Metropolitan Water Tunnel Program

Public Information Session

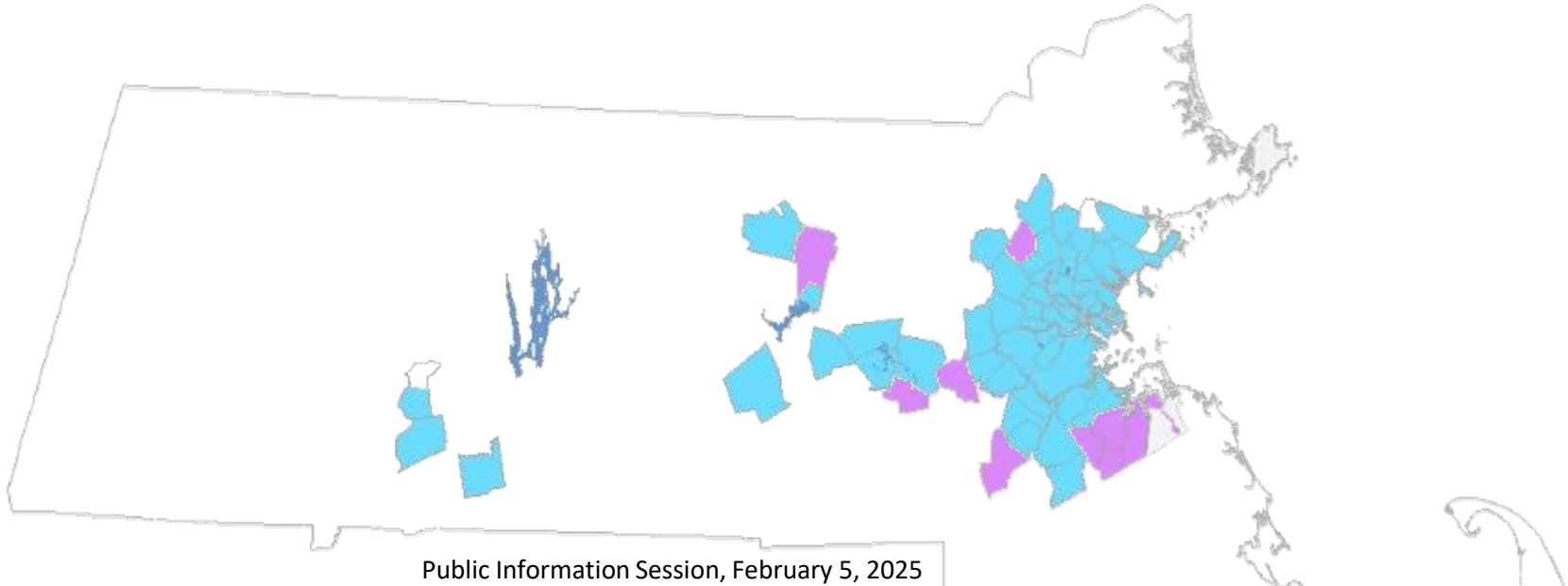
February 5, 2025


Welcome!

What We Do

MWRA …

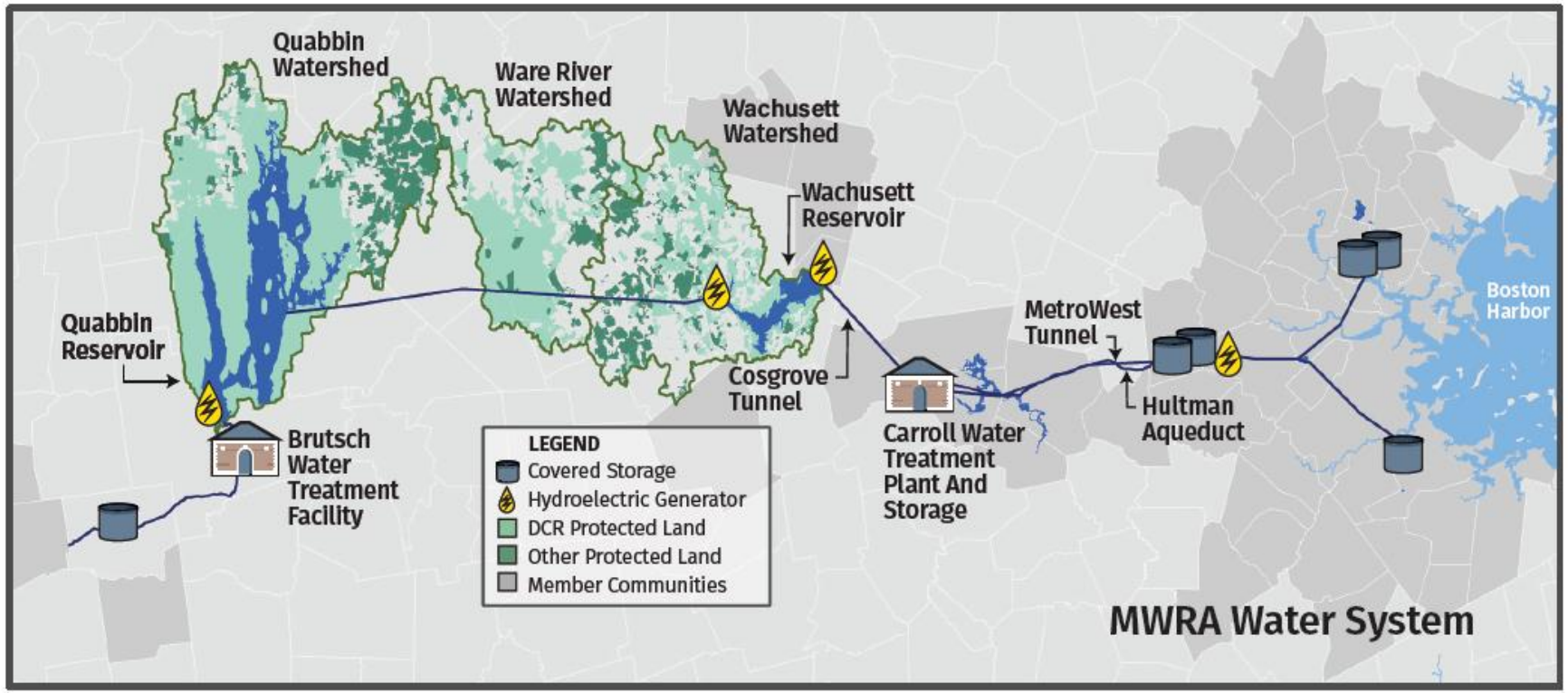
- provides wholesale water and wastewater services to over 3.1 million customers in 61 communities
- delivers an average of 200 million gallons per day to its water customers
- collects and treats an average of 350 million gallons of wastewater per day, with a peak capacity of 1.2 billion gallons



Quabbin and Wachusett Reservoirs

A Civil Engineering Marvel

- 102 miles of active transmission mains and tunnels (plus 43 miles on standby), including a number of deep rock pressure tunnels
- 284 miles of distribution mains with over 4,700 valves
- About 85% of our water is delivered by gravity
- 12 pump stations
- 5 years of storage



MWRA's Mission is Critical

We Must….

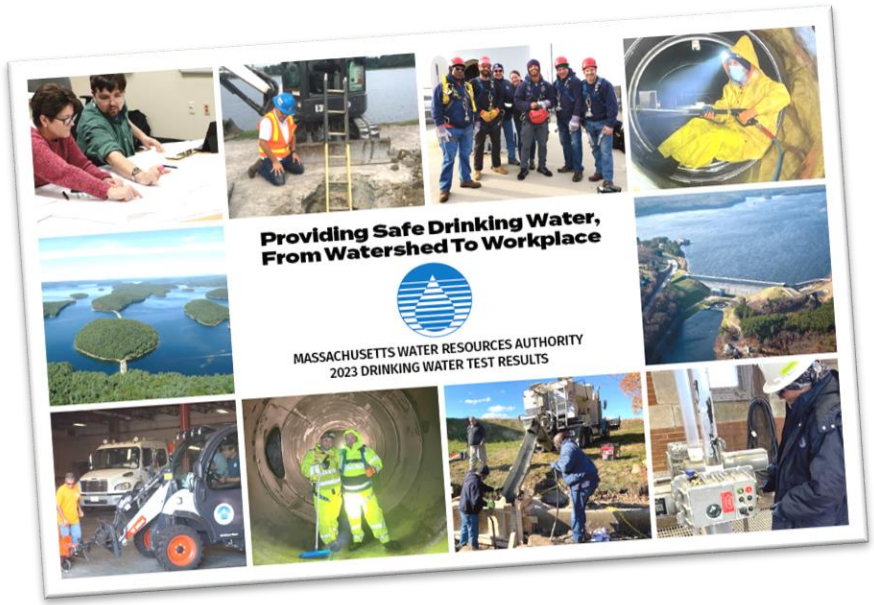
- Deliver water to protect **public health**, provide **sanitation**, and **fire protection**

We Need to….

- Have the ability to swiftly respond to a disruption in service
- Maintain and rehabilitate surface piping, key valves and tunnels on a periodic basis

Drinking Water Quality Is Excellent

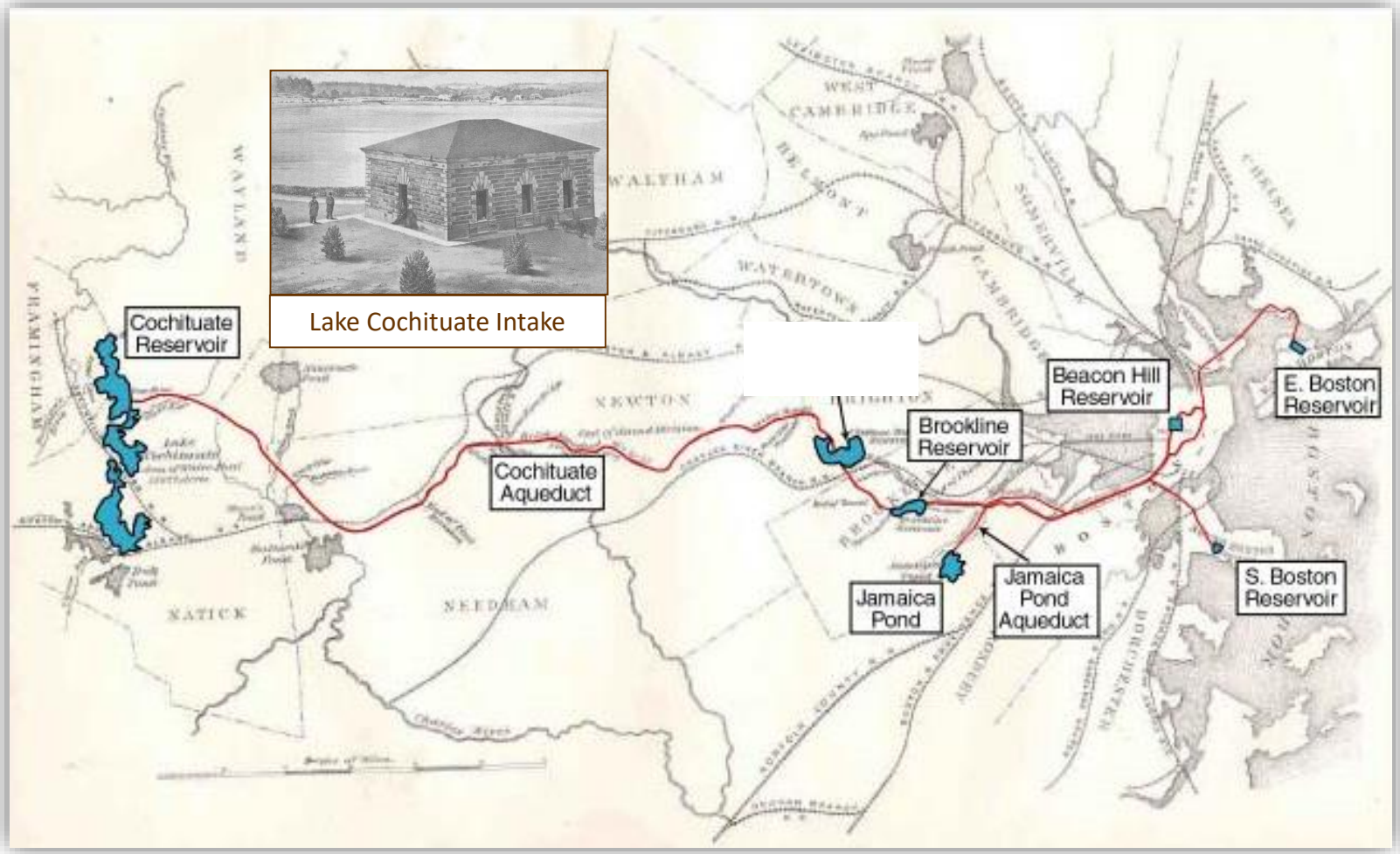
- All state and federal water quality standards are being met
- Annual Water Quality Report is mailed to over 800,000 households in the service area each June
- MWRA water has won numerous regional and national taste tests



Early Boston Water System

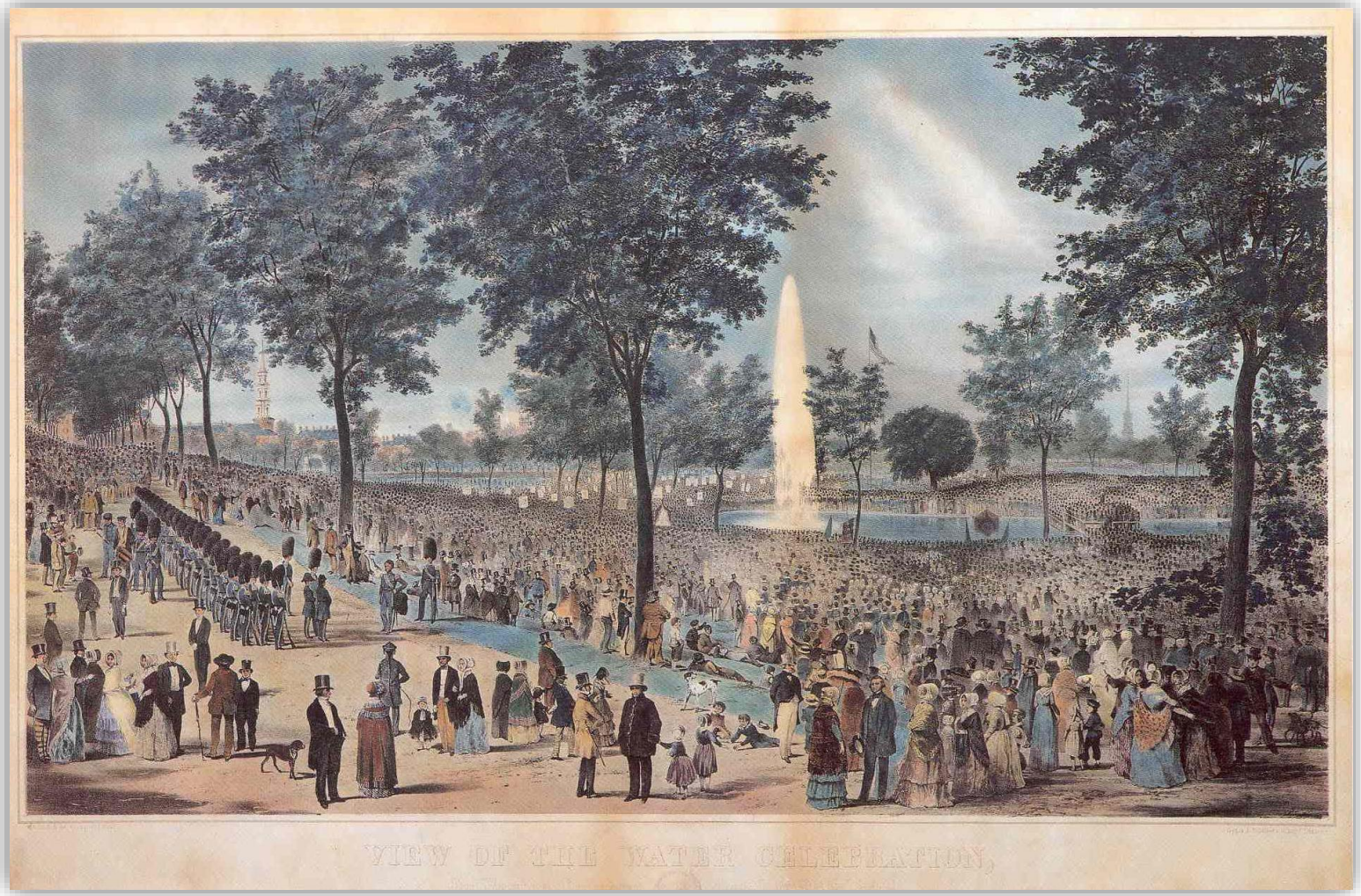
- Metro Boston's water system originated in the 1600's – the "Great Spring"
- The first corporation in the American Colonies was formed to build a water conduit using wooden pipes
- The water system was expanded in the 1700's and 1800's
- However, undersized pipes and low pressure hindered fire fighting
- The pattern of moving continually westward in search of larger water sources began

The Cochituate System



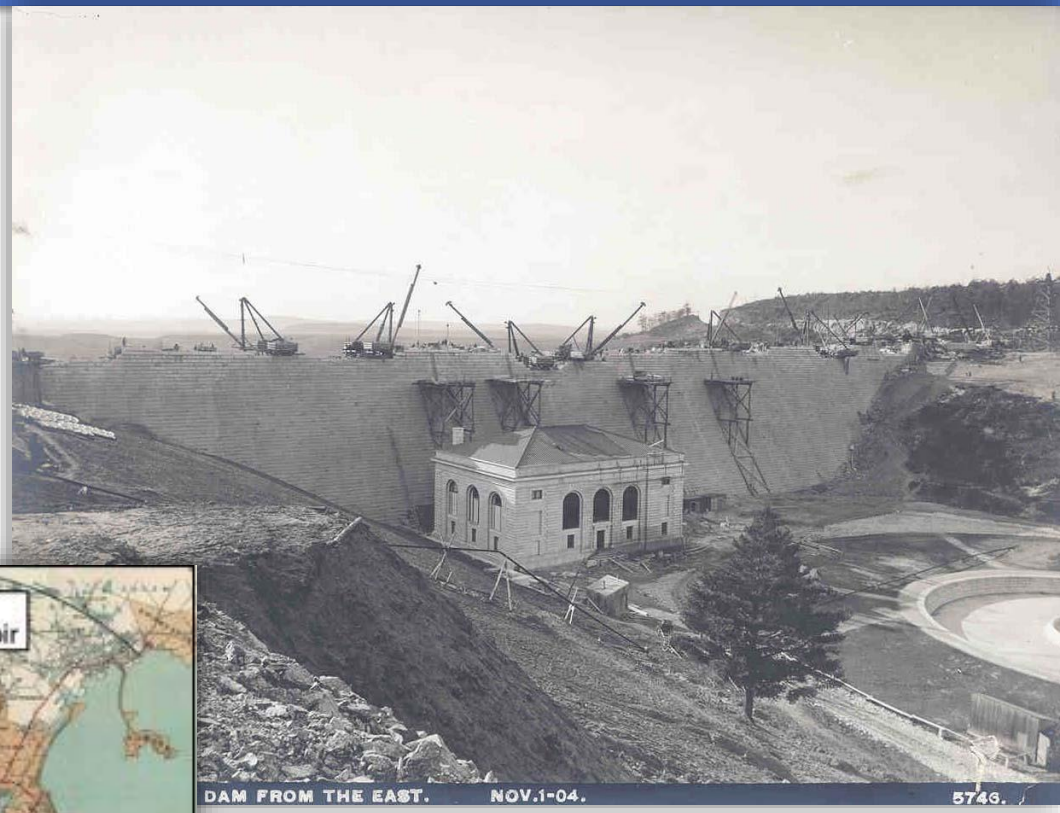
Water Celebration On Boston Common in 1848

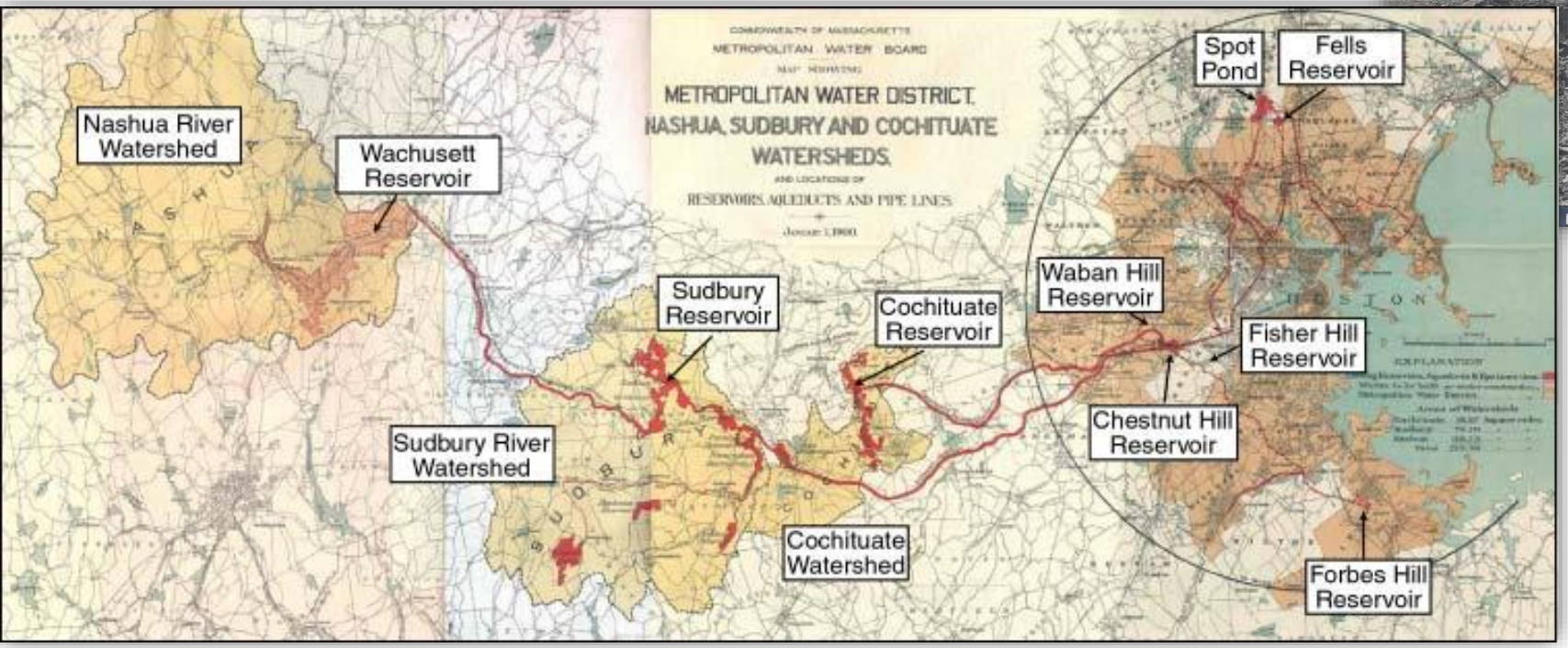
- Water from Lake Cochituate flowed into the Frog Pond on Boston Common in 1848 at a dedication ceremony that drew 100,000



MWRA Water System History

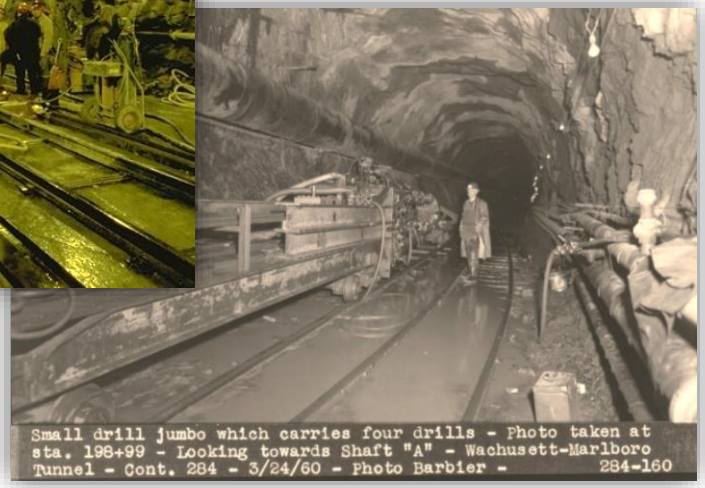
- By the early 1900's the Metropolitan Water District was formed
- Dams were built and reservoirs impounded
- Pipe networks were constructed
- Pumping stations provided much needed pressure

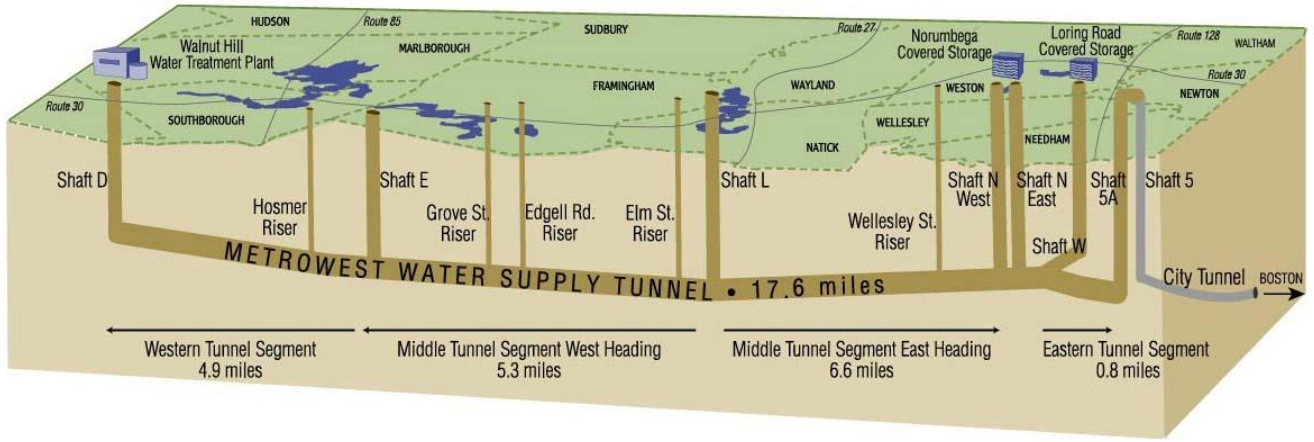




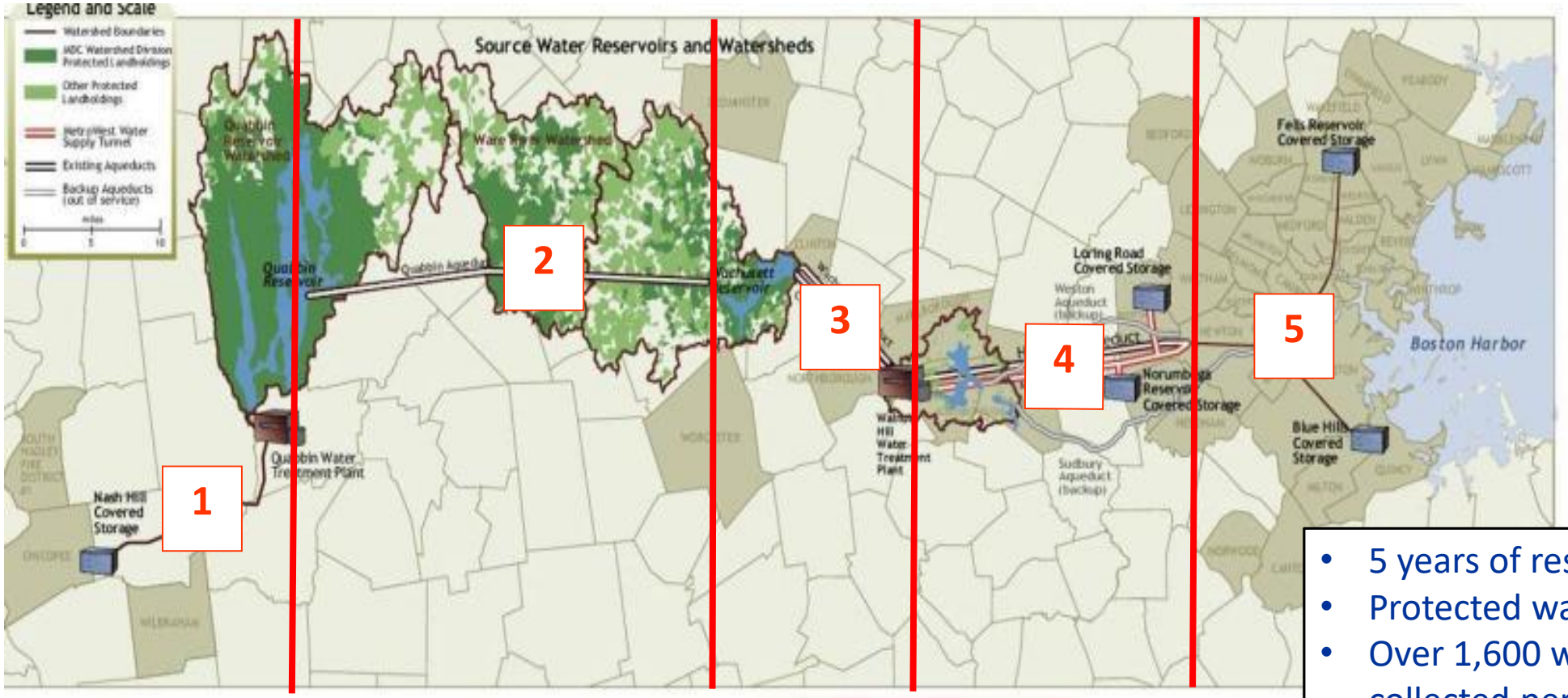
MWRA Water System History

- The mid 1900's brought more reservoir capacity, a pressure aqueduct system, and a deep rock pressure tunnel system
- The early 2000's brought redundancy up to the edge of Route 128





MWRA Water System

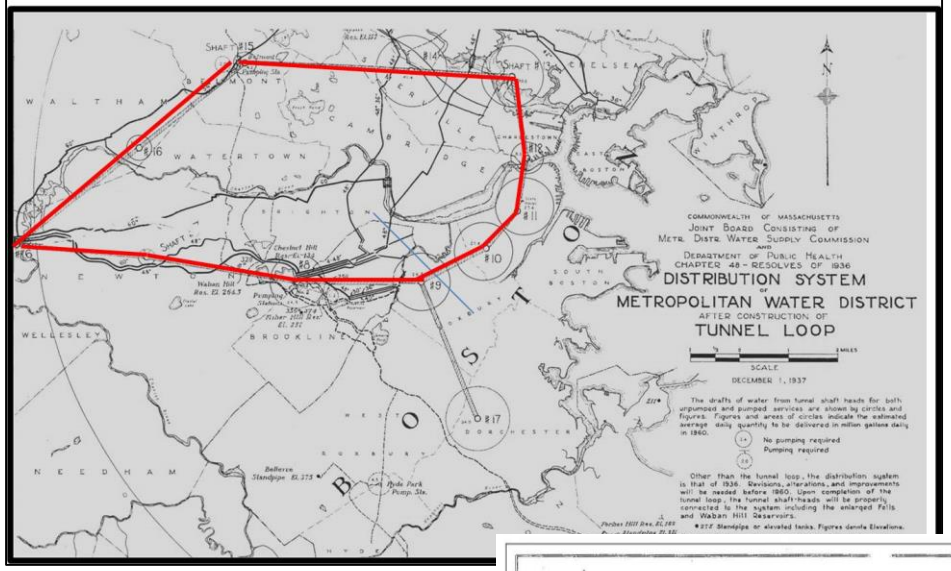


1. Chicopee Valley Aqueduct — 2007 Improvements ✓
2. Quabbin Aqueduct — Inspection planned ✓
3. Cosgrove Tunnel / Wachusett Aqueduct — 2019 Improvements ✓
4. MetroWest Tunnel / Hultman Aqueduct — 2003/2013 Improvements ✓
5. Metropolitan Tunnels — Significant Needs ← Next!

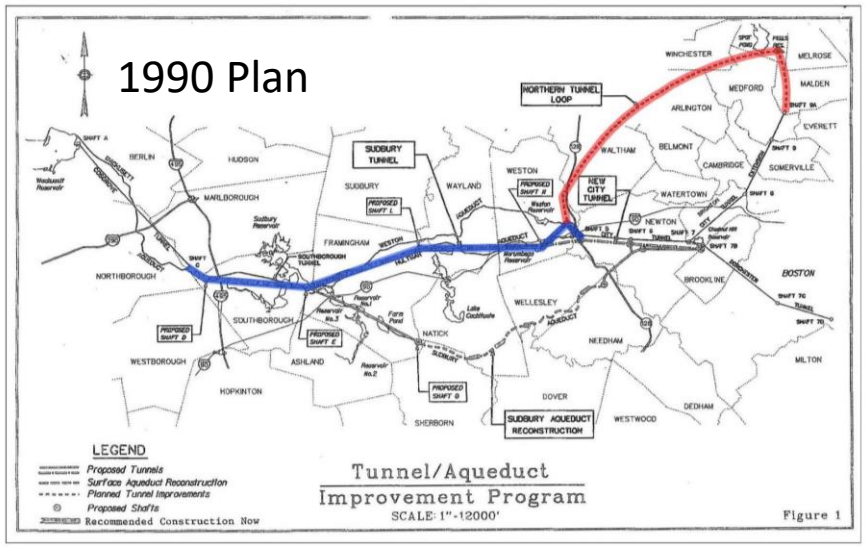
- 5 years of reservoir capacity
- Protected watershed
- Over 1,600 water samples collected per month
- Great taste!

Previous Redundancy Evaluations

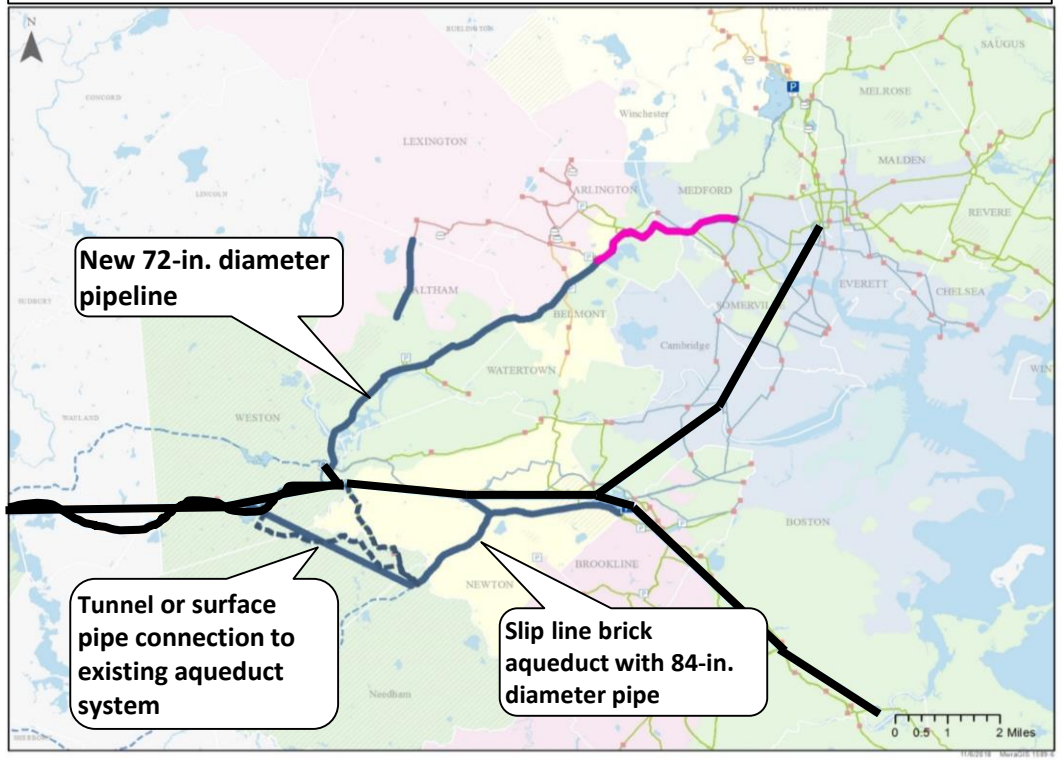
Original 1936 Tunnel Loop Plan



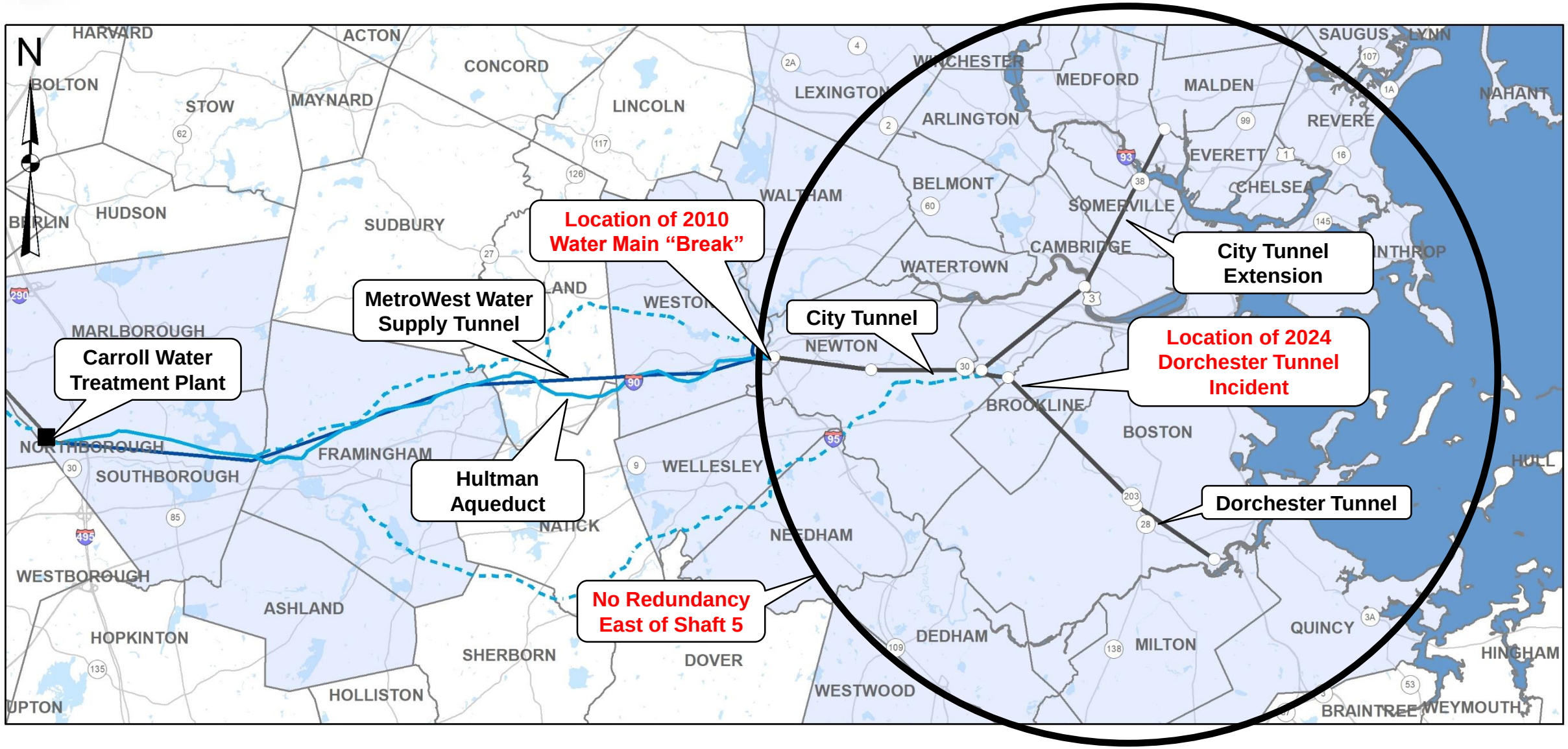
1990 Plan



2011 Plan – Surface piping with Northern and Southern Components

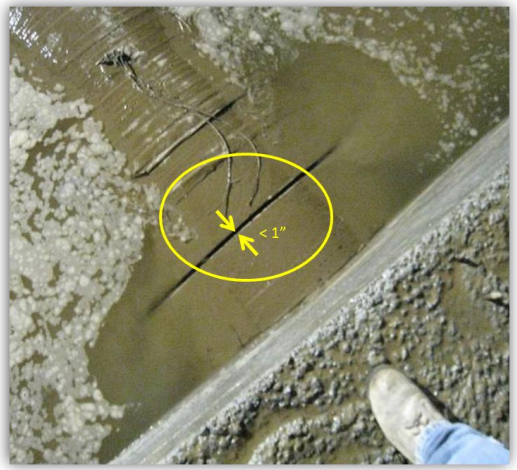


Metropolitan Tunnel System Serves About 60 Percent of Water Demand in Metropolitan Area



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

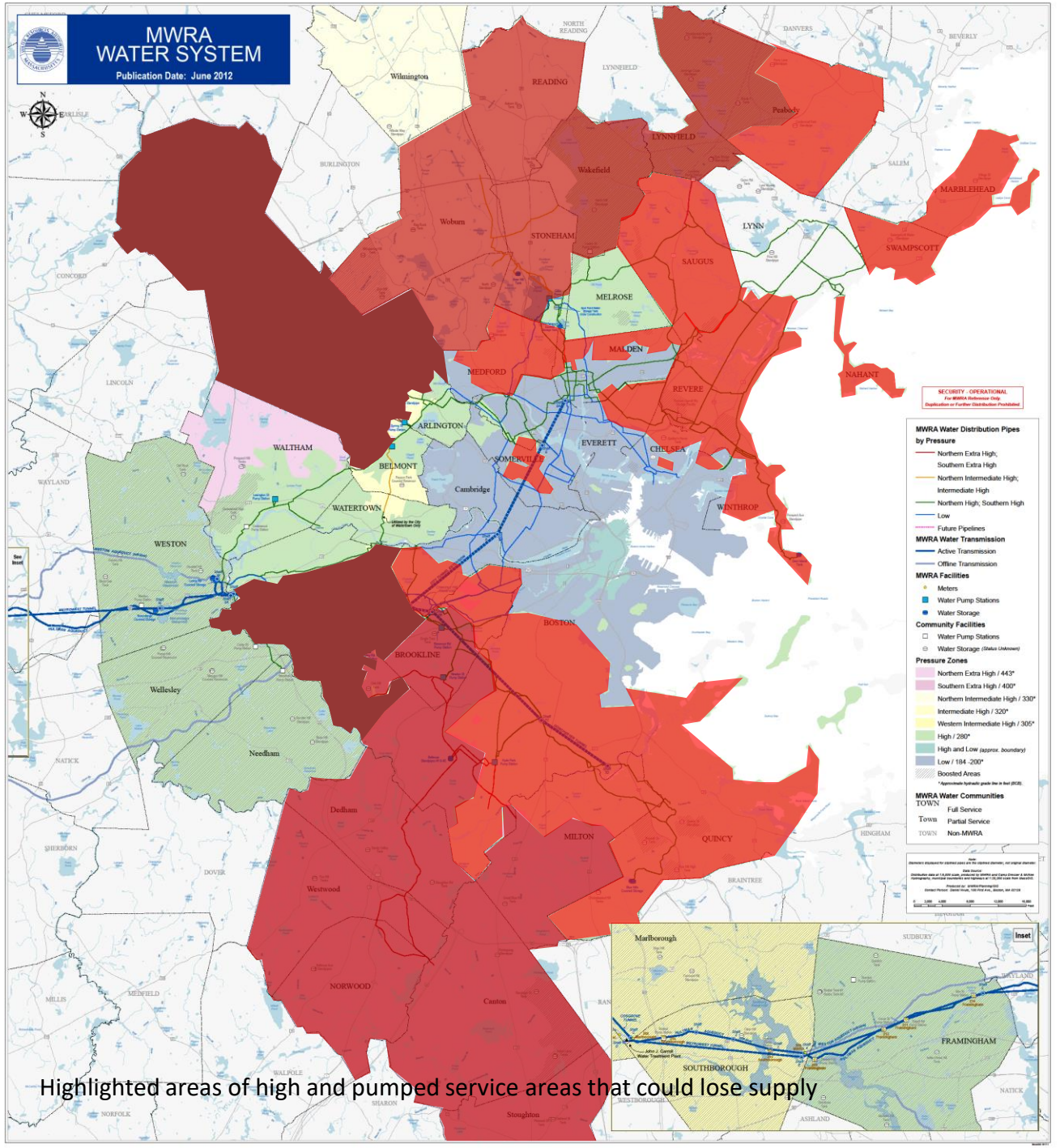


- Currently we cannot maintain our tunnel system east of Shaft 5 in Weston because a shutdown of the entire Metropolitan Tunnel System would be required
- The **Metropolitan Water Tunnel Program** will solve that problem by creating a redundant water tunnel system allowing the old system to be completely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

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

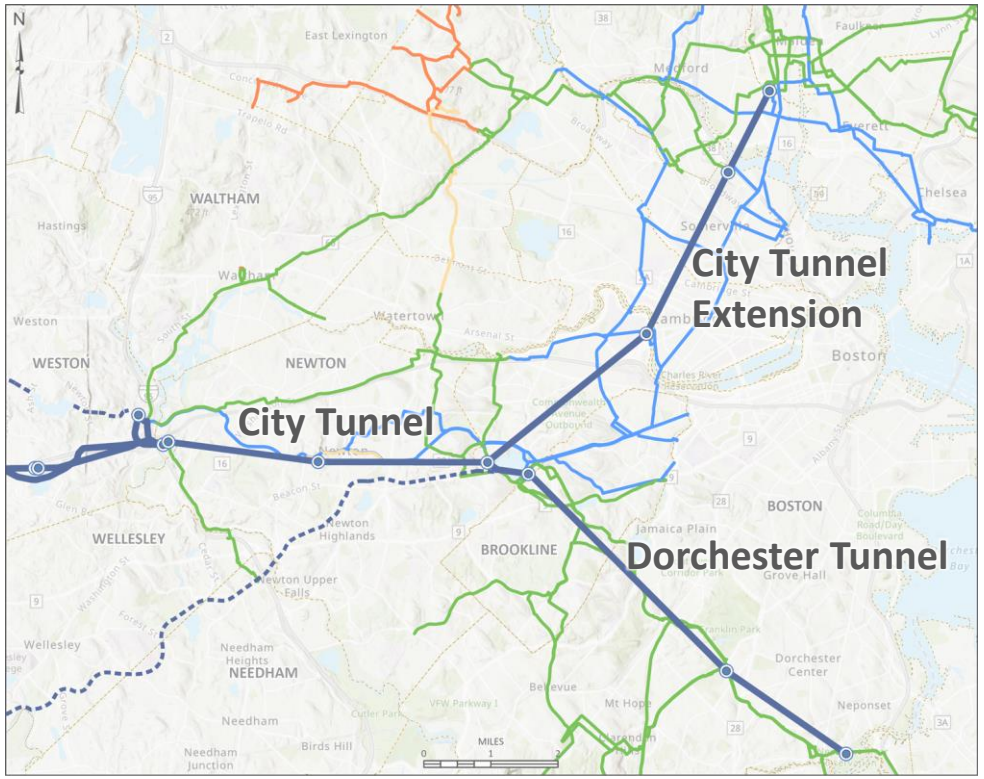
Agenda

- Program Overview
- Conceptual Tunnel Construction
- Work Completed & Upcoming
- Construction & Operations
- Outreach & Environmental Justice
- Schedule
- Information & Contacts

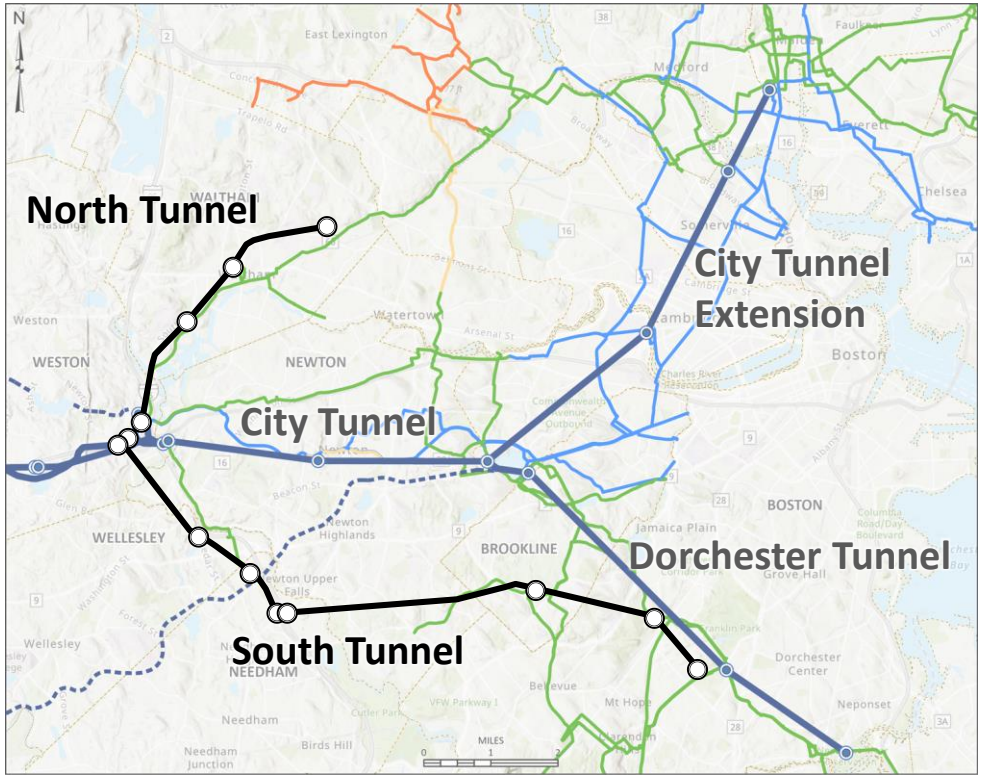
Metropolitan Water Tunnel Program

Purpose: To provide redundancy to the Metropolitan Tunnel System

Today

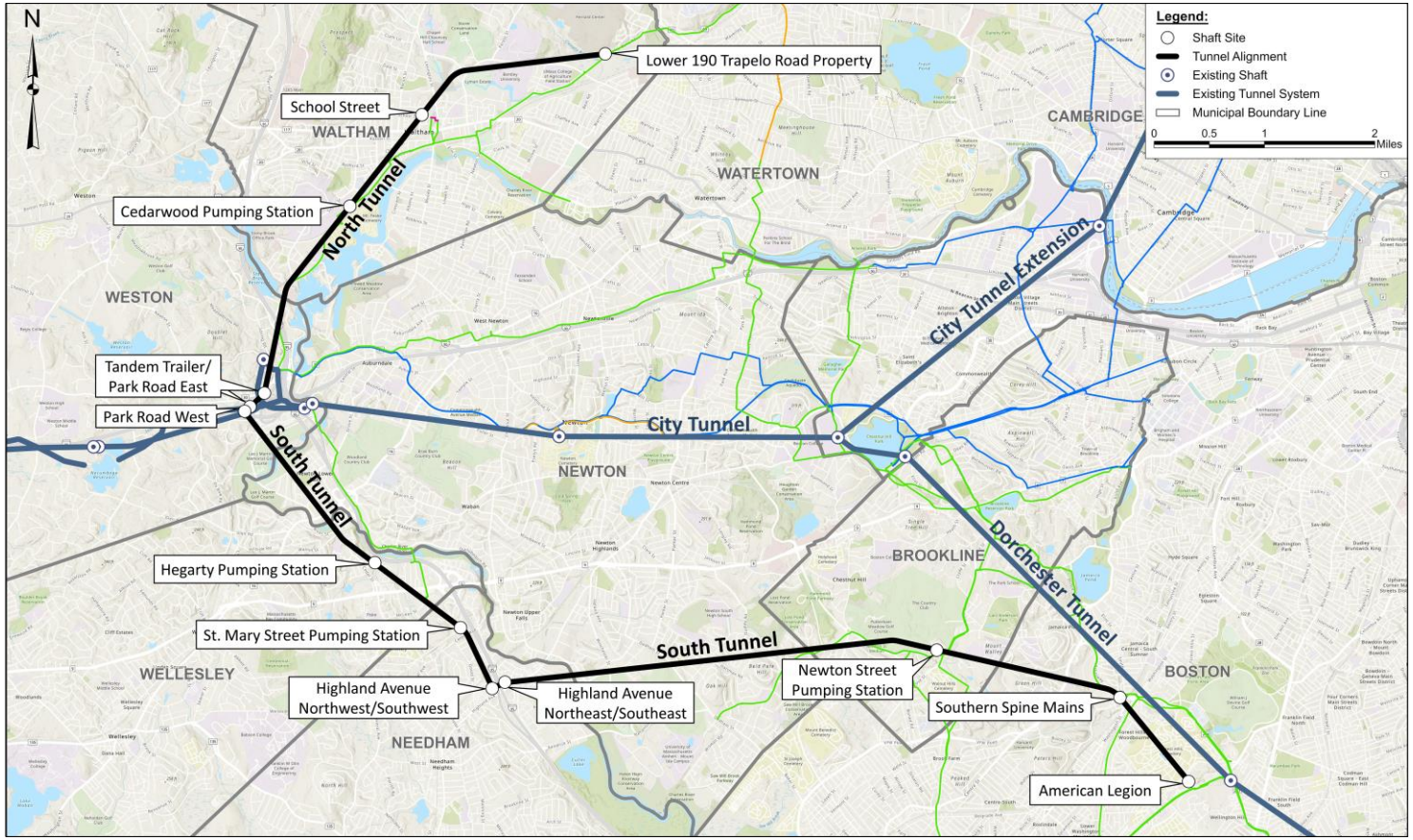


When Complete



Metropolitan Water Tunnel Program - Overview

- ~15 miles of deep, hard rock, pressure water tunnels
- 13 Shaft Sites
- Tunnels will begin in Weston (I-90/I-95)
- North Tunnel - ~5 miles, ends in Waltham
- South Tunnel - ~10 miles, ends in Mattapan near American Legion Hwy
- Tunnel Construction anticipated between 2028 and 2040



Tunnel Segments and Shaft Sites

Three Launching Shaft Sites ●

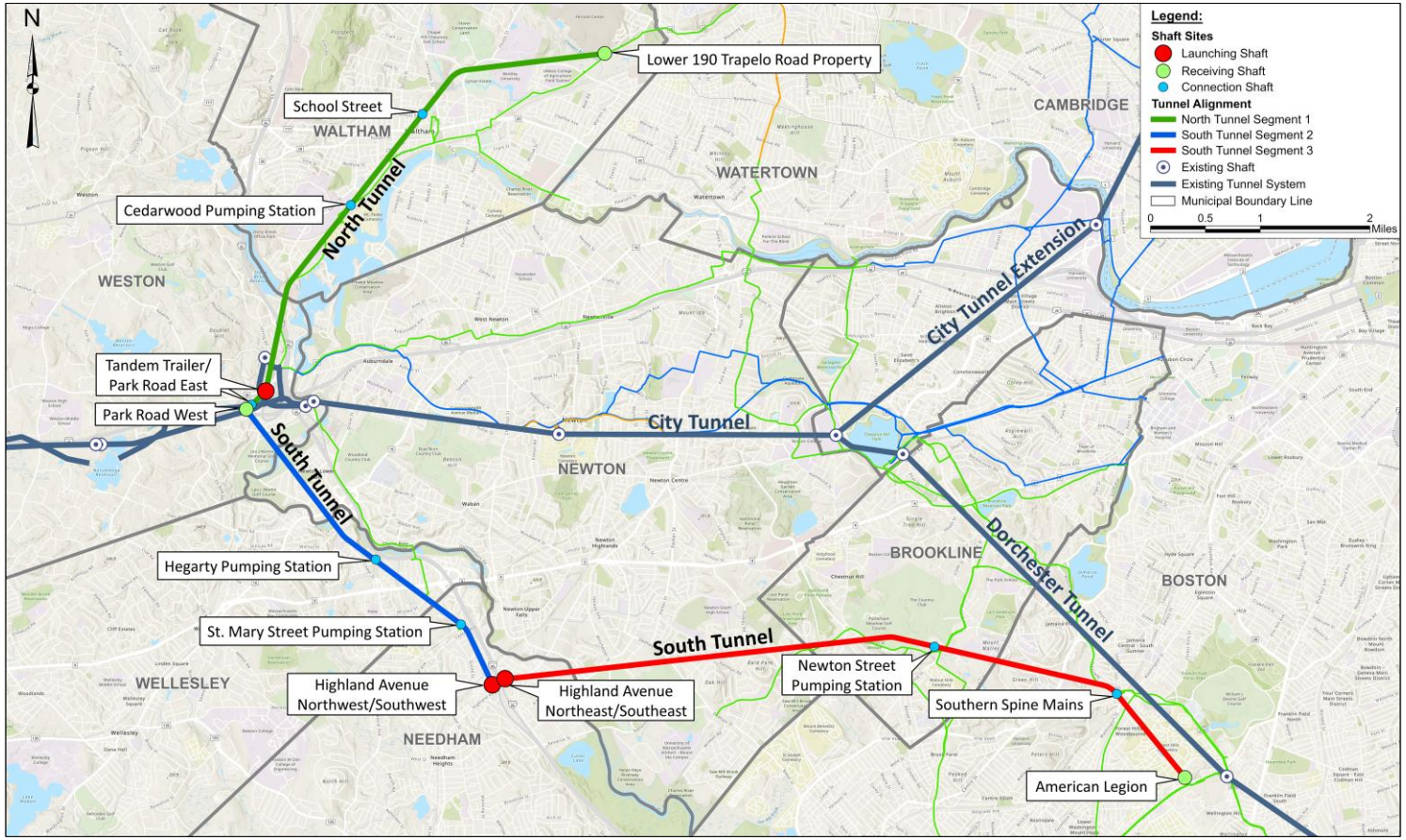
- Tandem Trailer, Weston (includes connection shaft at Park Road East)
- Highland Ave/I95 Interchange (NW & NE), Needham

Three Receiving Shaft Sites ●

- Lower 190 Trapelo Rd Property, Waltham
- Park Road West, Weston
- American Legion, Mattapan

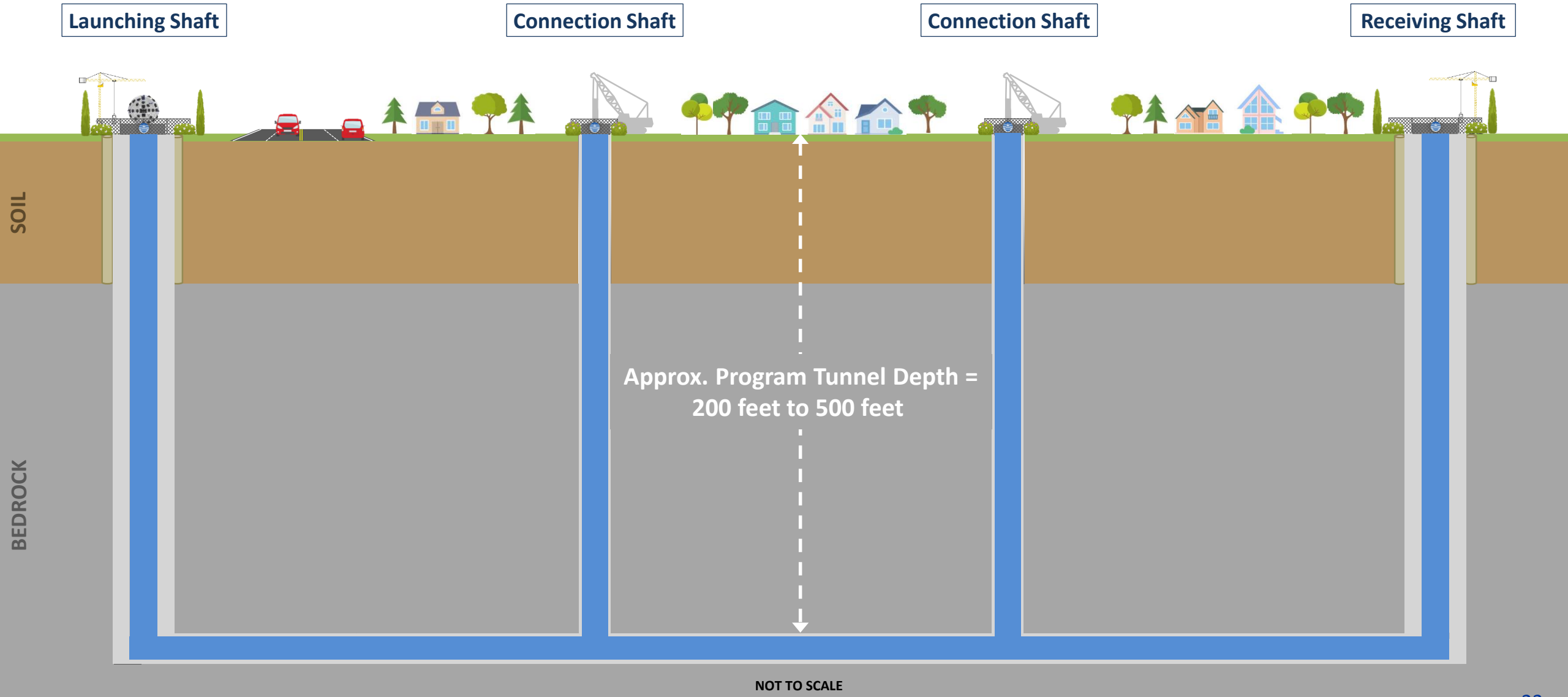
Six Intermediate Connection Shaft Sites ●

- School St, Waltham
- Cedarwood Pumping Station, Waltham
- Hegarty Pumping Station, Wellesley
- St. Mary Street Pumping Station, Needham
- Newton Street Pumping Station, Brookline
- Southern Spine Mains, Boston



Three Tunnel Segments — — —

Conceptual Construction Sequence



How Did We Get Here?

Early Concepts:

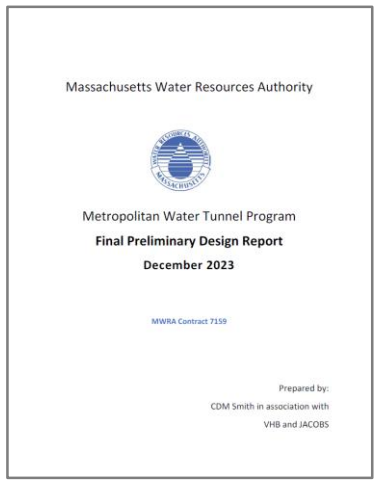
- Establish Program Goal = Full Redundancy
- Evaluated numerous tunnel and non-tunnel alternatives
- Selected all tunnel alternative (maximize work underground, least impacts)
- Gather Stakeholder input, incorporate into environmental analysis and preliminary design
- Shaft site selection
  - Meet system hydraulic requirements
  - Provide sufficient space for construction and permanent infrastructure
- Establish tunnel alignment
  - Minimize overall tunnel length
  - Avoid geo-hazards, when possible
- Avoid, minimize, and mitigate impacts to the environmental and communities to the maximum extent practicable

Preliminary Design

Early Concepts
Prelim. Design & EIR
Geotechnical Investigations
Final Design
Construction
Operations

Preliminary Design (2020 – Early 2024) Complete ✓

- 15 miles of deep rock tunnel
- 100 Year Service Design Life
- Preliminary tunnel alignment and profile, valve chambers and surface pipeline connections
- Establish readily constructible tunnel segment lengths
- Construction contract packaging and sequence approach
- Updated construction cost estimate and construction schedule
- Performed in parallel with environmental review


Massachusetts Water Resources Authority

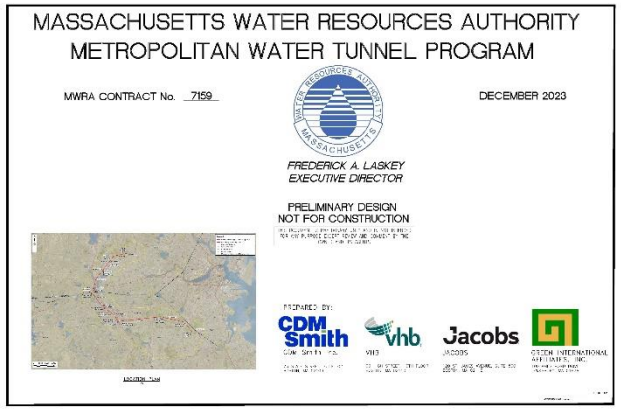
Metropolitan Water Tunnel Program

Final Preliminary Design Report

December 2023

MWRA Contract 7159

Prepared by:
CDM Smith in association with
VHB and JACOBS

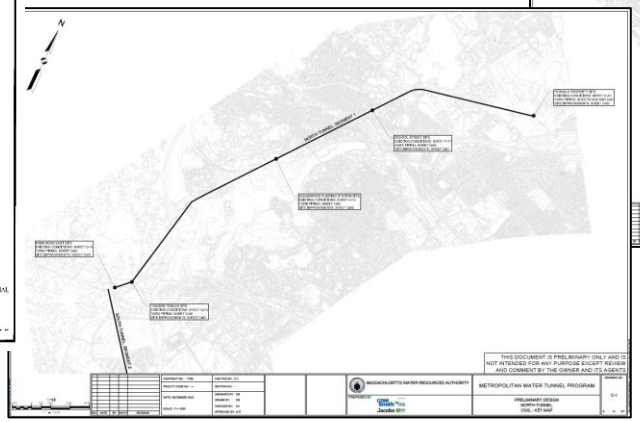

MASSACHUSETTS WATER RESOURCES AUTHORITY
METROPOLITAN WATER TUNNEL PROGRAM

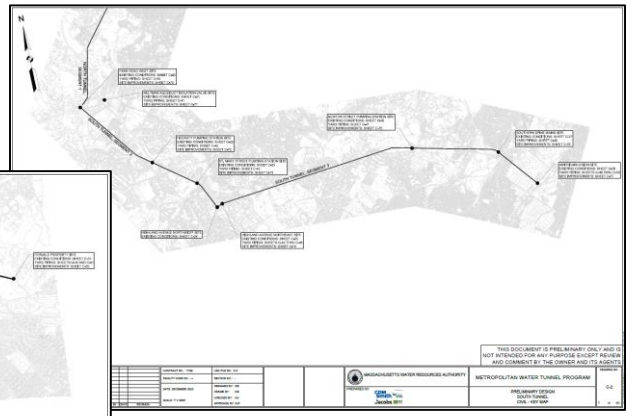
MWRA CONTRACT No. 7159

DECEMBER 2023

FREDERICK A. LASKEY
EXECUTIVE DIRECTOR

PRELIMINARY DESIGN
NOT FOR CONSTRUCTION





Environmental Review Documents

Early Concepts
Prelim. Design & EIR
Geotechnical Investigations
Final Design
Construction
Operations

MEPA filings and Environmental Impact Reports: Complete ✓

- Environmental Notification Form (ENF), March 2021
  - Certificate Issued May 2021
- Draft Environmental Impact Report (DEIR), October 2022
  - Certificate Issued December 2022
- Supplemental Draft Environmental Impact Report (SDEIR), July 2023
  - Certificate Issued September 2023
- Final Environmental Impact Report (FEIR), February 2024
  - Certificate Issued April 2024

Stakeholder Comments Were Addressed as Part of the Environmental Review Process

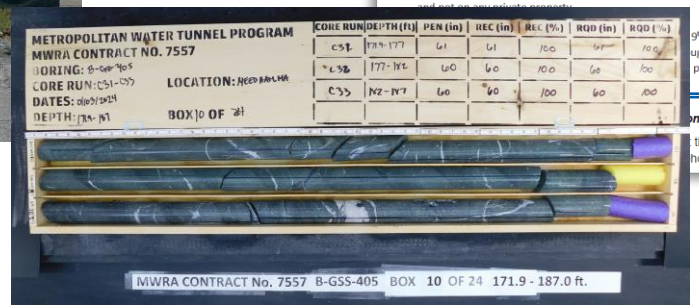
Documents are available on our website:
https://www.mwra.com/mwtp/resources.html#resources

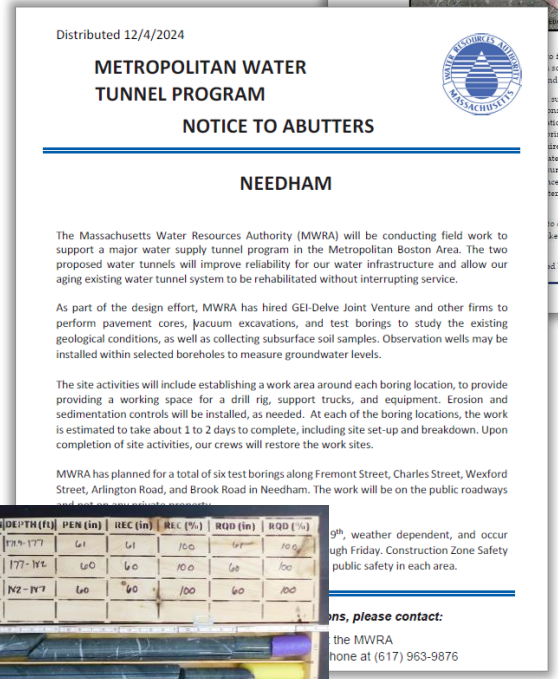
Geotechnical Investigation

Early Concepts
Prelim. Design & EIR
Geotechnical Investigations
Final Design
Construction
Operations

- Phase 1, Preliminary Design/Environmental Impact Report (2020 – 2023) **Complete ✓**
- Phase 2, Geotechnical Support Services (2023 – Early 2026) **Ongoing**
- Phase 3, Final Design (2025 – 2028) **Up Next**

Deep Test Boring Site





Distributed 12/4/2024

METROPOLITAN WATER TUNNEL PROGRAM

NOTICE TO ABUTTERS

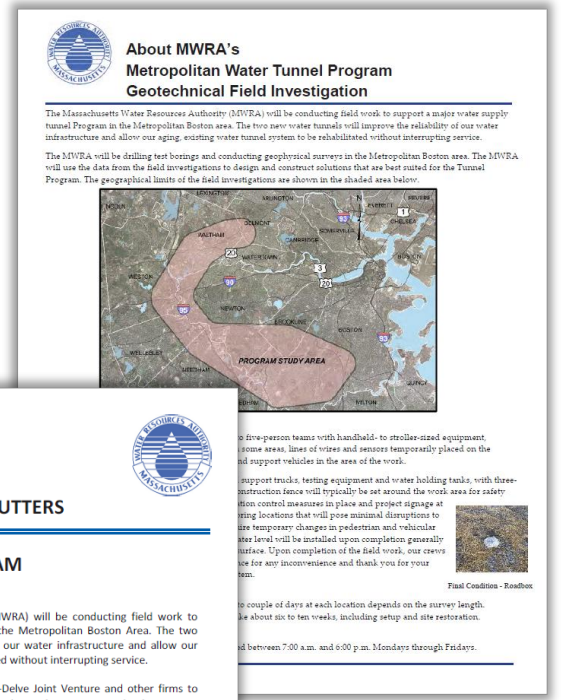
NEEDHAM

The Massachusetts Water Resources Authority (MWRA) will be conducting field work to support a major water supply tunnel program in the Metropolitan Boston Area. The two proposed water tunnels will improve reliability for our water infrastructure and allow our aging existing water tunnel system to be rehabilitated without interrupting service.

As part of the design effort, MWRA has hired GEI-Delve Joint Venture and other firms to perform pavement cores, vacuum excavations, and test borings to study the existing geological conditions, as well as collecting subsurface soil samples. Observation wells may be installed within selected boreholes to measure groundwater levels.

The site activities will include establishing a work area around each boring location, to provide providing a working space for a drill rig, support trucks, and equipment. Erosion and sedimentation controls will be installed, as needed. At each of the boring locations, the work is estimated to take about 1 to 2 days to complete, including site set-up and breakdown. Upon completion of site activities, our crews will restore the work sites.

MWRA has planned for a total of six test borings along Fremont Street, Charles Street, Wexford Street, Arlington Road, and Brook Road in Needham. The work will be on the public roadways



About MWRA's
Metropolitan Water Tunnel Program
Geotechnical Field Investigation

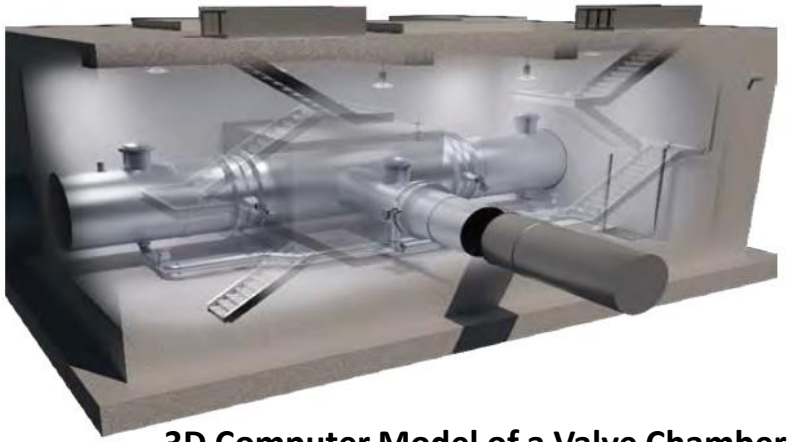
The Massachusetts Water Resources Authority (MWRA) will be conducting field work to support a major water supply tunnel Program in the Metropolitan Boston area. The two new water tunnels will improve the reliability of our water infrastructure and allow our aging, existing water tunnel system to be rehabilitated without interrupting service.

The MWRA will be drilling test borings and conducting geophysical surveys in the Metropolitan Boston area. The MWRA will use the data from the field investigations to design and construct solutions that are best suited for the Tunnel Program. The geographical limits of the field investigations are shown in the shaded area below.

Final Design

Early Concepts
Prelim. Design & EIR
Geotechnical Investigations
Final Design
Construction
Operations

- Detailed Design & Contract Document Preparation
- Geotechnical & Environmental Investigations & Reports
- Field Work
- Workshops
- Permitting
- Land Acquisition
- Securing Power Supply
- Community Approvals/Agreements
- Continue Outreach



3D Computer Model of a Valve Chamber

Permits and Approvals

Early Concepts

Prelim. Design & EIR

Geotechnical Investigations

Final Design

Construction

Operations

Commonwealth of Massachusetts

- Massachusetts Environmental Policy Act (MEPA) Review
- Massachusetts Historical Commission
- Highway Access/Construction Access Permits
- MBTA Right of Way Access License Agreement
- Natural Heritage Endangered Species Program
- Water Management Act Permit
- Chapter 91 Licenses
- Superseding Order of Conditions, upon appeal
- Section 401 Water Quality Certificate
- Distribution System Modification
- Land disposition/easements
- Article 97 Land Disposition Legislation

Municipal

- Wetlands Protection Act Order of Conditions
- Roadway Access Permits/Street Opening Permit
- Hydrant Permit
- Drainage Discharge Permit

Federal

- National Pollutant Discharge Elimination System (NPDES) Construction General Permit (CGP)
- NPDES Dewatering and Remediation General Permit (DRGP), if needed
- Section 404 Department of the Army Permit (General and Preconstruction Notice)

Construction

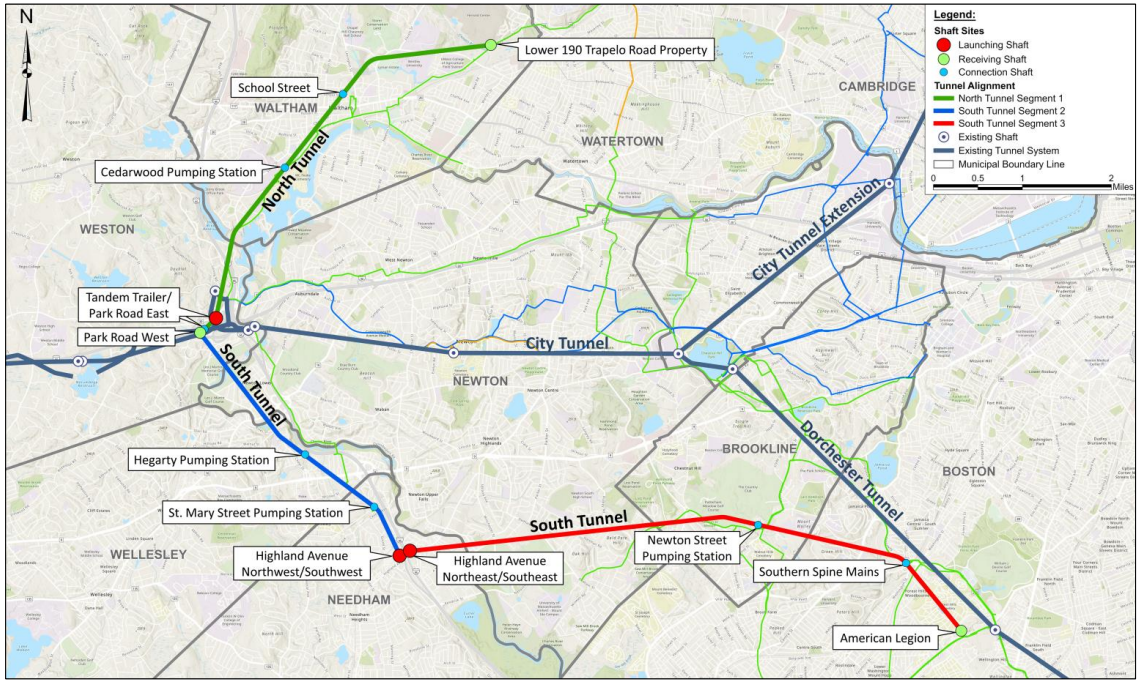
- Early Concepts
- Prelim. Design & EIR
- Geotechnical Investigations
- Final Design
- Construction
- Operations

Tunnel Construction:

- South Tunnel
- North Tunnel

Early Enabling Construction Work:

- TBM Power Supply
- Dewatering Drainage Line, Needham
- Building Demolition, Waltham
- Tandem Trailer Parking Relocation, Weston



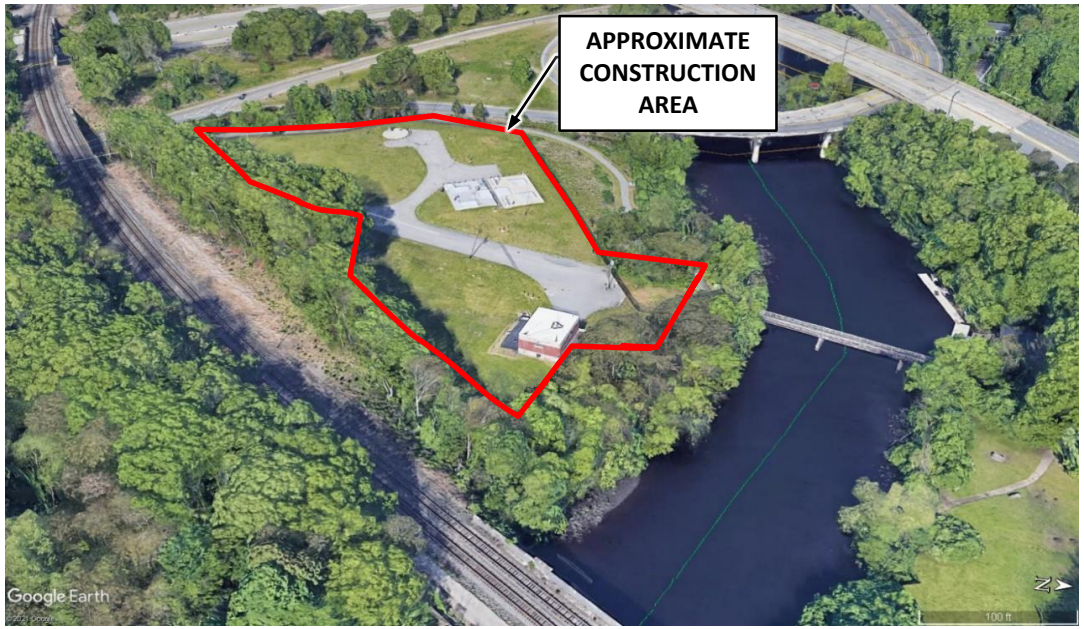
Launch Shaft Site

Early Concepts
Prelim. Design & EIR
Geotechnical Investigations
Final Design
Construction
Operations

MWWST Shaft 5A – During Construction

- Launching shaft is the only access until the TBM reaches and breaks through into the receiving shaft
- All launching shaft sites are located adjacent to the highway to reduce traffic impacts on local streets

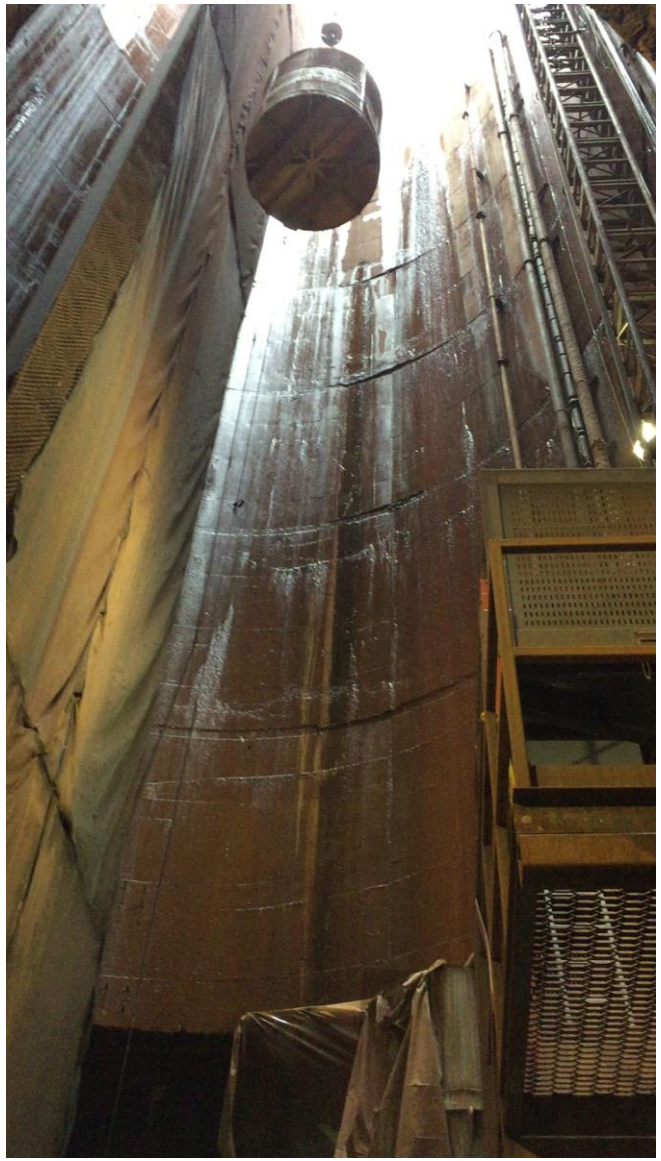
MWWST Shaft 5/5A – Post Construction



Launching / Receiving Shaft Construction

Early Concepts
Prelim. Design & EIR
Geotechnical Investigations
Final Design
Construction
Operations

- ~25’ – 40’ diameter, ~250’ – 400’ deep
- Significant work occurs deep underground at the base of the shafts, in starter tunnels and within the mined tunnel
- Surface work at shaft sites is mainly to support the underground work



Connection Shaft Construction

Early Concepts
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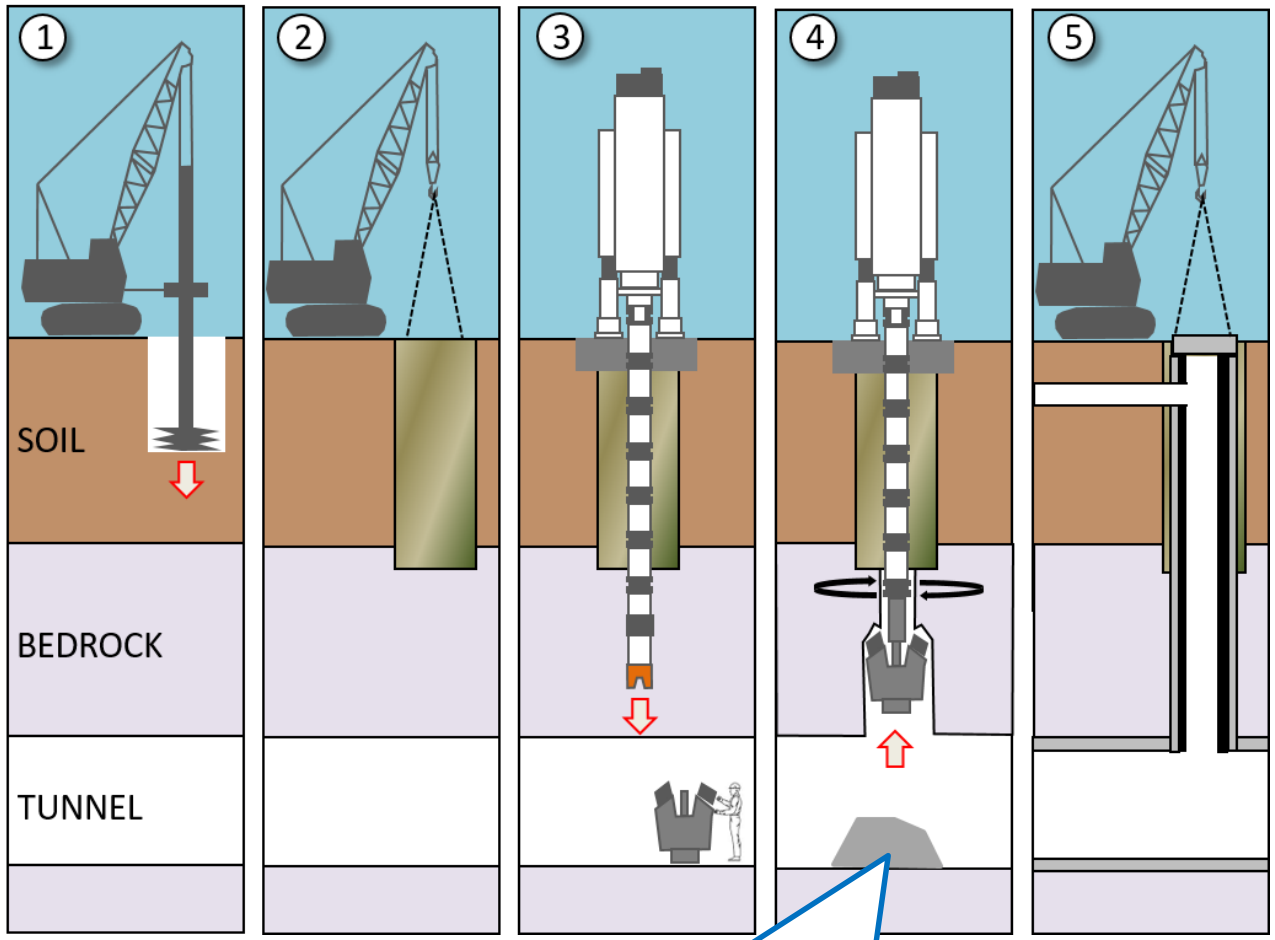
Final Design
Construction
Operations

- Connection shafts are smaller diameter
- Use raised bore shaft construction method where possible
- Benefits of Raised Bore Shaft Method:
  - Smallest footprint at the surface
  - Excavated rock is removed from inside the tunnel which limits trucking at the surface
  - No blasting

https://www.herrenknecht.com/en/products/product detail/raise-boring-reaming-heads-and-cutting-tools/



Excavated rock drops into tunnel and is transported to and removed from the launching shaft

Emergency Response Coordination

Early Concepts
Prelim. Design & EIR
Geotechnical Investigations
Final Design
Construction
Operations

- Shafts are located in six (6) communities, tunnel alignment is beneath seven (7) communities
- Advance coordination is needed to ensure coordinated emergency response during construction
  - Uniqueness of the underground construction environment and its hazards
  - Anticipated role and responsibilities of the MWRA tunnel contractors and local Emergency Responders
    - Tunnel Contractors to provide all OSHA required tunnel rescue resources (2 teams)
    - Local Emergency Responders assume incident command on the surface and, if needed, support underground for extrication and medical care
  - Training and equipment needed by the local Emergency Responders throughout tunnel construction
- Emergency response coordination needs to be tailored to community capabilities and size
- MWRA will ensure that resources are provided to ready the local Emergency Responders
- **MWRA is working with local Emergency Responders to determine what resources will be needed**

Valve Vaults and Connection Piping

Early Concepts
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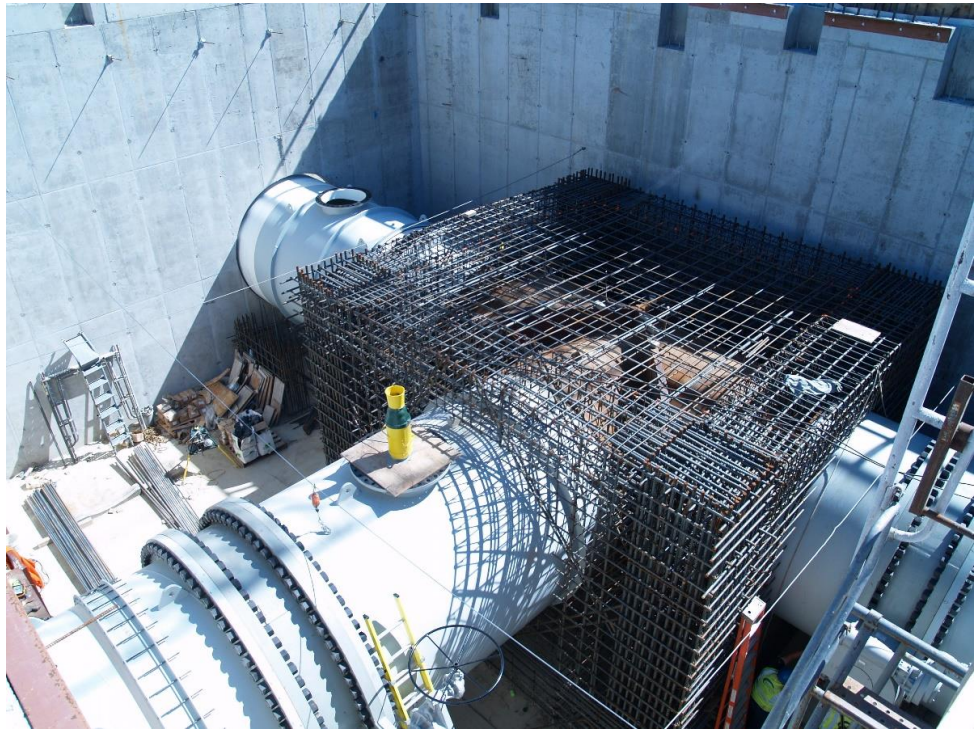
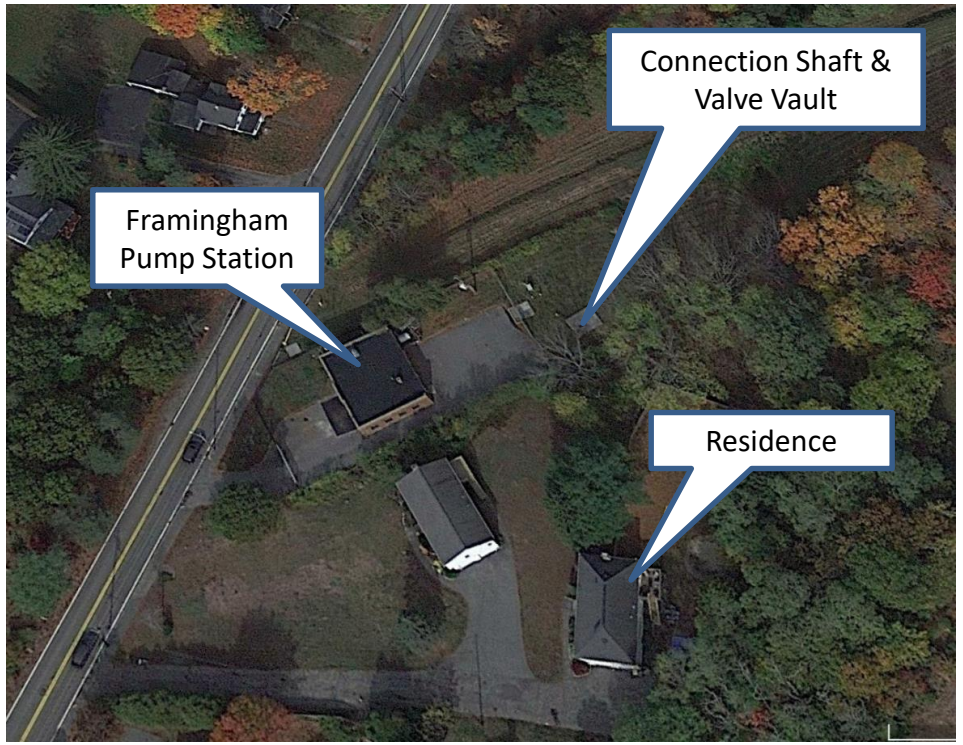
Construction
Operations



Shaft L, Framingham

- Vaults house multiple large valves to control the flow of water in the tunnels and pipelines
- Large valve vaults and connection piping are located at shaft sites near the highway and at the ends of the tunnels

- Small valve vaults are located at intermediate connection shaft sites to provide redundancy to local water infrastructure



Edgell Rd Riser Shaft, Framingham

Surface Piping

Early Concepts
Prelim. Design & EIR
Geotechnical Investigations
Final Design
Construction
Operations

- New pipelines are needed at a few locations to connect the new tunnel/shaft/valve vaults to existing local water infrastructure
- Limited length of new pipelines will be in community street
- Work will be coordinated to minimize traffic lane closures, detours and other impacts
- Some sections of new pipe will be constructed using trenchless methods to avoid traffic impacts

Permanent Infrastructure

Early Concepts
Prelim. Design & EIR
Geotechnical Investigations
Final Design
Construction
Operations

Wellesley St Connection Shaft, Weston

Permanent infrastructure is mostly below grade:

- Top of shaft structure and valve vaults (~2 ft above grade)
- Connection and surface piping (all buried)

Shaft L, Framingham

Shaft 5/5A, Weston

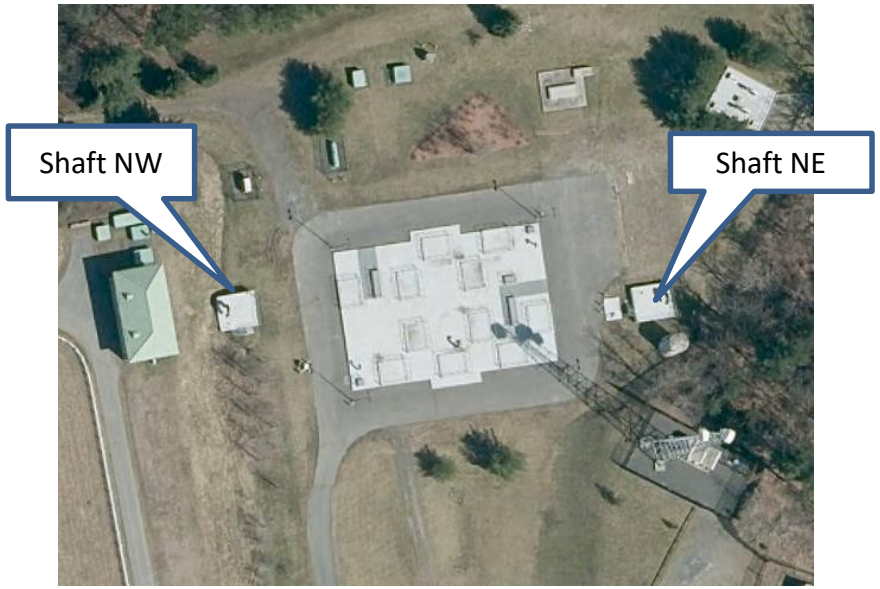
Shaft E, Southborough

Post Construction Operations

Early Concepts
Prelim. Design & EIR
Geotechnical Investigations
Final Design
Construction
Operations

- Operations
  - Regular inspections / security checks
  - Occasional water quality sampling
- Occasional Maintenance/Repairs
- Site Maintenance
  - Snow removal
  - Lawn care
- No increase to traffic or noise

Shaft 5/5A, Weston



MWWST Shafts NW and NE, Weston

Outreach

Early Concepts
Prelim. Design & EIR
Geotechnical Investigations
Final Design
Construction
Operations

- Met with 10 communities in the study area
- Established a Working Group with representatives from each community
- Met with Management, Public Works, Public Safety/Fire, etc. in the 7 communities in which the tunnel will be constructed
- Met with key stakeholders and permit agencies
- Met with numerous organizations, businesses & private property owners (to coordinate field work)
- Website https://www.mwra.com/mwtp.html
- Email address (for questions) Tunnels.info@mwra.com

Outreach will continue throughout final design and construction

Environmental Justice

Early Concepts

Prelim. Design & EIR

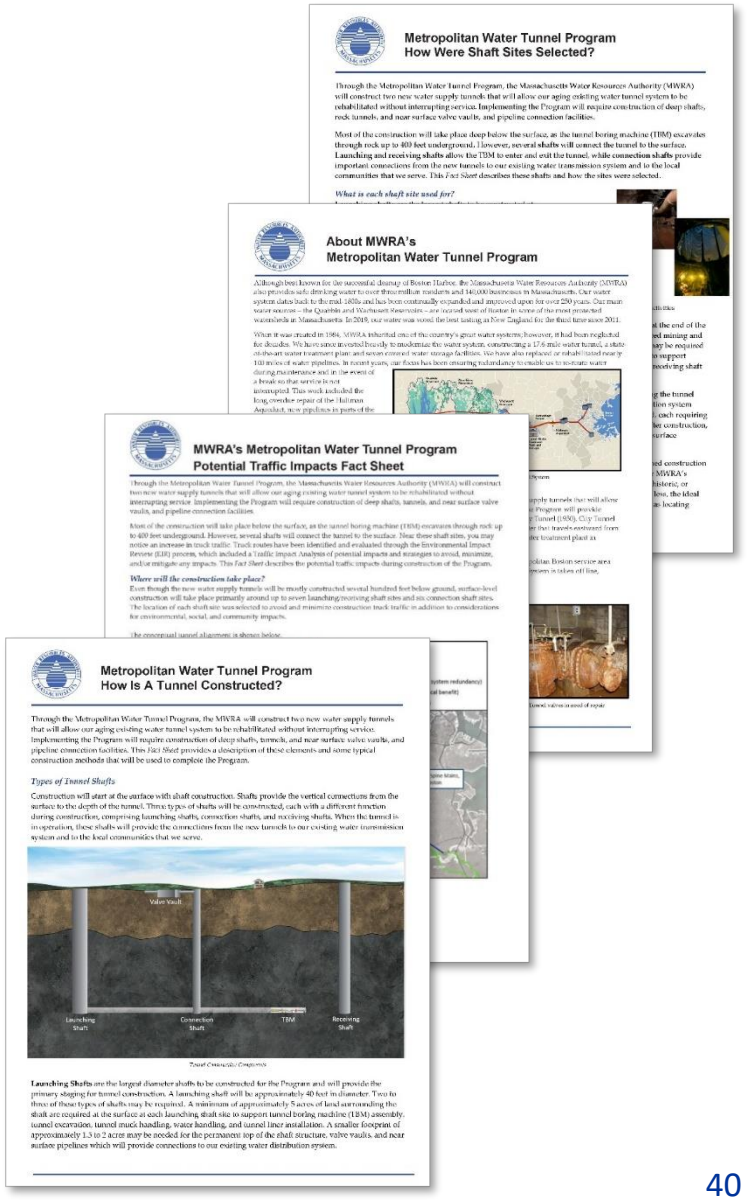
Geotechnical Investigations

Final Design

Construction

Operations

- Approximately 60% of residents in MWRA's service area live in Environmental Justice (EJ) populations
- Analyzed EJ community impacts as part of EIR
- Tunnel Program provides benefits to all residents in metro Boston, including EJ & non EJ populations
- Language Access Plan to improve accessibility https://www.mwra.com/media/file/LanguageAccessPlan2024
- Created multiple Program Fact Sheets – available in 4 languages
- Public Information Sessions **Starting today!**
  - Notifications in multiple languages
  - Non-English media outlets
  - Interpretation services available
- Meetings will be recorded and posted to our website with ability to comment



Current Schedule

- Preliminary Design & EIR: 2020 – 2024 **Complete ✓**
- Final Design: 2024 – 2029 **Ongoing**
- Power Supply Construction: 2025 – 2028
- Early Enabling Projects Construction: 2026 – 2028
- Land Acquisition: 2021 – 2028 **Ongoing**
- South Tunnel Construction: 2028
- North Tunnel Construction: 2029
- New Tunnel System in Operation: by 2040

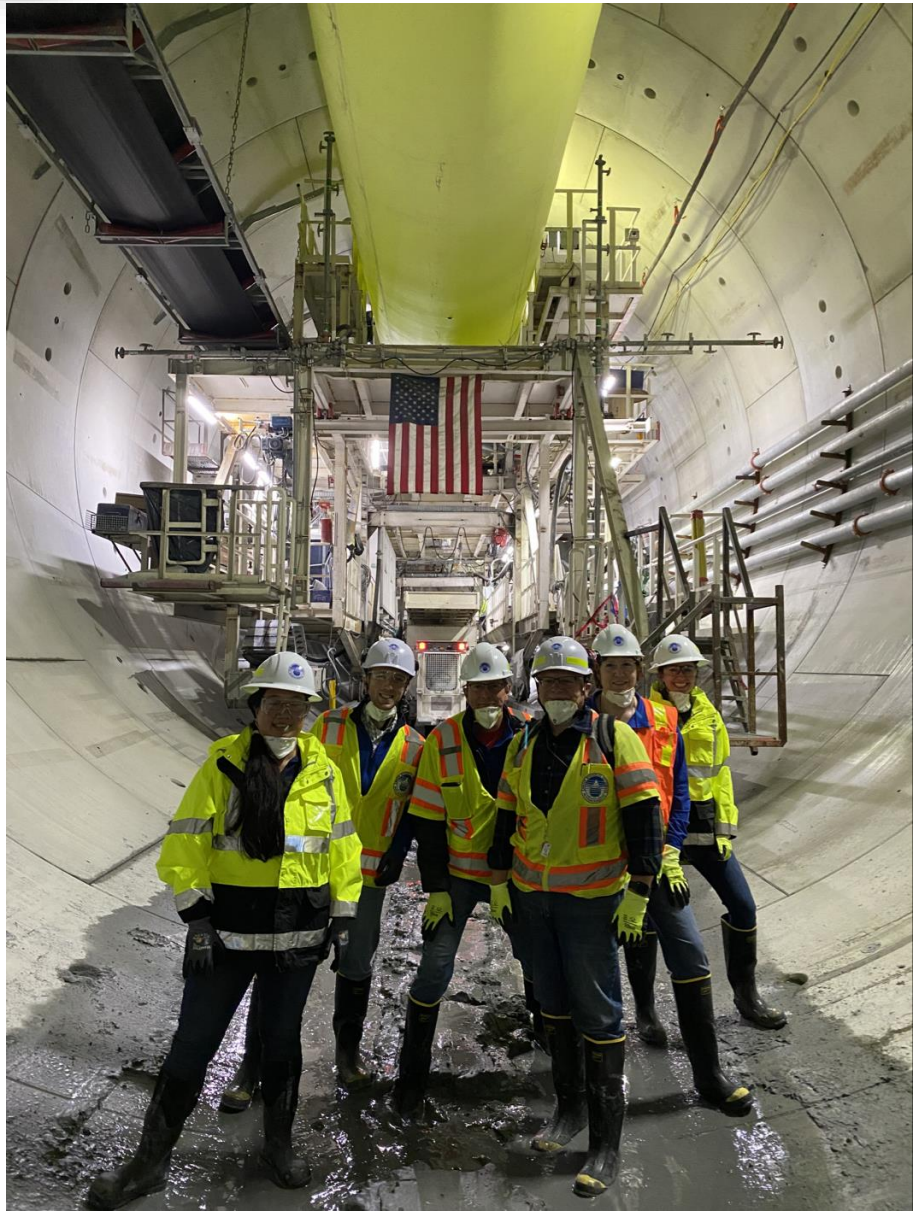
Where to Find Information / How to Contact Us

- Tunnel Program Website: https://www.mwra.com/mwtp.html
  - Program Information
  - Reports and other Documents
  - Meeting Agendas and Minutes
  - Notices and Info for each community

- Program email address: Tunnels.info@mwra.com
  - Public inquiries and information requests

- Contact Us!
  - Carmine DeMaria, Community Relations Coordinator
  - 617-305-5725
  - Carmine.DeMaria@mwra.com

Metropolitan Water Tunnel Program



Thank You!