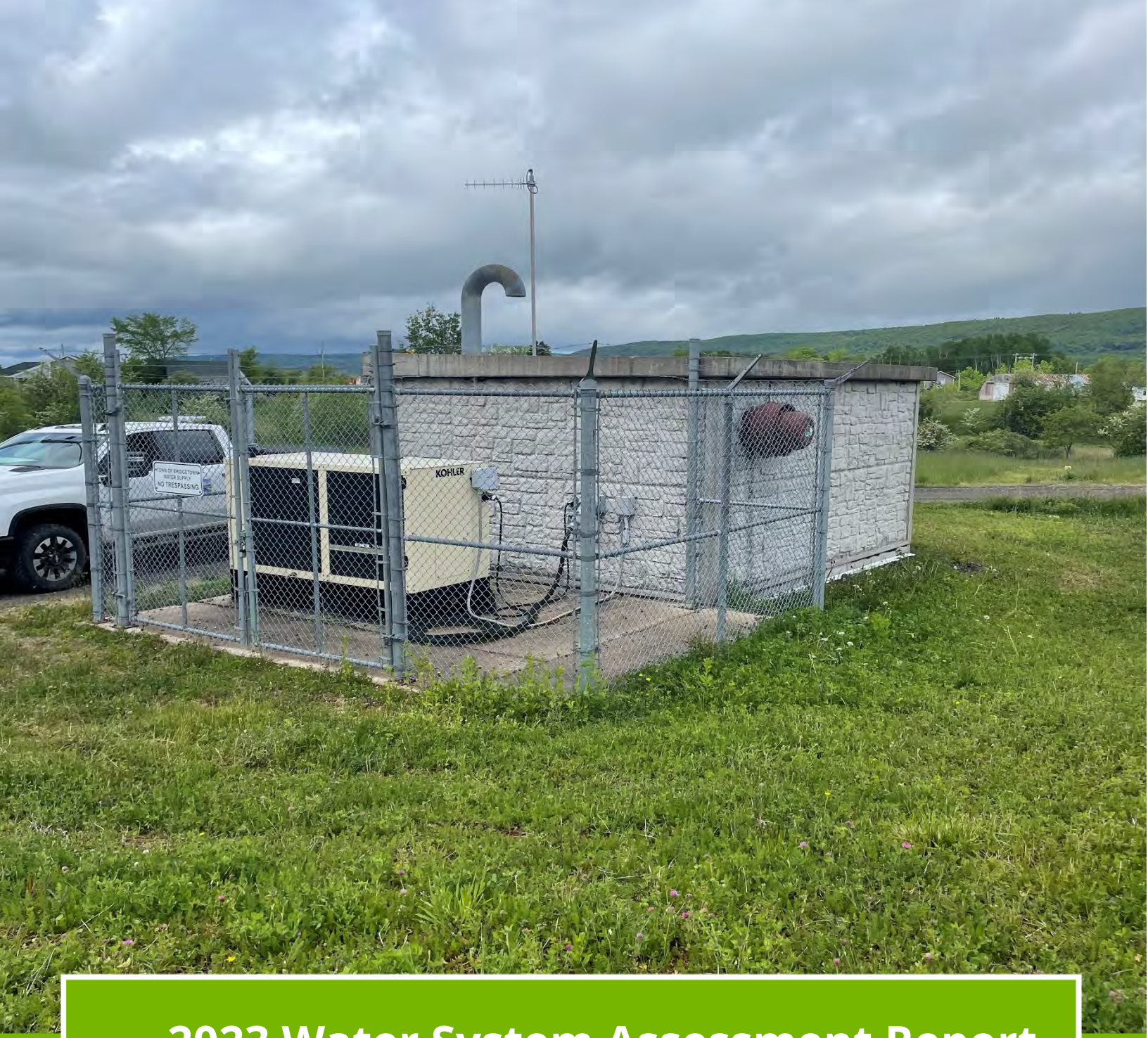

2023 Water System Assessment Report

Bridgetown

Final Report

CBCL

County of Annapolis
Naturally Rooted

230822.00 • September 2023

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A	DRAFT	BB	2023-07-30	ML
Issue or Revision		**Reviewed By:**	**Date**	**Issued By:**

CBCL

Project No. 230822.00

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September 13th, 2023

Mr. Jim Young, P.Eng.
Director of Municipal Operations
Municipality of the County of Annapolis
752 St. George Street
Annapolis Royal, NS B0S 1A0

Dear Mr. Young:

RE: ***Bridgetown Water Utility 2023 Water System Assessment Report***

Please find enclosed the 2023 System Assessment Report (SAR) for the Bridgetown Water Utility (the Utility) completed by CBCL Limited (CBCL) on behalf of the Municipality of the County of Annapolis (MOCA). This report includes the specific requirements of a SAR as outlined in the Nova Scotia Environment and Climate Change (NSECC) *Approval to Operate* for a Water Distribution System.

Yours very truly,

CBCL Limited

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Project No: 230822.00

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Appendices

1 Project

1.1 Introduction

The objective of this System Assessment Report (SAR) is to verify that the operation, supply, and distribution provided by this system complies with the environmental standards for safe drinking water as outlined in the *Nova Scotia Treatment Standards for Municipal Drinking Water Systems* (June 2022). This report follows the Terms of Reference provided by Nova Scotia Environment and Climate Change (NSECC). In addition to verifying the required performance, this report will identify any sources of concern and provide appropriate recommendations.

The overall study area includes all Bridgetown Water Utility (the Utility) infrastructure and wellfields within the municipal boundaries of the Community of Bridgetown. The infrastructure is owned by the Municipality of the County of Annapolis (MCA) and includes:

- Source water wellfields.
- Non- GUDI* source wells.
- Monitoring wells.
- Chlorination buildings.
- Transmission and distribution mains.
- Water distribution storage – underground concrete storage reservoir.

* GUDI= Groundwater under the direct influence of surface water.

1.2 Purpose

CBCL Limited (CBCL) has been retained by MCA to complete the 2023 SAR for the Bridgetown Water Utility to verify that the system meets the requirements to comply with the current standards outlined by NSECC. Previous SARs were completed in February 2004 and March 2013.

This report, prepared by CBCL, verifies that the system can:

- Meet current environmental standards, which are frequently updated and enhanced for public health protection.
- Meet the minimum requirements set out in the *Nova Scotia Treatment Standards for Municipal Drinking Water Systems.*
- Demonstrate performance with disinfection criteria.
- Demonstrate performance with turbidity criteria.

- Demonstrate that online equipment is in place and appropriately alarmed to continuously monitor chlorine residual, turbidity, and all parameters related to other primary disinfectants.
- Confirm that waste streams generated by the treatment facilities are adequately managed.

This report is organised into the following four sections:

1. Characterization of the Water Source.
2. Treatment Processes, Facilities and Equipment.
3. Operations, Monitoring and Management.
4. Ability to Comply with the terms of the SAR.

2 Characterization of the Water Source

This section of the SAR characterizes the source water for the system by reporting on the following:

1. Microbial risks.
2. Chemical and Physical risks.
   a. Lead and corrosion control.
   b. *Guidelines for Canadian Drinking Water Quality* (*GCDWQ*).
   c. *Guideline for Monitoring Public Drinking Water Supplies* (*GMPDWS*).
   d. Source Water Protection Plan (SWPP) monitoring.
3. Source Quantity.
4. SWPP.

2.1 Source Description & Schematic

Source water for the system is supplied by two wellfields, both located along Hampton Mountain Road. The new wellfield contains one non-GUDI production well (PW4) and is located approximately 1.3 km away from the existing wellfield. The original wellfield contains three non-GUDI production wells (PW1, PW2, PW3). The production wells are drilled to depths ranging from 103.6 - 122 m into an underlying layer of coarse sandstone. PW1 is currently not in use as per the updated Approval to Withdraw (2020). This was taken out of production as it exhibited the highest concentrations of uranium of all wells. Well construction information is provided below in Table 2.1.

Table 2.1: Summary of Bridgetown Wells

Well	Parameter	Value
PW1	UTM (Easting)	318864
	UTM (Northing)	4969098
	UTM (Zone)	20
	Well Total Depth (m)	103.6
	Casing Depth (m)	97.5
	Diameter (mm)	254
	Screen Description	Bedrock: 10.7 m. Screen (4X5 ft) 54.86-56.39 m, 73.15-74.68 m,

Well	Parameter	Value
		91.44-92.96 m, 103.63-105.16 m
PW2	UTM (Easting)	318783
	UTM (Northing)	4969291
	UTM (Zone)	20
	Well Total Depth (m)	106.7
	Casing Depth (m)	100.6
	Diameter (mm)	254
	Screen Description	Bedrock:10.7 m. Screen (4X5 ft) 51.82-53.34 m 76.2-77.72 m 88.39- 89.92 m
PW3	UTM (Easting)	318843
	UTM (Northing)	4969033
	UTM (Zone)	20
	Well Total Depth (m)	121.9
	Casing Depth (m)	21.3
	Diameter (mm)	203
	Screen Description	Bedrock: 9.1 m Screen: 21.34-121.9 m
PW4	UTM (Easting)	318104
	UTM (Northing)	4970229
	UTM (Zone)	20
	Well Total Depth (m)	57.6
	Casing Depth (m)	12.2
	Diameter (mm)	203
	Screen Description	Bedrock: 6 m Screen: 12.2-57.6 m
MW09 - 01	UTM (Easting)	318612
	UTM (Northing)	4969326
	UTM (Zone)	20
	Well Total Depth (m)	60.9
	Casing Depth (m)	12.2
	Diameter (mm)	152
	Screen Description	Open borehole
MW17-01D	UTM (Easting)	318065
	UTM (Northing)	4970378
	UTM (Zone)	20
	Well Total Depth (m)	6.1
	Casing Depth (m)	3.05
	Diameter (mm)	51

Well	Parameter	Value
	Screen Description	Unavailable
MW17-01S	UTM (Easting)	318063
	UTM (Northing)	4970377
	UTM (Zone)	20
	Well Total Depth (m)	12.2
	Casing Depth (m)	9.15
	Diameter (mm)	51
	Screen Description	Unavailable
TW4	UTM (Easting)	318829
	UTM (Northing)	4968955
	UTM (Zone)	20
	Well Total Depth (m)	122
	Casing Depth (m)	12.2
	Diameter (mm)	152
	Screen Description	Bedrock: 8 m Open hole
TW5	UTM (Easting)	318130
	UTM (Northing)	4970238
	UTM (Zone)	20
	Well Total Depth (m)	91.5
	Casing Depth (m)	12.2
	Diameter (mm)	152
	Screen Description	Open borehole

The three production wells (PW1, PW2, PW3) located in the existing wellfield all flow into a combined common pipe to the well control building 1. The production well (PW4) in the new wellfield flows directly to well control building 2 located in the new wellfield. There is infrastructure within the well control building 2 for an additional well source to be added, but none currently exist. Both well control buildings use sodium hypochlorite for primary disinfection. Flows from both well control buildings then feed into a common transmission water main that fills a reservoir located north of the community, which then flows by gravity to the distribution system. The source water schematic is identified on the Watershed Boundary Plan, provided in Appendix B.

2.1.1 Back-up Water Supplies

PW1 has been identified in the Water Withdrawal Approval as a potential back-up supply but is not currently in regular use due to elevated uranium concentrations.

2.2 Microbial Risks

Treatment requirements for all Nova Scotia municipal water system include the following:

- 3.0-log reduction in protozoa (e.g., *Cryptosporidium* oocysts and *Giardia* cysts).

- 4.0-log reduction in viruses.

Log reductions of microbial agents must be achieved by a combination of filtration and disinfection. Non-GUDI groundwater supplies are credited with 3.0-log reduction of protozoa by natural in-situ attenuation/filtration. As such, only a 4.0-log reduction of viruses by disinfection is required.

2.2.1 Surface Water Sources

There are no surface water sources utilized by the Bridgetown System.

2.2.2 Groundwater Sources

The system uses non-GUDI groundwater sources and is required to achieve a minimum of 4.0-log reduction of viruses according to the requirements outlined in the *Nova Scotia Treatment Standards for Municipal Drinking Water Systems* (2022). Chlorine disinfection is used to achieve the required virus log reductions.

The current NSECC *Approval to Operate* designates wells PW1, PW2, PW3, and PW4 as non-GUDI. This Approval was issued following the completion of GUDI assessments on PW1, PW2, and PW3 in 2009 and on PW4 in 2016. The wells were determined to be non-GUDI at Step 1 of the assessment. Nova Scotia Environment issued an Approval to Operate in 2019 reflecting the status of the production wells as non-GUDI. A summary of the production well GUDI classification is presented below in Table 2.2.

Table 2.2: Bridgetown Drinking Water Production Well GUDI Classification

Well Name	Classification	GUDI Protocol
PW1	Non-GUDI	Step 1
PW2	Non-GUDI	Step 1
PW3	Non-GUDI	Step 1
PW4	Non-GUDI	Step 1

During the site visit conducted on June 7, 2022, there were no obvious changes in the surrounding area that would warrant re-classification of the wells.

2.3 Chemical & Physical Risks

Routine monitoring for general chemical and physical water quality parameters is conducted as per the requirement outlined in the *Approval to Operate*.

2.3.1 Disinfection By-Products

Trihalomethanes (THMs) and Haloacetic Acids (HAAs) levels are currently monitored on a quarterly basis at three different locations within the distribution system. The sample locations are as follows:

- Site A: 684 Hampton Mountain Road (Storage tank).
- Site B: 27 Granville Street West (Ward's Farm).
- Site C: 612 Granville Street, east (Nobs Farm Market).

The extremities of the distribution system are most likely to have the longest residence times and will consequently have the highest concentrations of Disinfection By-Products (DBPs). Sites B and C were selected due to the long retention times at the distal ends of the system. Site A represents the entry into the distribution system from the storage tank.

The DBP sample locations appear to be appropriate to represent the areas with the highest potential for THMs and HAAs. The locations of the DBP sampling points are presented in on the Water Distribution Map in Appendix C.

2.3.1.1 Trihalomethanes

THM sampling results for 2022 are provided in Table A.2 (Appendix A). Monitoring occurs quarterly as per the *Approval to Operate*. THM levels observed in the distribution system have always been less than the Locational Running Annual Average (LRAA) maximum of 100 µg/L.

THM results in 2022 were very low, or below the detection limit, in all samples. MCA could request a reduction in sampling locations and frequency from quarterly to annually since the LRAA is less than 0.01 mg/L, based on 2022 quarterly samples.

2.3.1.2 Haloacetic Acids

HAA5 concentration results for 2022 is provided in Table A.3 (Appendix A). Monitoring occurs quarterly as per the *Approval to Operate*. HAA5 levels observed in the distribution system have always been less than the LRAA maximum of 80 µg/L.

HAA results in 2022 sampling were all below the detection limit. MCA could request a reduction in sampling locations and frequency from quarterly to annually since the LRAA is less than 0.01 mg/L, based on 2022 quarterly samples.

2.3.1.3 Other Disinfectant By-Products

Other DBPs listed in the NSECC Approval to Operate include Bromate and Chlorate, if sodium hypochlorite is stored for more than three months. The water treatment system utilizes sodium hypochlorite for primary and secondary disinfection. Operators confirmed that sodium hypochlorite is not stored for more than one month and, therefore, testing for Bromate and Chlorate has not been required.

2.3.2 Lead & Corrosion Control

The *Approval to Operate* requires MCA to minimize corrosion to the distribution system and residential plumbing. Minimizing the corrosion of the drinking water helps to protect distribution infrastructure and to minimize the release of lead and copper into the drinking water through contact with plumbing materials.

2.3.2.1 Lead & Copper

MCA has established a Lead Sampling Program for use in the distribution system. The purpose of this program is to implement consistent sampling of lead in residential buildings to assess public exposure, as well as to evaluate the Municipality's Corrosion Control Program.

The Lead Sampling Program outlines the sample locations and provides the following sections:

- Collecting Samples for Lead and Copper.
  - Sample Protocol and Number of Samples.
  - Sample Information.
- Notification and Investigation Procedures.
- Public Information and Communication Plan.
- Taking Action.

The *Guidelines for Canadian Drinking Water Quality* (*GCDWQ*) sets a Maximum Acceptable Concentration (MAC) of 0.005 mg/L for total lead. According to the *Approval to Operate,* the minimum number of sample locations is determined by the current serviced population. Table 2.3 displays the ranges for the minimum number of sample locations required based on the number of customers serviced.

Table 2.3: Minimum Number of Sample Locations for Lead and Copper Sampling

Number of People Served	Number of Sample Locations (Annual)
≤500	5
501-3,300	10
3,301-10,000	20
10,001-100,000	30
>100,000	50

As of 2022, the Bridgetown system serves approximately 1,000 people; therefore, ten locations are required to comply with Approval. MCA sampled seven residential locations for lead, which is not in compliance with the minimum number of sample locations required.

Sampling occurred twice in 2022, once in July and once in November (this is outside the required sampling window of May – October). Sample sites were selected based on the

following rationale to identify residences that were more likely to exceed the MAC for lead in drinking water:

- Residences with known lead service lines.
- Residences constructed prior to 1975.
- Residences that have shown elevated residential lead in prior testing.

1L Random Daytime Samples (RDT) were collected from the kitchen of residences and sent to a third-party lab for analysis. Sample locations, dates, and results for 2022 are provided in Table 2.4 and Table 2.5.

Table 2.4: Lead Sampling Locations & Results (July 2022)

Sample Date	Address	Lead Results (µg/L)
05-July-22	18 Church St.	**6.0**
05-July-22	12 Church St.	<0.5
05-July-22	10 Rectory St.	<0.5
05-July-22	54 Rectory St.	<0.5
05-July-22	211 Granville St.	<0.5
05-July-22	4037 Highway 201	<0.5
05-July-22	124 South St	<0.5

Table 2.5: Lead and Copper Sampling Locations & Results (November 2022)

Sample Date	Address	Lead Results (µg/L)	Copper Results (µg/L)
07-Nov-22	18 Church St.	**6.5**	116
07-Nov-22	12 Church St.	<0.5	72
07-Nov-22	10 Rectory St.	<0.5	71
07-Nov-22	54 Rectory St.	<0.5	25
07-Nov-22	211 Granville St.	<0.5	70

Lead concentrations were exceeded above the MAC limit of 5 µg/L at one location during both sampling events. MCA followed the response procedures as outlined in the 2022 monitoring plan. The homeowners and NSECC were notified of the exceedance. Based on the current Approval to Operate requirements, Tier 1 and 2 six-hour stagnation tests should be conducted at all sites where exceedances were observed to follow the *Approval to Operate*.

MCA should begin sampling ten residential locations to be in compliance with the current Approval to Operate and the NSECC *Requirements for Lead and Copper Management*. Clarification from NSECC on lead and copper sampling requirements should be requested and an updated Approval to Operate with current sampling requirements should be provided.

2.3.2.2 Corrosion Control

The current *Approval to Operate* (Schedule A) includes requirements to monitor and minimize corrosion within the distribution system. Regular sampling for various corrosion control parameters is required to be conducted on a quarterly basis in the distribution system. Sampling parameters include the following:

- pH.
- Alkalinity.
- Conductivity.
- Temperature.
- Dissolved oxygen.
- Chlorine residual.

The *Approval to Operate* indicates that these parameters will assist MCA to determine the corrosivity of the water, and the type of corrosion control system that may be needed. MCA has identified in the Annual Sampling Plan the three locations within the distribution system to be sampled on a quarterly basis for two consecutive years.

The Annual Report did not include results for these parameters at any sampling locations in the distribution system, which is not in compliance with the *Approval to Operate*. **MCA should begin sampling in accordance with its Annual Sampling Plan and Approval to Operate for corrosion control parameters.**

Currently no comprehensive document outlining the Corrosion Control Plan has been developed. No sampling results for the parameters identified in the Approval to Operate and the Annual Sampling Plan were available for review. A Corrosion Control Plan should be developed and should include a sampling plan, action limits for corrosion monitoring parameters, and description of follow-up actions. If water is deemed non-corrosive from sampling results, a request to NSECC for a reduction in sampling frequency can be made.

2.3.3 Guidelines for Canadian Drinking Water Quality

All parameters with associated MACs listed in the *GCDWQ* are required to be analyzed from a raw and treated water sample every five years. The most recent round of *GCDWQ* compliance sampling was completed on the following date:

- Sample Date #1: March 2012.
- Sample Date #2: June 18, 2018.
- Sample Date #3: Summer 2023 (scheduled).

Results from the last round of sampling, as required by NSECC, are provided in Appendix E. The next round of sampling will be completed in summer 2023 to meet the minimum requirements of one sampling event every five years.

Raw water samples were collected at PW2, and treated water samples were collected from the Town Hall. PW2 and treated samples were in compliance with NSECC requirements for the health-related parameters of the *GCDWQ* as shown in the 2018 sampling results, though the locations were not in compliance. MCA is required to take samples from each individual wellhead as well as treated water. Results for PW3 and PW4 were not provided and were therefore unable to be analyzed to determine if all parameters were within acceptable limits.

The next round of sampling is set to take place in the summer of 2023. Once these results have been received, the results should be compared to the previous testing to determine if any noticeable trends are identified between the past round of sampling.

MCA must begin *GCDWQ* compliance sampling for raw water from each individual well head in the next round of sampling (2023). Raw and treated water sampling is required as per the *Approval to Operate*.

2.3.4 Guidelines for Monitoring Public Drinking Water Supplies

The *Nova Scotia Treatment Standards for Municipal Drinking Water Systems* requires that municipal water utilities monitor water quality for the parameters listed in the *Guidelines for Monitoring Public Drinking Water Supplies* (*GMPDWS*). As per the *Approval to Operate,* the *GMPDWS* samples are collected and tested every two years at an accredited water quality laboratory. The last round of sampling results for raw and treated water from August 2021 are provided in Appendix F. There were no distinguishable water quality trends; however, not all individual wells were sampled in 2021 to compare directly to the 2019 sample results. Operations staff have reported anecdotally that uranium concentrations have generally been increasing at each of PW1 (before being taken offline), PW2, and PW3.

As per the last round of sampling completed in August 2021, Bridgetown is not in compliance with the NSECC sampling requirements of the *GMPDWS* based on the number of samples taken. Raw water quality from each individual wellhead, as well as treated water samples, should be collected during the next round of compliance testing, which is scheduled to occur in summer 2023.

In 2019, Health Canada added a health-based maximum for total manganese of 120 µg/L. NSECC updated the *GMPDWS* to reflect this change and requires monitoring of total manganese in raw, treated, and distribution system samples. As per the Municipality's *Approval to Operate*, manganese is to be sampled twice per year, during the spring and fall. Samples were taken in July 2022 and were below the health-based maximum.

Manganese testing for raw water samples should be taken twice per year in the spring and fall to comply, and distribution system samples should be taken quarterly with the Approval to Operate.

Uranium is tested multiple times per month at each source well to ensure limits are not being exceeded using a field-testing kit. All wells were below the limit for uranium in 2022.

2.3.5 Source Water Protection Plan for Monitoring

The SWPP for the wellfield outlines the recommended monitoring plan and possible sources of contaminants as point sources and non-point sources. A list of the sample locations and associated sampling schedule is provided below in Table 2.4.

Table 2.4: Bridgetown SWPP Monitoring Plan

Parameter	Locations		
	PW2	PW3	PW4
Total Coliform and *E. coli*	Weekly	Weekly	Weekly
Turbidity	Weekly	Weekly	Weekly
pH	Daily grab or continuous	Daily grab or continuous	Daily grab or continuous
Uranium, Pesticides, Herbicides	Yearly	Yearly	Yearly
Total Trihalomethanes	Quarterly	Quarterly	Quarterly
Haloacetic acids	Quarterly	Quarterly	Quarterly
Chlorine residual	Weekly or continuous	Weekly or continuous	Weekly or continuous
Fluoride	Every two years	Every two years	Every two years
Arsenic, Antimony, Lead	Every two years	Every two years	Every two years
Volatile Organic Compounds	Every five years	Every five years	Every five years

The sampling protocols for the wellfields protected water area provides sufficient data and information needed to constantly evaluate the effectiveness of the SWPP. The extensive sampling network in tandem with the comprehensive measurement of analytical parameters provides MCA with the strong early warning system for potential contamination or changes in source water quality.

Currently this monitoring program is not fully implemented; the Annual Sampling Plan and SWPP monitoring requirements should be reconciled, and MCA should conduct sampling accordingly.

2.3.6 Cyanobacteria

A monitoring and protection program against the risk of cyanobacteria is not required as the entire water supply consists of non-GUDI sources.

2.4 Filter Backwash Water

The Bridgetown system does not operate any filtration units; therefore, no filter backwash water is produced at any point.

2.5 Source Quantity

Water withdrawal permits are issued by NSECC in order to document the allowable withdrawals from a water source. The Water Withdrawal Approval Number is 2009-068808-05 with an expiry date of March 15, 2030. The document is attached in Appendix H.
The Approval authorizes the following withdrawal rates:

- Average rate of withdrawal: 1,000,000 litres per day (L/day) (averaged over 30 days).
- Maximum rate of withdrawal: 1,300,000 L/day (averaged over 3 days).
- 30-day withdrawal volume: 30,000,000 litres.
- Annual withdrawal volume: 365,000,000 litres.

Table 2.5: Approved Withdrawal Rates for Bridgetown's Production Wells

	PW2	PW3	PW4
Average Pumping Rate (Averaged over 30 days) (L/day)	573,235	583,708	654,637
Maximum Pumping Rate (Averaged over 3 days) (L/day)	716,531	728,760	981,956
30-day withdrawal volume (L)	17,197,050	17,511,240	19,639,110
Annual withdrawal volume (L)	209,520,775	213,343,420	238,942,505

The average daily rate of withdrawal of the system in 2022 was 623,000 L/day, with a maximum rate of withdrawal of 1,147,000 L/day occurring in September. In 2022, the system used 62% of it's allotted average yearly withdrawal rate, and 88% of the maximum rate of withdrawal. The 2022 raw water flow data is summarised in Table 2.6 below. It should be noted that the maximum withdrawal values for December were deemed inaccurate and were omitted. Flow meters for well 2 were inactive due to maintenance in December of 2022.

Table 2.6: Bridgetown Water Supply Combined Monthly Withdrawal 2022

Month	Monthly Maximum Daily Rate (m^3/day)	Monthly Average Daily Rate (m^3/day)	Monthly Withdrawal Volume (m^3)	Annual Withdrawal Volume (m^3)
January	590	590	18,304	
February	575	575	16,103	
March	561	544	16,859	
April	1027	601	18,023	
May	839	585	18,124	
June	841	705	21,138	
July	730	647	20,059	
August	750	550	17,053	
September	1147	609	18,271	
October	799	566	17,544	
November	845	757	22,696	
December	--	754	23,371	
				168,616

Individual well flow data can be found in Tables A.6 a. and A.6 b (Appendix A). Individual well and combined flows never exceeded the authorized withdrawal limits as per their Water Withdrawal Approval . As a result, all three wells were in compliance in 2022.

2.5.1 Demand Growth

In 2021, the Canadian Census listed the population of Bridgetown as 1,000, a 2.2% decrease from the population in 2016. Given the current population trends and production rate of the system, demand growth is expected to be met by the current drinking water system for the foreseeable future.

2.6 Source Water Protection Plan

Bridgetown is supplied from non-GUDI wells located within the municipal boundaries of Bridgetown. The SWPP was developed in 2018. A hydrogeological study was conducted to determine the three wellhead protection zones, based on the time-of-travel to the wellheads, which could be used to place restrictions on land-use and various activities that could negatively impact the safety of the source water. Moving away from the wellheads to the wellfield, restriction in the zones become more stringent as contamination events are more likely to pose a potential threat to the security of the water supply.

Groundwater flow patterns served as a tool to delineate the Source Water Protection Area (SWPA). When travel times of 2 years, 5 years, and 25 years were entered into the model, a roughly circular zone (or capture zone) corresponding to each travel time was produced:

- 2-year capture zone (Zone 1).
- 5-year capture zone (Zone 2).

- 25-year capture zone (Zone 3).

Based on the SWPP, the outer boundary of the SWPA for Wells 2 and 3 is the 25-year zone which intersects with the farmlands to the north, an orchard and several residential properties to the west, residential lots and a senior citizens' home to the south. Well 4 is situated on the floor of Annapolis Valley, extending north from the Annapolis River to the foot of the North Mountain. Adjacent land uses are primarily agricultural or wooded and include several rural residential lots. The northwest corner of the property is bordered by a former Nova Scotia Transportation and Infrastructure Renewal (NSTIR) depot, used to store and service maintenance vehicles. Groundwater flow in the Valley is dominated by the regional topography, directing drainage down the Valley slopes and into the Valley plain where groundwater discharges to the Annapolis River or flows to the southwest as regional flow. Appendix B identifies the boundaries of the source water protection area and delineates the three travel time zones around the production wells. The Water Protection Zone Mapping in GIS format is referenced in Appendix J and is to be provided separately as a deliverable along with the SAR.

The main objective of the SWPP is to help ensure the continued safety of the drinking water supply for Bridgetown. Following the delineation of the protected water area, the Source Water Protection Advisory Committee (SWPAC) identified potential contaminants and completed a risk ranking for the various point and non-point sources for each zone. The main risks that have been established within the protection area boundary are:

- Chemical/ temporary fuel storage.
- Abandoned wells.
- Roadway/potential spills.
- Fuel oil tank storage/heating oil tanks
- Fire suppressants.
- Herbicides/pesticides.
- Illegal dumping.

After the risk ranking was completed, a management plan was established to reduce the risk of a contamination event in the groundwater supply. Management strategies were developed for each potential risk. The management strategies adopted in the SWPP are as follows:

- Acquisition of land.
- Best management practices.
- By-laws.
- Contingency Planning.
- Designation as a SWPA.
- Education and stewardship initiatives.

A monitoring program has been established to regularly monitor for contaminants and identify changes in source water quality. Sampling for parameters identified in the SWPP is to be carried out on raw water at monitoring wells as part of MCAs overall monitoring plan.

An active SWPAC has not been held for an extended period. As such, the meeting minutes from the previous two SWPAC meetings are not attached as an appendix. The date of the next SWPAC meeting has not been scheduled.

As part of the *Approval to Operate*, MCA must review and update the SWPP on an annual basis.

2.7 Conclusion & Recommendations

The objective of this section was to provide a detailed characterization of the source water through a review of available information. Specifically, the focus was on assessing the approach and ability to protect against pathogenic organisms, effectiveness of DBP monitoring, lead and corrosion control/monitoring, assessment of *GCDWQ* and *GMPDWS* parameters, source quantity, and SWPP.

2.7.1 Treatment Requirements to Protect Against Pathogenic Organisms

Raw water is drawn from non-GUDI wells. As per the *Nova Scotia Treatment Standards for Municipal Drinking Systems*, groundwater sources require 3.0-log reduction for protozoa and 4.0-log reduction for viruses.

Using natural filtration and disinfection with sodium hypochlorite, the system meets the treatment requirements to protect against *Giardia*, *Cryptosporidium,* and viruses.

2.7.2 GUDI Classification

All production wells are classified as non-GUDI wells. The site visit confirmed there were no obvious changes in the area surrounding the wells that would warrant re-classification of the wells.

2.7.3 Disinfection By-Products

MCA monitors THMs and HAAs quarterly at three different locations throughout the distribution system. THM and HAAs levels observed in the distribution system comply with the respective LRAA maximum of 100 µg/L and 80 µg/L, respectively.

MCA could request a reduction in sampling frequency from quarterly to annually and the number of sample locations as all 2022 sample results were less than 0.01 mg/L.

2.7.4 Lead & Corrosion Control

MCA does not adequately monitor lead concentrations in the distribution system. As per the *Approval to Operate*, ten sampling locations are required. In 2022 MCA sampled seven locations, where one sampling location was in exceedance for MAC levels of lead.

Clarification from NSECC on lead and copper sampling requirements should be requested and an updated Approval to Operate with current sampling requirements should be provided.

The Annual Report did not include results for corrosion monitoring parameters at any sampling locations in the distribution system, which is not in compliance with the *Approval to Operate*. **MCA should begin sampling in accordance with its Annual Sampling Plan and Approval to Operate for corrosion control parameters.**

Currently no comprehensive document outlining the Corrosion Control Plan has been developed. This should include a sampling plan, action limits for corrosion monitoring parameters, and description of follow-up actions. If water is deemed non-corrosive from sampling results, a request to NSECC for a reduction in sampling frequency can be made.

2.7.5 Guidelines for Canadian Drinking Water Quality

Raw water samples were collected at one wellhead (PW2), and treated water samples were collected from the Town Hall. Samples were in compliance with NSECC requirements for the health-related parameters of the *GCDWQ* as shown in the 2018 sampling results, though the locations were not in compliance. MCA is required to take samples from each individual wellhead as well as treated water. Results for the remaining wellheads (PW3, PW4) were not provided and were therefore unable to be analyzed to determine if all parameters were within acceptable limits.

The next round of sampling is set to take place in the summer of 2023. Once these results have been received, the results should be compared to the previous testing to determine if any noticeable trends are identified between the past round of sampling.

MCA must begin *GCDWQ* compliance sampling for raw water from each individual well head in the next round of sampling (2023). Raw and treated water sampling is required as per the *Approval to Operate*.

2.7.6 Guidelines for Monitoring Public Drinking Water Supplies

As per the *Approval to Operate*, the *GMPDWS* samples are collected and tested every two years at AGAT Laboratories. The last round of sampling for raw and treated water from August 2021 are provided in Appendix F. There were no distinguishable water quality trends; however, not all individual wells were sampled in 2021 to compare directly to the 2019 sample results. Operations staff have reported anecdotally that uranium concentrations have generally been increasing at each of PW1 (before being taken offline), PW2, and PW3.

As per the last round of sampling completed in August 2021, MCA is not in compliance with the NSECC sampling requirements of the *GMPDWS* based on the number of samples taken. Raw water quality from each individual wellhead, as well as treated water samples, should be collected during the next round of compliance testing, which is scheduled to occur in summer 2023.

In 2019, Health Canada added a health-based maximum for total manganese of 120 µg/L. NSECC updated the *GMPDWS* to reflect this change and requires monitoring of total manganese in raw, treated, and distribution system samples. As per the Municipality's *Approval to Operate*, manganese is to be sampled twice per year, during the spring and fall. Samples were taken in July 2022 and were below the health-based maximum.

Manganese testing for raw water samples should be taken twice per year in the spring and fall to comply, and distribution system samples should be taken quarterly with the Approval to Operate.

2.7.7 Source Water Protection Plan Monitoring

The current SWPP includes a monitoring program. The sampling protocols for the wells provides sufficient data and information needed to constantly evaluate the effectiveness of the SWPP. The monitoring plan provides MCA with a strong warning system for potential contamination or changes in source water quality.

Currently this monitoring program is not fully implemented; the Annual Sampling Plan and SWPP monitoring requirements should be reconciled, and MCA should conduct sampling accordingly.

2.7.8 Filter Backwash Water Discharge

The Bridgetown system does not operate any filtration units, therefore, there is no filter backwash water to discharge.

2.7.9 Source Quantity

The average daily rate of withdrawal in the year 2022 was 623,000 L/day, with a maximum rate of withdrawal of 1,147,000 L/day occurring in September. In 2022, the system used 62% of its allotted average yearly withdrawal rate, and 88% of the maximum rate of withdrawal. Raw water flow data from 2022 is provided in Table A.6 (Appendix A). A copy of the Water Withdrawal Approval is provided in Appendix H.

Individual well flow data can be found in Tables A.6 a and A.6 b (Appendix A). Individual well flows never exceeded authorized withdrawal limits as per their Water Withdrawal Approval showing that all three wells were in compliance in 2022.

2.7.10 Source Water Protection Plan

Appendix B identifies the boundaries of the PWA. The Water Protection Zone Mapping in GIS Format is to be attached as a separate file. A SWPAC meeting has not occurred for an extended period of time.

As part of the *Approval to Operate*, the Community must review and update the SWPP on an annual basis.

3 Treatment Processes, Facilities, & Equipment

3.1 Treatment Process

The *Approval to Operate* classifies the system as a Class I Water Distribution Facility. The *Approval to Operate* is attached in Appendix G, and the details are as follows:

- Approval Holder: Municipality of the County of Annapolis.
- Approval No: 2010-073601-04.
- Expiry Date: June 1, 2029.

3.1.1 Treatment Process Schematic

The Bridgetown water system is a groundwater chlorination system consisting of the following units:

- Non-GUDI wells.
- Chlorination.

A schematic of the treatment process is presented in Figure 3.1 and in Appendix I.

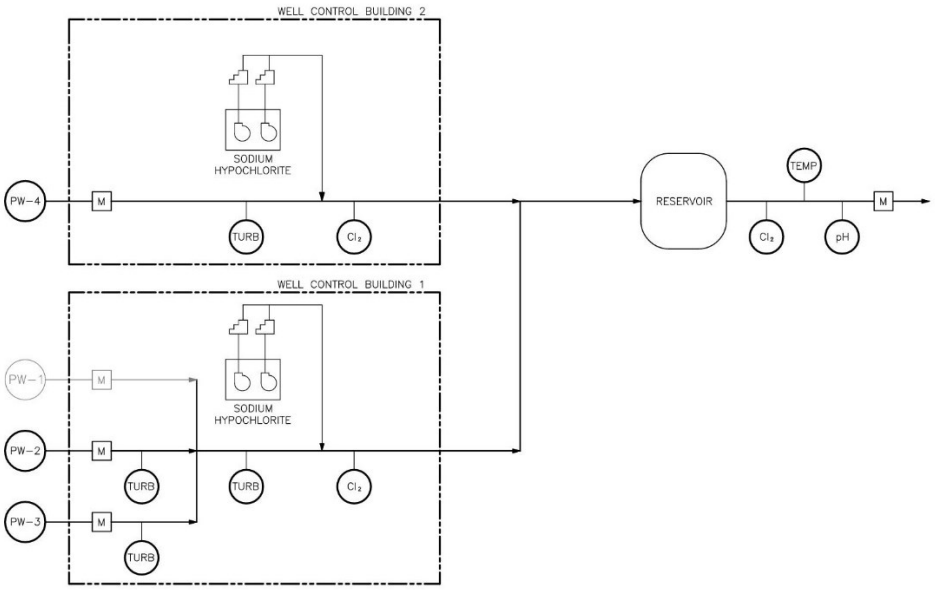


Figure 3.1: Treatment Process Schematic

Note that PW1 is greyed out to indicate that the well is currently not in use, but it still exists and the process equipment is still there.

3.1.1.1 Chlorination

Raw water is dosed with sodium hypochlorite at each well control building. The disinfection equipment in each well control building consists of duplex (redundant) peristaltic metering pumps and is complete with continuous chlorine residual measurement in water leaving each site.

The pumps operate in duty/standby such that if the duty pump is not able to operate the standby pump would turn on. Each pump is adequately sized to provide the design dose of sodium hypochlorite for each wellfield. An alarm has been set in SCADA that alerts staff when the chlorine residual is lower than the minimum set limit when entering the system. For locations leaving the storage tank, the action limit is set to 0.5 mg/L. Operations personnel maintain a daily log and verify the chlorine residual by grab sample.

Secondary disinfection is considered to be the maintenance of a free chlorine residual throughout the distribution system. Water leaving the reservoir and entering the distribution system is continuously monitored for chlorine residual and trended via SCADA. The chlorine dosage is reported to be relatively constant and the secondary residual leaving the reservoir is consistently above 0.6 mg/L.

3.1.2 Turbidity Levels & Associated Criteria

3.1.2.1 Surface Water

This section is not applicable for this system.

3.1.2.2 GUDI Wells

This section is not applicable for this system.

3.1.2.3 Non-GUDI Wells

Section 2.3 of the *Nova Scotia Treatment Standards for Municipal Drinking Water Systems* outlines the prescribed turbidity levels for non-GUDI systems. The requirements for combined flow turbidity or individual well turbidity limits for non-GUDI systems, such as the Bridgetown water system, are as follows:

- Shall be less than or equal to 1.0 NTU in at least 95% of the measurements taken by grab sample for each calendar month; or
- Shall be less than or equal to 1.0 NTU at least 95% of the time each calendar month if continuous monitoring is the method of turbidity measurement.

Verification of the ability for the Bridgetown water system to continuously achieve the 3.0-log removal credits was evaluated using Option 2 as outlined in the NSECC *Terms of Reference for Municipal Drinking Water Systems*. The system utilizes SCADA to provide combined raw water turbidity data for the four source wells. The turbidity from each individual well in use in 2022 was obtained from SCADA and is presented below in Figures 3.2, 3.3 and 3.4.

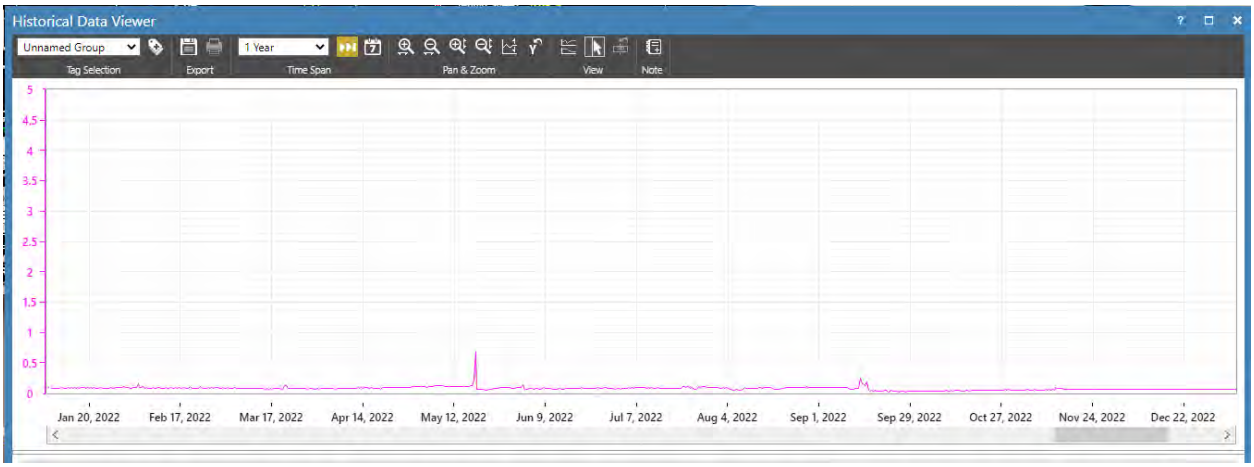


Figure 3.2: Well 2 Annual Turbidity Readings

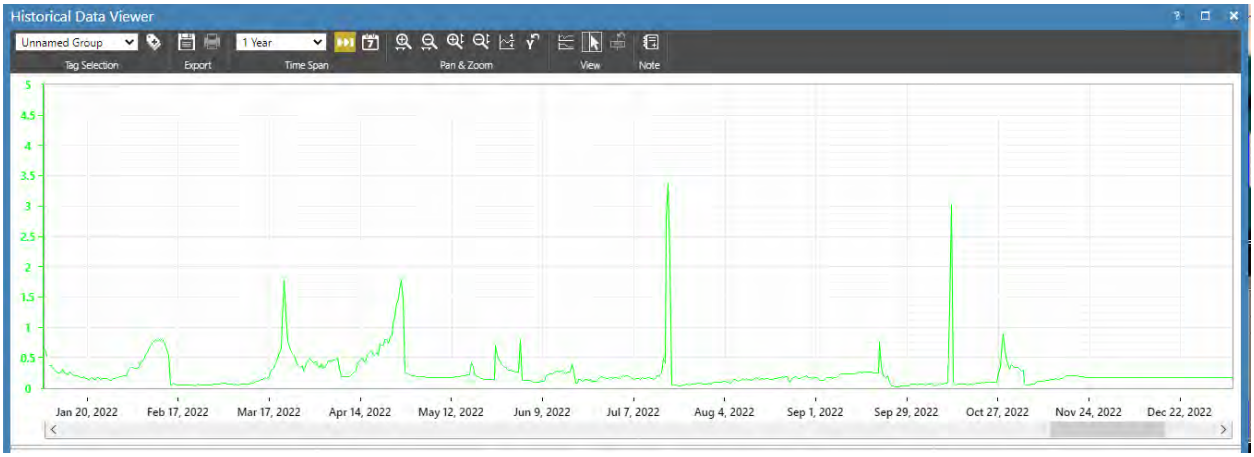


Figure 3.3: Well 3 Annual Turbidity Readings

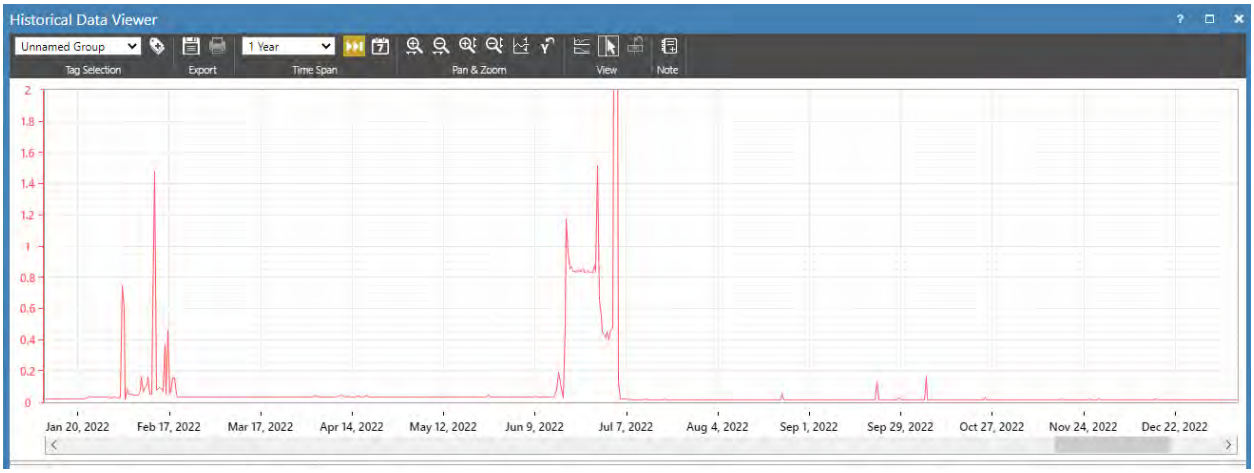


Figure 3.4: Well 4 Annual Turbidity Readings

Operators confirmed all exceedances observed were due to maintenance of the online turbidity analyzer and controller. The turbidity meter for PW4 was undergoing maintenance during June 2022. These readings were not indicative of turbidity levels of water being discharged to the distribution system. Operators indicated that daily grab samples were taken in lieu of the meters not communicating properly for PW 2 and 3. It should be noted that the turbidity levels from the grab samples did not match the SCADA turbidity levels for each well during the same time period. Daily grab samples for PW 2 and 3 are summarized in Figure 3.5, which confirm the raw water was able to meet the stipulated turbidity requirements. Based on the SCADA graphs and supplemental grab samples, the raw water met stipulated turbidity requirements for all months.

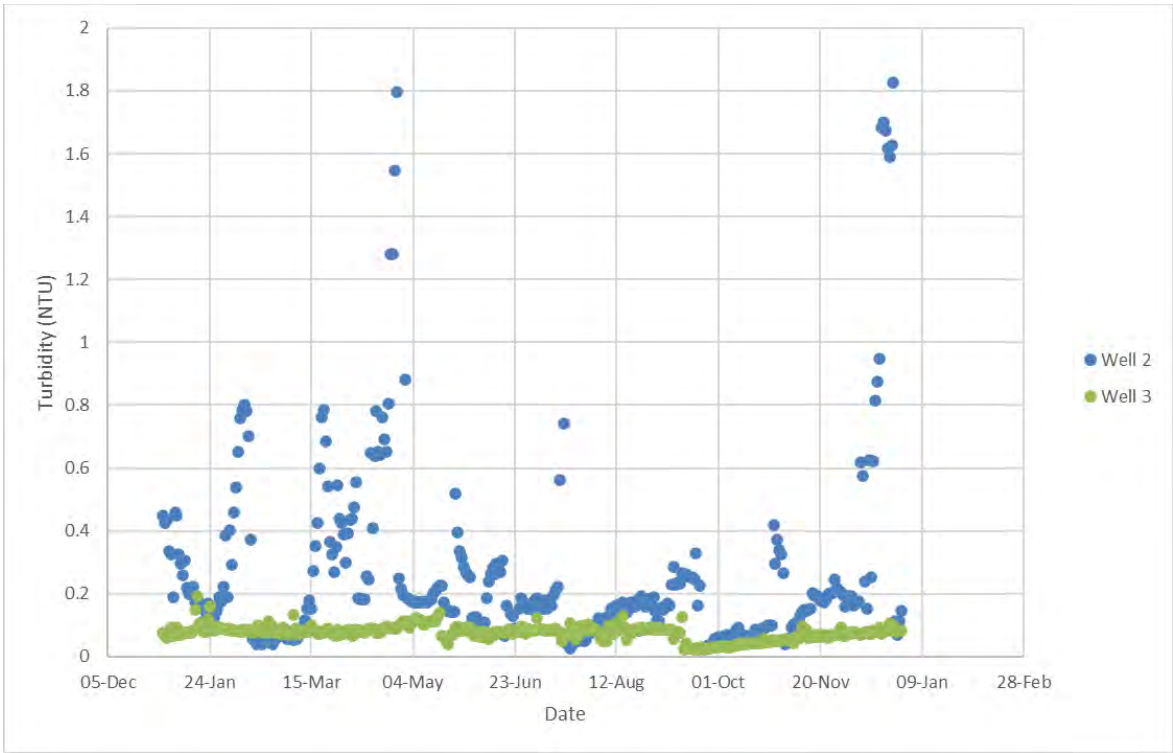


Figure 3.5: Supplemental turbidity grab samples for wells 2 and 3

Raw water is continuously monitored at each individual well using online turbidity monitors. The high alarm set point is established at 1.0 NTU and sends out an alarm to the operator to investigate, therefore, the system meets the requirements to receive the removal credits as per the *Nova Scotia Treatment Standards for Municipal Drinking Water Systems*.

3.1.2.4 Inspection of Turbidity Meters

Continuous monitoring of well turbidity is conducted using HACH 1720E low range process turbidimeters at the PW1/2/3 wellsite and HACH TU5300 series turbidimeter at the PW4 building. These meters meet and exceed the *USEPA Method 180.1* rules for measuring turbidity for drinking water compliance. The analysis method is based upon comparison of the light scattering by the sample under defined conditions with the intensity of light scattered by a standard reference suspension. These units are capable of measuring turbidity levels with an accuracy of ±2% of the reading or ±0.02 NTU (whichever is greater) from 0 to 40 NTU.

MCAs Operations and Maintenance Manual does not include a detailed quality assurance and calibration program. Turbidimeters are inspected on a weekly basis by operators and calibrated as needed. The system currently does not have continuous turbidity monitoring for water entering the distribution system (leaving the reservoir).

MCA should update the Quality Assurance/Quality Control (QA/QC) Standard Operating Procedure (SOP) to better reflect the operation, maintenance, and

calibration of the online monitoring equipment. The updated SOP should include sections on equipment start-up, calibration, maintenance, and troubleshooting.

3.1.3 Membrane Filtration

This section is not applicable for this system.

3.1.4 Primary Disinfection

Under the *Nova Scotia Treatment Standards for Municipal Drinking Water Systems,* treatment processes using non-GUDI groundwater as their source water are required to have the ability to achieve a:

- 3.0-log reduction for *Giardia* and *Cryptosporidium.*
- 4.0-log reduction for viruses.

The system is able to receive a 3.0-log removal credit for protozoa removal (*Cryptosporidium* oocysts and *Giardia* cysts), based on natural filtration log removal credits assigned to non-GUDI water supplies as described in the *Nova Scotia Treatment Standards for Municipal Drinking Water Systems*. For that reason, the system is required to provide a 4.0-log inactivation of viruses using disinfection. Sodium hypochlorite is used to achieve primary chemical disinfection from the CT control point at the outlet of the storage reservoir. A schematic of the primary disinfection system is provided in Appendix I.

3.1.4.1 Chemical Disinfection (CT Concept)

CT calculations are based on various operational, treatment, and system design parameters. Operational parameters including maximum flowrate, chlorine residual, and contact volume will affect the time that primary disinfection occurs as well as efficiency of disinfection. Furthermore, environmental conditions such as pH and temperature affect the efficiency of disinfection and are included in CT calculations. Calculations reflect the worst-case scenario to ensure that the system will always have adequate disinfection.

Primary disinfection occurs between the chlorination points (at each well building) and the outlet of the reservoir. The system disinfects water in the chlorination building at both wellfields. To be conservative, the calculation of CT for compliance is based only on the 850 m of 200 mm transmission main from both well control buildings (the combined chlorinated water transmission main) to the storage tank. Further disinfection occurs in the storage tank, which operators reported to be 75% full during peak hours. Plug flow conditions can be assumed in the pipe and so a baffling factor of 1.0 is assigned. All the design parameters are listed in Table 3.1 and Table 3.2.

Table 3.1: CT Design Parameters

CT Design Parameters	Values
Maximum Flow (m^3/day)	1,147
Maximum pH	8.0
Minimum Temperature (˚C)	0.5˚C
Minimum Free Chlorine Residual (mg/L)	0.5 mg/L

Table 3.2: Distribution Main Design Parameters for CT Calculations

Distribution Main Design Parameters	Values
Length (m)	850 m
Diameter (mm)	200 mm
Baffling Factor	1.0

$$Water\ Main\ Cross\ Sectional\ Area\ (m^2) = \pi r^2 = \pi\left(\frac{0.1m}{2}\right)^2 = 0.0314\ m^2$$

$$Water\ Main\ Volume\ (m^3) = L * A = (850\ m) * (0.0314\ m^2) = 26.7\ m^3$$

$$Contact\ time\ (min) = \frac{Volume\ (m^3)}{Max\ Flow\ (\frac{m^3}{min})} = \frac{26.7\ m^3}{0.8\ \frac{m^3}{min}} = 33.3\ min$$

$$CT_{actual}\ (mg * min/L) = Chlorine\ Residual\ \left(\frac{mg}{L}\right) * Contact\ Time\ (\text{min}) * \text{Baffling Factor}$$

$$CT_{actual}\ (mg * min/L) = 0.5\frac{mg}{L} * 33.3\ min * 1.0 = 16.7\ \ mg * min/L$$

$$CT_{req} = 12\ mg * min/L\ \textit{(for 4.0-log Virus at Temp = 0.5 ˚C, pH = 8.0)}$$

$$\frac{CT_{actual}}{CT_{req}} = \frac{16.7\ \ mg * min/L}{12\ \ mg * min/L} = 1.4$$

The CT calculation above for the log inactivation of viruses confirms that the minimum CT required for the 4.0-log inactivation of viruses in drinking water from both the primary and backup sources is being met. This is the case as the ratios of $CT_{actual}/CT_{required}$ are greater than one and confirms proper disinfection. In 2022, there were no instances where operational conditions for adequate CT were not met.

3.1.4.2 UV Disinfection (IT Concept)

This section is not applicable for this system.

3.1.4.3 Redundancy, Monitoring, & Alerting

Online monitoring of chlorine residual is accomplished using an online HACH CL17 colorimetric chlorine analyser at the outlet of the storage reservoir that continuously takes

primary disinfection residual readings and transmits this data to the SCADA system for monitoring and alarming as required. Control limits within the SCADA system are set to alarm and notify operators when the primary disinfection system is operating incorrectly. The SCADA system is set to alarm if chlorine residual falls below the level of 0.5 mg/L at any of the chlorine residual monitors in the system. There is also online chlorine residual monitoring at each well building, used to ensure the chlorination systems are functioning properly. A portable chlorine residual analyzer (HACH DR2000 Spectrophotometer) is used to confirm chlorine residual. This unit can measure free chlorine residual from a range of 0.1–2.0 mg/L (±0.2 mg/L).

3.1.4.4 Standard Operating Procedures

There is no formal SOP for the disinfection process. A general SOP describes how the CT concept of disinfection may be applied.

MCA should update the current disinfection SOP to formally outline operational setpoints, worst case scenario CT values, response procedures, and operation/maintenance of the disinfection equipment.

3.1.5 Secondary Disinfection

Secondary disinfection is achieved by maintaining a minimum free chlorine residual of 0.2 mg/L at all points within the distribution system. Grab samples are collected weekly at two points in the system. All samples collected in 2022 met the required chlorine residual, therefore, meeting the requirements of the *Approval to Operate.*

The requirement to maintain an adequate secondary disinfectant residual throughout the distribution system drives the dose applied at the primary chlorination point.

3.1.6 Other Critical Processes

There are no critical processes outside those described above.

3.1.7 Waste Streams

3.1.7.1 Filter-to-Waste

This section is not applicable for this system.

3.1.7.2 Filter Backwash Water - Discharging into a Freshwater Watercourse

This section is not applicable for this system.

3.1.7.3 Filter Backwash Water - Discharge to Land or Soil

This section is not applicable for this system.

3.1.7.4 Filter Backwash Water – Discharge to a Marine or Brackish Environment

This section is not applicable for this system.

3.1.7.5 Other Waste Streams

This section is not applicable for this system.

3.2 Distribution Water Quality

Distribution system water quality samples are collected from the locations listed below. The Distribution Map is provided in Appendix C.

Site A	Water Storage Tank, Hampton Mountain Road.
Site B	Wards Farm, 8607 Highway #1, Bridgetown, NS.
Site C	Nob's Farm Market, 612 Granville Street East

3.2.1 Chlorine Residual Levels

Samples from the distribution system for residual chlorine levels are collected weekly at sites B and C as per the *Approval to Operate* conditions. In 2022, the chlorine residuals did not fall below 0.2 mg/L.

Residual chlorine monitoring for water entering the distribution system is measured at the outlet of the storage tank by an online free chlorine analyzer. Values are recorded on the SCADA software which initiates alarms if the levels drop below 0.5 mg/L. The existing system is in good condition.

3.2.2 Microbial Water Quality

Schedule A in the existing *Approval to Operate* requires the collection of grab samples on a weekly basis to monitor for total coliforms and *E. coli*. Samples are collected from sites B and C as identified on the Water Distribution Map located in Appendix C. These locations represent the center and the distal end of the system. This results in 8 samples per month, which is above the minimum number of samples required for a population of 1,000 residents. All test results showed absent for *E. coli* and total coliforms in 2022. The number of sampling sites

3.2.3 Turbidity

Schedule A in the *Approval to Operate* requires turbidity samples to be taken on a weekly basis to ensure values are less than 5.0 NTU. Samples were collected at Sites A, B, and C each week, and all turbidity samples collected in 2022 were within compliance.

3.2.4 Cross Connection Control Program

MCA has developed a Cross Connection Control Program. The Cross Connection Control Program requires all multi residential units (greater than four units), industrial, commercial, and institutional buildings to install a Backflow Prevention Device (BFD) on their water service lateral. The devices are installed to provide premises isolation at the entrance to the building for new sprinkler services, and on the customer's side of the water meter for domestic services.

Currently the plan does not meet the minimum requirements outlined in *A Guide to Assist Nova Scotia Municipal Water Works Develop a Cross Connection Control Program*. **MCA should update the cross-connection control program to include a detailed project scope, budget, authority, and timelines.**

3.2.5 Other Distribution System Monitoring Programs

MCA conducts the following distribution system monitoring:

- Annual flushing program with inspection of hydrants and system gate valves.
- Ongoing leak detection program in development, includes both flow monitoring and correlation and acoustic leak detection equipment.

There is currently no formal reservoir inspection program in place at the Bridgetown reservoir. It is recommended that a program be established to conduct interior inspection in the reservoir on a regular basis.

3.3 On-Site Inspection

An on-site inspection was conducted on June 7, 2023, by Ben Bickerton, M.A.Sc., P.Eng., and Meghan Lea, M.A.Sc., EIT. There were no obvious concerns identified at this time other than the items listed elsewhere in this report.

3.4 Conclusion & Recommendations

3.4.1 Turbidity Levels

Water is provided to the distribution system without passing through any filtration unit. Schedule A of the *Approval to Operate* requires that turbidity entering the distribution system shall be less than or equal to 1.0 NTU at least 95% of the time each calendar month for continuous monitoring.

MCA should ensure all online turbidity meters for each individual well are in good working order and calibrated correctly. MCA should also update the Quality Assurance/Quality Control (QA/QC) Standard Operating Procedure (SOP) to better

reflect the operation, maintenance, and calibration of the online monitoring equipment to mitigate events where turbidity meters are not accurate.

3.4.2 Primary Disinfection

The system uses sodium hypochlorite for primary disinfection. The disinfection equipment consists of a duplex sodium hypochlorite peristaltic metering pump system complete with continuous chlorine residual measurement at each well building. Calculations for CT confirm that primary disinfection achieves a 4.0-log reduction of viruses at the CT control point (water storage reservoir outlet) prior to reaching the first customer in the distribution system.

MCA should update the current disinfection SOP to formally outline operational setpoints, worst case scenario CT values, response procedures, and operation/maintenance of the disinfection equipment.

3.4.3 Secondary Disinfection

Secondary disinfection is achieved by maintaining a minimum free chlorine residual of 0.2 mg/L at all points within the distribution system. Grab samples were collected weekly at designated sample locations. Free chlorine residual was also continuously monitored leaving the reservoir.

3.4.4 Other Critical Processes

There are no other critical processes in the system.

3.4.5 Waste Streams

MCA operates a municipal drinking water system lacking any filtration processes. No significant waste streams are present.

3.4.6 Distribution Water Quality

3.4.6.1 Chlorine Residual Levels

To satisfy the *Approval to Operate* requirements, operators utilize a handheld colorimeter to grab free chlorine samples from two sample locations in the distribution system. Data from all sample sites in 2022 showed levels greater than 0.2 mg/L and met regulatory requirements.

3.4.6.2 Microbial Water Quality

All *E. coli* and total coliform test results in 2022 showed absent for total coliforms and *E. coli*. As a result, the distribution system microbial water quality is within compliance.

3.4.6.3 Turbidity

The distribution system was monitored for turbidity on a weekly basis at three sampling locations. Turbidity samples collected in 2022 were within compliance and below 5.0 NTU.

3.4.6.4 Cross Connection Control Program

The Municipality has developed a Cross Connection Control Program to partially comply with NSECC requirements. The Cross Connection Control Program requires all multi residential units (greater than four units), industrial, commercial, and institutional buildings to install a backflow prevention device on their water service.

Currently the plan does not meet the minimum requirements outlined in *A Guide to Assist Nova Scotia Municipal Water Works Develop a Cross Connection Control Program*. **MCA should update the cross-connection control program to include a detailed project scope, budget, authority, and timelines.**

3.4.6.5 Other Distribution System Monitoring Programs

MCA conducts the following distribution system monitoring:

- Annual flushing program with inspection of hydrants and system gate valves.
- Ongoing leak detection program in development, includes both flow monitoring and correlation and acoustic leak detection equipment.

There is currently no formal reservoir inspection program in place at the Bridgetown reservoir. It is recommended that a program be established to conduct interior inspection in the reservoir on a regular basis.

3.4.7 On-site Inspection

An on-site inspection was conducted on June 7, 2023, and there were no obvious concerns identified at this time.

4 Operations, Monitoring, & Management

4.1 Operations & Maintenance

As required by the *Approval to Operate*, MCA has an Operations and Maintenance Manual which outlines the characteristics of the system and includes emergency actions and limited SOPs for normal operations. Copies of the Operations and Maintenance Manual are available digitally, and operations staff have access to these documents and are aware of their contents. This manual was last updated in 2010.

Sections of the Operations and Maintenance Performance Standards Manual includes the following:

- Chapter 1: Introduction.
- Chapter 2: Contact Information.
- Chapter 3: Water System Overview.
- Chapter 4: Standard Operating Procedures.
- Chapter 5: Contingency Plans.
- Appendix A: Approval to Operate.
- Appendix B: Approval to Withdraw.

The Contingency Plan in chapter 5 outlines the plans and steps to follow in case of an emergency and/or failure. The Contingency Plan includes power failure, failure of SCADA, chemical spill/release, high filter turbidity, disinfection, failure of disinfectant equipment, fire, failure of coagulation, and raw water contamination.

All certified operators make process adjustments such as chemical dosing changes, perform equipment and instrument maintenance as required based on experience, and continuous evaluation of the system performance. The Operator in Direct Responsible Charge (ODRC) is ultimately responsible for changes, and significant changes beyond routine adjustments are discussed with the ODRC prior to implementing the change. The Operations and Maintenance Manual lacks detailed SOPs for the operations staff to follow. The maintenance plan was reviewed and is not adequate to ensure the long-term viability of the Municipal Public Drinking Water Supply, including distribution system components.

MCA should update the Operation and Maintenance Manual to include detailed SOPs in accordance with the NSECC document *A Guide to Assist Nova Scotia Municipal Water Works Develop a Comprehensive Operations Manual*.

4.2 Monitoring & Reporting

The approved monitoring program was submitted to NSECC in 2022. The program includes quality assurance programs and training, water quality compliance limits, sampling sites, and monitoring plans. Compliance monitoring is required to ensure that the water adheres to the quality standards outlined in the *GCDWQ* and *GMPDWS*. A summary of the raw, treated, and SWPP sampling programs are provided in Table 4.1, Table 4.2, and Table 4.3, respectively.

Table 4.1: Raw Water Sampling Program

Summary of Raw Water Requirements			
Parameter	**Approval to Operate Sampling Requirements**		**Bridgetown Sampling Program**
	Location	**Frequency**	**Frequency**
Turbidity	Every Individual Well	Continuous	Continuous
Water Volume	Every Individual Well	Continuous	Continuous
All *GMPDWS*	Every Individual Well	Every two years	Every two years
All *GCDWQ*	Raw Water	Every 5 years	Every 5 years
Viruses	Raw Water	As requested	As requested
Manganese	Raw Water	Semi Annually	Semi Annually

Table 4.2: Distribution Water Sampling Program

Summary of Treated Water and Distribution Monitoring Requirements			
Parameter	**Approval to Operate Sampling Requirements**		**Bridgetown System Sampling Program**
	Location	**Frequency**	**Frequency**
Turbidity	Distribution System Sample Points	Weekly Grab	Weekly Grab
Free Chlorine	Entering Distribution System	Continuous	Continuous
	Storage Tank Outlet	Continuous	Continuous
	Distribution System Sample Points	Weekly Grab	Weekly Grab
All *GMPDWS*	Treated Water	Every 2 years	Every 2 years
All *GCDWQ*	Treated Water	Every 5 years	Every 5 years
Temperature	CT Control Point	Daily Grab or Continuous	Continuous
pH	CT Control Point	Continuous	Continuous
Viruses	Distribution System	As Requested	As Requested

Summary of Treated Water and Distribution Monitoring Requirements			
Parameter	Approval to Operate Sampling Requirements		Bridgetown System Sampling Program
	Location	Frequency	Frequency
Parameters per Corrosion Monitoring Program	Select Distribution Points	Quarterly Grab	No current plan
Lead (Flushed)	Select Distribution Points	Annual	Annual between May to October, distribution sampling points
Lead (Stagnant)	Select Distribution Points	Annual grab (between May to October)	Annual in August, distribution sampling points
THMs	Select Distribution Points	Quarterly	Annual
HAAs	Select Distribution Points	Quarterly	Annual
Manganese	Storage tank, distribution sampling points	Quarterly Grab	Quarterly Grab

Table 4.3: Source Water Protection Plan Sampling Program

Parameter	Locations		
	PW2	PW3	PW4
Total Coliform and *E. coli*	Weekly	Weekly	Weekly
Turbidity	Weekly	Weekly	Weekly
pH	Daily grab or continuous	Daily grab or continuous	Daily grab or continuous
Uranium, Pesticides, Herbicides	Yearly	Yearly	Yearly
Total THMs	Quarterly	Quarterly	Quarterly
HAAs	Quarterly	Quarterly	Quarterly
Chlorine residual	Weekly or continuous	Weekly or continuous	Weekly or continuous
Fluoride	Every two years	Every two years	Every two years
Arsenic, Antimony, Lead	Every two years	Every two years	Every two years
Volatile Organic Compounds	Every five years	Every five years	Every five years

All samples collected for the various monitoring programs are sent to AGAT Laboratories in Dartmouth, NS for analysis. AGAT Laboratories is an accredited laboratory as per the *Policy on Acceptable Certification of Laboratories*.

4.2.1 Review of Recent Submitted Annual Report

The 2022 Annual Report was reviewed. Not all sections were completed; most notably, distribution system corrosion control parameters, manganese and lead/copper sampling results were not included. **MCA should ensure that each section of the Annual Report where applicable to the Bridgetown system is completed in its entirety each year. The document can be modified from the basic template provided by NSECC.**

4.3 Management

The system has been classified as a Class I Water Distribution Facility. John Webber, Level II Water Distribution (WD) Operator is the ODRC of the Water Distribution Utility. A summary of staffing information is provided below:

- John Webber (ODRC) – Level II WD.
- James Jenner – Level I WD
- Charles Grant (DRC Operator) – Level I WD
- Amy Brown – Level I WD.
- Tim Durling – Level I WD.

The ODRC protocol information is provided in Appendix A.

4.4 Conclusion & Recommendations

4.4.1 Operation & Maintenance

MCA has a limited Operations and Maintenance Manual. It is recommended that a comprehensive manual be created that elaborates on protocols and procedures.

MCA should seek to update the Operations and Maintenance Manual to include detailed SOPs for daily operations of the plant.

4.4.2 Monitoring & Reporting

Results from all sampling listed in the approved Annual Sampling Plan was not available for review. The 2022 Annual Report did not include reporting on all parameters (e.g. corrosion control parameters).

MCA should ensure that each section of the Annual Report where applicable to the Bridgetown system is completed in its entirety each year. The document can be modified from the basic template provided by NSECC.

4.4.3 Management

The system has been classified as a Class I Water Distribution Facility. The ODRC is John Webber. All operators are adequately certified and there are a sufficient number of operators as well as back-up personnel available. The procedure for when the ODRC is absent is outlined in Appendix A.

5 Ability to Comply

This section will provide a summary of conclusions as referenced from the NSECC Terms of Reference.

5.1 Summary

5.1.1 Treatment Processes, Facilities, & Equipment

5.1.1.1 Treatment Process

Water is supplied from non-GUDI wells and undergoes chlorine disinfection prior to entering the distribution system. The *Approval to Operate* is valid until June 1, 2029.

5.1.1.2 Turbidity Levels & Associated Criteria

Raw water supplied from the non-GUDI wells must be less than 1.0 NTU 95% of the time in each calendar month based on continuous monitoring. SCADA graphs and grab samples indicate that the source wells did meet this turbidity limit for all months in 2022.

5.1.1.3 Primary Disinfection

All municipal drinking water systems in Nova Scotia are required to meet treatment standards to achieve:

- 3.0-log removal for *Giardia* and *Cryptosporidium*.
- 4.0-log removal credits for viruses.

The Bridgetown system is a groundwater chlorination process consisting of natural filtration and disinfection. Combined raw water turbidity was reviewed and meets the limits of 1.0 NTU 95% of the time. As such, the facility received a natural filtration 3.0-log reduction credit for *Giardia* and *Cryptosporidium*.

The remaining removal credits were achieved with chlorine disinfection. The CT for chlorine disinfection is adequate to achieve a 4.0-log inactivation of viruses, therefore, the combination of natural filtration and inactivation can remove and inactivate protozoa (*Giardia* and *Cryptosporidium*) and viruses to NSECC's treatment standards.

5.1.1.4 Secondary Disinfection

Secondary disinfection is achieved by maintaining a free chlorine residual of 0.2 mg/L. Weekly grab samples within the distribution system are used to ensure that the minimum chlorine residual is met.

5.1.1.5 Other Critical Processes

This section is not applicable for this system.

5.1.1.6 Process Waste Streams

This section is not applicable for this system.

5.1.2 Distribution System Water Quality

5.1.2.1 Chlorine Residuals

Chlorine residuals in the distribution system are acceptable and met a minimum concentration of 0.2 mg/L. Weekly grab samples were taken and analyzed at two locations throughout the distribution system. Chlorine residual levels were also continuously monitored leaving the storage reservoir.

5.1.2.2 Microbial Water Quality

Microbiological samples for *E. coli* and total coliforms were collected at two locations weekly. In 2022, all results for each location tested absent for both *E. coli* and total coliforms. As a result, the distribution system microbial water quality is within compliance.

5.1.2.3 Turbidity

Grab samples were collected on a weekly basis from the three distribution sampling locations. All samples tested were below the maximum turbidity of 5.0 NTU and within regulatory compliance.

5.1.2.4 Cross Connection Control Programs

MCA has implemented an approved Cross Connection Control Program which partially comply with NSECC requirements. **MCA should update the cross-connection control program to include a detailed project scope, budget, authority, and timelines.**

5.1.2.5 Other Distribution System Monitoring Programs

No other distribution system monitoring programs are in place for the system.

5.1.3 Operations, Monitoring, & Management

5.1.3.1 Operations & Maintenance

MCA has an Operations and Maintenance Manual. **It is recommended that the manual be updated to better outline the characteristics of the system and include emergency actions and SOPs for normal facility operation.**

5.1.3.2 Monitoring & Reporting

The 2022-2023 monitoring program and 2022 Annual Report appear to address all requirements, with minor exceptions including lead/copper, manganese, and corrosion control sampling results.

All chemical analyses are carried out at the AGAT Laboratories in Dartmouth. AGAT Laboratories is an accredited laboratory as per the *Policy on Acceptable Certification of Laboratories*.

5.1.3.3 Management

The system has been classified a Class I Water Distribution Facility. John Webber Level II WD Operator is the ODRC of the Water Distribution Facility.

5.1.4 Recommendations

Table 5.1: Recommendations for Bridgetown Water Utility

Category	Problem/ Challenge Area	Recommended Action	Time Frame to Complete	Opinion of Cost
Water Quality	Corrosion Control Monitoring	Formalize a comprehensive Corrosion Control Plan with action limits/responses that align with the current *Approval to Operate*, aiming to reduce lead and copper, to correspond to existing sampling plan.	6 months	No cost if done in-house
Water Quality	SWPP Monitoring Parameter testing	Begin sampling for parameters outlined in the SWPP following the appropriate schedule.	Annually	$1,000/year
Water Quality	DBP Monitoring	Propose reduced monitoring of THMs and HAAs based on low historical readings.	1 year	Sampling cost savings
SWPP	Annual SWPP meeting	Recommence bi-annual SWPAC meeting to review and update the SWPAC.	1 year	$0
Management	O&M Manual and SOPs limited	Update the Operations and Maintenance manual with SOPs for normal operation and emergency actions in accordance with the NSECC guidance manual.	1 year	No cost if done in-house
Metering	Turbidity Meters	Ensure all turbidity meters are properly cleaned and calibrated to mitigate events where readings may be inaccurate.	3 months	$1,000
Treatment	Disinfection SOP	Add notification and response procedures for inadequate CT to SOP.	6 months	Complete – In house

Category	Problem/ Challenge Area	Recommended Action	Time Frame to Complete	Opinion of Cost
Sampling	Lead Exceedance	3 additional residential sampling locations should be added for lead/copper sampling. Locations where lead concentrations exceeded the MAC should be retested using a 6-hour stagnation test as per the *Approval to Operate*.	3 months	$500
Sampling	GCDWQ/GMPDWS Sampling	Ensure samples are taken at each induvial wellhead as well as treated water.	Next round of compliance testing	$5,000
Sampling	Manganese Testing	Manganese testing for raw water samples should be taken twice per year in the spring and fall to comply, and distribution system samples should be taken quarterly with the Approval to Operate.	3 months	$200/year
Management	Limited Cross Connection Control Plan	Update Cross Connection Control Plan to comply with minimum requirements set by NSECC.	3 months	No cost if done in-house

5.2 Report Preparation

I, the undersigned, hereby declare that to the best of my knowledge, the information contained herein and the information in support of this submission, as completed by me, is complete and accurate in accordance with my obligations under the Engineering Profession Act and its regulations. I further declare that this submission has been prepared in accordance with the published standard for this submission.

Ben Bickerton, M.A.Sc., P.Eng.
Process Engineer

APPENDIX A

Tables Required by the Terms of References

Table A.1: Groundwater Under the Direct Influence of Surface Water: Microscopic Particulate Analysis (MPA) Test Results
Section not applicable.

Table A.2: Annual Trihalomethanes Concentrations (THMs) by Sample Location

Sampling Period/Month		Site A	Site B	Site C
		THM total (µg/L)	THM total (µg/L)	THM total (µg/L)
Q1	January	-	-	-
	February	<0.001	0.003	0.005
	March	-	-	-
Q2	April	-	-	-
	May	<0.001	0.005	0.006
	June	-	-	-
Q3	July	<0.001	0.002	0.007
	August	-	-	-
	September	-	-	-
Q4	October	<0.001	0.004	0.008
	November	-	-	-
	December	-	-	-
LRAA (µg/L)		0.001	<0.001	0.003
Meets MAC of 0.1 mg/L (100 µg/L)		**Yes**	**Yes**	**Yes**

Table A.3: Annual Haloacetic Acid Concentrations (HAA5) by Sample Location

Sampling Period/Month		Site A	Site B	Site C
		HAA (5) µg/L	HAA (5) µg/L	HAA (5) µg/L
Q1	January	-	-	-
	February	<0.004	<0.004	<0.004
	March	-	-	-
Q2	April	-	-	-
	May	<0.004	<0.004	<0.004
	June	-	-	-
Q3	July	<0.004	<0.004	<0.004
	August	-	-	-
	September	-	-	-
Q4	October	<0.004	<0.004	<0.004
	November	-	-	-
	December	-	-	-
LRAA (µg/L)		<0.001	0.004	<0.004
Meets MAC of 0.08 mg/L (80 µg/L)		**Yes**	**Yes**	**Yes**

Table A.4: Health-Related Parameters in the *Guidelines for Canadian Drinking Water Quality*

Parameter	MAC (mg/L)	PW2	PW3	PW4	Treated Water
		Sampling Date: June 18th, 2018	--	--	Sampling Date: June 18th, 2018
		µg/L	--	--	
Bacteria					
Total Coliforms	None per 100 mL	-	-	-	-
E. coli	None per 100 mL	-	-	-	-
Aluminum	2.9	<10	-	-	<10
Antimony	0.006	<2	-	-	<2
Arsenic	0.01	4	-	-	4
Atrazine	0.005	-	-	-	-
Barium	2	271	-	-	341
Benzene	0.005	<1	-	-	<1
Benzo[*a*]pyrene	0.00004	<0.00001	-	-	<0.00001
Boron	5	13	-	-	14
Bromate	0.01	-	-	-	-
Bromoxynil	0.03	<0.5	-	-	<0.5
Cadmium	0.007	<0.3	-	-	<0.3
Carbon tetrachloride	0.002	<1	-	-	<1
Chlorate	1	<0.02	-	-	<0.02
Chlorite	1	<0.02	-	-	<0.02
Chlorpyrifos	0.09	<1	-	-	<1
Chromium	0.05	3	-	-	3
Copper	2	<1	-	-	11
Cyanide	0.2	<0.002	-	-	<0.002
Cyanobacterial toxins	0.0015	-	-	-	-
Dicamba	0.11	-	-	-	-
1,4-Dichlorobenzene	0.005	<1	-	-	<1
1,2-Dichloroethane	0.005	<1	-	-	<1
1,1-Dichloroethylene	0.014	<2	-	-	<2
Dichloromethane	0.05	-	-	-	-
2,4-Dichlorophenoxy acetic acid (2,4-D)	0.1	-	-	-	-
Dimethoate	0.02	<1.5	-	-	<1.5
1,4-Dioxane	0.05	-	-	-	-
Diquat	0.05	<1	-	-	<1
Ethylbenzene	0.14	<2	-	-	<2
Fluoride	1.5	<0.12	-	-	<0.12
Glyphosate	0.28	<15	-	-	<15
Haloacetic acids - Total (HAAs)	0.08	--	-	-	--
Lead	0.005	<0.5	-	-	<0.5
Malathion	0.19	<1	-	-	<1
Manganese	0.12	<2	-	-	<2
Mercury	0.001	<0.026	-	-	<0.026

Parameter	MAC (mg/L)	PW2	PW3	PW4	Treated Water
		Sampling Date: June 18th, 2018	--	--	Sampling Date: June 18th, 2018
		µg/L	--	--	
2-Methyl-4-chlorophenoxyacetic acid (MCPA)	0.35	-	-	-	-
Metribuzin	0.08	<0.25	-	-	<0.25
Nitrate-Nitrogen	10	-	-	-	-
Nitrilotriacetic acid (NTA)	0.4	-	-	-	-
Nitrite-Nitrogen	1	-	-	-	-
N-Nitroso dimethylamine (NDMA)	0.00004	-	-	-	-
Pentachlorophenol	0.06	-	-	-	-
Perfluorooctane Sulfonate (PFOS)	0.0006	-	-	-	-
Perfluorooactanoic Acid (PFOA)	0.0002	-	-	-	-
Selenium	0.05	<2	-	-	<2
Strontium	7	-	-	-	-
Tetrachloroethylene	0.01	<1	-	-	<1
Toluene	0.06	<2	-	-	<2
Trichloroethylene	0.005	<1	-	-	<1
2,4,6-Trichlorophenol	0.005	<0.5	-	-	<0.5
Trihalomethanes (THM)	0.1	--	-	-	--
Turbidity		0.6	-	-	1.2
Uranium	0.02	19.7	-	-	19.5
Vinyl chloride	0.002	<0.6	-	-	<0.6
Xylenes (total)	0.09	<4	-	-	<4

Table A.5: Guidelines for Monitoring Public Drinking Water Supplies

Parameter	Health Based Guideline (mg/L)	Aesthetic Guideline (mg/L)	Treated Water Sample Date: August 17, 2021 (µg/L)	Raw Water Sample Date: August 17, 2021 (µg/L)
Alkalinity	-	-	-	-
Aluminium	2.9	0.1	-	<5
Ammonia	-	-	-	-
Antimony	0.006	-	-	<2
Arsenic	0.01	-	-	<2
Barium	1	-	205	202
Boron	5	-	9	9
Cadmium	0.007	-	-	<0.09
Calcium	-		-	-
Chloride	-	≤250	-	-
Chromium	0.05	-	-	-
Colour	-	≤ 15 TCU	-	-
Conductivity	-	-	-	-
Copper	2	≤1.0	-	<1
Fluoride	1.5	-	-	-
Hardness	-	-	-	-
Iron	-	≤0.3	-	<50
Lead	0.005		-	<0.5
Magnesium	-	-	-	-
Manganese	0.12	≤0.02	-	<2
Nitrate-nitrogen	10	-	-	-
pH	-	6.5-8.5	7.92	7.79
Potassium	-	-	-	-
Selenium	0.05	-	-	<1
Sodium	-	≤200	-	-
Sulphate	-	≤500	-	-
Total Dissolved Solids	-	≤500	-	-
Total Organic Carbon	-	-	-	-
Turbidity	-	-	-	-
Uranium	0.02	-	6.8	7.0
Zinc		≤5	<5	<5

Table A.6.a: Water Withdrawal Data

Month	Source 1 – Production Well 1 (P1)				Source 2 - Production Well 2 (P2)			
	Monthly Maximum Daily Rate (m^3/d)	Monthly Average Daily Rate (m^3/d)	Monthly Withdrawal Volume (m^3)	Annual Withdrawal Volume (m^3)	Monthly Maximum Daily Rate (m^3/d)	Monthly Average Daily Rate (m^3/d)	Monthly Withdrawal Volume (m^3)	Annual Withdrawal Volume (m^3)
January	0	0	0	0	179	64	318	
February	0	0	0	0	163	92	250	
March	0	0	0	0	40	39	77	
April	0	0	0	0	158	76	250	
May	0	0	0	0	49	33	89	
June	0	0	0	0	315	103	561	
July	0	0	0	0	274	110	804	
August	0	0	0	0	102	69	187	
September	0	0	0	0	202	73	642	
October	0	0	0	0	215	83	430	
November	0	0	0	0	77	71	141	
December	0	0	0	0	0	0	0	
Total Annual Withdrawal	--	--	--	0	--	--	--	3749

Table A.6.a: Water Withdrawal Data

Month	Source 3 – Production Well 3 (P3)				Source 4 – Production Well 4 (P4)			
	Monthly Maximum Daily Rate (m^3/d)	Monthly Average Daily Rate (m^3/d)	Monthly Withdrawal Volume (m^3)	Annual Withdrawal Volume (m^3)	Monthly Maximum Daily Rate (m^3/d)	Monthly Average Daily Rate (m^3/d)	Monthly Withdrawal Volume (m^3)	Annual Withdrawal Volume (m^3)
January	357	215	6,61		443	336	10,403	
February	387	222	6,204		438	368	10,299	
March	356	220	6,810		438	333	10,327	
April	356	227	6,820		437	323	9688	
May	354	258	7,997		431	370	11,462	
June	353	263	7,894		426	336	10,076	
July	378	259	8,041		418	316	9811	
August	350	247	7,666		411	334	10,348	
September	597	252	7,545		408	328	9,825	
October	350	254	7,859		411	323	10,007	
November	351	213	4,895		417	320	9,611	
December	0	0	0		421	274	8,506	
Total Annual Withdrawal				71,731				120,363

Table A.6.b: Water Withdrawal Data Comparison to Approved Limits

Source – PW1			Source – PW2			Source – PW3		
Specify Approved Withdrawal Limits		Exceeds (Yes/No)	Specify Approved Withdrawal Limits		Exceeds (Yes/No)	Specify Approved Withdrawal Limits		Exceeds (Yes/No)
Maximum Daily Rate Litres/day	0	No	Maximum Daily Rate Litres/day	716,531	No	Maximum Daily Rate Litres/day	728,760	No
Average Daily Rate - Litres/day	0	No	Average Daily Rate - Litres/day	573,235	No	Average Daily Rate - Litres/day	583,708	No
Volume (30 days) - Litres	0	No	Volume (30 days) - Litres	17,197,050	No	Volume (30 days) - Litres	17,511,240	No
Volume (Annual) - Litres	0	No	Volume (Annual) - Litres	209,520,775	No	Volume (Annual) - Litres	213,343,420	No

Table A.6.b: Water Withdrawal Data Comparison to Approved Limits

Specify Approved Withdrawal Limits		Exceeds (Yes/No)
Maximum Daily Rate (litres/day)	981,956	No
Average Daily Rate (litres/day)	654,637	No
Volume (30 days) (litres)	19,639,110	No
Volume (Annual) (litres)	238,942,505	No

Table C.1 - Operator in Overall Direct Responsible Charge

The operator in overall direct responsible charge (ODRC) is: *(Specify name - add additional lines if more than one ODRC operator)*

John Webber

Signature of operator: John Webber

Date: May 26/23

Protocols in place during the absence of the operator in ODRC include (specify):

When on vacation:

James Jenner

When ill:

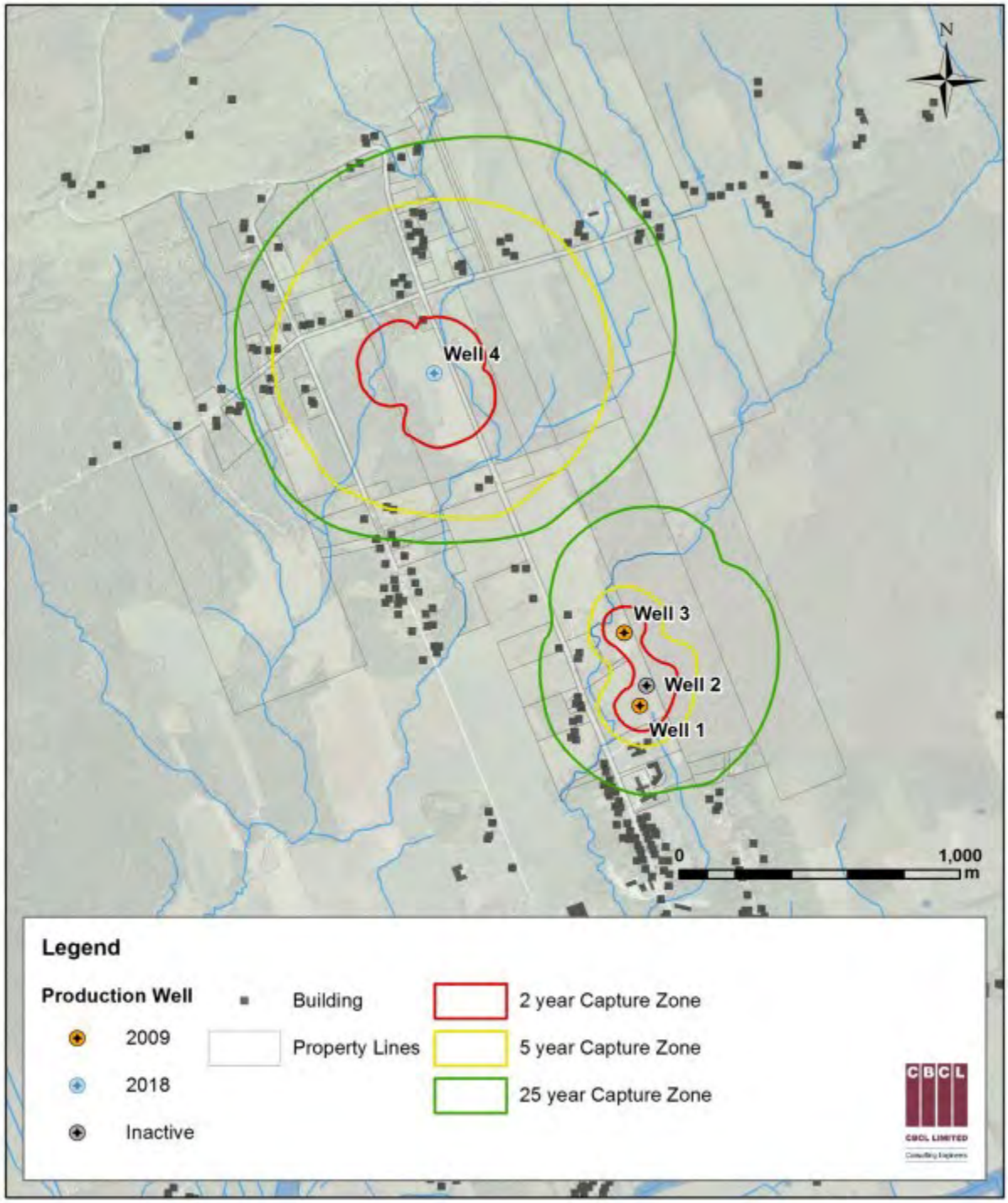
James Jenner

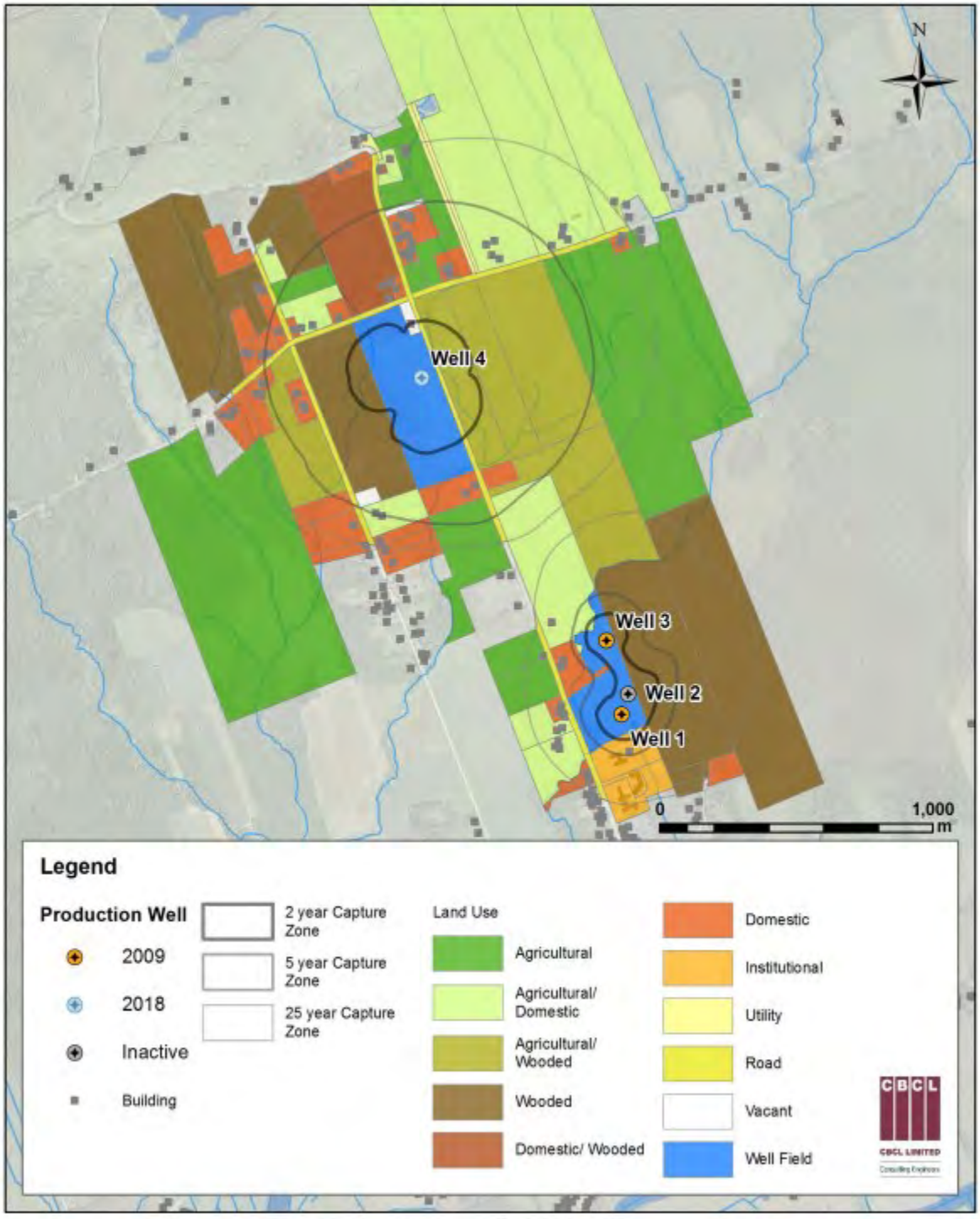
Other (specify)

James Jenner

APPENDIX B

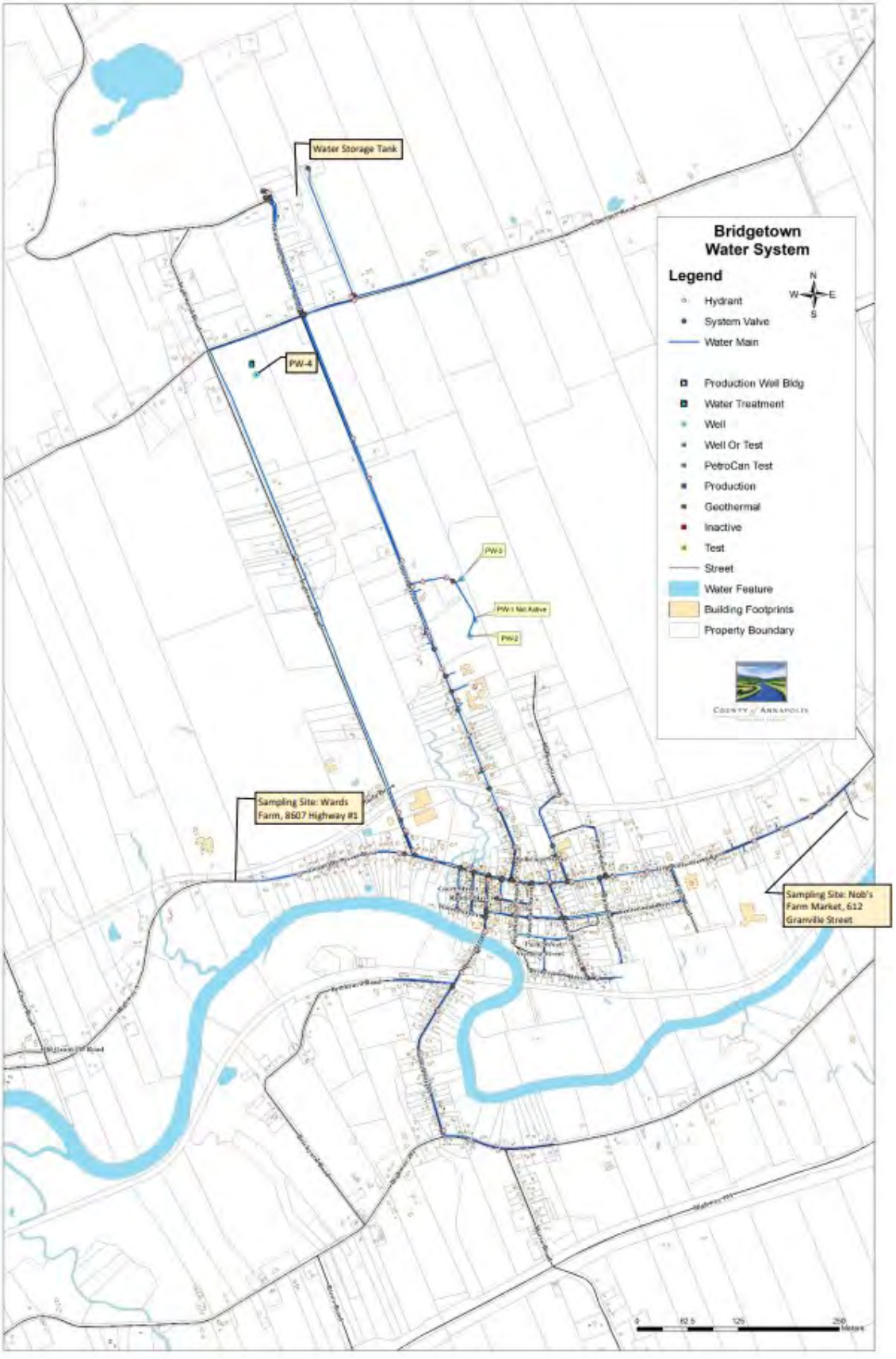
Watershed Boundary Plan


N
Well 4
Well 3
Well 2
Well 1
0
1,000
m
Legend
Production Well
2009
2018
Inactive
Building
Property Lines
2 year Capture Zone
5 year Capture Zone
25 year Capture Zone
CBCL LIMITED


N
Well 4
Well 3
Well 2
Well 1
0
1,000
m
Legend
Production Well
2009
2018
Inactive
Building
2 year Capture Zone
5 year Capture Zone
25 year Capture Zone
Land Use
Agricultural
Agricultural/ Domestic
Agricultural/ Wooded
Wooded
Domestic/ Wooded
Domestic
Institutional
Utility
Road
Vacant
Well Field
CBCL LIMITED

APPENDIX C

Distribution Map


Water Storage Tank
PW-4
PW-3
PW-1 Not Active
PW-2
Sampling Site: Wards Farm, 8607 Highway #1
Sampling Site: Nob's Farm Market, 612 Granville Street
Bridgetown Water System
Legend
N
W
E
S
Hydrant
System Valve
Water Main
Production Well Bldg
Water Treatment
Well
Well Or Test
PetroCan Test
Production
Geothermal
Inactive
Test
Street
Water Feature
Building Footprints
Property Boundary
County of Annapolis
0
62.5
125
250
Meters

APPENDIX D

Corrosion Control Program Results

AGAT Laboratories

11 Morris Drive, Unit 122
Dartmouth, Nova Scotia
CANADA B3B 1M2
TEL (902)468-8718
FAX (902)468-8924
http://www.agatlabs.com

CLIENT NAME: MUNICIPALITY OF ANNAPOLIS COUNTY
PO Box 100
Annapolis Royal, NS B0S1A0
(902) 532-3141
ATTENTION TO: James Jenner
PROJECT:
AGAT WORK ORDER: 22X967186
WATER ANALYSIS REVIEWED BY: Jason Coughtrey, Inorganics Supervisor
DATE REPORTED: Nov 17, 2022
PAGES (INCLUDING COVER): 6
VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (902) 468-8718

Notes

Disclaimer:

- *All work conducted herein has been done using accepted standard protocols, and generally accepted practices and methods. AGAT test methods may incorporate modifications from the specified reference methods to improve performance.*
- *All samples will be disposed of within 30 days following analysis, unless expressly agreed otherwise in writing. Please contact your Client Project Manager if you require additional sample storage time.*
- *AGAT's liability in connection with any delay, performance or non-performance of these services is only to the Client and does not extend to any other third party. Unless expressly agreed otherwise in writing, AGAT's liability is limited to the actual cost of the specific analysis or analyses included in the services.*
- *This report shall not be reproduced or distributed, in whole or in part, without the prior written consent of AGAT Laboratories.*
- *The test results reported herewith relate only to the samples as received by the laboratory.*
- *Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, or non-infringement. AGAT assumes no responsibility for any errors or omissions in the information contained in this document.*
- *All reportable information as specified by ISO/IEC 17025:2017 is available from AGAT Laboratories upon request.*

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Certificate of Analysis

AGAT WORK ORDER: 22X967186
PROJECT:

CLIENT NAME: MUNICIPALITY OF ANNAPOLIS COUNTY
ATTENTION TO: James Jenner
SAMPLING SITE:
SAMPLED BY:

Health Canada Lead & Copper Sampling - Drinking Water

DATE RECEIVED: 2022-11-08 **DATE REPORTED: 2022-11-17**

		SAMPLE DESCRIPTION:		18 Church St	12 Church St	10 Rectory St	54 Rectory St	211 Granville St
		SAMPLE TYPE:		Water	Water	Water	Water	Water
		DATE SAMPLED:		2022-11-07 10:10	2022-11-07 10:15	2022-11-07 10:20	2022-11-07 10:25	2022-11-07 11:50
Parameter	Unit	G / S	RDL	4497805	4497807	4497808	4497809	4497810
Total Lead - Health Canada	ug/L	5	0.5	**6.5**	<0.5	<0.5	<0.5	<0.5
Total Copper	ug/L	2000, 1000	2	116	72	71	25	70

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Canadian Drinking Water Quality - updated 2023-01
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

Analysis performed at AGAT Halifax (unless marked by *)

Certified By: Jason Coughlan

AGAT Laboratories
11 Morris Drive, Unit 122
Dartmouth, Nova Scotia
CANADA B3B 1M2
TEL (902)468-8718
FAX (902)468-8924
http://www.agatlabs.com

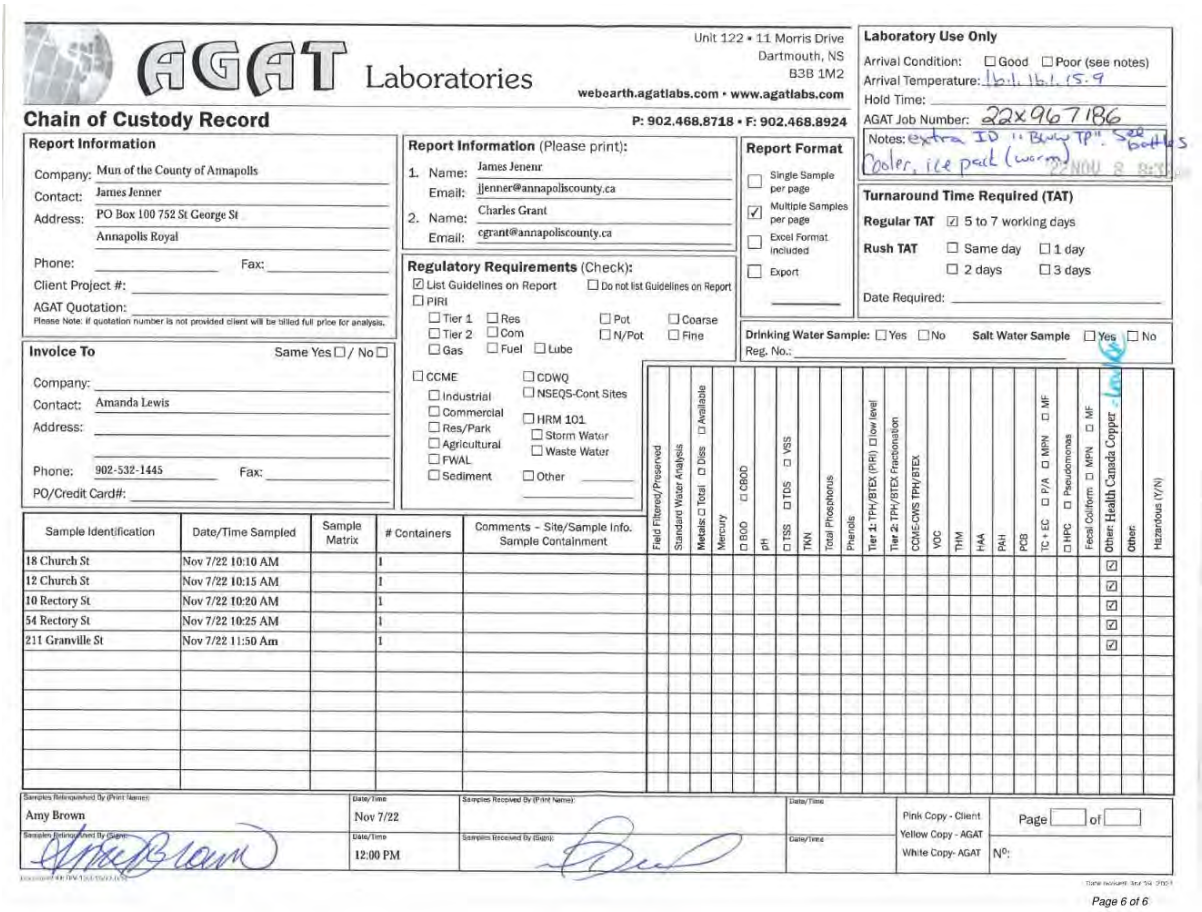
Guideline Violation

AGAT WORK ORDER: 22X967186
PROJECT:

CLIENT NAME: MUNICIPALITY OF ANNAPOLIS COUNTY

ATTENTION TO: James Jenner

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	UNIT	GUIDEVALUE	RESULT
4497805	18 Church St	NS-CDWQ incl [AO]	Health Canada Lead & Copper Sampling - Drinking Water	Total Lead - Health Canada	ug/L	5	6.5



AGAT Laboratories

Unit 122 • 11 Morris Drive
Dartmouth, NS
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webearth.agatlabs.com • www.agatlabs.com

P: 902.468.8718 • F: 902.468.8924

Chain of Custody Record

Laboratory Use Only

Arrival Condition: ☐ Good ☐ Poor (see notes)

Arrival Temperature: 16.1, 16.1, 15.9

Hold Time:

AGAT Job Number: 22x967186

Notes: extra ID "Bury TP". See bottles
Cooler, ice pack (warm)

Report Information

Company: Mun of the County of Annapolis
Contact: James Jenner
Address: PO Box 100 752 St George St
Annapolis Royal
Phone: Fax:
Client Project #:
AGAT Quotation:
Please Note: If quotation number is not provided client will be billed full price for analysis.

Report Information (Please print):

1. Name: James Jenenr
   Email: jjenner@annapoliscounty.ca
2. Name: Charles Grant
   Email: cgrant@annapoliscounty.ca

Report Format

☐ Single Sample per page
☑ Multiple Samples per page
☐ Excel Format included
☐ Export

Turnaround Time Required (TAT)

Regular TAT ☑ 5 to 7 working days

Rush TAT ☐ Same day ☐ 1 day ☐ 2 days ☐ 3 days

Date Required:

Invoice To Same Yes ☐ / No ☐

Company:
Contact: Amanda Lewis
Address:
Phone: 902-532-1445 Fax:
PO/Credit Card#:

Regulatory Requirements (Check):

☑ List Guidelines on Report ☐ Do not list Guidelines on Report
☐ PIRI
☐ Tier 1 ☐ Res ☐ Pot ☐ Coarse
☐ Tier 2 ☐ Com ☐ N/Pot ☐ Fine
☐ Gas ☐ Fuel ☐ Lube

☐ CCME ☐ CDWQ
☐ Industrial ☐ NSEQS-Cont Sites
☐ Commercial
☐ Res/Park ☐ HRM 101
☐ Agricultural ☐ Storm Water
☐ FWAL ☐ Waste Water
☐ Sediment ☐ Other

Drinking Water Sample: ☐ Yes ☐ No **Salt Water Sample** ☐ Yes ☐ No
Reg. No.:

Sample Identification	Date/Time Sampled	Sample Matrix	# Containers	Comments - Site/Sample Info. Sample Containment	Other: Health Canada Copper
18 Church St	Nov 7/22 10:10 AM		1		☑
12 Church St	Nov 7/22 10:15 AM		1		☑
10 Rectory St	Nov 7/22 10:20 AM		1		☑
54 Rectory St	Nov 7/22 10:25 AM		1		☑
211 Granville St	Nov 7/22 11:50 Am		1		☑

Field Filtered/Preserved | Standard Water Analysis | Metals ☐ Total ☐ Diss ☐ Available | Mercury | ☐ BOD ☐ CBOD | pH | ☐ TSS ☐ TDS ☐ VSS | TKN | Total Phosphorus | Phenols | Tier 1: TPH/BTEX (PIRI) ☐ low level | Tier 2: TPH/BTEX Fractionation | CCME-CWS TPH/BTEX | VOC | THM | HAA | PAH | PCB | TC + EC ☐ P/A ☐ MPN ☐ MF | ☐ HPC ☐ Pseudomonas | Fecal Coliform ☐ MPN ☐ MF | Other: | Hazardous (Y/N)

Samples Relinquished By (Print Name):	Date/Time	Samples Received By (Print Name):	Date/Time
Amy Brown	Nov 7/22		
Samples Relinquished By (Sign):	Date/Time	Samples Received By (Sign):	Date/Time
	12:00 PM		

Pink Copy - Client
Yellow Copy - AGAT
White Copy- AGAT

Page ☐ of ☐

N°:

Page 6 of 6

APPENDIX E

Last Round of Sampling Data for *GCDWQ*

AGAT Laboratories

11 Morris Drive, Unit 122
Dartmouth, Nova Scotia
CANADA B3B 1M2
TEL (902)468-8718
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CLIENT NAME: MUNICIPALITY OF ANNAPOLIS COUNTY
PO Box 100
Annapolis Royal, NS B0S1A0
(902) 532-3141

ATTENTION TO: James Jenner

PROJECT:

AGAT WORK ORDER: 18X352285

FOOD CHEMISTRY REVIEWED BY: Philippe Morneau, chimiste

MISCELLANEOUS ANALYSIS REVIEWED BY: Laura Baker, Inorganics Data Reporter

TRACE ORGANICS REVIEWED BY: Amy Hunter, Trace Organics Supervisor, B.Sc.

WATER ANALYSIS REVIEWED BY: Laura Baker, Inorganics Data Reporter

DATE REPORTED: Jul 16, 2018

PAGES (INCLUDING COVER): 23

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (902) 468-8718

NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

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Certificate of Analysis

AGAT WORK ORDER: 18X352285
PROJECT:

CLIENT NAME: MUNICIPALITY OF ANNAPOLIS COUNTY
ATTENTION TO: James Jenner
SAMPLING SITE:
SAMPLED BY:

Glyphosate (Montreal) (ug/L)

DATE RECEIVED: 2018-06-19 **DATE REPORTED: 2018-07-16**

		SAMPLE DESCRIPTION:		Town Hall	PW2 RAW
		SAMPLE TYPE:		Water	Water
		DATE SAMPLED:		2018-06-18	2018-06-18
Parameter	Unit	G / S	RDL	9342204	9342302
Glyphosate	ug/L		15	<15	<15

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 18X352285
PROJECT:

CLIENT NAME: MUNICIPALITY OF ANNAPOLIS COUNTY
ATTENTION TO: James Jenner
SAMPLING SITE:
SAMPLED BY:

Canadian Drinking Water MAC Package (Radiochemistry)

DATE RECEIVED: 2018-06-19 **DATE REPORTED: 2018-07-16**

		SAMPLE DESCRIPTION:		Town Hall	PW2 RAW
		SAMPLE TYPE:		Water	Water
		DATE SAMPLED:		2018-06-18	2018-06-18
Parameter	Unit	G / S	RDL	9342204	9342302
Radionuclides - Gross Alpha	Bq/L	0.5	0.1	0.48+/-0.16	0.92+/-0.25
Radionuclides - Gross Beta	Bq/L	1.0	0.1	0.25+/-0.05	0.26+/-0.04

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Canadian Drinking Water Quality - updated 2017-05
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

9342204-9342302 *Analysis performed at subcontracted laboratory.

Certified By: Laura Dale

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Certificate of Analysis

AGAT WORK ORDER: 18X352285
PROJECT:

CLIENT NAME: MUNICIPALITY OF ANNAPOLIS COUNTY
ATTENTION TO: James Jenner
SAMPLING SITE:
SAMPLED BY:

Canadian Drinking Water MAC Package (Subcontracted)

DATE RECEIVED: 2018-06-19 **DATE REPORTED: 2018-07-16**

		SAMPLE DESCRIPTION:		Town Hall	PW2 RAW
		SAMPLE TYPE:		Water	Water
		DATE SAMPLED:		2018-06-18	2018-06-18
Parameter	Unit	G / S	RDL	9342204	9342302
Nitriloacetic Acid (NTA)	mg/L	0.4	0.03	<0.03	<0.03
Microcystin - LR	ug/L	1.5	0.1	<0.1	<0.1
N-Nitrosodimethylamine (NDMA)	ug/L	0.04	0.0008	<0.0008	<0.0008

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Canadian Drinking Water Quality - updated 2017-05
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

9342204-9342302 *Analysis performed at subcontracted laboratory.

Certified By: Laura Dale

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AGAT WORK ORDER: 18X352285
PROJECT:

CLIENT NAME: MUNICIPALITY OF ANNAPOLIS COUNTY
ATTENTION TO: James Jenner
SAMPLING SITE:
SAMPLED BY:

Canadian Drinking Water MAC Package (Carb./Urea Pest)

DATE RECEIVED: 2018-06-19 **DATE REPORTED: 2018-07-16**

		SAMPLE DESCRIPTION:		Town Hall	PW2 RAW
		SAMPLE TYPE:		Water	Water
		DATE SAMPLED:		2018-06-18	2018-06-18
Parameter	Unit	G / S	RDL	9342204	9342302
Aldicarb	µg/L		0.15	<0.15	<0.15
Bendiocarb	µg/L		2	<2	<2
Carbofuran	µg/L	90	5	<5	<5
Carbaryl	µg/L	90	5	<5	<5
Diuron	µg/L	150	10	<10	<10

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Canadian Drinking Water Quality - updated 2017-05
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.
9342204-9342302 Analysis performed in AGAT Mississauga laboratory.

Certified By:

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AGAT WORK ORDER: 18X352285
PROJECT:

CLIENT NAME: MUNICIPALITY OF ANNAPOLIS COUNTY
ATTENTION TO: James Jenner
SAMPLING SITE:
SAMPLED BY:

Canadian Drinking Water MAC Package (Diq./Paraq.)

DATE RECEIVED: 2018-06-19 **DATE REPORTED: 2018-07-16**

		SAMPLE DESCRIPTION:		Town Hall	PW2 RAW
		SAMPLE TYPE:		Water	Water
		DATE SAMPLED:		2018-06-18	2018-06-18
Parameter	Unit	G / S	RDL	9342204	9342302
Diquat	µg/L	70	1	<1	<1
Paraquat	µg/L	10	1	<1	<1

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Canadian Drinking Water Quality - updated 2017-05
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

9342204-9342302 Analysis performed in AGAT Mississauga laboratory.

Certified By:

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AGAT WORK ORDER: 18X352285
PROJECT:

CLIENT NAME: MUNICIPALITY OF ANNAPOLIS COUNTY
ATTENTION TO: James Jenner
SAMPLING SITE:
SAMPLED BY:

Canadian Drinking Water MAC Package (HAAs, Herbicides, PAH, OC Pest, Triaz. Pest, OP Pest., VOCs)

DATE RECEIVED: 2018-06-19 **DATE REPORTED: 2018-07-16**

		SAMPLE DESCRIPTION:		Town Hall	PW2 RAW
		SAMPLE TYPE:		Water	Water
		DATE SAMPLED:		2018-06-18	2018-06-18
Parameter	Unit	G / S	RDL	9342204	9342302
Chloroacetic Acid	ug/L		1.7	<1.7	<1.7
Bromoacetic Acid	ug/L		0.3	<0.3	<0.3
Dichloroacetic Acid	ug/L		0.2	2.0	<0.2
Trichloroacetic Acid	ug/L		0.2	<0.2	<0.2
Bromochloroacetic Acid	ug/L		0.2	0.5	<0.2
Dibromoacetic Acid	ug/L		0.1	<0.1	<0.1
Haloacetic Acids	ug/L	80	4.0	<4.0	<4.0
Bromoxynil	µg/L	5	0.5	<0.5	<0.5
Dicamba	µg/L	120	0.05	<0.05	<0.05
2,4-Dichlorophenol	µg/L	900, 0.3	0.3	<0.3	<0.3
2,4-Dichlorophenoxyacetic acid (2,4-D)	µg/L	100	0.05	<0.05	<0.05
Diclofop Methyl	µg/L	9	0.05	<0.05	<0.05
Dinoseb	µg/L		1	<1	<1
2-Methyl-4-chlorophenoxyacetic acid (MCPA)	µg/L	100	5	<5	<5
Pentachlorophenol	µg/L	60, 30 AO	0.5	<0.5	<0.5
Picloram	µg/L	190	0.05	<0.05	<0.05
2,3,4,6-Tetrachlorophenol	µg/L	100, 1 AO	0.5	<0.5	<0.5
2,4,6-Trichlorophenol	µg/L	5, 2 AO	0.5	<0.5	<0.5
Aldrin	ug/L		0.05	<0.05	<0.05
Dieldrin	ug/L		0.05	<0.05	<0.05
Aldrin + Dieldrin	ug/L		0.05	<0.05	<0.05
Methoxychlor	µg/L		0.1	<0.1	<0.1
Phorate	µg/L	2	0.5	<0.5	<0.5
Dimethoate	µg/L	20	1.5	<1.5	<1.5
Terbufos	µg/L	1	0.7	<0.7	<0.7
Chlorpyrifos	µg/L	90	1	<1	<1
Diazinon	µg/L	20	1	<1	<1
Malathion	µg/L	190	1	<1	<1
Parathion	µg/L		1	<1	<1

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Certificate of Analysis

AGAT WORK ORDER: 18X352285
PROJECT:

CLIENT NAME: MUNICIPALITY OF ANNAPOLIS COUNTY
ATTENTION TO: James Jenner
SAMPLING SITE:
SAMPLED BY:

Canadian Drinking Water MAC Package (HAAs, Herbicides, PAH, OC Pest, Triaz. Pest, OP Pest., VOCs)

DATE RECEIVED: 2018-06-19 **DATE REPORTED: 2018-07-16**

		SAMPLE DESCRIPTION:		Town Hall	PW2 RAW
		SAMPLE TYPE:		Water	Water
		DATE SAMPLED:		2018-06-18	2018-06-18
Parameter	Unit	G / S	RDL	9342204	9342302
Azinophos	µg/L	20	2	<2	<2
Benzo(a)pyrene	mg/L	0.00004	0.00001	<0.00001	<0.00001
Trifluralin	µg/L	45	1	<1	<1
Simazine	µg/L	10	1	<1	<1
Atrazine	µg/L		0.5	<0.5	<0.5
Atrazine + N-dealkylated metabolites	µg/L	5	1	<1	<1
Metribuzin	µg/L	80	0.25	<0.25	<0.25
Cyanazine	µg/L		1	<1	<1
Metolachlor	µg/L	50	1	<1	<1
Vinyl Chloride	ug/L	2	0.6	<0.6	<0.6
Chloroethane	ug/L		5	<5	<5
1,1-Dichloroethylene	ug/L	14	2	<2	<2
Methylene Chloride (Dichloromethane)	ug/L	50	2	<2	<2
Methyl-t-Butyl-Ether (MTBE)	ug/L	15 AO	2	<2	<2
Chloroform	ug/L		1	2	<1
1,2-Dichloroethane	ug/L	5	2	<2	<2
Carbon Tetrachloride	ug/L	2	1	<1	<1
Benzene	ug/L	5	1	<1	<1
Trichloroethylene	ug/L	5	1	<1	<1
Bromodichloromethane	ug/L		1	2	<1
Toluene	ug/L	60, 24 AO	2	<2	<2
Dibromochloromethane	ug/L		1	2	<1
Tetrachloroethylene	µg/L		1	<1	<1
Chlorobenzene	ug/L	80, 30 AO	1	<1	<1
Ethylbenzene	ug/L	140,1.6 AO	2	<2	<2
Bromoform	ug/L		1	<1	<1
Xylenes (Total)	ug/L	300 AO	4	<4	<4
1,4-Dichlorobenzene	ug/L	5, 1 AO	1	<1	<1
1,2-Dichlorobenzene	ug/L	200, 3 AO	1	<1	<1

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Certificate of Analysis

AGAT WORK ORDER: 18X352285
PROJECT:

CLIENT NAME: MUNICIPALITY OF ANNAPOLIS COUNTY
ATTENTION TO: James Jenner
SAMPLING SITE:
SAMPLED BY:

Canadian Drinking Water MAC Package (HAAs, Herbicides, PAH, OC Pest, Triaz. Pest, OP Pest., VOCs)

DATE RECEIVED: 2018-06-19 **DATE REPORTED: 2018-07-16**

		SAMPLE DESCRIPTION:		Town Hall	PW2 RAW
		SAMPLE TYPE:		Water	Water
		DATE SAMPLED:		2018-06-18	2018-06-18
Parameter	Unit	G / S	RDL	9342204	9342302
Total Trihalomethanes	ug/L	100	1	6	<1
Surrogate	Unit	Acceptable Limits			
2-Bromobutanoic acid	%	50-130		102	114
Toluene-d8	%	60-130		95	96
4-Bromofluorobenzene	%	60-130		89	88

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Canadian Drinking Water Quality - updated 2017-05
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AGAT WORK ORDER: 18X352285
PROJECT:

CLIENT NAME: MUNICIPALITY OF ANNAPOLIS COUNTY
ATTENTION TO: James Jenner
SAMPLING SITE:
SAMPLED BY:

Canadian Drinking Water MAC Package (Metals, Hg & Inorganics)

DATE RECEIVED: 2018-06-19 **DATE REPORTED: 2018-07-16**

		SAMPLE DESCRIPTION:		Town Hall	PW2 RAW
		SAMPLE TYPE:		Water	Water
		DATE SAMPLED:		2018-06-18	2018-06-18
Parameter	Unit	G / S	RDL	9342204	9342302
Total Aluminum	ug/L	100 OG AO	10	<10	<10
Total Antimony	ug/L	6	2	<2	<2
Total Arsenic	ug/L	10	2	4	4
Total Barium	ug/L	1000	5	341	271
Total Boron	ug/L	5000	5	14	13
Total Cadmium	ug/L	5	0.3	<0.3	<0.3
Total Chromium	ug/L	50	2	3	3
Total Copper	ug/L	1000 AO	2	14	<2
Total Iron	ug/L	300 AO	50	52	<50
Total Lead	ug/L	10	0.5	<0.5	<0.5
Total Manganese	ug/L	50 AO	2	<2	<2
Total Selenium	ug/L	50	2	<2	<2
Total Uranium	ug/L	20	0.1	19.5	19.7
Total Zinc	ug/L	5000 AO	5	6	<5
Total Sodium	mg/L	200 AO	0.1	14.8	9.8
Mercury	ug/L	1	0.05	<0.05	<0.05
pH		7.0-10.5		8.27	8.26
Turbidity	NTU	0.1-1	0.1	0.1	0.2
True Color	TCU	15 AO	5	13	10
Chloride	mg/L	250 AO	1	11	6
Fluoride	mg/L	1.5	0.12	0.43	0.64
Nitrate as N	mg/L	10	0.05	0.25	0.23
Sulphate	mg/L	500 AO	2	5	4
Total Dissolved Solids	mg/L	500 AO	5	170	156
Bromate	mg/L	0.01	0.01	<0.01	<0.01
Chlorate	mg/L	1	0.02	0.14	<0.02
Chlorite	mg/L	1	0.02	<0.02	<0.02
Sulphide	mg/L	0.05 AO	0.05	<0.05	<0.05
Cyanide, Free	mg/L		0.002	<0.002	<0.002

Certified By: Laura Dale

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Certificate of Analysis

AGAT WORK ORDER: 18X352285
PROJECT:

CLIENT NAME: MUNICIPALITY OF ANNAPOLIS COUNTY
ATTENTION TO: James Jenner
SAMPLING SITE:
SAMPLED BY:

Canadian Drinking Water MAC Package (Metals, Hg & Inorganics)

DATE RECEIVED: 2018-06-19 **DATE REPORTED: 2018-07-16**

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Canadian Drinking Water Quality - updated 2017-05
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

9342204-9342302 Sulphide and Cyanide were analysed at AGAT Mississauga.

Certified By: Laura Dale

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Certificate of Analysis

AGAT WORK ORDER: 18X352285
PROJECT:

CLIENT NAME: MUNICIPALITY OF ANNAPOLIS COUNTY
SAMPLING SITE:

ATTENTION TO: James Jenner
SAMPLED BY:

Chloramines

DATE RECEIVED: 2018-06-19 **DATE REPORTED: 2018-07-16**

		SAMPLE DESCRIPTION:		Town Hall	PW2 RAW
		SAMPLE TYPE:		Water	Water
		DATE SAMPLED:		2018-06-18	2018-06-18
Parameter	Unit	G / S	RDL	9342204	9342302
Chloramines - Total	mg/L		0.50	<0.50	<0.50

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By: Laura Dale

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Certificate of Analysis

AGAT WORK ORDER: 18X352285
PROJECT:

CLIENT NAME: MUNICIPALITY OF ANNAPOLIS COUNTY
ATTENTION TO: James Jenner
SAMPLING SITE:
SAMPLED BY:

Total Metals - Uranium

DATE RECEIVED: 2018-06-19 **DATE REPORTED: 2018-07-16**

		SAMPLE DESCRIPTION:		PW2	PW3	Storage Tank
		SAMPLE TYPE:		Water	Water	Water
		DATE SAMPLED:		2018-06-18	2018-06-18	2018-06-18
Parameter	Unit	G / S	RDL	9342305	9342308	9342309
Total Uranium	ug/L		0.1	19.5	19.7	19.7

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By: Laura Dale

AGAT Laboratories

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Quality Assurance

CLIENT NAME: MUNICIPALITY OF ANNAPOLIS COUNTY

AGAT WORK ORDER: 18X352285

PROJECT:

ATTENTION TO: James Jenner

SAMPLING SITE:

SAMPLED BY:

Food Chemistry Analysis

RPT Date: Jul 16, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Glyphosate (Montreal) (ug/L)															
Glyphosate	628	9342202	< 15	< 15	0.0%	< 15	98%	70%	130%	98%	70%	130%	99%	70%	130%

Certified By:

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Quality Assurance

CLIENT NAME: MUNICIPALITY OF ANNAPOLIS COUNTY | **AGAT WORK ORDER: 18X352285**

PROJECT: | **ATTENTION TO: James Jenner**

SAMPLING SITE: | **SAMPLED BY:**

Trace Organics Analysis

RPT Date: Jul 16, 2018

PARAMETER	Batch	Sample Id	DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
			Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Canadian Drinking Water MAC Package (HAAs, Herbicides, PAH, OC Pest, Triaz. Pest, OP Pest., VOCs)															
Chloroacetic Acid	1	9340096	< 1.7	< 1.7	NA	< 1.7	84%	70%	130%	87%	60%	130%	121%	70%	130%
Bromoacetic Acid	1	9340096	< 0.3	< 0.3	NA	< 0.3	102%	70%	130%	83%	60%	130%	118%	70%	130%
Dichloroacetic Acid	1	9340096	2.6	2.5	3.9%	< 0.2	86%	70%	130%	116%	60%	130%	94%	70%	130%
Trichloroacetic Acid	1	9340096	0.3	<0.2	NA	< 0.2	97%	70%	130%	108%	60%	130%	99%	70%	130%
Bromochloroacetic Acid	1	9340096	1.4	1.3	7.4%	< 0.2	91%	70%	130%	102%	60%	130%	117%	70%	130%
Dibromoacetic Acid	1	9340096	1.6	1.4	13.3%	< 0.1	84%	70%	130%	85%	60%	130%	99%	70%	130%
Bromoxynil	1	9330262	< 0.5	< 0.5	NA	< 0.5	86%	70%	130%	95%	60%	130%	104%	60%	130%
Dicamba	1	9330262	< 0.05	< 0.05	NA	< 0.05	104%	70%	130%	96%	60%	130%	85%	60%	130%
2,4-Dichlorophenol	1	9330262	< 0.3	< 0.3	NA	< 0.3	82%	70%	130%	91%	60%	130%	119%	60%	130%
2,4-Dichlorophenoxyacetic acid (2,4-D)	1	9330262	< 0.05	< 0.05	NA	< 0.05	113%	60%	130%	85%	70%	130%	88%	70%	130%
Diclofop Methyl	1	9330262	< 0.05	< 0.05	NA	< 0.05	108%	70%	130%	100%	60%	130%	99%	60%	130%
Dinoseb	1	9330262	< 1	< 1	NA	< 1	111%	70%	130%	101%	60%	130%	109%	60%	130%
2-Methyl-4-chlorophenoxyacetic acid (MCPA)	1	9330262	< 5	< 5	NA	< 5	82%	70%	130%	105%	60%	130%	107%	60%	130%
Pentachlorophenol	1	9330262	< 0.5	< 0.5	NA	< 0.5	81%	70%	130%	106%	60%	130%	119%	60%	130%
Picloram	1	9330262	< 0.05	< 0.05	NA	< 0.05	105%	70%	130%	82%	60%	130%	114%	60%	130%
2,3,4,6-Tetrachlorophenol	1	9330262	< 0.5	< 0.5	NA	< 0.5	85%	70%	130%	97%	60%	130%	89%	60%	130%
2,4,6-Trichlorophenol	1	9330262	< 0.5	< 0.5	NA	< 0.5	83%	70%	130%	95%	60%	130%	102%	60%	130%
Aldrin	1	9342204	< 0.05	< 0.05	NA	< 0.05	102%	70%	130%	120%	60%	130%	120%	60%	130%
Dieldrin	1	9342204	< 0.05	< 0.05	NA	< 0.05	109%	70%	130%	116%	60%	130%	87%	60%	130%
Methoxychlor	1	9342204	< 0.1	< 0.1	NA	< 0.1	111%	60%	130%	123%	70%	130%	109%	60%	130%
Phorate	1	9330209	< 0.5	< 0.5	NA	< 0.5	75%	70%	130%	87%	40%	130%	79%	40%	130%
Dimethoate	1	9330209	< 1.5	< 1.5	NA	< 1.5	99%	70%	130%	107%	40%	130%	100%	40%	130%
Terbufos	1	9330209	< 0.7	< 0.7	NA	< 0.7	78%	70%	130%	93%	40%	130%	90%	40%	130%
Chlorpyrifos	1	9330209	< 1	< 1	NA	< 1	87%	70%	130%	94%	40%	130%	92%	40%	130%
Diazinon	1	9330209	< 1	< 1	NA	< 1	86%	70%	130%	88%	40%	130%	82%	40%	130%
Malathion	1	9330209	< 1	< 1	NA	< 1	70%	70%	130%	91%	40%	130%	87%	40%	130%
Parathion	1	9330209	< 1	< 1	NA	< 1	93%	70%	130%	96%	40%	130%	84%	40%	130%
Azinophos	1	9330209	< 2	< 2	NA	< 2	91%	70%	130%	122%	40%	130%	107%	40%	130%
Benzo(a)pyrene	1	9355714	< 0.00001	< 0.00001	NA	< 0.00001	75%	50%	140%	115%	50%	140%	113%	50%	140%
Cyanazine	1	9332565	< 1	< 1	NA	< 1	81%	50%	140%	110%	50%	140%	83%	50%	140%
Vinyl Chloride	1	9340643	< 0.6	< 0.6	NA	< 0.6	71%	70%	130%	76%	60%	140%	NA	60%	140%
Chloroethane	1	9340643	< 5	< 5	NA	< 5	88%	70%	130%	NA	60%	140%	NA	60%	140%
1,1-Dichloroethylene	1	9340643	< 2	< 2	NA	< 2	94%	70%	130%	71%	60%	140%	NA	60%	140%
Methylene Chloride (Dichloromethane)	1	9340643	< 2	< 2	NA	< 2	94%	70%	130%	107%	60%	140%	NA	60%	140%
Methyl-t-Butyl-Ether (MTBE)	1	9340643	< 2	< 2	NA	< 2	100%	60%	140%	121%	60%	140%	NA	60%	140%
Chloroform	1	9340643	< 1	< 1	NA	< 1	91%	70%	130%	99%	60%	140%	NA	60%	140%
1,2-Dichloroethane	1	9340643	< 2	< 2	NA	< 2	100%	70%	130%	102%	60%	140%	NA	60%	140%

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Quality Assurance

CLIENT NAME: MUNICIPALITY OF ANNAPOLIS COUNTY | **AGAT WORK ORDER: 18X352285**

PROJECT: | **ATTENTION TO: James Jenner**

SAMPLING SITE: | **SAMPLED BY:**

Trace Organics Analysis (Continued)

RPT Date: Jul 16, 2018

PARAMETER	Batch	Sample Id	DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
			Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Carbon Tetrachloride	1	9340643	< 1	< 1	NA	< 1	92%	70%	130%	102%	60%	140%	NA	60%	140%
Benzene	1	9340643	< 1	< 1	NA	< 1	85%	70%	130%	95%	70%	130%	NA	70%	130%
Trichloroethylene	1	9340643	< 1	< 1	NA	< 1	95%	60%	130%	100%	60%	140%	NA	60%	140%
Bromodichloromethane	1	9340643	< 1	< 1	NA	< 1	90%	70%	130%	97%	60%	140%	NA	60%	140%
Toluene	1	9340643	< 2	< 2	NA	< 2	84%	70%	130%	101%	60%	140%	NA	60%	140%
Dibromochloromethane	1	9340643	< 1	< 1	NA	< 1	97%	70%	130%	110%	60%	140%	NA	60%	140%
Tetrachloroethylene	1	9340643	< 1	< 1	NA	< 1	98%	70%	130%	111%	60%	140%	NA	60%	140%
Chlorobenzene	1	9340643	< 1	< 1	NA	< 1	88%	70%	130%	103%	60%	140%	NA	60%	140%
Ethylbenzene	1	9340643	< 2	< 2	NA	< 2	85%	70%	130%	102%	60%	140%	NA	60%	140%
Bromoform	1	9340643	< 1	< 1	NA	< 1	100%	70%	130%	111%	60%	140%	NA	60%	140%
1,4-Dichlorobenzene	1	9340643	< 1	< 1	NA	< 1	95%	70%	130%	109%	60%	140%	NA	60%	140%
1,2-Dichlorobenzene	1	9340643	< 1	< 1	NA	< 1	102%	70%	130%	113%	60%	140%	NA	60%	140%
Canadian Drinking Water MAC Package (Diq./Paraq.)															
Diquat		9356021	< 5	< 5	NA	< 1	95%	60%	140%	86%	60%	140%	87%	60%	140%
Paraquat		9356021	< 1	< 1	NA	< 1	94%	60%	140%	81%	60%	140%	84%	60%	140%
Canadian Drinking Water MAC Package (Carb./Urea Pest)															
Aldicarb		TW	< 0.15	< 0.15	NA	< 0.15	104%	60%	140%	105%	60%	140%	NA	60%	140%
Bendiocarb		TW	< 2	< 2	NA	< 2	108%	60%	140%	81%	60%	140%	NA	60%	140%
Carbofuran		TW	< 5	< 5	NA	< 5	108%	60%	140%	81%	40%	130%	NA	30%	150%
Carbaryl		TW	< 5	< 5	NA	< 5	131%	60%	140%	106%	40%	130%	NA	30%	150%
Diuron		TW	< 10	< 10	NA	< 10	100%	60%	140%	98%	60%	140%	NA	30%	150%

Comments: If Matrix spike value is NA, the spiked analyte concentration was lower than that of the matrix contribution.
If RPD value is NA, the results of the duplicates are less than 5x the RDL and the RPD will not be calculated.

Comments: Tap water analysis has been performed as QC sample testing for duplicate and matrix spike due to insufficient sample volume.
When the average of the sample and duplicate results is less than 5x the RDL, the Relative Percent Difference (RPD) will be indicated as Not Applicable (NA).

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Quality Assurance

CLIENT NAME: MUNICIPALITY OF ANNAPOLIS COUNTY | **AGAT WORK ORDER: 18X352285**

PROJECT: | **ATTENTION TO: James Jenner**

SAMPLING SITE: | **SAMPLED BY:**

Water Analysis

RPT Date: Jul 16, 2018

PARAMETER	Batch	Sample Id	DUPLICATE Dup #1	DUPLICATE Dup #2	DUPLICATE RPD	Method Blank	REFERENCE MATERIAL Measured Value	REFERENCE MATERIAL Acceptable Limits Lower	REFERENCE MATERIAL Acceptable Limits Upper	METHOD BLANK SPIKE Recovery	METHOD BLANK SPIKE Acceptable Limits Lower	METHOD BLANK SPIKE Acceptable Limits Upper	MATRIX SPIKE Recovery	MATRIX SPIKE Acceptable Limits Lower	MATRIX SPIKE Acceptable Limits Upper
Canadian Drinking Water MAC Package (Metals, Hg & Inorganics)															
Total Aluminum	9341819		12	<10	NA	< 10	106%	80%	120%	111%	80%	120%	111%	70%	130%
Total Antimony	9341819		<2	<2	NA	< 2	90%	80%	120%	105%	80%	120%	89%	70%	130%
Total Arsenic	9341819		40	39	2.1%	< 2	98%	80%	120%	103%	80%	120%	NA	70%	130%
Total Barium	9341819		17	15	NA	< 5	100%	80%	120%	104%	80%	120%	90%	70%	130%
Total Boron	9341819		11	10	NA	< 5	109%	80%	120%	112%	80%	120%	84%	70%	130%
Total Cadmium	9341819		<0.3	<0.3	NA	< 0.3	97%	80%	120%	99%	80%	120%	83%	70%	130%
Total Chromium	9341819		5	4	NA	< 2	91%	80%	120%	97%	80%	120%	96%	70%	130%
Total Copper	9341819		341	339	0.8%	< 2	94%	80%	120%	101%	80%	120%	NA	70%	130%
Total Iron	9341819		663	671	1.2%	< 50	101%	80%	120%	97%	80%	120%	NA	70%	130%
Total Lead	9341819		25.1	23.4	7.1%	< 0.5	105%	80%	120%	109%	80%	120%	NA	70%	130%
Total Manganese	9341819		157	155	1.5%	< 2	102%	80%	120%	109%	80%	120%	NA	70%	130%
Total Selenium	9341819		7	7	NA	< 2	105%	80%	120%	111%	80%	120%	NA	70%	130%
Total Uranium	9341819		<0.1	<0.1	NA	< 0.1	98%	80%	120%	103%	80%	120%	98%	70%	130%
Total Zinc	9341819		263	258	1.9%	< 5	88%	80%	120%	93%	80%	120%	NA	70%	130%
Total Sodium	9341819		360	369	2.5%	< 0.1	103%	80%	120%	107%	80%	120%	NA	70%	130%
Mercury	1	9340672	<0.026	<0.026	NA	< 0.05	100%	80%	120%		80%	120%	100%	70%	130%
pH	9340935		7.74	7.70	0.5%	<	102%	80%	120%	NA	80%	120%	NA	80%	120%
Turbidity	9340641		49.1	50.6	3.0%	< 0.1	96%	80%	120%	NA			NA		
True Color	9340641		6	<5	NA	< 5	105%	80%	120%	NA			NA		
Chloride	1	9340084	9	9	0.0%	< 1	91%	80%	120%	NA	80%	120%	86%	80%	120%
Fluoride	1	9340084	<0.12	<0.12	NA	< 0.12	96%	80%	120%	NA	80%	120%	94%	80%	120%
Nitrate as N	1	9340084	2.80	2.78	0.7%	< 0.05	96%	80%	120%	NA	80%	120%	NA	80%	120%
Sulphate	1	9340084	4	4	NA	< 2	96%	80%	120%	NA	80%	120%	89%	80%	120%
Total Dissolved Solids	9342204	9342204	170	176	3.5%	< 5	90%	80%	120%						
Bromate	1	9340084	<0.01	<0.01	NA	< 0.01	106%	70%	130%	NA	70%	130%	97%	70%	130%
Chlorate	1	9340084	<0.02	<0.02	NA	< 0.02	103%	70%	130%	NA	70%	130%	101%	70%	130%
Chlorite	1	9340084	<0.02	<0.02	NA	< 0.02	100%	70%	130%	NA	70%	130%	96%	70%	130%
Sulphide	9349906		<0.05	<0.05	NA	< 0.05	99%	80%	120%	100%	85%	115%	100%	70%	130%
Cyanide, Free	9351696		<0.002	<0.002	NA	< 0.002	99%	90%	110%	95%	90%	110%	98%	70%	130%

Comments: If RPD value is NA, the results of the duplicates are less than 5x the RDL and the RPD will not be calculated.

Total Metals - Uranium															
Total Uranium	9341819		<0.1	<0.1	NA	< 0.1	98%	80%	120%	103%	80%	120%	98%	70%	130%

Comments: If RPD value is NA, the results of the duplicates are less than 5x the RDL and the RPD will not be calculated.

Chloramines															
Chloramines - Total	1	9342302	<0.50	<0.50	NA	< 0.50	NA	100%	100%	NA	100%	100%	NA	100%	100%

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Quality Assurance

CLIENT NAME: MUNICIPALITY OF ANNAPOLIS COUNTY | **AGAT WORK ORDER: 18X352285**

PROJECT: | **ATTENTION TO: James Jenner**

SAMPLING SITE: | **SAMPLED BY:**

Water Analysis (Continued)

RPT Date: Jul 16, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

Certified By: Laura Baker

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Method Summary

CLIENT NAME: MUNICIPALITY OF ANNAPOLIS COUNTY **AGAT WORK ORDER: 18X352285**

PROJECT: **ATTENTION TO: James Jenner**

SAMPLING SITE: **SAMPLED BY:**

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Food Chemistry Analysis			
Glyphosate	ORG-100-5115F	MA.403-GLYAMP 1.0 Modifée	HPLC
Miscellaneous Analysis			
Radionuclides - Gross Alpha			
Radionuclides - Gross Beta			
Nitriloacetic Acid (NTA)			
Microcystin - LR			
N-Nitrosodimethylamine (NDMA)		EPA SW846-8270	GC/MS

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PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Aldicarb	ORG-91- 5101	EPA SW-632 531.1 & MOE E3389	HPLC
Bendiocarb	ORG-91- 5101	EPA SW-632 531.1 & MOE E3389	HPLC
Carbofuran	ORG-91-5101	EPA SW-632 531.1 & MOE E3389	HPLC
Carbaryl	ORG-91-5101	EPA SW-632 531.1 & MOE E3389	HPLC
Diuron	ORG-91- 5101	EPA SW-632 531.1 & MOE E3389	HPLC
Diquat	ORG-91-5102	EPA 549.1	HPLC
Paraquat	ORG-91-5102	EPA 549.1	HPLC
Chloroacetic Acid	ORG-120-5110	EPA 552.3	GC/ECD
Bromoacetic Acid	ORG-120-5110	EPA 552.3	GC/ECD
Dichloroacetic Acid	ORG-120-5110	EPA 552.3	GC/ECD
Trichloroacetic Acid	ORG-120-5110	EPA 552.3	GC/ECD
Bromochloroacetic Acid	ORG-120-5110	EPA 552.3	GC/ECD
Dibromoacetic Acid	ORG-120-5110	EPA 552.3	GC/ECD
Haloacetic Acids	ORG-120-5110	EPA 552.3	GC/ECD
2-Bromobutanoic acid	ORG-120-5110	EPA 552.3	GC/ECD
Bromoxynil	ORG-120-5111	modified from EPA SW846 8151A & EPA 515.1	GC/ECD
Dicamba	ORG-120-5111	modified from EPA SW846 8151A & EPA 515.1	GC/ECD
2,4-Dichlorophenol	ORG-120-5111	modified from EPA SW846 8151A & EPA 515.1	GC/ECD
2,4-Dichlorophenoxyacetic acid (2,4-D)	ORG-120-5111	modified from EPA SW846 8151A & EPA 515.1	GC/ECD
Diclofop Methyl	ORG-120-5111	modified from EPA SW846 8151A & EPA 515.1	GC/ECD
Dinoseb	ORG-120-5111	modified from EPA SW846 8151A & EPA 515.1	GC/ECD
2-Methyl-4-chlorophenoxyacetic acid (MCPA)	ORG-120-5111	modified from EPA SW846 8151A & EPA 515.1	GC/ECD
Pentachlorophenol	ORG-120-5111	modified from EPA SW846 8151A & EPA 515.1	GC/ECD
Picloram	ORG-120-5111	modified from EPA SW846 8151A & EPA 515.1	GC/ECD
2,3,4,6-Tetrachlorophenol	ORG-120-5111	modified from EPA SW846 8151A & EPA 515.1	GC/ECD
2,4,6-Trichlorophenol	ORG-120-5111	modified from EPA SW846 8151A & EPA 515.1	GC/ECD
Aldrin	ORG-120-5108	Based on EPA SW-846/6510 C-8080-8081 A	GC/ECD
Dieldrin	ORG-120-5108	Based on EPA SW-846/6510 C-8080-8081 A	GC/ECD
Aldrin + Dieldrin	ORG-120-5108	Based on EPA SW-846/6510 C-8080-8081 A	GC/ECD
Methoxychlor	ORG-120-5108	Based on EPA SW-846/6510 C-8080-8081 A	GC/ECD
Phorate	ORG-120-6112	modified from EPA SW-846 3510C/8141A/8270C	GC/MS
Dimethoate	ORG-120-6112	modified from EPA SW-846 3510C/8141A/8270C	GC/MS
Terbufos	ORG-120-6112	modified from EPA SW-846 3510C/8141A/8270C	GC/MS
Chlorpyrifos	ORG-120-6112	modified from EPA SW-846 3510C/8141A/8270C	GC/MS

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PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Diazinon	ORG-120-6112	modified from EPA SW-846 3510C/8141A/8270C	GC/MS
Malathion	ORG-120-6112	modified from EPA SW-846 3510C/8141A/8270C	GC/MS
Parathion	ORG-120-6112	modified from EPA SW-846 3510C/8141A/8270C	GC/MS
Azinophos	ORG-120-6112	modified from EPA SW-846 3510C/8141A/8270C	GC/MS
Benzo(a)pyrene	ORG-120-5104	EPA SW846/3510/8270C	GC/MS
Trifluralin	ORG-120-6113	EPA SW-846 3510C/8270C and MOE E3121	GC/MS
Simazine	ORG-120-6113	EPA SW-846 3510C/8270C and MOE E3121	GC/MS
Atrazine	ORG-120-6113	EPA SW-846 3510C/8270C and MOE E3121	GC/MS
Atrazine + N-dealkylated metabolites	ORG-120-6113	EPA SW-846 3510C/8270C and MOE E3121	GC/MS
Metribuzin	ORG-120-6113	EPA SW-846 3510C/8270C and MOE E3121	GC/MS
Cyanazine	ORG-120-6113	EPA SW-846 3510C/8270C and MOE E3121	GC/MS
Metolachlor	ORG-120-6113	EPA SW-846 3510C/8270C and MOE E3121	GC/MS
Vinyl Chloride	VOL-120-5001	EPA SW846 5230B/8260	GC/MS
Chloroethane	VOL-120-5001	EPA SW-846 5030B/8260B	GC/MS
1,1-Dichloroethylene	VOL-120-5001	EPA SW-846 5030B/8260B	GC/MS
Methylene Chloride (Dichloromethane)	VOL-120-5001	EPA SW-846 5030B/8260B	GC/MS
Methyl-t-Butyl-Ether (MTBE)	VOL-120-5001	EPA SW846 5230B/8260	GC/MS
Chloroform	VOL-120-5001	EPA SW-846 5030B/8260B	GC/MS
1,2-Dichloroethane	VOL-120-5001	EPA SW846 5230B/8260	GC/MS
Carbon Tetrachloride	VOL-120-5001	EPA SW846 5230B/8260	GC/MS
Benzene	VOL-120-5001	EPA SW846 5230B/8260	GC/MS
Trichloroethylene	VOL-120-5001	EPA SW846 5230B/8260	GC/MS
Bromodichloromethane	VOL-120-5001	EPA SW846 5230B/8260	GC/MS
Toluene	VOL-120-5001	EPA SW846 5230B/8260	GC/MS
Dibromochloromethane	VOL-120-5001	EPA SW846 5230B/8260	GC/MS
Tetrachloroethylene	VOL-120-5001	EPA SW-846 5230B & 8260	(P&T)GC/MS
Chlorobenzene	VOL-120-5001	EPA SW846 5230B/8260	GC/MS
Ethylbenzene	VOL-120-5001	EPA SW846 5230B/8260	GC/MS
Bromoform	VOL-120-5001	EPA SW846 5230B/8260	GC/MS
Xylenes (Total)	VOL-120-5001	EPA SW846 5230B/8260	GC/MS
1,4-Dichlorobenzene	VOL-120-5001	EPA SW846 5230B/8260	GC/MS
1,2-Dichlorobenzene	VOL-120-5001	EPA SW-846 5030B/8260B	GC/MS
Total Trihalomethanes	VOL-120-5001	EPA SW846 5230/8260	GC/MS
Toluene-d8	VOL-120-5001	EPA SW846 5030B/8260B	GC/MS
4-Bromofluorobenzene	VOL-120-5001	EPA SW846 5030B/8260B	GC/MS

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Method Summary

CLIENT NAME: MUNICIPALITY OF ANNAPOLIS COUNTY **AGAT WORK ORDER: 18X352285**

PROJECT: **ATTENTION TO: James Jenner**

SAMPLING SITE: **SAMPLED BY:**

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Total Aluminum	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Antimony	MET121-6104 & MET-121-6105	SM 3125	ICP-MS
Total Arsenic	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Barium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Boron	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Cadmium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Chromium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Copper	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Iron	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Lead	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Manganese	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Selenium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Uranium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Zinc	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Sodium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Mercury	INOR-121-6100 & INOR-121-6107	SM 3112 B	CV/AA
pH	INOR-121-6001	SM 4500 H+B	PC TITRATE
Turbidity	INOR-121-6022	SM 2130 B	NEPHELOMETER
True Color	INOR-121-6014	SM 2120 C	NEPHELOMETER
Chloride	INORG-121-6005	SM 4110 B	ION CHROMATOGRAPH
Fluoride	INOR-121-6005	SM 4110 B	ION CHROMATOGRAPH
Nitrate as N	INORG-121-6005	SM 4110 B	ION CHROMATOGRAPH
Sulphate	INORG-121-6005	SM 4110 B	ION CHROMATOGRAPH
Total Dissolved Solids	INOR-121-6024, 6025	SM 2540C, D	GRAVIMETRIC
Bromate	INOR-121-6005	SM 4110 B	ION CHROMATOGRAPH
Chlorate	INOR-121-6005	SM 4110 B	ION CHROMATOGRAPH
Chlorite	INOR-121-6005	SM 4110 B	ION CHROMATOGRAPH
Sulphide	INOR-93-6054	SM 4500 S2- D	SPECTROPHOTOMETER
Cyanide, Free	INOR-93-6052	MOE CN-3015 & SM 4500 CN- I	TECHNICON AUTO ANALYZER
Chloramines - Total			CALCULATION

AGAT Laboratories

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Chain of Custody Record

Laboratory Use Only
Arrival Condition: ☐ Good ☐ Poor (see notes)
Arrival Temperature: 12.5. 13.1. 13.2
Hold Time:
AGAT Job Number: 18X352285
Notes:

Report Information
Company: County of Annapolis
Contact: James Jenner
Address:
Phone: 902 526 0566 Fax:
Client Project #:
AGAT Quotation:
Please Note: If quotation number is not provided client will be billed full price for analysis.

Report Information (Please print):
1. Name: James Jenner
Email: jjenner@annapoliscounty.ca
2. Name: Charles Grant
Email: cgrant@annapoliscounty.ca

Report Format
☐ Single Sample per page
☒ Multiple Samples per page
☐ Excel Format Included

Turnaround Time Required (TAT)
Regular TAT ☒ 5 to 7 working days
Rush TAT ☐ Same day ☐ 1 day ☐ 2 days ☐ 3 days
Date Required:

Regulatory Requirements (Check):
☒ List Guidelines on Report ☐ Do not list Guidelines on Report
☐ PIRI
☐ Tier 1 ☐ Res ☐ Pot ☐ Coarse
☐ Tier 2 ☐ Com ☐ N/Pot ☐ Fine
☐ Gas ☐ Fuel ☐ Lube
☐ CCME ☐ Industrial ☐ Commercial ☐ Res/Park ☐ Agricultural ☐ FWAL ☐ Sediment
☐ CDWQ ☐ NSESQ-Cont. Sites
☐ HRM 101 ☐ Storm Water ☐ Waste Water
☐ Other

Drinking Water Sample: ☒ Yes ☐ No
Reg. No.:

Invoice To Same Yes ☐ / No ☐
Company:
Contact: Amy Barr
Address:
Phone: 902-665-4704 Fax:
PO/Credit Card#:

Sample Identification	Date/Time Sampled	Sample Matrix	# Containers	Comments – Site/Sample Info. Sample Containment	Field Filtered/Preserved	Standard Water Analysis	Metals: ☐ Total ☐ Diss ☐ Available	Mercury	☐ BOD ☐ CBOD	pH	☐ TSS ☐ TDS ☐ VSS	TKN	Total Phosphorus	Phenols	Tier 1: TPH/BTEX (PIRI) ☐ low level	Tier 2: TPH/BTEX Fractionation	CCME-CWS TPH/BTEX	VOC	THM	HAA	PAH	PCB	TC + EC ☐ P/A ☐ MPN ☐ MF	☐ HPC ☐ Pseudomonas	Fecal Coliform ☐ MPN ☐ MF	Other: IMAC	Other: Uranium	Hazardous (Y/N)
Town Hall Treated	Jun 18/18 10:00am		30																							✓		
PW2 Raw	Jun 18/18 2:10pm		30																							✓		
PW2	June 18/18 11:20am		1																								✓	
PW3	" " 11:00am		1																								✓	
P Storage Tank	" " 11:35am		1																								✓	

Samples Relinquished By (Print Name): Amy Brown Date/Time: Jun 18/18
Samples Relinquished By (Sign): Amy Brown Date/Time: 3:10pm
Samples Received By (Print Name): [signature] Date/Time: 19 June
Samples Received By (Sign): Date/Time: 15:00
Pink Copy - Client
Yellow Copy - AGAT
White Copy- AGAT
Page ☐ of ☐
Nº: 054869

Page 23 of 23

APPENDIX F

Last Round of Sampling Data for *GMPDWS*

AGAT Laboratories

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CLIENT NAME: MUNICIPALITY OF ANNAPOLIS COUNTY
PO Box 100
Annapolis Royal, NS B0S1A0
(902) 532-3141
ATTENTION TO: James Jenner
PROJECT: Health Canada Lead
AGAT WORK ORDER: 21X789410
WATER ANALYSIS REVIEWED BY: Ashley Dussault, Report Writer
DATE REPORTED: Aug 30, 2021
PAGES (INCLUDING COVER): 10
VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (902) 468-8718

Notes

Disclaimer:

- *All work conducted herein has been done using accepted standard protocols, and generally accepted practices and methods. AGAT test methods may incorporate modifications from the specified reference methods to improve performance.*
- *All samples will be disposed of within 30 days after receipt unless a Long Term Storage Agreement is signed and returned. Some specialty analysis may be exempt, please contact your Client Project Manager for details.*
- *AGAT's liability in connection with any delay, performance or non-performance of these services is only to the Client and does not extend to any other third party. Unless expressly agreed otherwise in writing, AGAT's liability is limited to the actual cost of the specific analysis or analyses included in the services.*
- *This Certificate shall not be reproduced except in full, without the written approval of the laboratory.*
- *The test results reported herewith relate only to the samples as received by the laboratory.*
- *Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, or non-infringement. AGAT assumes no responsibility for any errors or omissions in the guidelines contained in this document.*
- *All reportable information as specified by ISO/IEC 17025:2017 is available from AGAT Laboratories upon request.*

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Certificate of Analysis

AGAT WORK ORDER: 21X789410

PROJECT: Health Canada Lead

CLIENT NAME: MUNICIPALITY OF ANNAPOLIS COUNTY

ATTENTION TO: James Jenner

SAMPLING SITE:

SAMPLED BY:

Health Canada Lead Sampling - Drinking Water

DATE RECEIVED: 2021-08-18

DATE REPORTED: 2021-08-30

		SAMPLE DESCRIPTION:		61 Church St	154 Church St	63 Church St	419 Granville St	4187 Charlton Corner	165 Jeffery St	54 Rectory St	183 CentennialDr
		SAMPLE TYPE:		Water	Water	Water	Water	Water	Water	Water	Water
		DATE SAMPLED:		2021-08-17 08:14	2021-08-17 06:45	2021-08-17 06:20	2021-08-17 07:02	2021-08-17 06:10	2021-08-17 07:40	2021-08-17 06:30	2021-08-17 06:00
Parameter	Unit	G / S	RDL	2864987	2865051	2865052	2865053	2865054	2865055	2865056	2865057
Total Lead - Health Canada	ug/L	5	0.5	1.1	<0.5	<0.5	<0.5	<0.5	0.9	<0.5	<0.5

		SAMPLE DESCRIPTION:		25 Cromwell Ct	16 Bay Rd
		SAMPLE TYPE:		Water	Water
		DATE SAMPLED:		2021-08-17 07:10	2021-08-17 07:15
Parameter	Unit	G / S	RDL	2865058	2865059
Total Lead - Health Canada	ug/L	5	0.5	<0.5	<0.5

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Canadian Drinking Water Quality - updated 2021-03
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.
Analysis performed at AGAT Halifax (unless marked by *)

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 21X789410

PROJECT: Health Canada Lead

CLIENT NAME: MUNICIPALITY OF ANNAPOLIS COUNTY

ATTENTION TO: James Jenner

SAMPLING SITE:

SAMPLED BY:

Standard Water Analysis + Total Metals

DATE RECEIVED: 2021-08-18

DATE REPORTED: 2021-08-30

Parameter	Unit	G / S	RDL	SAMPLE DESCRIPTION: Bridgetown Treated Water SAMPLE TYPE: DATE SAMPLED: 2021-08-17 06:45 2865063	SAMPLE DESCRIPTION: Bridgetown Raw Water SAMPLE TYPE: DATE SAMPLED: 2021-08-17 06:40 2865069
pH		7.0-10.5		7.92	7.79
Reactive Silica as SiO2	mg/L		0.5	18.7	19.0
Chloride	mg/L	250 AO	1	12	10
Fluoride	mg/L	1.5	0.12	0.17	0.13
Sulphate	mg/L	500 AO	2	23	24
Alkalinity	mg/L		5	112	111
True Color	TCU	15 AO	5.00	<5.00	<5.00
Turbidity	NTU	1.0	0.5	**1.2**	0.6
Electrical Conductivity	umho/cm		1	336	326
Nitrate + Nitrite as N	mg/L		0.05	0.69	0.85
Nitrate as N	mg/L	10	0.05	0.69	0.85
Nitrite as N	mg/L	1.0	0.05	<0.05	<0.05
Ammonia as N	mg/L		0.03	<0.03	<0.03
Total Organic Carbon	mg/L		0.5	<0.5	<0.5
Ortho-Phosphate as P	mg/L		0.01	0.05	0.04
Total Sodium	mg/L	200 AO	0.1	8.9	8.1
Total Potassium	mg/L		0.1	0.8	0.8
Total Calcium	mg/L		0.1	57.3	46.2
Total Magnesium	mg/L		0.1	2.2	2.2
Bicarb. Alkalinity (as CaCO3)	mg/L		5	112	111
Carb. Alkalinity (as CaCO3)	mg/L		10	<10	<10
Hydroxide	mg/L		5	<5	<5
Calculated TDS	mg/L	500 AO	1	174	162
Hardness	mg/L			152	124
Langelier Index (@20C)	NA			0.12	-0.11
Langelier Index (@ 4C)	NA			-0.20	-0.43
Saturation pH (@ 20C)	NA			7.80	7.90
Saturation pH (@ 4C)	NA			8.12	8.22

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 21X789410
PROJECT: Health Canada Lead

CLIENT NAME: MUNICIPALITY OF ANNAPOLIS COUNTY
ATTENTION TO: James Jenner
SAMPLING SITE:
SAMPLED BY:

Standard Water Analysis + Total Metals

DATE RECEIVED: 2021-08-18 **DATE REPORTED: 2021-08-30**

SAMPLE DESCRIPTION:				Bridgetown Treated Water	Bridgetown Raw Water
SAMPLE TYPE:					
DATE SAMPLED:				2021-08-17 06:45	2021-08-17 06:40
Parameter	Unit	G / S	RDL	2865063	2865069
Anion Sum	me/L			3.11	3.06
Cation sum	me/L			3.45	2.86
% Difference/ Ion Balance	%			5.3	3.4
Total Aluminum	ug/L	2900, 100	5	<5	<5
Total Antimony	ug/L	6	2	<2	<2
Total Arsenic	ug/L	10	2	2	2
Total Barium	ug/L	2000	5	205	202
Total Beryllium	ug/L		2	<2	<2
Total Bismuth	ug/L		2	<2	<2
Total Boron	ug/L	5000	5	9	9
Total Cadmium	ug/L	7	0.09	<0.09	<0.09
Total Chromium	ug/L	50	1	<1	<1
Total Cobalt	ug/L		1	<1	<1
Total Copper	ug/L	2000, 1000	1	11	<1
Total Iron	ug/L	300 AO	50	<50	<50
Total Lead	ug/L	5	0.5	<0.5	<0.5
Total Manganese	ug/L	120, 20 AO	2	<2	<2
Total Molybdenum	ug/L		2	<2	<2
Total Nickel	ug/L		2	3	<2
Total Phosphorous	mg/L		0.02	0.05	0.05
Total Selenium	ug/L	50	1	<1	<1
Total Silver	ug/L		0.1	<0.1	<0.1
Total Strontium	ug/L	7000	5	236	230
Total Thallium	ug/L		0.1	<0.1	<0.1
Total Tin	ug/L		2	<2	<2
Total Titanium	ug/L		2	<2	<2
Total Uranium	ug/L	20	0.2	6.8	7.0
Total Vanadium	ug/L		2	4	4

Certified By: Ashley Dussault

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Certificate of Analysis

AGAT WORK ORDER: 21X789410

PROJECT: Health Canada Lead

CLIENT NAME: MUNICIPALITY OF ANNAPOLIS COUNTY

ATTENTION TO: James Jenner

SAMPLING SITE:

SAMPLED BY:

Standard Water Analysis + Total Metals

DATE RECEIVED: 2021-08-18

DATE REPORTED: 2021-08-30

				SAMPLE DESCRIPTION:	Bridgetown Treated	Bridgetown Raw
				SAMPLE TYPE:	Water	Water
				DATE SAMPLED:	2021-08-17 06:45	2021-08-17 06:40
Parameter	Unit	G / S	RDL		2865063	2865069
Total Zinc	ug/L	5000 AO	5		<5	<5

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Canadian Drinking Water Quality - updated 2021-03
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

2865063-2865069 % Difference / Ion Balance, Hardness, Langelier Index, Nitrate + Nitrite, Hydroxide and Saturation pH are calculated parameters. The calculated parameters are non-accredited. The component parameters of the calculations are accredited.

Analysis performed at AGAT Halifax (unless marked by *)

Certified By:

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Quality Assurance

CLIENT NAME: MUNICIPALITY OF ANNAPOLIS COUNTY | **AGAT WORK ORDER: 21X789410**

PROJECT: Health Canada Lead | **ATTENTION TO: James Jenner**

SAMPLING SITE: | **SAMPLED BY:**

Water Analysis

RPT Date: Aug 30, 2021

PARAMETER	Batch	Sample Id	DUPLICATE Dup #1	Dup #2	RPD	Method Blank	REFERENCE MATERIAL Measured Value	Acceptable Limits Lower	Upper	METHOD BLANK SPIKE Recovery	Acceptable Limits Lower	Upper	MATRIX SPIKE Recovery	Acceptable Limits Lower	Upper
Health Canada Lead Sampling - Drinking Water															
Total Lead - Health Canada	2882864		<0.5	<0.5	NA	< 0.5	101%	80%	120%	106%	80%	120%	98%	70%	130%
Comments: If RPD value is NA, the results of the duplicates are less than 5x the RDL and the RPD will not be calculated.															
Standard Water Analysis + Total Metals															
pH	2865063	2865063	7.92	7.83	1.1%	<	NA	80%	120%	NA			NA		
Reactive Silica as SiO2	2860511		15.7	13.0	18.8%	< 0.5	100%	80%	120%	100%	80%	120%	109%	80%	120%
Chloride	2865817		326	365	11.3%	< 1	86%	80%	120%	NA	80%	120%	NA	70%	130%
Fluoride	2865817		0.43	0.55	NA	< 0.12	91%	80%	120%	NA	80%	120%	95%	70%	130%
Sulphate	2865817		28	33	15.9%	< 2	99%	80%	120%	NA	80%	120%	NA	70%	130%
Alkalinity	2865063	2865063	112	111	1.1%	< 5	87%	80%	120%	NA			NA		
True Color	2859711		8.24	9.66	NA	< 5	107%	80%	120%	92%	80%	120%	NA		
Turbidity	2866465		1.7	1.9	NA	< 0.5	93%	80%	120%	NA			NA		
Electrical Conductivity	2865063	2865063	336	332	1.2%	< 1	104%	90%	110%	NA			NA		
Nitrate as N	2865817		<0.05	<0.05	NA	< 0.05	80%	80%	120%	NA	80%	120%	89%	70%	130%
Nitrite as N	2865817		<0.05	0.11	NA	< 0.05	86%	80%	120%	NA	80%	120%	87%	70%	130%
Ammonia as N	2871162		<0.03	<0.03	NA	< 0.03	98%	80%	120%	91%	80%	120%	122%	70%	130%
Total Organic Carbon	2865063	2865063	<0.5	<0.5	NA	<0.5	96%	80%	120%	NA	80%	120%	80%	80%	120%
Ortho-Phosphate as P	2859711		0.02	0.02	NA	< 0.01	101%	80%	120%	101%	80%	120%	110%	80%	120%
Total Sodium	2869402		32.6	33.1	1.5%	< 0.1	100%	80%	120%	98%	80%	120%	NA	70%	130%
Total Potassium	2869402		2.4	2.6	6.2%	< 0.1	111%	80%	120%	109%	80%	120%	NA	70%	130%
Total Calcium	2869402		29.0	27.8	4.3%	< 0.1	108%	80%	120%	106%	80%	120%	NA	70%	130%
Total Magnesium	2869402		4.1	4.3	4.0%	< 0.1	100%	80%	120%	95%	80%	120%	NA	70%	130%
Bicarb. Alkalinity (as CaCO3)	2865063	2865063	112	111	1.1%	< 5	NA	80%	120%	NA			NA		
Carb. Alkalinity (as CaCO3)	2865063	2865063	<10	<10	NA	< 10	NA	80%	120%	NA			NA		
Hydroxide	2865063	2865063	<5	<5	NA	< 5	NA	80%	120%	NA			NA		
Total Aluminum	2869402		16	16	NA	< 5	113%	80%	120%	108%	80%	120%	103%	70%	130%
Total Antimony	2869402		<2	<2	NA	< 2	91%	80%	120%	103%	80%	120%	94%	70%	130%
Total Arsenic	2869402		<2	<2	NA	< 2	99%	80%	120%	105%	80%	120%	96%	70%	130%
Total Barium	2869402		88	94	6.9%	< 5	99%	80%	120%	103%	80%	120%	NA	70%	130%
Total Beryllium	2869402		<2	<2	NA	< 2	114%	80%	120%	111%	80%	120%	94%	70%	130%
Total Bismuth	2869402		<2	<2	NA	< 2	103%	80%	120%	109%	80%	120%	92%	70%	130%
Total Boron	2869402		9	10	NA	< 5	96%	80%	120%	93%	80%	120%	83%	70%	130%
Total Cadmium	2869402		<0.09	<0.09	NA	< 0.09	97%	80%	120%	100%	80%	120%	90%	70%	130%
Total Chromium	2869402		<1	<1	NA	< 1	96%	80%	120%	99%	80%	120%	103%	70%	130%
Total Cobalt	2869402		<1	<1	NA	< 1	98%	80%	120%	100%	80%	120%	105%	70%	130%
Total Copper	2869402		4	4	NA	< 1	99%	80%	120%	102%	80%	120%	102%	70%	130%
Total Iron	2869402		66	54	NA	< 50	97%	80%	120%	97%	80%	120%	104%	70%	130%
Total Lead	2869402		<0.5	<0.5	NA	< 0.5	101%	80%	120%	105%	80%	120%	93%	70%	130%
Total Manganese	2869402		6	6	NA	< 2	97%	80%	120%	99%	80%	120%	104%	70%	130%

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Quality Assurance

CLIENT NAME: MUNICIPALITY OF ANNAPOLIS COUNTY
AGAT WORK ORDER: 21X789410
PROJECT: Health Canada Lead
ATTENTION TO: James Jenner
SAMPLING SITE:
SAMPLED BY:

Water Analysis (Continued)

RPT Date: Aug 30, 2021			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Total Molybdenum	2869402		<2	<2	NA	< 2	94%	80%	120%	97%	80%	120%	101%	70%	130%
Total Nickel	2869402		<2	<2	NA	< 2	98%	80%	120%	99%	80%	120%	103%	70%	130%
Total Phosphorous	2869402		<0.02	<0.02	NA	< 0.02	102%	80%	120%	87%	80%	120%	84%	70%	130%
Total Selenium	2869402		1	1	NA	< 1	93%	80%	120%	104%	80%	120%	90%	70%	130%
Total Silver	2869402		<0.1	<0.1	NA	< 0.1	96%	80%	120%	97%	80%	120%	87%	70%	130%
Total Strontium	2869402		157	155	1.2%	< 5	89%	80%	120%	87%	80%	120%	NA	70%	130%
Total Thallium	2869402		<0.1	<0.1	NA	< 0.1	99%	80%	120%	104%	80%	120%	93%	70%	130%
Total Tin	2869402		<2	<2	NA	< 2	99%	80%	120%	99%	80%	120%	97%	70%	130%
Total Titanium	2869402		<2	<2	NA	< 2	96%	80%	120%	92%	80%	120%	96%	70%	130%
Total Uranium	2869402		<0.2	<0.2	NA	< 0.2	98%	80%	120%	102%	80%	120%	97%	70%	130%
Total Vanadium	2869402		<2	<2	NA	< 2	96%	80%	120%	94%	80%	120%	105%	70%	130%
Total Zinc	2869402		5	5	NA	< 5	98%	80%	120%	100%	80%	120%	96%	70%	130%

Comments: If RPD value is NA, the results of the duplicates are less than 5x the RDL and the RPD will not be calculated.

Certified By:

AGAT Laboratories

11 Morris Drive, Unit 122
Dartmouth, Nova Scotia
CANADA B3B 1M2
TEL (902)468-8718
FAX (902)468-8924
http://www.agatlabs.com

Method Summary

CLIENT NAME: MUNICIPALITY OF ANNAPOLIS COUNTY **AGAT WORK ORDER: 21X789410**

PROJECT: Health Canada Lead **ATTENTION TO: James Jenner**

SAMPLING SITE: **SAMPLED BY:**

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Total Lead - Health Canada	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
pH	INOR-121-6001	SM 4500 H+B	PC TITRATE
Reactive Silica as SiO2	INOR-121-6027	SM 4500-SiO2 F	COLORIMETER
Chloride	INORG-121-6005	SM 4110 B	ION CHROMATOGRAPH
Fluoride	INORG-121-6005	SM 4110 B	ION CHROMATOGRAPH
Sulphate	INORG-121-6005	SM 4110 B	ION CHROMATOGRAPH
Alkalinity	INOR-121-6001	SM 2320 B	
True Color	INOR-121-6008	SM 2120 B	LACHAT FIA
Turbidity	INOR-121-6022	SM 2130 B	NEPHELOMETER
Electrical Conductivity	INOR-121-6001	SM 2510 B	PC TITRATE
Nitrate + Nitrite as N	INORG-121-6005	SM 4110 B	CALCULATION
Nitrate as N	INORG-121-6005	SM 4110 B	ION CHROMATOGRAPH
Nitrite as N	INORG-121-6005	SM 4110 B	ION CHROMATOGRAPH
Ammonia as N	INOR-121-6047	SM 4500-NH3 H	COLORIMETER
Total Organic Carbon	INOR-121-6026	SM 5310 B	TOC ANALYZER
Ortho-Phosphate as P	INOR-121-6012	SM 4500-P G	COLORIMETER
Total Sodium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Potassium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Calcium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Magnesium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Bicarb. Alkalinity (as CaCO3)	INORG-121-6001	SM 2320 B	PC TITRATE
Carb. Alkalinity (as CaCO3)	INORG-121-6001	SM 2320 B	PC TITRATE
Hydroxide	INORG-121-6001	SM 2320 B	PC-TITRATE
Calculated TDS	CALCULATION	SM 1030E	CALCULATION
Hardness	CALCULATION	SM 2340B	CALCULATION
Langelier Index (@20C)	CALCULATION	CALCULATION	CALCULATION
Langelier Index (@ 4C)	CALCULATION	CALCULATION	CALCULATION
Saturation pH (@ 20C)	CALCULATION	CALCULATION	CALCULATION
Saturation pH (@ 4C)	CALCULATION	CALCULATION	CALCULATION
Anion Sum	CALCULATION	SM 1030E	CALCULATION
Cation sum	CALCULATION	SM 1030E	CALCULATION
% Difference/ Ion Balance	CALCULATION	SM 1030E	CALCULATION
Total Aluminum	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Antimony	MET121-6104 & MET-121-6105	SM 3125	ICP-MS
Total Arsenic	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Barium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Beryllium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Bismuth	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Boron	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS

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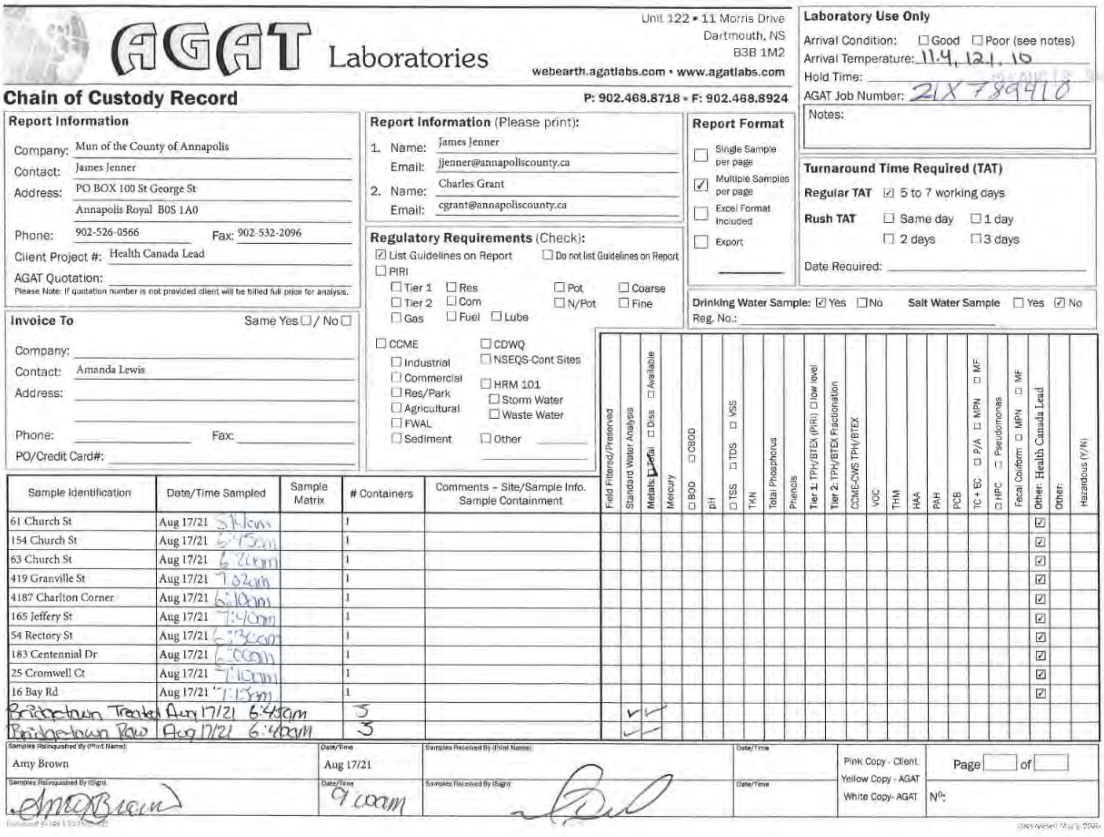
Method Summary

CLIENT NAME: MUNICIPALITY OF ANNAPOLIS COUNTY **AGAT WORK ORDER: 21X789410**

PROJECT: Health Canada Lead **ATTENTION TO: James Jenner**

SAMPLING SITE: **SAMPLED BY:**

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Total Cadmium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Chromium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Cobalt	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Copper	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Iron	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Lead	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Manganese	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Molybdenum	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Nickel	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Phosphorous	MET-121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Selenium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Silver	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Strontium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Thallium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Tin	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Titanium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Uranium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Vanadium	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS
Total Zinc	MET121-6104 & MET-121-6105	modified from SM 3125/SM 3030 B/SM 3030 D	ICP-MS



AGAT Laboratories

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Chain of Custody Record

Laboratory Use Only
Arrival Condition: ☐ Good ☐ Poor (see notes)
Arrival Temperature: 11.4, 12.1, 10
Hold Time:
AGAT Job Number: 21X789410
Notes:

Report Information
Company: Mun of the County of Annapolis
Contact: James Jenner
Address: PO BOX 100 St George St
Annapolis Royal B0S 1A0
Phone: 902-526-0566 Fax: 902-532-2096
Client Project #: Health Canada Lead
AGAT Quotation:
Please Note: If quotation number is not provided client will be billed full price for analysis.

Report Information (Please print):
1. Name: James Jenner
Email: jjenner@annapoliscounty.ca
2. Name: Charles Grant
Email: cgrant@annapoliscounty.ca

Report Format
☐ Single Sample per page
☑ Multiple Samples per page
☐ Excel Format Included
☐ Export

Turnaround Time Required (TAT)
Regular TAT ☑ 5 to 7 working days
Rush TAT ☐ Same day ☐ 1 day ☐ 2 days ☐ 3 days
Date Required:

Invoice To Same Yes ☐ / No ☐
Company:
Contact: Amanda Lewis
Address:
Phone: Fax:
PO/Credit Card#:

Regulatory Requirements (Check):
☑ List Guidelines on Report ☐ Do not list Guidelines on Report
☐ PIRI
☐ Tier 1 ☐ Res ☐ Pot ☐ Coarse
☐ Tier 2 ☐ Com ☐ N/Pot ☐ Fine
☐ Gas ☐ Fuel ☐ Lube
☐ CCME ☐ CDWQ
☐ Industrial ☐ NSEQS-Cont Sites
☐ Commercial ☐ HRM 101
☐ Res/Park ☐ Storm Water
☐ Agricultural ☐ Waste Water
☐ FWAL
☐ Sediment ☐ Other

Drinking Water Sample: ☑ Yes ☐ No **Salt Water Sample** ☐ Yes ☑ No
Reg. No.:

Sample Identification	Date/Time Sampled	Sample Matrix	# Containers	Comments – Site/Sample Info. Sample Containment
61 Church St	Aug 17/21 5:45am		1	
154 Church St	Aug 17/21 6:15am		1	
63 Church St	Aug 17/21 6:20am		1	
419 Granville St	Aug 17/21 6:32am		1	
4187 Charlton Corner	Aug 17/21 6:40am		1	
165 Jeffery St	Aug 17/21 7:40am		1	
54 Rectory St	Aug 17/21 6:32am		1	
183 Centennial Dr	Aug 17/21 6:00am		1	
25 Cromwell Ct	Aug 17/21 7:10am		1	
16 Bay Rd	Aug 17/21 7:15am		1	
Bridgetown Trailer Park	Aug 17/21 6:45am		5	
Bridgetown Rec	Aug 17/21 6:40am		3	

Field Filtered/Preserved
Standard Water Analysis
Metals: ☐ Total ☐ Diss ☐ Available
Mercury
☐ BOD ☐ CBOD
pH
☐ TSS ☐ TDS ☐ VSS
TKN
Total Phosphorus
Phenols
Tier 1: TPH/BTEX (PIRI) ☐ Low level
Tier 2: TPH/BTEX Fractionation
CCME-CWS TPH/BTEX
VOC
THM
HAA
PAH
PCB
TC + EC ☐ P/A ☐ MPN ☐ MF
☐ HPC ☐ Pseudomonas
Fecal Coliform ☐ MPN ☐ MF
Other: Health Canada Lead
Other:
Hazardous (Y/N)

Samples Relinquished By (Print Name)	Date/Time	Samples Received By (Print Name)	Date/Time
Amy Brown	Aug 17/21		
Samples Relinquished By (Sign)	**Date/Time**	**Samples Received By (Sign)**	**Date/Time**
	9 aam		

Pink Copy - Client
Yellow Copy - AGAT
White Copy - AGAT

Page ☐ of ☐

N°:

APPENDIX G

Approval to Operate

NOVA SCOTIA

55 Starrs Rd. Unit 9
Yarmouth NS
Canada B5A 2T2

902-742-8985 P
902-742-7796 F
www.novascotia.ca

APPROVAL

Province of Nova Scotia
Environment Act, S.N.S. 1994-95, c.1 s.1

APPROVAL HOLDER: MUNICIPALITY OF THE COUNTY OF ANNAPOLIS

SITE PID: 05141973, 05142039

APPROVAL NO: 2010-073601-04

EXPIRY DATE: June 1, 2029

Pursuant to Part V of the *Environment Act*, S.N.S. 1994-95, c.1 s.1 as amended from time to time, approval is granted to the Approval Holder subject to the Terms and Conditions attached to and forming part of this Approval, for the following activity:

Municipal - Water Works - Water Treatment Facility

Paddy-joe MacMillan

Administrator: Paddy-joe MacMillan

Effective Date: June 1, 2019

The Minister's powers and responsibilities under the Act with respect to this Approval have been delegated to the Administrator named above. Therefore, any information or notifications required to be provided to the Minister under this Approval can be provided to the Administrator unless otherwise advised in writing.

TERMS AND CONDITIONS OF APPROVAL

Nova Scotia Environment

Approval Holder: MUNICIPALITY OF THE COUNTY OF ANNAPOLIS

Project: Town of Bridgetown Well field

Site:

PID	Civic #	Street Name	Street Type	Community	County
05141973	507	CHURCH	ST.	BRIDGETOWN NORTH	ANNAPOLIS COUNTY
05142039	308	CHURCH	ST.	BRIDGETOWN NORTH	ANNAPOLIS COUNTY

Approval No: 2010-073601-04

File No: 94600-30-YAR-2010-073601

Grid Reference: Easting - 318036, Northing - 4970407

Reference Documents

- Application submitted March 28, 2018 and attachments.
- Previous Approval and Files 2010-073610
- Drawings C01, C02, A01, A02, S01, S02, S03 issued for Review October 20, 2017
- Design Brief Memo dated November 2, 2017
- Level 1 GUDI Screening Bridgetown Production Well #4 dated 28 November 2017 by C Walker P.Geo , CBCL
- Bore Hole Log for PW4
- Sketch SK01 dated Nov 2017

1. Definitions

a. Act means Environment Act. 1994-95, c.1, s.1 , and includes, unless the context otherwise requires, the regulations made pursuant to the Act, as amended from time to time.

b. Administrator means a person appointed by the Minister for the purpose of the

Act, and includes an acting administrator.

c. CT means disinfectant residual in mg/L multiplied by the contact time in minutes.

d. Contact Time, denoted as T10, is an effective contact time for disinfection in minutes and represents the time when 10% of the water passes the contact unit; that is 90% of the water remains in the unit and will be exposed to longer disinfection within the unit. T10 can be established by tracer studies or calculated using theoretical hydraulic detention times multiplied by an appropriate baffling factor listed in the "Nova Scotia Treatment Standards for Municipal Drinking Water Systems", as amended from time to time.

e. Continuous monitoring is sampling of flow through analysis equipment that creates an output signal a minimum of once every five minutes.

f. Department means the Department of Environment, and the contact for the Department for this approval is:

Nova Scotia Environment
Western Region, Yarmouth Office
55 Starrs Road, Unit 9
Yarmouth , NS , B5A 2T2

Phone: (902) 742-8985
Fax: (902) 742-7796

g. Grab sample means an individual sample collected in less than 30 minutes and which is representative of the substance sampled.

h. Inadequate Primary Disinfection means water that does not meet the required CT/IT.

i. Inadequate Secondary Disinfection means water that does not meet the required disinfectant residual in the distribution system.

j. Log reduction means a negative of the base 10 logarithm of the fraction of pathogens remaining after the treatment process.

log reduction = log removal by physical treatment + log inactivation by disinfection

where log removal by physical treatment is equal to the credit assigned to the filtration technology indicated in the Department's "Nova Scotia Treatment Standards for Municipal Drinking Water Systems", as amended from time to time; and

log inactivation by disinfection is equal to the inactivation which shall be

calculated as defined by the Department's "Nova Scotia Treatment Standards for Municipal Drinking Water Systems", as amended from time to time.

k. Minister means the Minister of Environment and includes any person delegated the authority of the Minister.

l. QA/QC means quality assurance and quality control.

m. Quarterly sampling means samples taken once per quarter with no less than a 45 day interval between sampling events.

n. Site means a place where a designated activity and/or undertaking is occurring or may occur.

2. Scope

a. This Approval (the "Approval") relates to the Approval Holder(s) and their application and all documentation submitted to the Department prior to the issuance of this approval for the Water Treatment Facility situated at or near Bridgetown, NS (the "Site").

b. This Approval supersedes previous Approval number 2010-073601-04 which is now null and void.

3. General

a. The Approval Holder(s) shall conduct the Designated Activity in accordance with the following provisions:

i. The Act, as amended from time to time;

ii. Any standard adopted by the Department, as amended from time to time, which includes, but is not limited to the following:

(a) The Atlantic Canada Guidelines for the Supply, Treatment, Storage, Distribution and Operation of Drinking Water Supply Systems (2004), as amended from time to time;

(b) By January 1, 2020, the Nova Scotia Treatment Standards for Municipal Drinking Water Systems (2012), as amended from time to time;

(c) The Guidelines for Monitoring Public Drinking Water Supplies, as amended from time to time;

(d) Health Canada's Guidelines for Canadian Drinking Water Quality, as amended from time to time; and

(e) Facility Classification Standards (2009), as amended from time to

time.

b. Nothing in this Approval relieves the Approval Holder(s) of the responsibility for obtaining and paying for all licenses, permits, approvals or authorizations necessary for carrying out the work authorized to be performed by this Approval which may be required by municipal by-laws or provincial or federal legislation. The Minister does not warrant that such licenses, permits, approvals or other authorizations will be issued.

c. If there is a discrepancy between the reference documents and the terms and conditions of this Approval, the terms and conditions of this Approval shall apply.

d. Any request for renewal or extension of this Approval is to be made in writing, to the Department, at least ninety (90) days prior to the Approval expiry.

e. If the Minister cancels or suspends this Approval, the Approval Holder(s) remains subject to the penalty provisions of the Act.

f. The Approval Holder(s) shall immediately notify the Department of any incidents of non-compliance with this Approval.

g. The Approval Holder(s) shall advise the Department, in writing, prior to any proposed extensions or modifications to the Site. An amendment to this Approval may be required before implementing any extension or modification.

h. The Approval Holder(s) shall bear all expenses incurred in carrying out the environmental monitoring required under the terms and conditions of this Approval.

i. All sampling and analysis must be performed in accordance with the following as amended from time to time: Standard Methods for the Examination of Water and Wastewater, or the analytical methods section of Health Canada's guideline technical document for the parameter of concern. All samples shall be collected by persons trained in appropriate sample collection procedures.

j. Unless written authorization is received otherwise from the Minister, all samples required by this Approval shall be analyzed by a laboratory that meets the requirements of the Department's "Policy on Acceptable Certification of Laboratories", as amended from time to time.

k. Notwithstanding the above item, the following parameters may be analyzed at the Site or a laboratory that is not certified:

   Alkalinity*, Aluminum Residual*, Chloramines, Chloride Dioxide Residual, Chlorine Residual, Colour, Conductivity*, Fluoride Residual*, Hardness*, Iron*, Manganese*, Methane*, Free Ammonia (as N)*, Ozone Residual, pH, Temperature, Total Organic Carbon, Turbidity and UV Absorbance.

*These parameters must have a Quality Assurance/Quality Control component that includes quarterly confirmation by an accredited laboratory.

l. The Approval Holder(s) shall ensure that this Approval, or a copy, is kept on Site at all times and that personnel directly involved in the designated activity are made fully aware of the terms and conditions which pertain to this Approval.

m. Upon any changes to the Registry of Joint Stock Companies information, the Approval Holder(s) shall provide a copy to the Department within five business days.

4. Releases

a. Releases shall be reported in accordance with the Act.

b. Releases shall be cleaned up in accordance with the Act.

5. Operation

a. The Municipal Public Drinking Water Supply has been classified as a Class I water distribution facility.

b. When it is necessary to use a by-pass to divert water around one or more unit processes, the Approval Holder(s) shall immediately notify the Department and identify the anticipated period of time that the by-pass will be in service.

c. When it is necessary to use a by-pass to divert water around one or more unit processes, the Approval Holder(s) shall immediately initiate a Boil Water Advisory. The Approval Holder(s) shall maintain the boil advisory until otherwise advised by the Department.

d. The Approval Holder(s) shall ensure the development and implementation of a cross-connection control program to protect the Municipal Public Drinking Water Supply from contamination due to cross-connections from commercial, institutional, industrial, multi-unit residential, and agricultural facilities, at a minimum, and avoid any cross-connections within the drinking water treatment facility. The program shall be submitted to the Department for review on or before June 1, 2020. Upon review, the Department may require changes to the cross-connection control program.

e. The Approval Holder(s) shall demonstrate that any Municipal Public Drinking Water Supply component in contact with treated water has been disinfected after construction, repair or maintenance in accordance with ANSI (American National Standards Institute)/AWWA (American Water Works Association) C651 - Disinfection of Water Mains, ANSI/AWWA C653 - Disinfection of Water Treatment Plant, and ANSI/AWWA C652 - Disinfection of Water Storage Facilities, or the latest revisions.

f. The Approval Holder(s) shall ensure that all chemicals used in the treatment process and all materials contacting the water are of "food grade" quality and meet both the AWWA quality criteria as set out in AWWA standards and the ANSI safety criteria as set out in ANSI standard NSF/60 (for chemical additives) or NSF/61 (for materials). A copy of the appropriate NSF certification is to be kept on Site and is to be available for review immediately upon request by the Department.

g. The Approval Holder(s) shall discontinue use of any chemical found to have adverse effects on finished water quality limits as prescribed in the Act and/or this Approval.

h. Emergency Notification Procedures:

    i. The Approval Holder(s) shall ensure that the emergency notification procedures are reviewed and updated on a yearly basis. The Approval Holder(s) shall document in the annual report what modifications were made to the emergency notification procedures and how the procedures were communicated to staff.

    ii. A copy of the emergency notification procedures are to be maintained on Site at all times and are to be available for review immediately upon request by the Department.

    iii. The Approval Holder(s) shall ensure that all employees are trained in accordance with the emergency notification procedures and shall keep a record of training at the facility for a minimum period of five (5) years.

i. Operations Manual:

    i. A copy of the operations manual is to be kept on Site at all times and is to be available for review immediately upon request by the Department.

    ii. The Approval Holder(s) shall ensure that all employees are trained in accordance with the operations manual and shall keep a record of training at the facility for a minimum period of five (5) years.

j. A set of drawings, incorporating any amendments made from time to time, shall be retained on Site by the Approval Holder(s) for as long as the Municipal Public Drinking Water Supply is kept in operation and are to be available for inspection or review by departmental staff immediately upon request.

k. The Approval Holder(s) shall establish procedures for receiving and responding to complaints including a reporting system that records and documents what steps were taken to determine the cause of complaint and the corrective measures taken to alleviate the cause and prevent its recurrence.

l. The Approval Holder(s) shall establish security measures to assure the safety of

the Municipal Public Drinking Water Supply.

m. The Approval Holder(s) shall maintain a written list of the name of each laboratory utilized, and the parameters analyzed by each laboratory, and shall submit this list to the Department immediately upon request.

6. System Assessment Report

a. The Approval Holder(s) shall submit a System Assessment Report to the Department by April 1, 2023, to verify that the Municipal Public Drinking Water Supply complies with the Act and standards.

b. The System Assessment Report shall be in accordance with the Department's "Terms of Reference for System Assessment Reports for Water Works", as amended from time to time.

c. The Approval Holder(s) shall provide the Department with their corrective action plan to address deficiencies identified by the System Assessment Report by October 1, 2023. Any changes to the corrective action plan shall be submitted to and deemed acceptable by the Department.

7. Source Water Protection

a. The Approval Holder(s) shall implement the accepted Source Water Protection Plan in accordance with the accepted schedule.

b. The Approval Holder(s) shall ensure that the Source Water Protection Plan is reviewed and updated on a yearly basis. The Approval Holder(s) shall ensure that any changes are documented in the annual report.

c. The Approval Holder(s) shall modify the Source Water Protection Plan, including updates, if so directed by the Department.

8. Water Quality Requirements - Performance and Limits

General Requirements

a. Treatment shall be sufficient to ensure 99.99% reduction of viruses (4-Log Reduction) for each well or, if water from individual wells is combined, for the combined flow.

b. The treated water shall minimize corrosion of the water distribution and/or plumbing systems.

Primary Disinfection Requirements

c. Primary disinfection through the use of chlorine, ultraviolet light (UV) and/or a Department approved alternate disinfection method, shall contribute a minimum of 4-log inactivation for viruses for each well or, if water from individual wells is

combined, for the combined flow. The disinfection log inactivation shall be based on CT/IT values which shall be calculated as defined by the Nova Scotia Treatment Standards for Municipal Drinking Water Systems, as amended from time to time.

d. Flow from each well or the combined flow, if water from individual wells is combined, shall have a minimum of two primary disinfection units configured to apply disinfection treatment at all times to ensure that inadequately disinfected water does not enter the water distribution system unless the Approval Holder(s) makes an application for system wide redundancy and the application is deemed acceptable by the Department.

e. Each disinfection unit shall be capable of meeting the maximum day demand flow. Where more than two disinfection units are provided, the maximum day demand flow shall be met when the largest unit is out of service.

f. Continuous on-line monitoring of the primary disinfection process is required at each treatment facility with measurements taken at a minimum of once every five minutes to ensure that inadequately disinfected water does not enter the distribution system. Water systems shall be equipped with alarm capabilities to notify operations staff if the disinfection process fails to operate properly to prevent inadequately disinfected water from being distributed.

g. In the event of an emergency situation where water enters the water distribution system that does not meet the water quality limits as prescribed in the Act and/or this Approval, the Approval Holder(s) shall issue a boil water advisory, do-not-consume, or do-not-use advisory as described in the Guidelines for Monitoring Public Drinking Water Supplies and notify the Department as soon as the Approval Holder(s) becomes aware.

h. Standard operational procedures (SOPs) for the disinfection process shall be developed, implemented and communicated to all operations staff and documented in the operations manual required herein. The procedures and a log indicating the date and method of communication to staff shall be made available to the Department immediately upon request.

    i. The standard operational procedures shall indicate the design ranges for achieving CT (e.g. minimum temperature and chlorine residual, maximum flow and pH) and/or IT (e.g. minimum UV intensity, minimum UV transmittance, and maximum water flow).

    ii. When operational conditions are outside the design ranges for achieving CT/IT, the Approval Holder(s) shall notify the Department as soon as the Approval Holder(s) becomes aware, investigate the cause and take necessary corrective action. CT/IT shall be calculated during every such event.

Secondary Disinfection and Residual Monitoring Requirements

i. Secondary disinfection through the use of chlorine shall be used to maintain a chlorine residual in the water distribution system.

j. The disinfection process shall be operated in such a manner as to ensure that the following minimum chlorine residual value is achieved throughout the water distribution system at all times:

   i. 0.20 mg/L free chlorine residual.

k. The disinfection process shall be operated in such a manner as to ensure that the maximum chlorine residual delivered to consumers does not exceed the following value:

   i. 4.0 mg/L free chlorine residual.

l. Continuous monitoring of chlorine residual is required for finished water at each location where water enters the distribution system from an individual well or combined wells, with measurements taken at no more than five minute intervals.

m. Continuous monitoring of chlorine residual is required for the water leaving any water storage structure within the water distribution system, with measurements taken at no more than five minute intervals.

n. Monitoring of the water distribution system for chlorine residual is required. Unless specified otherwise in this Approval, sampling and testing frequency is the same as for bacteriological sampling requirements as stated in the "Guidelines for Monitoring Public Drinking Water Supplies".

Turbidity Requirements

o. The turbidity levels entering the water distribution system from each well or combination of wells shall not exceed 1.0 NTU:

   i. In at least 95% of the measurements taken by grab sample for each calendar month; or

   ii. In at least 95% of the time each calendar month if continuous monitoring is the method of turbidity measurement.

p. If the Approval Holder(s) cannot meet the 1.0 NTU turbidity requirements described herein, the Approval Holder(s) may request that a less stringent value apply provided the Approval Holder(s) can demonstrate to the Department that the turbidity is not health-related and that the disinfection process is not compromised by the use of a less stringent value.

q. A turbidity value of 5.0 NTU or less shall be achieved on water distribution system sampling.

r. Unless specified otherwise in this Approval, sampling and testing frequency is the same as for bacteriological sampling requirements as stated in the "Guidelines for Monitoring Public Drinking Water Supplies".

s. Where turbidity values of greater than 5.0 NTU are observed in the water distribution system, the Approval Holder(s) shall investigate the cause and take corrective action as necessary and notify the Department immediately.

Turbidity Monitoring Requirements

t. Daily grab or continuous monitoring, with measurements taken at no more than five minute intervals, is required for each wellhead or combined flow.

u. Continuous or grab sample monitoring of the water distribution system is required. Unless specified otherwise in this Approval, sampling and testing frequency is the same as for bacteriological sampling requirements as stated in the "Guidelines for Monitoring Public Drinking Water Supplies".

9. Backup Water Systems

a. Prior to the use of a backup water system, the Approval Holder(s) shall immediately notify the Department and identify the anticipated period of time that the backup system will be in service.

b. For backup systems that do not meet the Nova Scotia Treatment Standards for Municipal Drinking Water Systems, the Approval Holder(s) shall immediately initiate a Boil Water Advisory as stated in the "Guidelines for Monitoring Public Drinking Water Supplies" prior to the use of a backup system. The Approval Holder(s) shall maintain the boil advisory until otherwise advised by the Department.

c. For backup systems that meet the Nova Scotia Treatment Standards for Municipal Drinking Water Supplies, the backup water system may continue to operate until the main water system is put back into service or as otherwise directed by the Department.

10. Laboratory Reports and Water Quality Results

a. The Approval Holder(s) shall submit copies of the laboratory certificate of analysis to the Department immediately upon request.

b. The Approval Holder(s) will authorize and work with laboratories to electronically report water quality results to the Department upon implementation of an on-line drinking water quality surveillance program.

c. Electronic reporting shall not replace the Approval Holder(s)'s responsibility to notify the Department immediately, by telephone, of the presence of bacteria or an exceedance of a maximum acceptable concentration for a health-related

parameter listed in the "Guidelines for Canadian Drinking Water Quality".

11. Monitoring and Recording

a. The Approval Holder(s) shall monitor and sample the Municipal Public Drinking Water Supply in accordance with a monitoring program deemed acceptable by the Department and which meets the minimum requirements of Schedule A, attached. In the case of a discrepancy between Schedule A and the accepted monitoring program, the accepted monitoring program shall apply.

b. All required monitoring data must be collected and submitted in the units of measure indicated in the standard(s)

c. Sampling shall be representative of the water distribution system.

d. On or before October 1 of each year, the Approval Holder(s) shall recommend to the Department the monitoring program for the Municipal Public Drinking Water Supply for the following calendar year, highlighting any proposed changes and the reason for the changes. Any existing monitoring program shall remain in place until the recommended monitoring program is deemed acceptable by the Department.

e. The monitoring program shall meet the minimum requirements of the Department's "A Guide to Assist Nova Scotia Municipal Water Works Prepare Annual Sampling Plans", as amended from time to time.

f. The monitoring program shall be acceptable to the Department.

g. The Approval Holder(s) is responsible for implementing, on an annual basis, the monitoring program and subsequent revisions as deemed acceptable by the Department.

h. The Approval Holder(s) shall not move, relocate or otherwise alter the location of the sampling locations indicated in the approved monitoring program without written permission from the Department.

i. Following a review of any of the analytical results required by this Approval, the Department may alter the frequencies, location, and parameters for analyses required for this Approval or require other remedial action.

j. Any flow measuring devices and continuous water quality analyzers and indicators with alarm systems shall be installed, maintained and calibrated as specified by the instrument manufacturer's instructions. Calibration logs for each instrument shall be maintained at the site and be available for inspection immediately upon request by the Department.

k. The Approval Holder(s) shall establish a QA/QC program to validate the measurements obtained from continuous monitoring equipment and for all

analysis conducted at the Site or a non-certified laboratory.

l. The Approval Holder(s) shall establish and conduct process control testing and sampling and record the results. Results are to be made available for inspection or review by departmental staff immediately upon request.

m. The Approval Holder(s) shall establish and conduct source water protection testing and sampling and record the results. Results are to be made available for inspection or review by departmental staff immediately upon request.

12. Reporting

Reporting Upon Request

a. The Approval Holder(s) shall keep records continually updated in such a way, that weekly and/or monthly reporting of monitoring and sampling results can be immediately sent to the Department upon request.

Annual Reporting

b. The Approval Holder(s) shall prepare and submit to the Department, an annual report for the Municipal Public Drinking Water Supply.

c. The annual report shall be submitted on or before April 1 following the completion of the calendar year being reported upon.

d. The annual report shall contain, but not be limited to, the following information:

i. a summary and discussion of the quantity of water supplied during the reporting period on a per month basis showing design values, maximum daily flow and average daily flow for each month and any other parameters or conditions specified in the Water Withdrawal Approval;

ii. a summary and interpretation of analytical results obtained in accordance with the "Monitoring and Recording" section of this Approval, including an explanation for any exceedance of the maximum acceptable concentration (MAC) of health-related parameters listed in the "Guidelines for Canadian Drinking Water Quality", latest edition and the actions taken to address the exceedance;

iii. annual trend graphs for parameters that are continuously monitored;

iv. date and description of any emergency or upset conditions which occurred during the period being reported upon and action taken to correct them;

v. any modifications to the contingency plan or emergency notification procedures including a description of how the information was communicated to staff;

vi. a list of the names of each laboratory utilized by the Approval Holder(s) and the parameters analyzed by each laboratory;

vii. an update on the status of the source water protection plan, including any modifications to the plan or implementation schedule, and a summary of activities taken to achieve the goals and objectives of the plan;

viii. all incidents of free chlorine residual below 0.20 mg/L in the water distribution system shall be detailed with a description of any actions taken

ix. verification that the operational conditions remained within the design range for achieving CT/IT; if operational conditions went outside the design ranges, provide CT/IT calculations and a summary of corrective actions taken;

x. mathematical verification that turbidity levels entering the water distribution system from each well or combination of wells shall not exceed 1.0 NTU 95% of the time each calendar month;

xi. a summary and interpretation of results obtained in accordance with the corrosion assessment/control program including, but not limited to, residential lead sampling results;

xii. incidents of non-compliance with this Approval, the date it was reported to the Department, and corrective actions taken by the Approval Holder(s);

xiii. any complaints received, the steps taken to determine the cause of the complaint and the corrective measures taken to alleviate the cause and prevent its recurrence;

xiv. a review of the QA/QC program to validate the measurements obtained from continuous monitoring equipment and for all analysis conducted at the facility or a non-certified laboratory; and

xv. a list of each certified operator and their level of certification.

Emergency Reporting on Operation

e. The Approval Holder(s) shall notify the Department immediately of an incident that may adversely affect the quality of the water within the Municipal Public Drinking Water Supply. Notification shall be made to a live person by phone or in person and followed by fax or email. These incidents shall include, but not be limited to: the presence of bacteria; inadequately disinfected water being directed to the water distribution system; sewage or other releases in the source Municipal Public Drinking Water Supply area; line breakage that may result in cross contamination; exceedance of turbidity values required by this Approval; if using membrane filtration, failure of direct integrity test, etc.

f. The Approval Holder(s) shall notify the Department immediately of any analytical results that exceed the maximum acceptable concentration (MAC) of health-related parameters listed in the "Guidelines for Canadian Drinking Water Quality", latest edition. Notification shall be made to a live person by phone or in person and followed by fax or email.

g. When bacteria are detected in the Municipal Public Drinking Water Supply, the Approval Holder(s) shall notify the Department immediately of the presence of bacteria and take corrective action as outlined in the latest edition of the "Guidelines for Monitoring Public Drinking Water Supplies", as amended from time to time. Notification shall be made to a live person by phone or in person and followed by fax or email.

h. If the chlorine residual in the water distribution system is less than 0.20 mg/L free chlorine, the Approval Holder(s) shall notify the Department immediately of the low chlorine residual and take corrective actions to obtain the required residual. Notification shall be made to a live person by phone or in person and followed by fax or email.

13. Contingency Plan

a. The contingency plan is to meet the minimum requirements of the Department's "A Guide to Assist Nova Scotia Municipal Water Works Develop a Comprehensive Operations Manual" and "Contingency Planning Guidelines", as amended from time to time.

b. The Approval Holder(s) shall ensure that the contingency plan for the Municipal Public Drinking Water Supply is reviewed and updated on a yearly basis. The Approval Holder(s) shall document in the annual report what modifications were made to the plan and how the plan was communicated to their staff.

c. The Approval Holder(s) shall ensure that all employees are trained in accordance with the contingency plan and shall keep a record of training at the facility for a minimum period of five (5) years.

d. A copy of the contingency plan is to be maintained on Site at all times and is to be available for review immediately upon request by the Department.

14. Records

a. The Approval Holder(s) shall keep the following records and water quality analyses:

i. All incidents of suspected and/or confirmed disease outbreaks attributed to the water system shall be documented and kept for a minimum of ten (10) years;

ii. Bacteriological, chlorine residual and turbidity analyses shall be kept for

two (2) years;

iii. Chemical analysis shall be kept for ten (10) years;

iv. Annual water withdrawal records shall be kept for ten (10) years.

b. The Approval Holder(s) shall retain the following information for a period of five (5) years:

i. Calibration and maintenance records;

ii. Continuous monitoring data.

c. A copy of project reports, construction documents and drawings, and inspection records shall be kept for the life of the Municipal Drinking Water Supply.

Schedule A Non-GUDI		
Water Quality Parameters	Sample Location	Minimum Frequency
Turbidity		
Turbidity	At individual wellheads or the combined flow	Continuous at no more than 5 minute intervals or daily grab sample.
	Distribution system sample points	Weekly grab sample
Primary Disinfection (Parameters to be monitored depend on the disinfection method used)		
Free Chlorine		
Free Chlorine Residual	CT control point (water entering the distribution system)	Continuous at no more than 5 minute intervals – must meet CT design criteria
Temperature	CT control point	Continuous at no more than 5 minute intervals or daily grab – must meet CT design criteria
pH	CT control point	Continuous at no more than 5 minute intervals – must meet CT design criteria
Secondary Disinfection (Parameters to be monitored depend on the disinfection method used)		
Free Chlorine		
Free Chlorine Residual	Storage structure outlet	Continuous at no more than 5 minute intervals
	Distribution system sample points	Weekly grab sample
Microbial Quality		
Total coliforms and *E. coli* (present/absent)	Distribution system sample points	Weekly grab sample
Viruses	Raw water	As requested by the Department
	Water distribution system	As requested by the Department
Corrosion Monitoring Program		
• pH • Alkalinity	Point of entry and representative locations	Quarterly grab sample for two consecutive years*

<table>
<tr><th colspan="3">Schedule A
Non-GUDI</th></tr>
<tr><th>Water Quality Parameters</th><th>Sample Location</th><th>Minimum Frequency</th></tr>
<tr>
<td>• Conductivity
• Temperature
• Dissolved oxygen
• Chlorine or chloramine residual
• Corrosion inhibitor residual (if used)

These parameters will assist the utility determine the corrosivity of the water and type of corrosion control the system should install, if needed.</td>
<td>within the distribution system based on population served:

<table><tr><th>Population</th><th># of distribution samples</th></tr><tr><td><100</td><td>1</td></tr><tr><td>101-500</td><td>2</td></tr><tr><td>501-3,300</td><td>3</td></tr><tr><td>3,301-10,000</td><td>4</td></tr><tr><td>10,001-100,000</td><td>6</td></tr><tr><td>>100, 000</td><td>10</td></tr></table></td>
<td>* An owner may submit a request to NSE for a reduction in the frequency of point-of- entry and distribution monitoring requirements from quarterly to annually between May and October if the water is not corrosive as evidenced by point-of-entry and distribution sample results for key parameters in conjunction with residential lead levels (e.g. the 90th percentile lead concentrations are below the lead action level for a period of two consecutive years).

*If the water is corrosive as evidenced by point-of-entry and distribution sample results for key parameters in conjunction with residential lead levels (e.g. the 90th percentile lead concentrations are above the lead action level in any given year), the utility shall implement a corrosion control program or optimize their existing program. The utility shall submit a corrosion control program to NSE for review and acceptance. Once accepted by NSE, the utility shall follow the corrosion control monitoring parameters, location(s) and frequency included in their program.</td>
</tr>
</table>

<table>
<tr><th colspan="3">Schedule A
Non-GUDI</th></tr>
<tr><th>Water Quality Parameters</th><th>Sample Location</th><th>Minimum Frequency</th></tr>
<tr><td>Lead – flushed sample(s)</td><td>Representative locations within the distribution system based on population served – see table above.</td><td>Annually – during the warmest month*

*An owner may submit a request to NSE to stop collecting flushed samples for lead from the distribution system, if samples collected from the distribution system during the warmest month for a period of two consecutive years show the utility does not have lead present in fittings or other components in the distribution system.</td></tr>
<tr><td rowspan="2">Lead – Stagnated Sampling
(as per Health Canada's Guidance for Controlling Corrosion in Drinking Water Distribution Systems, as amended from time to time)

Tier 1 Sampling
• Minimum 6-hour stagnation period
• Collect first draw 1 litre sample. May collect 4 1-litre samples in case Tier 2 sampling is required.</td><td>Where possible, sites shall be selected to include: 1/ at least 50% of sites with lead service lines (where present); 2/ locations that contain copper pipes with lead solders or lead pipes; and 3/ locations with lead containing brass fittings</td><td>Annually between May to October to assess corrosivity of water to lead release.

If < 10% (defined as 90th percentile) of initial sample results are above the lead action limit for a period of two consecutive years, submit request to NSE to sample once per year (reduced annual).

If > 10% (defined as 90th percentile) of initial sample results are above the lead action limit, proceed to Tier 2 sampling.</td></tr>
<tr><td colspan="2">Number of monitoring sites is based on the population served as shown in the following table:

<table><tr><th>Population</th><th># of sites (Routine annual)</th><th># of sites (Reduced annual)</th></tr><tr><td><100</td><td>5</td><td>5</td></tr><tr><td>101-500</td><td>10</td><td>5</td></tr><tr><td>501-3,300</td><td>20</td><td>10</td></tr></table></td></tr>
</table>

<table>
<tr><th colspan="3">Schedule A
Non-GUDI</th></tr>
<tr><th>Water Quality Parameters</th><th>Sample Location</th><th>Minimum Frequency</th></tr>
<tr><td></td><td colspan="2"><table>
<tr><td>3,301-
10,000</td><td>40</td><td>20</td></tr>
<tr><td>10,001-
100,000</td><td>60</td><td>30</td></tr>
<tr><td>>100, 000</td><td>100</td><td>50</td></tr>
</table>*An owner may submit a request to NSE for a reduction in the number of residential samples if the 90th percentile lead concentrations are below the lead action level for a period of two consecutive years.</td></tr>
<tr><td>Tier 2 Sampling
• Minimum 6-hour stagnation period
• Collect first draw 4* x 1 litre samples (or additional 3 x 1 litre samples from Tier 1)

* More than 4 samples may be required to identify the source of lead, depending on several factors including the length and diameter of piping, etc.</td><td>Sample at 10% of sites sampled in Tier 1 (sites with the highest lead concentration). For systems serving 500 or fewer people a minimum of two sites are required.

Each 1 liter sample is analyzed to obtain a profile of lead contribution from the:
-Faucet
-Plumbing (leaded solder, brass and bronze fittings, brass water meter, etc.)
-Lead service line</td><td>Only required when >10% of Tier 1 samples exceed the lead action limit.</td></tr>
<tr><td colspan="3">Process Control</td></tr>
<tr><td>Water Volume</td><td>Each individual well</td><td>Continuous at no more than 5 minute intervals</td></tr>
<tr><td>Fluoride – for facilities that add fluoride</td><td>Water entering the distribution system</td><td>Daily</td></tr>
<tr><td colspan="3">Disinfection By-products</td></tr>
<tr><td>Total Trihalomethanes (THMs)</td><td>Select distribution system sample point(s) – representative of highest level. Areas in the distribution system with the</td><td>Quarterly*- locational running annual average (lraa) based on a minimum of 4 quarterly samples.</td></tr>
</table>

Schedule A Non-GUDI		
Water Quality Parameters	Sample Location	Minimum Frequency
	longest disinfectant retention time.	* The Approval Holder may request a reduction in sample frequency to annual, if the lraa based on a minimum of four quarterly samples collected from each location is < 0.010mg/L
Haloacetic Acids (HAAs)	Select distribution system sample point(s) – where historical data show the highest concentration. Where historical data is not available concentrations shall be monitored in the middle and extremities of the distribution system.	Quarterly* - locational running annual average (lraa) based on a minimum of 4 quarterly samples. * The Approval Holder may request a reduction in sample frequency to annual, if the lraa based on a minimum of four quarterly samples collected from each location is < 0.010mg/L
Chlorate – if storing sodium hypochlorite more than 3 months	Water entering distribution system	Quarterly
Bromate – if storing sodium hypochlorite more than 3 months	Water entering distribution system	Quarterly
Treatment Process Backwash Wastewater		
If required, treatment process backwash wastewater- parameter(s), location(s), and frequency in accordance with this approval and the accepted annual monitoring program.		
General Chemical and Physical Quality		
General chemical and physical parameters listed in the Guidelines for Monitoring Pubic Drinking Water Supplies	Raw and treated water	Minimum every two-years
Manganese	• Raw water (prior to treatment) • Entering the distribution system • Distribution system	• Twice per year (spring and fall) • Quarterly • Quarterly * The Approval Holder may request a reduction in sample frequency, if it is

Schedule A Non-GUDI		
Water Quality Parameters	Sample Location	Minimum Frequency
		determined that manganese is not a parameter of concern for the water supply.
Guidelines for Canadian Drinking Water Quality		
All health-related parameters in the Guidelines for Canadian Drinking Water Quality	Raw and treated water	Every 5 years unless system assessment report or source water protection plan requires more frequent monitoring.
Source Water Protection		
Parameters as per the source water protection monitoring program	Locations and frequencies in accordance with the source water protection monitoring program.	

APPENDIX H

Approval to Withdrawal

NOVA SCOTIA

136 Exhibition Street
Kentville, NS
Canada B4N 4E5

902-679-6086 T
902-679-6186 F
www.novascotia.ca

Our File Number: 95100-30-KEN-2009-068808

May 19, 2020

MUNICIPALITY OF THE COUNTY OF ANNAPOLIS
James Jenner
PO BOX 609, 271 Granville Street
ANNAPOLIS ROYAL, NS B0S1C0

Attention: James Jenner

RE: Approval for Operation - Water Withdrawal. Approval No. 2009-068808-05
PID # 05141973, 05142039

Enclosed please find Approval 2009-068808-05 for Operation of the Water Withdrawal at 308 Church St.507 Church St. Bridgetown North, Annapolis County Nova Scotia.

Strict adherence to the attached terms and conditions is imperative in order to validate this approval.

Despite the issuance of this Approval, the Approval Holder is still responsible for obtaining any other authorization which may be required to carry out the activity, including those which may be necessary under provincial, federal or municipal law.

Should you have any questions, please contact Lanying X Zhao, Western Region, Kentville Office at 902-679-6086.

Yours truly,

Jennifer Lonergan
District Manager

cc: CBCL Limited

NOVA SCOTIA

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APPROVAL

Province of Nova Scotia
Environment Act, S.N.S. 1994-95, c.1 s.1

APPROVAL HOLDER: MUNICIPALITY OF THE COUNTY OF ANNAPOLIS

SITE PID: 05141973, 05142039

APPROVAL NO: 2009-068808-05

EXPIRY DATE: March 15, 2030

Pursuant to Part V of the *Environment Act*, S.N.S. 1994-95, c.1 s.1 as amended from time to time, approval is granted to the Approval Holder subject to the Terms and Conditions attached to and forming part of this Approval, for the following activity:

Water Approval - Water Withdrawal

Jennifer Lonergan

Administrator: Jennifer Lonergan

Effective Date: March 16, 2020

The Minister's powers and responsibilities under the Act with respect to this Approval have been delegated to the Administrator named above. Therefore, any information or notifications required to be provided to the Minister under this Approval can be provided to the Administrator unless otherwise advised in writing.

TERMS AND CONDITIONS OF APPROVAL

Nova Scotia Environment

Approval Holder: MUNICIPALITY OF THE COUNTY OF ANNAPOLIS

Project: Bridgetown Water Treatment

Site:

PID	Civic #	Street Name	Street Type	Community	County
05141973	507	CHURCH	ST.	BRIDGETOWN NORTH	ANNAPOLIS COUNTY
05142039	308	CHURCH	ST.	BRIDGETOWN NORTH	ANNAPOLIS COUNTY

Approval No: 2009-068808-05

File No: 95100-30-KEN-2009-068808

Grid Reference: Easting - 318104, Northing - 4970229

Reference Documents

- Application submitted February 13, 2020 and attachments.

1. Definitions

a. Act means Environment Act, Chapter 1 of the Acts of 1994-95, and includes, unless the context otherwise requires, all regulations made pursuant to the Act.

b. Department means the Department of Environment, and the contact for the Department for this approval is:
Nova Scotia Environment
Western Region, Kentville Office
136 Exhibition Street
Kentville, Nova Scotia B4N 4E5

Phone: (902) 679-6086
Fax: (902) 679-6186

c. Minister means the Minister of Environment and includes any person appointed as a designate of the Minister.

d. Site means a place where a designated activity and/or undertaking is occurring or may occur.

2. Scope

a. This Approval (the "Approval") relates to the Approval Holder and their application and supporting documentation, as listed in the reference documents above, to withdraw groundwater from well(s) denoted as: PW2, PW3, and PW4 situated at or near 308 and 507 Church Street, Bridgetown North, Annapolis County (the "Site").

b. The Approval Holder(s) shall ensure the designated activity is carried out in accordance with this Approval and reference documents, including the application and supporting documentation.

c. This approval authorizes only the activities outlined in the Scope section. All other watercourse alterations require additional Approvals or Notifications.

3. General

a. The Approval Holder(s) shall conduct the Designated Activity in accordance with the following provisions:

i. The Act, as amended from time to time;

ii. Any standard adopted by the Department, as amended from time to time.

b. No authority is granted by this Approval to enable the Approval Holder(s) to commence or continue the designated activity on lands which are not in the control or ownership of the Approval Holder(s). It is the responsibility of the Approval Holder(s) to ensure that such a contravention does not occur. The Approval Holder(s) shall provide, to the Department, proof of such control or ownership upon expiry of any relevant lease or agreement. Failure to retain said authorization may result in this Approval being cancelled or suspended.

c. If there is a discrepancy between the reference documents and the terms and conditions of this Approval, the terms and conditions of this Approval shall apply.

d. Any request for renewal or extension of this Approval is to be made in writing, to the Department, at least ninety (90) days prior to the Approval expiry.

e. Nothing in this Approval relieves the Approval Holder(s) of the responsibility for obtaining and paying for all licenses, permits, approvals or authorizations necessary for carrying out the work authorized to be performed by this Approval which may be required by municipal by-laws, provincial or federal legislation, or other organizations. The Minister does not warrant that such licenses, permits, approvals or other authorizations will be issued.

f. The Approval Holder(s) shall advise the Department in writing prior to any proposed extensions or modifications to the Activity and/or the Site. An amendment to this Approval may be required before implementing any extension or modification.

g. The Approval Holder(s) shall immediately notify the Department of any incidents of non-compliance with this Approval.

h. The Approval Holder(s) shall bear all expenses incurred in carrying out the environmental monitoring required under the terms and conditions of this Approval.

i. Unless specified otherwise in this Approval, all samples required to be collected by this Approval shall be collected, preserved and analysed, by qualified personnel, in accordance with recognized industry standards and procedures.

j. Unless written authorization is received otherwise from the Minister, all samples required by this Approval shall be analysed by a laboratory that meets the requirements of the Department's Policy on Acceptable Certification of Laboratories as amended from time to time.

k. The Approval Holder(s) shall ensure that this Approval, or a copy, is kept on Site at all times and that personnel directly involved in the Facility operation are made fully aware of the terms and conditions which pertain to this Approval.

l. Upon any changes to the Registry of Joint Stock Companies information, the Approval Holder(s) shall provide a copy to the Department within five business days.

4. Covenant Conditions

a. The Approval does not authorize any activity that would:

   i. prejudice any riparian rights of any owner or of any person lawfully in possession of or holding any lands abutting the watercourse;

   ii. cause any damage or nuisance to adjacent or abutting land; or

   iii. discharge water onto adjoining lands without the authorization of the affected landowner(s).

b. By granting this Approval, the Department is not responsible for any damages as a result of the approved activities, including any water quality or quantity problems that may be encountered by the Approval Holder(s) or other parties.

c. By issuing this approval, the department is not providing any assurance(s) as to sufficient water quantity and/or quality to meet any requirements of the Approval Holder(s).

5. Fees

a. The Approval Holder(s) shall, upon receipt of an invoice from the Department stating the amount owing in accordance with the Fees Regulations, as amended from time to time, pay to the Minister of Finance the amount stipulated.

6. Site Specific Conditions

a. Withdrawal Locations

i. This Approval applies to withdrawal water from the production wells denoted PW2, PW3, and PW4, situated at or near 308/507 Church St, Bridgetown North, Annapolis County, Nova Scotia (the "Site"). Available locations and construction details for the production wells, PW2, PW3, and PW4, and monitoring wells, are identified in Table 1, Well Construction Information in the Appendix.

b. Water Withdrawal Limits for the Wellfield

i. The Maximum Pumping Rate (litres/day), Average (30-day) Pumping Rate, 30-day Withdrawal Volume (litres) and Annual Withdrawal Volume shall adhere to the limits shown in Table 2, Approved Withdrawals in the Appendix.

c. Withdrawal Flow Monitoring

i. A flow meter shall be installed, maintained and monitored separately for each individual production well.

ii. The Approval Holder shall keep daily well production records for each well and the total for the wellfield including water withdrawal volumes. Data shall be tabulated within a spreadsheet and compared to approved limits.

d. Water Level Monitoring

i. A level logger shall be installed and maintained in each production well and monitoring well. Water levels shall be monitored continuously via leveloggers and validated with manual measurements every year.

ii. Water level data shall be recorded in meter as a geodetic elevation and reference to meter above sea water level, and tabulated in a spreadsheet.

e. Water Quality Sampling:

i. Raw water sample shall be collected for each production well (PW2, PW3, and PW4) and for mixed raw water for analyzing uranium on a monthly basis.

ii. Water quality analytical results including historical water chemistry results

shall be tabulated in spreadsheet format and compared to applicable guidelines. Data shall be presented to easily identify changes/trends in water quality.

f. Well Decommissioning

i. Any well located at the Site that is required to be decommissioned by the Minister or that is not being used or maintained for present or future use shall be decommissioned in accordance with the Well Construction Regulations and Water Well Decommissioning Guidelines. This condition survives the expiry or cancellation of this Approval.

g. Well Interference Remedy

i. In the event that groundwater withdrawal causes interference (water quality and water quantity) with other water supplies, the Department shall be notified immediately, and the water withdrawal rate shall be reduced and/or the problem rectified by the Approval Holder in accordance with an action plan acceptable to the Department.

h. Monitoring Records:

i. The Approval Holder shall maintain the following monitoring records, as a minimum:

(a) water withdrawal rates for each well and for the wellfield in comparison to approved limits, including:

(1) daily pumping rate (litre/day)
(2) average(30-day) pumping rate (litre/day)
(3) maximum daily withdrawal volume for each month (liter/day)
(4) 30-day withdrawal volume(litre) and
(5) annual withdrawal volume (litre).

(b) current and historical water chemistry results;

(c) current and historical uranium concentrations;

(d) current and historical water levels;

(e) potential hazards or changes to the water supply (e.g., nearby land development, new wells or pumps installed, wells abandoned, contaminant spills);

(f) complaints received regarding water withdrawal activities and the follow up actions taken;

(g) reported effects of the withdrawal on other groundwater users and/or the environment.

ii. Monitoring data referenced above including water chemistry shall be maintained in tabular (in a spreadsheet format) and in paper.

iii. The monitoring records shall be maintained by the Approval Holder for the duration of the Approval.

iv. All the monitoring data shall be available, in a format and timeframe acceptable to the Department, for review at any time upon request by the Department.

i. Reporting

i. The Approval Holder shall prepare an annual report in a format acceptable to the Department, and submit the annual report to the Department by February 1st following the completion of the calendar year being reported.

ii. The annual report shall include at least a summary of the above monitoring records (6.h.i), a comparison of the monitoring results to the Approval requirements, an evaluation of whether the results are in compliance with Approval conditions, an overall assessment of the wellfield performance (water levels and water chemistry), and recommendations to improve the water monitoring program based on the wellfield operation.

iii. The Approval Holder may be requested by the Department to retain the services of a Professional Hydrogeologist licenced to practice in Nova Scotia to prepare, analyse, or comment on the well field report(s).

Appendix to the Water Approval for Groundwater Withdrawal for Municipality of the County of Annapolis at Bridgetown site, Annapolis County

Table 1 - Well Construction Information

Civic Address: 308 Church Street; 507 Church Street,
Community: Bridgetown North, Annapolis County, NS
PID: 05142039, 05141973

Production Well	NSE Well Log Number	Well UTM Coordinates		Well Total Depth (m)	Casing Depth (m)	Diameter (mm)	Screen Description[3]
		Easting	Northing				
PW1	071319	318864	4969098	103.6	97.5	254	bedrock: 10.7m; screen(4X5feet) 54.86-56.39m, 73.15-74.68m, 91.44-92.96m, 103.63-105.16m
PW2	071326	318783	4969291	106.7	100.6	254	Bedrock:10.7m; screen(4X5feet) 51.82-53.34m, 76.2-77.72m, 88.39- 89.92m
PW3	090945	318843	4969033	121.9	21.3	203	bedrock: 9.1m screen:21.34-121.9m
PW4		318104	4970229	57.6	12.2	203	bedrock: 6m; screen12.2-57.6m
Monitoring Well							
TW4		318826	4968955	122	12.2	152	bedrock:8m;openhole
TW5		318130	4970238	60(91.5)	12.2	152	open borehole
MW09-01	090982	318612	4969326	60.9	12.2	152	open borehole
MW17-01S		318061	4970377	6.1	3.1	51	
MW17-01D		318065	4970378	12.2	9.2	51	

Notes: TW4: GPS coordinates are given based on google earth;
TW5: initial depth of 91.5m and backfilled to 60m; and
PW1: use of PW1 was discontinued in 2018 and is designated a back-up well/monitoring well.

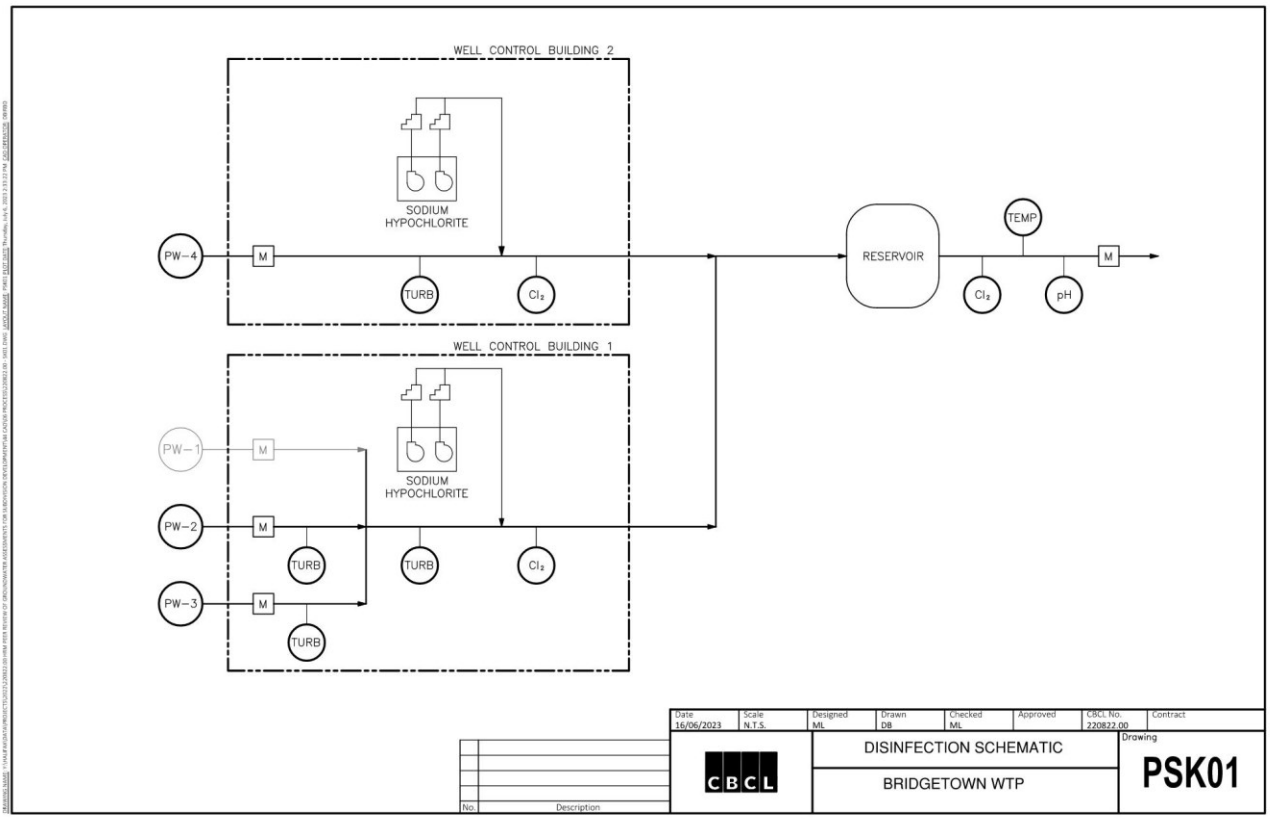
Table 2 - Approved Withdrawals				
Production Well	Pumping Rate (litre/day)		Withdrawal Volume (litre)	
	Average[1] (over 30 days)	Maximum[2] (Over 3 days)	30 day [3]	Annual[4]
PW1	0	0	0	0
PW2	573,235	716,531	17,197,050	209,520,775
PW3	583,708	728,760	17,511,240	213,343,420
PW4	654,637	981,956	19,639,110	238,942,505
Total Wellfield	**1,000,000**	**1,300,000**	**30,000,000**	**365,000,000**

Notes:

1. Average allowable pumping rate is based on the demonstrated water needs of the facility and the sustainable yield;
2. Maximum allowable pumping rate is based on the maximum rate used in the pumping test. Pump rate shall at no time exceed the maximum based on actual rate averaged after 3 days;
3. 30-day withdrawal volume equals approved average pumping rate multiplied by 30 days;
4. Annual withdrawal volume equals approved average pumping rate multiplied by 365 days; and
5. Use of PW1 was discontinued in 2018; PW1 is designated a back-up well/monitoring well.

APPENDIX I

Schematic of the Treatment & Disinfection Process


WELL CONTROL BUILDING 2
SODIUM HYPOCHLORITE
PW-4
M
TURB
Cl2
RESERVOIR
TEMP
Cl2
pH
M
WELL CONTROL BUILDING 1
SODIUM HYPOCHLORITE
PW-1
PW-2
PW-3
M
TURB
Cl2
Date 16/06/2023
Scale N.T.S.
Designed ML
Drawn DB
Checked ML
Approved
CBCL No. 220822.00
Contract
Drawing
DISINFECTION SCHEMATIC
BRIDGETOWN WTP
PSK01
No.
Description

APPENDIX J

Water Protection Zone Mapping in GIS Format for NSECC

To be provided separately.

APPENDIX K

Terms of Reference Checklist

Nova Scotia Environment & Climate Change

System Assessment Report
Terms of Reference Checklist

NOVA SCOTIA

PART I
Introduction

This checklist was prepared as a companion document to the Terms of Reference for System Assessment Reports for Municipal Drinking Water Systems, 2022. For detailed information on each of the submission requirements below, please consult the source document. For ease of reference, reports should follow the format and sequence of the checklist below. Where possible, section references should follow section and sub-section numbering conventions used in the checklist.

Where data is required to be submitted for "the most recent calendar year", Approval Holders may submit 12 consecutive months of data within a 2-year period from the date the system assessment report is due.

PART II
Characterization of the Water Source

2.0 Source Water Characterization

Confirm all applicable information has been submitted to the Department. Indicate the section and page number where the information is documented.	Yes	N/A	Section	Page #
2.1 Source Description and Schematic*				
i. Describe the water source(s) used to meet water consumption demand.	☑	☐	2.1	3
ii. Describe any sources that are used as back-up supplies.	☐	☑		
iii. Identify sources on a map.	☑	☐	App. C	
iv. Document what precautions are required for back-up supplies.	☐	☑		
v. If a back-up supply is intended to be used without precautions, verify that it meets the Nova Scotia Treatment Standards for Municipal Drinking Water Systems or if the back-up supply is connected to an adjoining municipality, document the name of the Municipal Public Drinking Water Supply to which it is connected.	☐	☑		
vi. For Municipal Public Drinking Water Supplies that purchase water from an adjoining system, identify system connections on a map.	☐	☑		
vii. Document the name of the municipal public drinking water supply(s) that water is purchased from and proceed to section 2.3.	☐	☑		

Confirm all applicable information has been submitted to the Department. Indicate the section and page number where the information is documented.	Yes	N/A	Section	Page #
2.2 Microbial Risks				
2.2.1 Surface Water Sources				
i. Summarize microbial risks and water quality variability of the surface water source(s).	☐	☑		
ii. Submit raw water quality data for total coliforms and E. coli, as well as Cryptosporidium and Giardia if available, for the most recent calendar year as an Appendix.	☐	☑		
2.2.2 Groundwater Sources				
i. Verify that all individual wells have been classified in accordance with the Protocol for Determining Groundwater Under the Direct Influence of Surface Water.	☑	☐	2.2.2	6
ii. Summarize the GUDI status by individual well and identify at which step in the GUDI Protocol the well was categorized as GUDI or non-GUDI.	☑	☐	2.2.2	6
iii. For wells that are no longer in use, identify if the well has been properly decommissioned or is being maintained as a back-up well or monitoring well.	☑	☐	2.2.2	6
iv. For GUDI wells, complete Table A.1 and verify that the GUDI classification has not changed based on the results of microscopic particulate analysis (MPA) testing required every two years.	☐	☑		
v. Verify that MPA samples were taken following a rainfall event in accordance with Step 3 of the GUDI Protocol (e.g., if there is a 15-day time-of-travel, then the well shall be sampled 15 days after a surface water event).	☐	☑		
vi. Inspect the site(s) to verify that there are no changes to the surrounding area to warrant re-classification of the well(s).	☑	☐	2.2.2	6

Confirm all applicable information has been submitted to the Department. Indicate the section and page number where the information is documented.	Yes	N/A	Section	Page #
vii. Recommend corrective action for wells: • For which MPA test results indicate a change in GUDI classification. • Where changes to the surrounding area have occurred to warrant re-classification of the well per the GUDI Protocol. • Where any other concerns are identified.	☐	☑		
viii. Submit raw water quality data for total coliforms and E. coli bacteria for the most recent calendar year as an Appendix.	☐	☑		
ix. For GUDI wells, submit any raw water quality data for Cryptosporidium or Giardia (if available) for the most recent calendar year as an Appendix.	☐	☑		

Confirm all applicable information has been submitted to the Department. Indicate the section and page number where the information is documented.	Yes	N/A	Section	Page #
2.3 Chemical Risks				
2.3.1 Disinfection By-Products				
a) Trihalomethanes (THMs)				
i. Complete Table A.2 to summarize quarterly THM concentrations by sampling location.	☑	☐	App.A	
ii. For non-GUDI systems that have had quarterly sampling reduced to annual sampling: • Note the acceptance date for this reduction in sampling frequency. • Modify Table A.2 to summarize annual results, including sampling date.	☐	☑		
iii. If the locational running annual average for any sampling location exceeds the maximum acceptable concentration, recommend corrective actions.	☐	☑		
iv. Verify that sampling locations are appropriate as follows: • Are samples collected at the point(s) in the distribution system with the highest potential THM concentrations? • Are an adequate number of sites sampled to represent exposure levels system-wide?	☑	☐	App.A	
v. Identify THM sampling locations on a map of the distribution system.	☑	☐	App. C	
vi. Recommend sampling location/frequency changes if necessary.	☐	☑		
b) Haloacetic Acids (HAA5)				

Confirm all applicable information has been submitted to the Department. Indicate the section and page number where the information is documented.	Yes	N/A	Section	Page #
i. Complete Table A.3 to summarize HAA5 concentrations by sampling location.	☑	☐	App. A	
ii. For non-GUDI systems that have had quarterly sampling reduced to annual sampling: • Note the acceptance date for this reduction in sampling frequency. • Modify Table A.3 to summarize annual results, including sampling date.	☐	☑		
iii. If the locational running annual average for any sampling location exceeds the maximum acceptable concentration, recommend corrective actions.	☐	☑		
iv. Verify that sampling locations are appropriate as follows: • Are samples collected at the location(s) where historical data show the highest HAA5 concentrations? If historical data are not available, are HAA5 concentrations monitored in the middle and extremities of the distribution system to determine the highest concentrations? • Are samples collected in areas where disinfectant residuals are significantly lower than the system average because of long residence time? • In systems with booster chlorination stations and water tanks/reservoirs, are HAA5 concentrations monitored downstream of these components? • Are an adequate number of sites sampled to represent system-wide exposure levels?	☑	☐	App A	
v. Identify HAA5 sampling locations on a map of the distribution system.	☑	☐	App C	
vi. Recommend sampling location/ frequency changes if necessary.	☐	☑		

Confirm all applicable information has been submitted to the Department. Indicate the section and page number where the information is documented.	Yes	N/A	Section	Page #
c) Other Disinfection By-Products (DBPs)				
i. Identify which other DBPs are required to be monitored and compare this to existing monitoring (see Table 1 in the Terms of Reference).	☐	☑		
ii. Verify that sampling locations are appropriate.	☐	☑		
iii. Identify sampling locations on a map of the distribution system.	☐	☑		
iv. Recommend sampling location/frequency changes if necessary.	☐	☑		
v. Summarize concentrations for the most recent calendar year as an Appendix.	☐	☑		
vi. Recommend corrective actions if any maximum acceptable concentration is exceeded.	☐	☑		
2.3.2 Lead and Corrosion Control				
a) Lead and Copper				

Confirm all applicable information has been submitted to the Department. Indicate the section and page number where the information is documented.	Yes	N/A	Section	Page #
i. Verify that sampling locations and frequencies for lead are appropriate as follows: • Does the residential sampling program meet the minimum requirements as outlined in the Lead and Copper Management Requirements – Municipal Public Drinking Water Supplies or as otherwise accepted by the Department? • Are residences suspected to be at the highest risk for lead targeted in the residential sampling program?	☑	☐	2.3.2	8
ii. Recommend sampling location/ frequency changes if necessary.	☑	☐	2.3.2	9
iii. Summarize and append lead and copper concentrations by sampling location and sample protocol used for the most recent calendar year.	☑	☐	2.3.2	9
iv. Summarize corrective actions taken when residential sample results exceeded the maximum acceptable concentration, as outlined in the Lead and Copper Management Requirements – Municipal Public Drinking Water Supplies. • Are the corrective actions taken in line with the minimum requirements outlined in the Lead and Copper Management Requirements – Municipal Public Drinking Water Supplies or as otherwise accepted by the Department?	☑	☐	2.3.2	9
v. Recommend program improvements, where applicable.	☑	☐	2.3.2	9
b) Corrosion Control				
i. Review the corrosion control program: • Does one exist?	☑	☐	2.3.2.2	10
• Does it include the minimum monitoring requirements as outlined in the Guidelines for Monitoring Public Drinking Water Supplies – Part 1?	☑	☐	2.3.2.2	10

Confirm all applicable information has been submitted to the Department. Indicate the section and page number where the information is documented.	Yes	N/A	Section	Page #
• Does it include action limits for the corrosion monitoring parameters that trigger follow-up?	☑	☐	2.3.2.2	10
ii. Summarize the water quality results of the corrosion control program for the most recent calendar year as an Appendix.	☐	☑		
iii. Recommend corrective actions if concerns are identified from the review of the corrosion control program.	☑	☐	2.3.2.2	10
iv. If a corrosion control program does not exist, document why, including water quality results that demonstrate non-corrosivity of the water, or recommend the need for a more comprehensive corrosion control program. Note: The Langelier Index is no longer considered an adequate measure of corrosivity. The submission of water quality results based solely on a positive Langelier Index will not be accepted as justification for not having a corrosion control program. Note: The Engineer is not required to develop a corrosion control program as part of the System Assessment Report.	☑	☐	2.3.2.2	10
2.3.3 Guidelines for Canadian Drinking Water Quality* *Municipalities that only distribute water purchased from another Municipal Public Drinking Water Supply may obtain water quality results from the Approval Holder of the Municipal Public Drinking Water Supply that treats the water.				
i. Verify that the full suite of health-related parameters (see Table A.4 in the Terms of Reference) has been analyzed a minimum of once every five years for all raw water sources and treated water and document sampling dates.	☑	☐	2.3.3	11
ii. Review the data to: • Verify that sampling locations and frequencies are appropriate for cyanobacterial toxins and pesticides. • Identify if any maximum acceptable concentrations (MACs) have been exceeded. • Identify parameters with detectable concentrations.	☑	☐	2.3.3	11

Confirm all applicable information has been submitted to the Department. Indicate the section and page number where the information is documented.	Yes	N/A	Section	Page #
iii. Discuss any trends for parameters with detectable concentrations.	☐	☑		
iv. Include laboratory results from the last round of sampling as an Appendix.	☑	☐	App. E	
v. Identify when the next round of sampling is scheduled to occur.	☑	☐	2.3.3	11
vi. Recommend corrective actions if any MACs are exceeded.	☐	☑		
vii. Recommend any changes to the monitoring program (frequency/location) if sampling is inappropriate for cyanobacterial toxins, pesticides or other parameters with enhanced monitoring that was recommended for parameters with detectable concentrations.	☐	☑		
2.3.4 Guidelines for Monitoring Public Drinking Water Supplies				
i. Verify that the parameters in the Guidelines for Monitoring Public Drinking Water Supplies (see Table A.5) have been analyzed as required in all raw water sources and treated water and document the sampling dates.	☑	☐	2.3.4	11
ii. Review the data to: • Verify that sampling locations and frequencies are appropriate. • Identify if any maximum acceptable concentrations (MACs) have been exceeded. • Identify any aesthetic parameters that may compromise disinfection or other critical processes.	☑	☐	2.3.4	11
iii. Discuss any water quality trends.	☐	☐		

Confirm all applicable information has been submitted to the Department. Indicate the section and page number where the information is documented.	Yes	N/A	Section	Page #
iv. Include laboratory results from the last round of sampling as an Appendix.	☑	☐	2.3.4	11
v. Identify when the next round of sampling is scheduled to occur.	☑	☐	2.3.4	11
vi. If any MACs are exceeded, recommend corrective actions.	☐	☑		
vii. Recommend any changes to the monitoring program, sampling location/ frequencies if necessary.	☐	☑		
2.3.5 Source Water Protection Plan Monitoring* *This section is not applicable for municipalities that only distribute water purchased from another Municipal Public Drinking Water Supply.				
i. For Approval Holders monitoring any other chemical parameters for source water protection purposes, summarize the parameters, their sampling frequency, and their measured concentrations.	☑	☐	2.3.5	12
ii. Recommend corrective actions if concentrations are detectable or increasing.	☑	☐	2.3.5	12
iii. Review the source water protection plan monitoring program: • Does one exist? • Does it include monitoring of parameters that provide the information that is needed to evaluate the effectiveness of the source water protection plan?	☑	☐	2.3.5	12

Confirm all applicable information has been submitted to the Department. Indicate the section and page number where the information is documented.	Yes	N/A	Section	Page #
2.3.6 Cyanobacteria* *This section is only applicable to surface water sources.				
i. Identify whether the source of supply has been impacted by cyanobacterial blooms.	☐	☑		
ii. Summarize and append any results for cyanobacterial blooms through visual observation and/or confirmation from laboratory results including dates.	☐	☑		
iii. Discuss any corrective actions taken when cyanobacteria have been detected in the source water.	☐	☑		
iv. Discuss the treatment capability of the facility to remove microcystin toxins and identify any vulnerabilities.	☐	☑		
v. Provide recommendations if necessary.	☐	☑		

Confirm all applicable information has been submitted to the Department. Indicate the section and page number where the information is documented.	Yes	N/A	Section	Page #
2.4 Filter Backwash Water* *Not applicable for municipalities that only distribute water purchased from another Municipal Public Drinking Water Supply				
i. Document the impact on the raw water source if water from the filter backwash treatment system is discharged upstream of the raw water intake.	☐	☑		
ii. Provide recommendations if this discharge impacts the source.	☐	☑		
2.5 Source Quantity* *Not applicable for municipalities that only distribute water purchased from another Municipal Public Drinking Water Supply				
i. Compile existing Water Withdrawal Approvals and include copies of these as an Appendix.	☑	☐	2.5	13
ii. Complete Table A.6.a and A.6.b to compare water withdrawals to approved limits.	☑	☐	App. A	
iii. Recommend corrective actions, including water conservation measures, if water withdrawals are greater than approved limits.	☑	☐	2.5	13
iv. Recommend corrective actions if water withdrawals are approaching approved limits and growth is forecast to increase withdrawals beyond approved limits.	☑	☐	2.5	13

Confirm all applicable information has been submitted to the Department. Indicate the section and page number where the information is documented.	Yes	N/A	Section	Page #
2.6 Source Water Protection Plan* *Not applicable for municipalities that only distribute water purchased from another Municipal Public Drinking Water Supply.				
i. Identify the source water protection zone(s) on a map.	☑	☐	2.6	14
ii. Submit the source water protection zone(s) in GIS format to the Department. If zones are not available in GIS format, contact the Watershed Planner for your supply.	☐	☑		
iii. Summarize the status of the source water protection plan and implementation schedule.	☑	☐	2.6	14
iv. Document the dates of the last two SWPP meetings.	☐	☑		
v. Note the status of meeting actions and/or SWPP deliverables.	☑	☐	2.6	14
vi. Make recommendations to address any concerns identified by the advisory committee or the source water protection planning process.	☑	☐	2.6	14
2.7 Conclusions and Recommendations				
i. Refer to the Terms of Reference.	☑	☐	2.7	

PART III
Treatment Processes, Facilities and Equipment

3.0 Evaluation of Treatment Processes, Facilities and Equipment

Confirm all applicable information has been submitted to the Department. Indicate the section and page number where the information is documented.	Yes	N/A	Section	Page #
3.1 Treatment Processes				
i. Compile existing Approval(s) to Operate and include copies of these as an Appendix. For Approval Holders that only distribute water purchased from another Municipal Public Drinking Water Supply, document the name of the treatment facility, and proceed to section 3.2.	☑	☐	App. G	
3.1.1 Treatment Process Schematic				
i. Provide a schematic of the treatment process from the source to treated water entering the distribution system.	☑	☐	3.1	19
3.1.2 Turbidity Levels and Associated Criteria				
a) Surface Water				
i. Verify that filtration technologies are meeting specified turbidity limits to receive the assigned log removal credits outlined in Table C2 of the Nova Scotia Treatment Standards for Municipal Drinking Water Systems by either Option 1 or Option 2.	☐	☑		
ii. Submit individual filter effluent turbidity values for the most recent calendar year by month (Option 1) or by the time interval graphed (Option 2).	☐	☑		
iii. Recommend corrective actions if the supply does not meet stipulated turbidity limits.	☐	☑		

Confirm all applicable information has been submitted to the Department. Indicate the section and page number where the information is documented.	Yes	N/A	Section	Page #
iv. For Municipal Public Drinking Water Supplies with cartridge filters assigned log reduction credits for protozoa, provide the highest recorded individual filter differential pressure reading for each month of the most recent calendar year.	☐	☑		
v. Review the standard operating procedures (SOPs) for the filtration process: • Have control limits been set to alarm and notify operators of issues related to the filtration process? • Have procedures been developed to remove a filter or membrane unit from service before turbidity or differential pressure (i.e., for cartridge filters assigned log reduction credits) exceeds stipulated values? • Have procedures been implemented and communicated to all operations staff? • Have procedures been documented in the operations manual?	☐	☑		
vi. Inspect the filtration process to verify that continuous on-line turbidity measurements are taken and recorded for each individual filter at a minimum of once every five minutes.	☐	☑		

Confirm all applicable information has been submitted to the Department. Indicate the section and page number where the information is documented.	Yes	N/A	Section	Page #
vii. Inspect the on-line turbidimeters: • Do they have the required range and accuracy to measure turbidity levels? • Are they in good working order? • Do they have a maintenance and quality assurance/calibration program?	☐	☑		
viii. Inspect the filtration process to verify that there are a minimum of two filters.	☐	☑		
ix. Document if the maximum day flow can be met with the largest filter out of service. Note: If the facility is unable to meet maximum day flows with the largest filter out of service, improvements to meet the Treatment Standards may be deferred to a future expansion provided SOPs are in place to minimize filter rate changes and spikes in turbidity which can result in filter breakthrough.	☐	☑		
x. Make recommendations to address any concerns identified by the review of the filtration SOPs, inspection of on-line turbidimeters, and filter redundancy.	☐	☑		

Confirm all applicable information has been submitted to the Department. Indicate the section and page number where the information is documented.	Yes	N/A	Section	Page #
b) GUDI Wells				
i. Verify that natural filtration is achieving specified turbidity limits to receive the assigned log removal credits outlined in Table C2 of the Nova Scotia Treatment Standards for Municipal Drinking Water Systems by either Option 1 or Option 2.	☐	☑		
ii. Submit individual GUDI well turbidity values for the most recent calendar year by month (Option 1) or by the time interval graphed (Option 2).	☐	☑		
iii. For GUDI wells that do not meet stipulated turbidity limits, contact the Department to determine what requirements shall apply.	☐	☑		
iv. Inspect the site(s) to verify that continuous on-line turbidity measurements are taken for each individual GUDI wellhead at a minimum of once every five minutes.	☐	☑		
v. Inspect the on-line turbidimeters: • Do they have the required range and accuracy to measure turbidity levels? • Are they in good working order? • Do they have a maintenance and quality assurance/calibration program?	☐	☑		
vi. Make recommendations to address any concerns identified by the inspection of the on-line turbidimeters.	☐	☑		

Confirm all applicable information has been submitted to the Department. Indicate the section and page number where the information is documented.		Yes	N/A	Section	Page #
c) Non-GUDI Wells					
i.	Summarize turbidity levels in non-GUDI wells by either Option 1 or Option 2.	☑	☐	3.1.2.3	21
ii.	Note if measurements are by daily grab samples or continuous on-line turbidimeters.	☑	☐	3.1.2.3	21
iii.	Submit non-GUDI system turbidity for individual wells or combined flow for the most recent calendar year by month (Option 1) or by the time interval graphed (Option 2).	☑	☐	3.1.2.3	21
iv.	For non-GUDI wells that do not meet stipulated turbidity limits, contact the Department to determine what requirements shall apply.	☐	☑		
v.	Where continuous measurements are taken, inspect the on-line turbidimeters: • Do they have the required range and accuracy to measure turbidity levels? • Are they in good working order? • Do they have a maintenance and quality assurance/calibration program?	☑	☐	3.1.2.4	22
vi.	Where grab samples are taken, inspect the monitoring equipment, SOPs, maintenance, and quality assurance/calibration program to ensure equipment is in good working order and measurements are appropriate.	☐	☑		
vii.	Make recommendations to address any concerns identified by the inspection of on-line turbidimeters or grab sample protocols.	☑	☐	3.1.2.4	22

Confirm all applicable information has been submitted to the Department. Indicate the section and page number where the information is documented.	Yes	N/A	Section	Page #
3.1.3 Membrane Filtration – Additional Requirements				
i. Complete Table B.1 to verify that each individual membrane treatment unit that is used for pathogen reduction credits is free of any integrity breaches and determine its log removal value using pressure-based testing.	☐	☑		
ii. Make recommendations to address any concerns identified.	☐	☑		
iii. For Municipal Public Drinking Water Supplies with integrated membrane systems, summarize the process used to verify the rejection rate remains adequate for organics removal.	☐	☑		
iv. Make recommendations to address any concerns identified.	☐	☑		
3.1.4 Primary Disinfection				
i. Document how many inactivation log credits are required by the disinfection process for each target microorganism (e.g., protozoa and/or viruses).	☑	☐	3.1.4	23
ii. Discuss how disinfection is achieved (e.g., chemical disinfectants, UV or both).	☑	☐	3.1.4.1	23

Confirm all applicable information has been submitted to the Department. Indicate the section and page number where the information is documented.	Yes	N/A	Section	Page #
a) Chemical Disinfection (CT Concept)				
i. Where chemical disinfectants are used, provide a schematic of the primary disinfection process including, but not limited to: • Tank(s) dimensions. • Baffling configuration and assumed baffling factor. • Water level operating range, highlighting the low level. • Disinfection type (e.g., free chlorine, chlorine dioxide, ozone). • Minimum disinfectant concentration at the CT control point. • Minimum water temperature. • Maximum pH of the water for free chlorine or optimum pH for chlorine dioxide or ozone. • Maximum flow and minimum retention time - if the tank used to achieve CT is subject to water level fluctuations, verify if the inflow/outflow represents the maximum flow condition.	☑	☐	3.1.4.1	24
ii. Calculate the design CT.	☑	☐	3.1.4.1	24
iii. Verify that operational conditions remained within the design range for achieving CT at all times during the most recent calendar year.	☑	☐	3.1.4.1	24
iv. Where operational conditions went outside the design range, identify the cause, document the corrective actions taken and verify that CT was calculated during every such event.	☐	☑		
v. Make recommendations to address any concerns identified.	☐	☑		
b) UV Disinfection (IT Concept)				

Confirm all applicable information has been submitted to the Department. Indicate the section and page number where the information is documented.	Yes	N/A	Section	Page #
i. Where UV disinfection is used, provide a schematic of the primary disinfection process including, but not limited to: • Unit manufacturer and model. • Validation standard. • Maximum flow. • Minimum intensity at the end of lamp life. • Minimum transmittance at the end of lamp life. • Correction for water temperature. • Maximum concentrations for water quality parameters that promote fouling (e.g., iron, manganese, hardness). • Sleeve cleaning method.	☐	☑		
ii. Verify that the unit has been designed to deliver a UV dose of 40 mJ/cm^2 or Department accepted alternate dose. Specify the alternate dose, if applicable.	☐	☑		

Confirm all applicable information has been submitted to the Department. Indicate the section and page number where the information is documented.	Yes	N/A	Section	Page #
iii. Verify that the following conditions were met at all times during the most recent calendar year: • Was the intensity above the minimum required? • Was the flow below the maximum allowed? • Was the transmittance above the minimum required?	☐	☑		
iv. Where operational conditions went outside the design range, identify the cause, document the corrective actions taken and verify that IT was calculated during every such event.	☐	☑		
v. Provide recommendations to address any concerns identified.	☐	☑		
c) Redundancy, Continuous Monitoring and Alerting				
i. Inspect the primary disinfection process to verify the following: • Are there a minimum of two primary disinfection units? • Are the primary disinfection units sized to meet maximum day demand with one unit out of service? • Is on-line monitoring of the primary disinfection process in place with measurements taken and recorded at least once every five minutes? • Have control limits been set to alarm and notify operators that the primary disinfection process is not working properly? • Are protocols in place to prevent inadequately disinfected water from entering the distribution system?	☑	☐	3.1.4.3	25
ii. Inspect the on-line instrumentation: • Do they have the required range and accuracy to measure chlorine concentrations?	☑	☐	3.1.4.3	25

Confirm all applicable information has been submitted to the Department. Indicate the section and page number where the information is documented.	Yes	N/A	Section	Page #
• Are they in good working order? • Do they have a maintenance and quality assurance/calibration program?				
iii. Provide recommendations to address any concerns identified.	☐	☑		
d) Standard Operating Procedures				
i. Review the standard operating procedures for the disinfection process: • Do they specify the design ranges for achieving CT (e.g., temperature, disinfectant residual, flow, pH) or IT (e.g., intensity, flow, transmittance)? • Do they include notification and response procedures when operational conditions are outside CT or IT design ranges? • Do they include procedures to ensure the disinfection process is working properly? • Do they include response procedures when the disinfection process is not working properly? • Have they been implemented and communicated to all operations staff? • Have they been documented in the operations manual?	☐	☑		
ii. Provide recommendations to address any concerns identified.	☑	☐	3.1.4.4	25
3.1.5 Secondary Disinfection				
i. Describe the secondary disinfection process.	☑	☐	3.1.5	25
ii. Inspect the secondary disinfection process to verify the following:	☑	☐	3.1.5	25

Confirm all applicable information has been submitted to the Department. Indicate the section and page number where the information is documented.	Yes	N/A	Section	Page #
• Are on-line continuous chlorine residual monitors in place to measure chlorine residual entering the distribution system at least once every five minutes? • Are the on-line chlorine residual monitors in good working order? • Is there a maintenance and quality assurance/calibration program in place?				
iii. Where free chlorine is used for both primary and secondary disinfection, refer to Section 3.1.4 and note if the chlorine dose is controlled by CT (primary disinfection) or distribution system residual maintenance (secondary disinfection).	☑	☐	3.1.5	25
iv. Where UV light is used for primary disinfection to receive protozoa inactivation credits, calculate the design CT for virus inactivation credits.	☐	☑		
v. Where UV light is used for primary disinfection to receive protozoa inactivation credits, verify that operational conditions remained within the design range for achieving CT for virus inactivation at all times during the most recent calendar year.	☐	☑		

Confirm all applicable information has been submitted to the Department. Indicate the section and page number where the information is documented.	Yes	N/A	Section	Page #
vi. Where operational conditions went outside the design range, identify the cause, document the corrective actions taken and verify that CT was calculated during every such event.	☐	☑		
vii. Provide recommendations to address any concerns identified.	☐	☑		
3.1.6 Other Critical Processes				
i. Evaluate and inspect other critical processes against established standards and guidelines.	☐	☑		
ii. Recommend corrective actions where necessary.	☐	☑		
3.1.7 Waste Streams				
a) Filter-to-Waste				
i. Describe the filter-to-waste process.	☐	☑		
ii. For chemically assisted filtration, verify that turbidity is less than or equal to 0.2 NTU before returning a filter to service.	☐	☑		
iii. Identify recommendations, if necessary, to meet the Nova Scotia Treatment Standards for Municipal Drinking Water Systems.	☐	☑		
b) Filter Backwash Water – Discharge Into A Freshwater Watercourse				
i. Summarize treatment of the filter backwash water, if applicable, and identify the watercourse it is discharging into.	☐	☑		
ii. Identify any discharge criteria specified in the Approval to Operate.	☐	☑		

Confirm all applicable information has been submitted to the Department. Indicate the section and page number where the information is documented.	Yes	N/A	Section	Page #
iii. Complete Table B.2. • Does sampling meet the minimum requirements as outlined in the Nova Scotia Treatment Standards for Municipal Drinking Water Systems? • Does effluent quality meet the discharge criteria stipulated in the Approval to Operate?	☑	☐	App A	
iv. If the water quality does not meet the discharge criteria stipulated in the Approval to Operate or if there are no discharge criteria stipulated in the Approval to Operate, identify recommendations to meet the requirements specified in Part V – Management of Waste Streams of the Nova Scotia Treatment Standards for Municipal Drinking Water Systems.	☐	☑		
v. Recommend corrective actions where necessary to address any concerns identified.	☐	☑		

Confirm all applicable information has been submitted to the Department. Indicate the section and page number where the information is documented.		Yes	N/A	Section	Page #
c) Filter Backwash Water – Discharge To Land Or Soil					
i.	Summarize treatment of the filter backwash water, if applicable, and identify the location of discharge.	☐	☑		
ii.	Identify whether the municipal public drinking water supply has a Discharge Management Plan in accordance with Part V – Management of Waste Streams of the Nova Scotia Treatment Standards for Municipal Drinking Water Systems, as amended from time to time.	☐	☑		
iii.	Identify the effluent discharge criteria specified in the Approval to Operate, or the Department accepted Discharge Management Plan.	☐	☑		
iv.	Complete Table B.3. • Does effluent quality meet the discharge criteria stipulated in the Approval to Operate, or the Department accepted Discharge Management Plan?	☐	☑		
v.	If the water quality does not meet the discharge criteria stipulated in the Approval to Operate, or the Department accepted Discharge Management Plan, identify recommendations to meet the minimum requirements for a plan specified in Part V – Management of Waste Streams of the Nova Scotia Treatment Standards for Municipal Drinking Water Systems, as amended from time to time.	☐	☑		
vi.	Identify operational, maintenance, and monitoring procedures in the Discharge Management Plan that do not meet the minimum requirements for a plan as specified in Part V – Management of Waste Streams of the Nova Scotia Treatment Standards for Municipal Drinking Water Systems, as amended from time to time.	☐	☑		
vii.	Recommend corrective actions where necessary to address any concerns identified.	☐	☑		

Confirm all applicable information has been submitted to the Department. Indicate the section and page number where the information is documented.	Yes	N/A	Section	Page #
d) Filter Backwash Water – Discharge To A Marine Or Brackish Environment				
i. Summarize treatment of the filter backwash water, if applicable, and identify the watercourse it is discharging into.	☐	☑		
ii. Identify any discharge criteria specified in the Approval to Operate.	☐	☑		
iii. Complete Table B.4. • Does effluent quality meet the discharge criteria stipulated in the Approval to Operate?	☐	☑		
iv. Recommend corrective actions where necessary to address any concerns identified.	☐	☑		
e) Other Waste Streams				
i. Review other waste streams and verify that they are being managed appropriately.	☐	☑		
ii. Provide recommendations to address any concerns identified.	☐	☑		

Confirm all applicable information has been submitted to the Department. Indicate the section and page number where the information is documented.	Yes	N/A	Section	Page #
3.2 Distribution Water Quality				
3.2.1 Chlorine Residual Levels				
i. Review distribution system chlorine residuals for the most recent calendar year available.	☑	☐	3.2.1	26
ii. Recommend corrective actions where residuals are routinely less than 0.20 mg/L or 0.40 mg/L (depending on the concentration specified in the Municipal Public Drinking Water Supply's Approval to Operate) where free chlorine is used (or less than 1.0 mg/L combined chlorine for chloraminated systems).	☑	☐	3.2.1	26
iii. Inspect all distribution water storage tanks to verify that on-line continuous chlorine residual monitors are in place to measure chlorine residual at the storage tank outlet at least once every five minutes.	☑	☐	3.2.1	26
iv. Inspect the on-line chlorine residual monitors to ensure that they are in good working order and that a maintenance and quality assurance/calibration program is in place.	☑	☐	3.2.1	26
v. Recommend corrective actions where necessary.	☑	☐	3.2.1	26

Confirm all applicable information has been submitted to the Department. Indicate the section and page number where the information is documented.	Yes	N/A	Section	Page #
3.2.2 Microbiological Water Quality				
i. Review total coliforms and E. coli results for the most recent calendar year available.	☑	☐	3.2.2	26
ii. Discuss any presence of bacteria in the distribution system and identify recommendations where necessary.	☐	☑		
iii. Verify that sampling locations and frequencies meet the requirements of the Guidelines for Monitoring Public Drinking Water Supplies Part I, including any re-sampling required after the presence of bacteria is detected.	☑	☐	3.2.2	26
iv. Identify sampling locations on a map of the distribution system.	☑	☐	App C	
v. Recommend sampling location/frequency changes if necessary.	☐	☑		

Confirm all applicable information has been submitted to the Department. Indicate the section and page number where the information is documented.	Yes	N/A	Section	Page #
3.2.3 Turbidity				
i. Review distribution system turbidity results for the most recent calendar year available.	☑	☐	3.2.3	27
ii. Verify that a protocol exists for investigating the cause of turbidity values above 5 NTU.	☑	☐	3.2.3	27
iii. Discuss any values above 5 NTU and identify recommendations identified where necessary.	☑	☐	3.2.3	27

Confirm all applicable information has been submitted to the Department. Indicate the section and page number where the information is documented.	Yes	N/A	Section	Page #
3.2.4 Cross Connection Control Program				
i. Review the cross connection control program. • Does it meet the minimum requirements as outlined in A Guide to Assist Nova Scotia Municipal Water Works Develop a Cross Connection Control Program, as amended from time to time. • Are implementation timelines being met in accordance with the accepted plan? Provide an update on the status of the Cross Connection Control Program, including any modifications to the plan or implementation schedule, and a summary of the activities taken to achieve the goals and objectives of the program.	☑	☐	3.2.4	27
ii. Provide recommend where necessary.	☐	☑		
3.2.5 Other Distribution System Monitoring/Programs				
i. Review any other distribution system monitoring or programs that are in place to deal with threats to distribution system integrity, including but not limited to infrastructure age, watermain breaks, leak detection, pressure transients, etc.	☐	☑		
ii. Provide recommendations where necessary.	☐	☑		

Confirm all applicable information has been submitted to the Department. Indicate the section and page number where the information is documented.	Yes	N/A	Section	Page #
3.3 Site Inspection				
i. Conduct a site inspection to evaluate treatment processes, as well as other facilities and equipment as per the requirements outlined in section 3.3 of the Terms of Reference.	☑	☐	3.3	27
3.4 Conclusions and Recommendations				
i. Refer to section 3.4 of the Terms of Reference.	☑	☐	3.4	

PART IV
Operations, Monitoring and Management

4.0 Review of Operations, Maintenance, Monitoring and Management

Confirm all applicable information has been submitted to the Department. Indicate the section and page number where the information is documented.	Yes	N/A	Section	Page #
4.1 Operations and Maintenance				
i. Review the comprehensive operations manual: • Does one exist? • Is it current and up to date? • Does it include SOPs, emergency notification procedures and contingency plans? • Is it available on site or an alternate location accepted by the Department? • Are operations staff aware of its contents?	☑	☐	4.1	30
ii. Evaluate the procedures an operator follows to identify any problem(s) with the water treatment and distribution process, determine the changes needed to correct the problem(s) and how adjustments to the processes are approved and performed as needed.	☑	☐	4.1	30
iii. Verify that a maintenance program exists and is adequate to ensure the long-term viability of the Municipal Public Drinking Water Supply, including distribution system components.	☑	☐	4.1	30
iv. Identify recommendations where necessary.	☑	☐	4.1	30
4.2 Monitoring and Reporting				

Confirm all applicable information has been submitted to the Department. Indicate the section and page number where the information is documented.	Yes	N/A	Section	Page #
i. Review the annual monitoring program to: • Does one exist? • Is it current and up to date? • Does it meet the minimum requirements as outlined in the Nova Scotia Treatment Standards for Municipal Drinking Water Systems and A Guide to Assist Nova Scotia Municipal Water Works Prepare Annual Sampling Plans? • Are operations staff aware of its contents?	☑	☐	4.2	31
ii. Identify the laboratories being used for water quality analyses.	☑	☐	4.2	31
iii. Verify that the Municipal Public Drinking Water Supply is operating in accordance with the Policy on Acceptable Certification of Laboratories.	☑	☐	4.2	31
iv. Review reporting requirements and verify that the Approval Holder has complied with the immediate, annual and ad hoc reporting requirements outlined in the Nova Scotia Treatment Standards for Municipal Drinking Water Systems.	☑	☐	4.2	31
v. Review the most recent annual report and identify any concerns in the System Assessment Report.	☑	☐	4.2	31
vi. Identify recommendations where necessary.	☑	☐	4.2	31

Confirm all applicable information has been submitted to the Department. Indicate the section and page number where the information is documented.	Yes	N/A	Section	Page #
4.3 Management				
i. Review the number of certified operators and back-up personnel to verify that the municipal public drinking water supply is operating in accordance with Part I of the Water and Wastewater Facilities and Public Drinking Water Supplies Regulations.	☑	☐	4.3	33
ii. Complete Table C.1 to identify the operator(s) in overall direct responsible charge (ODRC) and summarize what protocols are in place during the absence of the operator(s) in ODRC. Note: The ODRC operator(s) must sign Table C.1.	☑	☐	App. A	
iii. Review the water quality goals that the Municipal Public Drinking Water Supply has and evaluate their plan(s) to accomplish or maintain these goals.	☑	☐	4.3	33
iv. Identify recommendations where necessary.	☑	☐	4.3	33
4.4 Conclusions and Recommendations				
i. Refer to section 4.4. of the Terms of Reference.	☑	☐	4.4	

PART V
REPORT SUBMISSION

5.0 Ability to Comply

Confirm all applicable information has been submitted to the Department. Indicate the section and page number where the information is documented.	Yes	N/A	Section	Page #
5.1 Summary				
i. Summarize conclusions and identify all recommendations necessary to meet the Nova Scotia Treatment Standards for Municipal Drinking Water Systems.	☑	☐	5.1	34
ii. Include preliminary cost estimates and an implementation schedule to address the above requirements. Costs shall be presented and prioritized with respect to public health risks. Note: If the corrective action plan submitted to the Department varies from the risk-based approach documented in the System Assessment Report, written justification shall be included in the corrective action plan for varying the priority.	☑	☐	5.1.4	34
iii. Highlight any obvious problems associated with the Municipal Public Drinking Water Supply that jeopardize treated water quality to the point that it no longer meets the health protection standards adopted by the Department.	☐	☑		

Confirm all applicable information has been submitted to the Department. Indicate the section and page number where the information is documented.	Yes	N/A	Section	Page #
5.2 Report Preparation				
i. Submit three (3) copies of the System Assessment Report to the Department and include a copy of this completed checklist.	☑	☐		
ii. Engineer's Declaration (refer to section 1.4 of the Terms of Reference)	☑	☐	5.2	38

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