Water Operations

Annual Summary Report

~ Churchill Drinking Water System ~

DWS #220005063

~ Town of Innisfil ~

Reporting Year -2020

InnServices Utilities Inc.

Churchill DWS

Introduction

Effective January 1, 2016, the Town of Innisfil transferred ownership of its municipal Drinking Water Systems to InnServices Utilities Inc. (InnServices). InnServices is a municipal service corporation, wholly-owned by the Town of Innisfil, charged with the responsibility to operate, maintain and expand the municipal drinking water systems that service the Town of Innisfil.

The Churchill Drinking Water System (DWS) services a population of approximately 510, on 170 connections, 169 of which are residential. The distribution system is comprised of approximately 6 kilometers of cast iron piping, 31 hydrants and 52 valves.
The system relies on 3 drilled wells as its source of groundwater. Wells #1 and 2 feed directly into the reservoir, and run on an as-needed basis. Well #3 is the main source of raw water which feeds the distribution and can also fill the reservoir.

InnServices has prepared this Summary Report for the operations conducted during the 2020 calendar year.

This Annual Summary Report has been prepared to meet the following commitments:

- To provide InnServices Utilities Inc. Board of Directors, as “Owners” of the DWS, a summary of the operations and maintenance of the Churchill DWS that took place during the reporting period of January 1 to December 31, 2020;
- To provide a status update of the systems capabilities and capacities as of December 31, 2020;
- To satisfy the requirements of O. Reg 170/03 Section 11
- To satisfy the requirements of O. Reg.170/03 Schedule 22

The Annual Summary Report identifies specific details regarding the overall quality of the drinking water submitted to the Ministry of the Environment Conservation and Parks (MECP) for the Churchill DWS and is available on the Town of Innisfil website (https://innisfil.ca/annual-reports-drinking-water) and at InnServices Headquarters at 7251 Yonge St., Innisfil, Ontario.

This report provides information to the InnServices Board of Directors and Town of Innisfil Mayor and Council related to the operations, maintenance, drinking water quality, and system capacities of the Churchill DWS, which aids decision making related to system expansion needs, and assists Board and Council in meeting their Statutory Standard of Care requirements.

MECP Approvals

The Churchill DWS is classified as a Large Municipal Residential DWS, as defined by Ontario Regulation 170/03.

The **Safe Drinking Water Act, 2002** requires that the Owner of a municipal DWS have MECP approvals in the form of a Drinking Water Works Permit (DWWP) and a Municipal Drinking Water Licence (MDWL). The DWWP provides a description of the overall system and provides the authority to establish or alter the DWS. The MDWL provides the authority to use or operate the system.

The Churchill DWS operated for the majority of the year under

DWWP # 120-206, Issue #3 (Issued October 19, 2018)
MDWL # 120-106, Issue #2 (Issued January 8, 2016)

New DWWP and MDWL were issued December 15, 2020:

DWWP # 120-206, Issue #4
MDWL # 120-106, Issue #3

For the reporting period covered in this report, InnServices Utilities Inc. was defined as the Operating Authority of the Churchill DWS.

InnServices Utilities Inc. has established and maintains accreditation to the Drinking Water Quality Management Standard Version 2-2017 (DWQMS) under Certificate of Accreditation # 0136878, issued November 4, 2020 by SAI Global. The Certificate of Accreditation expires September 20, 2023.

Drinking Water System

The Churchill DWS (DWS) relies on 3 drilled wells as its source of groundwater.
Well #3 is the main source of raw water. It has its own chlorine contact chamber which feeds the distribution and can also fill the reservoir.
Wells #1 and 2 feed directly into the reservoir, and run on an as-needed basis.
Sodium hypochlorite is used for primary and secondary disinfection.
The below-grade, twin-cell concrete reservoir has a total volume of approximately 1100 cubic meters and provides fire protection for the community.
A 200 kilowatt standby generator ensures that the system is provided with water in the event of a power failure.
Expenses incurred in relation to well and well pump maintenance and repairs amounted to approximately $26,900.

Analytical Laboratory Water Quality Monitoring

Bacteriological Analysis

Bacteriological testing is completed to verify that no microbiological contamination of the treated drinking water can be detected. Raw water is also analyzed to inform operations if there is microbiological contamination in the DWS. Bacteriological monitoring for the reporting period was conducted as required by Ontario Regulation 170/03.
SGS Environmental Services, Lakefield, Ontario, conducted the bacteriological analysis of the drinking water.

Zero (0) items of non-compliance with the Ontario Drinking Water Standards related to bacteriological analyses occurred during the reporting period.

Microbiological testing done under the Schedule 10 of Regulation 170/03, during this reporting period.

	Number of Samples	Range of E.coli Results (min #)-(max #) CFU/100mL	Range of Total Coliform Results (min #)-(max #) CFU/100mL	Number of HPC Samples	Range of HPC Results (min #)-(max #) CFU/1mL
Raw	126	0-0	0-1	n/a	n/a
Treated	103	0-0	0-0	103	0-380
Distribution	207	0-0	0-0	207	0-740

Chemical Analysis

Chemical analysis of this water supply is conducted as required by Ontario Regulation 170/03.
SGS Environmental Services, Lakefield, Ontario, conducted the required chemical analyses for the DWS during the reporting period. This lab, as well as any laboratories to which they sub-contract certain types of analyses, are licensed by the MECP and accredited by the Canadian Association for Laboratory Accreditation (CALA) and/or Standard Council Canada (SCC).

InnServices has engaged the Walkerton Clean Water Centre to undertake a study to investigate THM (Trihalomethanes) formation in the Churchill DWS. Raw water quality was assessed and bench scale testing conducted in 2020; pilot studies for treatment options will be undertaken during Q1-Q2, 2021, with a report including recommendations and next steps.

With the issuance of the new Municipal Drinking Water Licence December 15, 2020, the Ministry has added a requirement to increase testing and monitoring of the health related parameter for THM from quarterly to monthly, beginning in January 2021.

Zero (0) incidents of non-compliance with Ontario Drinking Water Standards related to chemical analysis were reported during 2020.

A summary of all analytical results for Organic and Inorganic testing is attached in Appendix A.

Continuous Water Quality Monitoring

Free Chlorine Residual

The Churchill DWS utilizes NSF® certified 12% sodium hypochlorite to meet primary disinfection requirements and provide an adequate chlorine residual for secondary disinfection requirements.

A requirement of O.Reg. 170/03 and the Procedure for Disinfection of Drinking Water in Ontario is that the chlorine residual must be recorded at the point directly after primary disinfection is achieved, at a frequency of every 5 minutes. Grab samples are taken and analyzed for free chlorine residual (FCR) when microbiological samples are taken throughout the distribution system. Ontario Regulation 170/03 requires that sufficient residual be available in the water to achieve a residual of greater than 0.05 mg/L at all points in the distribution system.

During the reporting period covered by this report, zero (0) incidents of non-compliance with these requirements were reported.

A summary of the chlorination monitoring that took place directly after primary disinfection is achieved is depicted below:

	Number of Grab Samples	Range of Results (min #)-(max #)	Unit of Measure
Chlorine – Well #3	8760	0.00 – 5.00	mg/L
Chlorine – Well # 1 and 2	8760	0.008 – 5.00	mg/L

All instances where Free Chlorine Residual (FCR) was less than 1.00 mg/L were investigated and confirmed to coincide with a power outage, calibration activities, and/or appropriate corrective actions were taken to remove non-compliant water from the system.

Plant Flow Monitoring

Raw Water Takings

The Churchill DWS utilizes groundwater wells as its raw water source. The raw water takings from groundwater wells are authorized by the MECP through a Permit to Take Water (PTTW # 0557-B4HNR7)

Raw water takings for 2020 were reported to the electronic Water Taking Recording System (WTRS).

Table 1 below provides a summary of the raw water takings in 2020.

There were zero (0) incidents of non-compliance related to water takings in 2020.

Table 1: Summary of 2020 Raw Water Takings

	Units	Well #1	Well #2	Well #3	System
PTTW Daily Maximum	**(m^3/day)**	**262.08**	**295.2**	**743**	**743**
Maximum Day	(m^3/day)	181	207	447	544
Average Day	(m^3/day)	8.5	27.2	110.5	146.2
2020 Takings	(m^3)	3117	9967	40,443	53,527

System Performance Summary

The volume of daily treated water delivered to the distribution system is authorized by the MECP through the designation of a Rated Capacity within the Municipal Drinking Water Licence (MDWL). It should be noted Well #3 Capacity has been corrected in the new MDWL to 743 cubic meters per day. The Treated Water volume is essentially the

same as the Raw Water Takings. The Wells #1 & 2 subsystem is operating at approximately 3% of the rated capacity of 557 m³/day. At the maximum flow, treated water demand flow in 2020 was at 70% of the rated capacity.
The Well #3 subsystem is operating at approximately 15% of the rated capacity 743m³/day. At the maximum flow, treated water demand flow in 2020 was at 60% of the rated capacity.
The Treated Water Demand is summarized in Table 2 below.
There were zero (0) incidents of non-compliance related to rated capacity in 2020.

Table 2: Summary of 2019 Treated Water Demand

	Wells #1 & 2	***Well #3***
System Rated Capacity (m³/day)	557	743
Maximum Day (m³/day)	387.4	447
Average Day (m³/day)	17.9	110.5
Total Annual Demand (m³)	13,083.9	40,443
System Performance- rated capacity	3%	15 %
System Performance- at Maximum Flow	70 %	60%

Distribution Flow Monitoring

The Churchill DWS produces water for distribution to homes and businesses in the village of Churchill in the Town of Innisfil.

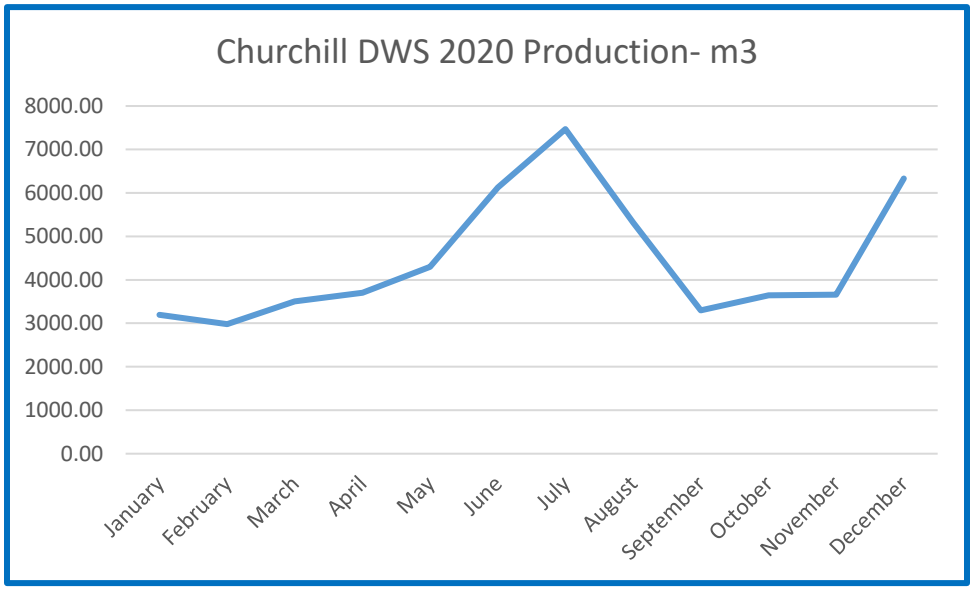
The following table and graph demonstrate the monthly water system demand.

Table 3, below, demonstrates the monthly volumes of drinking water directed toward the Churchill distribution systems in 2020.

Table 3: Monthly Water Production

Month	**Treated Water Produced (m³)**
January	3197.8
February	2980.8
March	3506.3
April	3701.4
May	4302.1
June	6125.4
July	7468.6
August	5316.1
September	3297.8
October	3640.9
November	3659.8
December	6330.0
Annual Total	**53527**

The following graph provides a visual display of the information provided in Table 3



MECP Annual Inspection

An Unannounced Focused inspection was conducted on December 3, 2020 by the Ministry of the Environment, Conservation and Parks. The inspection covered the period of September 5, 2019 to December 3, 2020.

Items of Non-Compliance
There were zero (0) items of non-compliance identified during the inspection period.

Provincial Officer's Orders
No Provincial Officer's Orders were issued in the Report as a result of the 2020 inspection.

Inspection Risk Rating
This year the Churchill system received an Inspection Risk Rating of 0%, resulting in a Compliance Rating of 100%.

Appendix A – Chemical Analysis

Organic and Inorganic parameters testing is required at least once every 36 months from a raw water supply that is ground water.

Churchill Well 1 & 2

Inorganic Parameter	*Sample Date*	*Result Value*	*Unit of Measure*	*Exceedance*
Antimony	20-Nov-2018	0.03	µg/L	No
Arsenic	20-Nov-2018	<0.2	µg/L	No
Barium	20-Nov-2018	35.6	µg/L	No
Boron	20-Nov-2018	158	µg/L	No
Cadmium	20-Nov-2018	<0.003	µg/L	No
Chromium	20-Nov-2018	0.11	µg/L	No
Mercury	20-Nov-2018	<0.01	µg/L	No
Selenium	20-Nov-2018	<0.04	µg/L	No
Uranium	20-Nov-2018	0.004	µg/L	No

Organic Parameter	*Sample Date*	*Result Value*	*Unit of Measure*	*Exceedance*
Alachlor	20-Nov-2018	<0.02	µg/L	No
Atrazine + N-dealkylated metobolites	20-Nov-2018	<0.01	µg/L	No
Azinphos-methyl	20-Nov-2018	<0.05	µg/L	No
Benzene	20-Nov-2018	<0.32	µg/L	No
Benzo(a)pyrene	20-Nov-2018	<0.004	µg/L	No
Bromoxynil	20-Nov-2018	<0.33	µg/L	No
Carbaryl	20-Nov-2018	<0.05	µg/L	No
Carbofuran	20-Nov-2018	<0.01	µg/L	No
Carbon Tetrachloride	20-Nov-2018	<0.16	µg/L	No
Chlorpyrifos	20-Nov-2018	<0.02	µg/L	No
Diazinon	20-Nov-2018	<0.02	µg/L	No
Dicamba	20-Nov-2018	<0.20	µg/L	No
1,2-Dichlorobenzene	20-Nov-2018	<0.41	µg/L	No
1,4-Dichlorobenzene	20-Nov-2018	<0.36	µg/L	No

1,2-Dichloroethane	20-Nov-2018	<0.35	µg/L	No
1,1-Dichloroethylene (vinylidene chloride)	20-Nov-2018	<0.33	µg/L	No
Dichloromethane	20-Nov-2018	<0.35	µg/L	No
2-4 Dichlorophenol	20-Nov-2018	<0.15	µg/L	No
2,4-Dichlorophenoxy acetic acid (2,4-D)	20-Nov-2018	<0.19	µg/L	No
Diclofop-methyl	20-Nov-2018	<0.40	µg/L	No
Dimethoate	20-Nov-2018	<0.03	µg/L	No
Diquat	20-Nov-2018	<1	µg/L	No
Diuron	20-Nov-2018	<0.03	µg/L	No
Glyphosate	20-Nov-2018	<1	µg/L	No
Malathion	20-Nov-2018	<0.02	µg/L	No
2-Methyl-4-chlorophenoxyacetic acid (MCPA)	20-Nov-2018	<0.00012	Mg/L	No
Metolachlor	20-Nov-2018	<0.01	µg/L	No
Metribuzin	20-Nov-2018	<0.02	µg/L	No
Monochlorobenzene	20-Nov-2018	<0.3	µg/L	No
Paraquat	20-Nov-2018	<1	µg/L	No
Pentachlorophenol	20-Nov-2018	<0.15	µg/L	No
Phorate	20-Nov-2018	<0.01	µg/L	No
Picloram	20-Nov-2018	<1	µg/L	No
Polychlorinated Biphenyls(PCB)	20-Nov-2018	<0.04	µg/L	No
Prometryne	20-Nov-2018	<0.03	µg/L	No
Simazine	20-Nov-2018	<0.03	µg/L	No
Terbufos	20-Nov-2018	<0.01	µg/L	No
Tetrachloroethylene	20-Nov-2018	<0.35	µg/L	No
2,3,4,6-Tetrachlorophenol	20-Nov-2018	<0.2	µg/L	No
Triallate	20-Nov-2018	<0.01	µg/L	No
Trichloroethylene	20-Nov-2018	<0.44	µg/L	No

2,4,6-Trichlorophenol	20-Nov-2018	<0.25	µg/L	No
Trifluralin	20-Nov-2018	<0.02	µg/L	No
Vinyl Chloride	20-Nov-2018	<0.17	µg/L	No

Inorganic or Organic parameter(s) that exceeded half the standard prescribed in Schedule 2 of Ontario Drinking Water Quality Standards.

Parameter	*Result Value*	*Unit of Measure*	*Date of Sample*
N/A			

One water sample is taken every 60 months to test for Sodium and Fluoride

Parameter	*Date of Sample*	*Result*	*Unit of Measure*	*Exceedance*
Sodium	19-Dec-2016	27.5	mg/L	Yes
Fluoride	19-Dec-2016	<0.4	mg/L	No

One water sample is taken every 3 months and tested for nitrate and nitrite

Parameter	*Date of latest Sample*	*Result*	*Unit of Measure*	*Exceedance*
Nitrite	09-Nov-2020	<0.003	mg/L	No
Nitrate	09-Nov-2020	0.006	mg/L	No

Churchill Well 3

Parameter	*Sample Date*	*Result Value*	*Unit of Measure*	*Exceedance*
Antimony	20-Nov-2018	0.02	µg/L	No
Arsenic	20-Nov-2018	<0.2	µg/L	No
Barium	20-Nov-2018	29.6	µg/L	No
Boron	20-Nov-2018	163	µg/L	No
Cadmium	20-Nov-2018	<0.003	µg/L	No
Chromium	20-Nov-2018	0.09	µg/L	No
Mercury	20-Nov-2018	<0.01	µg/L	No
Selenium	20-Nov-2018	<0.04	µg/L	No
Uranium	20-Nov-2018	<0.002	µg/L	No

Parameter	*Sample Date*	*Result Value*	*Unit of Measure*	*Exceedance*
Alachlor	20-Nov-2018	<0.02	µg/L	No
Atrazine + N-dealkylated metobolites	20-Nov-2018	<0.01	µg/L	No
Azinphos-methyl	20-Nov-2018	<0.05	µg/L	No
Benzene	20-Nov-2018	<0.32	µg/L	No
Benzo(a)pyrene	20-Nov-2018	<0.004	µg/L	No

Bromoxynil	20-Nov-2018	<0.33	µg/L	No
Carbaryl	20-Nov-2018	<0.05	µg/L	No
Carbofuran	20-Nov-2018	<0.01	µg/L	No
Carbon Tetrachloride	20-Nov-2018	<0.16	µg/L	No
Chlorpyrifos	20-Nov-2018	<0.02	µg/L	No
Diazinon	20-Nov-2018	<0.02	µg/L	No
Dicamba	20-Nov-2018	<0.2	µg/L	No
1,2-Dichlorobenzene	20-Nov-2018	<0.41	µg/L	No
1,4-Dichlorobenzene	20-Nov-2018	<0.36	µg/L	No
1,2-Dichloroethane	20-Nov-2018	<0.35	µg/L	No
1,1-Dichloroethylene (vinylidene chloride)	20-Nov-2018	<0.33	µg/L	No
Dichloromethane	20-Nov-2018	<0.35	µg/L	No
2-4 Dichlorophenol	20-Nov-2018	<0.15	µg/L	No
2,4-Dichlorophenoxy acetic acid (2,4-D)	20-Nov-2018	<0.19	µg/L	No
Diclofop-methyl	20-Nov-2018	<0.4	µg/L	No
Dimethoate	20-Nov-2018	<0.03	µg/L	No
Diquat	20-Nov-2018	< 1	µg/L	No
Diuron	20-Nov-2018	<0.03	µg/L	No
Glyphosate	20-Nov-2018	< 1	µg/L	No
Malathion	20-Nov-2018	<0.02	µg/L	No
2-Methyl-4-chlorophenoxyacetic acid (MCPA)	20-Nov-2018	<0.00012	Mg/L	No
Metolachlor	20-Nov-2018	<0.01	µg/L	No
Metribuzin	20-Nov-2018	<0.02	µg/L	No
Monochlorobenzene	20-Nov-2018	<0.3	µg/L	No
Paraquat	20-Nov-2018	<1	µg/L	No
Pentachlorophenol	20-Nov-2018	<0.15	µg/L	No
Phorate	20-Nov-2018	<0.01	µg/L	No

Picloram	20-Nov-2018	< 1	µg/L	No
Polychlorinated Biphenyls(PCB)	20-Nov-2018	<0.04	µg/L	No
Prometryne	20-Nov-2018	<0.03	µg/L	No
Simazine	20-Nov-2018	<0.01	µg/L	No
Terbufos	20-Nov-2018	<0.01	µg/L	No
Tetrachloroethylene	20-Nov-2018	<0.35	µg/L	No
2,3,4,6-Tetrachlorophenol	20-Nov-2018	<0.20	µg/L	No
Triallate	20-Nov-2018	<0.01	µg/L	No
Trichloroethylene	20-Nov-2018	<0.44	µg/L	No
2,4,6-Trichlorophenol	20-Nov-2018	<0.25	µg/L	No
Trifluralin	20-Nov-2018	<0.02	µg/L	No
Vinyl Chloride	20-Nov-2018	<0.17	µg/L	No

Inorganic or Organic parameter(s) that exceeded half the standard prescribed in Schedule 2 of Ontario Drinking Water Quality Standards.

Parameter	*Result Value*	*Unit of Measure*	*Date of Sample*
N/A			

One water sample is taken every 60 months to test for Sodium and Fluoride

Parameter	*Date of Sample*	*Result*	*Unit of Measure*	*Exceedance*
Sodium	19-Dec-2016	62.4	Mg/L	Yes
Fluoride	19-Dec-2016	0.5	mg/L	No

One water sample is taken every 3 months and tested for nitrate and nitrite

Parameter	*Date of latest Sample*	*Result*	*Unit of Measure*	*Exceedance*
Nitrite	09-Nov-2020	<0.003	mg/L	No
Nitrate	09-Nov-2020	0.013	mg/L	No

Distribution Sampling

Based on results of community lead sampling program conducted, Churchill DWS has qualified for reduced sampling protocol as per O. Reg .170/03 Schedule 15.1. Under this protocol, only alkalinity and pH are required from 2 sampling points for each summer and winter period. Lead is tested every third 12-month period.

Location Type	*Number of Samples*	*Range of Alkalinity Results Minimum - maximum*	*Range of Lead Results- 2020*	*Number of Exceedances*
		Aesthetic Objective 30-500 Mg/L	Maximum Concentration 10 µg/L	
Distribution	4	129-174 Mg/L	0.02 – 0.21 µg/L	0

Trihalomethanes (THMs) and Haloacetic Acids (HAAs) were sampled on a quarterly basis in accordance with O. Reg. 170/03 Schedule 13. The most recent (2020) sample results:

Parameter	*Sample Date*	*Result Value*	*Maximum Allowable Concentration*
THM (latest rolling annual average)	09-Nov-2020	93.06 µg/L	100 µg/L
HAA (latest rolling annual average)	09-Nov-2020	13.04 µg/L	80 µg/L

Lead, Haloacetic Acids or Trihalomethanes results that exceeded half the standard prescribed in Schedule 2 of Ontario Drinking Water Quality Standards

Parameter	*Result Value*	*Unit of Measure*	*Date of Sample*
THM (running annual average)	Q1 – 82.57	µg/L	March 6, 2020
	Q2 – 89.49	µg/L	June 8, 2020
	Q3 – 90.74	µg/L	September 21, 2020
	Q4 – 93.06	µg/L	November 9, 2020