Metropolitan Water Tunnel Program

Working Group
Meeting No. 1

April 7, 2021

Agenda

- Welcome/ Introductions
- Tunnel Working Group
- The Metropolitan Water Tunnel Program
- Program Schedule, Preliminary Design & MEPA Review
- Next Steps
- Thank You and Questions

Ground Rules

- Audio Settings
  - Please **mute** your audio unless you are presenting or have been given the floor by the facilitator
- Video Settings
  - Please have your video **turned on**
- Questions/Comments
  - Please either select the "**raise hand**" **control** in the control panel or
  - Please **physically raise your hand** or
  - Members can enter questions or comments in the **chat** under the chat panel

Metropolitan Water Tunnel Program

MWRA Program Team

- Fred Laskey, Executive Director
- Ria Convery, Special Assistant to the Executive Director
- Michele Gillen, Director of Administration
- Beth Card, Director of Environmental and Regulatory Affairs
- Sean Navin, Director of Intergovernmental Affairs (Working Group **Facilitator**)

Tunnel Redundancy Department:

- Kathy Murtagh, Director
- Fred Brandon, Director of Design and Construction
- Paul Savard, Deputy Director of Design and Construction
- Colleen Rizzi, Manager of Design
- Vivian Chan, Manager of Geotechnical & Tunneling
- Kristin MacDougall, Communications Manager for Tunnel Program

Working Group Members – Community Representatives

- Mark Mancuso, Belmont
- Peter Salvatore, Boston
- Frederick W. Russell, Brookline
- Joseph Flanagan and Jason L. Mammone, Dedham
- Robert A. Lewis, Needham
- Louis M. Taverna, Newton
- Michael Chiasson, Waltham
- Greg St. Louis, Watertown
- William Shaughnessy, Wellesley
- Thomas E. Cullen Jr., Weston

Working Group Members - Additional Stakeholders

- TBD, Environmental Justice Representative
- John G. Sanchez, MWRA Advisory Board
- TBD, Environmental Advocacy Group
- Lexi Dewey, Water Supply Citizens Advisory Committee
- Martin Pillsbury, Metropolitan Area Planning Council (MAPC)

Tunnel Working Group

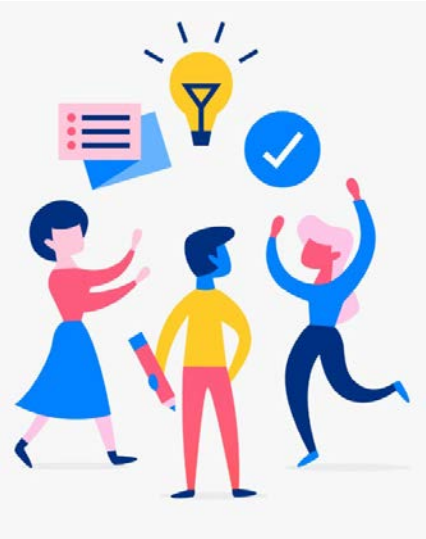
Tunnel Working Group Concept

- Provide a transparent process for MWRA evaluation and selection of shaft sites and tunnel alignments
- Meet regularly through the evaluation of alternatives and EIR process (2021 – 2023)
- Collaborate and engage with the MWRA design team, other Working Group members, and stakeholders
- Help yield more informed comments during the MEPA process
- As Program becomes more refined, potentially split into two Working Groups (e.g., Northern Tunnel and Southern Tunnel Working Groups)
- The Working Group is an advisory group to MWRA

We Want/Need Your Input!

Working Group Members:

- Play an active role in the planning process
- Gather input from community and industry members
- Provide feedback on approaches to minimize community impacts



Keep Updated on Program Activities:

- MEPA Submittals
- Geotechnical Field Work
- Evaluation of Alternatives

Meeting Logistics

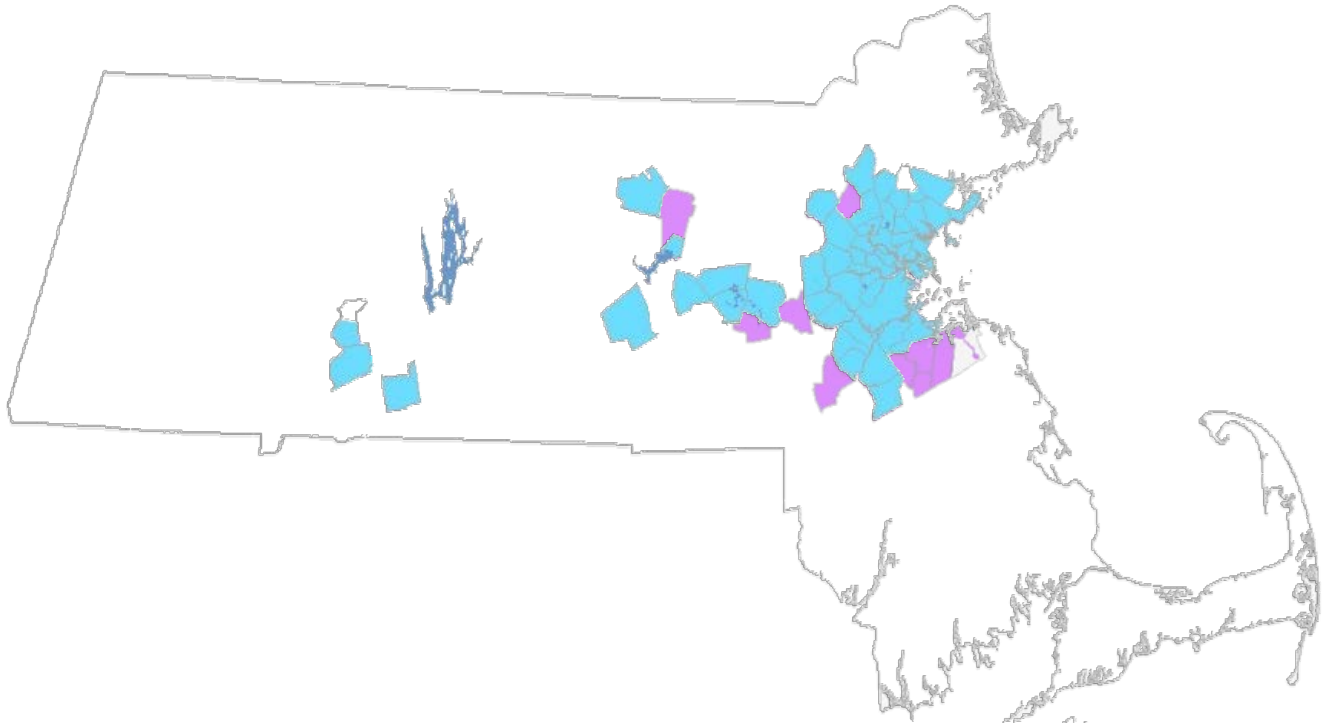
- Attendance expectations
  - We really want to see you!
- What if you miss a meeting?
  - Please send an alternate
- Agenda, handouts, presentations, minutes
  - Distributed to Members
  - Posted on MWRA MWTP webpage
- Meeting Format
  - WebEx for now, hybrid or in person later (?)

The Metropolitan Water Tunnel Program

Who is MWRA?

The MWRA …

- Provides wholesale water and wastewater services to you and over 3.1 million customers in 61 communities
- Delivers an average of 200 million gallons per day to you and other water customers
- Collects and treats an average of 350 million gallons of wastewater per day, with a peak capacity of 1.2 billion gallons



MWRA Water System

We Have….

- 105 miles of active transmission mains and tunnels (plus 39 miles on standby)
- 286 miles of distribution mains with over 4,700 valves
- 5 years of storage
- 12 pump stations
- ~ 85% of our water is delivered by gravity

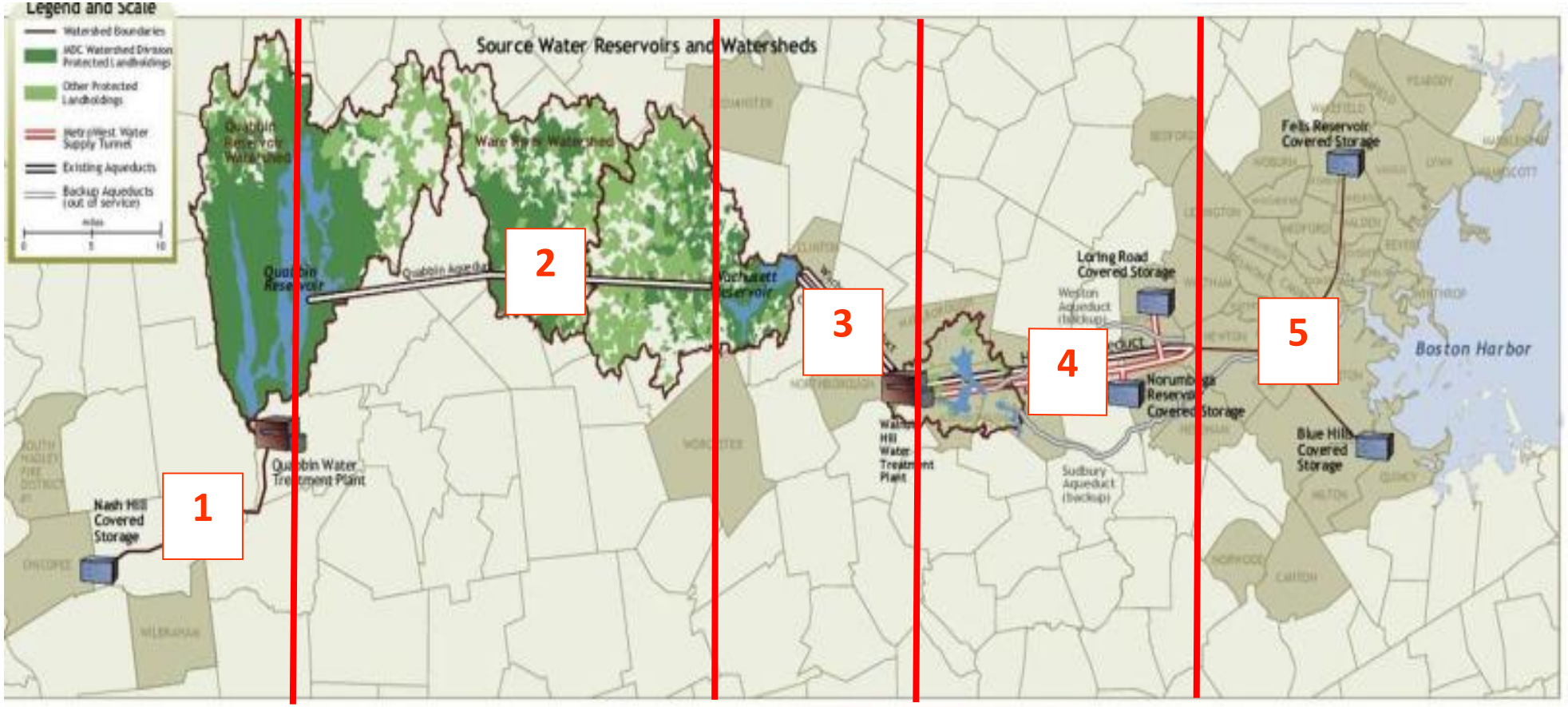
We Must….

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

We Need to….

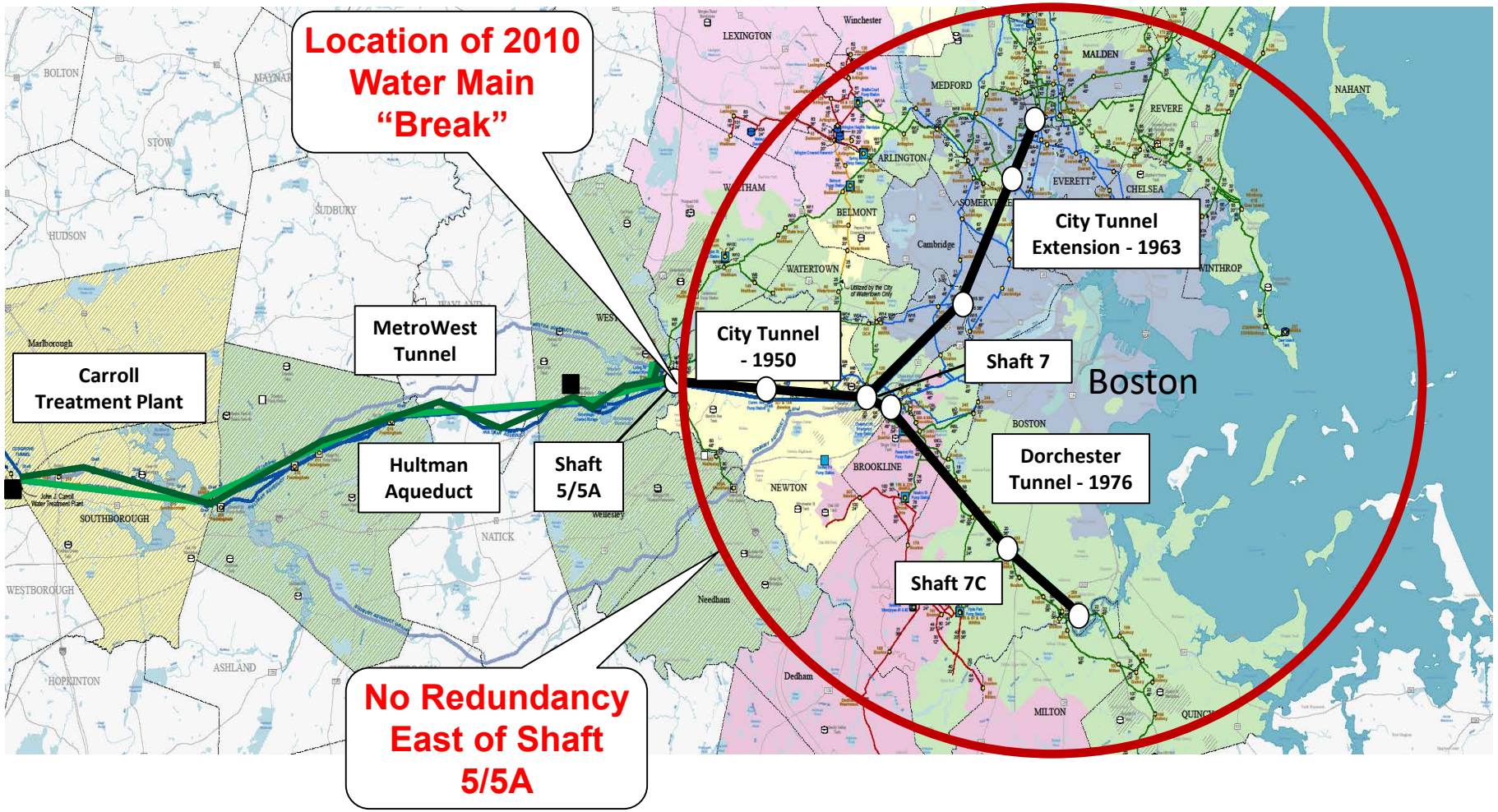
- Have the ability to swiftly respond to a disruption in service
- Maintain and rehabilitate surface piping, key valves and tunnels on a periodic basis

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!

Metropolitan Tunnel System Supplies About 60 Percent of the Water Demand for the Boston Metropolitan Area



Condition of the Metropolitan Tunnel System

- Tunnel system:
  - Concrete-lined deep rock pressure tunnels
  - Steel and concrete lined vertical shafts
  - Surface pipe, valves and appurtenances

- Little maintenance required for tunnels and shafts. Little risk of failure

- Pipe, valves and appurtenances need maintenance, rehabilitation, replacement

- Currently we cannot maintain the tunnel system east of Shaft 5 because a shutdown of the entire Metropolitan Tunnel System would be required

Valve Reliability Concern

- Valves that don't work
- Valves we can't operate

Shaft 8 PRV Chamber

Shaft 8

Shaft 8

Access Can Be Difficult

- High ground water table
- Standing water in some chambers
- Corrosion is a concern

Shaft 7C connection to Section 58

Chamber at Shaft 7C

Shaft 7D connecting pipe air valve chamber

Appurtenances Can Be Liabilities

Small pipe failures can lead to shut downs

Control piping at Shaft 8

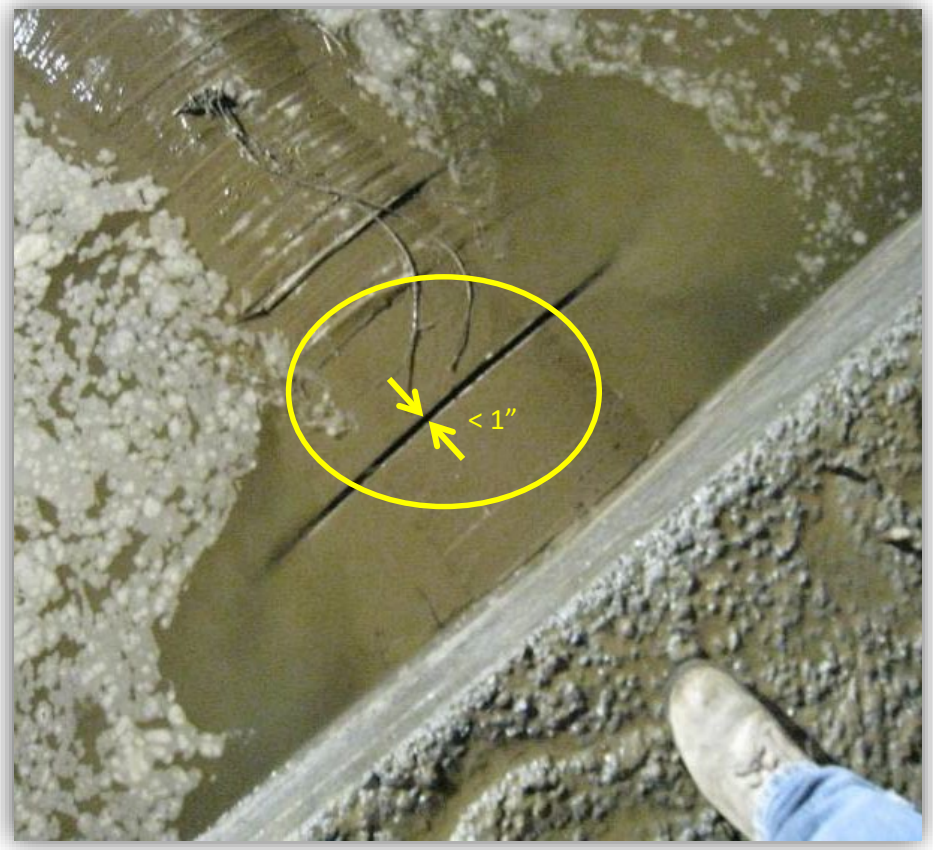
Air valve at Shaft 9A

Shaft 8 PRV Chamber

The Great Water Main Break of May 2010

Small pipe failures can lead to big problems

250 MGD flow at Shaft 5 break….



…came from a small gap in the pipe

The Great Water Main Break of May 2010 – Security Footage

Impact of the 2010 Water Main Break

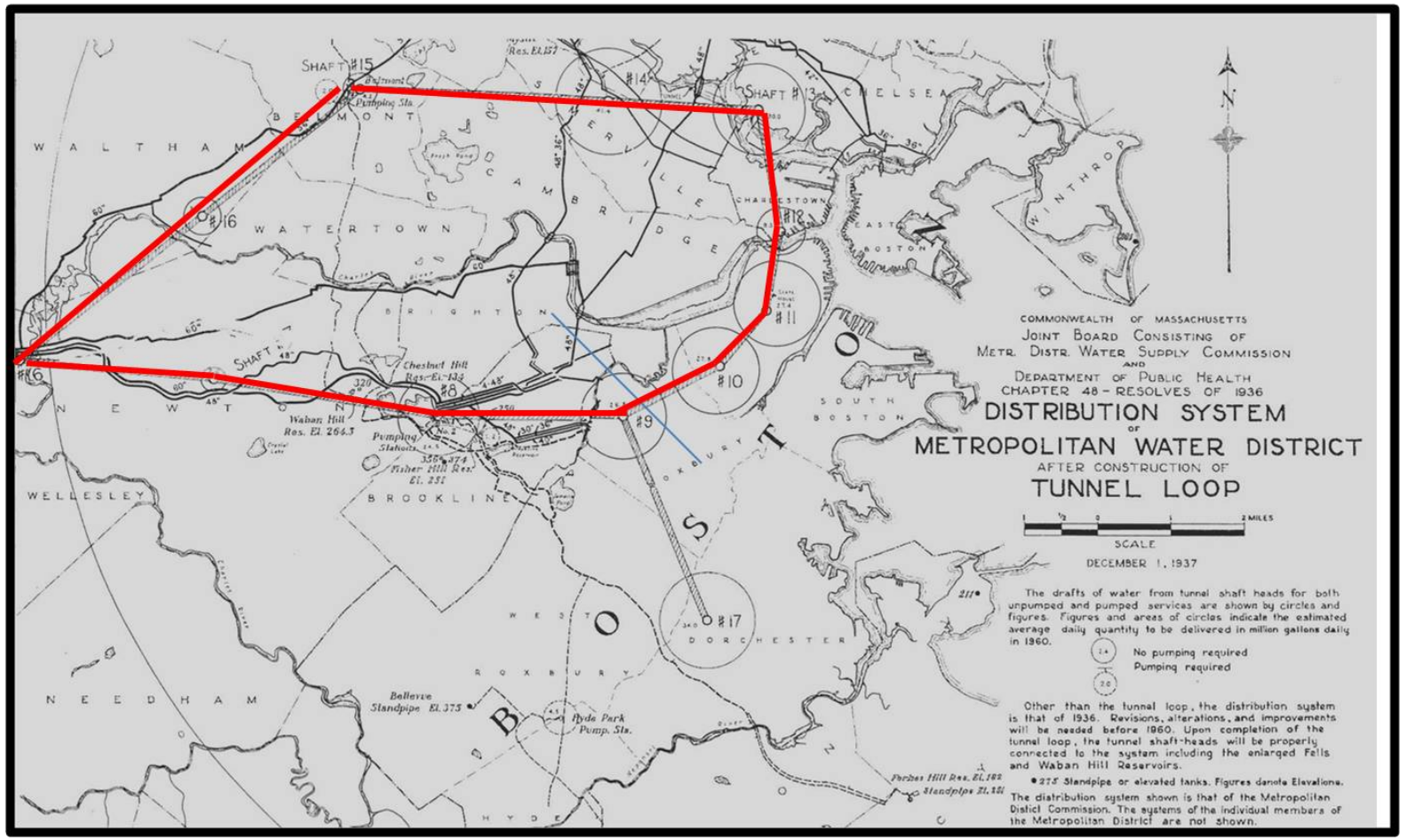
- Activated emergency water supplies at Sudbury Aqueduct and Chestnut Hill Reservoir
- A state of emergency and a boil water order was issued for ~2 million people located in 30 communities
- The estimated economic loss of water supply within the Boston Metropolitan area is ~$310M per day (businesses and residences)
- Within 2 days of the initial break, the pipe was repaired, full flow was restored, tested, confirmed safe, and the boil water order was lifted

We Need Redundancy!

- Why do we need a redundant water distribution system?
  - Valve reliability for the Metropolitan Tunnels is a concern
  - Without the ability to close (and then reopen) valves, there is no way to isolate a portion of the Metropolitan Tunnel System
  - Many valves have reached the end of their useful life but can't be replaced because shutdown of the City Tunnel would be required…which we cannot do
  - A failure anywhere within the Metropolitan Tunnel System requires shut down at Shaft 5, which is the limit of current distribution redundancy
  - Water main break at Shaft 5 in 2010 put a "sharp point" on the need to operate these valves and have full redundancy
- If we do nothing, another failure will eventually occur

History of Redundancy Planning

Original 1936 Tunnel Loop Plan



- 1990 Plan – MetroWest Tunnel followed by Northern Tunnel Loop
- 1996 Plan – MetroWest Tunnel followed by Northern and Southern Tunnel Loop (in 2020)
- 2011 Plan – Surface piping with Northern and Southern Components

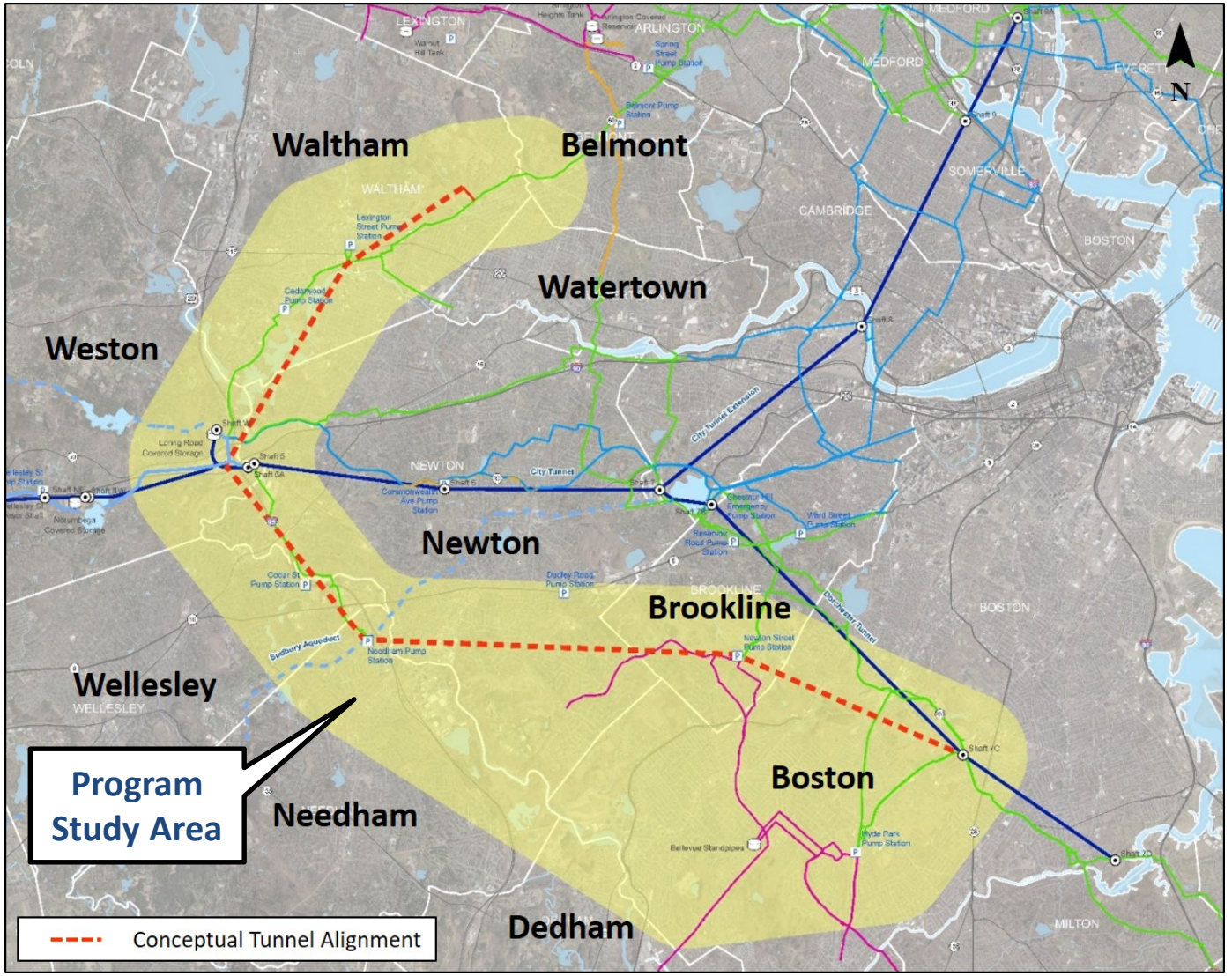
Tunnel Redundancy – Alternatives Analysis (2016)

- Extensive alternatives identified and evaluated by MWRA
  - 25+ surface and tunnel alignments analyzed
  - Long distance, large diameter pipeline alternatives present significant implementation challenges

- Recommended **Two Tunnel Concept** meets service objectives and goals
  - Allows planned maintenance year-round of 60+ year old infrastructure that are beyond their useful life
  - Allows emergency response at normal level of service
  - Constructible

Two Tunnel Concept

- ~14 miles of 10 ft diameter, hard rock, pressure tunnel
- Time to complete: 17 to 23 years (design - commissioning)
- Current plan is for tunnels to begin in the Mass Pike/Route 128 vicinity
- Northern Tunnel - ~4.5 miles, ends in Waltham/Belmont area @ WASM3
- Southern Tunnel - ~9.5 miles, ends in Mattapan near Shaft 7C
- Anticipate tunnel construction to start in 2026 or 2027



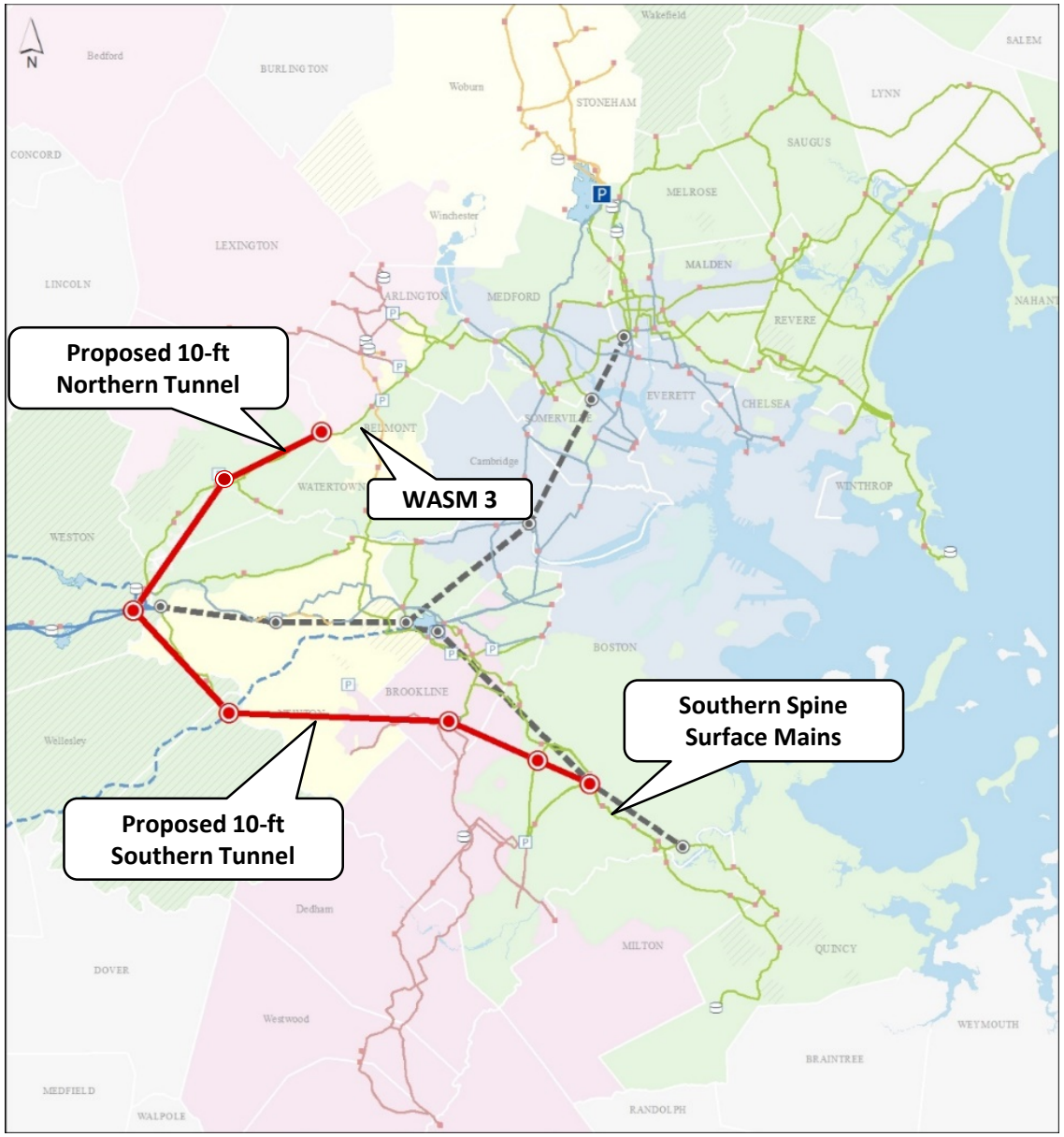
Program Goals

Protect Public Health, Provide Sanitation and Fire Protection

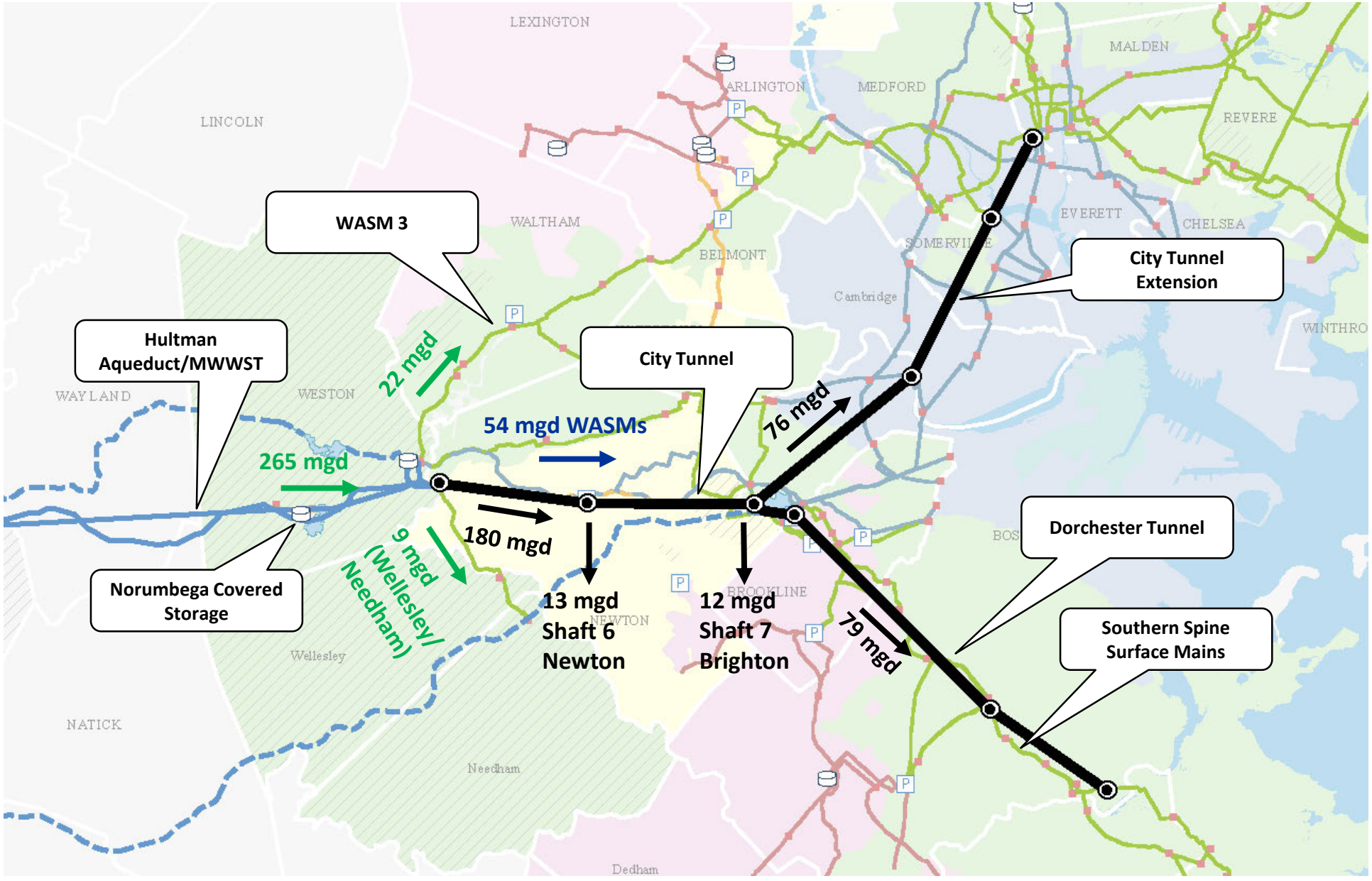
- Provide full redundancy for the Metropolitan Tunnel System:
  - Provide normal water service and fire protection when the existing tunnel system is out of service
  - Provide the ability to perform maintenance on existing tunnels year-round
  - Provide uninterrupted service in the event of an emergency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

Hydraulic Objectives for Proposed Tunnel

- Provides redundancy for entire metropolitan tunnel system
- Provides normal water service and fire protection if existing tunnel system is out of service
- Designed to meet high day demand. No seasonal restrictions
- Provides ability to perform maintenance on existing tunnels year-round
- Avoids activation of emergency reservoirs
- No boil order!



Existing System – High Day Demand 265 mgd East of Norumbega



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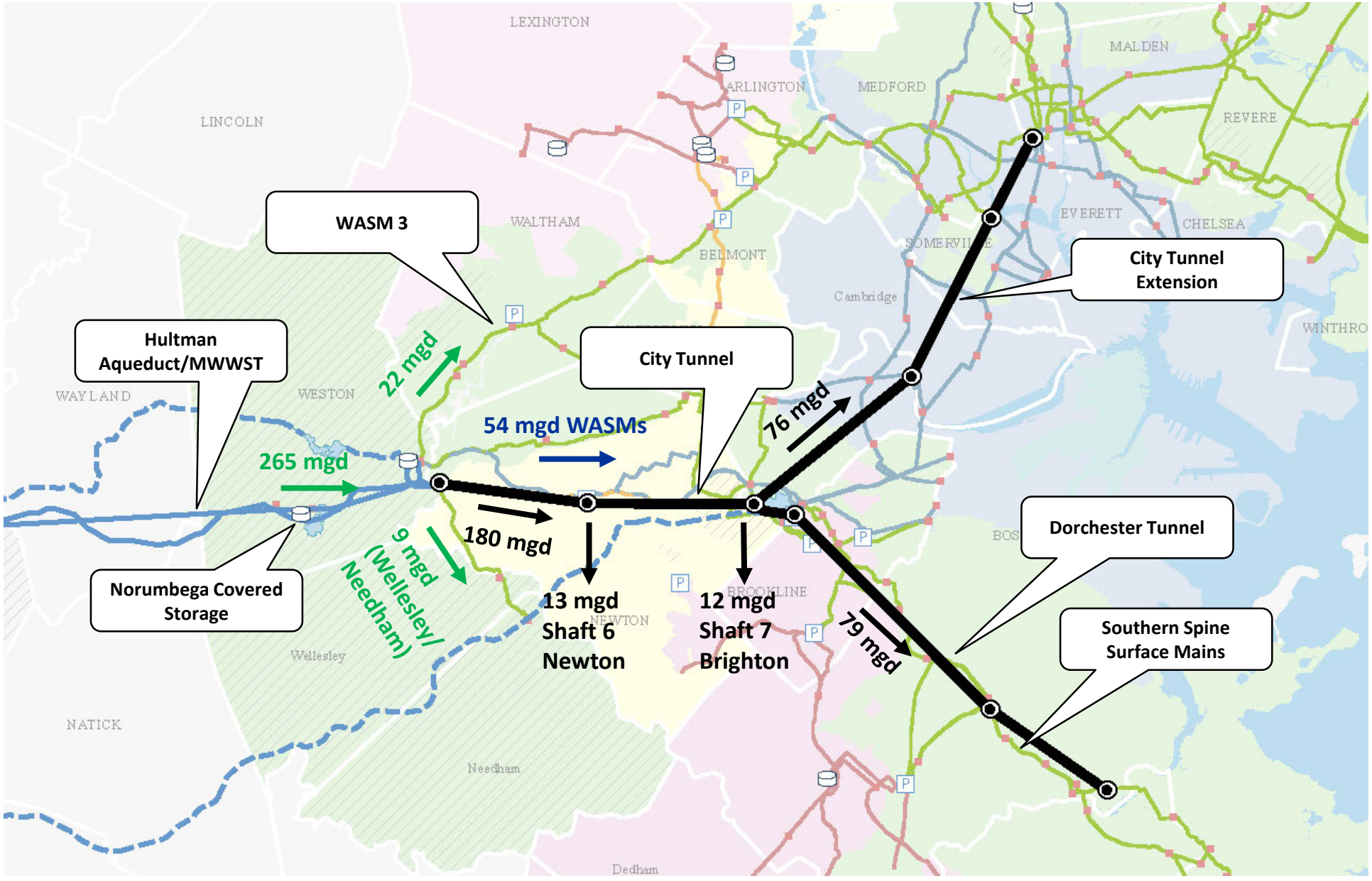

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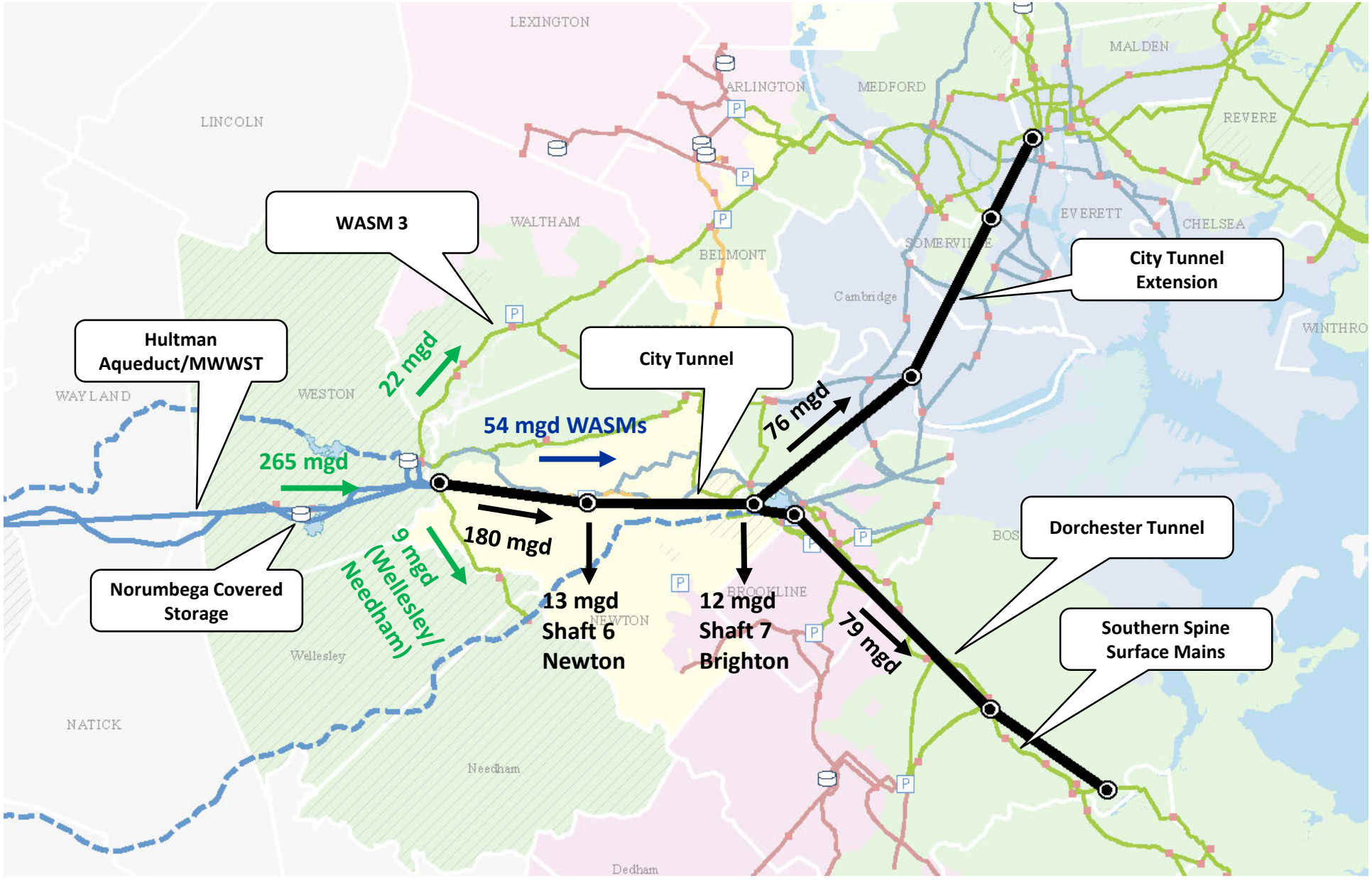
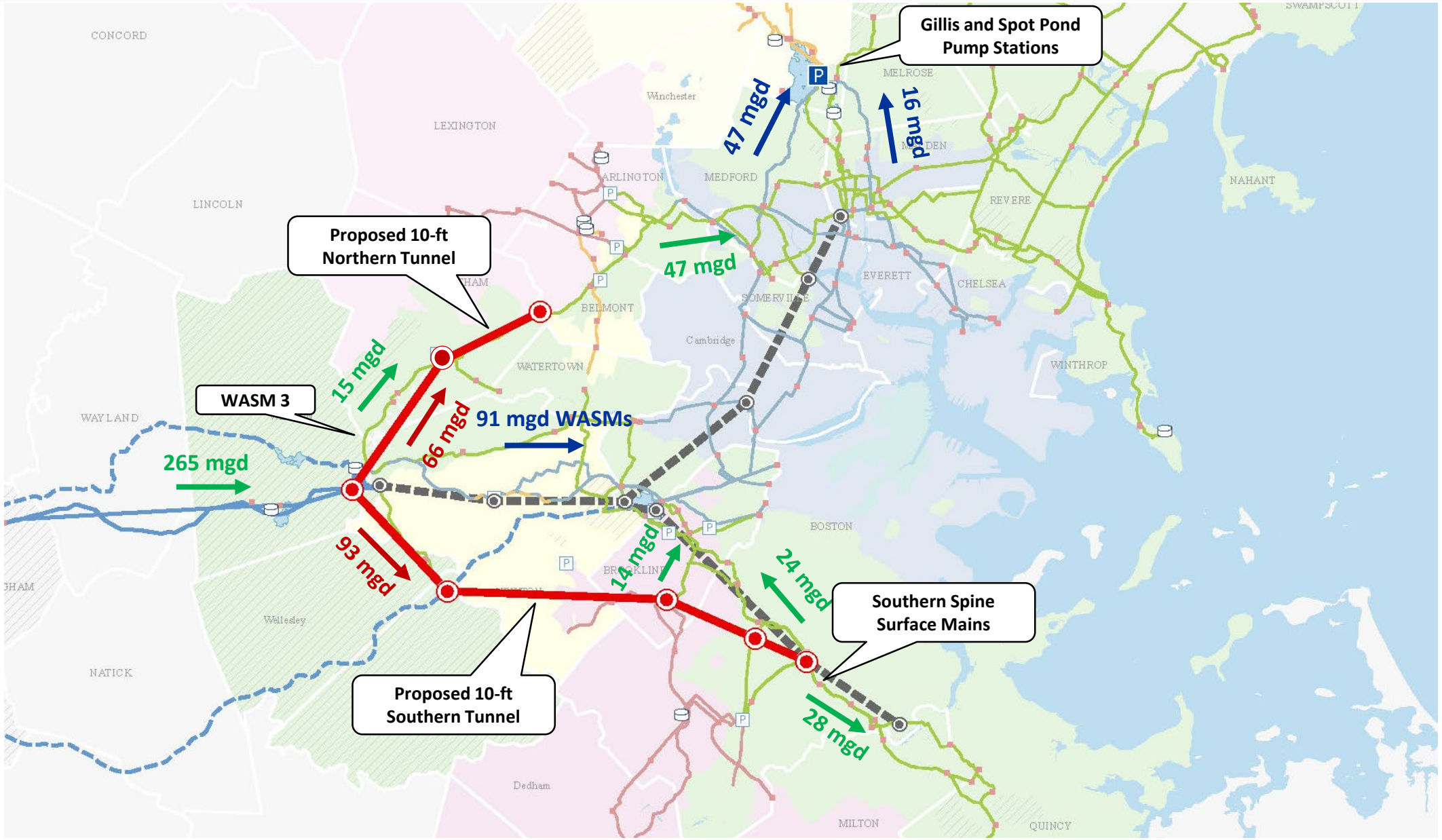


New Tunnel – Existing Tunnel Offline – High Day 265 mgd
East of Norumbega



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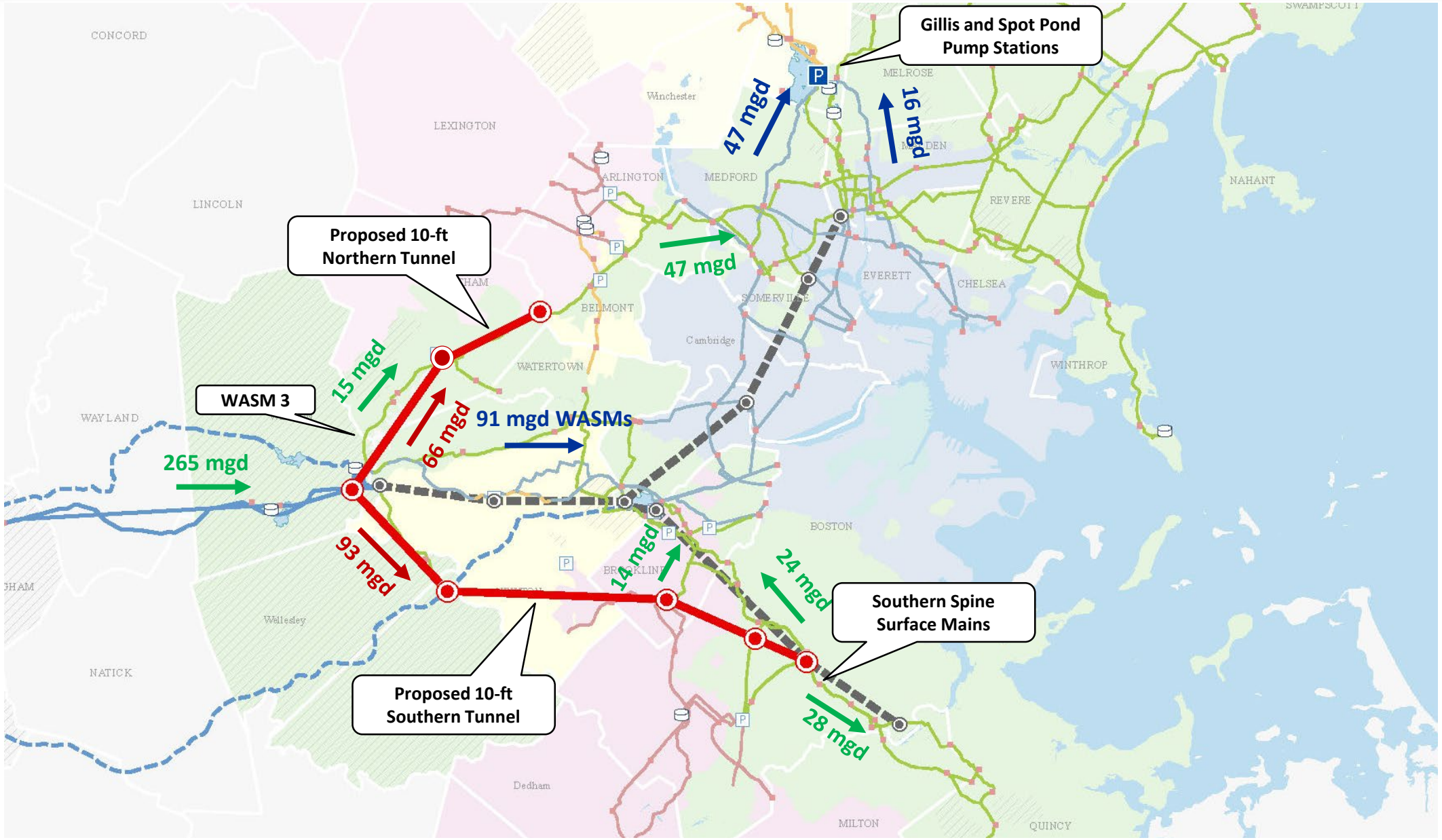

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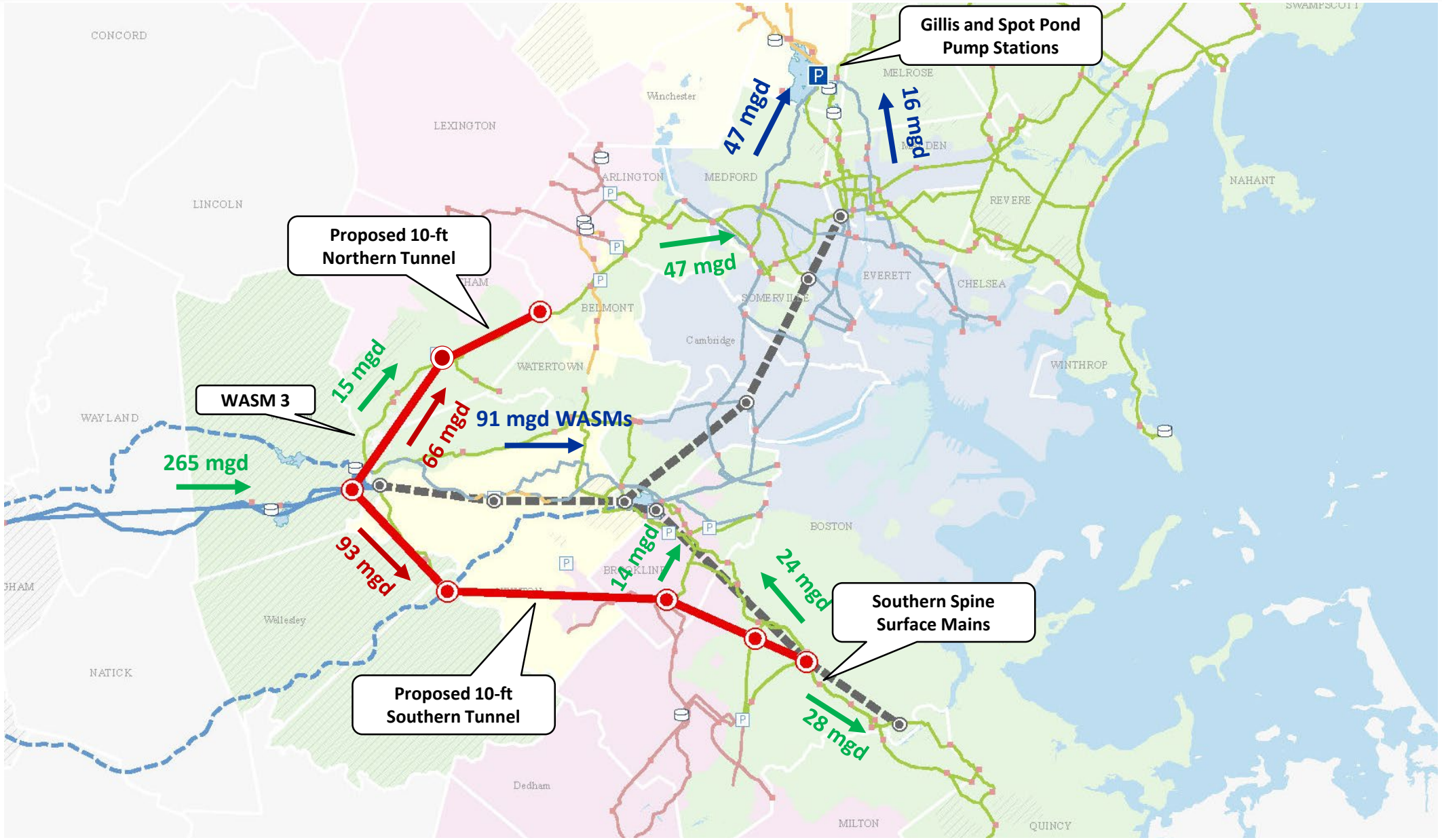
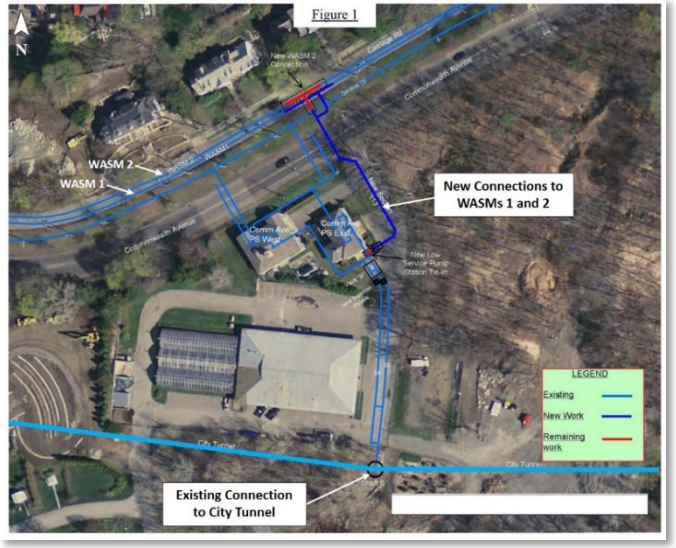
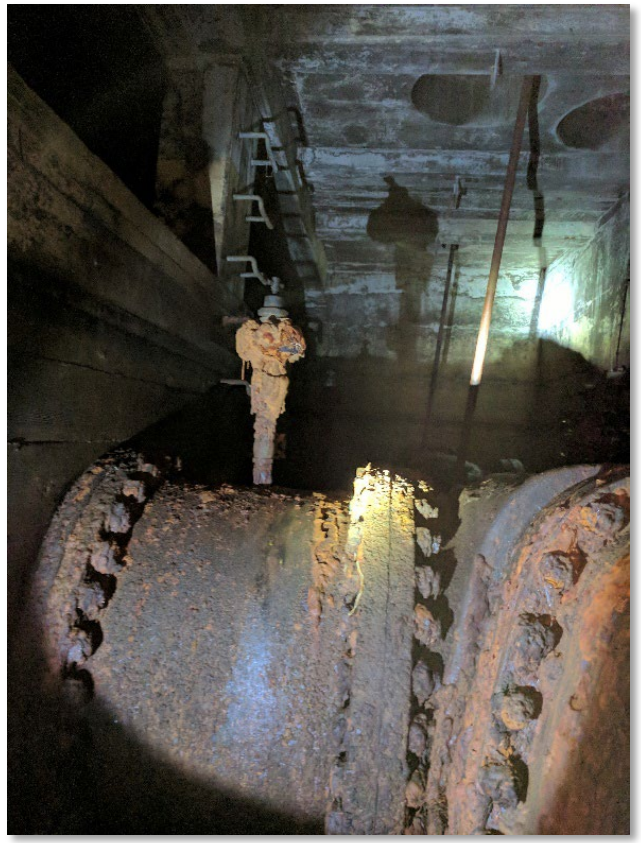


Interim Improvements to Improve Redundancy
Reduce Risk of Failure and Improve Ability to Respond…Now!

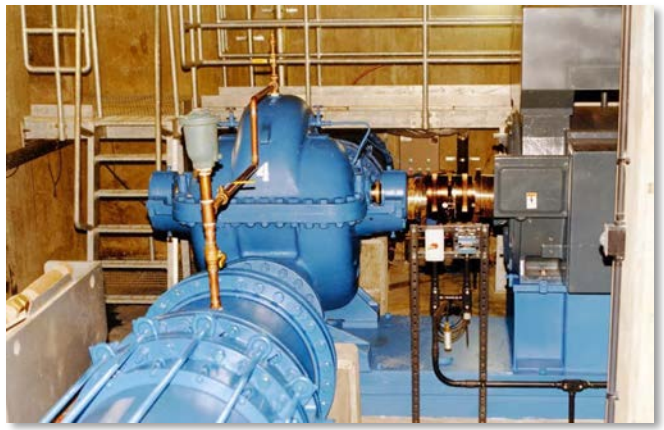


Commonwealth Avenue Pump Station Improvements

Pressure Reducing Valve Improvements



Top of Shafts Improvements

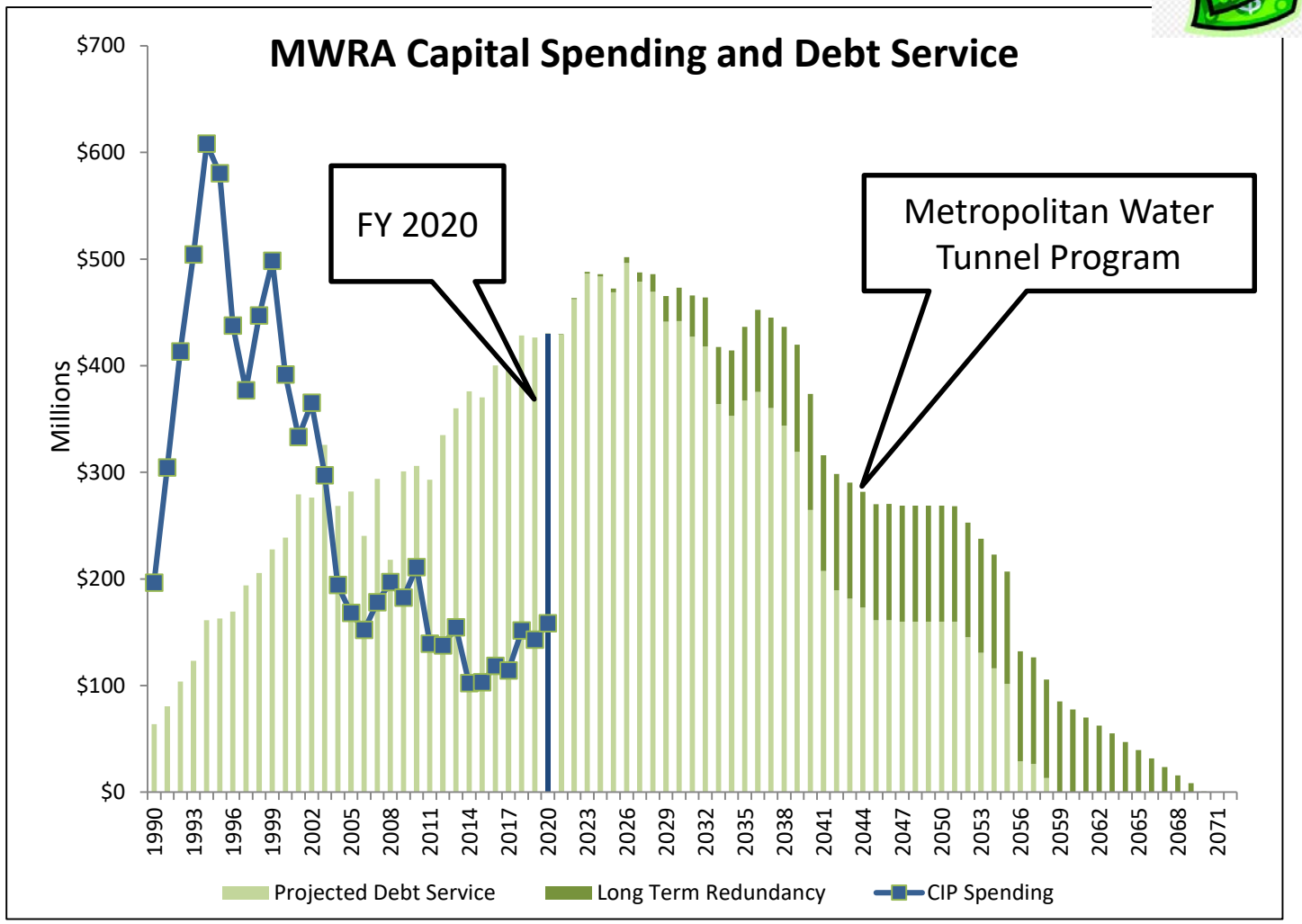


Chestnut Hill Emergency Pump Station Improvements

WASM 3 Pipeline Rehabilitation

How are we paying for all this?

- Since 1985 MWRA has spent approximately $8.4 billion to upgrade the wastewater and water systems
- The MWRA is projected to reach the peak of its debt service payments in fiscal 2026
- Debt for the Tunnel Program can be “layered on” without increasing water assessments more than our goal



Program Schedule, Preliminary Design, and MEPA Review

Metropolitan Water Tunnel Program Schedule

- Preliminary Design: July 2020, 3.5 years
  - Evaluate tunnel alignment alternatives
  - Geotechnical investigations
  - Environmental Impact Report
  - Preliminary Design Report
  - Establish contract packages
  - Refine Program cost and schedule

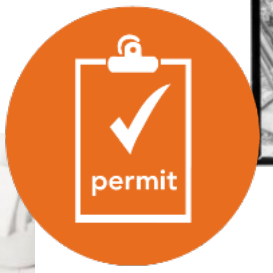
- Final Design: begin in 2024
  - Two or more final design contracts
  - Additional geotechnical investigation, survey, State and local permitting

- Construction: begin in 2026 or 2027
  - Two or more tunnel construction packages
  - Each contract lasts 5 years+/-

Preliminary Design Key Activities

Preliminary Design Began in July 2020:

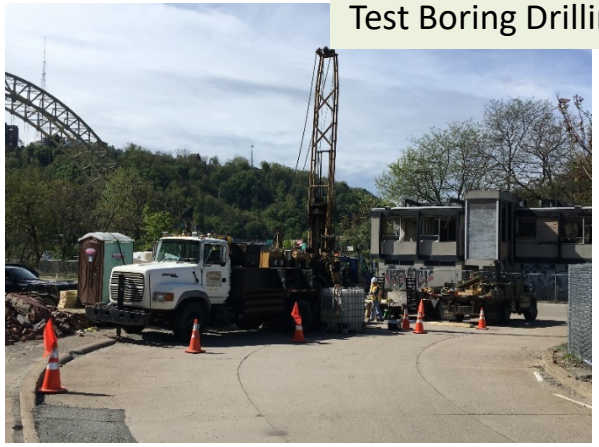
- Duration of 3.5 years
- Environmental Notification Form (ENF) Noticed in April 7, 2021 Environmental Monitor
  - ENF proposes Program Study Area for Tunnel Alignment Alternatives Evaluation
  - Comment period deadline is April 27, 2021, https://eeaonline.eea.state.ma.us/EEA/PublicComment/Landing/
  - erin.flaherty@state.ma.us
- Evaluation of Alternatives (2021 – 2022) - Select Shaft and Connection Locations
- Extensive Public Engagement – Working Group (early 2021 – 2023)
- Geotechnical Investigations (begin early 2021)
- Mapping and Survey
- Environmental Impact Reports (Fall 2022)
- Preliminary Design (complete by Dec 2023)



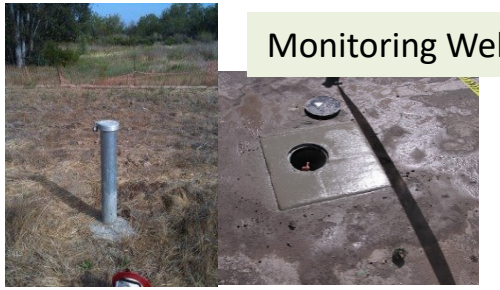
Keeping You Informed - Upcoming Field Work

- Multiple phases over next ~5 years
  - Geophysical Survey – non invasive
  - Deep Test Borings
  - Monitoring Wells
- Bedrock Outcrop Mapping (locations on public land)
  - Observe and Take Pictures
  - Winter/Spring 2021
- Geophysical Surveys (locations on public land)
  - Noninvasive
  - Spring/Summer 2021
- Test Borings
  - 10 initially
  - Some will include monitoring wells
  - Spring/Summer 2021
- Survey/Wetlands Flagging
  - Start Mid-Late 2021

Geophysical Survey



Test Boring Drilling



Monitoring Wells

Next Steps

- Next meeting – June 2, 2021, 2:00 – 3:00 pm
  - MEPA Review
  - Geotechnical Field Program
- Other topics?
  - Tunneling, Shaft Sites, Community Engagement, Costs & Financing, Alternatives Evaluation, Environmental Mitigations, Site Visits
  - Tell us what you want to hear about/discuss

- MWRA Program Team can provide individual briefings/presentations to your community/organization at any time. Just ask!

Metropolitan Water Tunnel Program

- Contact Us
  - Sean Navin, Working Group Facilitator
  - 617-788-1112
  - Sean.Navin@mwra.com
  - Tunnels.info@mwra.com

- https://www.mwra.com/mwtp.html
  - Meeting notices, agenda, presentations, minutes

Metropolitan Water Tunnel Program

Thank You!