

AMENDMENT

Lead Reduction Plan for the City of Sarnia

November 2022



The Corporation of the City of Sarnia

255 Christina St N, Sarnia,

ON N7T 7N2

Executive Summary

Introduction. The Ministry of the Environment, Conservation and Parks (MECP) requested that the City of Sarnia (City) prepare a Lead Reduction Plan (LRP) through Conditions 1.10 and 1.11 of Schedule D, as outlined in the City's Municipal Drinking Water Licence (MDWL) for the Sarnia Water Distribution System (SWDS) (Licence Number 037-101, Issue Number 5, dated June 1, 2017). The Lead Reduction Plan (LRP) developed in 2018 identified a total of 8854 properties potentially serviced with a lead water line. The City had chosen to assess and evaluate both chemical treatment alternatives and lead source reduction alternatives as per the Lead Reduction Plan (LRP).

The investigation program conducted by the City since 2019 resulted in a much lower number of verified lead service lines (LSL) than initially anticipated. Thus in 2021, Ministry of the Environment, Conservation and Parks (MECP) approved the City's proposal to focus on accelerated Lead service line (LSL) removal and not to pursue the chemical treatment-based approach. This amendment to the Lead Reduction Plan (LRP) is in response to the conditions 1.10 and 1.11 of Schedule D, as outlined in the City's Municipal Drinking Water Licence (MDWL) for the Sarnia Water Distribution System (Licence Number 037-101, Issue Number 8, dated November 26, 2021). A summary of the City's investigation programs and proposed Lead reduction strategies are outlined in this plan.

Sampling Program. Parcels included in error and properties with a water service line size greater than one inch (1") (service lines > 1" will not be lead) were eliminated from the total number of estimated Lead service line (LSL)s. Thus the outstanding residential properties with possible lead lines were reduced to 8,221.

The City followed a two-tier sampling program in which a five-minute flush sample is collected and is followed by a 30-minute stagnation sample if the initial sampling result came back over 1 µg/L (microgram per litre). The City successfully managed to collect 7580 five-minute flush samples and 1627 thirty-minute stagnation samples from various properties in the Lead zone. Out of all the 5-minute samples collected, 1509 samples came back over 1 µg/L and out of all the 30-minute samples collected, 317 samples came back over 10µg/L for the analysis of total lead.

The City made several attempts to contact and collect samples from all the properties in the lead zone but was unable to collect samples from around 350 properties. The program will make attempts at these properties again, to collect the samples throughout 2022.

Verified Lead Service Lines. Over the past years, the City steered an extensive investigation program (water sampling, hydro-excavation, historical records, and maintenance notes) to determine which properties have lead service lines. The results recorded 142 properties with verified Lead service line (LSL)s that exceeded the Ontario Drinking Water Quality Standards of 10µg/L in the Sarnia Water Distribution System (SWDS).

Chemical Treatment Approach. In 2018, the City chose to evaluate the chemical treatment-based Lead reduction approach pertaining to the high number of Lead service line (LSL)s identified in the Lead

Reduction Plan (LRP). At the conclusion of the sampling and verification program in 2021, the City collected information from 97% of the properties in the Lead zone and verified that only 99 properties (~1%) had a city-owned Lead service line (LSL) and 88 properties (1%) had a privately-owned Lead service line (LSL), that exceeded the Ontario drinking water standard of 10µg/L.

Altering the water chemistry in the Sarnia Water Distribution System (SWDS) to inhibit lead leaching in 0.5% of the 26,000 serviced homes would not be the optimum technique. Rather, the City had placed an aggressive plan to remove all the Lead service line (LSL)s in both public and private portions.

Lead Replacement Strategy. In the accelerated Lead service line (LSL) removal plan, the City's Public Works division is in charge of replacing all City-owned lead service lines. The City is planning to complete 25-30 municipal replacements annually and to remove all the public Lead service line (LSL)s in four to eight years.

In order to assist homeowners to remove private Lead service line (LSL)s, the City launched a generous grant program in 2021. In this program, the City covers the full cost of replacing a Lead service line (LSL) in private property with limited restoration costs and coordinates the work with an independent contractor on behalf of the property owners. The property owner is required to take care of any additional restoration work and costs. In the case of a combined Lead service line (LSL), the contractor will remove the municipal Lead service line (LSL) at the same time. The program is retroactive to benefit the homeowners who have proactively replaced lead lines after January 1, 2019 until November 30, 2023. Homeowner shall submit their invoice for the completed replacement and the City can rebate the amount equal to the invoice (if below \$2500) or a maximum up to \$2500. After November 2023 program will switch to a grant program, where the homeowner has to coordinate the replacement themselves with a maximum grant of \$1500 from the City.

The City has performed 7 private Lead service line (LSL) replacements until now through the assistance grant program and is planning to complete thirty to forty private side replacements annually. At this rate, the City can remove all the Lead service line (LSL)s in the Sarnia Water Distribution System (SWDS), in the next four (4) to eight (8) years.

Local Health Unit. In coordination with the local health unit, the City will enclose a 'Lead in Drinking Water' fact sheet from Lambton Public Health (LPH) with every lead verification result letter sent to the homeowners. The fact sheet outlines the toxicity of lead and the steps to reduce exposure to lead in water. It also requests homeowners to contact Lambton Public Health (LPH) for more information, if any homeowners have more concerns/situations/problems about lead results. The City of Sarnia along with Lambton Public will consult to put an appropriate plan of action together to address specific concerns and needs of the homeowner. The City's sampling result inventory and the list of properties that are above 10µg/L will be sent to Lambton Public Health for their records.

Public Outreach. The City's existing outreach efforts in partnership with Lambton Public Health consist of notifying property owners and consumers with Lead service line (LSL)s about the risks posed by lead and the appropriate steps to reduce those risks. Letters are sent to properties communicating the free Lead testing, testing results, assistance programs and factsheets. The City uses the website, local

newspapers, press releases, mailouts and door hangers to encourage homeowners to participate in the Lead reduction program.

Sensitive Population. To protect sensitive populations such as infants, children under 6, and expecting or breastfeeding mothers the City has implemented the filter rebate program, replacement assistance program, and public outreach and awareness program.

Implementation Monitoring Plan. The City will monitor the distribution for any elevated levels of lead during the Lead Removal Program implementation using the following sampling methods.

- Distribution sampling - Eight (8) Summer samples (June to October) and eight (8) Winter Samples (December to April) from various locations in the Sarnia Water Distribution System (SWDS) will be collected. The results will be analyzed and documented.
- Residential sampling - Starting in 2023, The City will attempt to collect four (4) - five(5) minute grab samples in the Spring (April to June) and four (4) - five(5) minute grab samples in the Fall (September to November) from different residential properties outside of the Lead Zone. The results will be analyzed and documented.
- Lead sampling when water in the distribution system is below 10°C (degree Celsius) will yield lower results since the level of lead leaching into the drinking water system is temperature dependent.
- Time frame - The monitoring plan will remain effective until one (1) year after the last Lead Service Line removal is completed within the Lead Reduction Program.

Post Implementation Monitoring. The City has implemented a post-replacement monitoring program to evaluate the effectiveness of the Lead service line (LSL) replacements. Following are the proposed sampling programs:

- Short-term post-replacement sampling. This mandatory sample will be collected from all the properties that participated in the replacement assistance program six (6) to twelve (12) months after the Lead service line (LSL) replacement. In 2022, the City will be attempting to collect water samples from 57 properties where an Lead service line (LSL) replacement was performed in the past.
- Long-term post-replacement sampling. In this process, the City will monitor a property for three years after Lead service line (LSL) replacement. Two samples collected in the first two consecutive years will be analyzed and if the results are below 10 µg/L, the property will be eliminated from the program or else a third sample will be collected in the third year and results will be recorded. In 2023, the City will be attempting to collect water samples (Year 2 samples) from 57 properties under the long-term post-replacement sampling program. This post-sampling program will continue and will remain effective for all Lead service line (LSL) replacements coordinated by the City.

Partial Lead service line replacement. Since the start of the Lead Program, the City's capital project conducted four (4) partial Lead service line (LSL) replacements. If the crew did find a lead service connected to the watermain, they replaced them up to the curb stop at the property line. Around that time, the City had limited information on the material on the private side. The City will give priority to those properties to enroll in the replacement assistance program along with an option to participate in

the filter rebate program. Furthermore, the Lead Program will coordinate with the on-site capital projects' crew to perform a full replacement if they find a combined Lead service line (LSL) i.e., Lead on both the City and private sides.

Conclusion of the Lead Reduction Program. Since 2019, the City made yearly attempts to contact all the properties in the Lead zone and encourage them to participate in the Lead reduction program. Once the City reaches the end of the 2022 sampling program;

- all the remaining properties within the Lead Zone that have not been sampled for lead will have a note attached to their "Tax Certificate" stating "Possible lead drinking water service line. Contact Public Works". Thus, in case of the sale of the property, future homeowners will have full disclosure when tax records are requested, and
- the Lead Reduction Program will be made available, for testing and grant program for Lead service line (LSL) removal at the time of property ownership change.

Long Term Monitoring Plan. The long-term monitoring plan will take effect one year after the end of the Lead Reduction Program and will continue to monitor the distribution system as follows;

- Remaining Lead Services. The City's Public Works Department will replace a city-side lead service line if one is found during a water main break, sewer repair, etc. All City side lead services found during a capital project will be replaced. The City will contact the homeowners to perform a full replacement if the on-site capital projects' crew finds a combined or a private lead service line. The replacement rebate program will be available to the properties in the Lead Zone in which the homeowner has to coordinate the private side replacement themselves with a maximum grant of \$1500 from the City.
- Residential Sampling. After the conclusion of the Lead Reduction Program, free lead water testing will be made available to all the properties in the Lead Zone that are without a sample.
- Distribution Sampling. The City in coordination with the Ontario Clean Water Agency (OCWA) will collect eight (8) Summer samples (June to October) and eight (8) Winter Samples (December to April) from various locations in the Sarnia Water Distribution System (SWDS). For the first two years, the samples will monitor alkalinity and ph and for the third year, alkalinity, ph and lead will be monitored. This process will continue for all years going forward.
- Drinking-Water Quality Standards. If the acceptable lead concentration in the drinking water is revised to 5µg/liter as per the Canadian Drinking Water Quality guidelines established by Health Canada in collaboration with the Federal-Provincial-Territorial Committee on Drinking Water (CDW), the City will incorporate those properties (already recorded by the Lead Removal Program) that fall into the revised range into the Lead Reduction Program by offering those properties (as needed); sampling, filter rebates, excavation/exploration of lead water service lines for lead verification, and grants for removal.

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Acronyms and Abbreviations

| | |
|-------|---|
| City | City of Sarnia |
| LAWSS | Lambton Area Water Supply System |
| MECP | Ministry of the Environment, Conservation and Parks |
| LRP | Lead Reduction Plan |
| LSL | Lead service line |
| MDWL | Municipal Drinking Water Licence |
| µg/L | micrograms per litre |
| mg/L | milligrams per litre |
| NSF | National Sanitation Foundation |
| WTP | Water treatment plant |
| MAC | Maximum acceptable concentration |
| SWDS | Sarnia Water Distribution System |
| POU | Point of Use |
| OCWA | Ontario Clean Water Agency |
| LPH | Lambton Public Health |

1. Introduction and Lead Reduction Program

The City of Sarnia (City) services a population of approximately 72,000 with purchased treated drinking water from the Lambton Area Water Supply System (LAWSS). Like many cities in North America, there was a period when the water service lines, that connected the watermain under the road to the water meter in the home, were made of lead.

1.1 Sarnia Water Distribution System (DWS Number 260003136)

The City of Sarnia is located on the south shore of Lake Huron, across the St. Clair River from Eastern Michigan. The Sarnia Water Distribution System (SWDS) services the population through 26,000 service connections. The City’s Public Works Division is the operating authority of the Sarnia Water Distribution System (SWDS).

1.2 Lead Reduction Plan (LRP)

The Ministry of the Environment, Conservation and Parks (MECP) requested that the City prepare a Lead Reduction Plan (LRP), per Section 10.0 of the Ministry of the Environment, Conservation and Parks (MECP)s Guidance Document for Preparing Corrosion Control Plans for Drinking Water Systems (Guidance Document), through Conditions 1.10 and 1.11 of Schedule D, as outlined in the City of Sarnia’s Municipal Drinking Water Licence (MDWL) for the Sarnia Water Distribution System (Licence Number 037-101, Issue Number 5, dated June 1, 2017).

The initial version of the Lead Reduction Plan developed in 2018 by Jacobs (a third-party consultant later known as CH2M Hill Canada Limited) identified a total of 8854 properties to be within the zone where the age of the properties meant that the service lines could potentially be lead. The lead zone is classified into the Primary Suspected Lead Zone and Secondary Suspected Lead Zone. The “Primary Zone” is bounded by Murphy Road and the St. Clair River (east to west) and Highway 402 to St. Andrew St (north to south). The Secondary Zone includes properties by Lakeshore Road, Exmouth St and London Line as shown on the map. The Lead Reduction Plan (LRP) prepared and presented demonstrated that the City had chosen to assess and evaluate both chemical treatment alternatives and lead source reduction alternatives as per the plan.

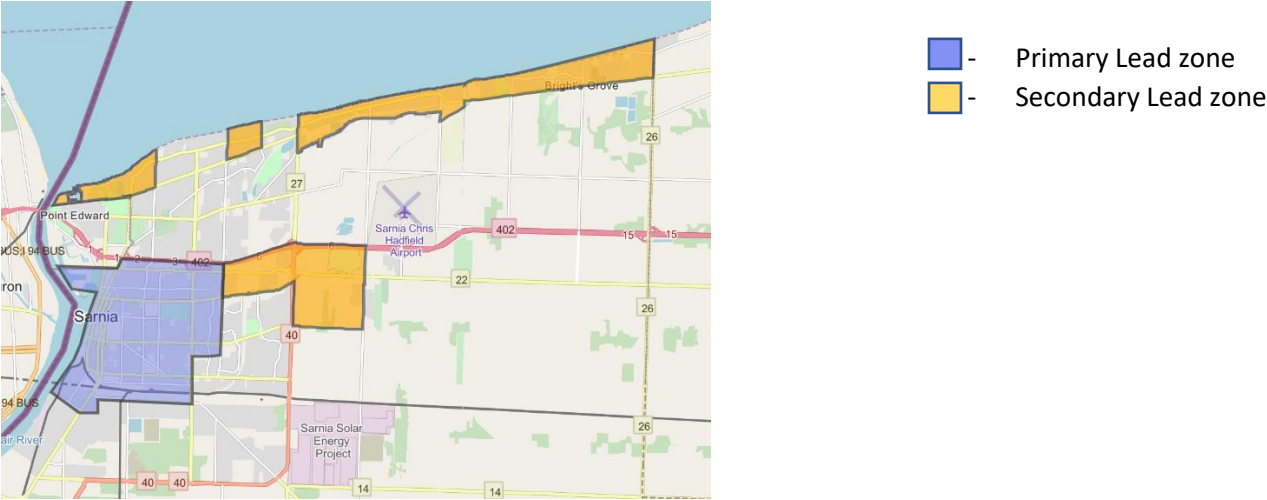


Figure 1 Lead Zone: area with suspected Lead in the City

1.3 Lead Reduction Plan Modification Proposal

Over the past years, the City has conducted an extensive investigation program to determine which properties have lead service lines and found the total number of Lead Service Lines (LSL) is much lower than predicted at the beginning of the program. In 2021, a summary of the Lead Reduction Program progress and result assessment was presented to the Ministry of the Environment, Conservation and Parks (MECP). As a result of the lower number of lead services than initially estimated, the City submitted a proposal to remove the obligation to perform three different studies (Member Municipal Impact Study, Pipe Loop Study, Coagulation Optimization Study) required for a treatment-based lead reduction approach as outlined by the Lead Reduction Plan (LRP), but rather focus more on an accelerated lead source reduction.

The Ministry of the Environment, Conservation and Parks (MECP) approved the proposal and removed the City's requisite to perform the studies and further requested the City to update the Lead Reduction Plan (LRP) through Conditions 1.10 and 1.11 of Schedule D, as outlined in the City of Sarnia's Municipal Drinking Water Licence (MDWL) for the Sarnia Water Distribution System (Licence Number 037-101, Issue Number 8, dated November 26, 2021).

1.4 Lead Reduction Plan Amendment

This amendment to the Lead Reduction Plan was prepared in response to Conditions 1.10 and 1.11 of Schedule D, of the City's Municipal Drinking Water Licence (MDWL). Based on very positive early results from the investigation program, which showed significantly fewer lead service lines than originally anticipated, the City had chosen to perform an accelerated lead service replacement program. This report will include a summary of the sampling program and assessment of results, an explanation of why a treatment-based approach is not feasible, strategies for the lead service replacement program with timelines, public outreach initiatives, coordination with the local health unit and protecting the sensitive population, and outlines sampling monitoring plans during the implementation and post-implementation stages.

1.5 Coordination with Local Health Unit

In coordination with the local health unit, the City will enclose a 'Lead in Drinking Water' fact sheet from Lambton Public Health (LPH) with every lead verification result letter sent to the homeowners. The fact sheet outlines the toxicity of lead and the steps to reduce exposure to lead in water. It also requests homeowners to contact Lambton Public Health (LPH) for more information, if any homeowners have more concerns/situations/problems about lead results. The City of Sarnia along with Lambton Public will consult to put an appropriate plan of action together to address specific concerns and needs of the homeowner. The City's sampling result inventory and the list of properties that are above 10µg/L will be sent to Lambton Public Health for their records.

2. Summary of the Sampling Program and Results Assessment

This section summarizes the Lead service line (LSL) verification sampling program conducted by the City from 2019 to 2021.

2.1 Lead Verification under Lead Reduction Plan (LRP)

The initial studies conducted on the Sarnia Water Distribution System (SWDS) identified a total of 8,854 properties that could potentially be serviced by a lead water line. After eliminating parcels that were included in error (empty lots, parking lots, demolished structures, etc.) there were a total of 8,639 properties remaining. The City conducted an accelerated Lead service line (LSL) verification sampling program from 2019 to 2021.

2.1.1 Sampling Rate

The Lead Reduction Plan (LRP) was estimated to sample 40% of homes in the potential lead zone throughout the past three years (2019 to 2021) i.e., sampling 1,200 homes annually.

2.1.2 Sampling Protocol

The City followed a two-tier verification sampling protocol.

- Tier-1 sampling: Flush the tap for five minutes. Collect a 500-millilitre sample for analysis of total lead. This flushed sample is collected by the City staff.
- Tier-2 sampling: If lead detected in the flushed sample was over 1 ug/L, the City staff returned to the home to conduct a lead profile consisting of a five-minute flush followed by a 30-minute stagnation. After the stagnation period, the City staff collected the first two consecutive litres in two individual bottles for analysis of total lead in the premise plumbing and the service line.

2.2 Summary of the Sampling Program (2019 – 2021)

In the past three years, the City attempted to collect water samples from all potential homes in the lead zone as per the sampling protocol mentioned in the Lead Reduction Plan (LRP) (section 2.1). This sampling is at no cost to the homeowner and the sampling of an address is predicted to take place one week after the delivery of a notice using the assumed consent method. If the homeowner preferred to have an appointment, the staff scheduled a time as requested. The City staff collected a majority of water samples from an outside tap as permitted in 2020 by the Ministry of the Environment, Conservation and Parks (MECP).

2.2.1 Potential Homes

As the Lead program progressed, 418 properties were eliminated from the estimated total number (8,639), being classified as either apartment, multi-unit residential complexes, businesses, government buildings, hospitals, long-term care homes, schools, or parks. This elimination was also supported by the fact that the water service lines with a size greater than one inch (1") will not be of Lead material. Thus the outstanding residential properties suspected with lead lines were reduced to 8,221.

2.2.2 Sampling Progress

The sampling program has proven to be more successful than originally intended. The following table shows the sampling progress made in the past years.

| Year | Number of 5-min Flush Samples Collected | Number of 30-min Stagnation Samples Collected |
|--------------|---|---|
| 2021 | 1161 | 1012 |
| 2020 | 4191 | 273 |
| 2019 | 1964 | 207 |
| Until 2018 | 264 | 135 |
| Total | 7580 | 1627 |

Table 1 Sampling Progress

2.3 Result Assessment

The City has successfully managed to collect 7580 five-minute samples and 1627 thirty-minute stagnation samples from various properties in the Lead zone.

- Out of the total 7580 five-minute samples collected, 1509 samples came back over 1 µg/L for the analysis of total lead.
- Out of the 1509 thirty-minute samples collected, 317 samples came back over 10µg/L for lead

2.4 Remaining Samples

Since 2019, the City has contacted and attempted to collect samples from properties in the lead zone on numerous occasions through means of sending letters, leaving flyers, and going door to door. The City was unable to collect samples from a few properties due to one of the following reasons: the gate was locked, water was shut off, water access was blocked, etc. The total number of the remaining samples are listed below:

- Remaining 5-min flush sample – 234
- Remaining 30-min stagnation sample – 105

The program will make attempts at these properties again, to collect the samples throughout 2022.

3. Treatment-based Lead Reduction Approach

This section examines why a chemical treatment-based approach would not be feasible in Sarnia Water Distribution System (SWDS) to control corrosion.

3.1 Lead Reduction Plan and Long-term Goal

The initial version of the Lead Reduction Plan developed in 2018 anticipated a higher number of properties (than actual) that could potentially be serviced by lead lines. Thus, Lead Reduction Plan (LRP) considered the total number of lead water service line removal for the City as a long-term goal. For the interim period, the plan proposed a chemical treatment-based approach to inhibit the lead from leaching into the water.

3.2 Investigation Program

Since 2019, data from multiple sources such as water sampling results, service line explorations results, historical records, and public work maintenance sheets were used to identify properties serviced with lead water pipelines. The total number of suspected properties was further reduced to 8,221 as mentioned in section 2.2 (Potential Homes).

At the conclusion of the 2021 Water Sampling Program, 7631 (93%) different properties were sampled. A further 358 (4%) properties were able to be categorized using historical records (Capital projects, public works maintenance, etc.). Combining these two major sources of information shows that the City's Lead Reduction Program has collected data from 7987 (97%) of the properties identified as possibly being serviced by a lead water line. This leaves 234 properties (3%) from which the Lead Program has not been able to collect data.

3.3 Verified Lead Services

An extensive investigation program was conducted by the City on the 8221 properties and it was found that only 99 properties (~1%) had a verified city-owned lead service line and 88 properties (1%) had a verified privately-owned lead service line, that exceeded the Ontario drinking water standard of 10µg/L. The numbers will differ at the completion of all the planned verification sampling and exploration procedures. The total number of water services in the City of Sarnia is 26,000. Therefore approximately 0.3% of the privately-owned service lines and 0.4% of the publicly-owned service lines are composed of lead.

3.4 Accelerated Lead service line removal

- The investigation programs have resulted in much lower numbers of lead service lines than predicted at the beginning of the program.
- Changing the water chemistry to inhibit lead leaching in 0.5% of the 26,000 homes serviced in the Sarnia Water Distribution System (SWDS) is not justifiable.
- With the actual physical number of Lead Water service lines to be removed under 300, the City will strive to put in place an aggressive removal plan for the lead services in both public and private homes and will try to accomplish a significant portion of the removal within the next four to eight years

4. Proposed Lead Reduction Strategy

Based on the results of the lead verification initiative the City carried out, the City has updated its strategies to reduce/eliminate the lead in the Sarnia Water Distribution System (SWDS). This section describes the City's updated lead reduction strategies.

4.1 Process Flow

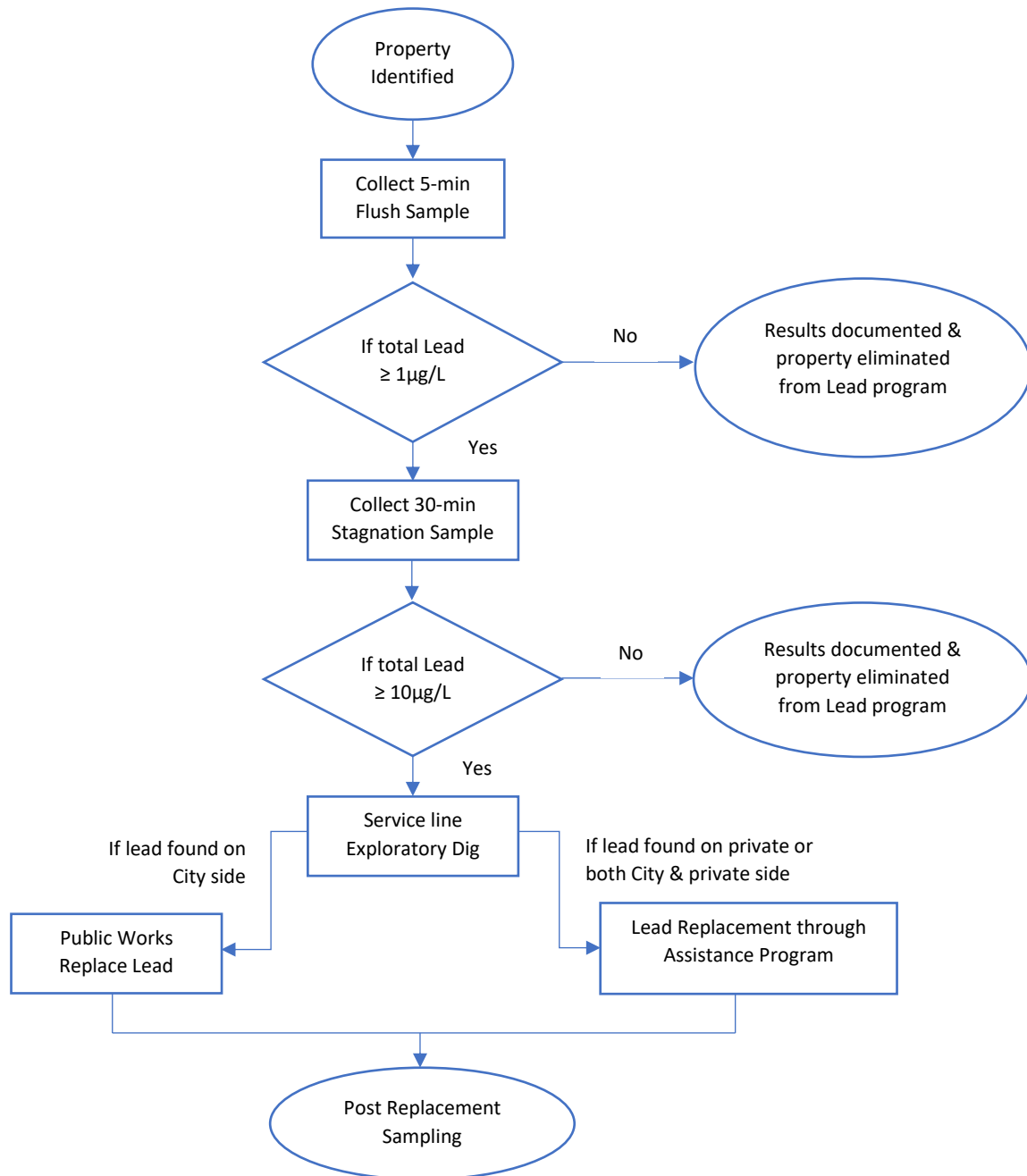


Figure 2 Process Flow - Lead Reduction Program

4.2 Lead Service Line Verification by Exploration

Based on the results of the sampling program, the properties with a total lead over 10µg/L are scheduled for an exploratory dig. In this investigation process, the service line is exposed using hydro-excavation. This process enables the City to physically verify the water service line material on both municipal and private portions.

4.3 Total number of verified Lead Service Lines (LSL)

Over the past years, the City has conducted an extensive investigation program to determine which properties have lead service lines. Through various methods such as water sampling, exploration, historical records, and maintenance notes, it was found that only 142 (2%) out of the 8,221 properties have verified lead water service lines in the water distribution system that exceeds the Ontario Drinking Water Quality Standards of 10µg/L as of today.

| Lead Portion | # |
|--------------------------------|------------|
| City-side | 54 |
| Combined (Both City & private) | 45 |
| Private side | 43 |
| Total Lead Lines | 142 |

Table 2 Verified Lead Service Lines

The properties are categorized based on the results from the investigation program for the presence of lead such as lead on the City, combined or private side.



Figure 3 Responsibility Division

- City portion: Length of the water line from the Water main to the property line (curb stop or shut-off valve)
- Private portion: Length of the water line from the property line (curb stop or shut-off valve) to the house connection

4.4 Lead Service Line Replacement Program

The City's Public Works division is in charge of replacing all City-owned lead service lines and in 2021 the City launched a replacement assistance program to help homeowners to remove lead service lines on private portions. The replacement strategies are discussed in the following sections.

4.4.1 City Lead Line Replacement

The water line from the water main to the property line consisting of Lead is replaced by the Public Works or by a capital project. This replacement is performed only when the lead is present on the City portion and not on the private side. The City has performed 296 lead replacements on the public side as of today.

- The following table shows the completed replacements in the past years;

| Year | Number of public replacements completed |
|--------------|---|
| 2021 | 26 |
| 2020 | 24 |
| Until 2019 | 246 |
| Total | 296 |

Table 3 Total City side replacements

- The City is planning to complete 25-30 municipal replacements annually.
- At the current rate of replacements, the City can remove all the public lead service lines that are verified and yet to be found, in the next four (4) to eight (8) years.

4.4.2 Combined (City & Private) and Private Lead Line Replacement

As the total number of lead services in the private portion is low and in order to quickly remove all the Lead service line (LSL)s, the City launched a generous grant program in 2021. This program covers the full cost of replacing a service line with limited restoration costs and coordinates the work on behalf of the property owner.

If the lead is on both the private and the City side, the best practice is to remove all lead in a service line at once. As a result, for combined lines, there would have to be a coordination with the private side plumber if the City wasn't coordinating the work. The City coordinating all the removals upfront simplifies the work.

Homeowner assistance program. The City covers the full cost of replacing the lead service lines (LSL) with limited restoration costs and coordinates the work with an independent contractor on behalf of the property owners. Eligible homeowners are contacted and requested to sign a commitment form as the primary step of enrollment. An independent contractor will replace the Lead service line (LSL)s from the watermain to the house connection at the property. The work will include the replacement of lead lines and limited restoration such as seeding/sodding and filling gravel on asphalt/concrete driveways. The City will cover all the costs of lead line replacement and limited restoration directly with the independent contractor. The property owner is required to take care of any additional restoration work and costs.

The program is retroactive to benefit the homeowners who have proactively replaced lead lines after January 1, 2019 until November 30, 2023. Homeowner shall submit their quote and invoice for previous lead line replacement and the City can rebate the amount equal to the invoice (if below \$2500) or a maximum up to \$2500 for an Lead service line (LSL) replacement that is completed.

This program will only run until November 2023 and will then switch to a grant program, where the homeowner has to coordinate the replacement themselves with a maximum grant of \$1500 from the City.

Replacement Program Progress. In 2021, the City contacted 62 eligible properties under this program and received 45 applications enrolling with the replacement program. The City has performed 7 Lead service line (LSL)s replacements until now. The details of the completed replacements are as follows:

| ID | Address | Replacement Date | Independent Contractor |
|----|-----------------|-------------------|------------------------|
| 1 | 512 Cromwell St | November 17, 2021 | Cope Constructions |
| 2 | 544 Cromwell St | November 16, 2021 | Cope Constructions |
| 3 | 548 Cromwell St | November 9, 2021 | Cope Constructions |
| 4 | 564 Cromwell St | November 10, 2021 | Cope Constructions |
| 5 | 569 Cromwell St | November 12, 2021 | Cope Constructions |
| 6 | 576 Cromwell St | November 8, 2021 | Cope Constructions |
| 7 | 585 Cromwell St | November 15, 2021 | Cope Constructions |

Table 4 Private Replacements in 2021

The City is planning to complete thirty to forty private side replacements in 2022. At this rate, the City can remove all the Lead service line (LSL)s in the Sarnia Water Distribution System (SWDS), in the next four (4) to eight (8) years.

4.5 Coordination with Local Health Unit

In coordination with the local health unit, the City will enclose a ‘Lead in Drinking Water’ fact sheet from Lampton Public Health (LPH) with every lead verification result letter sent to the homeowners. The fact sheet outlines the toxicity of lead and the steps to reduce exposure to lead in water. It also requests homeowners to contact Lampton Public Health (LPH) for more information, if any homeowners have more concerns/situations/problems about lead results. The City of Sarnia along with Lampton Public will consult to put an appropriate plan of action together to address specific concerns and needs of the homeowner. The City’s sampling result inventory and the list of properties that are above 10µg/L will be sent to Lambton Public Health for thier records.

4.6 Public Outreach Program

Public outreach and communication are the foundation of the City’s lead management strategy. As part of the outreach program, the City is working to expand outreach efforts to alert property owners and consumers with lead service lines about the risks posed by lead and the appropriate steps to reduce those risks. In partnership with Lambton Public Health, the City’s existing outreach efforts consist of the following:

- Letters and door hangers to homeowners communicating the free lead testing offered
- Letters to homeowners communicating results from lead testing
- Letters to homeowners communicating the discovery of a private or municipal Lead service line (LSL) and an application form to enroll in the replacement program
- Letters to homeowners communicating removal of a private or municipal Lead service line (LSL)
- Fact sheets from Lambton Public Health and point-of-use (POU) filter applications are enclosed with all results letters

- Website content maps the suspected lead zone, discusses the risks associated with lead and summarizes the measures to reduce exposure to lead
- News articles in local newspapers on the Lead program's progress, and new programs
- Press releases with the City's Lead reduction program progress

4.7 Strategies to Protect Sensitive Populations

The City has implemented measures to protect sensitive populations such as infants, children under 6, and expecting or breastfeeding mothers. The following are the currently executed strategies toward this goal:

- **Filter Rebate Program.** The City is offering Water Filter Rebates to those properties that either has a lead sampling result above 10µg/L or are serviced with a lead service line. Residents who live in a home with a lead service line are advised to use an appropriate filtration device (approved by the National Sanitation Foundation, NSF-053). Priorities are given to properties with sensitive populations while processing the filter rebate applications. This filter rebate program will be in effect until the City concludes the Lead Reduction Program.
- **Homeowner Assistance and Accelerated Lead Replacement Program.** The homeowner assistance program launched in 2021 aims to remove all the lead service lines in the next four to eight years. The program covers the full cost of replacing the lead service lines (LSL) with limited restoration costs and coordinates the work on behalf of the property owners.
- **Public Outreach Program.** The City has implemented its outreach and education program to create awareness about the harmful effects of lead consumption and the measures that can be taken to eliminate the risks.

4.8 Monitoring Plan during Implementation

The proposed monitoring plan discusses the City's strategies to detect any elevated levels of lead in the Sarnia Water Distribution System (SWDS) and methods to monitor the effectiveness of the updated lead reduction plan during implementation.

4.8.1 Distribution Monitoring Sampling

The City plans to monitor the water distribution system during the Lead Reduction Plan (LRP) implementation by coordinating with the Ontario Clean Water Agency (OCWA). In this sampling type, eight (8) Summer samples (June to October) and eight (8) Winter Samples (December to April) from various locations in the Sarnia Water Distribution System (SWDS) will be collected. The results will be analyzed and documented.

Lead sampling when water in the distribution system is below 10°C (degree Celsius) will yield lower results since the level of lead leaching into the drinking water system is temperature dependent.

4.8.2 Residential Monitoring Sampling

Starting in 2023, The City will attempt to collect four (4) - five(5) minute grab samples in the Spring (April to June) and four (4) - five(5) minute grab samples in the Fall (September to November) from different residential properties outside of the Lead Zone. The results will be analyzed and documented.

Lead sampling when water in the distribution system is below 10°C (degree Celsius) will yield lower results since the level of lead leaching into the drinking water system is temperature dependent.

4.8.3 Monitoring Plan Time frame

The City is planning to remove all the Lead service line (LSL)s in the Sarnia Water Distribution System (SWDS), in the next four (4) to eight (8) years. The monitoring plan will remain effective until one (1) year after the last Lead service line (LSL) removal is completed within the Lead Reduction Program.

4.9 Post Implementation Monitoring

The City has implemented a post-replacement monitoring program to evaluate the effectiveness of the Lead service line (LSL) replacements. Following are the proposed sampling programs to monitor the properties after replacement:

4.9.1 Short-term Post-Replacement Sampling

A post-replacement water sampling is intended to take place approximately 6 and 12 months following a replacement. The new results are compared with the previous 5-minute flush and 30-minute stagnation samples. The variance is calculated and the results are recorded. This sampling program is mandatory for all homes participating in the no-cost replacement program. By signing the lead service line replacement application form, the homeowner consents the City to collect this sample 6-months after the replacement.

In 2022, the City will be attempting to collect water samples from 57 properties where an Lead service line (LSL) replacement was performed in the past.

4.9.2 Long-term Post-Replacement Sampling

Through the long-term post-replacement sampling program, the City plans to monitor the lead levels at a replacement location for a period of up to three years. Prior notice will be sent to the homeowner notifying the sampling schedule. This will not be a mandatory sampling program and the homeowner has the option to opt-out of this process if desired.

The sampling program is intended to take place as follows after the completion of Lead service line (LSL) replacement:

- Year 1 – the results from the initial short-term post-replacement sampling will be recorded,
- Year 2 – a 5-minute flush sample will be collected from the property
- If both the sampling (Year 1 and Year 2) results are below 10 µg/L, the property is eliminated from the Lead program or else the sampling continues for one more year
- Year 3 – a 5-minute flush sample will be collected from the property and the results will be recorded.

In 2023, the City will be attempting to collect water samples (Year 2 samples) from 57 properties under the long-term post-replacement sampling program. This post-sampling program will continue and will remain effective for all Lead service line (LSL) replacements coordinated/completed by the City.

4.10 Impact of Partial Lead Service Replacements

This section discusses the impacts of partial Lead service line (LSL) replacements and the City's strategies to discourage such replacements. A partial Lead service line (LSL) replacement implies conducting Lead

service line (LSL) replacement on the public side of properties alone while the private portion remains a Lead connection.

4.10.1 Previous Partial Lead service line Replacements

Even though the City's Lead Program does not recommend partial Lead service line (LSL) replacements, four (4) such Lead service line (LSL) replacements were performed in the past years through the City's Capital projects. If the crew did find a lead service connected to the watermain, they replaced them up to the curb stop at the property line. Around that time, the City had limited information on the material on the private side.

4.10.2 Proposed Strategy

The following new measures will be taken concerning partial Lead service line (LSL) replacements:

- A water filter rebate application will be sent to the addresses with a partial Lead service line (LSL) replacement and these properties will be given priority to enroll in the replacement program.
- The City's Lead Program will coordinate with the on-site capital projects' crew to perform a full replacement if they find a combined lead service line.

4.11 Conclusion of the Lead Reduction Program

Since 2019, the City has made yearly attempts to contact all the properties in the Lead zone and encourage them to participate in the Lead reduction program. Once the City reaches the end of the 2022 sampling program;

- i. all the remaining properties within the Lead Zone that have not been sampled for lead will have a note attached to their "Tax Certificate" stating "Possible lead drinking water service line. Contact Public Works". Thus in case of the sale of the property, future homeowners will have full disclosure when the tax records are requested, and
- ii. the Lead Reduction Program will be made available, for testing and grant program for Lead service line (LSL) removal at the time of property ownership change.

4.11.1 Long Term Monitoring Plan

The long-term monitoring plan will take effect one year after the end of the Lead Reduction Program and will continue to monitor the distribution system as follows;

4.11.1.1 Remaining Lead Services

The City will strive to remove lead if a lead service line is found in a subsequent scenario:

- I. **Lead Replacement by Public Works.** The City's Public Works Department will replace a city-side lead service line if one is found during a water main break, sewer repair, etc.
- II. **Lead Replacement by Capital Projects.** All City side lead services found during a capital project will be replaced. The City will contact the homeowners to perform a full replacement if the on-site capital projects' crew finds a combined or a private lead service line.

- III. The City will agree to investigate if a LSL is found during other work or by other means for multiple lead services or if it is an isolated case by;
 - a) Document review of a representative sample of properties in proximity from the confirmed LSL checking the age of the built house and watermain
 - b) Representative water sampling (5 min grab and if needed 30 minute stagnation) of properties in proximity from the confirmed LSL property.
 - c) If all below allowable Lead concentration then it will be deemed an "isolated" case.
 - d) If other properties are over the allowable Lead concentration an exploratory dig will be performed to determine if there is any lead and if so what side it falls on.
 - e) If there are multiple LSL's (more than 1) the representative water sampling proximity will be expanded.

- i. **Private Lead Replacement.** The replacement rebate program will be available to the properties in the Lead Zone in which the homeowner has to coordinate the private side replacement themselves with a maximum grant of \$1500 from the City.

4.11.1.2 Residential Sampling

After the conclusion of the Lead Reduction Program, free lead water testing will be made available to all the properties in the Lead Zone that are without a sample.

The city will include free Water sampling for Lead for houses outside the identified Lead zones as long as they residences meet the following criteria;

- 1) Watermain installed prior to 1960 and residence built prior to 1960

Excerpt from CH2M Hill Canada (now Jacobs) original report for the LRP;

"It was assumed that the practice of installing lead services ceased around 1957. Using GIS, a preliminary list of addresses was developed based on watermains that were originally installed in 1957 or earlier. Addresses on this list were populated with "suspected lead" for the material of both the public and private lines, also known as the primary and secondary "Lead Zones"

4.11.1.3 Distribution Sampling

The City in coordination with the Ontario Clean Water Agency (OCWA) will monitor the water distribution after the conclusion of the Lead Program. In this sampling type, eight (8) Summer samples (June to October) and eight (8) Winter Samples (December to April) from various locations in the Sarnia Water Distribution System (SWDS) will be collected. For the first two years, the samples will monitor alkalinity and ph and for the third year, alkalinity, ph and lead will be monitored. This process will continue for all years going forward.

4.11.1.4 Drinking-Water Quality Standards

If the acceptable lead concentration in the drinking water is revised to 5µg/liter as per the Canadian Drinking Water Quality guidelines established by Health Canada in collaboration with the Federal-Provincial-Territorial Committee on Drinking Water (CDW), the City will incorporate those properties

(already recorded by the Lead Removal Program) that fall into the revised range into the Lead Reduction Program by offering those properties (as needed); sampling, filter rebates, excavation/exploration of lead water service lines for lead verification, and grants for removal.