
**THE CORPORATION OF THE TOWNSHIP OF HAMILTON**

# CAMBORNE AND CREIGHTON HEIGHTS

# DRINKING WATER SYSTEMS

## ANNUAL & SUMMARY REPORT 2021

Prepared By:

Water Operations Team

**CONTENTS**

## 1. WATER SYSTEMS INFORMATION

All items listed below and referenced throughout this document are available at any time by contacting the Water Operations Manager at (905) 342-2810 ext. 147 or emailing aschoenleber@hamiltontownship.ca

### Camborne

- Drinking Water System # 220008113
- Municipal Drinking Water License # 139-103
- Drinking Water Works Permit # 139-203
- Permit to Take Water # 2140-AP5P6D

### Creighton Heights

- Drinking water System # 220008104
- Municipal Drinking Water License # 139-102
- Drinking Water Works Permit # 139-202
- Permit to Take Water # 7265-8W9HLX

## 2. PURPOSE

The *Safe Drinking Water Act, 2002* sets out the framework for the treatment and distribution of safe drinking water in Ontario. *Ontario Regulation 170/03* sets requirements for public waterworks regarding treatment equipment, operational checks, maintenance, sampling and corrective actions. In addition to this, the regulation also has requirements for specific reports that must be prepared by the owner of a drinking water system annually.

This report satisfies all conditions set out in *Ontario Regulation 170/03,* Section 11 – Annual Reports and Schedule 22 – Summary Reports.

This report is completed annually by the Water Operations Team, representing the Township of Hamilton as the owner and operating authority of the Camborne Drinking Water System and the Creighton Heights Drinking Water System.

## 2.1 Scope

The Annual & Summary Report contains information about the two Drinking Water Systems, for which the Township of Hamilton is the owner and operating authority, for the period of January 1, 2021 to December 31, 2021. *Ontario Regulation 170/03* requires this information be made available to the following stakeholders:

- Drinking Water System Owner (Mayor and Council)
- Operating Authority Top Management (CAO)
- The Public

## 2.2 Availability

Hard copies of this Annual Summary Report are available for viewing at the Township of Hamilton office located at 8285 Majestic Hills Drive, Cobourg, ON. Alternatively, the report can be accessed online at www.hamiltontownship.ca by navigating to the Water Services page located in the Resident Services tab.

# 3. DRINKING WATER SYSTEMS OVERVIEW

## Camborne

The Camborne Drinking Water System provides potable water to approximately 70 water connections consisting of homes, one elementary school and one church. There are no commercial or industrial service connections on this system.

The Camborne Water Treatment Plant (WTP) takes water from two drilled artesian wells. The water is dosed with sodium hypochlorite (liquid chlorine) before being directed through two greensand filters used for removal of oxidized iron. Filtered water is discharged into underground clearwells which consist of two cells with baffle curtains which ensure proper chlorine contact time in the achievement of primary disinfection. A High Lift pumping system, consisting of three pumps and a series of large pressure tanks, is used to provide flow and adequate pressure to the end users in the distribution system. Continuous online monitoring is used to measure chlorine residual, pressure and flow at all times to maintain regulatory compliance. These instruments are tied in with our Supervisory Control and Data Acquisition System (SCADA) and are equipped with alarms to notify a Water Operator of any deviation from a control setpoint. Process wastewater is de-chlorinated using sodium thiosulfate and allowed to settle before clear supernatant liquid is pumped to the storm water system. Solids from process wastewater tanks are removed periodically.

The distribution system consists of approximately 3.5 km of watermains throughout the settlement area. The Camborne Drinking Water System is not designed to provide fire protection.

**Creighton Heights**

The Creighton Heights Drinking Water System provides potable water to approximately 475 water connections consisting of residential customers, approximately 10 commercial/industrial properties and one elementary school.

The Creighton Heights WTP takes water from three drilled wells. The water is dosed with potassium permanganate before being directed through two manganese greensand filters. This process is used for removal of oxidized iron and manganese. Filtered water is conveyed through Ultraviolet Reactors to achieve primary disinfection. Sodium hypochlorite is dosed for secondary disinfection prior to the water being discharged into underground clearwells which consists of cells with baffle curtains to ensure proper residence time. A High Lift pumping system, consisting of three pumps for regular system pressure and two pumps designed for fire protection, provide flow and pressure to the end users of the distribution system. A booster station is located in the highlift suction well and conveys drinking water to Deerfield Estates. Continuous online monitoring is used to measure chloramine/chlorine residual, pressure and flow at all times, to maintain regulatory compliance. These instruments communicate with our SCADA and are equipped with alarms to notify a Water Operator of any deviation from a control setpoint. Process wastewater is de-chlorinated using sodium thiosulfate and allowed to settle before clear supernatant liquid is pumped to the storm water system. Solids from process wastewater tanks are removed periodically.

The distribution system consists of approximately 14 km of watermains ranging in diameter from 50 mm to 300 mm. The Creighton Heights Drinking Water System is designed for fire protection with 72 hydrants in the Baltimore Subdivision and areas along Cty Rd 45.

## 4. COMPLIANCE

### 4.1 License and Permit

The Camborne and Creighton Heights Drinking Water Systems were operated in accordance with all terms and conditions of their Municipal Drinking Water Licenses (MDWL), Drinking Water Works Permits (DWWP), Permit to Take Water (PTTW) and all relevant Provincial legislation in 2021. Any items of non-compliance are identified in the annual Ministry of Environment Conservation and Parks (MECP) Inspection Reports referenced in section 4.2. The MDWL's and DWWP's for both Camborne and Creighton Heights were renewed in Aug of 2021.

The Permit to Take Water governs the amount of groundwater allowed to be taken per day at specified flow rates per minute. There were no instances of exceeding the permitted amount of

water taking on any day during 2021. The Camborne and Creighton Heights Drinking Water Systems flow summaries are detailed below.

**Camborne**

## Raw Water

The two wells at Camborne are classified as artesian and thus overflow constantly to a storm water system which ultimately discharges to an adjacent creek. Flow meters measure the overflow to ensure regulatory compliance. The artesian flow is relatively constant from both wells and is well below the permitted amount. The water taken for treatment and distribution is metered to ensure compliance with permitted amounts.

**Table 1. Camborne Permit to Take Water # 2140-AP5P6D, Maximum Flows and Totals**

| Location | Maximum Flow (L/min) | Maximum Total per Day ($m^3$) |
|---|---|---|
| Well 1A Plant Flow | 200 | 288 |
| Well 2A Plant Flow | 286 | 412 |
| Well 1A Artesian Overflow | 340 | 489.6 |
| Well 2A Artesian Overflow | 360 | 518.4 |

Note: $1m^3 = 1000$ L

**Table 2. Camborne Raw Water Taken 2021**

| Month | Total Raw Water Taken ($m^3$) | Average Daily Raw Taken ($m^3$) | Maximum Day of Raw Taken (both wells) ($m^3$) |
|---|---|---|---|
| January | 1305.57 | 42.1 | 79.51 |
| February | 1232.06 | 44.0 | 71.04 |
| March | 1554.32 | 50.3 | 69.02 |
| April | 1519.92 | 50.7 | 106.47 |
| May | 2582.51 | 83.3 | 383.75 |
| June | 1820.62 | 60.7 | 177.29 |
| July | 1596.74 | 51.6 | 153.09 |
| August | 1554.89 | 50.2 | 87.55 |
| September | 1452.83 | 48.2 | 94.57 |
| October | 1709.94 | 55.2 | 154.68 |
| November | 1239.56 | 41.3 | 137.23 |
| December | 1361.47 | 21.96 | 75.44 |

Average daily water taking remains relatively consistent throughout the year with slightly elevated averages during summer months. Overall daily average for the year is approximately 50 $m^3$/day, which represents roughly 17% of the permitted water taking from Well 1A and roughly 12% of the permitted water taking from Well 2A. During the months of May and November, there was higher water taking in order to rehabilitate Well 1A and Well 2A, respectively. Thus, the average customer usage is actually lower.

## Treated Water

In accordance with the Camborne Municipal Drinking Water License, the "maximum daily volume of treated water that flows from the treatment subsystem into the distribution system shall not exceed the rated capacity of 415 $m^3$/day". Table 3 below illustrates the flow data for 2021. The daily average for the year is approximately 46.6 $m^3$/day, representing roughly 11% of the rated capacity.

**Table 3. Camborne Treated Flow Data 2021**

| Month | Total Treated Water Discharged ($m^3$) | Average Daily Treated Water Discharged ($m^3$) | Maximum Day Treated Water Discharged ($m^3$) |
|---|---|---|---|
| January | 1248.33 | 40.27 | 49.98 |
| February | 1190.06 | 46.43 | 46.43 |
| March | 1356.84 | 43.77 | 47.56 |
| April | 1314.88 | 43.83 | 59.51 |
| May | 1797.36 | 57.98 | 110.79 |
| June | 1737.88 | 57.93 | 85.15 |
| July | 1227.37 | 39.59 | 53.14 |
| August | 1469.81 | 47.41 | 76.04 |
| September | 1338.22 | 44.61 | 55.62 |
| October | 1662.22 | 53.62 | 143.03 |
| November | 1218.52 | 40.62 | 77.16 |
| December | 1325.67 | 42.76 | 64.79 |

### Creighton Heights

## Raw Water

The Creighton Heights Water Treatment Plant (WTP) takes water from three drilled wells. Wells 6 and 7 are the primary production wells and only one of these wells can operate at a time. Well 1 is a back-up, designed to run in conjunction with either primary well. The water taken for treatment and distribution is metered to ensure compliance with permitted amounts.

**Table 4. Creighton Heights Permit to Take Water # 7265-8W9HLX, Maximum Flows and Totals**

| Location | Maximum Flow (L/min) | Maximum Total per Day ($m^3$) |
|---|---|---|
| Well 1 | 225 | 489.6 |
| Well 6 | 680 | 979.2 |
| Well 7 | 680 | 979.2 |

**Table 5. Creighton Heights Raw Water Taken 2021**

| Month | Total Raw Water Taken ($m^3$) | Average Daily Raw Taken ($m^3$) | Maximum Day for 3 wells ($m^3$) |
|---|---|---|---|
| January | 9261.50 | 298.76 | 420.23 |
| February | 7848.89 | 299.33 | 463.49 |
| March | 8923.62 | 316.50 | 456.68 |
| April | 8655.46 | 304.10 | 403.80 |
| May | 12632.08 | 443.20 | 714.02 |
| June | 14527.11 | 570.00 | 1183.39 |
| July | 10737.91 | 464.70 | 866.48 |
| August | 13029.15 | 435.50 | 814.04 |
| September | 10405.29 | 346.90 | 869.49 |
| October | 13302.17 | 496.40 | 877.89 |
| November | 9545.39 | 341.60 | 929.67 |
| December | 8899.80 | 287.10 | 721.39 |

Average daily water taking remains relatively consistent throughout the year with slightly elevated averages during summer months and during the hydrant flushing program in the fall. Overall daily average for the year is approximately 384 $m^3$/day, representing roughly 39 % of the permitted water taking from Well 6 or 7. These numbers indicate that we are within our regulated limits.

## Treated Water

In accordance with the Creighton Heights Municipal Drinking Water License, the "maximum daily volume of treated water that flows from the treatment subsystem into the distribution system shall not exceed the rated capacity of 979.2 $m^3$/day". Table 6 below illustrates the flow data for 2021. The daily average for the year is approximately 332 $m^3$/day, which represents roughly 34% of the rated capacity and permitted discharge.

**Table 6. Creighton Heights Treated Flow Data 2021**

| Month | Total Treated Water Discharged ($m^3$) | Average Daily Treated Water Discharged ($m^3$) | Maximum Day Treated Water Discharged ($m^3$) |
|---|---|---|---|
| January | 8765.23 | 282.75 | 321.99 |

| | | | |
|---|---|---|---|
| February | 7497.18 | 267.76 | 314.09 |
| March | 8396.08 | 270.84 | 203.15 |
| April | 8136.49 | 271.21 | 337.55 |
| May | 11900.76 | 383.90 | 589.47 |
| June | 13859.42 | 461.98 | 668.41 |
| July | 10153.29 | 327.52 | 475.59 |
| August | 12385.05 | 414.01 | 555.77 |
| September | 9854.21 | 328.47 | 409.18 |
| October | 12573.38 | 405.59 | 565.45 |
| November | 8991.25 | 299.71 | 426.48 |
| December | 8432.36 | 272.01 | 321.03 |

It should be noted that the Creighton Heights Drinking Water System appears to be below rated and/or permitted capacities as illustrated in the tables above. The design of the Water Treatment Plant and continued water processing challenges demonstrate that we are currently running very close to the processing capabilities. If new development in the Creighton Heights Settlement Area is going to be considered, further review of WTP processing capabilities must be considered.

### 4.2 MECP Annual Inspections

The 2021 MECP annual inspections for Camborne and Creighton Heights have not been completed yet as of the publishing of this report. Once inspections have taken place and the reports are received, the results will be available to the Public on the Township website.

### 4.3 Adverse Water Quality Incidents and Corrective Actions

There were two reportable water quality incidences in the Camborne Drinking Water System that occurred during 2021:

- Report of SCADA data gaps for the following dates/times: 16Aug2021-0343 to 0431, 24Aug2021-0455 to 0524 and 29Aug2021-0341 to 0410. Back up data collection has been set up for both plants by our SCADA Integrator and will be collected going forward as a contingency for any future data gaps.

- On 4Nov2021 at 1441, a very low amount of raw water flow through Well 1A flowmeter was noticed while Well 1A was out of service during rehabilitation work on Well 2A. Well contractor had inadvertently shut off the valve to artesian flow which forced water up to the plant. Raw water flow was stopped immediately upon finding the issue. Investigation of the issue found that it could not be confirmed with certainty that the

sodium hypochlorite system was running during this time. Samples were collected from the clearwell with the following chlorine residuals:

- 0.86mg/L Free and 0.97mg/L Total at 1505
- 0.86mg/L Free and 0.98mg/L Total at 1530
- 0.86mg/L Free and 0.92mg/L Total at 1600

Well 1A Sodium Hypochlorite dosing factor was raised to increase Free chlorine residual.

There were the following reportable water quality incidences in the Creighton Heights Drinking Water System that occurred in 2021:

- 18Feb2021-On Call Operator called in for spike above 3.00 mg/L of chloramine to 3.035mg/L from 0309-0314 on continuous analyzer. Reading before spike was 2.54 mg/L and reading after spike was 2.54 mg/L. Instrumentation anomaly.
- 25Mar2021- On Call Operator called in for spike above 3.00 mg/L of chloramine to 3.090 mg/L from 0018-0023 on continuous analyzer. Reading before spike was 2.60 mg/L and reading after spike was 2.60 mg/L. Instrumentation anomaly.
- 30Apr2021- On Call Operator called in for spike above 3.00 mg/L of chloramine to 3.090 mg/L from 2300-2305 on continuous analyzer. Reading before spike was 2.48 mg/L and reading after spike was 2.48 mg/L. Instrumentation anomaly.
- 22May2021- On Call Operator called in for spike above 3.00 mg/L of chloramine to 3.060 mg/L from 2040-2049 on continuous analyzer. Reading before spike was 2.69 mg/L and reading after spike was 2.70 mg/L. Instrumentation anomaly.
- 31May2021- On Call Operator called in for spike above 3.00 mg/L of chloramine to 4.260 mg/L from 0512-0514 on continuous analyzer. Reading before spike was 2.53 mg/L and reading after spike was 2.56 mg/L. Instrumentation anomaly.
- 3Jun2021- On Call Operator called in for spike above 3.00 mg/L of chloramine to 3.810 mg/L from 1845-1847 on continuous analyzer. Reading before spike was 2.55 mg/L and reading after spike was 2.57 mg/L. Instrumentation anomaly.
- 19Jun2021- On Call Operator called in for dip below 0.25 mg/L of chloramine to 0.14 mg/L from 2359-0005 on continuous analyzer. Reading before dip was 2.37 mg/L and reading after spike was 2.48 mg/L. On Call Operator checked residual with Handheld analyzer which read 2.58 mg/L. Instrumentation anomaly.
- 20Jun2021- On Call Operator called in for dip below 0.25 mg/L of chloramine to 0.04 mg/L from 1952-1954 on continuous analyzer. Reading before dip was 2.36 mg/L and reading after spike was 2.46 mg/L. On Call Operator checked residual with Handheld analyzer which read 2.56 mg/L. Instrumentation anomaly.
- 21Jun2021- On Call Operator called in for dip below 0.25 mg/L of chloramine to 0.19 mg/L from 1137-1140 on continuous analyzer. Reading before dip was 2.29 mg/L and reading after spike was 2.49 mg/L. On Call Operator checked residual with Handheld analyzer which read 2.64 mg/L. Instrumentation anomaly.

- 22Jun2021- On Call Operator called in for spike above 3.00 mg/L of chloramine to 3.06 mg/L from 2046-2049 on continuous analyzer. Reading before spike was 2.70 mg/L and reading after spike was 2.69 mg/L. Instrumentation anomaly.
- 23Jun2021- On Call Operator called in for dip below 0.25 mg/L of chloramine to 0.035 mg/L from 1911-1914 on continuous analyzer. Reading before dip was 2.45 mg/L and reading after spike was 2.39mg/L. Instrumentation anomaly.

Note: for all the above instrument anomalies, extensive troubleshooting was conducted to resolve the issue including assessment of: chloramine analyzer, wiring and logic by Water Operator, Hach Technician and electrician. All equipment related to this process was thoroughly checked and rechecked with no issues found. Issue resolved itself with no indication why this was happening. Electrical anomalies are not uncommon especially with original process equipment such as the control panel known as CP-01. It is original from 1996 and needs to be replaced.

- 6Oct2021 – while switching from Chloramination Disinfection to Free Chlorination Disinfection for the annual Fall Creighton Heights Distribution watermain denitrification, the chloramine residual rose above 3.00 mg/L to 3.056mg/L at 0139 for approximately 1 hour.
- 6Oct2021 – while continuing to switch from Chloramination Disinfection to Free Chlorination Disinfection for the annual Fall Creighton Heights Distribution watermain denitrification, the chloramine residual rose above 3.00 mg/L to 3.05 mg/L at 0805. The correction factor for hypo dosing for Free Chlorination was adjusted. Residual dropped below 3.00 mg/L at 1341 and remained below 3.00 mg/L. This process of switching from chloramination to chlorination takes time as it has to travel through the entire clearwell system

## 5. CAPITAL AND OPERATING INFRASTUCTURE UPGRADES

### Camborne

In the prior year, on Nov 11, 2020, Well 1A failed catastrophically and could no longer deliver water to process. As quickly as possible, a specialized well rehabilitation firm was contracted to restore supply from Well 1A. Holes in the riser pipe were discovered which were caused by electrochemical corrosion and inferior riser pipe material from original construction. The riser pipe and the well pump/motor were replaced as the original pump/motor was showing severe signs of wear and deterioration due to sand entering through the well casing. Further work was needed on Well 1A as the casing had multiple holes in it due to high pressure from artesian flow. This further work was completed in May of 2021. The work included installation of a stainless steel liner, injection of specifically engineered thixotropic grout in the annular space and replacement of the well head. Well 1A became fully functional. Cost: $80000

On 01Nov2021, a specialized well rehabilitation firm was contracted to restore supply from Well 2A as Well 2A had not been reliably functional since prior to 2020. Well 2A was jetted with high pressure to redevelop the aquifer. Specifically engineered thixotropic grout was injected into the annular space, between the original casing and the PVC liner (PVC liner was installed several years ago). A new well pump was installed. Well 2A became fully functional. Cost: $56000

Flow Control Valves were replaced on the Raw Water Feed lines. Cost: $9000

Kennedy Rd watermain was re-disinfected, tested and re-commissioned after laying dormant since construction in preparation for supplying water to a new home at the north end of Kennedy Rd. Cost: $9000

**Creighton Heights**

During the spring/early summer, Wells 1 and 6 were inspected and rehabilitated. Cost: $48000

Due to a leak, a section of highlift header was replaced, all while maintaining flow and pressure to distribution. Cost: $5000

**Both Systems**

Approximately 30 water meters were replaced based on condition, state of operation and age. Cost: $21000

The Water Department secured a good quality used vehicle from the County for use as our Water Truck. Cost: $7000.

## 6. SAMPLING AND ANALYSIS

As per O. Reg 170/03, water quality samples were collected throughout the Water Systems and results are provided below.

**Camborne**

**Table 7. Camborne Microbiological Testing (Schedule 11 of O. Reg 170/03)**

| | Number of Samples | E.Coli (cfu/100mL)<br><br>(min #)-(max #) | Total Coliform (cfu/100mL)<br><br>(min #)-(max #) | Number of HPC Samples | HPC Results (cfu/1mL)<br><br>(min #)-(max #) |
|---|---|---|---|---|---|
| **Raw** | 28 | 0 – 0 | 0 – 0 | N/A | N/A |
| **Distribution** | 52 | 0 – 0 | 0 – 0 | 52 | 0 – 22 |

Note: cfu refers to colony forming units

**Table 8. Camborne Operational Testing (Schedule 7 of O. Reg 170/03)**

| | Number of Grab Samples | Range of Results (Min – Max) |
|---|---|---|
| **Chlorine Residual (primary disinfection)** | 8760 (continuous monitoring) | 0.78 mg/L – 1.27 mg/L |

**Table 9. Camborne Additional Sampling Requirements**

| Date of MDWL | Parameter | Number of Samples | Maximum Allowable Annual Average Concentration | Actual Average Concentration |
|---|---|---|---|---|
| 21Aug2021 | Total Suspended Solids | 4 (Quarterly) | 25 mg/L | 7.25 mg/L |

**Table 10. Camborne Lead Testing (MDWL 139-103 Schedule D)**

| Location Type | Date | Sample Location | pH | Alkalinity | Lead |
|---|---|---|---|---|---|
| Distribution | 28Jan2021 | Schoolhouse | 7.2 | 190 mg/L | N/A |
| Distribution | 26July2021 | Schoolhouse | 7.2 | 199 mg/L | N/A |

There are many other parameters that are tested on a less frequent basis. For these parameters, the most recent analysis is listed in Table 11 below. <MDL refers to 'less than Method Detection Limit' which means the measured concentration of the parameter is less than the lowest measurement possible.

**Table 11. Camborne Organic and Inorganic Sampling (Schedules 13, 23 and 24 of O.Reg 170/03)**

| Parameter | Sample Date | Result Value | Unit of Measure | Exceedance |
|---|---|---|---|---|
| Antimony | 26May2021 | 0.9<MDL | ug/l | no |
| Arsenic | 26May2021 | 1.0 | ug/l | no |
| Barium | 26May2021 | 125 | ug/l | No |
| Boron | 26May2021 | 20 | ug/l | No |
| Cadmium | 26May2021 | 0.003 <MDL | ug/l | No |

| | | | | |
|---|---|---|---|---|
| Chromium | 26May2021 | 0.29 | ug/l | No |
| Mercury | 26May2021 | 0.01<MDL | ug/l | No |
| Selenium | 26May2021 | 0.04<MDL | ug/l | No |
| Sodium | June 5, 2016 | 8.01 | mg/l | No |
| Uranium | 26May2021 | 0.381 | ug/l | No |
| Fluoride | June 5, 2016 | 0.15 | mg/l | No |
| Nitrite | 10Mar2021<br>18Jun2021<br>13Sept2021<br>6Dec2021 | 0.003<MDL<br>0.003<MDL<br>0.003<MDL<br>0.003<MDL | mg/l | No |
| Nitrate | 10Mar2021<br>18Jun2021<br>13Sept2021<br>6Dec2021 | 0.006<MDL<br>0.006<MDL<br>0.006<MDL<br>0.006<MDL | mg/l | No |
| Alachlor | 26May2021 | 0.02<MDL | ug/l | No |
| Atrazine | 26May2021 | 0.01<MDL | ug/l | No |
| Atrazine + N-dealkylated metabolites | 26May2021 | 0.01<MDL | ug/l | No |
| Desethyl atrazine | 26May2021 | 0.01<MDL | ug/l | No |
| Azinphos-methyl | 26May2021 | 0.05<MDL | ug/l | No |
| Benzene | 26May2021 | 0.32<MDL | ug/l | No |
| Benzo(a)pyrene | 26May2021 | 0.004<MDL | ug/l | No |
| Bromoxynil | 26May2021 | 0.33<MDL | ug/l | No |
| Carbaryl | 26May2021 | 0.05<MDL | ug/l | No |
| Carbofuran | 26May2021 | 0.01<MDL | ug/l | No |
| Carbon Tetrachloride | 26May2021 | 0.17<MDL | ug/l | No |
| Chlorpyrifos | 26May2021 | 0.02<MDL | ug/l | No |
| Diazinon | 26May2021 | 0.02<MDL | ug/l | No |
| Dicamba | 26May2021 | 0.20<MDL | ug/l | No |
| 1,2-Dichlorobenzene | 26May2021 | 0.41<MDL | ug/l | No |
| 1,4-Dichlorobenzene | 26May2021 | 0.36<MDL | ug/l | No |
| 1,2-Dichloroethane | 26May2021 | 0.35<MDL | ug/l | No |
| 1,1-Dichloroethylene (vinylidene chloride) | 26May2021 | 0.33<MDL | ug/l | No |
| Dichloromethane | 26May2021 | 0.35<MDL | ug/l | No |
| 2-4 Dichlorophenol | 26May2021 | 0.15<MDL | ug/l | No |
| 2,4-Dichlorophenoxy acetic acid (2,4-D) | 26May2021 | 0.19<MDL | ug/l | No |
| Diclofop-methyl | 26May2021 | 0.40<MDL | ug/l | No |
| Dimethoate | 26May2021 | 0.06<MDL | ug/l | No |
| Diquat | 26May2021 | 1<MDL | ug/l | No |
| Diuron | 26May2021 | 0.03<MDL | ug/l | No |
| Glyphosate | 26May2021 | 1<MDL | ug/l | No |
| Haloacetic Acid (HAA) | As per O. Reg 170, ceased sampling for 8 consecutive | Not applicable | ug/l | Not applicable |

| | | | | |
|---|---|---|---|---|
| | quarters due to low conc in previous 12 quarters | | | |
| Malathion | 26May2021 | 0.02<MDL | ug/l | No |
| Metolachlor | 26May2021 | 0.01<MDL | ug/l | No |
| Metribuzin | 26May2021 | 0.02<MDL | ug/l | No |
| Monochlorobenzene | 26May2021 | 0.3<MDL | ug/l | No |
| MCPA | 26May2021 | 0.00012<MDL | mg/l | No |
| Paraquat | 26May2021 | 1<MDL | ug/l | No |
| Pentachlorophenol | 26May2021 | 0.15<MDL | ug/l | no |
| Phorate | 26May2021 | 0.01<MDL | ug/l | no |
| Picloram | 26May2021 | 1<MDL | ug/l | no |
| Polychlorinated Biphenyls(PCB) | 26May2021 | 0.04<MDL | ug/l | no |
| Prometryne | 26May2021 | 0.03<MDL | ug/l | no |
| Simazine | 26May2021 | 0.01<MDL | ug/l | no |
| Trihalomethane (THM) | As per O. Reg 170, ceased sampling for 8 consecutive quarters due to low conc in previous 12 quarters | Not applicable | ug/l | Not applicable |
| Terbufos | 26May2021 | 0.01<MDL | ug/l | no |
| Tetrachloroethylene | 26May2021 | 0.35<MDL | ug/l | no |
| 2,3,4,6-Tetrachlorophenol | 26May2021 | 0.20<MDL | ug/l | no |
| Triallate | 26May2021 | 0.01<MDL | ug/l | no |
| Trichloroethylene | 26May2021 | 0.44<MDL | ug/l | no |
| 2,4,6-Trichlorophenol | 26May2021 | 0.25<MDL | ug/l | no |
| Trifluralin | 26May2021 | 0.02<MDL | ug/l | no |
| Vinyl Chloride | 26May2021 | 0.17<MDL | ug/l | no |

**Creighton Heights**

**Table 12. Creighton Heights Microbiological Testing (Schedule 11 of O.Reg 170/03)**

| | **Number of Samples** | **E.Coli (cfu/100mL)**<br><br>**(min #)-(max #)** | **Total Coliform (cfu/100mL)**<br><br>**(min #)-(max #)** | **Number of HPC Samples** | **HPC Results (cfu/1mL)**<br><br>**(min #)-(max #)** |
|---|---|---|---|---|---|
| **Raw** | 146 | 0 – NDOGT | 0– NDOGT | N/A | N/A |
| **Treated** | 52 | 0 – 0 | 0 – 0 | 52 | 0 – 340 |
| **Distribution** | 115 | 0 – 0 | 0 – 0 | 52 | 0 – 60 |

Note: cfu-refers to colony forming units, NDOGT-No Data-Overgrown with Target for Well 1. Well 1 was placed out of service until 0 E. Coli and 0 Total coliform results were obtained after resampling.

**Table 13. Creighton Heights Operational Testing (Schedule 7 of O.Reg 170/03)**

| | Number of Grab Samples | Range of Results (Min – Max) |
|---|---|---|
| **Chlorine Residual (secondary disinfection)** | 365 | 0.29 mg/L – 2.72 mg/L (Chloramination)<br>0.10 mg/L – 2.40 mg/L (Free Chlorination) |

Note: System free chlorinated from 5Oct2021 to 2Nov2021 for distribution maintenance and denitrification

**Table 14. Creighton Heights Additional Sampling Requirements**

| Date of MDWL | Parameter | Number of Samples | Maximum Allowable Annual Average Concentration | Actual Average Concentration |
|---|---|---|---|---|
| 21Aug2021 | Total Suspended Solids | 4 (Quarterly) | 25 mg/L | 23.25mg/L |

**Table 15. Creighton Heights Lead Testing (MDWL 139-102 Schedule D)**

| Location Type | Date | Sample Location | pH | Alkalinity | Lead |
|---|---|---|---|---|---|
| Distribution | 2Feb2021 | Burwash<br>Hwy 45 | 7.30<br>7.6 | 199 mg/L<br>198 mg/L | Not applicable<br>Not applicable |
| Distribution | 28July2021 | Burwash<br>Hwy 45 | Not available<br>7.40 | Not available<br>203 mg/L | Not applicable<br>Not applicable |

There are many other parameters that are tested on a less frequent basis. For these parameters, the most recent analysis is listed in Table 16 below. <MDL refers to 'less than Method Detection Limit' which means the measured concentration of the parameter is less than the lowest possible measurement.

**Table 16. Creighton Heights Organic and Inorganic Sampling (Schedules 13, 23 & 24 of O.Reg 170/03)**

| Parameter | Sample Date | Result Value | Unit of Measure | Exceedance |
|---|---|---|---|---|
| Antimony | 26May2021 | 0.9<MDL | ug/l | no |
| Arsenic | 26May2021 | 0.2 <MDL | ug/l | no |
| Barium | 26May2021 | 20.4 | ug/l | no |
| Boron | 26May2021 | 65.0 | ug/l | no |
| Cadmium | 26May2021 | 0.003<MDL | ug/l | no |
| Chromium | 26May2021 | 0.17 | ug/l | no |
| Mercury | 26May2021 | 0.01<MDL | ug/l | no |
| Selenium | 26May2021 | 0.04< MDL | ug/l | no |
| Sodium | June 5, 2017 | 27.2 | mg/l | no |
| Uranium | 26May2021 | 0.002 | ug/l | no |
| Fluoride | June 5, 2017 | 0.34 | mg/l | no |
| Nitrite | 10Mar2021<br>18Jun2021<br>13Sept2021<br>6Dec2021 | 0.022<br>0.015<br>0.020<br>0.021 | mg/l | no |
| Nitrate | 10Mar2021<br>18Jun2021<br>13Sept2021<br>6Dec2021 | 0.026<br>0.020<br>0.024<br>0.018 | mg/l | no |
| Alachlor | 26May2021 | 0.02<MDL | ug/l | no |
| Atrazine + N-dealkylated metabolites | 26May2021 | 0.01<MDL | ug/l | no |
| Atrazine | 26May2021 | 0.01<MDL | ug/l | no |
| Azinphos-methyl | 26May2021 | 0.05<MDL | ug/l | no |
| Benzene | 26May2021 | 0.32<MDL | ug/l | no |
| Benzo(a)pyrene | 26May2021 | 0.004<MDL | ug/l | no |
| Bromoxynil | 26May2021 | 0.33<MDL | ug/l | no |
| Carbaryl | 26May2021 | 0.05<MDL | ug/l | no |
| Carbofuran | 26May2021 | 0.01<MDL | ug/l | no |
| Carbon Tetrachloride | 26May2021 | 0.17<MDL | ug/l | no |
| Chlorpyrifos | 26May2021 | 0.02<MDL | ug/l | no |
| Desethyl atrazine | 26May2021 | 0.01<MDL | ug/l | no |
| Diazinon | 26May2021 | 0.02<MDL | ug/l | no |
| Dicamba | 26May2021 | 0.20<MDL | ug/l | no |
| 1,2-Dichlorobenzene | 26May2021 | 0.41<MDL | ug/l | no |
| 1,4-Dichlorobenzene | 26May2021 | 0.36>MDL | ug/l | no |
| 1,2-Dichloroethane | 26May2021 | 0.35<MDL | ug/l | no |
| 1,1-Dichloroethylene (vinylidene chloride) | 26May2021 | 0.33<MDL | ug/l | no |
| Dichloromethane | 26May2021 | 0.35<MDL | ug/l | no |
| 2-4 Dichlorophenol | 26May2021 | 0.15<MDL | ug/l | no |

| | | | | |
|---|---|---|---|---|
| 2,4-Dichlorophenoxy acetic acid (2,4-D) | 26May2021 | 0.19<MDL | ug/l | no |
| Diclofop-methyl | 26May2021 | 0.40<MDL | ug/l | no |
| Dimethoate | 26May2021 | 0.06<MDL | ug/l | no |
| Diquat | 26May2021 | 1<MDL | ug/l | no |
| Diuron | 26May2021 | 0.03<MDL | ug/l | no |
| Glyphosate | 26May2021 | 1<MDL | ug/l | no |
| Haloacetic Acid HAA | 10Mar2021<br>18Jun2021<br>29Sept2021<br>22Dec2021 | 6.05<br>(Running Annual Average) | ug/l | no |
| Malathion | 26May2021 | 0.02<MDL | ug/l | no |
| MCPA, 2-methyl-4-chlorophenoxyacetic acid | 26May2021 | 0.00012<MDL | mg/L | no |
| Metolachlor | 26May2021 | 0.01<MDL | ug/l | no |
| Metribuzin | 26May2021 | 0.02<MDL | ug/l | no |
| Monchlorobenzene | 26May2021 | 0.3<MDL | ug/L | no |
| NDMA, N-nitrosodimethylamine<br>As per new MDWL (12Aug2021) we are required to test for NDMA quarterly | 29Sept2021<br>22Dec2021<br>(2 quarters tested since new MDWL) | 0.0028<br>(Running Annual Average) | ug/L | no |
| Paraquat | 26May2021 | 1<MDL | ug/l | no |
| Pentachlorophenol | 26May2021 | 0.15<MDL | ug/l | No |
| Phorate | 26May2021 | 0.01<MDL | ug/l | No |
| Picloram | 26May2021 | 1<MDL | ug/l | No |
| Polychlorinated Biphenyls(PCB) | 26May2021 | 0.04<MDL | ug/l | No |
| Prometryne | 26May2021 | 0.03<MDL | ug/l | No |
| Simazine | 26May2021 | 0.01<MDL | ug/l | No |
| Trihalomethane (THM) | 10Mar2021<br>18Jun2021<br>29Sept2021<br>22Dec2021 | 1.55<br>(Running Annual Average) | ug/l | No |
| Terbufos | 26May2021 | 0.01<MDL | ug/l | No |
| Tetrachloroethylene (perchloroethylene) | 26May2021 | 0.35<MDL | ug/l | No |
| 2,3,4,6-Tetrachlorophenol | 26May2021 | 0.20<MDL | ug/l | No |
| Triallate | 26May2021 | 0.01<MDL | ug/l | No |
| Trichloroethylene | 26May2021 | 0.44<MDL | ug/l | No |
| 2,4,6-Trichlorophenol | 26May2021 | 0.25<MDL | ug/l | No |
| Trifluralin | 26May2021 | 0.02<MDL | ug/l | No |
| Vinyl Chloride | 26May2021 | 0.17<MDL | ug/l | No |