September 16, 2024

Memo to: Asa Hopkins and Phil Hanser, NCCE Co-Chairs
From: Peter J. Barrer and Denise Freed
Re: GSEP in Newton 2023 - an updated Investigation from 2022
Cc: Bob Persons, Ellie Goldberg, Nathan Phillips

**Summary**

The Newton Gas Pipes Team, a volunteer non-governmental group, has completed an investigation of National Grid's Gas System Enhancement Program (GSEP) plans and National Grid's pipeline replacement and leak repair projects in Newton for calendar year 2023. We initiated this investigation to evaluate whether National Grid's (NG) leak repair and pipeline replacement activities are in the interest of the City and its resident gas ratepayers.

On December 29, 2023, the authors released an investigation on the cost and results of National Grid's gas pipeline replacement and leak repair in 2022. This current report similarly investigates National Grid's pipeline replacement and leak repair in Newton in 2023.

We found that the present GSEP does not serve the interests of Newton and does not correspond to the City's Climate Action Plan goal of eliminating fossil fuel carbon emissions by 2050.

The City's priorities have changed since GSEP was first implemented in 2014. The City now recognizes that even leaks classified as non-hazardous can still pose significant risks to health and the environment and that the City needs a plan for retiring the gas system entirely.

Gas leaks are a significant contributor to Newton's greenhouse gas emissions. However, "leak-prone" pipe replacement dominates current GSEP expenses, and this pipe replacement has been ineffective in reducing existing gas leaks. Leak repair is less expensive and much more effective for leak reduction than pipe replacement. In coordination with National Grid, Newton should now prioritize repairing gas leaks as quickly as possible. To achieve this goal while minimizing ratepayer costs, the GSEP needs to be completely overhauled.

**Detailed Highlights**

- $17,834,218 was charged to GSEP in Newton in 2023.
- Only $198,996 was charged to GSEP for repairing non-hazardous, large emitting (grade 3SEI) leaks without replacing gas pipes.
- Almost all of the eliminated leak extent was treated by lower-cost leak repair and not by pipe replacement.
- Approximately $4,500,000 was spent on low priority work, (work that was not specifically based on the safety of the pipes).

- Over 60% of the money charged to GSEP was spent without appearing in GSEP plans. Such projects were primarily due to new conditions in the field or coordination with a City public works project.
- Some new leaks appeared on lengths of pipe (or the service lines connected to them) after the pipe had been replaced under GSEP.

As Newton residents work to eliminate carbon emissions, the leaky gas distribution system will be retired as it becomes obsolete. Under GSEP, however, National Grid's continued investments in the outdated gas pipe system will impose unnecessary costs on ratepayers and perhaps taxpayers.

**Introduction**

The Newton Gas Pipes non-governmental volunteer team compiles publicly available data about the Newton gas distribution system operated by National Grid. We have compiled public records of Gas System Enhancement Program (GSEP) plans, end-of-year accounting reports (GREC), end-of-year Service Quality reports (SQARs), and quarterly gas leak reports filed with the Mass. Department of Public Utilities (DPU), in addition to street surveys and other data from Newton public records.

The pipe replacement program requires National Grid to evaluate leak-prone pipe segments in order to prioritize replacing pipes that are at significant risk of developing high-impact leaks that could be explosive. It requires National Grid to repair the dangerous leaks, and permits accelerated cost recovery for repairing leak-prone pipes. GSEP also permits accelerated cost recovery for pipes whose replacement can be coordinated with other public works jobs.

The Massachusetts legislature established GSEP in 2014 to increase the safety and reliability of the gas distribution system. This plan was made in the context of an aging system of pipes that would be used for the foreseeable future. GSEP provided a framework for classifying and repairing leaks that were deemed hazardous, replacing leak-prone pipes, and expanding the gas infrastructure to replace what were considered to be more-polluting energy sources. However, even "non-hazardous" leaks pose health risks and can contribute significantly to greenhouse gasses and to extra costs to consumers. To address the leak problem, the legislature in 2017 added the repair of high-volume methane leaks to the GSEP scope. These leaks are classified as "non-hazardous" but as still having Significant Environmental Impact (SEI).

The DPU has defined the various gas leak grades. Grade 1 leaks are hazardous and must be repaired immediately. Grade 2 leaks are non-hazardous, but could become hazardous in the near future and must be repaired within a year. Grade 3 leaks are non-hazardous and are expected to remain non-hazardous. Grade 3 leaks initially designated after 1/1/2018 are required to be repaired or eliminated within 8 years. Grade 3 SEI are grade 3 leaks larger than

2,000 square feet as measured by the leak extent method and are required to be repaired in 1-3 years.

We initiated this analysis to investigate whether GSEP work is in the interest of the City and its resident gas ratepayers.

**Methodology**

Data for this investigation were compiled from National Grid's filings submitted to the DPU. Most of these filings were downloaded from the DPU's web-based "file room."

Each fall NGrid files GSEP plans for the coming year and at the same time files less-detailed GSEP plans ("lookaheads") for the following four years. We focused on the 2023 GSEP plan. However, allowing for the possibility of a previous GSEP installation being delayed, we searched all GSEP plans back to 2020. Allowing for an unexpected acceleration of a GSEP installation, we also searched GSEP "lookaheads"[1] covering 2022 through 2028. We compiled GSEP plans for 2020, 2021, 2022, 2023, and 2024 into a single table, see linked Table L1. We compiled lookahead plans for 2022 to 2025, 2023 to 2026, 2024 to 2027, and 2025 to 2028 in linked Table L2. These plans were initially collected with assistance from the Home Energy Efficiency Team (HEET), a nonprofit climate solutions incubator.

National Grid filed its Reconciliation "GREC" report for the 2023 GSEP expenses on May 1, 2023. To compile the cost data supporting this investigation, we downloaded from the file room (Docket 23-GREC-03) the CY 2023 GREC reports NG-AS/MT-2, 3, 5, 6, 7, 8, and 13.

We obtained gas leak data from the best available source: the 2023 NG Service Quality Report dated March 1, 2024. The report lists all reported leaks and identifies which ones were eliminated during the year. Unfortunately, NGrid's leak survey process is too infrequent to capture current conditions, so even the best source is an incomplete description of leak extent in the City.

In addition, every quarter, National Grid submits to the DPU an accounting of gas leaks in its system; we obtained these reports covering December 31, 2021 to the present, using DPU records requests.

Regarding leak repair, GSEP also provides incentivized cost recovery for repair of G3SEI (Grade 3 significant environmental impact) leaks. We compiled and analyzed the GSEP plans for such repair in 2023 and the actual 2023 costs in the GREC filing.

We extracted Newton data from all the filed reports. We analyzed the 2023 GREC filings to determine what kind of work the 2023 costs actually funded.

[1] Our use the of the word "lookahead" refers to NGrid's reports that anticipate pipe replacements four years in advance, in compliance with regulations in 220 CMR 114.

Lastly, we compiled reports of how leaks were eliminated in 2023.

**Results: GSEP cost summary for Newton 2023**

Table 1 below summarizes GSEP costs in Newton as reported in the GREC filing by National Grid. In addition to leak repair and pipe main replacement, GSEP also allows costs to replace "service" pipes to individual buildings. Note this table excludes $600,000 for a pipe lining project that was partially in Newton.

**Table 1 2023 GSEP costs in Newton**

| | | |
|---|---|---|
| GSEP costs for repairing large leaks | $198,996 | 1.1% |
| GSEP costs for pipe replacements | $16,423,668 | 92.1% |
| GSEP costs for in-service projects[2] | $1,203,477 | 6.8% |
| GSEP costs for service replacements[3] | $8,077 | <0.1% |
| Total | $17,834,21 | 100% |

**Results: Pipe replacement**

Analysis of 2023 GSEP pipe replacement costs as displayed in the GREC filing

We separated the costs reported in the 2023 GREC into the following five categories of projects, displayed in Table 2.

A. Projects that were anticipated in the GSEP plans for 2023.
B. Projects that appeared in any other year's GSEPs or lookaheads.[4]
C. Projects that did not appear in GSEP plans and were attributed to "encroachment."
D. Projects that did not appear in GSEP plans but responded to priority conditions during the year or previous years.[5]
E. Projects that were not in GSEP plans, had no priority assessment, and were accomplished in accordance with Newton DPW coordination.

[2] These repairs were required on pipes that had already been replaced. Note that our Newton Gaspipes Team 2022 GSEP investigation incorrectly described the meaning of "in service replacements".
[3] Service replacements connect the main in the street to the customer's building.
[4] Category B includes a project that had a priority number and was in a lookahead but was done because of priority conditions in the field.
[5] Category D Includes two projects that we presume were responding to priority conditions in prior years. One is a project that is typically done because of conditions in the field (H2OINT), but is listed by National Grid as a carry-over from previous years. The second does not appear in any of the GSEPs or lookaheads, has a priority number, and is listed as a carry over from a previous year.

**Table 2: Analysis of 2023 GSEP pipe replacement costs**

| Category | Number of projects | GSEP cost |
|---|---|---|
| A. | 2 | $2,807,049 |
| B. | 2 | $2,338,594 |
| C. | 2 | $166,256 |
| D. | 4 | $6,641,417 |
| E. | 5 | $4,470,353 |
| Total | 15 | $16,423,669 |

Table 3 below consolidates results from Table 2.

**Table 3 Consolidated analysis of 2023 GSEP pipe replacement costs**

| Description | GSEP cost | Pct. |
|---|---|---|
| All projects in a GSEP plan or lookahead (A plus B) | $5,145,643 | 31% |
| Projects that were not in GSEP plans but addressed field conditions or encroachment from other utilities (C plus D) | $6,807,673 | 42% |
| Projects without GSEP prioritization that were completed in coordination with Newton Public Works. (E) | $4,470,353 | 27% |
| Total | $16,423,669 | 100% |

Note that 27% of the costs originated in coordination with Newton Public Works in the context of maintaining the gas infrastructure for the indefinite future.

Pipe replacement projects charged to GSEP in 2023 are shown in linked Table L3. The table lists each pipe replacement project. If the project appeared in a prior GSEP plan, the prior plan is also noted in the table.

**Results - Leaks and GSEP in Newton**

Analysis of the National Grid reporting of leaks and leak repair results in the following conclusions:

GREC over the year reported an expense of $198,996 to repair 24 G3SEI leaks comprising 110,898 sq. ft. according to the latest measurement reported in 2023.

Through pipe replacement, in 2023, GSEP addressed 10 leaks comprising 3,425 sq. ft. leak extent at the time of repair. Only 6 of the 15 replacement projects included at least one leak repair. The cost of pipe replacement work orders that included at least one leak repair was $9,236,671. Two of the completed pipe replacement projects addressed leaks that at some time were measured to be grade 3SEI, and most of the leak extent eliminated by pipe replacement came from these two projects. 64% of the leak extent eliminated by pipe replacement, including the Grade 3 SEI leak, occurred in public works projects. This suggests that in 2023 there was some consideration about current leaks when public works projects were selected.[6] See linked Table L4 which displays leaks that were associated with GSEP pipe replacement projects.

In Table L4, we looked at all the reported leaks since April 1, 2019 along the locations where pipes were replaced. These leaks include Grade 1, Grade 2, and Grade 3 leaks.

Two Grade 1 leaks, one Grade 2 leak, and two Grade 3 leaks were first reported during the replacement period, which indicates that these pipes were in a fragile state. At least two leaks were reported after the replacements were completed. These two leaks might be in the service lines at those locations. We concluded that replacing or repairing pipes does not prevent all new leaks, which illustrates the fragility of the whole gas distribution system.

For the pipe replacement locations that appeared in a GSEP plan or lookahead (i.e. the 4 projects in categories A and B), we identified only 4 reported leaks over the past 5 years, while for public works-related projects (the 5 projects in category E) we found 7 reported leaks.

The 2023 experience shows that GSEP expenditures to reduce leak extent by leak repair are much more cost-effective than expenditures by pipe replacement.

[6] Mayor Fuller's newsletter on Feb 2, 2023 described improved attention to repair of G3SEI leaks in the first quarter of 2023.

**Results - Leaks in Newton during 2023**

We analyzed the National Grid Service Quality Report to understand how all Newton leaks were treated in 2023 regardless of whether the cost appeared in GSEP or outside of GSEP. Our analysis found the following:

- Total reported leaks as of Jan 1, 2023: 600 leaks comprising 486,884 sq. ft. leak extent Table L5
    - 1 Grade 1 leak
    - 31 Grade 2 leaks
    - 568 Grade 3 leaks comprising 483,989 sq. ft. leak extent

- Total reported leaks as of Jan 1, 2024: 515 leaks comprising 305,767 sq. ft. leak extent Table L6
    - 3 Grade 1 leaks
    - 20 Grade 2 leaks
    - 492 Grade 3 leaks comprising 305,767 sq. ft. leak extent

- A total of 390 leaks were eliminated during 2023, including 137 Grade 3 leaks comprising 146,008 sq. ft. of leak extent.

- 87% of the eliminated leak extent for Grade 3 leaks was accomplished by leak repair. Only 3% of the eliminated leak extent for Grade 3 leaks was accomplished by pipe replacement. The remainder, 10% of eliminated leak extent, resulted from a variety of circumstances including leaks that stopped being observable, duplicate leak accounting, or other circumstances.

- 305 new leaks were recorded during 2023 (515 + 390 - 600 = 305).
    - 172 new Grade 1 leaks
    - 44 new Grade 2 leaks
    - 89 new Grade 3 leaks

- 17 leaks that were non-hazardous in January 2023 were “upgraded” to a higher risk category during the year and eliminated. (Two of these received new leak ID’s when they were upgraded .)

- 5 that were non-hazardous in January 2023 were “upgraded” to a higher risk category during the year and not eliminated.

Table L7 lists all the leaks that were eliminated during 2023 and how they were eliminated. Table L8 lists leaks eliminated by leak repair without first being upgraded to a more hazardous category.

Table L9 lists leaks eliminated by pipe replacement (GSEP and non-GSEP)
Table L10 lists leaks "eliminated otherwise", such as by being upgraded first, by repair of a nearby leak, or by some circumstance other than repair
Table L11 aggregates National Grid's statement of how leaks were "Eliminated Otherwise"

Table 4 aggregates data by how leaks were eliminated, according to National Grid categories.

**Table 4 Aggregation of how leaks were eliminated in 2023**

| How eliminated | Count (All grades) | Count (Grade 3) | Leak extent sq. ft. (Grade 3) | % leak extent |
|---|---|---|---|---|
| Simple repair | 276 | 56 | 127,254 | 87.2% |
| Pipe replacement | 17 | 15 | 4,955 | 3.4% |
| Eliminated by leak repair of other leaks or after being upgraded | 26 | 18 | 5,955 | 4.1% |
| Eliminated by circumstances other than leak repair or pipe replacement | 71 | 48 | 7,844 | 5.4% |
| Total | 390 | 137 | 146,008 | 100.0% |

**Results - Leak History in Newton since December 31, 2019**

Table 5 summarizes the status of reported gas leaks in Newton at the end of each quarter. In the first quarter of 2023, Mayor Fuller stated a desire for Newton to reduce large leaks. She also reported a successful recent reduction in leak extent, which is evident in Table 5. Over the course of nearly four years, the extent of reported leaks has been reduced by more than half. However, since the Mayor's statement in early 2023, leak extent reduction has lagged, particularly in 3Q of 2023 and in 2Q of 2024. Newton has a valuable opportunity to review its coordination with National Grid to ensure the continuous elimination of large leaks.

## Table 5 Newton Reported Leak History since January 1, 2020

| National Grid Report Date | Number of Unrepaired Leaks | Total Leak Extent of unrepaired leaks | Percentage Reduction in Total Leak Extent from Previous Quarter |
|---|---|---|---|
| 03/31/2020 | 860 | 800,862 | |
| 06/30/2020 | 769 | 652,552 | 19% |
| 09/30/2020 | 737 | 557,358 | 15% |
| 12/31/2020 | 718 | 523,966 | 6% |
| 03/31/2021 | 695 | 571,889 | -9% |
| 06/30/2021 | 682 | 569,074 | 0% |
| 09/30/2021 | 677 | 567,119 | 0% |
| 12/31/2021 | 644 | 607,732 | -7% |
| 03/31/2022 | 627 | 554,472 | 9% |
| 06/30/2022 | 645 | 587,340 | -6% |
| 09/30/2022 | 625 | 534,642 | 9% |
| 12/31/2022 | 594 | 486,769 | 9% |
| 03/31/2023 | 579 | 375,515 | 23% |
| 06/30/2023 | 572 | 340,320 | 9% |
| 09/30/2023 | 551 | 335,892 | 1% |
| 12/31/2023 | 513 | 305,667 | 9% |
| 03/31/2024 | 502 | 297,824 | 3% |
| 06/30/2024 | 512 | 316,538 | -6% |

In Newton as of June 30, 2024 there were 28 unrepaired SEI leaks out of 512 total unrepaired leaks. The sum of SEI leak extent was 151,183 sq ft. which is almost half of the total leak extent in Newton (316,538 sq. ft). In other words, 5% of leaks, the SEI leaks, account for 48% of all the leak extent. Therefore, repairing SEI leaks is particularly effective in reducing methane releases to the atmosphere. However, roughly half of the leak extent in Newton is due to non-SEI leaks, which points to the importance of eliminating as many leaks as possible, even those less than the 2,000 sq. ft. definition of SEI.

## Conclusions and Recommendations

Gas leak repair is much more cost-effective in the short term for reducing gas leaks than replacing leak-prone pipes.

National Grid's pattern for replacing pipes and repairing leaks in 2023 was similar to 2022.

Our recommendations are similar to the recommendations in the 2022 investigation:

Gas pipe work in Newton should heavily prioritize leak repair and other technologies, such as pipe lining, that cost much less than pipe replacements. Complete pipe replacement, which is currently mandated, is an expensive choice and should be avoided wherever possible.

Newton should strengthen its policy of encouraging National Grid to repair the largest leaks as quickly as possible because leaking methane is a significant current source of greenhouse gasses. The plans and results for leak repair in Newton should be published quarterly for accountability.

GSEP should be entirely overhauled to align with the December 6, 2023 DPU Order 20-80-B. In contrast to the concept behind the original program, which envisioned operation of the gas system indefinitely, GSEP should provide incentives to accelerate the retirement of the residential gas infrastructure.

Newton should amplify its official advocacy to State officials for an overhaul of GSEP to reflect Newton's priorities. Newton's Climate Action Plan goals will require retiring the gas system entirely. GSEP needs to emphasize/prioritize the immediate reduction/repair of gas leaks and require a detailed plan for the retirement of the gas distribution system as ratepayers transition to electrification. An overhauled GSEP needs to provide a better balance among public safety, infrastructure cost, and speedy retirement of the gas system.

## Appreciations

Thank you to HEET and to others on the Newton pipes team including, in particular, Josh Nichols-Barrer.

# APPENDIX

List of Tables

**Guide to GSEP program abbreviations for pipe replacement**
Quoted from NGrid filing D.P.U. 23-GREC-03, Exhibit NG-AS/MT-1, May 1, 2023, Page 7

> There are 11 types of programs included: (1) “BSMNRPL,” which indicates a bare steel main replacement project; (2) “CIMNRPL<10,” which is a cast iron main replacement project with pipe diameter less than 10 inches; (3) “CIRE101214,” which is a cast iron main replacement project with pipe diameter greater than 8” but less than or equal to 14”; (4) “ENCRCHMTPL,” which is a parallel main encroachment; (5) “PWNONREIM,” which is a public works non-reimbursable project; (6) “ENCRCHMTUM,” which is a main encroachment due to undermining of the existing facility; (7) “H2OINT,” a program that addresses recurring customer outages resulting from water intrusion into low-pressure distribution systems through the replacement of existing leak-prone pipe; (8) “REANONLEAK,” a program used to replace main that, based on conditions found in the field, is immediately prioritized for replacement regardless of leak history; (9) “ALDYRPL,” a program to replace pre-1985 vintage Aldyl-A plastic pipe; (10) “GPLNG,” which are system reliability main replacements; and, (11) BRIDGES.

END