Title: WWW 11 New Watermain Testing and Commissioning (including services >100mm dia.)	
Control Number: WWW 11	**Effective Date:** June 2024
Revision: 4	**Approved by:** Operating Authority

1.0 Objective

To provide watermain and service connection (>100mm dia.) testing and commissioning procedures in accordance with recognized methods and practices while protecting the existing water distribution system from bacteriological contamination and the natural environment from adverse effects that may be caused as a result of this testing procedure.

2.0 Scope

To provide contractors, consultants, Town of Georgina Water/Wastewater, Development Engineering and the Building Division groups with a standardized method for the testing and commissioning of new potable watermains. Services equal to and greater than 100mm shall be considered as a watermain and shall follow this procedure and follow best practices dictated by AWWA Standard C651.

3.0 Definitions

- OIC – Operator-in-Charge

-Workforce – a collective group of individuals involved in the commissioning of newly installed watermain and assets/attributes.

4.0 Procedure

The new watermain shall not be connected to the existing water distribution system prior to completion of the cleaning, disinfection, hydrostatic testing and bacteriological sampling except temporarily through an approved, certified and tested Reduced Pressure backflow device.

At locations where the new watermains are to be connected to the existing watermains they shall be stopped short of the connection point. Swabbing launch points shall be brought to the surface, capped, restrained and fitted with an appropriately sized blow off and valve.

The Contractor carrying out the cleaning, testing, disinfection, hydrostatic testing and bacteriological sampling shall submit a copy of their Watermain Disinfection Policy/Procedure to the Operations and Infrastructure Department – Water/Wastewater Division for approval prior to commencing work.

For all service connections equal to or greater than 100mm diameter, the Contractor carrying out above mentioned work shall submit a copy of their Water Service Disinfection and Commissioning Policy/Procedure to the Building Division for approval prior to commencing work.

All Commissioning contractors must be on the Town of Georgina pre-approved contractor list. If the contractor is not on the list, please contact the Water and Wastewater Division for further instructions and or to make arrangements to be approved. A Contractors Responsibility Package will be provided.

Water/Wastewater Division shall witness all cleaning, disinfection, hydrostatic testing and sampling activities performed by the Contractor. The Contractor carrying out the cleaning and disinfection shall document all activities on the Town of Georgina FORM 009 A & B - New Watermain Disinfection, Hydrostatic Testing & Check List and Chlorine Residual Form. All such records shall be submitted to Water/Wastewater for approval prior to making final connections to the existing water distribution system.

A proposed work schedule shall be submitted a minimum of three (3) working days prior to commencement of any testing related to this procedure by the Contractor to the Operations and Infrastructure Department – Water/Wastewater Division for approval. The Building Department shall notify the Water/Wastewater Division of the same for all projects concerning Services 100mm dia. and greater for residential and ICI categories.

No deviations from the forgoing procedure shall be permitted unless submitted in writing by the Project Consultant and/or Contractor to the Operations and Infrastructure Department – Water/Wastewater Division for approval. Any proposed deviations shall reference recognized methods and practices for the cleaning, disinfecting, hydrostatic testing and sampling of potable watermains.

Prior to the commencement of commissioning of the newly installed watermain, a Flushing program is to be submitted for review and approval to the Water/Wastewater Division. All water consumed for commissioning purposes and flushing shall be paid for by the Development Owner for all water usage and or any other applicable rates.

Roles and Responsibilities

Development Engineering – Ensures all plans and drawings adhere to the Town of Georgina Development Design Criteria and ensures all documents and records are maintained as such. In the event of deviations from design standards, Development Engineering to keep records of such deviations.

Water/Wastewater – Witnesses all cleaning, disinfection, hydrostatic testing, sampling, and connection activities performed by the Contractor as it relates to watermains and ensures documents and records are maintained. For services equal to and greater than 100mm in diameter Water/Wastewater (OIC) must witness final connection to the existing Distribution System and shall ensure all sanitary practices are followed.

Building Division – Ensures all plans and procedures regarding cleaning, disinfection, testing, and sampling which relate to service connections equal to or greater than 100mm in diameter adhere to the Building Code and all relevant sanitary practices and shall ensure all documents and records are maintained as such. The Building Division will provide all documents and records to Development Engineering and Water/Wastewater for approval prior to final connection and shall schedule in advance with Water/Wastewater OIC to witness final connection.

Valve Operation

All existing water distribution system valves shall only be operated by Town of Georgina - Water/Wastewater Division MECP Certified Operators. The Contractor must contact the Water/Wastewater Division to make arrangements for this operation.

Testing Procedure

Chlorine residuals and turbidity shall be tested with an approved electronic tester such as a Hach Pocket Colorimeter, DR300 or equivalent. Copies of the manufacturer's calibration certificates must be submitted to the Water/Wastewater Division prior to commencing work.

A) Sample Point Drawings (to be provided by Consultant/Commissioning Contractor)

A separate drawing labeled "Sample Point Drawing" is required to be submitted to Water/Wastewater for approval with the submission of engineering drawings for proposed development(s) as per the Town of Georgina Development Design Criteria.

Sample Point Drawings shall show the following information:

1) Location of existing potable water supply indicating “connect to only with an approved and certified backflow device”
2) Swab launch points
3) Sample points
4) Turbidity sample locations
5) All watermains, mainline valves, hydrants and secondary valves
6) All water services
7) De-chlorination points and discharge locations
8) Flow requirements indicating existing water distribution system static pressure at bypass location and achievable flushing velocities including all discharge points.
9) Location and size of the by-pass
10) All fire hydrants within the development and immediately bounding outside the development on the existing distribution system denoting flow hydrants and residual hydrants for the purposes of flow testing

Where the scope of the work requires the watermain to be tested in phases this shall be indicated on the Sample Point drawing.

All identified locations to be used for any type of sampling or testing must reference municipal addresses as assigned by the Town and/or lot numbers as per the registered M-plan. Where this is not practical, a clear description of the sample or testing location must be given.

Note - All sample and test points are to be brought to the surface complete with a valve and approved and certified reduced pressure back flow device used to prevent contamination during the testing procedures. Restraining all standpipes is mandatory.

B) Loading of Watermain (Physical Separation)

Prior to loading of the new watermain all mainline valves and fire hydrant secondary valves in the new system shall be checked to ensure they are in a fully open position. This task shall be witnessed by the Town’s Water/Wastewater Operators.

During loading of the watermain, all service connection curb stops, blow offs, fire hydrants and swab launch points shall be opened expelling all air from the service line.

The new watermain is to be physically separated and to be loaded via a temporary watermain connection. The bypass to be used for all water supply issues unless otherwise noted. Minimum size of bypass should be 50mm. All materials for bypass to conform to the Town’s Approved Material List. The Backflow Prevention provisions within Section 4.8.9 of ANSI/AWWA Standard C651-14 shall be mandatory for the installation of new watermain. A CSA approved reduced pressure (RP) backflow preventer which has been selected, installed and tested in accordance with CSA Standard B64.10 is required and shall be field tested according to CSA standard B64.10 and a copy of the backflow certificate is to remain on site with Town of Georgina Operator and or Workforce. All water used MUST be always metered with approved device.

The temporary bypass is to be removed once all testing completed and accepted. For direct bury installations the saddles are to be removed and a repair clamp installed in their place. For chamber installations the main stop can be removed and downsized to a 25mm main stop.

For site plan applications there are to be test point(s) installed by the isolation valve(s). The loading of the watermain will be done, from the bypass isolation valve, once they have ensured there is a flow to the discharge. All direct bury test points within the Municipal Right of Way are to be removed and a repair clamp installed in its place once all testing completed and accepted.

* If physical separation cannot be achieved a hydrant which is NSF 61/372 certified can be used as the feed however, approval from Water/Wastewater Division Manager is necessary. Before hydrostatic testing can be done, one set of satisfactory bacteriological samples must be received before pressure test can commence.

Watermain By-pass Requirements

The minimum size of the by-pass shall be 50mm diameter or larger so that a flushing velocity of 0.91 m/sec (3.0ft/sec) can be achieved. The by-pass must be fitted with a reduced pressure (RP) backflow preventer and field tested according to CSA standard B64.10.

All materials used for the by-pass are to be approved for potable water supply.

The bypass shall be disconnected during the hydrostatic testing procedure (below).

C) Swabbing

The watermain shall be loaded via the by-pass expelling all air from the watermain prior to the commencement of swabbing.

No swabs are to be inserted into the watermain during the construction process unless recorded on the Sample Point drawings and approved by the Water/Wastewater Division.

All swabs shall be new and sized a minimum of one (1) size larger in diameter than the watermain diameter and one and a half (1 ½) times longer in length of the diameter of the watermain.

All swabs inserted and removed by the Contractor are to be numbered and witnessed by the Water/Wastewater Division and recorded on the Town of Georgina FORM 009 A - New Watermain Disinfection, Hydrostatic Testing & Check List by the Contractor.

All sections of the watermain shall be swabbed in such a manner that a minimum of three (3) swabs are used. All fire hydrants shall have a minimum of one (1) swab passed through them. At the discretion of the Town additional swabs may be required.

All stubs and/or dead ends of the watermain shall be provided with a temporary swab discharge point to allow for the removal of the swabs.

D) Hydrostatic Testing

All above ground temporary watermains are not required to complete this section. A visual inspection for leaks shall be completed upon loading of the temporary watermain while maintaining existing water distribution system pressure. Any leaks found shall be corrected prior to swabbing and chlorination.

The watermain hydrostatic test is to be completed in the following manner and a safety restraint is required on all riser caps. The RP backflow assembly and hose must be removed during this process.

General Procedure

Stage 1

The watermain shall be pressurized to 1035 kPa (150 psi) and maintained there for one (1) hour during which time small pressure drops may be topped up to maintain the 1035 kPa (150 psi) testing pressure. The test section shall not exceed any of the isolated sections as indicated on the sample point drawing where the testing procedure is completed in phases as indicated on the Sample Point Drawings. If the test pressure drops significantly, the test section shall be isolated to a manageable area. At the end of the one (1) hour test period, the volume of water used to maintain the 1035 kPa (150 psi) is to be recorded on the Town of Georgina Watermain Testing and Commissioning Form by the Contractor.

Stage 2

The watermain pressure shall be maintained at 1035 kPa (150 psi) and maintained there for one (1) hour with no pressure drops permitted.

When it is determined that the new watermain does not maintain the 1035 kPa (150 psi) pressure test, the leak(s) shall be located and repaired, and the hydrostatic test applied again beginning at Stage 1 until successful.

Polyethylene Pipe

An initial 3-to-4-hour expansion period, maintaining 1035kPa (150 psi) shall be performed. During this period makeup water may be added to maintain the test pressure. Immediately following the expansion period the test pressure of 1035kPa (150 psi) shall be maintained for a period of two (2) hours.

If the hydrostatic test is not successful, the leak(s) shall be located and repaired and the hydrostatic test applied again until it is successful.

Concrete Pressure Pipe

A 24-hour period of absorption shall be completed prior completion of the hydrostatic test. Following the absorption period the test pressure of 1035 kPa (150 psi) shall be maintained for two (2) hours.

If the hydrostatic test is not successful, the leak(s) shall be located and repaired and the hydrostatic test applied again until it is successful.

E) Flushing to Remove Turbidity

The watermain shall be flushed to remove any possible remaining air pockets and foreign matter from the watermain.

Flushing of the new watermain via the by-pass shall continue until such time as the turbidity levels taken using an approved Turbidimeter are less than 1 NTU.

The locations where turbidity samples are taken shall be indicated on the sample drawing. The turbidity testing shall be performed by the Contractor and witnessed by the Water/Wastewater Division and recorded on the

Town of Georgina FORM 009 A & B - New Watermain Disinfection, Hydrostatic Testing & Check List and Chlorine Residual form by the Contractor.

F) Disinfecting Watermain

The method of disinfection to be used is the continuous feed method unless otherwise approved by the Water/Wastewater Division.

The chlorine solution shall be applied so that the chlorine concentration is a minimum of 50 mg/l free chlorine residual throughout the new watermain system and does not exceed 100 mg/l free chlorine residual.

The chlorine solution is to be flowed through each hydrant, water service, sample point, blow-off and swabbing launch/discharge points. The high chlorine residual is to be measured by the Contractor at each location and recorded on the Town of Georgina FORM 009 B - Chlorine Residual Form by the Contractor.

Upon completion of the chlorination, the remaining chlorine solution within the contractor's tank is to be neutralized and disposed of in accordance with AWWA C651 Sec.6 Appendix C

The chlorinated water shall be isolated in the new watermain system for a period of twenty-four (24) hours. After the required contact time, the chlorine residual shall be taken at each sample location by the Contractor and recorded Town of Georgina FORM 009 B - Chlorine Residual Form by the Contractor. The maximum allowable residual decrease after 24hrs is 40% of the original concentration to a maximum decrease of 50mg/l.

> (Example 1: If upon completion of chlorination process the recorded chlorine concentration level was 75mg/l, the acceptable level after 24 hours of contact time would be 45mg/l).
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> (Example 2: If upon completion of chlorination process the recorded chlorine concentration level was 150 mg/L, the acceptable level after 24 hours of contact time would be 100 mg/L which is the maximum decrease of 50mg/l. These concentration levels are for exemplification only and are not the recommended levels as part of the procedure.

In the event that the residual is less than 40% of the original concentration of the chlorine, the chlorinated water in the new watermain shall be discharged and neutralized. The new watermain shall be re-chlorinated and re swabbed if necessary, at the discretion of the Water/Wastewater Division.

G) Removal and Disposal of Super-Chlorinated Water

Super-chlorinated water shall not be discharged from the new watermain unless neutralized as per AWWA C655.

The super-chlorinated water shall be flushed from the new watermain via the by-pass through each hydrant, sample, blow-off and swabbing launch/discharge points until the chlorine residual matches that of the existing distribution system (by-pass supply location).

The chlorine residual shall be checked at each discharge location by the Contractor and recorded on the Town of Georgina FORM 009 B - Chlorine Residual Form Contractor.

The discharge of the super-chlorinated water shall be monitored by the Contractor and witnessed by a certified operator from the Water/Wastewater Division. The free chlorine residual shall be tested at the discharge locations at adequate intervals ensuring that no chlorine residual remains and the discharged dechlorinated

water will not have an adverse effect on the environment. The results and times of the test results shall be recorded on the Town of Georgina FORM 009 B - Chlorine Residual Form by the Contractor.

H) Bacteriological Sampling

Before approving a main for release, take an initial set of samples, then resample again after 24 hours and or when approved by Town of Georgina Supervisor of Water and Wastewater and or designate a minimum of 16 hours using the sampling site procedures outlined in the approved sampling location drawing. If the initial disinfection fails to produce satisfactory bacteriological results, or if other results indicate unacceptable water quality, the main may be re-flushed and be resampled. If check samples fail to produce acceptable results, the watermain shall be re-chlorinated by the continuous- feed method or slug method until satisfactory results are obtained. For more information, see ANSI/AWWA C651-14.

All samples will be collected by the Workforce and will be witnessed by the Water/Wastewater Operator and delivered to the Town of Georgina accredited Lab. All samples taken must be delivered on the same day as the sample(s) were taken.

* New watermain guidelines for Bacteriological test results are as follows:

HPC <=100, Background <=50, Total Coliform =0, E. coli =0

The Workforce shall ensure that bacteriological samples are taken in accordance with ANSI/AWWA Standard C651.

The cost of all bacteriological sampling is included in the subdivision agreement unless otherwise specified. However, if more than 2 sets of samples are required to obtain release of the new watermain, the Developer shall reimburse the Town for the additional cost incurred by the Town resulting from the additional testing and sampling of the watermain section. The cost will include administration, additional water usage, laboratory fees, staff and resource charges.

If sample results meet SDWA requirements, then final connection can take place.

If sample results do not meet SDWA, the failed section must be disinfected again and resampled at sample locations determined by the Town.

Copies of the York/Durham Laboratory samples results are to be provided to the Project Consultant and to the Water/Wastewater Division.

I) Sample Results

Upon receiving two consecutive water sample results from the Town of Georgina accredited laboratory that meet the requirements of the Safe Drinking Water Act, 2002 – Ontario Regulation 169/03 and all other testing procedures have been completed and accepted, the final connections to the existing water distribution system can be coordinated and the approved flushing program will commence within 5 business days of the final connection.

If sample results do not meet the requirements of the Safe Drinking Water Act, 2002 – Ontario Regulation 169/03 the watermain shall be re-sampled until two consecutive sets of sample results meet the requirements of the Safe Drinking Water Act, 2002 – Ontario Regulation 169/03 and /or re-tested at the direction of the Town. This may include additional swabbing, flushing, re-chlorinating, de-chlorinating and re-sampling.

Disinfection and Sampling of Services > 100mm on the Private Side

Per section 1.6 Service Pipes, of the Ontario Watermain Disinfection Procedure 2020; service pipes of 100mm diameter and greater shall be considered as watermains for the purposes of this procedure and shall be disinfected and tested in accordance with the requirements of ANSI/AWWA Standard C651.

Development Engineering and Water/Wastewater to receive the testing and commissioning results from the Building Division for the Private System. The Private side must be commissioned to meet the Ontario Building Code requirements and the Town shall ensure the Contractor disinfects services in accordance with the above guidelines prior to allowing final connection to the existing distribution system.

Disinfection and Sampling of Services < 100mm on the Private Side

For Service Pipes of diameter less than 100mm, the Building Division shall ensure that sanitary conditions are maintained during installation/repair, and that Flushing is conducted before they are placed into service.

The Building Division shall provide record of disinfection and sampling to Development Engineering and Water/Wastewater Division for final approval prior to connection to the existing system. Water/Wastewater Division must witness final connection and ensure all sanitary practices are being followed.

J) Final Connections to Existing Mains and Acceptance

All final connections to the existing water distribution system, including services >100mm diameter shall be coordinated and witnessed by the Water/Wastewater Division.

Upon receiving satisfactory bacteriological sample results permanent connections may be made to the existing water distribution system. Construction practices in accordance with AWWA Standard C651 and the MECP Ontario Watermain Disinfection Procedure (2020) must be followed during installation of the final connection ensuring no contamination occurs to the new or existing water main.

At the time of scheduling with the Water/Wastewater Division, a drawing indicating the affected area (those impacted by the shutdown) along with a water disruption notice shall be submitted. It is the responsibility of Development Owner/Contractor to provide minimum 48 hours' notice to those that will be affected by the water service distribution.

Closure piece installation must be witnessed by a Water/Wastewater Operator. If a Water/Wastewater Operator is not available to witness the connection, then closure piece must be rescheduled.

All piping must be thoroughly cleaned and disinfected using 1% Sodium hypochlorite solution. Fittings/pipe shall be sprayed with chlorine solution and pipe hand swabbed with chlorine solution.

Upon completion of the final connection(s) to the existing water distribution system, The Water/Wastewater Operator will operate isolation valves to flush through the connection until an acceptable disinfectant concentration is achieved (Chlorine Residual) and then take 1 microbiological sample.

At the discretion of the Town additional bacteriological may be required prior to the watermain or water service being turned on.

Upon receiving satisfactory bacteriological samples results, the watermain can be turned on to facilitate Fire Hydrant Flow Testing provided the completed FORM 009 A & B – New Watermain Disinfection, Hydrostatic Testing & Check List and Chlorine Residual Form has been received and the Water/Wastewater Division is

satisfied with the same and all other authorities having jurisdiction including but not limited to Town of Georgina Building Department approvals.

The cost of all bacteriological sampling shall be charged back to the Development Owner unless otherwise specified.

K) Additional Bacteriological Sampling

Where alternate methods of testing and commissioning have been approved which alter the procedures describe in Section A to Section J or at the discretion of the Water/Wastewater Division additional bacteriological samples may be required be taken at each sample location and submitted to the Town of Georgina accredited laboratory for analysis. Upon receiving acceptable sample results any final connections to the existing water distribution may be made and the water supply to the new watermain can be turned on provided the completed FORM 009 A & B – New Watermain Disinfection, Hydrostatic Testing & Check List and Chlorine Residual Form has been received and approved by the Water/Wastewater Division and all other authorities having jurisdiction including but not limited to Town of Georgina Building Department approvals and water meter installations.

The cost of all bacteriological sampling shall be charged back to the Development Owner unless otherwise specified.

L) Fire Hydrant Flow Testing

Fire Hydrant flow testing shall be performed to confirm the original design water system analysis and the distribution systems capacity to maintain 140kpa/20psi under maximum day demand plus fire flow conditions as required by the Town's Drinking Water Works Permit 119-201 is to be performed.

Upon completion of the final connections to the existing water distribution system and meeting all the requirements of this procedure to the satisfaction of the Water/Wastewater Division flow testing shall be performed in accordance with NFPA 291.

The fire hydrants to be flow tested including residual pressure hydrants shall be indicated on the "Sample Point Drawing".

Coordination of the flow testing shall be made with the Water/Wastewater Division.

The flow testing shall be witnessed by a representative of the Operations and Infrastructure Department - Water/Wastewater Division.

Flow testing shall take place during the Town's distribution systems Maximum Day Demand periods. This is to be determined by the Water/Wastewater Division.

Copies of the flow test reports shall be provided to the Project Consultant and the Water/Wastewater Division in a digital PDF format.

The Project Consultant shall review the results of the fire hydrant flow tests and provide a written, signed and stamped report by a Professional Engineer certifying that the results are consistent with the original design Water System Analysis and requirements of the Form 1 – Record of Watermains Authorized as a Future Alteration have been satisfied.

Upon receipt and review of the above noted report to the satisfaction of the Water/Wastewater Division and all the requirements this procedure and the Drinking Water Works Permit 119-201 have been met, the watermain may be turned on and placed into service.

M) Flushing Program

It is the sole responsibility of the Development Owner to ensure that the newly constructed watermain maintains the regulated secondary disinfectant (Chlorine Residuals) as required per Ontario regulation 170/03. This will be accomplished by maintaining a flushing program and conducting bacteriological samples as directed by the Water/Wastewater Division.

5.0 References/Associated Documents

ANSI/AWWA Standard C651
MECP Ontario Watermain Disinfection Procedure 2020
FORM 009 A & B – New Watermain Disinfection, Hydrostatic Testing & Check List and Chlorine Residual
Form 1 – Record of Watermains Authorized as a Future Alteration
Ontario regulation 170/03
Safe Drinking Water Act, 2002
Ontario Regulation 169/03

6.0 Records

Form 1 – Record of Watermains Authorized as a Future Alteration

7.0 History of Changes

Revision	Date	Description	By
1	12-Dec-2008		
2	22-Aug-2019		Director of Operations & Infrastructure
3	06-Apr-2021		Director of Operations & Infrastructure
4	24-June-2024	Revise/update WWW11 New Watermain Testing and Commissioning document – change format.	M. Puopolo, A Antoniadis.