

STAFF SUMMARY



TO: Board of Directors
FROM: Frederick A. Laskey, Executive Director
DATE: March 13, 2024
SUBJECT: Metropolitan Water Tunnel Program
Program Needs and Overview

COMMITTEE: Water Policy & Oversight

X INFORMATION
 VOTE



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Preparer/Title

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RECOMMENDATION:

For information only. This staff summary provides a review of the needs for the Metropolitan Water Tunnel Program (Tunnel Program) and an overview of the Tunnel Program development to date.

DISCUSSION:

On February 5, 2017, the Board of Directors approved construction of northern and southern deep rock water supply tunnels to provide needed redundancy for the Metropolitan Tunnel system. The Board directed staff to proceed with preliminary design, geotechnical investigations and Massachusetts Environmental Policy Act review of the project.

This decision was the culmination of a series of meetings that started with a Special Meeting of the Board of Directors on October 6, 2016, at which staff provided a briefing on the status of the existing MWRA water transmission system and the lack of redundancy for the City Tunnel (1950), City Tunnel Extension (1963), and the Dorchester Tunnel (1976) with an accompanying binder of supporting materials.



Figure 1 – Condition of Some Existing Tunnel System Valves

The following is a summary of the briefing and staff recommendations.

- Staff concluded that the tunnels and shafts themselves require little or no maintenance and represent a low risk of failure. However, the cast iron, steel pipe and valves at the tops of the shafts are in poor condition and are in need of rehabilitation and maintenance.
- Staff noted that failure at the tops of shafts in the existing system could result in widespread outages of water service, impacting 60% of the service area, which would require activation of emergency backup sources of supply, water use restrictions, pressure swings, and a boil order. The economic impact, at that time, to the metropolitan region was determined through Federal Emergency Management Agency methodology to be on the order of \$360 million per day (2024).
- Staff presented financial considerations of advancing a capital program to address redundancy with the goals of preserving sustainable and predictable rates at the water utility level, ensuring adequate capital is available when necessary, and minimizing the cost of borrowing.

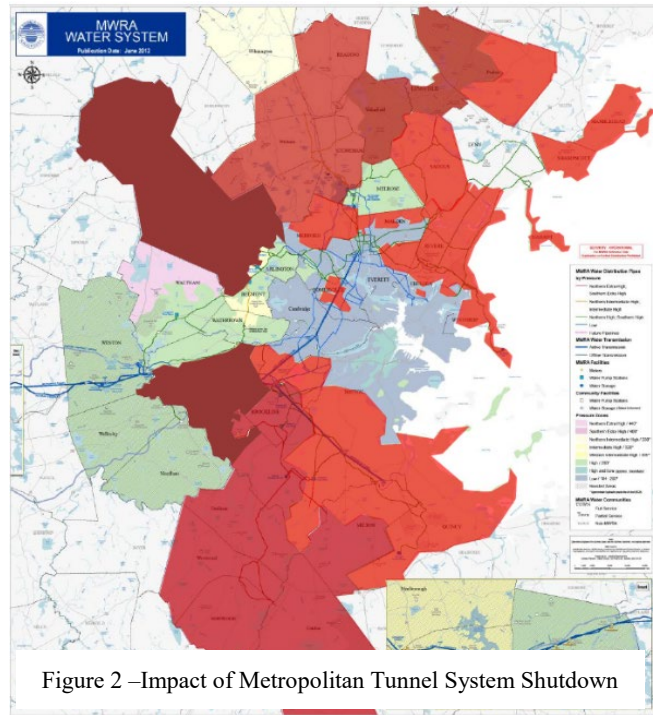


Figure 2 –Impact of Metropolitan Tunnel System Shutdown

Following the 2016 Special Meeting, and at the direction of the Board of Directors, staff developed Metropolitan Redundancy Interim Improvements projects to mitigate the risk of a failure while proceeding with planning, design, construction and ultimately start-up of the new tunnels.

At the conclusion of the Special Meeting, staff were directed to brief member communities, and state and local officials in order to build consensus and support.

The MWRA Advisory Board hosted a Long-Term Redundancy Forum on December 8, 2016 at which staff presented the history of the MWRA waterworks system, the need for Metropolitan Tunnel redundancy and the challenges, both implementation and financial, of building redundancy. The Honorable Jeanette A. McCarthy, Mayor of Waltham, provided the perspective of local communities on the potential for impacts and disruption. On January 19, 2017, the MWRA Advisory Board met and voted to support moving forward with the deep rock, two-tunnel project, utilizing a Program Management Division Approach, similar to the model used for the Boston Harbor Project; and concurrent construction of both tunnels, rather than a phased approach. In February 2017, the Board of Directors approved construction of northern and southern deep rock tunnels and for staff to proceed with preliminary design.

In 2018, MWRA established the Metropolitan Tunnel Redundancy Department to develop and execute the Metropolitan Water Tunnel Program and lead its day-to-day operations, decision-

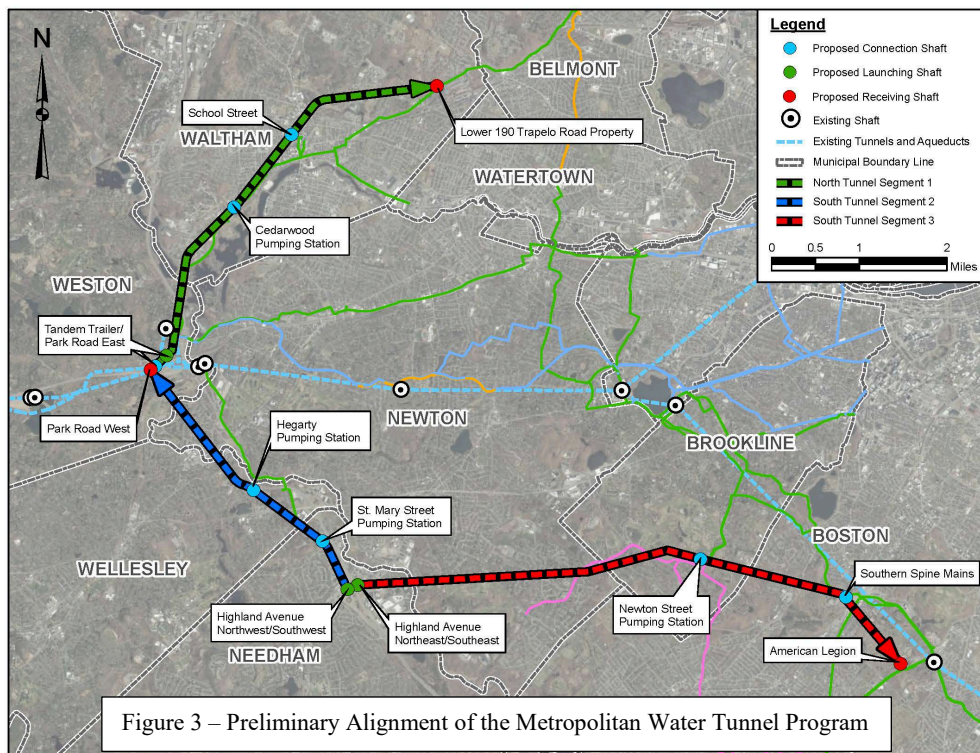
making and selection of implementation strategies as well as to manage all professional services and construction contracts for the Program.

Preliminary design began in 2020 and was completed in early 2024 and included preliminary geotechnical investigation (deep rock borings), evaluation of preliminary tunnel alignment and shaft site alternatives, preliminary design, preliminary contract packaging, preparation of the required MEPA filings and development of a comprehensive list of required environmental permits. In addition, an updated and comprehensive preliminary design level cost estimate and construction schedule was developed. Geotechnical investigations along the primary tunnel alignment are ongoing. Final design is anticipated to start later in 2024 with a target for the first tunnel construction contract bidding in 2027, and tunnel construction beginning in 2028. Tunnel Program completion is anticipated by 2040.

The Tunnel Program transition from preliminary to final design is an opportunity to review the Program’s development over the last few years, current status, and path forward. Accordingly, staff summaries and presentations will be provided at this Board of Directors’ meeting on the following topics:

- Update on Interim Improvements Projects;
- Preliminary Design and Environmental Impact Reviews;
- Program Schedule and Look Ahead (including critical path items, challenges and opportunities);
- Updated Program Cost Estimate, FY25 CIP, and Cost Controls; and
- Final Design Engineering Services Procurement and Contract Structure.

Finally, Figure 3 below shows the current preliminary tunnel alignment, limits of segments, and shaft sites.



BUDGET/FISCAL IMPACTS:

The proposed FY25 CIP includes \$2.1 billion for the Metropolitan Water Tunnel Program. This budget will be refined periodically during Final Design.



Presentation to

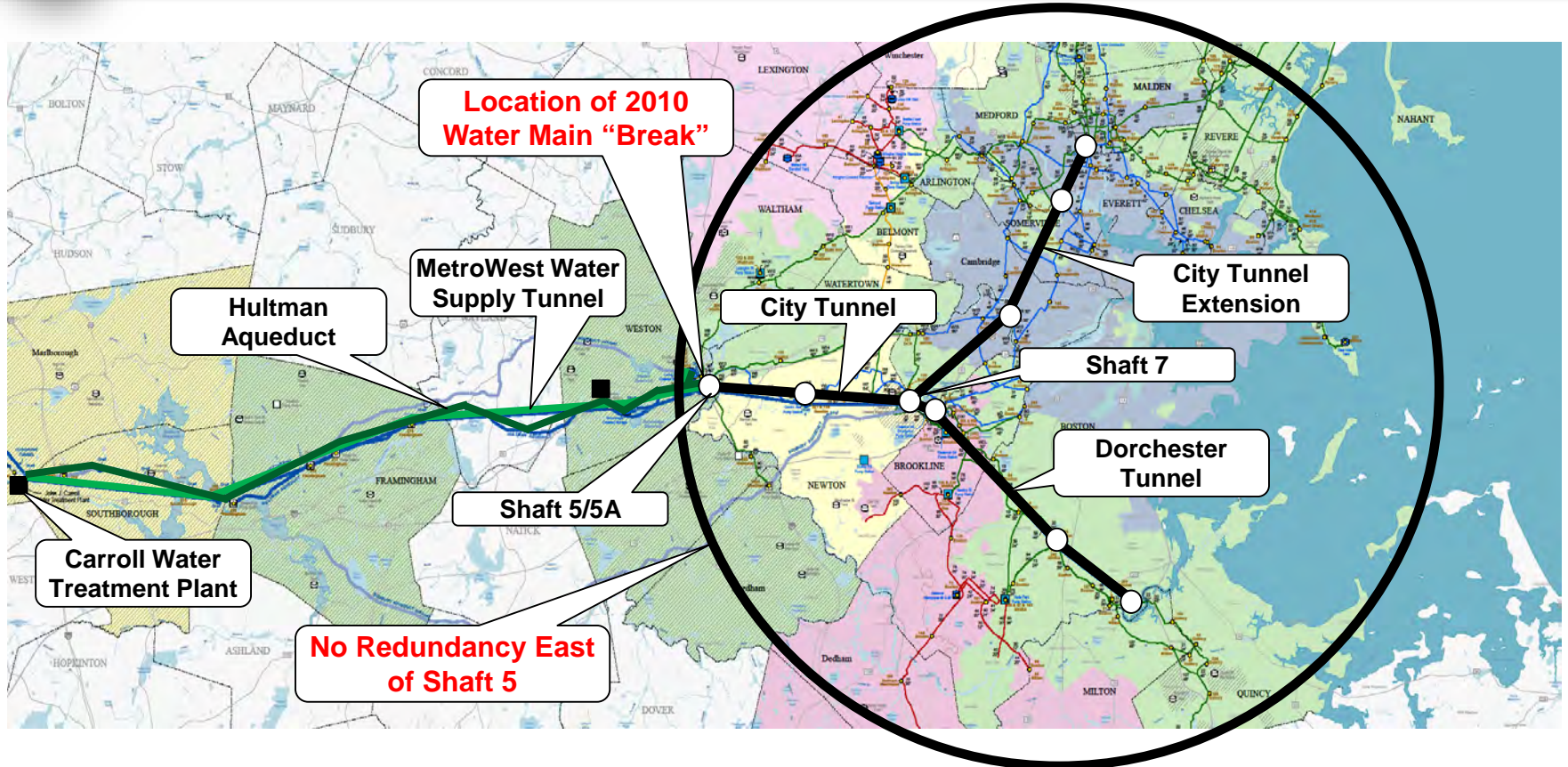
MWRA Board of Directors

Metropolitan Water Tunnel Program Tunnel Program Needs and Overview

March 13, 2024



Metropolitan Tunnel System Serves About 60 Percent of Water Demand in Metropolitan Area





Metropolitan Water Tunnel Program Purpose

- Our current Metropolitan Tunnel System, servicing the Boston area, is in need of repair
- The tunnels, valves, chambers & pipelines are between 50 – 80 years old

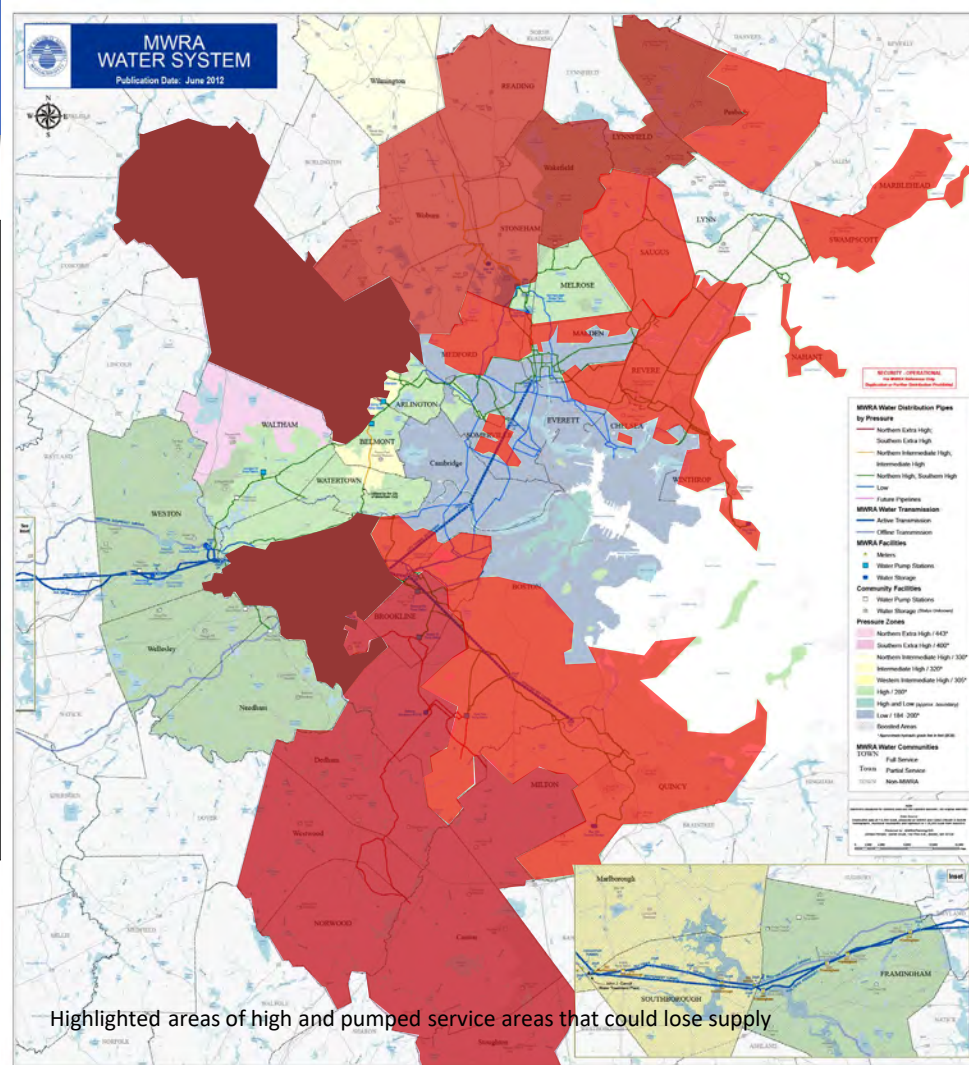


- Currently we cannot maintain our tunnel system east of Shaft 5 in Weston because a shutdown of the entire Metropolitan Tunnel System would be required
- The **Metropolitan Water Tunnel Program** will solve that problem by creating a redundant water tunnel system allowing the old system to be completely taken offline for inspection, maintenance, and repair



Wide-Spread Impact

- Sudden shut down of Metropolitan Tunnel system
- Loss of supply to high service areas
- Pumped Service Areas lose supply as tanks empty
- Whole system would be on boil order
- Economic Impact for Total Water Loss - One Day:
 - \$360 million (2024)
- Economic Impact for Total Water Loss - Three Days:
 - \$1.1 billion (2024)



Highlighted areas of high and pumped service areas that could lose supply



Metropolitan Water Tunnel Program Goals

Protect Public Health, Provide Sanitation and Fire Protection

- Provide full redundancy for the Metropolitan Tunnel System:
 - Provide normal water service and fire protection when the existing tunnel system is out of service
 - Provide the ability to perform maintenance on existing tunnels year-round
 - Provide uninterrupted service in the event of an emergency shut down
 - Meet high day demand flow with no seasonal restrictions
 - Avoid activation of emergency reservoirs
 - Meet customer expectations for excellent water quality
- Result in no future boil orders!





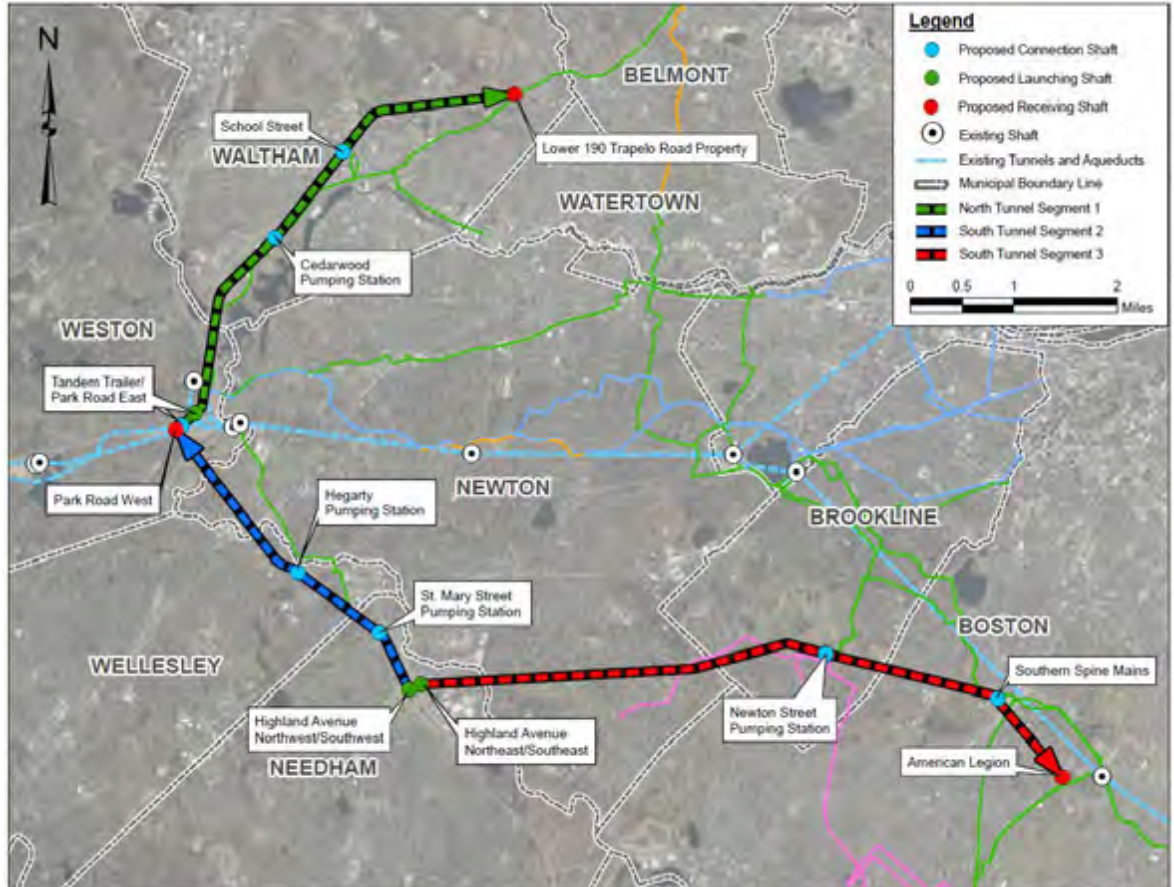
Tunnel Program – Since 2017

- 2017 – Board approves Two-Tunnel Concept
- 2018 – Tunnel Department established
- 2019 – PSS consultant and Expert Review Panel
- 2020 – Began preliminary design and environmental review process
- 2021 – Purchased School St property
- 2022 – GSS consultant began an expanded geotechnical program
- 2023 – Completed preliminary design, first bottom-up cost estimate
- 2024 – Complete environmental review process
- 2024 – Begin final design
- Over 10 Board Updates & Tunnel Program Contract Awards since 2017



Metropolitan Water Tunnel Program

- ~15 miles of deep, hard rock, pressure tunnel
- Tunnels will begin in the Weston (I-90/I-95 vicinity)
- Northern Tunnel - ~5 miles, ends in Waltham
- Southern Tunnel - ~10 miles, ends in Mattapan near American Legion Hwy
- Six intermediate connections to existing water infrastructure
- Construction anticipated between 2028 and 2040





Today's Agenda

- Update on Interim Improvements Projects
- Preliminary Design and Environmental Impact Report
- Program Schedule and Look Ahead (including critical path)
- Updated Program Cost Estimate, Proposed FY25 CIP, and Cost Controls
- Contract Structure for Final Design Engineering Services, Contract 7556