

COUNTY OF BRANT ENVIRONMENTAL SERVICES WATER OPERATIONS	
TITLE: GUIDE FOR THE DEVELOPMENT OF A DISINFECTION AND COMMISSIONING PROCEDURE FOR MUNICIPAL DRINKING WATER INFRASTRUCTURE, PRIVATE WATER SERVICE CONNECTIONS AND PRIVATE FIRE LINES 100 MM OR GREATER	
QMS REFERENCE: GD-03-17	
TO BE REVIEWED: AS REQUIRED	
CURRENT REVISION DATE: JANUARY 22, 2025	VERSION NUMBER: 11

Preamble

The following guidance document is to be used by Contractors, Consultants and/or Developers (Third Party) to develop a procedure for the disinfection and commissioning of new municipal drinking water infrastructure projects, private water service lines and private fire service lines (100 mm or greater).

The goal is providing and ensuring safe municipal drinking water infrastructure. Following sanitary practices, adequate swabbing, flushing, and contacting with water having elevated chlorine residual will help achieve satisfactory bacteriological testing and will ensure that the new municipal water infrastructure and/or private water service lines and private fire lines (100 mm or greater) can be connected to the County's existing municipal water distribution system. Each step of the process is as important as any other and must be carried out with the same high level of care.

The County of Brant requires that the third party must always be familiar with, follow, and document the requirements of the most current versions of the drinking water system's Municipal Drinking Water Licence, Drinking Water Works Permit, the Safe Drinking Water Act, all applicable regulations, the Ontario Watermain Disinfection Procedure, AWWA C651 -Standard for Disinfecting Watermains and OPSS 441 - Construction Specification for Watermain in Open Cut.

Third parties must be aware of the County's Quality Management System (QMS) as defined by the Drinking Water Quality Management Standard (DWQMS) (see Attachment 1 – GD-04-18 Notification to Contractors / Consultants / Developers / Suppliers / Services Quality Management System and Regulatory Information.

The County prefers that all communication regarding the disinfection and commissioning plan be through the consultant to the Water Quality Technical Specialist when possible.

It is recommended that the results of each step of the process be reported to the Water Quality Technical Specialist (or designate) prior to proceeding with the next step. At all times, and immediately, full disclosure to Environmental Services Water Operations must be provided by the third party if an issue occurs at any time during a disinfection and commissioning project.

The disinfection and commissioning plan must be carried out in chronological order as documented. Failure to meet a requirement, at any step, means that there is a deficiency. Deficiencies must be corrected before proceeding to the next step. Before correcting the deficiency, the third party must submit a plan to the Water Quality Technical Specialist (or designate) outlining the steps to be taken to correct the deficiency. Environmental Services Water Operations retains the ability to arbitrarily increase disinfection procedure requirements if the contractor deviates from the approved procedure during the work.

A copy of the project specific disinfection and commissioning plan, meeting summaries, corrective actions, and test results are to be provided to the Water Quality Technical Specialist (or designate). A copy of the project specific disinfection and commissioning plan must be always onsite during the project.

Part A: Development, Submission and Approval of a Municipal Water Infrastructure Disinfection and Commissioning Procedure and Kickoff and Coordination Meeting

1. The County of Brant requires third parties to prepare a detailed procedure for the disinfection and commissioning of new municipal water infrastructure when installed as part of a capital project, new development or as part of private water service line and/or private fire service line (100 mm or greater) connection.
2. The procedure must document that the requirements of this guidance document, the system specific MDWL, DWWP, the Ontario Watermain Disinfection Procedure, applicable legislation, regulations, and standards. The procedure must also include a detailed description for all the items noted in Part B, C, D and E of this guide.

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3. Project Timing – The procedure should document a schedule and timing of the proposed commissioning work. Watermain commissioning and final connection work should only occur between the April 1st and November 30th of each year. Watermain commissioning in months where the temperature remains at or below 0 degrees Celsius creates a risk of damage to municipal water infrastructure as well as safety risk to on site staff. Exceptions to this can occur with a properly documented plan approved by the Water Quality Technical Specialist (or designate).
4. The disinfection and commissioning procedure will be submitted to the Water Quality Technical Specialist (or designate) at least two weeks prior to the project kickoff and coordination meeting to be reviewed and approved.
5. Once the site-specific disinfection and commissioning plan has been approved by the Water Quality Technical Specialist (or designate), the project kickoff and coordination meeting to review the plan will be arranged at least one week prior to commencement of the work.
6. Minimum attendance at the meeting should include: the Water Quality Technical Specialist (or designate), the Water Lead Hand (or his designate), the Water Operator(s) assigned to the project, a representative from the County's Infrastructure Services staff (for County of Brant initiated capital projects) and supervisory field staff of the third party. All attendees must sign an attendance sheet.
7. The third party will submit a meeting summary to the Water Quality Technical Specialist. The meeting summary should be distributed within one week of the meeting and before field work commences.

Part B: Site and Material Requirements

The County of Brant requires the following items be incorporated into the project's final disinfection and commissioning report with a detailed explanation/description of how all items were met.

1. All pipe and appurtenances were new and capped at the factory and that all caps remained on until the connection in the trench.
2. That all watermain pipe and appurtenances used are identified in the County's Development Standards to ensure they meet the requirements of Schedule B, Condition 14.0 of the subject systems Municipal Drinking Water Licence. A detailed bill of materials, catalogue cuts and documentation confirming NSF/60, NSF/61 and NSF/362 certification (current (within on year) up-to-date copies) must be provided to the Water Quality Technical Specialist (or designate). Also records that all materials were installed as specified.
3. All materials used must be documented in the Section 18 of the most current version of the County's Development Standards to ensure NSF/60, NSF/61, and NSF/362 certification. Approval must be received from the Director of Environmental Services or the Environmental Services Manager for materials not noted in the development standards. NSF/60, NSF/61 and NSF/362 certification must be submitted to the Water Quality Technical Specialist for these approved materials by the third party.
4. How all material and equipment was stored and handled on the job site so that it remained clean. If it is determined by a representative of Environmental Services Water Operations or by the Contract Administrator that the materials are or were not clean; the material may be rejected as unsuitable for use. The third party may clean materials with 1 to 5% sodium hypochlorite solution and present for re-inspection for use in the project.
5. How all work areas, tools, and equipment were maintained to prevent potential contaminants from entering the watermain and appurtenances.
6. Only County of Brant Certified Operators can operate valves in the County's Distribution systems.

Part C: Requirements of the Procedure

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The County of Brant requires the following items be incorporated into the project's disinfection and commissioning procedure with a detailed explanations/descriptions of how all items will be achieved, measured, verified, recorded and/or reported to Environmental Services Drinking Water.

1. All work areas will be prepared by hand swabbing, parts, material, and existing pipe with a 1% to 5% chlorine solution.
2. The disinfectant used must be approved by the Water Quality Technical Specialist. The proposed NSF 60/61 disinfectant must meet the requirements of Schedule B, Condition 14 of the drinking water system's Municipal Drinking Water Licence. A current (within on year) up-to-date copy of all NSF documentation and correspondence will be provided to the Water Quality Technical Specialist (or designate).
3. All containers used to mix and spray the disinfectant must always be NSF 60/61.
4. Prior to making the temporary connection, the third party must confirm with the County that distance for the temporary connection will allow for a final connection that will be less that 6 meters. A tape measure or other measuring device must be used.
5. If it is determined that the final connection will be over 6 meters, modifications must be made by the third party prior to the temporary connection unless approved by the Environmental Services Manager.
6. The temporary connection between new and existing works will be installed as per County of Brant Drawing 18-600 "Source Assembly for New or Temporary Watermains" (see attached).
7. The third party will provide all reduced pressure style backflow preventers for temporary connection. They will be tested by a certified tester provided by the third party. The backflow preventer's test results and tester's certification will be submitted to the Water Quality Technical Specialist (or designate) (see Condition 1.1.1 of the Ontario Watermain Disinfection Procedure).
8. Arrangements must be made to have Environmental Services Drinking Water staff witness the assembly of the temporary connection and the testing of the backflow preventer (See Part D).
9. The County of Brant may be able to provide the required volumetric water meter(s) (2 inch) based on availability. If the County of Brant supplies the water meter(s), associated paperwork, and a deposit of \$1,000.00 must be provided to the County of Brant Finance Department (26 Park Ave., Burford ON). The deposit will be returned to the third party when the water meter has been returned in satisfactory condition to the County of Brant. Arrangements are to be made through the Water Quality Technical Specialist (or designate).
10. If the third party is providing their own volumetric water meter(s), they will complete form "R-41-18 Developer/Consultant/Contractor Information for Billing" and provide the completed form to the Water Quality Technical Specialist.
11. The third party will take photo, showing the initial volumetric meter read and submit the photo to the Water Quality Technical Specialist (or designate) at the time of installation and a second photo, showing the final volumetric meter will be taken and submitted to the Water Quality Technical Specialist (or designate) when the volumetric meter is removed.
12. If potable water will be provided by a water tanker truck to load the watermain as part of the disinfection process, the water hauler must be approved by the by the Water Quality Technical Specialist (or designate). The Water Quality Technical Specialist (or designate) will be provided the water tanker's company name and contact information. Always review and follow the "Drinking Water Haulage Guidance Document - Ministry of Health and Long-Term Care (December 2008)".

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13. The assembled watermain/private service line/private fire line and appurtenances will be filled with potable water to ensure that all surfaces in contact with the water are soaked for a minimum of 12 hours prior to swabbing or flushing (this includes the dry barrel of all hydrants).
14. The new watermain/private service line/private fire line and appurtenances will be pressure and leak tested. The plan is to include the procedure for pressure testing and the calculation of minimum acceptable results in accordance with OPSS 441 "Construction Specification for Watermain in Open Cut". *Environmental Services Drinking Water staff must be onsite to witness the pressure testing (see Part D).*
15. The watermain will be swabbed with a minimum of two (2) new swabs, including how:
 - a) Swabs will be polyurethane with a density of approx. 24.7 kg/m³.
 - b) Swabs will be minimum of 50mm greater in diameter than the watermain and have a minimum length 1.5 times its diameter.
 - c) Swabs will be numbered.
 - d) Swabs will not be pre-loaded.
 - e) Watermain will be full of water when swabbing.
 - f) Swabs will have a minimum of 2 meters of separation with the space between the swabs filled with water.
 - g) Swabs will be propelled at adequate speeds. A minimum 2" backflow will be used with watermain sized 4" to 8", a minimum 4" backflow for watermain sized 10" to 16", and a minimum 6" backflow for watermain sized greater than 16". Other arrangements can be made at the discretion of the Water Quality Technical Specialist or Designate based on site specific needs.
 - h) Swabbing will continue until the water runs clear in colour, with no visible solids or particulate, after the last swab exits the watermain and there is no staining on the swabs.

Environmental Services Water Operations staff must be onsite to witness the swabbing and will determine if the acceptable level of "clear" water is achieved on site during swabbing (see Part D).
16. After swabbing is completed, all sections that could not be swabbed, hydrant leads, and service connections will be flushed with potable water at a minimum velocity of 0.91 m/sec. Also, all moving parts (valves and hydrants) will be operated during flushing.
17. It is recommended that sample ports be installed at this time, so they receive the full benefit of the disinfection process. The Water Quality Technical Specialist (or designate) will advise the third party of the number and location of sample ports prior to loading the infrastructure with water having an elevated chlorine residual.
18. A detailed drawing will be provided to the Water Quality Technical Specialist (or designate) that shows the sampling locations and the distances between the sample points.
19. Sample ports shall be constructed of stainless steel or copper to ensure that the ends of the sample ports can be heated with a torch to achieve sterilization prior to sampling (See attached County of Brant Drawing 18-601 "Temporary Sample Port"). *The County of Brant retains the ability to arbitrarily increase the number of sample ports and location of the sample ports at any time.*
20. All surfaces of the watermain/private service line/private fire line and appurtenances will be contacted with water having an elevated free chlorine residual for at least 24 hrs as described in AWWA C651 continuous feed method. The initial free chlorine residual at the start of the 24-hour period will be between 50 mg/L and 100 mg/L and will drop no more than 40% of the initial concentration at the end of the 24-hour period. At the Water Quality Technical Specialists or designates discretion, the AWWA C651 slug method may be used for an unusually long run of water main. The Minimum contact time for all parts of the watermain shall be 3 hours. The minimum concentration of free chlorine shall be ≥100 mg/L. If the chlorine concentration decreases by more

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than 25 mg/L at any of the sampling points, flow shall be stopped, and additional chlorine shall be added to restore the chlorine concentration in the slug to not less than its original concentration.

21. No water shall be put into or out of the assembly during the soak and while bacti testing is being carried out and results are pending.
22. Environmental Services Water Operations staff will conduct all chlorine residual testing for the project (see Part D).
23. All moving parts will be exercised, including valves and hydrants, at the beginning and the end of the 24-hour soaking period.
24. At the end of the 24-hour period, the non-potable water will be flushed and de-chlorinated (as per Schedule C, Condition 10 and Schedule C, Condition 4.5 from the system's MDWL) from all parts of the system/private service line/private fire line until the system is full of water representative of the water in the municipal water distribution system in the area.
25. All moving parts will be exercised, including valves and hydrants, while the system/private service line/private fire line is being flushed.
26. Two rounds of water samples will be taken and tested for bacti - E. coli, Total Coliforms, and HPC (see Part D). The Water Quality Technical Specialist (or designate) will advise the third party of the sampling schedule at the time of sampling. *There shall be no more than 50% decrease in chlorine residual from the first set of samples to the time of the second set and the chlorine residual of the second sample shall be no less than 0.40 mg/L.*
21. Prior to the final connection, all surfaces that will be in contact with water in the infrastructure will be wiped or sprayed with an NSF 60/61 sodium hypochlorite solution of 1% to 5% at all connections between the new and commissioned watermains/private service line/private fire line. *A County of Brant Certified Water Operator must witness all final connections (see Part D).*
22. After the connection(s) between the new works and the County's existing watermain, the entire system will be flushed by a County of Brant Water Operator.
23. For final connections over 6 meters, Bacti samples must be taken after flushing has been completed. A second set of Bacti samples will be taken at least 24 hours after the first set.

The Water Quality Technical Specialist (or designate) will identify the sampling locations prior to the time of sampling.

Part D: Testing and County of Brant Staff On-Site Attendance

1. The disinfection and commissioning plan will include that Environmental Services Water Operations staff will be provided at least 2 business days' notice to attend the site to:
 - a) Witness installation of initial temporary connections, backflow preventer and volumetric meter.
 - b) Witness pressure testing.
 - c) Witness swabbing.
 - d) Verify "clear" water after swabbing and flushing steps are complete.
 - e) Test the elevated chlorine residual in the water loaded into the infrastructure for disinfection. (If the batch method is used, the testing will be prior to loading, immediately after loading and following the 24-hour soak period.)
 - f) Collecting samples for bacti testing. The County of Brant's minimum acceptable results of bacti testing are:
 - i. 0 cfu/100 ml E. coli.
 - ii. 0 cfu/100 ml Total Coliform
 - iii. < 500 CFU/ml HPC

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g) Witness the final connection.

The provision of 2 business days' notice is provided as a guideline only. While County of Brant Environmental Services Water Operations staff intend to accommodate the project's schedule the best they can, they may have commitments which may take priority. Good communication enhances the probability of Environmental Services Water Operations availability when required.

To minimize the impact to the project's schedule, all third parties should keep the Water Quality Technical Specialist (or designate) informed on the status of the project's schedule so that County of Brant Water Operations staff can consider the project's schedule when planning day to day operations. It remains the responsibility of all third parties to ensure good communication with the Water Quality Technical Specialist (or designate).

2. The County may require resampling due to a test result not meeting the minimum acceptable criteria. This may be applied to the sample port of the failed sample only if it appears that the result might be specific to conditions at the sample port at the time of sampling.

Part E: Reporting

1. The County of Brant will provide third parties with a blank copy of R-46-21 Third Party Watermain/Service Connection (Over 100 mm) Disinfection and Commissioning Final Report to be completed to ensure Condition 3.1 of the Ontario Watermain Disinfection Procedure and the systems MDWL and DWWP were met.
2. The report describes how items in Sections B, C, and D were achieved, measured, and verified, all recorded data such as volumes of water from the municipal system used (initial and final reads from the volumetric meter(s), flows and records of the exercised valves, hydrants and curb stops.
3. Pages 1 through 5 of the report and associated attachments will be submitted to the Water Quality Technical Specialist (or designate) within five business days of completion of the work.
4. Page 6 of the report will be provided to the Water Quality Technical Specialist (or designate) within five business days of the completion of the final connection.
5. A detailed drawing will be provided to the Water Quality Technical Specialist (or designate) that shows the sampling locations and the distances between the sample points.

Part F: Attachments

1. GD-04-18 Notification to Contractors / Consultants / Developers / Supplier / Services Quality Management System and Regulatory Information
2. County of Brant Drawing 18-600 "Source Assembly for New or Temporary Watermains"
3. County of Brant Drawing 18-601 "Temporary Sample Port"
4. Form R-41-18 Contractors/Consultants/Developers Information for Billing

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1	Document creation date.	19/10/2017	Water Technologist	1
2	<p>Part C.1 – Removed the requirement that the water haulers truck must be used exclusively used for drinking water.</p> <p>Part C.2 – Removed the statement that the County would provide sodium hypochlorite for the project at no charge for the initial disinfection and would supply additional sodium hypochlorite for a fee.</p> <p>Part C.2 – Revised to note that contractor, consultant and/or developer will be invoiced for the sodium hypochlorite used for the disinfection project for a rate of \$50.00 per every 20 L supplied.</p> <p>Part C.3 – Revised to note the requirement to install a volumetric water meter to record the volume of water entering the projects infrastructure from the municipal drinking water system.</p> <p>Part C.3 – Revised to note that the County may be able to provide a water meter, based on availability for a refundable deposit of \$1,000.</p> <p>Part C. 7(g) – Revised to note that the procedure shall note swab pass times.</p>	27/10/2017	Water Technologist	2
3	<p>Entire guide revised to include private service connection and fire lines greater the 50mm.</p> <p>Preamble – Revised to reference Attachment 1 – D-3-18 Notification to Contractors/Consultants/Developers/Supplier/Services Quality Management System and Regulatory Information.</p> <p>Part A. 3 – Revised to note Meeting Summary be submitted within 1 week.</p> <p>Part C. 3 – Revised to add reference to Form R-48-18 Developer/Consultant/Contractor Information for Billing.</p> <p>Part C. 7(h) – Revised to note “colour with no visible solids or particulate”.</p> <p>Part E – Revised to note disinfection report should be submitted within one week. Final connection cannot be made until report verified. Final connection report shall be submitted one week after final connection.</p>	24/04/2018	Water Technologist	3
4	<p>Restructured Part C.4. Contains the same information.</p> <p>Revised Part D.1 – Removed the requirement to test for Background and revised HPC to <500 CFU/mL.</p>	14/06/2018	Water Technologist	4
5	Entire document revised to address the Ontario Watermain Disinfection Procedure.	21/01/21	Water Technologist	5
6	Part C, Section 14 – Revised wording to note that residual “and will drop” by no more than 40%	30/08/2021	Water Technologist	6

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7	Part A 5. – Removed the Director. Part C 3. – Updated to the Water Quality Technical Specialist. Part C 13. and Part E 5. – Added the requirement to provide a sample location map with distances between sample ports.	04/26/2022	Water Technologist	7
8	Part B 2 and 3- Added requirements for submitting watermain materials. Part C 3 – Added containers used to mix and spray disinfectant must be NSF. Part C 4 and 5 – Added requirement to ensure final connection will be under 6 meters.	03/21/2023	Water Technologist	8
9	Part C 15 g) describing propelling swabs to adequate speeds. Part C 20 – updated the description of the continuous feed method for chlorine and added a clause for the slug chlorination method.	04/30/2024	Water Quality Technical Specialist	9
10	Part C 13 describing 12 hour pre soak of water main	11/11/2024	Water Quality Technical Specialist	10
11	Addition of Part B, #3 outlining commissioning timeframes.	01/22/2025	Water Quality Technical Specialist	11