APEX COMPANIES, LLC

Sudbury Lead Service Line Inventory and Replacement - Final Report

PREPARED FOR:

Sudbury Water District
199 Raymond Road
Sudbury, MA 01776

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

LIST OF ABBREVIATIONS

AC	Asbestos Cement
AMI	Advanced Metering Infrastructure
AMR	Automated Meter Reading
ANSI	American National Standards Institute
ASR	Annual Statistics Report
BABA	Build America Buy America
BIL	Bipartisan Infrastructure Law
CI	Cast Iron
DPH	Department of Public Health
DWP	Drinking Water Program
DWSRF	Drinking Water State Revolving Fund
EPA	US Environmental Protection Agency
ESWTP	East Street Water Treatment Plant
GIS	Geographic Information System
GRR	Galvanized Requiring Replacement
IUP	Intended Use Plan
LCR	Lead and Copper Rule
LCRI	Lead and Copper Rule Improvements
LCRR	Lead And Copper Rule Revisions
LG	Lead Or Galvanized
LSU	Lead Status Unknown
LSL	Lead Service Lines
LSLR	Lead Service Line Replacement
MassDEP	Massachusetts Department of Environmental Protection
MCLG	Maximum Contaminant Level Goal
MG	Million Gallon(s)
NONLSL	Non-Lead Service Lines
NSF	US National Science Foundation
PDF	Portable Document Format
PEF	Project Evaluation Form
PFAS	Per- and polyfluoroalkyl substances
PPB	Parts Per Billion
PPM	Parts Per Million
PWS	Public Water Supply
QA	Quality Assurance
RLDWA	Reduction of Lead in Drinking Water Act
RRWTP	Raymond Road Water Treatment Plant
SDWA	Safe Drinking Water Act
SLI	Service Line Inventory
SRF	State Revolving Fund
UNK	Unknown
USPHS	US Public Health Service
WSMP	Water System Master Plan
XRF	X-Ray Fluorescence
VOCs	Volatile Organic Compounds

SECTION 1 INTRODUCTION

SECTION 1.1 PUBLIC WATER SYSTEMS HISTORY WITH LEAD

Historically, lead was a common material for water pipe installations in the US. Lead is a durable metal that is also malleable and easy to work with in earthwork environments; it is not prone to rust and is not as expensive to produce as copper. Installation of lead pipes in the United States on a major scale began in the late 1800s, particularly in the larger cities. By 1900, more than 70 percent of cities with populations greater than 30,000 used lead water lines (US EPA, 2023). Lead pipe was also combined with iron pipe to create a lead-lined iron; this composite pipe configuration prevented the iron oxide from rusting the pipe from the inside while reducing the overall cost of a lead service. These lead-lined services were often galvanized on the exterior to extend their service life and, as a result, were referred to simply as galvanized services by the water system personnel who worked with them. Water suppliers often installed lead gooseneck to connect the service to the corporation stop when rigid water service materials were used. Gooseneck materials are often not defined on historical tie-card data, making their presence difficult to verify.

With the large-scale introduction of lead service pipes, numerous public health and newspaper accounts of lead poisoning from drinking water began to appear with increasing frequency. From the late 1800s to the early 1900s, numerous journal articles and reports appeared documenting the dangers to human health from lead exposure. In 1890, the Massachusetts State Board of Health advised the state's cities and towns to avoid the use of lead pipes. By the 1920s, many cities had concluded that the public health risks outweighed the engineering advantages of lead, and then revised local and state plumbing codes to prohibit or limit the use of lead in pipes for water distribution.

Until the formation of the United States Environmental Protection Agency (EPA) in 1970, there were few federal-level standards and enforcement mechanisms in the United States regarding approved plumbing materials for public water systems. Regulation of water systems prior to the formation of the EPA fell to the US Public Health Service (USPHS), which had a much broader mandate of protecting and promoting the health and safety of the nation. USPHS published drinking water regulations in 1925, 1946, and 1962. Regulations focused mainly on the bacteriological quality of drinking water. The USPHS 1962 Drinking Water Standards listed a federal limit on lead concentrations in drinking water at 0.05 mg/l or 50 parts per billion (ppb). The 1962 standards reference lead in pipes as the primary contributor but do not enforce any limitations on its use. An excerpt from the 1962 standards states:

> "A principal source of lead in municipal drinking waters is lead pipe and goosenecks in house services and plumbing systems. The practice of using lead pipe is still permitted by many plumbing codes." (USPHS, 1964)

At the time of the 1962 Drinking Water Standards, the USPHS believed humans would have some baseline environmental exposure to lead that could not be mitigated. USPHS referenced lead concentrations in the air (a direct result of lead gasoline), the workplace (leaded paint and other products), food, and drinking water.

Local plumbing code requirements often did not have jurisdiction over water systems outside of structures. Each water system had significant autonomy in deciding on suitable service materials. Furthermore, manufacturers, which often distributed country-wide, had little incentive to adjust their processes for local-level efforts to adjust material selection, making it economically disadvantageous to prohibit lead use.

In 1986, Congress amended the Safe Drinking Water Act, prohibiting the use of lead pipes, solder, or flux in public water systems or plumbing in facilities providing water for human consumption. Lead-free was a defined term

that changed depending on the product in reference. Solders and flux, used in plumbing systems, were defined as lead-free when they contained less than 0.2 percent lead. Pipes and fittings were classified as lead-free when they contained less than 8 percent lead.

In 1989, the US National Science Foundation (NSF) established a set of rules for manufacturers regarding the maximum lead concentrations in waterworks products at the EPA's request. The NSF 61 standard referred to "wetted" parts that would directly contact drinking water, while the less restrictive NSF 372 referred to "non-wetted" parts that would not contact drinking water directly but would be an appurtenance of a valve or fitting.

In 1991, EPA published the Lead and Copper Rule (LCR) to minimize lead and copper concentrations in drinking water. The rule established a maximum contaminant level goal (MCLG) of zero for lead in drinking water and a treatment technique to reduce corrosion of lead and copper within the distribution system. Over the years, the LCR has received updates and revisions, and is further explained in Section 1.2 below.

In 2011, the Reduction of Lead in Drinking Water Act (RLDWA) amended the 1986 lead ban to reduce the lead-free definition to 0.25 percent lead as a weighted average with respect to wetted surfaces.

SECTION 1.2 LEAD & COPPER RULE

The 1991 LCR established the first regulatory sampling and reporting mechanism of lead and copper concentrations taken from the customer's tap instead of at the entry point to the distribution system. This sampling approach more accurately captured the concentrations of lead precipitating into the system from the distribution infrastructure and internal plumbing. If the action level of 15 parts per billion (ppb) of lead or 1.3 parts per million (ppm) of copper is detected in more than 10 percent of the samples collected by each water system, the water system must begin steps to control the corrosivity of the water. In addition, public notification must occur, if the action level of lead is exceeded.

In 2000, EPA made minor revisions to the LCR and required each public water system to optimize corrosion control. If the system was deemed "optimized" and little to no corrosion occurred in the distribution system, then the water system could reduce monitoring to once every three years. In addition, the EPA made small changes to public education and monitoring requirements.

In 2007, the EPA again revised the LCR to address confusion regarding sample collection by clarifying the number of samples and sites required. In addition, it clarified that all the samples must be collected in the same calendar year. The revisions also included reduced monitoring requirements for systems that did not exceed the regulatory threshold for a given number of years. Furthermore, the 2007 revisions required the primary agency to approve the changes, if a water system wanted to change its corrosion control treatment system. Additionally, the water system must also provide notification of tap water monitoring results for lead to the owner and/or occupants.

Section 1.2.1 LCR Monitoring Rules

The initial LCR primarily focused on corrosion control chemistry and sampling frequency. Systems that test under the action level for three years in a row qualify for reduced monitoring. The table below provides a high-level breakdown of Massachusetts's LCR Sampling tiering classifications:

Table 1: Massachusetts LCR Sample Site Tiering Classifications for Community Public Water Supply (PWS)

LCR Tiering Classification	Sub-Classification
Tier 1	• 1A – Single family residences with a confirmed LSL • 1A2 – Multi-family residence with a confirmed LSL (only if less than 20% of connections served by the PWS are multi-family residences) • 1A3 – any residence with a confirmed lead gooseneck • 1B – Single family residences with confirmed lead/tin solder (built in 1983, 1984, or 1985) • 1B2 – Single family residences with verified lead/tin solder built in 1986 or later
Tier 2	• 2C – Multi-family residence with confirmed LSL • 2D – Multi-family residence with confirmed lead/tin solder (built 1983, 1984, or 1985) • 2E – Any private building with confirmed LSL • 2F – Private building with lead pipe or copper pipe installed in 1983, 1984 or 1985.
Tier 3	• 3G – Single family residences built prior to 1983 • 3H – Other/exceptional cases

Note: LCR sample site monitoring will change by January 2025 with the LCR Revisions coming into effect. Please see Section 1.3 below for changes.

The 2007 LCR required standard monitoring to be completed once every 6 months. PWS that qualify for reduced monitoring were allowed to conduct sampling once every three years. The lead and copper action levels for 15 ppb for lead and 1.3 ppm for copper respectively. An action level exceedance occurs when 10 percent or more of samples exceed the action level. All customers who volunteer for reduced monitoring at their residence are due to receive the laboratory results from the PWS and the PWS must include results and statements about lead and copper sampling in the annual consumer confidence reporting. Any exceedances of the lead or copper action levels trigger public notification requirements. The PWS is required to sample a number of sites based on the number of persons served by the PWS. Table 2 below breaks down the minimum number of sample sites based on population served.

Table 2: LCR Required Minimum Number of Sample Sites vs Population Served

Population Served by PWS	Minimum Number of Sample Sites	
	Standard Monitoring (Every 6 months)	Reduced Montoring (Annually or once every 3 years)
>100,000	100	50
10,001 – 100,000	60	30
3,301 – 10,000	40	20
501 – 3,300	20	10
101 – 500	10	5
100 or less	5	5

As required in the LCR, PWS must prioritize sample sites according to the highest risk for lead exposure based on the tiering system listed in Table 1 above. The PWS must submit their sampling plan to the primary agency for approval prior to conducting monitoring and must justify the use of lower risk sample sites.

SECTION 1.3 2021 LEAD & COPPER RULE REVISIONS

In December 2021, the EPA finalized the lead and copper rule revisions (LCRR), which addresses the lead exposure from drinking water that had not been successfully eliminated with the past versions of this rule. The LCRR is the first major update in the EPA's plan to revamp the LCR into a lead removal effort with the goal of replacing 100 percent of lead service lines (LSLs). The LCRR stops short of mandating replacements, focusing on inventorying the extent of lead exposure each water system faces. Section 1.4 further describes the mandatory replacements that are expected to be required in the proposed LCR Improvements.

The EPA set the primary deadline of the LCRR requiring every water system to develop and submit an initial inventory of all their service lines, including public and private side material, by October 16, 2024. Failure to do so requires tier 3 public notification. Appendix A provides the Massachusetts drinking water public notification requirements for the LCRR.

Apex Companies, LLC (Apex) has listed below the additional requirements of the LCRR that each water system must comply with:

1. Verify as many service lines of unknown material as possible, as unknown lines are classified as lead until proven otherwise.
2. Prepare an LSL replacement plan if the system has LSLs.
3. Revise the LCR sampling pool locations to align with the new sampling tiers, subject to review and approval by the primary agency. (See Table 4 below)
4. Prepare a sampling plan and communication for lead testing in schools. PWS must offer sampling to all schools and daycare facilities connected to the water system.
5. Within 30 days of the submission of the inventory, send consumer notifications to customers with the following identified service line materials:
    - Lead service lines (See Appendix B for template notification)
    - Galvanized service lines requiring replacement, presumed to be lead-lined iron services and/or services with a lead gooseneck, (See Appendix C for template notification)
    - Unknown service line materials (See Appendix D for template notification and Appendix E for list of addresses)
    - PWS must notify new customers activating service on property falling into the material categories noted above with the notification provided at the time-of-service activation.
6. Notify customers of specific health effects language approved by the state regarding lead exposure, steps a person can take to reduce exposure, information and opportunities for how to replace a lead service, as well as programs and financing solutions to assist with replacement. PWS must notify customers of unknown service line materials while also providing methods and ways to properly identify the service line material. (See Appendices mentioned above for template notifications)
    - PWS must notify properties with the above-listed materials annually until all lead is removed from the system. PWS must submit annual reports to the State by July 1st, with proof of notification delivery to the impacted customers for the previous calendar year. All notifications must contain required public education materials and resources for property owners. Failure to certify notification by July 1st requires a tier 3 public notification. (See Appendix A)

Table 3 lists the EPA's LCRR requirements and its enforcement date accordingly. The Massachusetts Department of Environmental Protection (MassDEP)is the primary agency referred to in Table 3 below.

Table 3: LCRR Water System Requirements

LCRR Requirements	Date
Initial Inventory and Associated Reporting	
Develop initial LSL inventory (includes making inventory publicly accessible).	October 16, 2024
Submit initial inventory to the State	October 16, 2024
PWS will receive a Tier 3 Public Notification for failure to submit the initial LSL inventory to the State by October 16, 2024.	Starting October 16, 2024
Notification of Service Line Material and Associated Reporting	
Notify customers of known or potential service line containing lead within 30 days of completion of the inventory (initial) and repeat notification on an annual basis until the entire service connection is no longer lead, galvanized requiring replacement, or unknown. For new customers, PWS shall also provide the notice at the time-of-service initiation.	Within 30 days of submission of the inventory, and then annually
Provide revised lead health effects language in public education materials to ensure consistent notification messaging with public notification requirements.	Starting October 16, 2024
Submit annual reporting to the State by July 1 confirming that the PWS provided notification and delivered lead service line information materials to affected consumers with lead, galvanized requiring replacement, or unknown service lines for the previous calendar year. PWS shall provide a copy of the notification and information materials to the State.	July 1, 2025, and then annually
PWS will receive a Tier 3 Public Notification for failure to certify to the State that the system notified persons served at service connections of a known or potential service line containing .	Starting October 16, 2024
Public Notification and Associated Reporting (See Appendix A)	
Provide Tier 1 public notification for exceeding the lead action level, as specified in§ 141.80(c)to persons served by the water system no later than 24 hours after the system learns of the exceedance.	Starting October 16, 2024
Send a copy of the Tier 1 public notification for lead Action Level exceedance to the primary agency and the EPA Administrator no later than 24 hours after the system learns of the exceedance.	Starting October 16, 2024
Provide revised lead health effects language as required in Tier 1 public notification for lead action level exceedance and Tier 2 and 3 public notifications for violations.	Starting October 16, 2024

MassDEP has further defined LCRR requirements and notifications for the state of Massachusetts, including developing a standardized macro-enabled spreadsheet for the development of initial inventories. MassDEP will only accept inventory submissions from its standard spreadsheet after a validation process is completed using the pre-programmed macros. Furthermore, PWS must submit a completed Certification of Non-Lead Service Lines (NONLSL) with the initial inventory that do not contain any lead, galvanized, or unknown service materials. For water systems with lead, galvanized, or unknown services, PWS must submit a plan for replacement and further classification of unknowns with the initial inventory. MassDEP encourages all water systems to plan replacement of all LSLs within a 5-year period.

MassDEP also requires an updated inventory of all unknown water service line materials within 30 days of the end of each tap sampling monitoring period. The frequency of the inventory submissions will match the frequency of LCR monitoring. The requirement shall remain until all lead, galvanized, or unknown services are removed from the system. Furthermore, PWS must re-evaluate and report on tap sampling locations used in their sampling pool prior to the next round of LCR sampling, water systems with lead, galvanized, or unknown services.

Section 1.3.1 LCRR Monitoring Rules

For the LCRR, the EPA revised the sample site tiering classification of the LCR, which will take effect by January 2025. All PWS subject to the LCRR, including those with currently approved LCR monitoring schedule, must begin standard (semiannual) monitoring by January 2025, unless the PWS:

1. Has no LSL, galvanized requiring replacement (GRR), or unknown water services in its LSL.
2. Contains any Tier 1B and/or Tier 3H sample sites in its sampling plan
3. Collects all water samples in accordance with LCRR sampling rules of 310 CMR 22.06B(7)(b).
4. Does not exceed the lead action level during currently approved LCR monitoring schedules between 2021 and October 2024.

If all four above conditions are met, the PWS can continue monitoring at a reduced frequency in 2025. Based on the information above, the Sudbury Water District (the District) will be on standard monitoring in 2025. Table 4 below clarifies the changes in the LSL sampling tiering classifications for community water systems.

Table 4: LCRR changes to sample site tiering classifications for Massachusetts Community PWS

Previous LCR Tier Classification	New LCRR Tier Classification
Tier 1B – Single family residences with confirmed lead/tin solder (built in 1983, 1984, or 1985)	**Tier 4** – Single family residences that contain copper pipes with lead solder installed before the effective date of the state's applicable lead ban
Tier 3H - Other/exceptional cases	**Tier 5** – Single family structures or buildings, including multiple family residents that are representative of sites throughout the distribution system. a representative site is a site in which the plumbing materials used at that location would be commonly found at other locations serviced by the PWS. Non-residential sites may be used if there are an insufficient number of single family or muti family residential sites available.

The number of sample sites required under the LCR is the same as under the LCRR. The LCRR made some minor changes to the sampling procedures at sample sites. Appendix F describes these changes in further detail.

SECTION 1.4 LEAD & COPPER RULE IMPROVEMENTS

The next set of regulatory updates to the LCR are called the Lead and Copper Rule Improvements (LCRI), which EPA proposed on November 30, 2023, and have not yet been finalized. The draft text of the rule currently requires the following:

1. Replacing all lead and galvanized service lines within ten years of the final LSL inventory due date (i.e., October 16, 2034).
    a. The draft regulations include provisions for states to set shorter deadlines or deferred deadlines for water systems with less or more lead respectfully to enable full compliance. Massachusetts may accelerate the replacement requirement to five years (i.e., October 16, 2029).
    b. The draft regulations mandate a full water service replacement when the service line is "under the control" of the water system; this is defined as having adequate access (legal and physical). EPA has placed additional restrictions on when partial replacements of lead service lines are acceptable, limited to emergency repairs or in coordination with unrelated infrastructure work. A dielectric coupling will be required in these instances to prevent galvanic corrosion.
2. Requiring updated inventories three years after the LCRI baseline inventory, if lead, galvanized, or unknown services are present. EPA will also require replacement plans and plans to further identify unknowns. This secondary submission will mandate:
    a. Records on the gooseneck and connector materials.
    b. Supplemental verification of previously identified non-lead services that were not determined by physical inspection or records review verification methods.
    c. All unknown service materials must be fully identified by the replacement deadline.
3. Revising the LCR sampling protocols for LSLs to include 5th-liter sampling that would start after October 2024.
4. Lowering the lead action level from 15 ppb to 10 ppb.
5. Water systems must regularly update their inventories, create a publicly available service line replacement plan, and identify the material of all service lines of unknown material.
6. Water systems with lead action level exceedances would be required to conduct additional outreach and make lead-free filters available to all consumers.

If the LCRI is published by October 16, 2024, the EPA will pause conflicting aspects of the LCRR monitoring plan. PWS will need to continue complying with the original LCR until 2027, at which point the LCRI will take effect. PWS still must comply with LCRR inventory requirements. The EPA will require compliance with the LCRI three years after final publication, currently scheduled for October 2027.

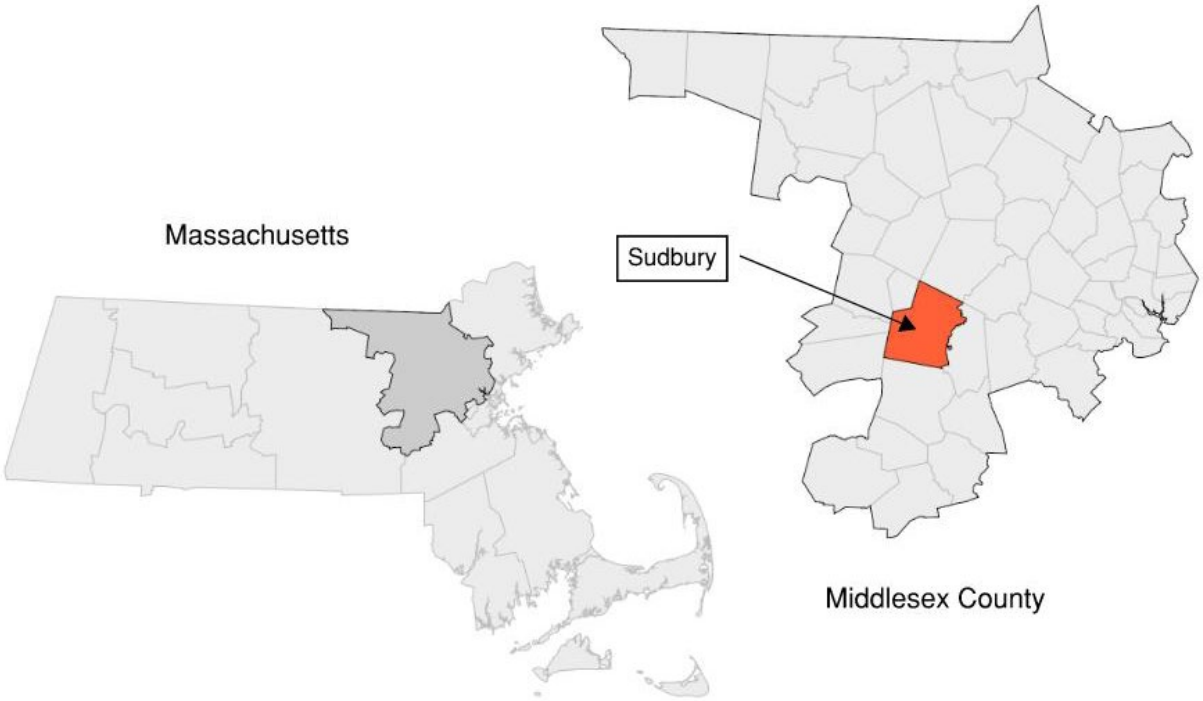
SECTION 1.5 WATER SYSTEM OVERVIEW

The District provides drinking water and fire protection to the Town of Sudbury, Massachusetts. In 1934, the District was constituted by vote to establish a town water supply. The District currently supplies drinking water to 18,416 customers with the following facilities:

- nine groundwater wells,
- two treatment plants,
- 136.5 miles of water mains, and
- four above ground storage tanks.

The Town of Sudbury is in Middlesex County and borders Stow, Hudson, and Marlborough to the west; Wayland to the east; Framingham to the south; and Maynard and Concord to the north. Figure 1 presents a locus map of Sudbury below.

Figure 1: Town of Sudbury Locus Map



Sudbury is one of the oldest towns in New England and was incorporated in 1638. The Town of Sudbury was primarily agricultural until post-World War II and the emergence of the automobile. Currently the town is mainly suburban with its population steadily growing since the 1970s and reaching 18,934 as of the 2020 census. Figure 2 shows the general breakdown of community development by structure age.

Figure 2: Approximate age of neighborhoods throughout Sudbury

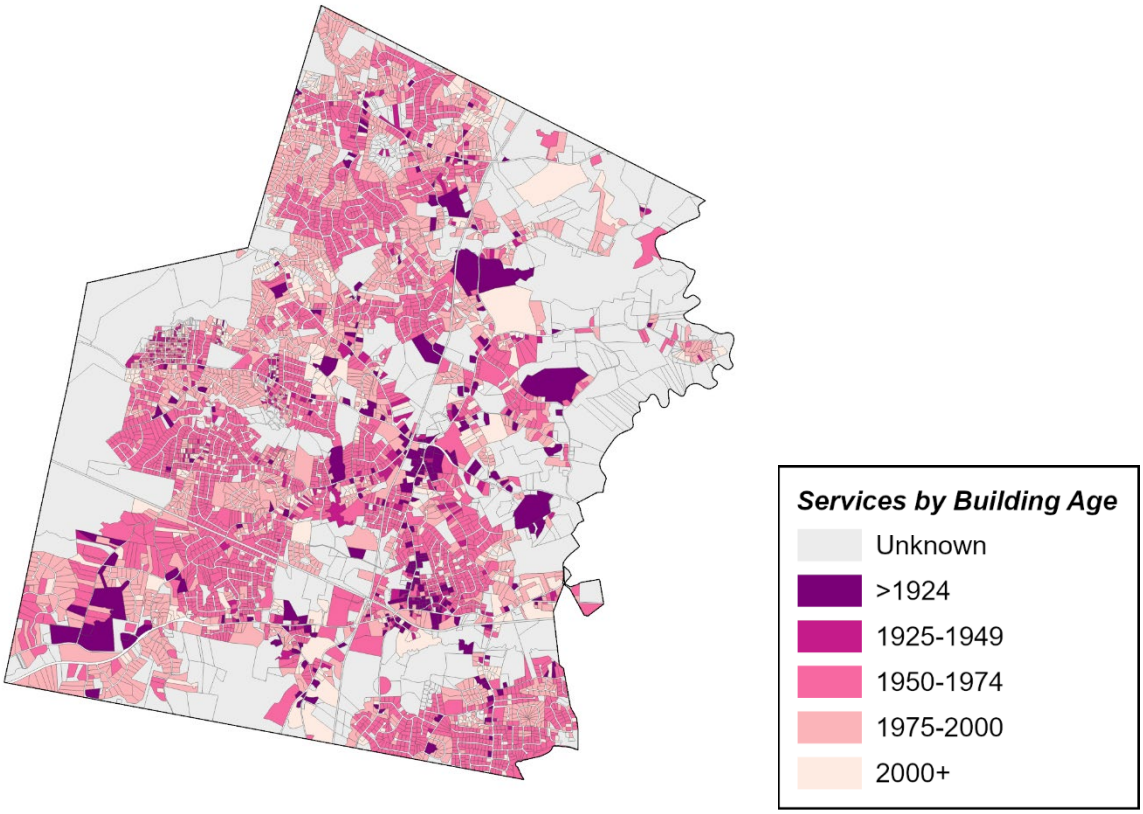
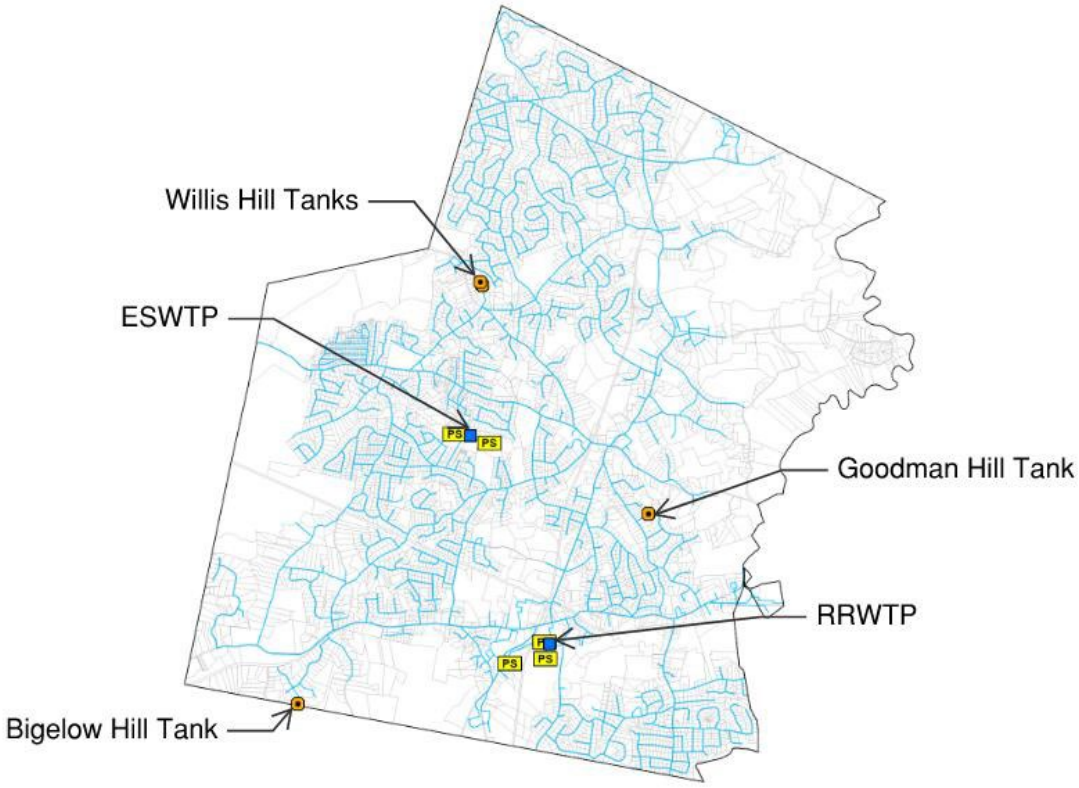


Figure 2 was created using assessor data for building age of the structure on the parcel. The age was classified into groups reflecting the early 1900s, mid-1900s, late 1900s, and the 20th century. As shown in the figure, most developments in Sudbury occurred between 1950-1974. However, certain areas of town have considerable portions developed after 1975. Of the areas built after 1975, there is a significant concentration in the town's more rural sections of town as farmland was repurposed for housing needs.

The water system currently has four water storage tanks: Goodman Hill Tank, Bigelow Hill Tank, and two Willis Hill Tanks with a total storage volume of 6.35 million gallons (MG). The system's water distribution piping consists of approximately 137 miles of pipe, ranging in diameter from 4 inches to 16 inches. The Town's piping consists primarily of asbestos cement and cement-lined ductile iron. A map of the water distribution system is shown in Figure 3 below.

Figure 3: Sudbury Water District: Water Distribution System



The District currently operates eight groundwater wells to produce water. Wells 4 and 6 serve as active standalone treatment facilities, supplying finished water directly to the distribution system. Wells 2A, 7, and 9 supply raw water to the District's Raymond Road Water Treatment Plant (RRWTP). The RRWTP treats water with air stripping to reduce volatile organic compounds (VOCs), Greensand Plus filtration, sodium hypochlorite for disinfection, sodium hydroxide for pH adjustment, and sodium fluoride for fluoridation. The District has recently designed and implemented Per- and polyfluoroalkyl substances (PFAS) at the RRWTP.

Wells 3A, 8A, and 10 supply raw water to the East Street Water Treatment Plant (ESWTP). The ESWTP uses chlorine gas for disinfection, sodium hydroxide, and sodium fluoride. The District will also begin construction of upgrades and improvements at the at the ESWTP for removing PFAS in the fall of 2024.

The District has a ninth permitted well, Well 5, which is out of service due to water quality issues. The water system consists of one pressure zone with all existing sources withdrawing raw water from the Concord River Basin. The treated water is then distributed to the storage tanks and customers. Table 5 below provides a breakdown of the water service use categories below.

Table 5: Sudbury Water District Water Service Connections

Use Category	Number of Service Connections	Description
Residential	6030	Water provided to residences in the distribution system, including apartments, condos, and seasonal homes.
Residential Institutions	0	Water provided to institutions with residential population such as colleges.
Commercial/Business	268	Water service to businesses and other commercial entities.
Agricultural	5	Water is used to grow food, raise animals, or run a garden center.
Industrial	5	Water is used mainly for industrial purposes.
Municipal/Institutional/Non-profits	47	Water used for municipal purposes, including schools, playing fields, municipal buildings, treatment plants, non-profits such as churches, and non-residential institutions such as private schools.
Other	17	Water used for purposes not included in above categories.
Total	**6372**	

SECTION 2 WATER SERVICE CLASSIFICATION

The Massachusetts Department of Environmental Protection (MassDEP) developed an inventory template for LSL data collection with 26 attribute fields to be populated with the template describing each attribute field. Apex used available water system records to populate the MassDEP template and compile the service line inventory (SLI) for the Sudbury Water District.

SECTION 2.1 MATERIAL IDENTIFICATION

All service lines connected to the public water distribution system, regardless of ownership status, must be included in the SLI. Systems must include all service lines, regardless of the actual or intended use and include the following:

- Service lines with non-potable applications, such as for fire suppression or those designated for emergency use. These service lines could be repurposed for potable or non-emergency use.
- Service lines connected to vacant or abandoned buildings, even if they are unoccupied and the water service is turned off.

Water services are classified as:

1. Lead Service Lines (LSL),
2. Galvanized Requiring Replacement (GRR),
3. lead status unknown service lines (UNK),
4. or non-lead service lines.

Goosenecks or pigtails were included in the compilation of the inventory if the record separately noted the material. Otherwise, they were noted as "UNK". Lead goosenecks or connectors are not a required inventory element under the LCRR, but EPA strongly recommends tracking them. Galvanized pipes are iron, or steel piping dipped in zinc to prevent corrosion and rusting. These can be lined with lead or can absorb lead (legacy lead) and continue to contribute lead in drinking water. Water services are classified as GRR if:

1. It is or ever was at any time downstream of an LSL,
2. It is currently downstream of a lead status unknown service line, or
3. There was no available evidence to demonstrate that it was never downstream of an LSL.

Split ownership services are water service lines where a portion of the service is owned by the system and the other by the customer. The material on each the public side (system-owned portion) and the private side (customer-owned portion) are classified independently, and the template generates an entire water service line classification. The template defaults to the classification on either side, which is the worst case. For example, if the public side was identified as non-lead and the private side was identified as lead, the entire service's classification was lead.

SECTION 2.2 RECORDS REVIEW

To determine the material of each water service, Apex reviewed and organized all available applicable documents, such as Geographic Information System (GIS) data, water main installation record drawings, capital improvement plans, and master plans, to gain a preliminary understanding of service materials throughout the system and identify areas of the distribution system that predate the 1986 Safe Drinking Water Act (SDWA) lead ban.

In addition, Apex reviewed all available water service tie cards, installation and maintenance/repair records, meter installation records, and any other provided documentation regarding the existing services within the water system to determine the material of the existing water services connected to the PWS.

The District scanned every water service tie card and maintenance record in the District's database into portable document format (PDF) and uploaded them to their existing GIS system. Records were found for 5,906 services connected to the District's distribution system. Apex transposed all pertinent information to the District's LSL Inventory database and confirmed that not all records contained useful information beyond how to locate the curb stop. Assumptions were made during the data review process to ensure consistency with data documentation. Section 3 of this report describes these assumptions.

SECTION 2.3 PHYSICAL INSPECTIONS

The District did not embark on a dedicated field verification program of water services to develop the initial inventory; however, the District has collected some limited basement inspection records as part of regular water system maintenance. This information was collected during other maintenance work, such as meter leaks, meter replacements, final reads, or other service calls. These methods may have included field/visual inspection with or without full excavation, responses to customer complaints, inspections to locate leaks, inspections to investigate meter issues, and cross-connection inspections.

SECTION 3 QUALITY ASSURANCE

Throughout the initial inventory collection, Apex took several steps to ensure that the collected data was verified for accuracy and consistency. This section explains the steps and methods used to ensure the reported inventory remains at a high level of confidence.

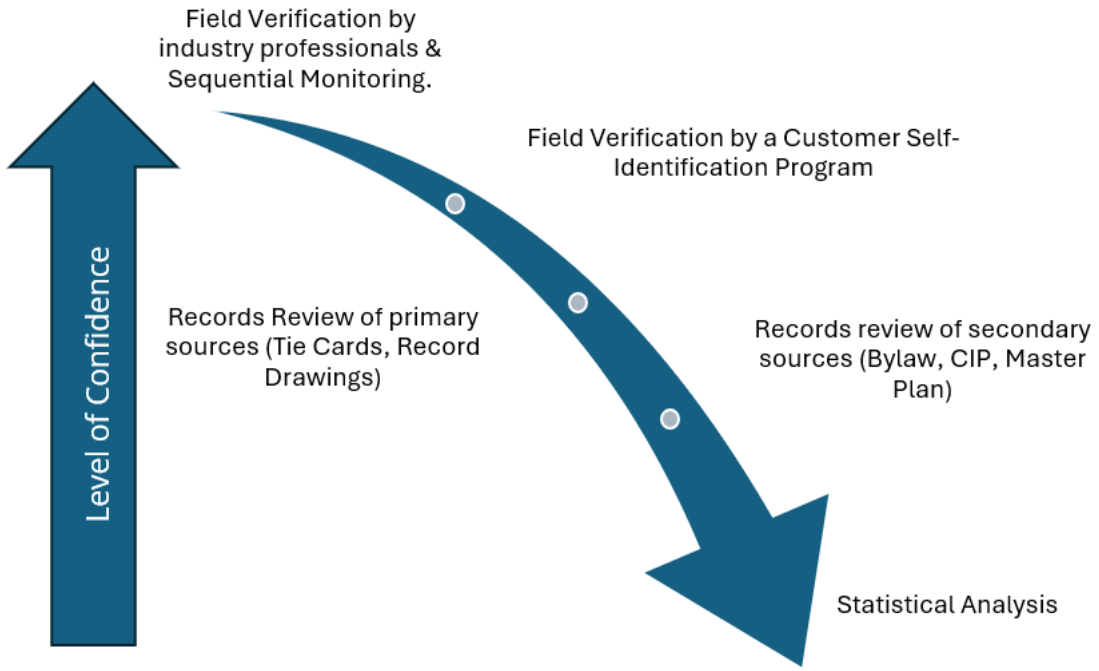
SECTION 3.1 VERIFICATION OF DATA

It is important to validate the inventory's accuracy. Some options to verify the SLI include records validation, field inspection, profile sampling/sequential monitoring, statistical analysis, and homeowner verification.

MassDEP has provided a list of acceptable verification methods. These include field inspections, customer self-identification, sequential monitoring, and statistical analysis (to be used only if all other verification methods were unsuccessful).

The confidence level in the verification methods was based on standard industry practices. Field verifications are considered the most accurate method and, therefore, override any potential conflicting information from an installation record. Furthermore, installation records override statistical analysis models. Figure 4 below lists the MassDEP acceptable verification methods on a confidence level scale.

Figure 4: Inventory Verification Methods & Level of Confidence



For the District's SLI review, most of the data came from records review of primary sources (Tie Cards & Meter Replacement Records), which sits in the middle of the confidence chart above.

Apex performed the initial data collection strictly without any assumptions or inferences and transferred useful data from records directly to the inventory. Once initial data collection was completed, Apex aggregated and

analyzed the data in graphical and spatial formats to identify deficiencies or entries that would suggest work was completed against standard industry practices. These entries received a secondary review and verification for quality assurance.

Furthermore, Apex conducted spot checks continuously on a randomized basis to ensure data entry was proceeding correctly without human error. If mistakes were found, the frequency and quantity of spot checks would increase proportionally to ensure the full extent of the error was identified and corrected.

SECTION 3.2 ASSUMPTIONS AND CLARIFICATIONS

Assumptions and clarifications are critical to the quality assurance (QA) process. They allow for optimal precision in tracking changes to the initial inventory.

Apex made the following assumptions while developing the District's inventory.

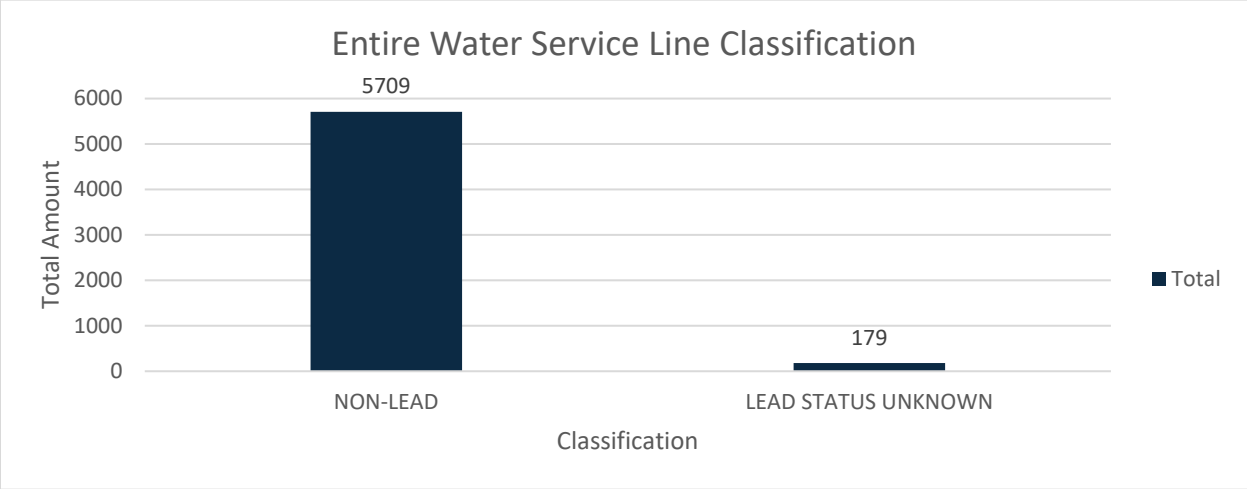
- Assume pipe material is HDPE, not PVC, when the material was listed as Plastic.
- Match public material with private material if the private side material is known but the public side material is unknown. This would assume the worst-case scenario, as private side materials are most likely the oldest material of the water service, as public side services typically get renewed with water main replacements.
- Label unknown service lines installed before 1986 as UNK-LG, label any unknown installed after 1986 as UNK-NOLG.
- Replace unknown private installation dates with building construction years from MassDEP Tax Assessors Database.

EPA guidance is for unknown services installed before 1986 to be listed as Unknown – lead or galvanized (LG). However, the District has claimed via its institutional knowledge that the District has not installed any lead services. Unfortunately, written record of this change could not be found. Both the District and Apex understand that the LCRR guidance does not include provisions for institutional knowledge to be a valid form of service verification.

SECTION 4 ANALYSIS OF WATER SYSTEM INVENTORY

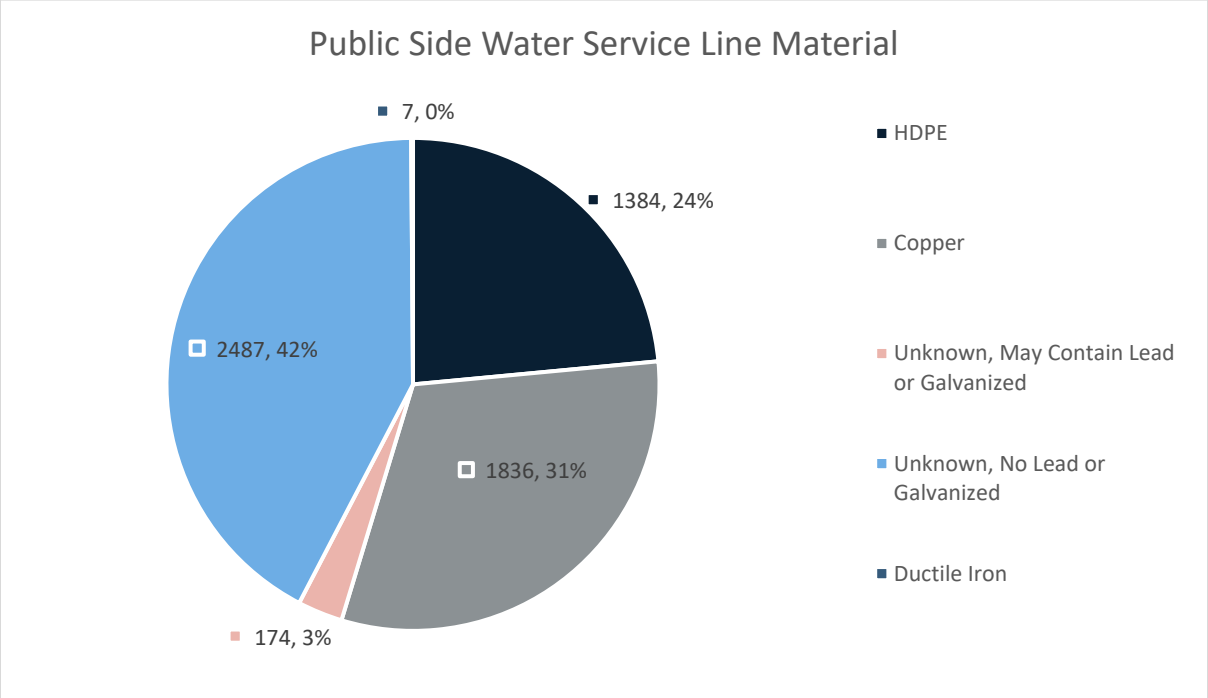
Apex reviewed a total of 5,888 water services during the compilation of the District's SLI. The District has 6,372 service lines recorded in its distribution system based on data from its 2018 Annual Statistical Report (ASR). The difference in services may be attributed to billing accounts listed in their ASR but no longer active. Based on the verification of the data stated in Section 3 above, Apex performed an analysis based on the EPA-defined categories of service pipe materials. As shown in Figure 5, of the 5,888 services, 179 services are classified as lead status unknown (LSU), and 5,709 services are classified as non-lead.

Figure 5: Sudbury Water District: Entire Water Service Classification



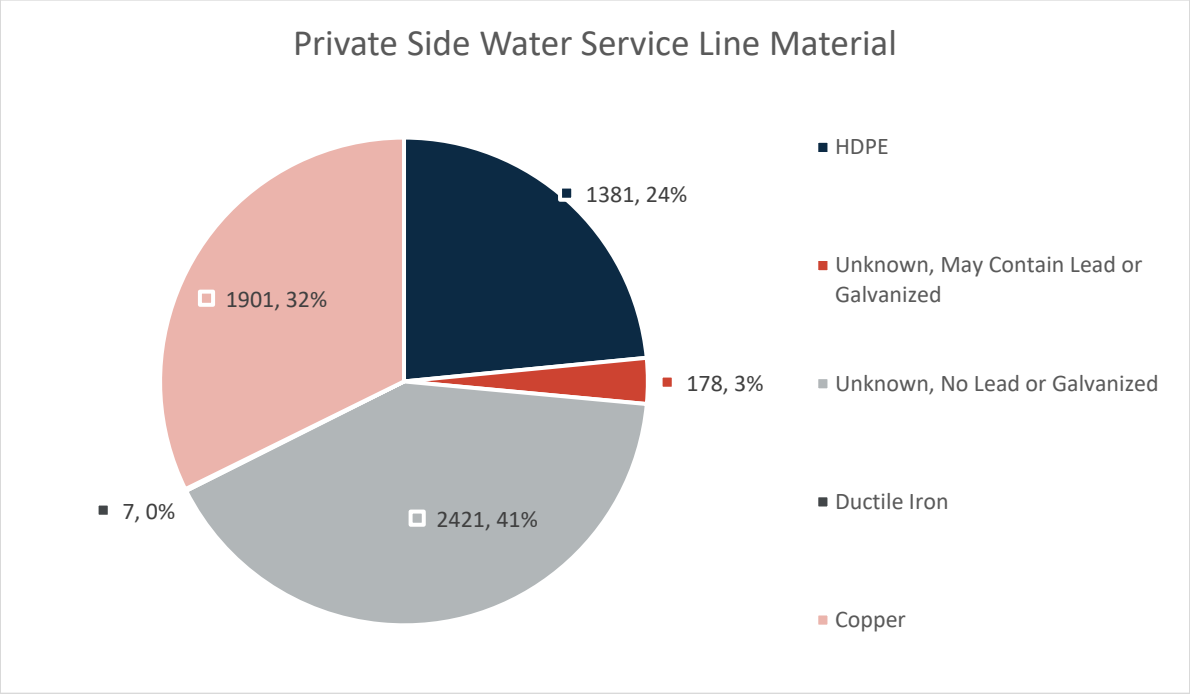
Apex inventories both the private and public sides of the service. Figures 6 and 7 show the breakdown of materials by percentage and total number for public side material and private side material respectively.

Figure 6: Public Side Water Service Material Breakdown



As shown in the above figure, unknown, no lead or galvanized is the predominant service material on the public side, representing 42 percent of the total system. The next most utilized material is Copper, representing 31 percent of the total. HDPE represents 24 percent of the total, or 1,384 services.

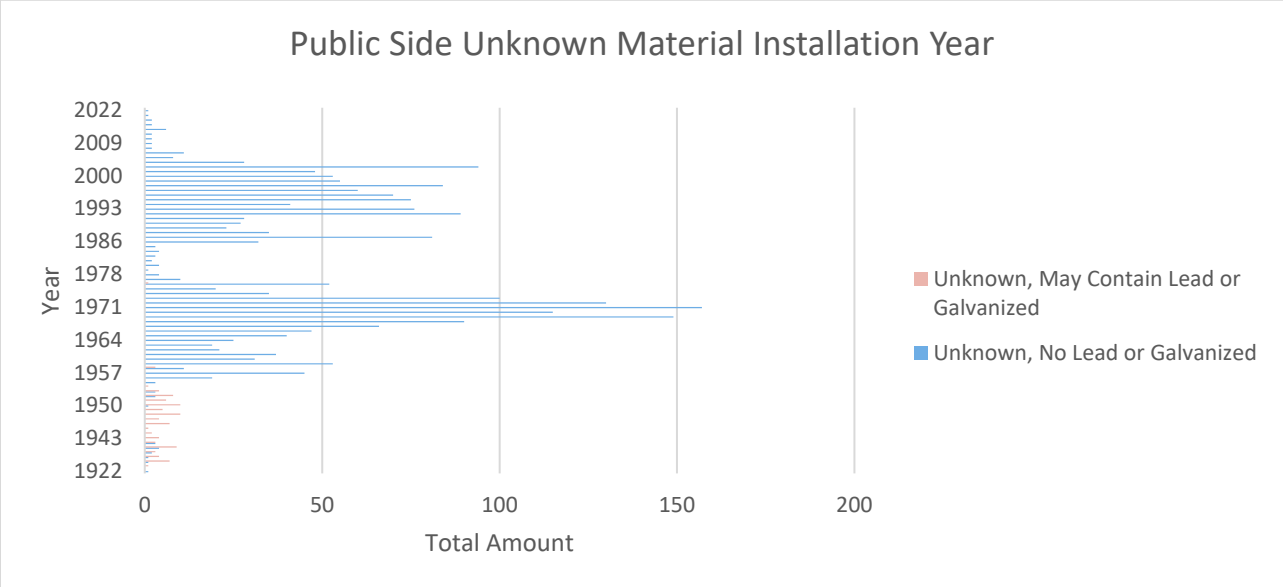
Figure 7: Private Side Water Service Material Breakdown



For private side materials, unknown, no lead or galvanized is the predominant service material on the private side representing 41 percent of the total system. Copper and HDPE, make up 32 and 24 percent of private side services, respectively.

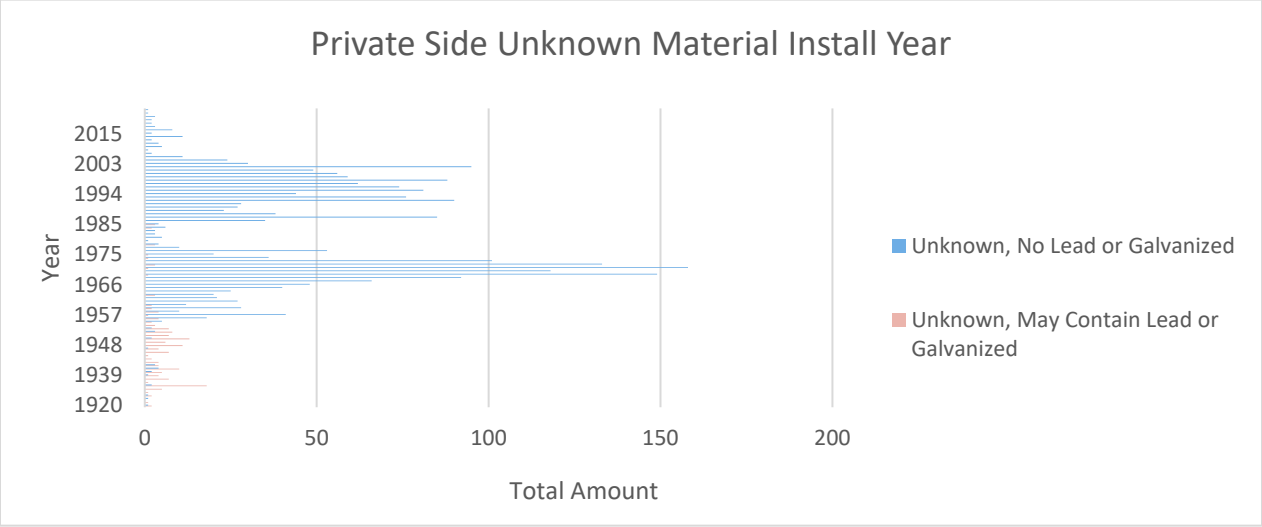
Figures 8 and 9 represent the installation year of only unknown services. The installation year came from either a tie card that didn't indicate a service material or the tax assessor database installation year of the structure.

Figure 8: Public Side Installation Year for Unknown Service Materials



As the data suggests, the District made significant investments with the installation of water mains and services between 1955 and 1975, and again in the 1990s and early 2000s.

Figure 9: Private Side Installation Year for Unknown Service Materials



Private Side Unknown Installation Years are similar to the Public Unknown Installation Years.

SECTION 5 FURTHER CLASSIFICATION OF UNKNOWNS

At the conclusion of the LSL inventory, there are approximately 179 water services in the District that remain unknown, which represents approximately 0.03 percent of all service connections. The primary reason for this discrepancy is insufficient information on historical records. MassDEP has two classifications of unknown water services, Unknown – LG, is for records that could be lead or galvanized, and Unknown – NOLG, does not contain lead or galvanized. The primary differentiator between the two unknowns is the installation date. The installation date is taken from a tie card or other water system record that may not list service material or the assessor's database as the year the structure was built.

Apex further analyzed unknown data spatially to draw connections to the development of the District and the Town. Figure 10 below shows the unknowns mapped against the building age.

Figure 10: Building Age and Water System with Unknown LSLs

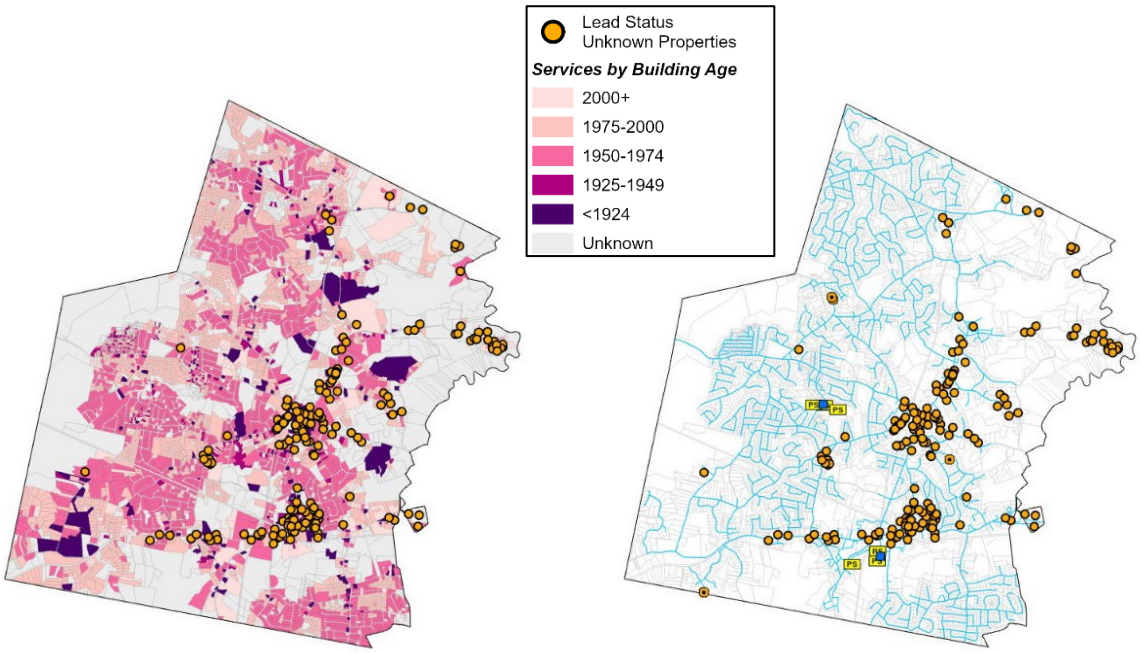


Figure 10 data suggests most unknowns are on properties developed between 1925 and 1974. This implies a period of expansion when record keeping was poor. Unknowns are distributed throughout the District's system, but mostly cover the northwest, central, and southeast portions of Sudbury.

The District should continue to eliminate as many unknown service lines as possible. Upon submission of the inventory, the District must notify all properties owners about unknown service materials within 30 days. The EPA and MassDEP will require annual notification until these services are classified.

Ideally, the District make efforts to identify service line material during normal operations as much as possible to reduce the financial burden. Examples include water meter reading, repair or replacement, service line repair or replacement, water main repair or replacement, and backflow prevention inspections.

In the following sub-sections, Apex presents options the District can consider reducing the number of unknowns in the system. Section 5.6 provides Apex's recommendation below.

SECTION 5.1 IN-HOME INSPECTIONS

There are various in-person methods that can be used to identify the material type of a service line. Apex has listed below methods that the District can consider to reduce the number of unknown services in their system:

- *Visual inspection of line in basement at meter*. This requires an inspector to observe the service line in addition to checking the line for magnetic properties as well as scratching the pipe to see if it is made of a soft or hard material. Lead test swabs can be purchased for as little as 50 cents per swab. Once the swab is activated with vinegar, it will turn red if exposed to lead. The disadvantage of this method is that it does not identify the service line material of the public side of the service.

- *Electrical Resistance Test*. Electrical Resistance Testing is a service line identification method where a probe is placed into a service line which then detects and transmits an electrical resistance signal of the service line material the probe is in contact with. Pre-established resistance ranges for common pipe materials

then allow the user to identify service line materials. A common selling point of many electrical resistance testing products/services is the lack of disruption to customers to identify their service line. In comparison to potholing, electrical resistance scanning is less invasive and disruptive to customers. However, this verification, through the scraping of the interior of the service line, can disrupt the service line. To protect the customer from potential increases in lead if the service line is lead or GRR and disrupted, MassDEP will require steps taken by the PWS after the line is tested. With this additional required step, this method may be more costly and burdensome.

There are various manufacturers of this equipment such as the Swordfish Electroscan. The District should evaluate a number of manufacturers before acquiring this equipment. Although these units may be available to rent, the cost to purchase a unit is around $70,000.

- X-ray fluorescence (XRF) is a proven, non-destructive technique that enables the determination of the elemental composition of various materials, including metal alloys, in seconds. These handheld analyzers can be used for the rapid testing of metal plumbing components in existing and new water installations. This equipment can be used in conjunction with a visual inspection as well as when performing potholing (see below). An example of the rental cost of one of these units from Pine Environmental in Woburn for the Thermonitro xl2 is $560/day or $2,240/week. Alternatively the District can purchase these or similar systems for between $20,000 and $25,000 per unit.

SECTION 5.2 WATER METER REPLACEMENT PROGRAM

A water meter replacement program is a great way to update the District's water metering infrastructure while also visually observing the private-side water service material and, therefore, reducing the number of unknow service lines. This type of program could save labor costs as it combines two projects in one visit to the customer.

Meters need to be calibrated and in good order to provide accurate billing data. The size and type of meter selected are based on the flow profile for a given service connection. Age and damage to meters can lead to deterioration and incorrect readings, making it difficult to detect leakage. Regular inspection and calibration of meters and replacing them as necessary is important in managing water loss. Meter inspection and maintenance frequency may depend on system-specific conditions such as water quality, installation characteristics, and equipment age. Technological advances have yielded much more powerful tools for water systems to monitor water use and loss than the traditional manual-read meters. With automated meter reading (AMR) and Advanced Metering Infrastructure (AMI), PWSs can measure water use per connection remotely and in real-time, which not only allows for more accurate and frequent billing (itself a measure to improve water efficiency) but also is an important tool for detecting changes that might indicate significant water loss. This technology offers the added benefit of optimizing the volume of water billings issued by the water system.

Grants or loans may be available to water systems if a water meter replacement program is linked to a SLI project.

SECTION 5.3 CONSUMER LSL IDENTIFICATION PROGRAM

The District can set up a consumer verification program to increase the number of field-verified service line materials. This project would include detailed information for the homeowner to assist in identifying their water service material. The information will include photos of different types of water line materials along with instructions and techniques to identify typical materials such as copper, plastic, or lead from each other. EPA has made this information available so PWSs can have residents assist in identifying the water service material in their homes.

Apex can set up a dedicated website with GIS capabilities for homeowners to find resources to identify their service, take photos, find their property on the website, and upload their identification for review by Apex and District. This process can be paired with in-home inspection if additional verification is required.

MassDEP has a separate lead service line identification web application that can be used by the District. To sign-up for an account, the District to identify at least two staff who will receive the email notifications, including submissions, that are generated by the crowdsourcing app. Once you have identified the two staff members, send an email to program.director-dwp@mass.gov (subject line: MA-LSLI Web App Sign-Up Request) with the following information:

- PWS Name and PWS ID #
- At least two staff. For each identified individual:
    - Full Name
    - Email Address (where notifications and submissions will be sent). Each identified individual must have a unique email address. The District should confirm that the email account's message limit and account capacity are large enough to handle large image attachments from your customers. MassDEP will not make the provided email addresses public.
    - Contact Phone Number (MassDEP Drinking Water Program (DWP) staff will only use this phone number to contact the District's staff about the web application and the phone number will not be made public.)

Apex can provide public outreach support to promote the consumer LSL identification plan including mailings, social media posts, town hall presentations, billing inserts, and more as required to help facilitate this effort.

SECTION 5.4 WATER QUALITY SAMPLING PROGRAM

The District can utilize water quality sampling can help determine if the service line is lead. Research has shown that taking a sample of tap water several liters after the first flush can assist in determining if the service line is lead. As part of the LCRR updates, EPA will be requiring a five-liter sample during LCR sampling if the service is known to be lead. For their study in Flint, Michigan, EPA showed that lead levels were highest between four and eight liters sampled from a tap that was stagnant overnight and sampled before use in the morning.

The District could collect profile or sequential samples to identify LSLs. If using profile sampling as a verification method, the District should collect a series of consecutive samples (usually ten, with the first two samples using 250-mL bottles and the subsequent eight using one-L bottles) from an interior tap after a stagnation period (six hours). The number of samples needed depends on the length and diameter of the plumbing from the tap through the length of the premise plumbing and service line, but the volume could range from five to 15 liters. This procedure could also be scaled down to assess contributions of lead or copper from premise plumbing by sampling smaller volumes of water to target specific fixtures/plumbing components.

On average, each household sampling protocol could include ten samples for lead analysis to determine whether lead exists in the service line. Either the PWS or the customer could conduct the sampling if the PWS provides sufficient training and direction.

SECTION 5.5 POTHOLING

Potholing is the term used to describe the excavation of the water service at the water main or up to the curb stop to determine the service material on both sides of the service (public and private). This procedure can be done by either using an excavator to dig up the ground or a vacuum truck to remove the soil to expose the service line, typically 5 feet below the surface.

Mechanical excavation with a backhoe or excavator requires a large area to store excavated material and is significantly more invasive and detrimental to other buried infrastructure. This method could be very difficult in either busy roadways or in very narrow side streets by causing traffic delays or requiring traffic detours. Mechanical excavation potholing is costly, requires intensive manpower, and disturbs pavement and landscaping. Hydro-vacuum trucks consist of a high-pressure water jet and industrial vacuum. The jet loosens the soil and the vacuum removes soils into a holding tank until the service line is exposed. Typically, this method is used in locations where sensitive utilities may be located. This method produces a smaller excavation, requires less disturbance to the landscape and/or pavement, and marginally reduces traffic delays; however, in rocky soils, vacuum excavation can be slow and tedious.

SECTION 5.6 RECOMMENDATIONS

Apex recommends combining a Consumer LSL identification plan and an in-home inspection plan. The plan should target the unknown services and seek additional verification on the lead and galvanized services.

To comply with the LCRR public notification requirements, the District must notify all these properties in writing and include information on a Consumer LSL identification plan. By sending these notices, the District can address any potential homeowner questions while also elevating concerns about in-home inspection plan. Homeowners identifying a service would submit their findings to the District via an online portal, and District personnel can schedule a follow-up inspection, if required. Due to the large amount of unknown service materials, Apex recommends the District prioritize developing and promoting a Consumer LSL Identification Plan within the year.

Apex understands the District initiated a comprehensive water meter replacement program in 2001. As 15 to 20 years is the average lifespan of water meters, the District has started replacing meters with accuracy issues. The District can utilize GIS reporting tools to enable personnel to quickly and accurately record all the pertinent service information required by the LSL while performing meter replacement or other service call work. Apex can assist the District with developing these GIS reporting tools.

Potholing is not recommended unless combined with a dedicated LSL replacement plan, which allows the District to identify and replace any lead service lines in real-time, thereby making the cost, effort, and disturbance worthwhile.

SECTION 6 LSL REPLACEMENT PLANNING

While determining service line materials is a major effort, the District will need to confirm whether unknown service lines are lead, galvanized, before determining of the extend a replacement plan. This section documents replacement options, timelines, estimated costs, and funding opportunities.

SECTION 6.1 REVIEW OF WATER SYSTEM MASTER PLAN

In 2020, Apex developed a Water System Master Plan (WSMP) for the Sudbury Water District, where Apex analyzed the existing water system and provided recommendations for system improvement. In Phase II System Improvement Recommendations (Years 2026 – 2030), Apex recommended investing over $9,000,000 into replacing Asbestos Cement (AC) and Cast Iron (CI) water mains. Apex determined 64 percent of the distribution system is comprised of AC mains installed between the 1930s and 1950s. Apex suggests strategically pairing replacing water mains nearing the end of their service life with service line replacement. This water main replacement program would include AC mains installed beginning in the 1930s and CI mains installed before the 1980s.

SECTION 6.2 DEDICATED LSL REPLACEMENT PLAN

The EPA will require all lead services, galvanized requiring replacement, and unknown services to be replaced over a ten-year period starting in October 2027 as part of the District's LCRI program. MassDEP is encouraging a five-year replacement plan that may override the EPA requirement if finalized (the EPA and MassDEP have yet to finalize their rules).

Given the limited number of mandatory replacements, Apex recommends a replacement plan within the five-year window with two options available to the District to accomplish this work:

- Self-Perform Replacements/Use On-call Contractor.
    - The District can self-perform/use an on-call contractor to complete service replacements. This approach may not be eligible for federal/state funding opportunities unless specific funding provisions are included in the on-call contracts.

- Hire a dedicated LSL Replacements Contractor.
    - The District can hire a contractor through the public bid process.

Apex estimates the planning-level cost for the service line replacement plan to be around $10,000 – $20,000 per service line. This includes replacement of the water main to the meter, traffic control, public restoration costs, and reasonable private restoration costs. Apex has also included a 20 percent engineering fee and a 30 percent construction contingency. All water services vary in length and replacement complexity; these specific conditions can significantly impact replacement costs.

There are no published requirements for the water system to pay for the private side replacement. However, federal/state funding cannot be utilized to complete any partial lead service line replacements and homeowner opt-in is required to work on private property. Also, partial service line replacements have been proved to significantly disturb the remaining lead service and create a health risk for the consumer. Additionally, until the lead services are confirmed and then removed, the District will be mandated to continue annual reporting, notification, and sampling of all potential or remaining lead and galvanized services. Therefore, Apex recommends making every effort to encourage the homeowner to participate in the replacement program when lead services are identified; this can include offering to cover some or all the costs of the private side replacement.

SECTION 6.3 FUNDING OPTIONS

The Massachusetts Clean Water Trust (the Trust) and MassDEP are offering zero percent interest construction loans for lead service line replacement. The District can apply for these loans through the State Revolving Fund (SRF) system. Project eligibility is determined through the Project Evaluation Form (PEF) application process, which takes place annually and is due in July/August. Projects selected for funding are listed on the Intended Use Plan (IUP), which is typically released as a draft in the winter and finalized in the spring. Projects on the IUP are required to have local funding authorization in place by June 30th of that year. The project then proceeds to the loan application stage loan, which is due in the fall, and construction contracts must be executed by June the following year.

The Build America Buy America (BABA) Act is a requirement of the SRF loan program. All steel, iron, manufactured products, non-ferrous metals, plastic and polymer-based products, glass, lumber, and drywall used in infrastructure projects must be produced in the United States. The Bipartisan Infrastructure Law (BIL) provided $50 billion to support upgrades to the nation's drinking water and wastewater infrastructure. This includes $15 billion dedicated to lead service line replacement and $11.7 billion of general Drinking Water State Revolving Funds that can also be used for lead service line replacement.

The MassWorks Infrastructure Program is a competitive grant program that provides the largest and most flexible source of capital funds to municipalities and other eligible public entities, primarily for public infrastructure projects that support and accelerate housing production, spur private development, and create jobs throughout the Commonwealth. Per M.G.L.ch.23A§63, the primary purpose of the MassWorks Program is: (i) to issue public infrastructure grants to municipalities and other public instrumentalities for design, construction, building, land acquisition, rehabilitation, repair, and other improvements to publicly-owned infrastructure including, but not limited to, sewers, utility extensions, streets, roads, curb-cuts, parking, water treatment systems, telecommunications systems, transit improvements, public parks, and spaces within urban renewal districts and pedestrian and bicycle ways.

SECTION 6.4 REPLACEMENT TIME HORIZON

The currently proposed LCRI would require all lead service lines, galvanized requiring replacement, and unknown materials service lines to be replaced by 2037. There will be three years from October 2024 to determine the material of any unknowns before the LCRI will be enforced based on their materials, remove them from the required replacement list or include them in the replacement plan. The state of Massachusetts is still reviewing the Federal rule and is considering changing the required replacement timeline from ten years to five years.

Likewise, a dedicated Lead Service Line Replacement project would complete all replacements and be eligible for Funding opportunities. This will enable the District to spend more time and resources on further classification of unknown services prior to bidding a replacement project.

SECTION 6.5 DECISION MATRIX

In order to aid in the decision-making process, Apex put together a decision matrix, weighing updates to the capital improvement plan, performing/use an on-call contractor, and a dedicated LSL replacement project. The options are ranked from low to high based on solution effectiveness, implementation timeline, design, permitting and constructability challenges, project costs and funding.

Table 6: Decision Matrix

Option	Solution Effectiveness	Implementation Timeline	Design, Permitting, and Constructability Challenges	Cost & Funding
Updates to the CIP to include the required LSL replacements	Low – LSLR will be a secondary effort of a larger project	Low – CIP time horizon likely over 5 years	Low – much work being done any as part of a larger project	Low – potential for mobilization savings
Self-perform/use on-call contractor	Medium	Medium – 5-year timeline can be achieved.	Medium	Medium – average cost, low possibility of funding
Dedicated LSL replacement Project	High – dedicated project under engineering oversite	A high – solution could be implemented within a single year	High	High – dedicated project and SRF costs

Based on the decision matrix above, Apex recommends self-performing or using an on-call contractor to complete the required LSL replacements within the next five years. Despite periods of poor record keeping, the District remains adamant there are few to no LSLs or GRRs. The District must focus its immediate efforts conducting additional verification as discussed in detail in Section 5. After determining the final count of LSLs, the District can self-perform or utilize an on-call contractor to perform the replacements.

Additionally, the District should update the existing WSMP plan to prioritize entire service line replacements thereby reaching replacement requirements while also improving overall system infrastructure. The District should also add a provision to all future water main projects that requires the Contractor to replace all lead or galvanized services they discover to the water meter.

REFERENCES

MassDEP. (2001, November 9). *Fact Sheet: Drinking Water Public Notification*. Retrieved from Massachusetts Department of Environmental Protection : https://www.mass.gov/info-details/fact-sheet-drinking-water-public-notification#:~:text=Public%20water%20systems%20must%20notify,public%20health%3B%20if%20the%20water

MassDEP. (2024, August 18). *Guide on inital Lead and Copper Rule Revisions (LCRR) monitoring for PWS on current LCR reduced monitoring*. Retrieved from Massachusetts Department of Environmnetal Protection : https://www.mass.gov/doc/monitoring-frequency-guide-for-systems-subject-to-the-lcrr/download

MassDEP. (2024, May 9). *Lead & Copper Forms and Templates.* Retrieved from Massachusetts Department of Environmental Protection : https://www.mass.gov/lists/lead-copper-forms-and-templates#lead-&-copper-rule-revisions-(lcrr)-

US EPA. (2023, November 28). *Lead & Copper Rule* . Retrieved from United States Environmental Protection Agency : https://www.epa.gov/dwreginfo/lead-and-copper-rule#rule-history

USPHS. (1964). Drinking Water Standards 1962. In E. a. US Department of Heath, *Public Health Service Drinking Water Standards* (p. 42). Washington, DC: United States Goverment Printing Office .

APPENDIX A - MASSACHUSETTS DRINKING WATER PUBLIC NOTIFICATION REQUIREMENTS

MASSACHUSETTS DRINKING WATER PUBLIC NOTIFICATION REQUIREMENTS

Public notification is intended to ensure consumers will be informed of a problem with the quality or service of their drinking water. If a contaminant level exceeds the regulations published by the EPA or MassDEP, Public notification is required. MassDEP public notification requirements are recorded in 310 CMR 22.16 and were adopted on November 9, 2021.

Public notification is divided into three tiers that dictate the severity of the problem and specify the speed in which the notification must be set to customers.

- Tier 1 – For violations and situations with significant potential to have serious adverse effects on human health with short-term exposure. Notice is required within 24 hours of the violation

- Tier 2 – For violations and situations with the potential to have serious. But not immediate, adverse effects on human health. Notice is required within 20 days of the violation, or as soon as possible. An extension of up to three months may be granted by MassDEP for violations that have already been resolved.

- Tier 3 – For all other violations and situations not included in Tier 1 and Tier 2. Unless otherwise specified in writing by MassDEP, notice is required within 12 months of the violation, and may be part of a single annual report, including the Consumer Confidence Report.

The regulations also include a consultation requirement with MassDEP upon discovery of a violation. MassDEP may clarify the public notification requirements at the time of consultation. MassDEP must be consulted within 24 hours of a violation. During non-working hours MassDEP can be reached at the emergency number 888-304-1133.

Most monitoring violations require the use of standard language. MassDEP has many template notification documents containing the standard language on its website:
https://www.mass.gov/lists/public-notification-forms-and-templates

Required delivery methods vary slightly by Tier. Water systems can select from the following options:

- Tier 1 – Media, hand delivery, or posting
- Tier's 2 & 3 – direct mail, hand delivery or posting

Water systems must submit a certification of compliance to MassDEP within 10 days specifying they have met all public notice requirements.

Source: (MassDEP, 2001)

APPENDIX B - MASSACHUSETTS TEMPLATE LCRR NOTIFICATION FOR LEAD SERVICE

SUDBURY WATER DISTRICT
DRINKING WATER NOTICE

Your home is served by a lead service line verified by records review.

This notice contains important information about your drinking water. Have someone translate it for you or speak with someone who understands it.

Dear Customer,

As part of the Lead and Copper Rule Revisions (LCRR), water systems are required to document all water service line materials in their system and identify any lead or lead containing materials that are in the system. Our most recent service line inventory indicates that some or all of the water service line materials between the water main and your property are of **lead containing material.**

Health effects of lead.

Exposure to lead in drinking water can cause serious health effects in all age groups. Infants and children can have decreases in IQ and attention span. Lead exposure can lead to new learning and behavior problems or exacerbate existing learning and behavior problems. The children of women who are exposed to lead before or during pregnancy can have increased risk of these adverse health effects. Adults can have increased risks of heart disease, high blood pressure, kidney or nervous system problems.

Steps you can take to reduce exposure to lead in drinking water.

- **Obtain an** ANSI (American National Standards Institute)/**NSF (National Sanitation Foundation) Certified home water treatment device** that is certified to remove lead. An ANSI/NSF Certified treatment device is an effective way to reduce lead exposures. Sudbury Water District provides an ANSI/NSF Certified Pitcher with 6 months worth of filters when lead service lines are replaced.
- **Run your water to flush out lead.** Lead levels increase over time as water sits in lead-containing plumbing materials and regular non-consumptive water usage (e.g., laundry, bathing) in the building can reduce lead levels in drinking water. Consumers served by lead service lines may need to flush water for longer periods.
- **Use only cold, fresh water for drinking, cooking, and preparing baby formula.** Run the water for at least 1 minute or until after it turns cold.
- **Do not boil water to remove lead.** Boiling water does not remove lead.
- **Clean your aerator.** Regularly clean your faucet's screen (also known as an aerator). Sediment, debris, and lead particles can collect in your aerator. If lead particles are caught in the aerator, lead can get into your water.
- **Identify and replace plumbing fixtures** containing lead and any copper piping with lead solder.
- **Have your child's blood tested for lead.** Children are a higher risk group of the health effects of lead. If you would like to have your child tested, you may contact your health care provider, or local state health department here:

Mass Department of Public Health (DPH)

Phone: (617) 624-6000 Fax: (617) 624-5206
Address: 250 Washington Street, Boston, MA, 02108
Website: https://www.mass.gov/orgs/department-of-public-health

- **Have your water tested for lead.** Sudbury Water District must sample water in contact with both premise plumbing and the service line to test for lead if requested by the consumer. Contact information to request sampling is available below.

Opportunities to Replace Lead Service Lines

Sudbury Water District has developed a Lead Service Line Replacement (LSLR) Program with the goal of removing all the lead service lines in the water system. Consumers may view the Sudbury Water District Service Line Replacement Plan at this website: Website Information.

Sudbury Water District intends to replace the portion of the service line under Sudbury Water District ownership; while replacing this line, we offer to replace the homeowner's portion of the service line at the homeowner's expense [If PWS offers replacements at a discount or without cost, change this statement to match your policy]. If you as the homeowner do not replace your portion of the service line, you may experience a temporary increase in lead levels in your drinking water; we strongly recommend having your portion of the service line replaced when Sudbury Water District replaces the service line portion under Sudbury Water District ownership.

Financing for Homeowner Lead Service Line Replacement

[System must include information about programs that provide financing solutions to assist homeowners with replacement of their portion of a lead or galvanized requiring replacement service line if customer payment for a portion of the replacement is required by State or local law or a water tariff agreement.]
For more information on financial assistance programs for lead service line replacement see [insert System LSLR help if applicable]. For MassDEP information on Lead in Drinking Water see https://www.mass.gov/lead-in-drinking-water.

Sudbury Water District is **required** to replace its portion of a lead service line if the homeowner notifies Sudbury Water District that they are replacing their portion of the lead service line.

Please notify Sudbury Water District if you disagree with the service line material categorization in our service line inventory, using the contact information below.

For more information, contact [name of contact] at (978) 443-6602 or 199 Raymond Rd, Sudbury, MA 01776.

Please share this information with all the other people who drink this water at this address, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

This notice is being sent to you by Sudbury Water District. PWS ID#: 32880000
Date distributed November 2024

Distributed media type [insert type]

Source: (MassDEP, 2024)

APPENDIX C - MASSACHUSETTS TEMPLATE LCRR NOTIFICATION FOR GALVANIZED SERVICE

SUDBURY WATER DISTRICT
DRINKING WATER NOTICE
Your home is served by a Galvanized Requiring Replacement service line.
Your service line may contain lead.

This notice contains important information about your drinking water. Have someone translate it for you or speak with someone who understands it.

Dear Customer,

As part of the Lead and Copper Rule Revisions (LCRR), water systems are required to document all water service line materials in their system and identify any lead or lead containing materials that are in the system. Our most recent service line inventory indicates that some or all of the water service materials between the water main and your property are **galvanized requiring replacement material**. This material is not made of lead but may have built up lead deposits over time due to an existing or previous upstream lead service line; it can be a source of lead in your drinking water.

The EPA has defined "Galvanized Requiring Replacement" to mean where a galvanized service line is or was at any time downstream of a lead service line or is currently downstream of a "Lead Status Unknown" service line. If the water system is unable to demonstrate that the galvanized service line was never downstream of a lead service line, it must presume there was an upstream lead service line.

Health effects of lead.

Exposure to lead in drinking water can cause serious health effects in all age groups. Infants and children can have decreases in IQ and attention span. Lead exposure can lead to new learning and behavior problems or exacerbate existing learning and behavior problems. The children of women who are exposed to lead before or during pregnancy can have increased risk of these adverse health effects. Adults can have increased risks of heart disease, high blood pressure, kidney or nervous system problems.

Steps you can take to reduce exposure to lead in drinking water.

- **Obtain an** ANSI (American National Standards Institute)/**NSF (National Sanitation Foundation) Certified home water treatment device** that is certified to remove lead. An ANSI/NSF Certified treatment device is an effective way to reduce lead exposures. Sudbury Water District provides an ANSI/NSF Certified Pitcher with 6 months' worth of filters when lead service lines are replaced.
- **Run your water to flush out lead.** Lead levels increase over time as water sits in lead-containing plumbing materials and regular non-consumptive water usage (e.g., laundry, bathing) in the building can reduce lead levels in drinking water. Consumers served by lead service lines may need to flush water for longer periods.

- **Use only cold, fresh water for drinking, cooking, and preparing baby formula.** Run the water for at least 1 minute or until after it turns cold.
- **Do not boil water to remove lead.** Boiling water does not remove lead.
- **Clean your aerator.** Regularly clean your faucet's screen (also known as an aerator). Sediment, debris, and lead particles can collect in your aerator. If lead particles are caught in the aerator, lead can get into your water.
- **Identify and replace plumbing fixtures** containing lead and any copper piping with lead solder.
- **Have your child's blood tested for lead.** Children are a higher risk group of the health effects of lead. If you would like to have your child tested, you may contact your health care provider, or local state health department here:

  Mass Department of Public Health (DPH)
  Phone: (617) 624-6000 Fax: (617) 624-5206
  Address: 250 Washington Street, Boston, MA, 02108
  Website: https://www.mass.gov/orgs/department-of-public-health
- **Have your water tested for lead.** Sudbury Water District must sample water in contact with both premise plumbing and the service line to test for lead if requested by the consumer. Contact information to request sampling is available below.

Opportunities to Replace Lead Service Lines

Sudbury Water District has developed a Lead Service Line Replacement (LSLR) Program with the goal of removing all the lead service lines in the water system. Consumers may view the Sudbury Water District Service Line Replacement Plan at this website:

Sudbury Water District intends to replace the portion of the service line under Sudbury Water District ownership; while replacing this line, we offer to replace the homeowner's portion of the service line at the homeowner's expense [If PWS offers replacements at a discount or without cost, change this statement to match your policy]. If you as the homeowner do not replace your portion of the service line, you may experience a temporary increase in lead levels in your drinking water; we strongly recommend having your portion of the service line replaced when Sudbury Water District replaces the service line portion under Sudbury Water District ownership.

Financing for Homeowner Lead Service Line Replacement

[System must include information about programs that provide financing solutions to assist homeowners with replacement of their portion of a lead or galvanized requiring replacement service line if consumer payment for a portion of the replacement is required by State or local law or a water tariff agreement.]
For more information on financial assistance programs for service line replacement see [insert System LSLR help if applicable].
For MassDEP information on Lead in Drinking Water see https://www.mass.gov/lead-in-drinking-water.

Sudbury Water District is **required** to replace its portion of a lead or galvanized requiring replacement service line if the homeowner notifies Sudbury Water District that they are replacing their portion of the service line.

Please notify Sudbury Water District if you disagree with the service line material categorization in our service line inventory, using the contact information below.

For more information, contact [name of contact] at (978) 443-6602 or 199 Raymond Rd, Sudbury, MA 01776.

Please share this information with all the other people who drink this water at this address, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

This notice is being sent to you by Sudbury Water District. PWS ID#: 32880000
Date distributed November 2024

Distributed media type [Print]

Source: (MassDEP, 2024)

APPENDIX D - MASSACHUSETTS TEMPLATE LCRR NOTIFICATION FOR UNKNOWN SERVICE

Sudbury Water District DRINKING WATER NOTICE
Your home is served by a lead status unknown service line.
Your service line material is unknown but could contain lead.

This notice contains important information about your drinking water. Have someone translate it for you or speak with someone who understands it.

Dear Customer,

As part of the Lead and Copper Rule Revisions (LCRR), water systems are required to document all water service line materials in their system and identify any lead or lead containing materials that are in the system. Our most recent service line inventory indicates that some or all of the water service line materials between the water main and your property are of **unknown material classification**. Unknown means that the service line could contain lead.
As precaution, here is information on the health effects of lead and steps to reduce your exposure. If your service line is confirmed as lead, Sudbury Water District will share information on financial help to remove it and replace it with one made of a safer material.

The EPA has defined "Galvanized Requiring Replacement" to mean where a galvanized service line is or was at any time downstream of a lead service line or is currently downstream of a "Lead Status Unknown" service line. If the water system is unable to demonstrate that the galvanized service line was never downstream of a lead service line, it must presume there was an upstream lead service line.

Health effects of lead.

Exposure to lead in drinking water can cause serious health effects in all age groups. Infants and children can have decreases in IQ and attention span. Lead exposure can lead to new learning and behavior problems or exacerbate existing learning and behavior problems. The children of women who are exposed to lead before or during pregnancy can have increased risk of these adverse health effects. Adults can have increased risks of heart disease, high blood pressure, kidney or nervous system problems.

Until the material of your service line is confirmed and any lead is removed, use the following steps to reduce exposure to lead in drinking water.

- **Obtain an** ANSI (American National Standards Institute)/**NSF (National Sanitation Foundation) Certified home water treatment device** that is certified to remove lead. A ANSI/NSF Certified treatment device is an effective way to reduce lead exposures. Sudbury Water District provides a ANSI/NSF Certified Pitcher with 6 months' worth of filters when lead service lines are replaced.
- **Run your water to flush out lead.** Lead levels increase over time as water sits in lead-containing plumbing materials and regular water usage in the building can reduce lead levels in drinking water. Consumers served by lead service lines may need to flush water for longer periods.
- **Use only cold, fresh water for drinking, cooking, and preparing baby formula.** Run the water for at least 1 minute or until after it turns cold.

- **Do not boil water to remove lead.** Boiling water does not remove lead.
- **Clean your aerator.** Regularly clean your faucet's screen (also known as an aerator). Sediment, debris, and lead particles can collect in your aerator. If lead particles are caught in the aerator, lead can get into your water.
- **Identify and replace plumbing fixtures** containing lead and any copper piping with lead solder.
- **Have your child(ren)'s blood tested for lead.** Children are a higher risk group of the health affects of lead. If you would like to have your child(ren tested), you may contact your health care provided, or local state health department here:

  Mass Department of Public Health (DPH)
  Phone: (617) 624-6000 Fax: (617) 624-5206
  Address: 250 Washington Street, Noston, MA, 02108
  Website: https://www.mass.gov/orgs/department-of-public-health
- **Have your water tested for lead.** Sudbury Water District must sample water in contact with both premise plumbing and the service line to test for lead if requested by the consumer. Contact information to request sampling is available below.

Opportunities to Verify Lead Service Materials

To verify the material of your service line, contact Sudbury Water District at (978) 443 – 6602 to schedule an inspection.

The Sudbury Water District Staff or its contractor may contact you to perform a service line material inspection, please utilize the **MassDEP Lead Service Line Identification Tool** presented in the QR codes above to send your service line information to the [Sudbury Water District] and to **learn more about Lead in Drinking Water**.

[Delete graphics below if not applicable]

MassDEP Lead Service Line Identification Tool https://app.smartsheet.com/b/form/f9ee39b7972f443ca63e8b936cd7f92b.

US EPA Protect Your Tap Tool Protect Your Tap: A Quick Check for Lead

For more information on lead see Sudbury Water District webpage at https://www.sudburywater.com/
For MassDEP information on Lead in Drinking Water see https://www.mass.gov/lead-in-drinking-water.

For more information, or if you have questions on how to verify the material of your service line, contact
[name of contact] at (978) 443-6602 or 199 Raymond Rd, Sudbury, MA 01776

Please share this information with all the other people who drink this water at this address, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

This notice is being sent to you by Sudbury Water District PWS ID#: 32880000

Date distributed November 2024

Distributed media type [Print]

Source: (MassDEP, 2024)

APPENDIX E– LIST OF ADDRESSES REQUIRING UNKNOWN SERVICE NOTIFICATION

Site ID	Locational Identifier
0001	10 MAPLE AVE
0008	51 HUDSON RD
0011	25 KING PHILIP RD
0025	610 PEAKHAM RD
0029	272 CONCORD RD
0031	34 MAPLE AVE
0035	218 OLD SUDBURY RD
0036	136 OLD SUDBURY RD
0037	250 OLD SUDBURY RD
0039	30 RICE RD
0041	277 CONCORD RD
0042	16 RICE RD
0043	344 BOSTON POST RD
0045	23 POKONOKET AVE
0046	225 RAYMOND RD
0049	47 CONCORD RD
0050	531 CONCORD RD
0054	330 CONCORD RD
0057	102 CONCORD RD
0059	276 OLD SUDBURY RD
0060	279 OLD SUDBURY RD
0063	11 CANDY HILL LN
0064	354 BOSTON POST RD
0065	18 CONCORD RD
0067	265 CONCORD RD
0068	17 KING PHILIP RD
0070	289 BOSTON POST RD
0072	315 GOODMANS HILL RD
0080	394 BOSTON POST RD
0081	438 CONCORD RD
0082	20 CONCORD RD
0083	30 HUDSON RD
0084	277 OLD SUDBURY RD
0085	268 OLD SUDBURY RD
0086	16 CONCORD RD
0087	44 CONCORD RD
0089	210 PLYMPTON RD
0093	19 CANDY HILL RD
0094	15 HUDSON RD
0096	497 CONCORD RD
0097	58 HUDSON RD
0099	280 GOODMANS HILL RD
0101	269 CONCORD RD
0102	21 CONCORD RD
0107	444 CONCORD RD
0109	25 CONCORD RD
0111	289 CONCORD RD
0117	452 CONCORD RD

Site ID	Locational Identifier
0124	281 GOODMANS HILL RD
0126	40 CANDY HILL RD
0129	309 GOODMANS HILL RD
0133	48 KING PHILIP RD
0135	586 PEAKHAM RD
0136	450 BOSTON POST RD
0138	588 PEAKHAM RD
0145	357 BOSTON POST RD
0150	391 CONCORD RD
0159	555 BOSTON POST RD
0160	610 BOSTON POST RD
0169	554 BOSTON POST RD
0172	22 KING PHILIP RD
0176	29 HUDSON RD
0177	210 CONCORD RD
0178	233 CONCORD RD
0180	295 CONCORD RD
0182	308 CONCORD RD
0187	9 CHURCH ST
0188	356 BOSTON POST RD
0193	594 PEAKHAM RD
0195	236 CONCORD RD
0199	390A LINCOLN RD
0201	295A GOODMANS HILL RD
0204	604 PEAKHAM RD
0205	262 OLD SUDBURY RD
0207	621 BOSTON POST RD
0208	578 BOSTON POST RD
0210	61 KING PHILIP RD
0213	407 BOSTON POST RD
0217	573 BOSTON POST RD
0218	68 CONCORD RD
0219	21 POKONOKET AVE
0221	564 PEAKHAM RD
0228	11 MAPLE AVE
0229	605 CONCORD RD
0233	213 OLD SUDBURY RD
0234	440 BOSTON POST RD
0240	583 PEAKHAM RD
0242	568 PEAKHAM RD
0243	241 GOODMANS HILL RD
0248	245 GOODMANS HILL RD
0252	46 MASSASOIT AVE
0253	24 POKONOKET AVE
0254	28 INDIAN RIDGE RD
0255	444 BOSTON POST RD
0256	55 MASSASOIT AVE
0257	32 INDIAN RIDGE RD

Site ID	Locational Identifier
0262	280 OLD SUDBURY RD
0263	22 INDIAN RIDGE RD
0265	1 UNION AVE
0268	246 RAYMOND RD
0272	582 PEAKHAM RD
0280	379 CONCORD RD
0283	284 CONCORD RD
0287	424 CONCORD RD
0297	241 OLD SUDBURY RD
0299	465 BOSTON POST RD
0311	200 HORSE POND RD
0312	198 HORSE POND RD
0314	199 HORSE POND RD
0324	210 HORSE POND RD
0327	377 CONCORD RD
0330	384 PEAKHAM RD
0333	11 BRADLEY PL
0335	275 BOSTON POST RD
0336	524 CONCORD RD
0338	19 CONCORD RD
0342	46 INDIAN RIDGE RD
0344	11 BLUEBERRY HILL LN
0351	502 CONCORD RD
0358	578 PEAKHAM RD
0364	258 GOODMANS HILL RD
0367	676 BOSTON POST RD
0369	708 BOSTON POST RD
0393	414 CONCORD RD
0399	202 HORSE POND RD
0409	43 PENNYMEADOW RD
0428	351 BOSTON POST RD
0434	26 PENNYMEADOW RD
0758	358 PEAKHAM RD
4768	48+46 FAIRBANKS RD
4933	245 DUTTON RD
5724	725 BOSTON POST RD, 12
5749	490-C BOSTON POST RD
6101	119 PANTRY RD
6155	5 CONCORD RD
UNK	1030 CONCORD RD
UNK	1065 CONCORD RD
UNK	1073 CONCORD RD

Site ID	Locational Identifier
UNK	1074 CONCORD RD
UNK	136 LINCOLN RD
UNK	142 NORTH RD
UNK	142 PANTRY RD
UNK	145 LINCOLN RD
UNK	15 NORTH RD
UNK	153 LINCOLN RD
UNK	155 PANTRY RD
UNK	18 GREEN HILL RD
UNK	20 BOSTON POST RD
UNK	20 LINCOLN RD
UNK	244 LINCOLN RD
UNK	25 LINCOLN RD
UNK	25 PLYMPTON RD
UNK	261 LINCOLN RD
UNK	273 LINCOLN RD
UNK	30 LINCOLN RD
UNK	33 BOSTON POST RD
UNK	33 LINCOLN RD
UNK	33 OLD COUNTY RD
UNK	40 LINCOLN RD
UNK	40 PLYMPTON RD
UNK	435 COLD BROOK DR
UNK	435 CONCORD RD
UNK	46 LINCOLN RD
UNK	472 CONCORD RD
UNK	5 PLYMPTON RD
UNK	51 PLYMPTON RD
UNK	52 LINCOLN LN
UNK	54 BOSTON POST RD
UNK	55 LINCOLN RD
UNK	56 LINCOLN RD
UNK	58 PLYMPTON RD
UNK	64 LINCOLN RD
UNK	72 PLYMPTON RD
UNK	80 LINCOLN RD
UNK	84 BOSTON POST RD
UNK	85 LINCOLN RD
UNK	89 LINCOLN RD
UNK	94 GOODMANS HILL RD
UNK	97 LINCOLN RD

APPENDIX F - SAMPLE COLLECTION METHODS FOR LEAD UNDER THE LCR AND LCRR

Sample Collection Methods for Lead Under the LCR and the LCRR

Current LCR	Future LCRR
Sample Collection Methods	**Sample Collection Methods**
• First draw samples	• First draw samples
	• Fifth liter sample for sites with LSL
• Stagnation time: at least 6 hours	• Stagnation time: at least 6 hours
• Wide-mouth one-liter sample bottles	• Wide-mouth one-liter sample bottles
• First-draw samples from residential housing shall be collected from the cold-water kitchen tap or bathroom sink tap.	• First-draw samples from residential housing shall be collected from the cold-water kitchen tap or bathroom sink tap.
• First-draw samples from a non-residential building shall be collected at an interior tap from which water is typically drawn for consumption.	• First-draw samples from a non-residential building shall be collected at an interior tap from which water is typically drawn for consumption.
• Samples may be collected by the system, or the system may allow residents to collect first draw samples after instructing the residents of the sampling procedures (No pre-stagnation flushing, no cleaning or removing aerators).	• Samples may be collected by the system, or the system may allow residents to collect first draw samples after instructing the residents of the sampling procedures (Sampling instructions provided to customers must not direct the customer to remove the aerator or clean or flush the taps prior to the start of the minimum six-hour stagnation period).
• Acidification of first draw samples may be done up to 14 days after the sample has been collected.	• Acidification of first draw samples may be done up to 14 days after the sample has been collected.

Source: (MassDEP, 2024)