater effluent. The regulation includes a requirement that sewer flows reaching treatment plants should not exceed 2.0 times "average dry weather flow" during storm events with less than a 5-year return period. Based on the measured flow rates, the Magic Lake Estates sewer system does not meet that requirement.

The peak winter flows have also resulted in a number of total daily flow exceedances at each treatment plant as shown in Figure 8 below. Most of the exceedances occurred before the wastewater upgrades were completed at Cannon and Schooner WWTP. It is expected in future years that there will be no more exceedances at Cannon WWTP, and significantly fewer at Schooner WWTP. During large storm events there still will be some blending of screened and tertiary treated effluent (which may meet the regulatory effluent requirements but will be reported when blending occurs). Non-compliances due to power outages should be eliminated at Schooner WWTP due to the permanent standby generator.



Figure 6: Total Monthly Flows (m<sup>3</sup>/month)



Figure 7: Total Wastewater Flows (m<sup>3</sup>/year)

# Treated Effluent – Regulatory Compliance

Flow and effluent quality are assessed for compliance with the federal regulatory limits (Schooner only) and provincial discharge permits (both Schooner and Cannon) on a daily and monthly basis, respectively. In 2024, treated wastewater from Cannon met all regulatory limits for total suspended solids (TSS) and carbonaceous biochemical oxygen demand (CBOD), but had 10 flow exceedances. As noted above, there should be no more exceedances at Cannon WWTP as it now pumps to Schooner WWTP.

At Schooner, there were 5 presumed or documented compliance exceedances due to power outages, as well as 2 fecal coliform exceedances and 3 flow exceedances. Flow exceedances at both plants occurred during storm events when inflow and infiltration occurs and neither plant had been upgraded yet. Figure 8 shows the number of exceedances at each plant along with the annual precipitation. In 2024 there were 17 flow exceedances, (with 7 at Schooner and 10 at Cannon). In 2023, there were 16 flow exceedances but that was an abnormally dry year. In 2021, there were 73 flow exceedances. As noted, flow exceedances are primarily driven by volume and intensity of precipitation in each year. Now that the wastewater upgrades have been completed, there should be fewer flow exceedances. During large storm events there still will be some blending of screened and tertiary treated effluent at Schooner WWTP (which may still meet the regulatory effluent requirements but will be reported regardless).



Figure 8: Schooner and Cannon WWTP Flow Exceedances

#### **Receiving Water**

Routine receiving water monitoring is required every four years at both Magic Lake Estates WWTP's, with 2024 being a sampling year. This sampling involves collecting 5 samples in a 30-day period for comparison to provincial guidelines set to protect people who are recreating in the vicinity of the marine outfall. The 2024 receiving water sampling results were all well below water quality guidelines. An enhanced monitoring program will be in place for 2 years, as required by The Ministry of Environment and Parks after commissioning of the new Schooner WWTP. This program will consist of additional 5-in-30 sampling events, happening in summer 2025, winter 2025 and summer 2026.

Receiving water sampling is also required if there are planned bypasses, plant failures/overflows, or wet weather overflows that exceed 3 days duration in the winter or 1 day duration in the summer. There was no non-routine receiving water sampling required in 2024.

# **Sewer Service Operational Highlights**

The following is a summary of the major operational issues that were addressed by CRD Infrastructure and Water Services staff:

- Schooner Wastewater Treatment Plant
  - Significant operational effort and support as part of the Schooner Wastewater Treatment Plant capital upgrade project though commissioning and operational handover.
  - Corrective maintenance of the air blower equipment (now decommissioned).
  - Buccaneers Pump Station control float replacement.
- Cutlass Court Pump Station corrective maintenance that included replacement of nonrepairable pump.

• Collection system emergency response to sewer system backups because of blockages.

#### Sewer Service Capital Project Updates

After public consultation, a referendum was held on November 23, 2019, to borrow up to \$6 million to use along with a \$5.65 million "Investing in Canada Infrastructure" grant to complete some sewer replacement; and renewal of some pump stations and the Schooner WWTP.

The Capital Projects that were in progress or completed in 2024 included:

- Wastewater Infrastructure Renewal Sewer Replacement (Phase 1) In 2021-2022 about 3km of sewer pipe and 35 manholes were replaced in various locations in the sewer service area.
- 2. Wastewater Infrastructure Renewal Pump Station and Treatment Plant Upgrades (Phase 2 & 3)

The following items were completed and commissioned in 2024:

- Galleon Pump Station was commissioned on May 27, 2024, and includes new mechanical and electrical equipment including a new standby generator;
- Schooner Pump Station was commissioned on June 7, 2024, and includes new mechanical and electrical equipment including a new standby generator;
- Cannon Pump Station was commissioned on November 5, 2024. It is a brand-new pump station and now pumps wastewater to Schooner WWTP. The old Cannon WWTP is no longer in service; and
- Schooner WWTP was substantially complete on December 10, 2024, and includes new headworks, equalization tank, membrane bioreactor treatment processes, sludge holding tank, a new operations building with blowers, pumps, electrical room, and control room.
- The entire project was substantially complete on December 10, 2024.

In the near future, upgrades will have to be made to Buccaneer, Capstan, Cutlass and Masthead Pump Stations and additional sewer pipe replacement.

#### **Financial Report**

Please refer to the attached 2024 Statement of Operations and Reserve Balances.

Revenue includes parcel taxes (Transfers from Government), fixed user fees (User Charges), interest on savings (Interest earnings), a transfer from the maintenance reserve account, and miscellaneous revenue such as late payment charges (Other revenue).

Expenses include all costs of providing the service. General Government Services include budget preparation, financial management, utility billing and risk management services. CRD Labour and Operating Costs include CRD staff time as well as the cost of equipment, tools, and vehicles. Debt servicing costs are interest and principal payments on long term debt. Other Expenses include other costs to administer and operate the water and sewer systems, including insurance, water testing and electricity.

The difference between Revenue and Expenses is reported as Net revenue (expenses). Any transfers to or from capital or reserve funds for the service (Transfers to own funds) are deducted from this amount and it is then added to any surplus or deficit carry forward from the prior year, yielding an Accumulated Surplus (or deficit). In alignment with *Local Government Act* Section 374 (11), any deficit must be carried forward and included in next year's financial plan.

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Attachments: Table 1

Table 2

Appendix A: 2024 Statement of Operations and Reserve Balances

For questions related to this Annual Report please email <u>IWSAdministration@crd.bc.ca</u>

# Table 1

Table 1: 2024 Summary of Rav	w Water Test Re	esults, Magi	CLAKE E	states Wat	ter System	CANADIAN GUIDELINES	2014	- 2023 ANA		ESULTS	
Parameter	Units of	Annual	Samples	Ra	nge	<pre>&lt; = Less than or equal to</pre>	2014	Samples	Ra	inge	
Name (ND means Not Detected by analytical)	Measure method used)	Median	Analyzed	Minimum	Maximum		Median	Analyzed	Minimum	Maximum	
Physical/Biological Parameters											
Buck Lake		0.05	40				0.005	100	5.0	0.04	
Carbon, Total Organic Colour, True	mg/L TCU	6.95 15	12 17	6.3 11	8.1	≤ 15 AO	6.695 12	102 149	5.3	9.84 29	
Hardness as CaCO <sub>3</sub>	mg/L	66.95	4	65	67.6	No Guideline Required	65.1	42	57.9	91.9	
Turbidity	NTU	0.55	16	0.4	2.00	7.0 - 10.5 AO	0.95	25 163	0.36	8.68 10	
Magic Lake											
Carbon, Total Organic Colour. True	mg/L TCU	9.65 28	12 17	8.7 24	11 93	≤ 15 AO	8.7 24	98 140	6.4 6	11 50	
Hardness as CaCO <sub>3</sub>	mg/L	56.55	4	53.7	63.2	No Guideline Required	60.2	39	50.7	96	
pH Turbidity	pH units NTU	7.23 1.625	1 16	7.23 0.8	7.23 9.2	7.0 - 10.5 AO	7.4	20 148	6.9 0.49	8.03 24.5	
Non-Metallic Inorganic Chemicals           Buck Lake         Image: Chemical State Sta											
Silicon	mg/L as Si	4705	4	4440	5370		5125	42	4.6	11900	
Magic Lake	1										
Silicon	mg/L as Si	2500	4	1790	2580		1290	39	281	5760	
	Į.			Metals	<u> </u>						
Buck Lake											
Aluminum	ug/L as Al	7.05	4	3.1	49 < 0.5	2900 MAC / 100 OG	< 10	42	< 3	95.6	
Arsenic	ug/L as As	0.37	4	0.33	0.43	10 MAC	0.4	42	0.31	0.654	
Barium	ug/L as Ba	11.15	4	9.2	13	1000 MAC	9.95	42	7.5	21.9	
Bismuth	ug/L as Bi	< 1	4	< 1	< 1		< 1	40	0.074	< 1	
Boron	ug/L as B	< 50	4	< 50	< 50	5000 MAC	< 50	42	< 50	< 50	
Cadmum	ug/∟as Co mg/Las Ca	18.3	4	17.5	18.7	No Guideline Required	18	42	13.9	21.4	
Chromium	ug/L as Cr	<1	4	<1	< 1	50 MAC	<1	42	< 0.1	< 10	
Copper	ug/∟ as Co ug/L as Cu	< 0.2 0.605	4 4	< 0.2 0.51	< 0.2	2000 MAC / ≤ 1000 AO	< 0.2 0.9	42	0.089	37.3	
lron	ug/L as Fe	64.5	4	25.8	138	≤ 100 AO	72.3	42	14.2	507	
Lead	ug/L as Pb ug/L as Li	< 0.2 < 2	4	< 0.2 < 2	< 0.2 < 2	5 MAC	< 0.2 < 2	42 26	< 0.2 0.88	3.7 < 5	
Magnesium	mg/L as Mg	5.1	4	4.99	5.34	No Guideline Required	4.96	42	4.26	9.34	
Manganese Molybdenum	ug/Las Mn ug/Las Mo	67.3 < 1	4	15.2	158 < 1	120 MAC / ≤ 20 AO	43.25 < 1	42	11 0.065	506 < 20	
Nickel	ug/L as Ni	< 1	4	< 1	< 1		< 1	42	< 0.5	< 50	
Potassium	mg/L as K	1.255	4	1.23	1.3	50 MA C	1.17	42	0.509	1.38	
Silver	ug/L as Ag	< 0.02	4	< 0.02	< 0.02	No Guideline Required	< 0.02	42	< 0.001	< 10	
Sodium	mg/Las Na	11.4	4	11.2	11.8	≤ 200 AO	11	42	9.95	12.7	
Sulphur	mg/L as S	< 3	4	< 3	4	7000 MAC	< 3	42	< 3	4.1	
Tin	ug/L as Sn	< 5	4	< 5	< 5		< 5	42	< 0.2	< 20	
Thallium	ug/L as Ti	< 0.01	4	< 0.01	< 0.01		< 0.01	42	< 0.002	< 0.05	
Uranium	ug/L as U	< 0.1	4	< 0.1	< 0.1	20 MAC	< 0.1	40	0.012	< 0.1	
Zinc	ug/L as V ug/L as Zn	< 5	4	< 5	< 5	≤ 5000 AO	< 5	42	0.28 < 1	205	
Zirconium	ug/L as Zr	< 0.1	4	< 0.1	< 0.1		< 0.1	40	< 0.1	< 0.5	
Magic Lake Aluminum	ug/Las Al	11.4	4	47	68.3	2900 MAC / 100 OG	20.9	39	< 0.01	713	
Antimony	ug/L as Sb	< 0.5	4	< 0.5	< 0.5	6 MAC	< 0.5	39	< 0.5	< 0.5	
Arsenic	ug/L as As	0.445	4	0.4	0.72	10 MAC	< 0.5	39	0.35	2.75	
Barium BervIlium	ug/L as Ba ug/L as Be	13.95	4	12.5	15 < 0.1	1000 MAC	14.9 < 0.1	39 39	< 9	84.9 < 3	
Bismuth	ug/L as Bi	< 1	4	< 1	< 1		< 1	37	< 1	< 1	
Boron	ug/L as B	< 50	4	< 50 < 0.01	< 50 < 0.01	5000 MAC 7 MAC	< 50 < 0.01	39 39	< 50 < 0.01	64 0.01	
Calcium	mg/L as Ca	14.4	4	13	16	No Guideline Required	15.1	39	12.7	19.8	
Cobalt	ug/L as Cr	< 1	4	< 1	< 1	50 MAC	< 1	39 39	< 1	< 10 < 20	
Copper	ug/L as Cu	0.925	4	0.32	1.53	2000 MAC / ≤ 1000 AO	1.2	39	0.28	8.12	
lron Lead	ug/L as Fe	137.5 < 0.2	4	111	199 < 0.2	≤ 100 AO 5 MAC	224 < 0.2	39 39	48.6	4260 0.69	
Lithium	ug/L as Li	< 2	4	< 2	< 2	0 111 (0	< 2	28	< 2	< 5	
Magnesium	mg/Las Mg	5.085 37.35	4	4.97	5.65	No Guideline Required $120 \text{ MAC} / \leq 20 \text{ AO}$	5.47 42.3	39 39	4.5	11.5 5000	
Molybdenum	ug/L as Mo	< 1	4	< 1	< 1	120 1007 220 70	< 1	39	< 1	< 20	
Nickel	ug/Las Ni mg/Las K	< 1	4 4	< 1 0 709	< 1 1.32		< 1 1 13	39 39	< 1 0 17	< 50 1 62	
Selenium	ug/L as Se	< 0.1	4	< 0.1	< 0.1	50 MAC	< 0.1	39	< 0.1	< 0.5	
Silver	ug/L as Ag	< 0.02	4	< 0.02	< 0.02	No Guideline Required	< 0.02	39	< 0.02	< 10	
Strontium	ug/L as Na	104.5	4	96.9	12.3	7000 MAC	108	39	86	158	
Sulphur	mg/L as S	< 3	4	< 3	< 3		< 3	37	< 3	3.7	
Titanium	ug/L as Ti	< 5	4	< 5	< 5		< 5	39	< 5	22	
Thallium	ug/L as Ti	< 0.01	4	< 0.01	< 0.01	20 MA C	< 0.01	37	< 0.01	< 0.05	
Vanadium	ug/∟ as U ug/L as V	< 0.1	4	< 0.1	< 0.1	ZU MAC	< 0.1	37	< 0.1	< 10	
Zinc	ug/L as Zn	< 5	4	< 5	< 5	≤ 5000 AO	< 5	39	< 1	215	
	uy/∟as ∠r	< U. I	4	× 0.1	0.1	l	< 0.1	37	~ 0.05	<ul><li>∨ 0.5</li></ul>	
			Microb	oial Para	meters						
Indicator Bacteria (Bud	ck Lake)		I		I			1			
Coliform, Total	CFU/100 mL	46	17	3	1100	0 MAC	73	181	<1	4700	
E. coli Hetero Plate Count 7 day	CFU/100 mL	< 1	17 Not test	< 1	8	0 MAC	< 2 1345	181	<1	34	
				20 III 2024			1040	04		3000	
Indicator Bacteria (Mag	gic Lake)										
Coliform, Total	CFU/100 mL	840	16	17	63000	0 MAC	411	142	2	6000	
E. coli	CFU/100 mL	4	17	< 1	80		< 2	150	<1	115	
Hetero. Hate Count, 7 day	CFU/1 mL	]	Not teste	ea in 2024		No Guideline Required	2600	59	370	20000	
Parasites (Buck La	Parasites (Buck Lake)										
Cryptosporidium Total occusts	occvsts/1001	<1	2	<1	<1	Zero detection desirable	< 1	22	< 1	1 45	
<i>Giardia</i> , Total cysts	cysts/100 L	<1	2	<1	<1	Zero detection desirable	< 1	22	< 1	< 1	
Parasites (Magic L	ake)										
Cryptosporidium, Total oocysts Giardia, Total cysts	oocysts/100 L cysts/100 L	<1 <1	2	<1 <1	<1 <1	Zero detection desirable Zero detection desirable	< 1 < 1	22 22	< 1 < 1	5.3 < 1	

# Table 2

Table 2: 2024 Summary of	Treated Water T	est Results	, Magic L	ake Estate	s Water S	System					
PARAMETER		2024 ANALYTICAL RESULTS				CANADIAN GUIDELINES	2014 - 2023 ANALYTICAL RESULTS				
Parameter	Units of	Annual	Samples	Ra	nge	< = Less than or equal to		Samples	R	ange	
Name	Measure	Median	Analyzed	Min.	Max.	<u>s</u> = Less than or equal to	Median	Analyzed	Minimum	Maximum	
ND means Not Detected by analytical method used											
			Phys	sical Par	ameters	1			-		
Carbon Total Organic	mg/L as C	37	20	33	47		3.83	172	22	13.5	
Colour. True	TCU	< 2	51	< 2	9	15 AO	< 2	743	< 0.7	11	
Hardness as CaCO3	ma/L	65.25	12	62.8	66.9	10710	64.7	108	56.4	72.1	
pH	No units	7.03	1	7.03	7.03	7.0-10.5 AO	7.16	29	6.89	7.7	
Turbidity	NTU	0.15	48	0.05	10.9	1 MAC and ≤ 5 AO	< 0.14	975	0.05	13	
Water Temperature	Degrees C	11.95	296	3.6	23.9	≤ 15 C°C	10.6	4609	0	24.7	
Microbial Parameters											
Indicator Bacte	eria										
Coliform Total	CEU/100 ml	<1	191	< 1	< 1	0 MAC	< 1	1378	<1	45	
E. coli	CFU/100 mL	<1	191	< 1	<1	0 MAC	< 1	1378	<1	< 1	
Hetero. Plate Count, 7 day	CFU/1 mL	45	20	< 10	380	No Guideline Required	< 10	198	< 10	6700	
				Disinfect	ants						
Disinfectants	6										
									_		
Chlorine, Free Residual	mg/L as Cl2	0.47	299	0.02	1.67	No Guideline Required	0.4	5017	0	4.9	
Chlorine, Total Residual	mg/L as Cl <sub>2</sub>	0.675	138	0.14	1.96	No Guideline Required	0.62	4589	0.08	3.8	
			Disinfo	ction P	Produc	te					
			DISIIIIE		-FIOUUC			1			
Tribalomethanes	(THMs)	1									
maiomethales	(1111113)										
Bromodichloromethane	ua/L	16.5	8	13	22		18.5	65	12	24	
Bromoform	ug/L	< 1	8	< 1	< 1		< 1	65	< 0.1	< 1	
Chloroform	ug/L	42	8	33	70		54.5	2	52	57	
Chlorodibromomethane	ug/L	3.35	8	2.2	4		3.25	64	<0.1	4.9	
Total Trihalomethanes	ug/L	62	8	51	96	100 MAC	69	65	46	120	
Haloacetic Acids	(HAAs)		Netteste	d in 2024		00.140.0		40	1.0.4	40	
HAA5	ug/L		NOT TESTE	a in 2024		80 MAC	33.5	12	< 0.1	46	
Metals			1					1			
Aluminum	ug/L as Al	25.1	12	14.4	51.9	2900 MAC / 100 OG	24.4	108	11.7	186	
Antimony	ug/L as Sb	< 0.5	12	< 0.5	< 0.5	6 MAC	< 0.5	108	0.033	< 0.5	
Arsenic	ug/L as As	0.235	12	0.18	0.28	10 MAC	0.22	108	0.14	0.36	
Barium	ug/L as Ba	8.8	12	8	10.5	1000 MAC	7.9	108	5.7	10.7	
Beryllium	ug/L as Be	< 0.1	12	< 0.1	< 0.1		< 0.1	108	< 0.01	0.1	
Bismuth	ug/L as Bi	< 1	12	< 1	< 1		< 1	108	< 0.005	1	
Boron	ug/L as B	< 50	12	< 50	< 50	5000 MAC	< 50	108	< 50	52	
Cadmium	ug/L as Cd	< 0.01	12	< 0.01	< 0.01	7 MAC	< 0.01	108	< 0.005	0.035	
Calcium	mg/L as Ca	17.8	12	16.8	18.3	No Guideline Required	17.4	108	15.2	19.8	
Chromium	ug/L as Cr	<1	12	< 1	< 1	50 MAC	< 1	108	< 0.1	< 1	
Cobalt	ug/L as Co	< 0.2	12	< 0.2	< 0.2		< 0.2	108	0.02	< 0.5	
Copper	ug/L as Cu	13.25	12	< 0.2	40.3	2000 MAC / ≤ 1000 AO	9.65	108	0.21	55.4	
Iron	ug/L as Fe	6.3	12	< 5	46.2	≤ 100 AO	8.2	108	2.4	58.9	
Lead	ug/L as Pb	0.675	12	< 0.2	2.39	5 MAC	0.455	108	0.057	2.21	
Lithium	ug/L as Li	< 2	12	< 2	< 2		< 2	65	0.85	< 5	
Magnesium	mg/Las Mg	5.065	12	4.91	5.38	No Guideline Required	5.035	108	4.31	5.7	
Manganese	ug/L as Mn	1.75	12	< 1	14.2	120 MAC / ≤ 20 AO	3.25	108	< 1	190	
Molybdenum	ug/Las Mo	<1	12	< 1	< 1		< 1	108	0.05	< 1	
Nickel	ug/L as Ni	<1	12	< 1	2.4		< 1	108	0.309	2.8	
Potassium	mg/Las K	1.375	12	1.28	1.48		1.37	108	1.17	1.63	
Selenium	ug/L as Se	< 0.1	12	< 0.1	< 0.1	50 MAC	< 0.1	108	< 0.04	0.11	
Silicon	ug/L as Si	4080	12	3620	4440	No Quidelin - Dominin - I	4030	108	4.13	5140	
19VIIC	ug/L as Ag	< 0.02 44.05	12	< 0.0Z	< 0.02 10		< 0.02	108	< 0.005	< U.UZ	
Sudium	Ing/L as Na	14.25	12	13.5	100	≤ 200 AU	13.4	108	100	10.3	
Subbur	ug/L as Sr	121.5	12	110	132	7000 MAC	- 11/	108	102	133	
Tin	IIIII/L as S	~ 5	12	~ 5	4		~ 5	108	<02	4.5	
Titanium		~ 5	12	~ 5	~5		~ 5	100	< 0.2	~ 5	
Thellium		< 0.01	12	< 0.01	< 0.01		< 0.01	108	< 0.0	< 0.05	
Uranium	ug/Las II	< 0.01	12	< 0.01	< 0.01	20 MAC	< 0.01	108	< 0.002	< 0.00	
Vanadium	ug/L as V	< 5	12	< 5	< 5		< 5	108	< 0.2	< 5	
Zinc	ug/L as Zn	9.75	12	< 5	43.8	≤ 5000 AO	5.6	108	2.02	39.7	
Zirconium	ug/L as Zr	< 0.1	12	< 0.1	< 0.1		< 0.1	107	< 0.1	< 0.5	