

STAFF SUMMARY

TO: Board of Directors
FROM: Frederick A. Laskey, Executive Director *Frederick A. Laskey*
DATE: October 20, 2021
SUBJECT: Metropolitan Water Tunnel Program Update

COMMITTEE: Water Policy and Oversight

X INFORMATION
 VOTE

Paul V. Savard, P.E., Deputy Director, Design and Construction
Preparer/Title

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Kathleen M. Murtagh, P.E.
Director, Tunnel Redundancy

RECOMMENDATION:

For information only.

DISCUSSION:

This staff summary provides an update on the following ongoing activities for the Metropolitan Water Tunnel Program.

- Geotechnical Field Investigation
- MEPA Review Process
- Evaluation of Alternative Tunnel Shaft Sites and Tunnel Alignments
- Community Outreach

Staff will provide future updates to the Board at key milestones during the Preliminary Design phase of the Program, such as recommendation of the proposed tunnel alignment and shaft sites; completion of the Draft Environmental Impact Report; and completion of the Preliminary Design Report and Program cost estimate and schedule.

On February 15, 2017, the Board approved staff's preferred alternative of construction of northern and southern deep rock tunnels from the Hultman Aqueduct and MetroWest Water Supply Tunnel to the Weston Aqueduct Supply Main No. 3 (WASM 3) and to the Southern Spine water mains for the purpose of providing redundancy for the Metropolitan Tunnel System (City Tunnel, City Tunnel Extension and Dorchester Tunnel) and directed staff to proceed with preliminary design, geotechnical investigations and Massachusetts Environmental Policy Act (MEPA) review of the project. The MEPA review process is designed to provide meaningful opportunities for public review of potential environmental impacts of certain projects for which actions by state agencies are required. The ultimate goal is to use all feasible measures to avoid, minimize and mitigate damage to the environment.

On May 27, 2020, the Board approved the award of Contract 7159, Metropolitan Tunnel Redundancy Program Preliminary Design, Geotechnical Investigation and Environmental Impact Report to CDM Smith, Inc. This contract includes 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 the environmental permits needed.

Geotechnical Field Investigation

The ongoing preliminary design engineering contract includes the first phase of an extensive geotechnical field investigation to provide an understanding of ground conditions that the tunnel will be constructed in. The results are being used to support the tunnel alternatives analysis required as part of the MEPA review process. The geotechnical field investigations are being initiated during the preliminary design phase and will continue throughout the final design phase.

MWRA’s preliminary design engineer initiated the Phase 1A geotechnical field program in spring of 2021. Rock outcrop mapping and geophysical investigations are complete. Nine out of ten deep rock borings up to 550 feet deep have been drilled within the tunnel study area. The tenth and last Phase 1A boring is scheduled to be completed in the fall of 2021. Rock cores from these borings have been extracted and are being inspected and logged for rock type and characteristics. Laboratory testing will be conducted on the rock cores to provide further information on the rock characteristics. Figure 1 shows the locations of the ten borings under the preliminary design Phase 1A geotechnical program. Figure 2 shows typical rock cores that have been extracted from a borehole. A second subsurface investigation program (Phase 1B) is being planned for spring and summer of 2022.

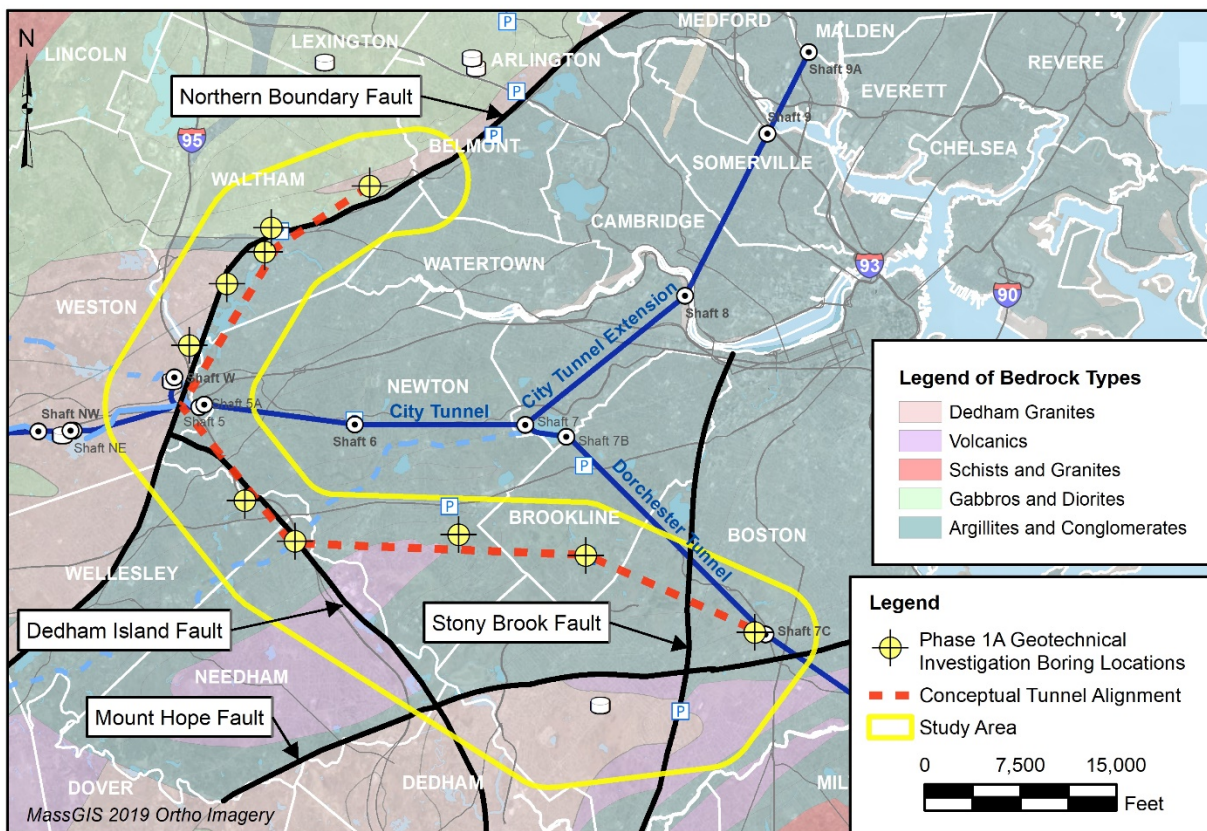


Figure 1. Locations of Phase 1A deep rock borings.



Figure 2. Typical Rock Cores Extracted from a Boring.

MEPA Review Process

Staff submitted an Environmental Notification Form (ENF) to the MEPA Office for public comment in March 2021. This is the first step in the environmental review process for the proposed Metropolitan Water Tunnel Program. The ENF presented the need for tunnel redundancy, the proposed two-tunnel concept and proposed study area for identifying and evaluating potential tunnel shaft sites and tunnel alignment alternatives. The ENF also included an Alternatives Screening Report that documents the comparison and selection of the preferred two-tunnel concept to other surface pipe and tunnel alternatives. Six comment letters were received on the ENF from the following entities:

- Charles River Watershed Association
- Department of Conservation and Recreation
- Massachusetts Department of Environmental Protection - Northeast Regional Office
- Water Supply Citizens Advisory Committee
- City of Newton
- Massachusetts Historical Commission

The Secretary of Energy and Environmental Affairs issued a certificate on the ENF that requires the submittal of a mandatory Draft Environmental Impact Report (DEIR). The DEIR will identify the proposed locations of tunnel shaft sites and tunnel alignments and describe environmental impacts of constructing the proposed tunnel. Over the next year, staff will be identifying potential

shaft sites giving priority to undeveloped publically owned land where there would be minimal environmental impacts, although any site that may be potentially viable could be considered. The Secretary's Certificate requires that the DEIR include information on the following topics:

- Project Description and Permitting
- Public Outreach/Environmental Justice
- Alternatives Analysis
- Land Alteration, Open Space, Wetlands, Rare Species Habitat, Cultural and Historical Resources
- Water Management Act/Water Supply
- Climate Change (adaption and resiliency, greenhouse gas emissions)
- Construction Period
- Mitigation and Draft Section 61 Findings
- Responses to Comments

Staff are currently evaluating alternative tunnel shaft sites and alignments (further discussed below) and plan to propose one preferred and up to two back up alternatives for further evaluation in the DEIR. The DEIR is scheduled to be completed and submitted to the MEPA office in fall 2022.

Evaluation of Alternative Tunnel Shaft Sites and Tunnel Alignments

Staff have begun to identify key locations of tunnel shaft sites for constructing the tunnels and making connections to the water distribution system. Figure 3 shows the conceptual alignment for the north and south tunnels. Potential shaft sites are indicated by large circles (indicating potential tunnel construction shafts) and small circles (indicating potential intermediate tunnel connection shafts). The conceptual tunnel alignment will be updated once the shaft sites are selected and geologic conditions are better understood. It is expected that the tunnel alignment will generally follow a line between the shaft sites, but will likely not be a straight line to account for underground conditions.

As the Metropolitan Water Tunnel Program progresses through preliminary design and MEPA review, a key factor at this stage of the Program is identifying and, if possible, securing real estate for tunnel shaft sites. These shaft sites need to be located close to connection points to our existing water distribution system. Staff are targeting Authority controlled land for potential shaft sites. If Authority controlled land is not available, which is the case at many locations, then publically owned land (municipal or state) is being investigated. At this time, land owned by the Authority, Waltham, Wellesley, MassDOT, DCR and DCAMM is being investigated for suitable shaft sites. Finally, where no Authority, municipal or state land is available for a particular shaft site, then the availability of privately owned land is being investigated, as is the case for the recently purchased School Street parcel in downtown Waltham.

As discussed above, staff plan to propose one preferred and up to two backup alternatives for further evaluation in the DEIR. These alternatives may include alternative shaft sites or alternative site uses (tunnel boring machine launching shaft vs. receiving shaft) for one or more shaft sites.

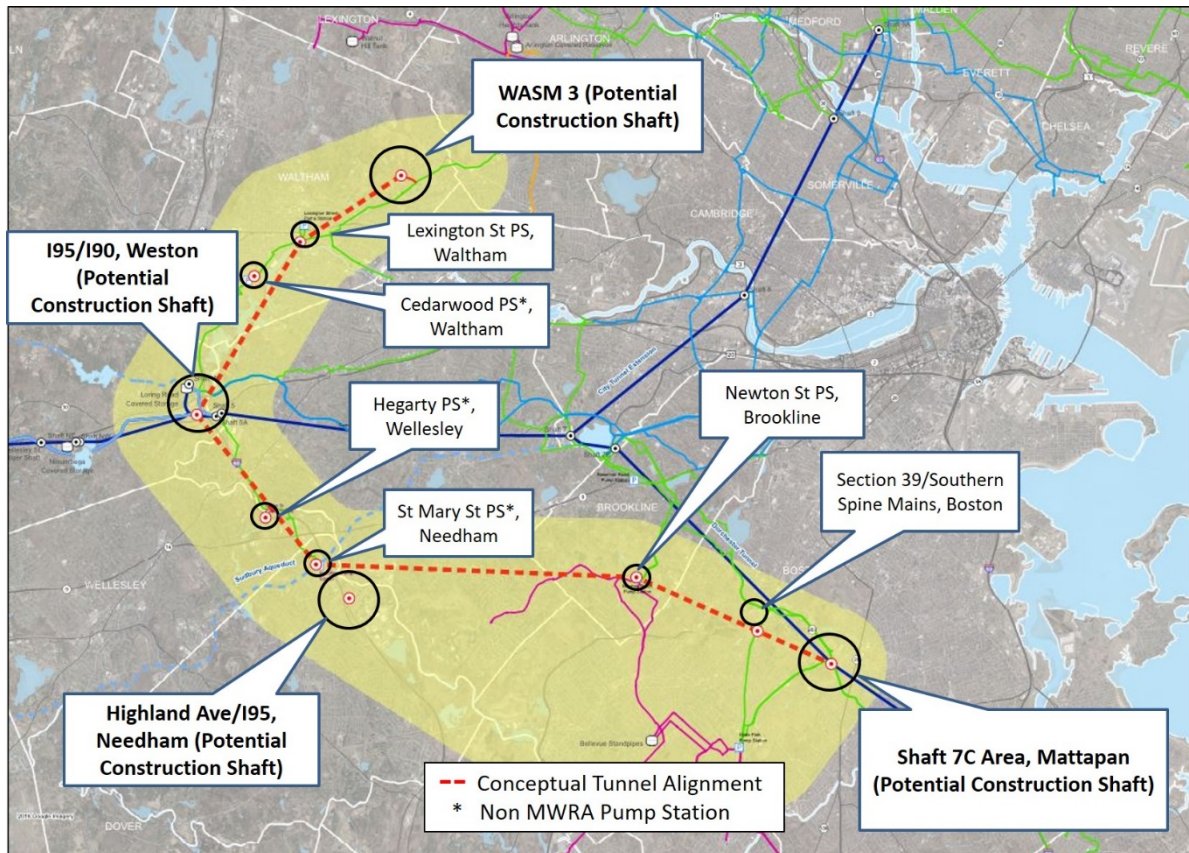


Figure 3. Conceptual North and South Tunnel Alignment

Staff will present the recommended preferred and backup alternatives to the Board after the evaluation has been completed.

Community Outreach

As the MEPA process has progressed, MWRA has simultaneously implemented its communication plan to ensure that communities and stakeholders are informed as to the importance of this effort and what can be expected in the years ahead. Staff have contacted all ten communities within the Program Study Area and have formed a working group, which includes representatives of each of the ten communities, MWRA Advisory Board, Water Supply Citizens Advisory Committee and the Metropolitan Area Planning Council. These working group members will participate in regular meetings with the Program Team, be kept informed on Program progress, and provide input on certain elements of the Program. The goals of the working group meetings are to provide a collaborative and transparent process for evaluating alternatives, and yield more informed comments during the MEPA process. The working group has met three times since it was formed in April 2021.

In addition to reaching out to communities, staff will also work to schedule a briefing or summary document for MWRA’s Legislative Caucus. MWRA also plans to reach out to environmental advocacy groups and environmental justice representatives.

The development of the preliminary design and environmental impact reports will require substantial amounts of coordination with environmental regulatory agencies in order to ensure the data and documentation generated result in a robust alternatives analysis in the MEPA

process. Staff have already met several times with members of the Department of Environmental Protection and MEPA to present the proposed Tunnel Program, and discuss the regulatory process. This early interaction with regulators will give MWRA staff the opportunity to address comments and concerns raised by agencies in the earlier MEPA phases.

BUDGET/FISCAL IMPACTS:

The FY22 CIP includes \$1.5 billion for the Metropolitan Tunnel Redundancy Program. This budget will be refined at the completion of Preliminary Design.



Metropolitan Water Tunnel Program
Program Update

October 20, 2021



Program Update

- Geotechnical Field Investigation
- MEPA Review Process
- Community & Stakeholder Outreach
- Evaluation of Alternatives – tunnel shaft sites and alignments
- Ongoing & Upcoming Work

- Program Schedule
 - Currently in preliminary design – thru Jan 2024
 - Begin final design in 2024
 - Targeting construction to start in 2027
 - Targeting construction to be complete by ~2037





Preliminary Design Phase Geotechnical Field Investigation – Overview

Phase 1A Program (spring - fall 2021)

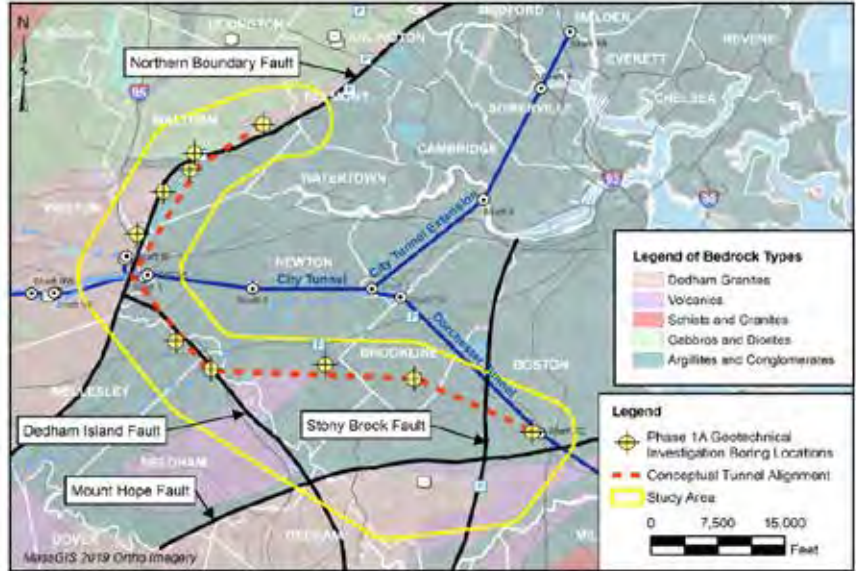
- Completed 9 test borings
 - Conducted downhole geophysical survey
 - Conducted bedrock permeability testing
 - Installed Vibrating Wire Piezometers (measure water level)
- Currently drilling 1 test boring at School St in Waltham
- Each boring takes ~8 weeks to complete
- Performed bedrock outcrop mapping at 26 locations
- Conducted 12,940 ft of seismic refraction survey

Phase 1B Program (spring - fall 2022)





Phase 1A Program – Test Borings!



Phase 1A = 10 Test Borings:

- Waltham – Fernald School – 445 ft
- Waltham – School St (ongoing)
- Waltham – Felton Street – 411 ft
- Waltham – Cedarwood PS - 437 ft
- Weston – DCR, Norumbega Tower Park – 433 ft
- Wellesley – Hegarty PS - 416 ft
- Needham – St Mary St PS - 513 ft
- Newton – Newton South High School - 470 ft
- Brookline – Newton Street PS – 548 ft
- Boston – DCR/Boston Light, American Legion Hwy – 412 ft



Brookline



Needham



Newton



School St, Waltham



Phase 1A Program – Test Borings!



Hard Quartz in Waltham



Pink Granite in Waltham



Roxbury Conglomerate (aka "Pudding Stone") in Brookline

- 9 of 10 boring completed (Ph1A)
- Average of 455 ft deep
- 3,800 lf of rock core collected



Field Logging



Detailed Core Logging & Sample Selection



Core Storage at DITP



Phase 1A Program – Bedrock Outcrop Survey



Waltham

Where bedrock is exposed at the surface, detailed rock characteristics are recorded to help better understand the underlying rock mass



Border Rd in Waltham



Roadway rock cut on Border Rd in Waltham



Phase 1A Program – Seismic Refraction Survey

Non invasive method used to determine subsurface conditions including variations in top of bedrock



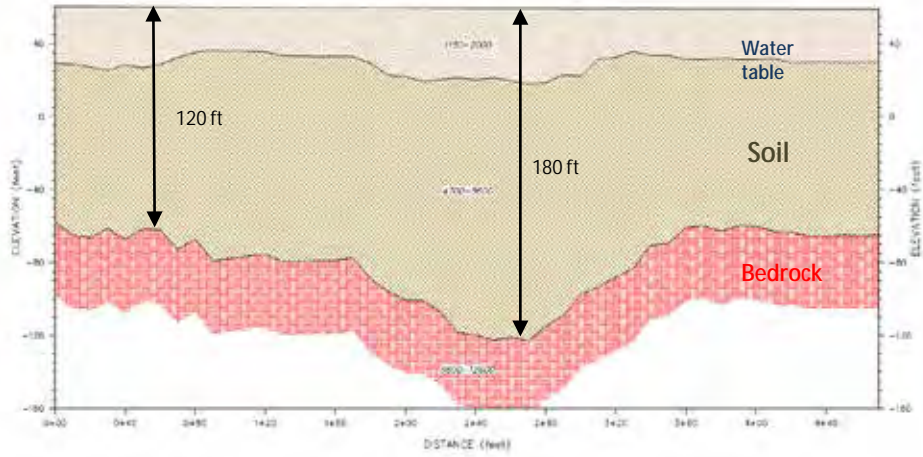
Hamilton Field in Newton



Mount Feake Cemetery in Waltham



McDevitt Middle School in Waltham



NOTES

1. Estimated accuracy (standard deviation) of depth of bedrock is ±10% or ±2 feet, whichever is greater.
2. No errors determined for bedrock are factor of compressed rock, weathered and/or fractured bedrock might occur at shallow depths.

3. Surface elevations estimated from plane provided by GPS.
4. Data were collected using the generalized Regional bedrock.

LEGEND

- Unconsolidated sand
- Unconsolidated/saturated sand
- Bedrock
- 1400-1600 Velocity (ft/s)
- Interface determined from seismic refraction data



MEPA Review Process & Community Outreach

MEPA Review

- Environmental Notification Form (ENF) submitted to MEPA for public comment in March 2021
- Six comment letters were received
- Received Secretary's Certificate which outlines the DEIR requirements
- Plan to submit DEIR in fall 2022

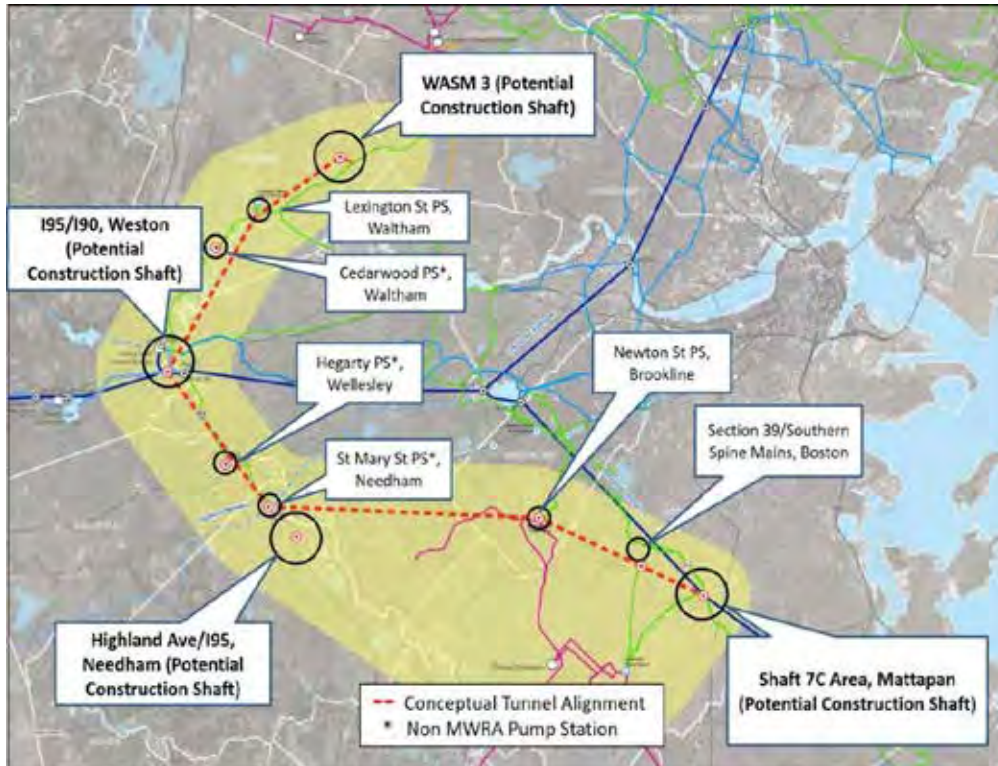
Community & Stakeholder Outreach

- Met with all 10 communities in the study area
- Working Group has been established
- Met with MassDOT, DCR, and DCAMM





Alternatives Evaluation



- Currently evaluating various alternatives that link specific shaft sites considering:
 - Land availability & suitability
 - Environmental impacts
 - Geology
 - Constructability
 - Schedule
 - Cost
- Sites currently under consideration are owned/controlled by MWRA, Waltham, Wellesley, MassDOT, DCR, and DPH
- Will identify 1 preferred and 2 back up alternatives for further evaluation in the DEIR
- Preliminary design will be for one alternative (preferred)



Ongoing and Upcoming Preliminary Design Work

- Finalize alternatives evaluation - soon
- Submit DEIR to MEPA in fall 2022
- Begin survey work this fall/winter
- Plan for Phase 1B field program for spring - fall 2022
- Continue preliminary design work
- Continue to meet with community leaders and stakeholders
- Continue shaft sites real estate acquisition efforts
- Engage our Expert Review Panel regularly
- Prepare for geotechnical assistance, final design(s), and construction management professional services contracts





Already Working at School Street in Waltham!



Thank You!