2025

ANNUAL EVALUATION REPORT ASSESSING THE EFFECTIVENESS OF THE CORROSION CONTROL MEASURES

Corrosion Control Program
Hamilton Drinking Water System, Woodward Subsystem

Hamilton

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1 SUMMARY

This annual evaluation report is provided as per Section 9.2 of Schedule C of the City of Hamilton's (the City's) Municipal Drinking Water Licence (MDWL) Number: 005-101 Issue 11, dated May 24, 2024; as per Part V of the Safe Drinking Water Act, 2002. This report assesses the effectiveness of the Corrosion Control Program within the Hamilton Drinking Water System, Woodward Subsystem (Woodward Distribution System). It outlines the activities undertaken by the City within the 2025 calendar year.

This report covers the following:

- Lead sampling results and a summary of any key corrosion control parameters
- A technical evaluation of the effectiveness of corrosion control measures
- A summary of lead levels and other metals monitored since the implementation of corrosion control and comparison to pre-implementation levels
- An evaluation of secondary impacts resulting from corrosion control implementation
- Summary of results of all other aspects of the City's lead mitigation strategy

The City began the addition of phosphoric acid (orthophosphate) on November 8, 2018, with 2025 being the seventh year of program operation. Throughout 2025, operating conditions were stable at the Woodward Avenue Water Treatment Plant with orthophosphate inhibitor concentrations steadily observed at the ends of the Woodward Distribution System.

The Schedule 15.1 Community Lead Sampling Program was reinstated in 2018 for the Woodward Distribution System, under a reduced sampling schedule, to monitor the effectiveness of corrosion control measures put in place. Two sampling rounds, Round 35 (Winter) and Round 36 (Summer), were completed in 2025 for a total of 14 rounds completed since Corrosion Control Program implementation. Result summaries are included in this report, which show a significantly lower level of lead at the tap, in comparison to levels measured prior to the Corrosion Control Program implementation.

2 INTRODUCTION

At the November 25, 2015, City of Hamilton Council Meeting, Public Works Committee Report 15-015, the Corrosion Control Program for the Woodward Distribution System was approved. The primary recommendation of the report was to implement corrosion control within the Woodward Distribution System using a phosphate-based treatment approach, with orthophosphate as the method for corrosion control and phosphoric acid as the treatment additive. On November 8, 2018, the City began adding phosphoric acid completing the pre-implementation requirements and moving into post-implementation and ongoing activities. This 2025 evaluation report summarizes the post-implementation sampling and monitoring activities of the year and illustrates the observed effectiveness of the program.

3 TECHNICAL EVALUATION OF THE EFFECTIVENESS OF CORROSION CONTROL MEASURES

3.1 KEY MILESTONES OF POST IMPLEMENTATION SAMPLING AND MONITORING

Post-implementation sampling and monitoring remains the primary means of evaluating the program's goal of reducing lead concentrations observed at the tap (premise). Post-implementation sampling, as per Schedule C of the MDWL, was completed including two rounds of the legislated Community Lead Sampling Program.

Ongoing proactive and reactive flushing of the Woodward Distribution System took place throughout 2025. This ensured the movement of orthophosphate throughout the system, minimizing secondary impacts and reducing water age.

The Plant Optimization Study commenced in 2019 to examine the Woodward Avenue Water Treatment Plant's dosing system for orthophosphate and ammonia. The goal of the study was to ensure the chemicals were delivered effectively and did not create adverse conditions in the Woodward Distribution System. Recommendations to begin the first phase of orthophosphate concentration reduction were implemented in October 2024, with the target orthophosphate concentration, at the point of entry into the Woodward Distribution System, reduced from 2.10 mg/L to 1.90 mg/L. The study was completed in 2025 and recommends that the orthophosphate dosing target remain at 1.90 mg/L and that the comprehensive lead and water quality monitoring program continue.

System-wide sampling continued in 2025, providing additional monitoring data for the entire Woodward Distribution System. This branch of the monitoring program allows for surveillance of orthophosphate levels and potential secondary impacts. In the event of an elevated orthophosphate, colour, or turbidity result, further investigation is conducted to determine the cause of any anomaly and ensure appropriate action is taken.

The key post-implementation activities are summarized in Table 1.

TABLE 1: 2025 CORROSION CONTROL PROGRAM POST IMPLEMENTATION MONITORING PLAN

Task	Status
Distribution System Flushing	On-going • 2,915 hydrants flushed in 2025 • Proactive flushing continues in 2026
Post-Implementation Monitoring	On-going • Sampling as per Schedule C of the MDWL completed in 2025 • Additional system-wide monitoring program • 668 samples collected in 2025 • Sampling continues in 2026
Plant Optimization Study	Complete • Study to optimize the Water Treatment Plant's dosing system for orthophosphate and ammonia • Target orthophosphate concentration reduced from 2.10 mg/L to 1.90 mg/L in October 2024 • Final recommendation to keep orthophosphate at 1.90 mg/L and continue lead and water quality monitoring

3.2 EQUIPMENT MALFUNCTION OR UPSET CONDITIONS

No equipment malfunctions or upset conditions occurred in 2025.

A summary of the continuously monitored parameters at the Point of Entry, where values are recorded every 15 minutes, is included in Table 2. The MDWL also requires additional parameters to be measured at the Point of Entry annually, quarterly and monthly. The results from these grab samples are summarized in Table 3. A full historical data set of pre- and post-implementation values is found in Appendix A (Tables A-1 and A-2). Comparison of pre- and post-implementation values illustrates a minimal change in water quality.

TABLE 2: 2025 SUMMARY OF CONTINUOUSLY MONITORED PARAMETERS AT THE POINT OF ENTRY

Dates	Point of Entry Continuous Monitoring, Result Value Range			
	pH	Temperature Raw Water (°C)	Orthophosphate (mg/L)	Turbidity (NTU)
01-Jan-2025 to 31-Dec-2025	7.09 to 7.53	-0.52 to 23.92	1.19 to 2.92	0.033 to 0.946

TABLE 3: 2025 SUMMARY OF CORROSION CONTROL RELATED PARAMETERS AT THE POINT OF ENTRY

Dates	Point of Entry Result Value Range								
	Lead (mg/L)	Iron (mg/L)	Copper (mg/L)	Alkalinity (mg/L)	Total Dissolved Solids (mg/L)	Colour (apparent) (CU)	Chloride (mg/L)	Sulphate (mg/L)	Ortho-phosphate (mg/L)
01-Jan-2025 to 31-Dec-2025	<0.0001	<0.003	0.0003 to 0.0005	85	176 to 236	<2 to 3	28.3 to 41.6	22.2 to 24.7	1.43 to 2.42

3.3 MAINTAINING OPERATING CONDITIONS AND INHIBITOR CONCENTRATIONS

The ability to maintain operating conditions and inhibitor concentrations within the Woodward Distribution System was monitored as required by the MDWL. The regulated sampling program continued in 2025 with orthophosphate concentrations and other related parameters measured at the ends of the Woodward Distribution System. In addition, these parameters were measured throughout the Woodward Distribution System as part of the system-wide corrosion control sampling program, which continued in 2025. This branch of the program provides monitoring data beyond the regulatory requirements for the entire Woodward Distribution System. It allows for a system-wide surveillance of orthophosphate levels and potential secondary impacts. In the event of an observed anomaly, flushing and enhanced sampling is initiated to determine the cause and to ensure appropriate action is taken.

As illustrated in Table 4, orthophosphate residuals at the ends of the distribution system demonstrate consistent delivery of orthophosphate throughout the system. The Table also summarizes the 2025 turbidity values. A full historical data set of pre- and post-implementation values are found in Appendix A (Table A-3). Results show that the addition of the inhibitor has not been shown to negatively impact the aesthetic quality of the water in the Woodward Distribution System.

Although operating conditions and inhibitor concentrations are not measured in premise plumbing, Section 4 discusses the levels of lead and other metals as seen in premise plumbing as a result of orthophosphate use.

TABLE 4: 2025 SUMMARY OF ORTHOPHOSPHATE RESIDUALS, FIELD TURBIDITY, FIELD TEMPERATURE AND IRON IN THE DISTRIBUTION SYSTEM

Dates	Distribution Result Value Range			
	Orthophosphate (mg/L)	Field Turbidity (NTU)	Field Temperature (°C)	Iron (mg/L)
01-Jan-2025 to 31-Dec-2025	1.34 to 2.07	0.05 to 1.96	2.0 to 23.6	<0.003 to 0.177

3.4 REDUCTION OF LEAD AND CORROSION RELATED PARAMETERS (DISTRIBUTION SYSTEM AND PREMISE PLUMBING)

Lead levels and other corrosion control related parameters are monitored primarily through the Schedule 15.1 Community Lead Sampling Program, under O. Reg. 170/03 of the Safe Drinking Water Act. Prior to the inhibitor addition in the Woodward

Distribution System, the MDWL contained a Condition of Lead Regulatory Relief - Schedule D.

Upon addition of the inhibitor, the Schedule 15.1 sampling program was resumed under a reduced sampling plan as specified in the Woodward Distribution System MDWL. Round 35 (Winter) and Round 36 (Summer) took place in 2025 with a summary of the results found in Section 4 of this report.

As summarized in Figure 1, an overall decline in lead levels at the tap and the percentage of samples with results above the Maximum Acceptable Concentration (MAC) for lead (0.01 mg/L) continues to be observed.

4 SUMMARY OF LEAD LEVELS AND OTHER METALS

4.1 SCHEDULE 15.1 COMMUNITY LEAD SAMPLING ONTARIO REGULATION 170/03

Tables 5, 6 and 7 illustrate the 2025 results from the Schedule 15.1 sampling rounds for the Woodward Distribution System as seen at premise plumbing (residential and non-residential) and in the distribution system. A full historical data set of pre- and post-implementation values are found in Appendix A (Tables A-4, A-5 and A-6).

TABLE 5: 2025 RESULTS FROM THE SCHEDULE 15.1 SAMPLING – PREMISE (RESIDENTIAL)

Round	Dates	Number of Samples		Results Value Range		Percent (%) of Samples with Lead >0.01mg/L
		Total	Lead >0.01 mg/L	Lead (mg/L)	Field pH	
35	15-Dec-2024 to 15-Apr-2025	50	0	<0.0001 to 0.0075	7.12 to 7.67	0%
36	15-Jun-2025 to 15-Oct-2025	50	0	<0.0001 to 0.0086	7.26 to 7.64	0%

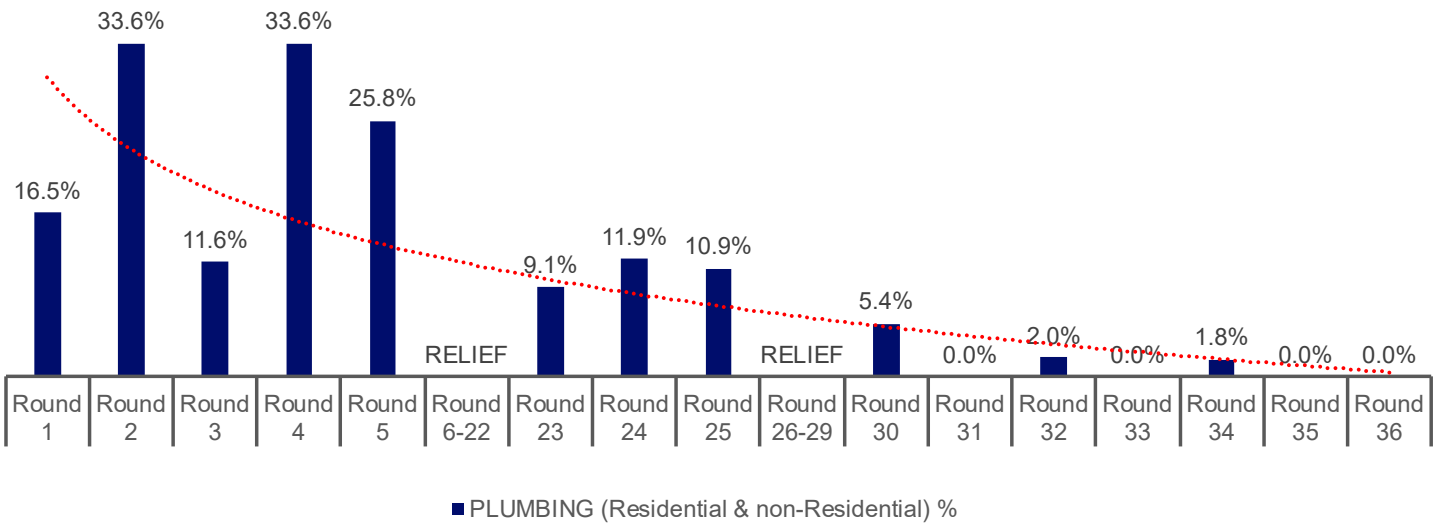
TABLE 6: 2025 RESULTS FROM THE SCHEDULE 15.1 SAMPLING – PREMISE (NON-RESIDENTIAL)

Round	Dates	Number of Samples		Results Value Range		Percent (%) of Samples with Lead >0.01mg/L
		Total	Lead >0.01 mg/L	Lead (mg/L)	Field pH	
35	15-Dec-2024 to 15-Apr-2025	5	0	<0.0001 to 0.0048	7.36 to 7.54	0%
36	15-Jun-2025 to 15-Oct-2025	5	0	<0.0001 to 0.0007	7.33 to 7.52	0%

TABLE 7: 2025 RESULTS FROM THE SCHEDULE 15.1 SAMPLING – DISTRIBUTION SYSTEM

Round	Dates	Number of Samples		Results Value Range			Percent (%) of Samples with Lead >0.01mg/L
		Total	Lead >0.01 mg/L	Lead (mg/L)	Field pH	Alkalinity (mg/L)	
35	15-Dec-2024 to 15-Apr-2025	10	0	<0.0001 to 0.0007	7.34 to 7.62	85 to 87	0%
36	15-Jun-2025 to 15-Oct-2025	10	0	<0.0001 to 0.0012	7.32 to 7.63	85 to 87	0%

FIGURE 1: PERCENT (%) OF PREMISE SAMPLES WITH LEAD ABOVE THE MAC (0.01MG/L)



As required by the MDWL, copper is monitored at residential and non-residential premise plumbing through the Schedule 15.1 Community Lead Sampling Program. Copper was not measured prior to the implementation of the Corrosion Control Program; however, it was measured throughout the Woodward Distribution System over three sampling periods as part of the City's Corrosion Control Baseline Study.

The Ontario Drinking Water Standards, Objectives and Guidelines have an Aesthetic Objective guideline of 1.0 mg/L for copper. Pre- and post-implementation sampling results are illustrated in Table 8 and show copper results remaining well below the Aesthetic Objective guideline. A full historical data set of pre- and post-implementation values is found in Appendix A (Tables A-7).

TABLE 8: 2025 SUMMARY OF COPPER CONCENTRATIONS – PREMISE (RESIDENTIAL AND NON-RESIDENTIAL)

Dates	Number of Samples	Copper Results (Range) (mg/L)
01-Jan-2025 to 31-Dec-2025	110	0.0010 to 0.0864

5 ASSESSMENT OF SECONDARY IMPACTS

5.1 CUSTOMER FEEDBACK AND WATER QUALITY COMPLAINTS

The City collects and reviews customer feedback and water quality complaints to ensure customer safety and satisfaction. In 2025, there were no water quality

complaints related to the Corrosion Control Program. There were eight inquiries related to lead pipes and the lead pipe replacement program. These ranged from residents requesting that public-side lead service line replacements be expedited, to tenants seeking clarification on their authority to initiate lead service line replacement work when they were not the property owners. In all cases, the responses were promptly provided by the Customer Service and Community Outreach team, which included information on the City's Corrosion Control Program.

Section 6.2 summarizes the outreach and education conducted by the City regarding the Corrosion Control Program and lead awareness.

5.2 IMPACTS ON SECONDARY DISINFECTION AND BIOFILM CONTROL

The City monitors secondary disinfection by measuring chlorine residuals throughout the Woodward Distribution System. Biofilm formation is monitored through the Heterotrophic Plate Count (HPC) test. Table 9 summarizes chlorine residuals and HPC before and after orthophosphate addition. A full historical data sets of pre- and post-implementation values is found in Appendix A (Table A-8)

The City investigates locations with elevated HPC as part of their due diligence flushing and resampling program. This program continued in 2025 as a proactive approach to addressing water quality indicators. In 2025, no significant changes were observed in either the HPC test or chlorine residuals within the Woodward Distribution System.

TABLE 9: 2025 SUMMARY OF CHLORINE RESIDUALS AND HPC VALUES

Dates	DISTRIBUTION RESULTS RANGE	
	Combined Chlorine (mg/L)	HPC (CFU/1mL)
01-Jan-2025 to 31-Dec-2025	0.61 to 2.92	0 to 176

5.3 IMPACTS ON WASTEWATER TREATMENT AND PHOSPHORUS LOADING

The City operates both the Woodward Avenue and Dundas Wastewater Treatment Plants (WWTPs). Since program implementation in 2018, the addition of orthophosphate has had minimal effects on the wastewater treatment process, as seen in the final effluent concentrations summaries illustrated in Tables 10 and 11. The values remain below the effluent limits set by the Environmental Compliance Approvals (ECA)/Certificate of Approval (CofA); Woodward Avenue WWTP ECA Number 9410-B65QRT, dated May 14, 2019, and Dundas WWTP CofA Number 3101-89PNRC, dated

October 6, 2010. A full historical data set of pre- and post-implementation values is found in Appendix A (Tables A-9 and A-10).

TABLE 10: 2025 SUMMARY OF RAW INFLUENT CONCENTRATIONS AND LOADINGS

Dates	ANNUAL AVERAGE RESULTS					
	WOODWARD AVENUE WWTP			DUNDAS WWTP		
	TP (mg/L)	Lab pH	TP Daily Loadings (kg/day)	TP (mg/L)	Lab pH	TP Daily Loadings (kg/day)
01-Jan-2025 to 31-Dec-2025	9.32	7.62	2,672	4.25	7.56	49
NOTE: TP - Total Phosphorus as P						

TABLE 11: 2025 SUMMARY OF FINAL EFFLUENT CONCENTRATIONS AND LOADINGS

Dates	ANNUAL AVERAGE RESULTS					
	WOODWARD AVENUE WWTP			DUNDAS WWTP		
	TP (mg/L)	Lab pH	TP Daily Loadings (kg/day)	TP (mg/L)	Lab pH	TP Daily Loadings (kg/day)
01-Jan-2025 to 31-Dec-2025	0.220	7.56	68	0.114	7.43	1.30
NOTE: TP - Total Phosphorus as P Woodward Avenue ECA Limits for TP = 0.30 mg/L; TP Loadings = 123 kg/day; pH = 6.0 to 9.5 inclusive. Dundas CofA Limits for TP = 0.50 mg/L; TP Loadings = 9.1 kg/day; pH = 6.0 to 9.5 inclusive.						

6 OWNER MITIGATION MEASURES

6.1 LEAD SERVICE LINE REPLACEMENT (PUBLIC AND PRIVATE)

As of the end of 2025, approximately 17,500 substandard water service lines - comprising of lead and undersized copper lines - remain in the Woodward Distribution System. This number is an approximation due to various uncertainties and variables making it difficult to track.

The City's Substandard Water Service Line Replacement Program has been in place for over 30 years to address customer requests related to pressure or other concerns (such as undersized services or leaks). Over the last 10 to 15 years, as the public has become more aware of the risks associated with lead, the program's focus has shifted from poor pressure to substandard lead water service line replacements.

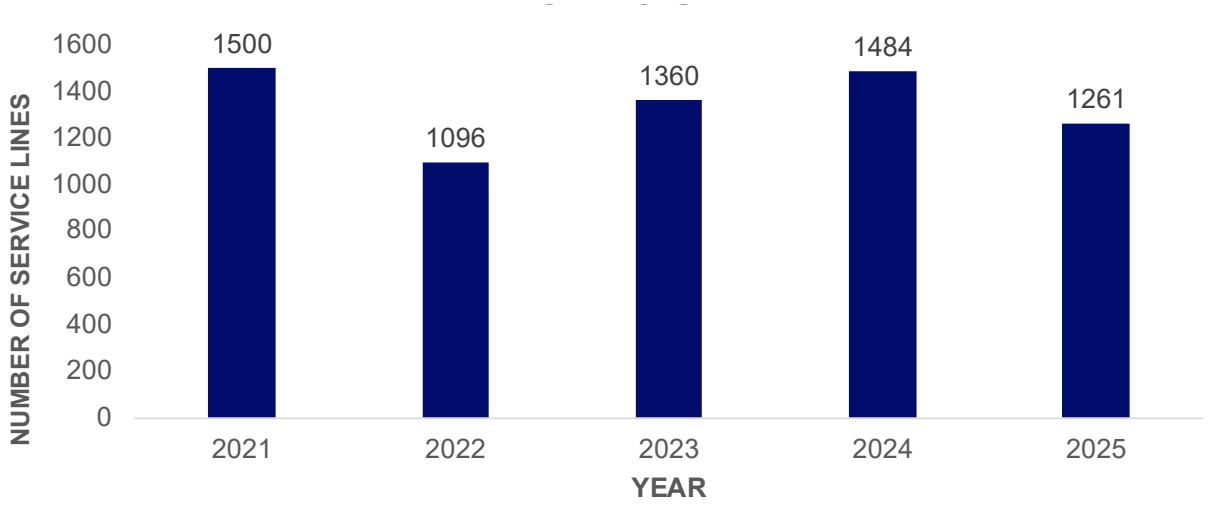
In this program, the City replaces the substandard material up to the property line (public portion), and the homeowner replaces the privately owned portion. In addition, the City has a loan program available to assist homeowners with the replacement of their privately-owned portion.

Under this program in 2025, 396 substandard replacements were completed by the City on the public portion and 684 replacements were performed on the private portion. In addition, 181 replacements were completed by the City as part of routine watermain maintenance/rehabilitation work. It is important to note that only the public portion is replaced as part of routine watermain work as performed by the Capital Construction section. This summary is illustrated in Table 12. A summary of the number of substandard service line replacement over the last 5 years is illustrated in Figure 2.

TABLE 12: 2025 SUMMARY OF SUBSTANDARD SERVICE LINE REPLACEMENTS

Year	Public	Private	Watermain Maintenance/Rehabilitation Work (Public)	Remaining LWSL
2025	396	684	181	Approx. 17,500

FIGURE 2: NUMBER OF SUBSTANDARD SERVICE LINE REPLACEMENTS, 2021-2025



6.2 OUTREACH AND EDUCATION

In 2025, the following outreach/education on lead awareness and the Corrosion Control Program was completed:

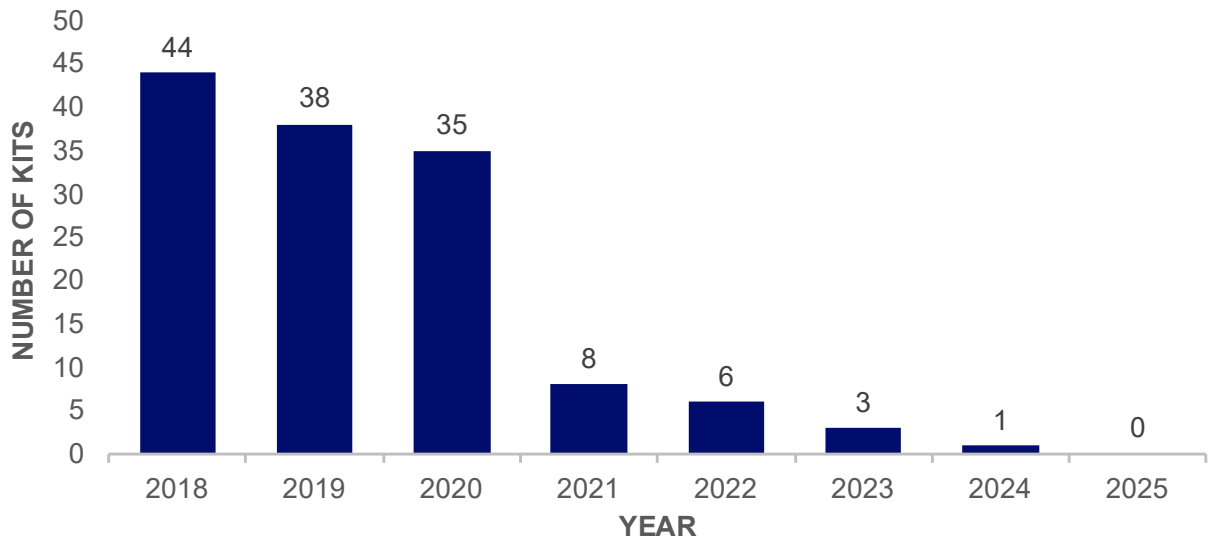
- The City maintained the following websites:
  - Lead in your Drinking Water (www.hamilton.ca/home-neighbourhood/house-home/home-water-services/lead-your-drinking-water)
  - Lead Water Service Replacement (www.hamilton.ca/LeadPipes)
  - Corrosion Control (www.hamilton.ca/CorrosionControl)
- Lead awareness advertising informed Hamilton residents that homes built before 1955 may have lead water pipes. It encouraged residents to check their pipes and offered a free City inspection. The advertisements were click-through adverts and would go directly to the website (hamilton.ca/leadpipes) for easy instructions on how to check and what to do if a lead pipe was found. The advertising was completed through the following outlets:
  - Meta (Social): July 31 to August 11 and August 28 to September 8, 2025

    - Bell (Digital): September 1 to 30, 2025
    - JUNCTION/CHCH (Digital): September 1 to 30, 2025
- 25,241 properties were mailed lead awareness packages. These were sent to properties with known lead service lines, as well as to homes built before 1955 where the service type is unknown.
- 1,559 Coordinated Roads information packages were mailed out including Public Health Lead inserts and the Lead Pipe Replacement Program details to property owners that were going to be affected by road cuts at their properties due to work such as watermain replacement or road resurfacing.
- 149,000 properties within the Woodward Distribution System received the following from Alectra Utilities, an electricity utility and distributor that invoices water, wastewater and stormwater charges on behalf of the City:
    - Alectra Rates Insert (September 2025) that included information on lead pipe awareness
    - Residential Bill Insert (January 2025) that included information on the Lead Water Service Replacement Program
- The 2024 Drinking Water Systems Water Quality Report included a summary of the Corrosion Control Program. This report was advertised through the following outlets:
    - The Hamilton Spectator (print): February 10 and 18, 2025
    - The Weather Network (digital): Feb 1 to 28, 2025
    - Meta (social): February 28 to March 9, 2025
- 2024 Annual Evaluation Report Assessing the Effectiveness of the Corrosion Control Program Measures Report. This report assesses the effectiveness of the Corrosion Control Program within the Hamilton Drinking Water System, Woodward Subsystem. This report is maintained on the City of Hamilton Website beginning March 31.

6.3 FILTER KIT PROGRAM

The City provides filter kits certified by the National Sanitation Foundation (NSF/ANSI-53). The kit consists of a Brita jug and three filters. They are provided to homeowners when requested or to contractors when a permit to replace a lead water service line is obtained. No residents requested a lead filter kit in 2025. Data from the last eight years shows a decline in the number of kits provided by the City (Figure 3). The cause of the decline remains unclear; however, the City continues to maintain this program.

FIGURE 3: NUMBER OF LEAD FILTER KITS HANDED OUT BY THE CITY OF HAMILTON, 2018-2025



6.4 INVOLVEMENT OF PUBLIC HEALTH AUTHORITIES

Public Health Services (PHS) has worked in conjunction with Hamilton Water from the development of the Corrosion Control Program to the implementation of activities related to the program. Public Health Services educates the public on the risks associated with lead exposure by maintaining a link on their website of the various sources of lead in the environment, the health risks, and how the public can take steps to protect themselves from lead exposure.

Public Health Services was also involved in all Adverse Water Quality Incidents (AWQIs) that were initiated in 2025. Liaison meetings between Public Health Services and Hamilton Water continued in 2025 keeping both units informed on related activities. Liaison meetings and the involvement of Public Health Services during Adverse Water Quality Incidents continues in 2026.

7 CONCLUSION

The City began adding phosphoric acid to the Woodward Distribution System on November 8, 2018, and, in conformance with the requirements of Schedule C of the MDWL, continues to sample and monitor to evaluate the effectiveness of the program for lead control.

The post-implementation sampling and monitoring plan shows the orthophosphate inhibitor is working as expected with minimal secondary effects observed. The Schedule 15.1 Community Lead Sampling results demonstrate a reduction in lead concentrations and a decreasing trend in the percentage of samples above the Maximum Acceptable Concentration (MAC) of 0.01 mg/L set by Ontario Regulation 169/03.

Sampling and monitoring, including the Schedule 15.1 Community Lead Sampling Program is continuing in 2026.

2025

HISTORICAL DATA SETS

Appendix A

Hamilton

APPENDIX A: HISTORICAL DATA SETS

LIST OF TABLES

TABLE A - 1: POST-IMPLEMENTATION SUMMARY OF CONTINUOUSLY MONITORED PARAMETERS AT THE POINT OF ENTRY

Dates	Point of Entry Continuous Monitoring, Result Value Range			
	pH	Temperature Raw Water (°C)	Ortho-phosphate (mg/L)	Turbidity (NTU)
08-Nov-2018 to 31-Dec-2018	7.58 to 8.17	1.50 to 6.66	0.02 to 3.39	0.03 to 0.54
01-Jan-2019 to 31-Dec-2019	6.67 to 7.64	-1.03 to 20.47	0.20 to 7.81	0.02 to 0.33
01-Jan-2020 to 31-Dec-2020	6.66 to 7.64	0.63 to 23.35	0.84 to 3.46	0.02 to 0.27
01-Jan-2021 to 31-Dec-2021	6.74 to 7.60	-0.53 to 23.29	0.96 to 5.33	0.02 to 0.86
01-Jan-2022 to 31-Dec-2022	6.22 to 7.71	-0.48 to 22.5	0.68 to 6.38	0.009 to 0.282
01-Jan-2023 to 31-Dec-2023	7.06 to 7.56	0.45 to 20.89	0.74 to 2.86	0.03 to 0.71
01-Jan-2024 to 31-Dec-2024	6.95 to 7.47	0.29 to 22.74	1.34 to 2.76	0.03 to 7.75*
01-Jan-2025 to 31-Dec-2025	7.09 to 7.53	-0.52 to 23.92	1.19 to 2.92	0.033 to 0.946

*The high turbidity value was due to a very brief spike lasting less than 20 seconds, likely caused by a temporary disturbance to the meter, after which levels quickly returned to normal. All treated water (filter) turbidity levels remained within acceptable limits throughout the year.

TABLE A - 2: PRE- AND POST-IMPLEMENTATION SUMMARY OF CORROSION CONTROL RELATED PARAMETERS AT THE POINT OF ENTRY

Dates	Point of Entry Result Value Range								
	Lead (mg/L)	Iron (mg/L)	Copper (mg/L)	Alkalinity (mg/L)	Total Dissolved Solids (mg/L)	Colour (apparent) (CU)	Chloride (mg/L)	Sulphate (mg/L)	Ortho-phosphate (mg/L)
PRE-IMPLEMENTATION									
04-Feb-2008 to 22-May-2018	<0.001	<0.01 to 0.059	0.00039 to <0.002	82 to 99	156 to 252	<2 to 4	30.0 to 31.5	24.2 to 28.2	<0.15
POST-IMPLEMENTATION									
01-Oct-2018 to 31-Dec-2018	<0.0001	<0.003	0.0002	85	178	<2	30.0 to 31.5	23.7 to 24.7	<0.15 to 3.80
01-Jan-2019 to 31-Dec-2019	<0.0001	<0.003 to 0.004	0.0003 to 0.0006	83 to 88	160 to 232	<2	29.1 to 42.6	22.9 to 27.0	<0.15 to 2.69
01-Jan-2020 to 31-Dec-2020	<0.0001	<0.003	0.0002 to 0.0004	86 to 88	166 to 228	<2 to 2	29.2 to 40.3	23.3 to 26.1	1.60 to 2.48

Dates	Point of Entry Result Value Range								
	Lead (mg/L)	Iron (mg/L)	Copper (mg/L)	Alkalinity (mg/L)	Total Dissolved Solids (mg/L)	Colour (apparent) (CU)	Chloride (mg/L)	Sulphate (mg/L)	Ortho-phosphate (mg/L)
01-Jan-2021 to 31-Dec-2021	<0.0001	<0.003	0.0002 to 0.0008	86	170 to 248	<2 to 2	29.1 to 43.4	22.6 to 25.7	1.20 to 2.89
01-Jan-2022 to 31-Dec-2022	<0.0001	<0.003	0.0003 to 0.0004	80 to 91	162 to 202	<2 to 2	28.4 to 44.0	22.5 to 25.1	1.48 to 2.85
01-Jan-2023 to 31-Dec-2023	<0.0001	<0.003	0.0002 to 0.0003	87 to 91	150 to 228	<2 to 2	28.4 to 39.1	22.1 to 25.8	1.34 to 2.58
01-Jan-2024 to 31-Dec-2024	<0.0001	<0.003	0.0003 to 0.0004	86 to 89	182 to 226	<2	28.9 to 38.3	22.1 to 23.8	1.00 to 2.85
01-Jan-2025 to 31-Dec-2025	<0.0001	<0.003	0.0003 to 0.0005	85	176 to 236	<2 to 3	28.3 to 41.6	22.2 to 24.7	1.43 to 2.42
Target orthophosphate concentration reduced from 2.10 mg/L to 1.90 mg/L in October 2024									

TABLE A - 3: PRE- AND POST-IMPLEMENTATION SUMMARY OF ORTHOPHOSPHATE RESIDUALS, FIELD TURBIDITY, FIELD TEMPERATURE AND IRON IN THE DISTRIBUTION SYSTEM

Dates	Distribution Result Value Range			
	Ortho-phosphate (mg/L)	Field Turbidity (NTU)	Field Temperature (°C)	Iron (mg/L)
PRE-IMPLEMENTATION				
01-Jul-2016 to 30-Sept-2016	<0.15	0.05 to 3.49	n/a	n/a
01-Nov-2016 to 30-Jan-2017	<0.15	0.09 to 3.10	n/a	n/a
01-Mar-2017 to 30-Jun-2017	<0.15	0.07 to 0.71	n/a	n/a
POST-IMPLEMENTATION				
05-Nov-2018 to 27-Dec-2018	<0.15 to 2.55	0.06 to 1.10	7.1 to 17.3	<0.003 to 0.056
01-Jan-2019 to 31-Dec-2019	0.22 to 2.42	0.05 to 1.16	3.1 to 22.0	<0.003 to 0.102
01-Jan-2020 to 31-Dec-2020	1.72 to 3.53	<0.05 to 1.67	4.8 to 22.3	<0.003 to 0.093
01-Jan-2021 to 31-Dec-2021	1.43 to 6.54	<0.05 to 5.04	<0.1 to 25.0	<0.003 to 0.079
01-Jan-2022 to 31-Dec-2022	1.76 to 10.0	0.05 to 9.87	4.0 to 24.3	<0.003 to 0.062
01-Jan-2023 to 31-Dec-2023	1.48 to 7.80	0.05 to 4.2	4.8 to 23.0	<0.003 to 0.167
01-Jan-2024 to 31-Dec-2024	1.41 to 4.81	0.06 to 2.44	4.3 to 23.7	<0.003 to 0.485
01-Jan-2025 to 31-Dec-2025	1.34 to 2.07	0.05 to 1.96	2.0 to 23.6	<0.003 to 0.177

TABLE A - 4: PRE- AND POST-IMPLEMENTATION RESULTS FROM THE SCHEDULE 15.1 SAMPLING – PREMISE (RESIDENTIAL)

Round	Dates	Number of Samples		Results Value Range		Percent (%) of Samples with Lead >0.01 mg/L
		Total	Lead >0.01 mg/L	Lead (mg/L)	Field pH	
1	20-Feb-2008 to 2-Apr-2008	105	18	<0.001 to 0.056	6.17 to 7.80	17%
2	2-Sep-2008 to 9-Oct-2008	106	36	<0.001 to 0.239	7.12 to 7.92	34%
3	26-Feb-2009 to 21-Mar-2009	100	10	<0.001 to 0.0118	6.94 to 7.41	10%
4	26-Sept-2009 to 15-Oct-2009	103	35	<0.001 to 0.0339	6.97 to 8.01	35%
5	15-Dec-2009 to 15-Apr-2010	110	28	<0.0005 to 0.0353	7.25 to 8.00	26%
6-22	Regulatory Relief					
23	15-Dec-2018 to 15-Apr-2019	50	5	<0.0001 to 0.0226	7.34 to 7.65	10%
24	15-June-2019 to 15-Oct-2019	53	5	<0.0001 to 0.0331	6.77 to 7.81	9%
25	15-Dec-2019 to 15-Apr-2020	50	4	<0.0001 to 0.0189	7.25 to 7.89	8%
26-29	COVID Regulatory Relief for lead sampling (premise)					

Round	Dates	Number of Samples		Results Value Range		Percent (%) of Samples with Lead >0.01 mg/L
		Total	Lead >0.01 mg/L	Lead (mg/L)	Field pH	
30	15-Jun-2022 to 15-Oct-2022	51	2	<0.0001 to 0.0152	7.38 to 7.64	4%
31	15-Dec-2022 to 15-Apr-2023	50	0	<0.0001 to 0.0070	7.22 to 7.73	0%
32	15-Jun-2023 to 15-Oct-2023	50	1	<0.0001 to 0.0152	7.14 to 7.63	2%
33	15-Dec-2023 to 15-Apr-2024	51	0	<0.0001 to 0.0063	7.34 to 7.87	0%
34	15-Jun-2024 to 15-Oct-2024	50	1	<0.0001 to 0.0118	7.08 to 7.56	2%
35	15-Dec-2024 to 15-Apr-2025	50	0	<0.0001 to 0.0075	7.12 to 7.67	0%
36	15-Jun-2025 to 15-Oct-2025	50	0	<0.0001 to 0.0086	7.26 to 7.64	0%

TABLE A - 5: PRE- AND POST-IMPLEMENTATION RESULTS FROM THE SCHEDULE 15.1 SAMPLING – PREMISE (NON-RESIDENTIAL)

Round	Dates	Number of Samples		Results Value Range		Percent (%) of Samples with Lead >0.01 mg/L
		Total	Lead >0.01 mg/L	Lead (mg/L)	Field pH	
1	20-Feb-2008 to 2-Apr-2008	10	1	<0.001 to 0.0270	6.94 to 7.30	10%
2	2-Sep-2008 to 9-Oct-2008	10	3	<0.001 to 0.0250	7.39 to 7.58	33%
3	26-Feb-2009 to 21-Mar-2009	12	3	<0.001 to 0.0502	6.82 to 7.72	25%
4	26-Sept-2009 to 15-Oct-2009	10	3	<0.001 to 0.0489	7.46 to 7.65	33%
5	15-Dec-2009 to 15-Apr-2010	10	3	<0.0005 to 0.0407	7.35 to 7.76	33%
6-22	Regulatory Relief					
23	15-Dec-2018 to 15-Apr-2019	5	0	0.0004 to 0.0092	7.41 to 7.72	0%
24	15-June-2019 to 15-Oct-2019	6	2	0.0006 to 0.0020	7.48 to 7.65	33%
25	15-Dec-2019 to 15-Apr-2020	5	2	0.0004 to 0.0029	7.48 to 7.89	40%
26-29	COVID Regulatory Relief for lead sampling (premise)					

Round	Dates	Number of Samples		Results Value Range		Percent (%) of Samples with Lead >0.01 mg/L
		Total	Lead >0.01 mg/L	Lead (mg/L)	Field pH	
30	15-Jun-2022 to 15-Oct-2022	5	1	<0.0001 to 0.0330	7.40 to 7.63	20%
31	15-Dec-2022 to 15-Apr-2023	5	0	<0.0001 to 0.0012	7.37 to 7.45	0%
32	15-Jun-2023 to 15-Oct-2023	5	0	<0.0001 to 0.0025	7.24 to 7.44	0%
33	15-Dec-2023 to 15-Apr-2024	5	0	<0.0001 to 0.0005	7.38 to 7.50	0%
34	15-Jun-2024 to 15-Oct-2024	5	0	<0.0001 to 0.0040	7.34 to 7.67	0%
35	15-Dec-2024 to 15-Apr-2025	5	0	<0.0001 to 0.0048	7.36 to 7.54	0%
36	15-Jun-2025 to 15-Oct-2025	5	0	<0.0001 to 0.0007	7.33 to 7.52	0%

TABLE A - 6: PRE- AND POST-IMPLEMENTATION RESULTS FROM THE SCHEDULE 15.1 SAMPLING – DISTRIBUTION SYSTEM

Round	Dates	Number of Samples		Results Value Range			Percent (%) of Samples with Lead >0.01 mg/L
		Total	Lead >0.01 mg/L	Lead (mg/L)	Field pH	Alkalinity (mg/L)	
1	20-Feb-2008 to 2-Apr-2008	20	0	<0.001 to 0.001	6.10 to 8.00	82 to 87	0%
2	2-Sep-2008 to 9-Oct-2008	21	0	<0.001 to 0.002	7.20 to 7.60	80 to 85	0%
3	26-Feb-2009 to 21-Mar-2009	20	0	<0.001 to 0.004	6.10 to 7.60	84 to 88	0%
4	26-Sept-2009 to 15-Oct-2009	20	0	<0.001 to 0.002	7.20 to 7.70	77 to 90	0%
5	15-Dec-2009 to 15-Apr-2010	23	0	<0.0005 to 0.0027	7.57 to 8.03	83 to 88	0%
6-22	Regulatory Relief						
23	15-Dec-2018 to 15-Apr-2019	10	0	0.0001 to 0.0025	7.36 to 7.66	82 to 89	0%
24	15-June-2019 to 15-Oct-2019	11	1*	<0.0001 to 0.0444	7.35 to 7.87	82 to 90	9%
25	15-Dec-2019 to 15-Apr-2020	10	0	<0.0001 to 0.0012	7.40 to 8.01	84 to 87	0%
26	15-June-2020 to 15-Oct-2020	10	0	<0.0001 to 0.0003	7.42 to 7.65	85 to 88	0%

Round	Dates	Number of Samples		Results Value Range			Percent (%) of Samples with Lead >0.01 mg/L
		Total	Lead >0.01 mg/L	Lead (mg/L)	Field pH	Alkalinity (mg/L)	
27	15-Dec-2020 to 15-Apr-2021	10	0	<0.0001 to 0.0018	7.39 to 7.60	86 to 88	0%
28	15-June-2021 to 15-Oct-2021	10	0	<0.0001 to 0.0003	7.23 to 7.45	83 to 86	0%
29	15-Dec-2021 to 15-Apr-2022	10	0	<0.0001 to 0.0006	7.47 to 7.87	87 to 90	0%
30	15-Jun-2022 to 15-Oct-2022	10	0	<0.0001 to 0.0003	7.47 to 7.59	86 to 93	0%
31	15-Dec-2022 to 15-Apr-2023	10	0	<0.0001 to 0.0002	7.21 to 7.59	89 to 90	0%
32	15-Jun-2023 to 15-Oct-2023	10	0	<0.0001 to 0.0005	7.24 to 7.53	85 to 88	0%
33	15-Dec-2023 to 15-Apr-2024	10	0	<0.0001 to 0.0003	7.36 to 7.59	84 to 88	0%
34	15-Jun-2024 to 15-Oct-2024	10	0	<0.0001 to 0.0004	7.27 to 7.46	88 to 91	0%
35	15-Dec-2024 to 15-Apr-2025	10	0	<0.0001 to 0.0007	7.34 to 7.62	85 to 87	0%
36	15-Jun-2025 to 15-Oct-2025	10	0	<0.0001 to 0.0012	7.32 to 7.63	85 to 87	0%

*Hydrant was found to contain a lead port. Resampling and analysis at the same hydrant had a lead result of <0.01 mg/L.

TABLE A - 7: PRE- AND POST-IMPLEMENTATION SUMMARY OF COPPER CONCENTRATIONS

Dates	Number of Samples	Copper Results (Range) (mg/L)
PRE-IMPLEMENTATION		
01-Jul-2016 to 30-Sept-2016	98	<0.002 to 0.0062
01-Nov-2016 to 30-Jan-2017	79	<0.002 to 0.0900
01-Mar-2017 to 30-Jun-2017	82	<0.002 to 0.0042
POST-IMPLEMENTATION		
01-Jan-2019 to 31-Dec-2019	114	0.0020 to 0.0931
01-Jan-2020 to 31-Dec-2020	55	0.0017 to 0.0633
01-Jan-2021 to 31-Dec-2021	COVID Regulatory Relief for sampling	
01-Jan-2022 to 31-Dec-2022	56	0.0012 to 0.0906
01-Jan-2023 to 31-Dec-2023	110	0.0014 to 0.2390
01-Jan-2024 to 31-Dec-2024	110	0.0013 to 0.1170
01-Jan-2025 to 31-Dec-2025	110	0.0010 to 0.0864

TABLE A - 8: PRE- AND POST-IMPLEMENTATION SUMMARY OF CHLORINE RESIDUALS AND HPC VALUES

Dates	DISTRIBUTION RESULTS RANGE	
	Combined Chlorine (mg/L)	HPC (CFU/1mL)
PRE-IMPLEMENTATION		
01-Jan-2018 to 07-Nov-2018	0.64 to 2.8	0 to 98
POST-IMPLEMENTATION		
08-Nov-2018 to 31-Dec-2018	0.93 to 2.8	0 to 64
01-Jan-2019 to 31-Dec-2019	0.51 to 3.06	0 to 1,010
01-Jan-2020 to 31-Dec-2020	0.11 to 2.81	0 to 2,200
01-Jan-2021 to 31-Dec-2021	0.19 to 2.85	0 to 1,720
01-Jan-2022 to 31-Dec-2022	0.51 to 2.95	0 to 810
01-Jan-2023 to 31-Dec-2023	0.04 to 2.90	0 to 1,700
01-Jan-2024 to 31-Dec-2024	0.08 to 3.05	0 to 188
01-Jan-2025 to 31-Dec-2025	0.61 to 2.92	0 to 176

NOTE: The City investigates locations with elevated HPC as part of their due diligence flushing and resampling program, as a proactive means of acting on water quality indicators. Previous elevated HPC tests were attributed to internal building plumbing, as these locations had very little or no water use. Increasing water use reduced stagnation and brought the results back to a baseline count.

TABLE A - 9: PRE- AND POST-IMPLEMENTATION SUMMARY OF RAW INFLUENT CONCENTRATIONS AND LOADINGS

Dates	ANNUAL AVERAGE RESULTS					
	WOODWARD AVENUE WWTP			DUNDAS WWTP		
	TP (mg/L)	Lab pH	TP Daily Loadings (kg/day)	TP (mg/L)	Lab pH	TP Daily Loadings (kg/day)
PRE-IMPLEMENTATION						
01-Jan-2018 to 31-Oct-2018	4.83	7.74	1,484	3.24	7.66	40
POST-IMPLEMENTATION						
01-Nov-2018 to 31-Dec-2018	5.55	7.72	1,897	3.29	7.71	44
01-Jan-2019 to 31-Dec-2019	4.25	7.69	1,560	3.22	7.67	42
01-Jan-2020 to 31-Dec-2020	5.49	7.61**	1,611	3.39	7.65	40
01-Jan-2021 to 31-Dec-2021	4.87	7.59	1,344	3.41	7.62	37
01-Jan-2022 to 31-Dec-2022	5.23	7.58	1,332	3.76	7.61	38
01-Jan-2023 to 31-Dec-2023	8.21	7.57	2,664	4.36	7.56	52
01-Jan-2024 to 31-Dec-2024	7.39	7.60	2,246	3.78	7.52	46

Dates	ANNUAL AVERAGE RESULTS					
	WOODWARD AVENUE WWTP			DUNDAS WWTP		
	TP (mg/L)	Lab pH	TP Daily Loadings (kg/day)	TP (mg/L)	Lab pH	TP Daily Loadings (kg/day)
01-Jan-2025 to 31-Dec-2025	9.32	7.62	2,672	4.25	7.56	49

NOTE: TP - Total Phosphorus as P

**For samples collected from May 29, 2021, to December 31, 2021, use lab pH results with caution as an electrode malfunction may have impacted the results.

TABLE A - 10: PRE- AND POST-IMPLEMENTATION SUMMARY OF FINAL EFFLUENT CONCENTRATIONS AND LOADINGS

Dates	ANNUAL AVERAGE RESULTS					
	WOODWARD AVENUE WWTP*			DUNDAS WWTP		
	TP (mg/L)	Lab pH	TP Daily Loadings (kg/day)	TP (mg/L)	Lab pH	TP Daily Loadings (kg/day)
PRE-IMPLEMENTATION						
01-Jan-2018 to 31-Oct-2018	0.443	7.85	138	0.052	7.70	0.65
POST-IMPLEMENTATION						
01-Nov-2018 to 31-Dec-2018	0.341	7.77	116	0.054	7.75	0.72
01-Jan-2019 to 31-Dec-2019	0.504	7.76	194	0.083	7.76	1.07
01-Jan-2020 to 31-Dec-2020	0.572	7.62**	171	0.108	7.45**	1.27
01-Jan-2021 to 31-Dec-2021	0.573	7.54	162	0.131	7.52	1.45
01-Jan-2022 to 31-Dec-2022	0.437	7.54	116	0.129	7.51	1.25
01-Jan-2023 to 31-Dec-2023	0.200	7.06	63	0.089	7.59	1.05
01-Jan-2024 to 31-Dec-2024	0.210	7.05	63	0.093	7.23	1.12

Dates	ANNUAL AVERAGE RESULTS					
	WOODWARD AVENUE WWTP*			DUNDAS WWTP		
	TP (mg/L)	Lab pH	TP Daily Loadings (kg/day)	TP (mg/L)	Lab pH	TP Daily Loadings (kg/day)
01-Jan-2025 to 31-Dec-2025	0.220	7.56	68	0.114	7.43	1.30

NOTE: TP - Total Phosphorus as P

Dundas CofA Limits for TP = 0.50 mg/L; TP Loadings = 9.1 kg/day; pH = 6.0 to 9.5 inclusive.

*Woodward Avenue ECA Final Effluent Compliance Limits changed October 30, 2024, following the commissioning of the Tertiary Treatment Facility. Previous ECA Limits: TP = 0.80 mg/L; TP Loadings = 327 kg/day; pH = 6.0 to 9.5 inclusive. The current Woodward Avenue ECA Limits for TP = 0.30 mg/L; TP Loadings = 123 kg/day; pH = 6.0 to 9.5 inclusive.

Woodward Avenue WWTP Data is an average of Final Effluent North and South. Beginning October 2022, the data is an average of Final Effluent 1 and 2, where the final treatment process moved from secondary to tertiary (third) level treatment as a result of the Woodward Avenue Wastewater Treatment Plant Upgrades.

**For samples collected from May 29, 2021, to December 31, 2021, use lab pH results with caution as an electrode malfunction may have impacted the results.