Massachusetts Water Resources Authority

Metropolitan Water Tunnel Program

Supplemental Draft Environmental Impact Report

July 2023

MWRA Contract 7159

Volume 1

Prepared by

CDM Smith in association with

VHB and JACOBS

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July 31, 2023

Rebecca Tepper, Secretary
Executive Office of Energy and Environmental Affairs (EEA)
100 Cambridge Street, Suite 900
Boston, MA 02114

RE: MWRA's Metropolitan Water Tunnel Program – EEA #16355
Supplemental Draft Environmental Impact Report

Dear Secretary Tepper,

MWRA is pleased to submit the enclosed Supplemental Draft Environmental Impact Report (SDEIR) for the Metropolitan Water Tunnel Program located in multiple communities in the metropolitan Boston area. This SDEIR responds to the Secretary of EEA's Draft Environmental Impact Report (DEIR) Certificate issued on December 16, 2022 and provides responses to all comments received on the DEIR.

Through the Metropolitan Water Tunnel Program (the Program), MWRA proposes to construct approximately 14 miles of two new deep rock tunnels that will provide redundancy for MWRA's existing Metropolitan Tunnel System, which includes the City Tunnel (1950), City Tunnel Extension (1963) and Dorchester Tunnel (1976). The Program will also allow MWRA's aging existing water tunnel system to be rehabilitated without interrupting service. Temporary construction impacts will be associated with the construction of the deep rock tunnels, associated construction shaft sites and intermediate shaft sites.

An electronic copy of the SDEIR is being distributed to all parties as noted on the SDEIR Distribution List (see Chapter 16 Circulation). We respectfully request that you publish notice of availability of the DEIR for public review in the August 9, 2023 edition of The Environmental Monitor. Public comments are due by September 8, 2023 and a certificate is due to be issued on September 15, 2023.

Please let me know if you have any questions regarding this submittal.

Sincerely,

Kathleen Murtagh

Kathleen Murtagh
Director, Tunnel Redundancy Program

MWTP-LTR-ENV-Tepper-SDEIR-07-31-2023-R0-Final

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1 Program Description and Permitting

The Massachusetts Water Resources Authority (MWRA) hereby submits this **Supplemental Draft Environmental Impact Report (SDEIR)** on the Metropolitan Water Tunnel Program (the Program) to continue the Program's review under the Massachusetts Environmental Policy Act (MEPA). MWRA is a Massachusetts public authority established by an act of the Legislature in 1984 that provides wholesale water and sewer services to 3.1 million people and more than 5,500 businesses in 61 communities in eastern and central Massachusetts.

1.1 Program Description

As described in **Draft Environmental Impact Report (DEIR) Chapter 1, Program Description and Permitting, Section 1.1, Program Description (pg. 1-1),** the MWRA plans to construct two new deep rock water supply tunnels (north and south alignments) to provide redundancy for MWRA's existing Metropolitan Tunnel System. The existing Metropolitan Tunnel System includes the City Tunnel (1950), the City Tunnel Extension (1963), and the Dorchester Tunnel (1976). The Metropolitan Tunnel System delivers approximately 60 percent of the water that travels eastward from the Quabbin Reservoir through a series of tunnels and aqueducts to MWRA's John J. Carroll Water Treatment Plant in Marlborough to serve 53 communities. Treated water is conveyed from the plant through the MetroWest Water Supply Tunnel (MWWST) and the Hultman Aqueduct.

The new, redundant deep-rock tunnels would originate at a site located at the westernmost portion of the Metropolitan Tunnel System roughly in the vicinity of the Interstate I-90/I-95 Interchange (I-90/I-95). The tunnels would be constructed such that water flows in two directions, with one tunnel extending north towards Waltham and the other south towards Boston/Dorchester. Each tunnel would connect to existing water supply infrastructure at key locations to achieve redundancy goals. The Program Study Area encompasses approximately 15 miles of deep rock tunnel approximately 200 to 400 feet below the ground surface of several communities. See **Figure 1-1** for a depiction of the Program Study Area.

As described in **DEIR Section 1.1.1, Program Background (pg. 1-2),** the Metropolitan Water Tunnel Program (the Program) was conceived to address outstanding challenges, primarily the inability to maintain or repair the existing Metropolitan Tunnel System or readily respond to emergencies as boil water orders are needed when implementing back-up water supply measures. As a result of the construction of the two new deep-rock tunnels, the Program would allow the MWRA to take its aging existing water tunnel system offline to be rehabilitated without interrupting water service to over 2.5 million water customers.

Consistent with the DEIR, Program construction is estimated to take 8 to 12 years and is planned to occur between 2027 and 2040. The MWRA expects that the proposed new deep-rock tunnel system would be placed into service before or around 2040 and that the system would have a useful life of more than 100 years. When sizing the proposed facilities, the MWRA considered projected future water demands due to population and employment increases within the service area as well as increased water use efficiency.

The intent of the Program is not to increase total capacity of the system, but to ensure redundancy by providing a backup to the existing Metropolitan Tunnel System if it were ever out of service for planned or unplanned reasons.

1.1.1 Summary of Program Changes Since the DEIR

The Certificate on the DEIR issued by the Commonwealth of Massachusetts, Secretary of the Executive Office of Energy and Environmental Affairs (EEA) on December 16, 2022, required that the MWRA file an SDEIR to address concerns "related to the viability of the proposed receiving shaft site at the Fernald Property in Waltham, which is common to all alternatives considered for the project for the northern alignment." The Certificate requests that potential alternative receiving locations that could replace the Fernald Property be disclosed and that impacts of those locations are analyzed. Since the DEIR was filed, the MWRA identified other sites for the terminus of the North Tunnel, Segment 1, and identified two new sites that would serve as the end point of the North Tunnel. A description of the site selection process to identify alternative sites for the terminus of the North Tunnel, Segment 1, is documented in **SDEIR Chapter 2, Alternatives, Section 2.2, Changes Since the DEIR**.

A property owned by the University of Massachusetts (UMass) located at 240 Beaver Street (referred to as the UMass Property site) and a different area of the former Walter E. Fernald State School property (referred to as the Lower Fernald Property site) closer to Waverley Oaks Road were identified as candidate sites in place of the Fernald Property site previously considered in the DEIR. The UMass Property site would serve as the end point for SDEIR Alternatives 3A and 4A. The UMass Property would be a large connection shaft site and unlike under the DEIR scenario, would not be a receiving shaft location for the Tunnel Boring Machine (TBM). The TBM would be disassembled in the tunnel, parts would be transported back through the tunnel and removed through the launch shaft with the shell of the TBM left abandoned in the ground at the large connection site, or the TBM may be backed out the whole length to the launching site at Tandem Trailer. The Lower Fernald Property would serve as the end point for SDEIR Alternative 10A. The Lower Fernald Property site would be a receiving shaft site for the TBM and would have a larger shaft site diameter than the large connection for the UMass Property site. The change in the proposed site for the terminus of the North Tunnel, Segment 1, revises the alignment of the tunnel which was also assessed in relation to wetlands and waterways, water supply, and Article 97 resources. See **SDEIR Section 2.2, Changes Since the DEIR**, for more information on changes since the DEIR.

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CONCORD
LINCOLN
LEXINGTON
MEDFORD
MALDEN
REVERE
ARLINGTON
BELMONT
EVERETT
CHELSEA
SUDBURY
WALTHAM
CAMBRIDGE
SOMERVILLE
WAYLAND
WESTON
WATERTOWN
Weston Aqueduct
City Tunnel Extension
MetroWest Water Supply Tunnel
NEWTON
City Tunnel
BOSTON
FRAMINGHAM
Hultman Aqueduct
BROOKLINE
Dorchester Tunnel
WELLESLEY
Sudbury Aqueduct
NEEDHAM
DOVER
DEDHAM
MILTON
QUINCY
WESTWOOD

Legend
- Program Study Area
- MWRA Water Storage
- MWRA Pump Station
- Existing Transmission Shafts
- Active Water Tunnel or Aqueduct
- Emergency Backup Aqueduct
- Low Service Main
- Northern Intermediate High; Intermediate High Service Main
- Northern Extra High; Southern Extra High Service Main
- Other High Service Main

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Miles

Metropolitan Water Tunnel Program

MWRA Contract No. 7159
Supplemental Draft Environmental Impact Report 2023

CDM Smith in association with vhb
Jacobs GREEN INTERNATIONAL AFFILIATES, INC.

Belmont, Waltham, Watertown, Weston, Newton, Wellesley, Needham, Brookline, Dedham, and Boston, MA

Program Study Area
Figure 1-1

Source: VHB, MassGIS, MWRA

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This SDEIR evaluates the existing conditions for the two new alternative sites, conducts an environmental impact assessment, and identifies mitigation where needed. The SDEIR also updates the environmental resource analysis for each SDEIR Alternative incorporating the new alternative sites and the refined tunnel alignment (see **SDEIR Chapter 3** to **SDEIR Chapter 14** for documentation of these findings). The assessment reaffirmed that SDEIR Alternative 4A is the Preferred Alternative, and that the two-back up alternatives are SDEIR Alternative 3A and 10A. See **SDEIR Section 2.7, SDEIR Alternatives and Evaluation Methodology**, and **SDEIR Section 2.8, Selecting the Preferred Alternative**, which describe the alternatives evaluation process and the selection of the preferred alternative, respectively.

This SDEIR responds to the comments raised in the Secretary's Certificate on the DEIR, along with each comment letter received on the DEIR during the public review comment period (see **SDEIR Chapter 15, Responses to Comments**).

1.1.2 Status of Review/Updates to MEPA Guidance

The MWRA filed an Environmental Notification Form (ENF) for the Program with the MEPA Office on March 31, 2021, to initiate review under MEPA. The ENF was noticed in the Environmental Monitor on April 7, 2021, and the Secretary of the EEA issued a Certificate on the ENF on May 7, 2021, requiring that the Program prepare a mandatory DEIR.

The DEIR was prepared in accordance with the scope outlined in the ENF Certificate. Since the ENF filing, MEPA amended its regulations under 301 Code of Massachusetts Regulations (CMR) 11.00, which were promulgated on December 24, 2021 and January 6, 2023. The DEIR was filed on October 17, 2022, and noticed in the Environmental Monitor of October 24, 2022. On December 16, 2022, the Secretary of the EEA issued a Certificate on the DEIR and determined that the project did not adequately and properly comply with MEPA due to site availability. As described above, two new sites were identified and are assessed in this SDEIR.

The *MEPA Interim Protocol on Climate Change Adaptation and Resiliency*[1] is effective for all new filings as of October 1, 2021, and the *MEPA Public Involvement Protocol for Environmental Justice (EJ) Populations*[2] and the *MEPA Interim Protocol for Analysis of Project Impacts on Environmental Justice Populations*[3] were finalized and are effective as of January 1, 2022, for all new filings. Although the ENF was filed before these effective dates, the MWRA continues to voluntarily follow components of the *MEPA Interim Protocol for Analysis of Project Impacts on Environmental Justice Populations* and the *MEPA Public Involvement Protocol for Environmental Justice Populations* as a part of this SDEIR. This includes identifying EJ populations using the EJ Maps Viewer and Department of Public Health (DPH) criterion data

1 MEPA Office (2021, Oct. 1). MEPA Interim Protocol on Climate Change Adaptation and Resiliency. [Online.] Available: https://www.mass.gov/doc/mepa-interim-protocol-on-climate-change-adaptation-and-resiliency-effective-oct-1-2021/download.

2 MEPA Office (2022, Jan. 1). MEPA Public Involvement Protocol for Environmental Justice Populations. [Online.] Available: https://www.mass.gov/doc/final-mepa-public-involvement-protocol-for-environmental-justice-populations-effective-date-of-january-1-2022/download.

3 MEPA Office (2022, Jan. 1). MEPA Interim Protocol for Analysis of Project Impacts on Environmental Justice Populations. [Online.] Available: https://www.mass.gov/doc/final-mepa-interim-protocol-for-analysis-of-project-impacts-on-environmental-justice-populations-effective-date-of-january-1-2022/download.

by census tract within 1 mile of each site and along trucking routes to assess Program impacts on EJ populations. Details on the Program's public outreach plan and a summary of the outreach conducted to date, as well as EJ populations near the Program's sites, are documented in **SDEIR Chapter 3, Outreach and Environmental Justice**.

The MWRA continues to voluntarily follow components of the *MEPA Interim Protocol on Climate Change Adaptation and Resiliency* as a part of this SDEIR. This includes use of the Resilient Massachusetts Action Teams' Climate Resilience Design Standards Tool (RMAT Tool) for evaluating the Program's climate exposure to sea-level rise, flooding, and extreme heat, as well as methods to mitigate these impacts (see **SDEIR Chapter 7, Climate Change**).

1.2 Program Purpose and Need/Goals

The Metropolitan Tunnel System (City Tunnel, City Tunnel Extension, and Dorchester Tunnel) was constructed from the 1950s to the 1970s and has been in continuous service ever since. While the concrete-lined deep rock tunnels have a long design life, some of the associated valves and piping have exceeded their design life and are currently in poor condition. To exercise, service, and replace some of these valves and piping without interruption to water supply, a redundant system is needed.

The purpose of the Metropolitan Water Tunnel Program is to enhance the reliability of the Metropolitan Tunnel System that serves the metropolitan Boston area, allowing for system maintenance and repair without disrupting service in a way that maintains the system's ability to provide water needed to support public health and safety.

The primary goal of the Program is to protect public health, provide sanitation, and provide fire protection, in line with the mission of the MWRA.

In support of this goal, the Program is intended to:

- Provide 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 the existing tunnel system year-round
- Provide uninterrupted service in the event of an emergency shutdown
- 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 the water utility level
- Be constructible
- Avoid boil water orders

1.2.1 Condition of the Metropolitan Tunnel System

Each tunnel comprising the existing Metropolitan Tunnel System consists of concrete-lined deep-rock tunnel sections linked to the surface through steel and concrete vertical shafts. At the top of each shaft, cast iron or steel pipes and valves connect to the MWRA's surface pipe network. These pipes and valves are accessed through subterranean vaults and chambers. The tunnels and shafts themselves require little or no maintenance and represent a low risk of failure; however, many of the valves and piping are in poor condition.

Valve reliability is a concern for the Metropolitan Tunnel System. The City Tunnel (1950) appurtenances are 70 years old and cannot be adequately maintained or replaced until a back-up exists. Failure of some valves could cut off most of the system's capacity to supply water. Moreover, due to the physical condition, age, and environment in which they were installed, the valves have not been exercised recently for fear of them failing in a closed position which would prevent water supply to downstream portions of the system. At many of the top-of-shaft structures are smaller piping and valves of varying diameters (ranging from less than an inch to several inches in diameter) that provide air and vacuum relief, along with drains, flushing connections, valve by-passes, and control piping for hydraulic valve actuators. Some of these pipes and valves are in a similar deteriorated condition as the main pipes and valves themselves. Failure of one of these smaller diameter connections could require a tunnel shutdown to allow for a safe repair in some of these confined spaces. The amount of water that can flow out of a modest opening under high pressure can potentially be over 100 million gallons per day (MGD).

Some of these concerns can be mitigated somewhat through replacing corroded bolts, wrapping, or coating corroded pipeline segments, replacing air valves, and installing cathodic protection systems. A program is underway to implement some of these measures to reduce the risk of certain failures that would require complete tunnel shutdown. However, all the potential failure points cannot be addressed without tunnel isolation and complete replacement or maintenance of failed or failing components at some point in the future.

1.3 Program Schedule and Phasing

The Program is composed of two separate tunnels. The North Tunnel, Segment 1 would include a tunnel extending from a site near the I-90/I-95 interchange to either the UMass Property or Lower Fernald Property, depending on Alternative. The South Tunnel, Segment 2 would include a tunnel extending between a site near the I-90/I-95 interchange and the Highland Avenue/I-95 interchange. South Tunnel, Segment 3 would extend from the Highland Avenue/I-95 interchange to the American Legion site. The alternatives described in more detail in **SDEIR Chapter 2, Alternatives**, outline the phasing and contract packaging options for each alternative. The number of construction packages will be confirmed as the Program advances through the design phases. Program construction is estimated to take 8 to 12 years and is planned to occur between 2027 and 2040. The MWRA expects that the proposed new deep-rock tunnel system would be placed into service before or around 2040 and that the system would have a useful life of more than 100 years. The following subsections provide details of the Program's progression, and a timeline of activities is provided in **Figure 1-1.**

1.3.1 Preliminary Geotechnical Data and Design Reports

To aid in the selection of the appropriate subterranean (underground) alignment for the deep-rock tunnels, the MWRA conducted geotechnical investigations during preliminary design in three phases at key locations within the Program Study Area. In the summer and fall of 2021, the MWRA executed the first phase (Phase 1A) of the preliminary geotechnical investigations, which included surficial geophysical investigations and the drilling of 10 deep-rock borings with continuous coring, downhole geophysics and pressure testing, and instrumentation installations (piezometers). Each boring was drilled at least 50 feet below the proposed tunnel depth and took approximately eight weeks to complete, including in-situ (on-site) testing. The MWRA performed the second phase (Phase 1B) in the spring and summer of 2022, which was similar in scope to first phase but with 6 deep-rock borings. The MWRA performed the third phase (Phase 1C) in the winter of 2023, which consisted of 2 deep-rock borings, again with continuous coring, downhole geophysics and pressure testing, and instrumentation installations (observation well and piezometers). The MWRA will continue to conduct additional geotechnical investigations and testing as the Program moves through final design. The MWRA will prepare a Preliminary Design Report to support and provide the technical basis for the information included in the DEIR, SDEIR and Final Environmental Impact Report (FEIR). The Preliminary Design Report will include design criteria, construction considerations, and operational requirements for the tunnels, shafts, and valve chambers and pipe connections. The Preliminary Design Report will include a detailed hydraulic analysis of the proposed tunnels using projected future water demands. In addition, the Preliminary Design Report will include preliminary design drawings, proposed construction packaging, a proposed schedule, and a preliminary cost estimate. **Figure 1-2** presents the anticipated schedule for design and construction activities.

1.3.2 Final Design and Construction

Final Design and the development of construction contract documents will be underway in 2024. The MWRA will advance Final Design to prepare procurement documents, including Final Plans, Specifications, and a detailed Construction Schedule and Cost Estimate. Based on these, the MWRA will initiate a public bidding process to select contractors. Construction is anticipated to begin in 2027.

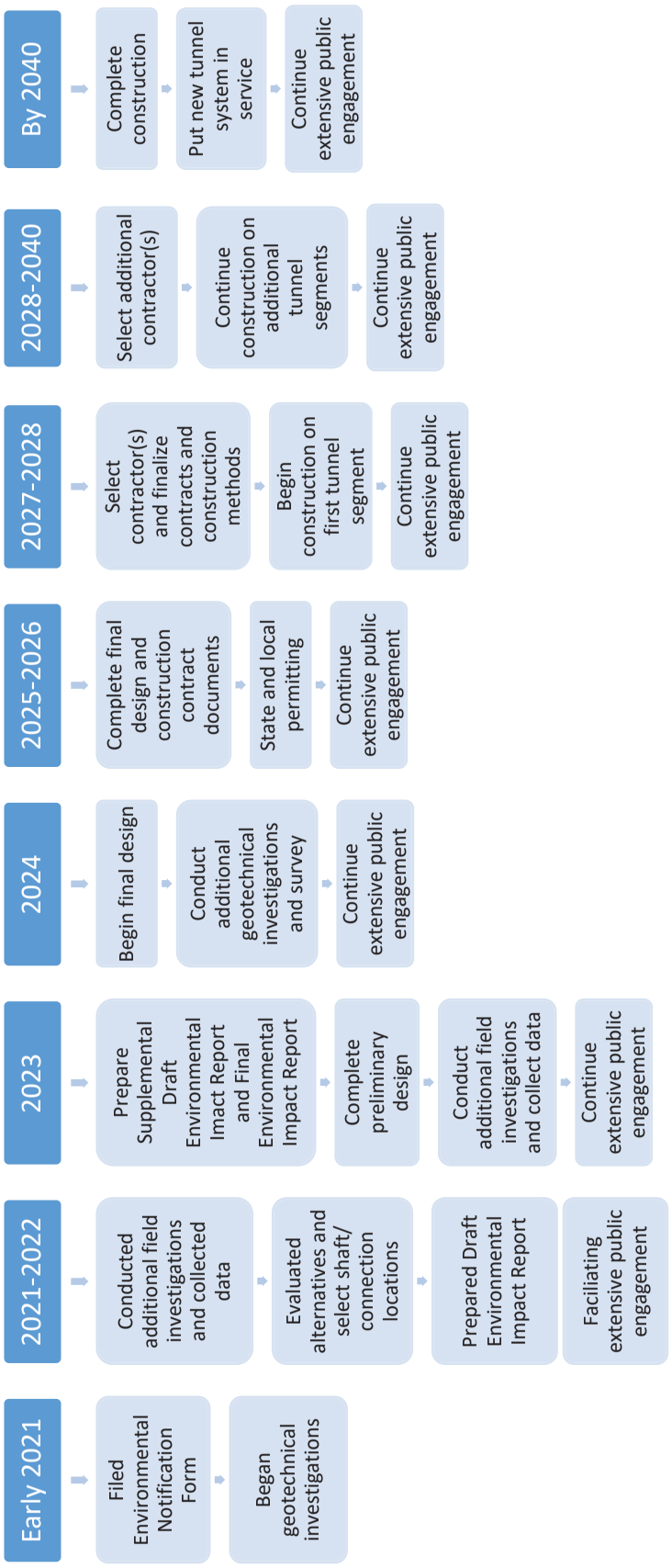


Figure 1-2 Anticipated Program Timeline

1.4 Regulatory Context

The MEPA Office within the EEA oversees the state environmental review of the Program. MEPA review is required when:

- A project is undertaken by a state agency, requires a permit from a state agency, or involves financial assistance or a land transfer by a state agency
- One or more thresholds, as defined in 301 CMR 11.03, are met or exceeded

The Program is subject to the preparation of a Mandatory EIR pursuant to 301 CMR 11.03(4)(a)(3) because it requires State Agency Actions and involves the construction of one or more new water mains 10 or more miles in length. The Secretary's Certificate on the DEIR requested additional MEPA thresholds that will be exceeded by the Program to be listed. The project also exceeds the additional ENF thresholds pursuant to 301 CMR 11.03 as listed below:

- **301 CMR 11.03(1)(b)(3)**: Disposition or change in use of land or an interest in land subject to Article 97 of the Amendments to the Constitution of the Commonwealth
- **301 CMR 11.03(1)(b)(1)**: Direct alteration of 25 or more acres of land
- **301 CMR 11.03(3)(b)(1)(f)**: Alteration of ½ or more acres of any other wetlands
- **301 CMR 11.03(6)(b)(2)(b)**: Construction, widening or maintenance of a roadway or its right-of-way that will cut five or more living public shade trees of 14 or more inches in diameter at breast height.

The MWRA filed an ENF with the MEPA Office on March 31, 2021, to initiate MEPA review and the Secretary of the EEA issued an ENF Certificate on May 7, 2021. The DEIR was drafted in accordance with Scope items from the ENF Certificate and filed on October 17, 2022. The Secretary issued a Certificate on December 16, 2022, for the DEIR finding that the DEIR did not adequately and properly comply with MEPA and requiring a SDEIR. The following Sections and Chapters address comments from the Secretary's Certificate. See **SDEIR Chapter 15, Response to Comments** for the Secretary's Certificate, comment letters from interested parties, and a detailed response to comments.

1.4.1 Anticipated Permits and Approvals

Table 1-1 provides an updated list of potential permits and approvals that the Program may require as requested by the following comments from the Secretary's Certificate: The MWRA will further evaluate this list as the design progresses and will update it accordingly in future filings. Some permits and approvals are site specific, as noted in **Table 1-1**.

Table 1-1 Potential Permits and Approvals

Agency/Department	Permit/Approval/Action	Status
Federal		
U.S. Environmental Protection Agency (USEPA)	*National Pollutant Discharge Elimination System (NPDES) Construction General Permit (CGP)*	*To be obtained*
	NPDES Dewatering and Remediation General Permit, if needed	*To be obtained, if needed*
U.S. Army Corps of Engineers (USACE)	*Section 404 Department of the Army Permit (General and Project Construction Notice)*[1]	*To be obtained*
Commonwealth of Massachusetts		
Executive Office of Energy and Environmental Affairs (EEA)	*Massachusetts Environmental Policy Act (MEPA) Review*	*Underway; ENF filed in March 2021, DEIR filed December 2022, SDEIR herein*
Massachusetts Historical Commission (MHC)	*Review pursuant to Massachusetts General Law Ch. 9, Section 26-27C*	*Underway through MEPA review*
Massachusetts Department of Transportation (MassDOT)[2]	*Land disposition/easements*[1]	*To be obtained*
	Highway Access/Construction Access Permits[1]	*To be obtained*
Massachusetts Bay Transportation Authority (MBTA) [2]	*MBTA Right of Way Access License Agreement*	*To be obtained, if needed*
Department of Conservation and Recreation (DCR) [2]	*Land disposition/easements*[1]	*To be obtained*
	Construction/Access Permits[1]	*To be obtained*
Massachusetts Department of Environmental Protection[2]	*Water Management Act Permit*	*To be obtained*
	Chapter 91 Licenses	*To be obtained, if needed*
	Superseding Order of Conditions, upon appeal[1]	*To be obtained, if needed*
	Section 401 Water Quality Certificate[1]	*To be obtained*
	Distribution System Modification	To be obtained
Massachusetts Division of Capital Asset Management and Maintenance	*Article 97 Land Disposition Legislation*[1]	*To be completed*
Municipal		
Conservation Commissions	*Wetlands Protection Act Order of Conditions*[1]	*To be obtained*
Departments of Public Works	*Roadway Access Permits/Street Opening Permit*[1]	*To be obtained*
Boston Water and Sewer Commission	Hydrant Permit	To be obtained
	Drainage Discharge Permit	To be obtained, if needed

1 Indicates that the permit or approval is site specific.

2 Indicates State agency that will issue Section 61 Findings

Italicized text within the table indicates no change from the DEIR.

Note: This is a preliminary list of permits and approvals that may be sought for the Program. This list is based on current information about the Program and is subject to change as the design of the Program progresses.

1.4.2 Federal

The Program may require approval pursuant to several federal environmental regulations.

1.4.2.1 USEPA NPDES Construction General Permit

Construction activities would involve the disturbance of one acre or more of land, which will require the completion and submittal of a Notice of Intent (NOI) to the Environmental Protection Agency (USEPA) for coverage under the National Pollutant Discharge Elimination System (NPDES) Construction General Permit (CGP) for stormwater discharge from construction activities. As a part of the NOI, a Stormwater Pollution Prevention Plan (SWPPP) will be prepared by the contractor to document stormwater management during the construction period. The NOI submitted for the NPDES CGP will contain information about the contents and stipulations of the SWPPP. This permit will be needed to cover all the launching, receiving, large connection, and connection sites for the Program. **SDEIR Chapter 5, Wetlands and Waterways, Section 5.2.2, Wetlands and Waterways Construction Period Impacts**, discusses the requirements needed for the NPDES CGP and SWPPP.

1.4.2.2 USEPA NPDES Dewatering and Remediation General Permit

Dewatering activities associated with construction and operation of the Program may require the issuance of a USEPA NPDES Dewatering and Remediation General Permit (DRGP). This permit will be issued by the USEPA and authorizes discharges of groundwater, stormwater, potable water, and surface water for dewatering and remediation activities, including infrastructure dewatering and remediation. The DRGP will cover all launching, receiving, and connection sites that involve dewatering and remediation activities. See **SDEIR Chapter 5, Wetlands and Waterways**.

1.4.2.3 Section 404 Department of the Army Permit (General and Project Construction Notice)

The construction of the Program would require the discharge of dredge or fill material into waters of the U.S. Work consisting of construction, dredging, or discharge of fill into a U.S. navigable water or adjacent wetlands requires a Section 404 permit from the U.S. Army Corps of Engineers (USACE). Prerequisites for a Section 404 permit would be the Section 401 Water Quality certificate issued by the Massachusetts Department of Environmental Protection (MassDEP). A Section 404 permit would be needed for discharges associated with outlet pipes with riprap splash pads for dewatering facilities at Tandem Trailer, Bifurcation, Highland Avenue Northeast/Southeast, and Highland Avenue Northwest/Southwest and for discharges at American Legion to construct a connection to the existing distribution system and a dewatering outlet pipe with a riprap splash pad. Prior to construction, a Preconstruction Notification filing, or a Self-Verification Form would be completed for the applicable sites.

1.4.3 State

The Program may require the following state agency actions.

1.4.3.1 Review Pursuant to MGL Ch. 9, Section 26-27C

The Massachusetts Historical Commission (MHC) has review authority over projects requiring state funding, licenses, permits, or approvals, in order to evaluate potential direct or indirect impacts to properties listed in the State Register of Historic Places, in compliance with MEPA and the State Register Review requirements (MGL Ch. 9, Section 26-27C, as amended by Chapter 254 of the Acts of 1988). Similar to Section 106, the consultation process identifies potential adverse effects to historic properties and evaluates ways to avoid, minimize, or mitigate these adverse effects. An evaluation of historic and archaeological resources was conducted as part of the DEIR. The MHC is included in the distribution of the Program's MEPA filings. Additionally, the MWRA coordinated with MHC in advance of the DEIR filing to provide preliminary information to assist in its review. No comments were received from the MHC on the DEIR. The MHC will receive a copy of the SDEIR as well as an archaeological study that was conducted for the UMass Site. See **SDEIR Chapter 12, Cultural and Historical Resources**.

1.4.3.2 MBTA Right of Way Access License Agreement

The Program may require access to and the use of sites under the care, custody, and control of the Massachusetts Bay Transportation Authority (MBTA). The use of these sites might require right of way access license agreement from MBTA for construction activities or a permanent easement or land disposition from MBTA for the proposed facilities. License agreement may be needed for the portion of North Tunnel, Segment 1, beneath the MBTA Commuter Rail in Waltham.

1.4.3.3 MassDOT Land Disposition/Easements

The Program requires the use of sites under the care, custody, and control of the Massachusetts Department of Transportation (MassDOT). The use of these sites might require a temporary easement from MassDOT for construction activities or a permanent easement or land disposition from MassDOT for the proposed facilities. Land disposition and/or easement approvals will be needed for multiple Program sites (Tandem Trailer, Park Road East, Park Road West, Bifurcation, Highland Avenue Northeast/Southeast, and Highland Avenue Northwest/Southwest). See **SDEIR Chapter 4, Land Alteration and Article 97**.

1.4.3.4 MassDOT Highway Access/Construction Access Permits

Construction activities would take place within the right-of-way or on property in the care, custody, and control of MassDOT. Activities on these lands would require Highway Access and Construction Access permits from MassDOT. These permits will be needed at Program sites including Tandem Trailer, Park Road East, Park Road West, Bifurcation, Hultman Aqueduct Isolation Valve,[4] Highland Avenue Northeast/Southeast, Highland Avenue Northwest/Southwest, Lower Fernald Property, UMass Property and American Legion). See **SDEIR Chapter 4, Land Alteration and Article 97**.

1.4.3.5 DCR Land Disposition/Easements

The Program requires the use of sites under the care, custody, and control of the Massachusetts Department of Conservation and Recreation (DCR). The use of these sites may require a temporary easement from DCR for construction activities, and/or a permanent easement and land disposition from DCR for the proposed facilities. For any permanent easements and/or land dispositions, compliance with the EEA Article 97 Land Disposition policy will be necessary for land resources protected under the policy. Two sites (Southern Spine Mains and American Legion) are under the care, custody, and control of DCR and are anticipated to require a land disposition. A comment letter from the DCR on the DEIR, see **SDEIR Chapter 15, Responses to Comments**, concurred that DCR land will require dispositions and or easements and expressed willingness to coordinate with the MWRA throughout permitting. See **SDEIR Chapter 4, Land Alteration and Article 97**.

1.4.3.6 DCR Construction/Access Permits

Permits for construction activities and access will be needed for land under the care, custody, and control of DCR, in addition to land disposition and easement approvals. Comment letters from DCR on the ENF and on the DEIR (see **SDEIR Chapter 15, Response to Comments**), confirmed the need for the Program to seek construction access permits at sites under the care, custody, and control of the DCR. This applies to one receiving site (American Legion) and one connection site (Southern Spine Mains). See **Chapter 4, Land Alteration and Article 97**.

1.4.3.7 MassDEP Water Management Act

Dewatering from construction activities would require a Water Management Act (WMA) permit. A WMA permit is required for complete or partial transfer of the right to withdraw water and for requests to withdraw over 100,000 gallons of water per day annually from a watershed. A comment letter on the ENF from the MassDEP Northeast Regional Office (NERO) dated April 27, 2021, expressed the need for the estimated withdrawal rates and discharge locations for dewatering activities associated with construction to determine if a WMA permit is required. A comment letter on the DEIR from MassDEP NERO further confirmed the need for a WMA permit based on the estimated withdrawal rates contained in the DEIR. The withdrawal rates and discharge sites are described in **SDEIR Chapter 6, Water Supply and Water Management Act**. The Program consists of sites located in the Charles River Basin, and withdrawal,

4 The MWRA has an existing permanent easement for the Hultman Aqueduct Isolation Valve site.

discharge, and dewatering will not cross major basin boundaries. Therefore, multiple WMA permits are not required, and Program groundwater withdrawals during construction are not subject to the Interbasin Transfer Act.

1.4.3.8 MassDEP Superseding Order of Conditions, Upon Appeal

The MWRA will file a NOI with the local Conservation Commissions to ultimately receive a Wetlands Protection Act (WPA) Order of Conditions from those commissions for some of the proposed launching, receiving, and large connection sites. In the event that there is an appeal of an Order of Conditions issued by a local Conservation Commission, a WPA Superseding Order of Conditions by the MassDEP would be needed. This would occur on a site-specific basis.

1.4.3.9 MassDEP Section 401 Water Quality Certificate

Construction activities would result in the discharge of dredged or fill material into waters of the U.S. associated with outlet pipes with riprap splash pads for dewatering facilities at Tandem Trailer, Bifurcation, Highland Avenue Northeast/Southeast, and Highland Avenue Northwest/Southwest and for temporary vegetated wetland impacts for a surface connection and a dewatering outlet pipe with a riprap splash pad at American Legion. These discharge activities would require Section 401 Water Quality Certification (WQC) from MassDEP. It is anticipated that the Program would require a Minor Fill/Excavation Project Certification due to the cumulative impact to less than 5,000 square feet of vegetated wetland and land under water. It is not anticipated that the Program would require a Dredge Project Certification because the volume of dredging would not be more than 100 cubic yards. This determination will be updated as necessary during Program final design and permitting.

1.4.3.10 MassDEP Chapter 91 License

Since the filing of the DEIR, the Program has determined that construction within waterways may be exempt from requiring a Chapter 91 License. All work being completed on, in, over, or under waterways would be installed in accordance with 310 CMR 9.05(3)(g), which states:

"(g) placement in a non-tidal river or stream subject to jurisdiction under 310 CMR9.04(1)(e) of fill or structures for which a final Order of Conditions has been issued under M.G.L. c. 131, § 40 and 310 CMR 10.00: Wetlands Protection, and which does not reduce the space available for navigation; such fill or structures are limited to:

1. *overhead wires, conduits, or cables to be attached to an existing bridge, without substantial alteration thereof, or constructed and maintained in accordance with the National Electrical Safety Code;*
2. *fish ladders, fishways, and other devices which allow or assist fish to pass by a dam or other obstruction in the waterway;*
3. *pipelines, cables, conduits, sewers, and aqueducts entirely embedded in the soil beneath such river or stream; and*

4. *bulkheads, revetments, headwalls, storm drainage outfalls, and similar structures which do not extend into such river or stream, except as may be necessary for bank stabilization;"*

In accordance with 310 CMR 9.05(3)(g)(3) the tunnel would be entirely embedded in the soil (or bedrock) beneath the waterway. In accordance with 310 CMR 9.05(3)(g)(4), proposed outfalls and splash pads would not extend into the waterway or adjacent wetland. The placement of rip rap splash pads and tunneling of the structure below waterways would not reduce the space available for navigation and therefore may not require Chapter 91 authorization. See **Table 5-13** in **SDEIR Chapter 5, Wetlands and Waterways** for further details. Further coordination with MassDEP will be completed during final design to determine applicability of Chapter 91 exemptions to proposed Program elements and/or requirements to comply with Chapter 91 regulations should the Program not meet exemption criteria.

1.4.3.11 MassDEP Distribution System Modification Permit

The goal of the Program is to provide redundancy to the existing MWRA distribution system that supplies the Greater Boston area. Modification of a public water supply system requires a Distribution System Modification Permit from MassDEP. This permit is required for modification of water distribution systems serving more than 3,300 people in order to protect public health and welfare. The permit will be required for the entire Program.

1.4.3.12 Article 97 Land Disposition Legislation

The Program would use land that is protected under the EEA Article 97 Land Disposition Policy. Article 97 includes a no-net-loss policy for designated land within Massachusetts. This Program includes a transfer of ownership, change in physical or legal control, and change in use in and to Article 97 land. For a disposition of Article 97 land to take place, a two-thirds vote from the General Court must occur, demonstrating that there is no reasonable alternative to using land protected by Article 97. A comment letter from DCR on the ENF dated April 27, 2021, expressed that the use of some DCR sites that will require permanent easements may trigger Article 97. The MWRA is working directly with DCR in order to comply with Article 97. Article 97 land disposition is anticipated to be needed for three proposed connection and receiving sites: Hegarty Pumping Station, owned by the Town of Wellesley, Southern Spine Mains and American Legion, both under the care, custody, and control of DCR. A comment letter from the DCR on the DEIR (see **SDEIR Chapter 15, Response to Comments**) concurred that DCR land will require an Article 97 disposition for DCR owned land and expressed willingness to coordinate with the MWRA throughout permitting. As described in **SDEIR Chapter 4, Land Alteration and Article 97**, the MWRA will also have to follow additional requirements for Article 97 disposition review under *An Act Preserving Open Space in the Commonwealth* also known as the Public Lands Preservation Act (PLPA). The PLPA effectively sets up a method of review of potential Article 97 land dispositions for the Secretary of the EEA before heading to the state legislature. See **SDEIR Section 4.3, Technical Analysis to Respond to Certificate Comments**, for additional details on PLPA and applicability for the Program. As demonstrated in **SDEIR Section 4.2.4, Land Alteration and Article 97 Avoidance, Minimization, and Mitigation**, the MWRA will comply with the Article 97 Land Disposition Policy where there are no other possible means to avoid disposition. To mitigate the impacts of the disposition, the MWRA would identify and provide

compensatory land of equal or greater value to offset any disposed of land required for the Program when applicable or comply with other provisions of the policy.

1.4.4 Municipal

The Program may require approval pursuant to the following local environmental regulations.

1.4.4.1 WPA Order of Conditions

This Program has planned work within 100 feet of wetlands and within 200 feet of perennial waterways. Work within the vicinity of such resources requires the issuance of a WPA Order of Conditions by the Conservation Commission for each municipality in which proposed construction would occur. For the Program, a WPA Order of Conditions will be needed from the Conservation Commissions of Waltham, Weston, Needham, Wellesley, and Boston.

1.4.4.2 Roadway Access Permits/Street Opening Permit

Construction at some of the sites for the Program would occur within the public right-of-way or may include alteration to existing driveways or curb cuts. At sites where this work is anticipated, Roadway Access Permits or Street Opening Permits from the Department of Public Works of each respective municipality will be needed. The MWRA anticipates this work at some of the proposed Program sites located in Waltham, Wellesley, Needham, and Boston; Program sites requiring a Roadway Access Permit or Street Opening Permit include the School Street site, UMass Property site, Lower Fernald Property site, Highland Avenue Northwest/Southwest site, Highland Avenue Northeast/Southeast site, Hegarty Pumping Station site, St. Mary Street Pumping Station site, Southern Spine Mains site, and American Legion site.

1.4.4.3 Boston Water and Sewer Commission Hydrant Permit and Drainage Discharge Permit

The MWRA's contractor will have to obtain a Hydrant Permit from the Boston Water and Sewer Commissions Meter Department for use of any hydrant during the construction phase of the Program. The water used from the hydrant will have to be metered. The MWRA's contractor will have to obtain a Drainage Discharge Permit for any dewatering discharges to the Boston Water and Sewer Commission's storm drainage system.

1.4.5 Interagency Coordination

The MWRA continues to perform extensive interagency coordination, including multiple meetings or correspondence with MEPA, MassDOT, DCR, MHC, DPH, and MassDEP, Department of Youth Services (DYS), as well as with the local communities and community stakeholder groups within the Program study area. **Table 3-1** in **Chapter 3, Outreach and Environmental Justice**, summarizes stakeholder meetings were held since the ENF filing. Since the filing of the DEIR, the MWRA has coordinated with: MEPA,

MassDOT, Jamaica Plain Neighborhood Council, City of Boston, Town of Brookline, Town of Needham, City of Newton, Town of Wellesley, City of Waltham, Town of Weston, fire departments from the towns of Weston, Needham, Newton and Waltham, City of Waltham, Town of Weston, Water Supply Advisory Committee (WSCAC), and University of Massachusetts.

The MWRA will continue to coordinate and communicate with the USEPA, the USACE, the MHC, MassDOT, the MBTA, DCR, DPH, MassDEP, the Natural Heritage and Endangered Species Program (NHESP), the Commonwealth of Massachusetts General Court, the local Conservation Commissions, and the local Departments of Public Works and local elected officials of Waltham, Weston, Wellesley, Needham, Newton, Brookline, and Boston as Program MEPA review and permitting progresses.

1.5 Technical Analysis to Respond to Certificate Comments

The following comments were identified in the Secretary's Certificate on the DEIR for the Program as pertaining to Program description and permitting. Responses to comments are provided below each delineated comment.

Certificate Comment C-8

The SDEIR should include a detailed and updated description of the project and identify any changes since the filing of the DEIR.

Response to C-8

As detailed in **DEIR Section 1.1, Program Description (pg. 1-1)**, the MWRA plans to construct two new deep rock water supply tunnels (north and south alignments). The new, redundant deep-rock tunnels would originate at a site located at the westernmost portion of the Metropolitan Tunnel System roughly in the vicinity of the Interstate I-90/I-95 Interchange (I-90/I-95). The tunnels would be constructed such that water flows in two directions, with one tunnel extending north towards Waltham and the other south towards Boston/Dorchester. Each tunnel would connect to existing water supply infrastructure at key locations to achieve redundancy goals. Program construction is estimated to take approximately 8 to 12 years and is planned to occur between 2027 and 2040. The MWRA expects that the proposed new deep-rock tunnel system would be placed into service before or around 2040 and that the system would have a useful life of more than 100 years. As discussed in **SDEIR Section 1.1.1**, since the filing of the DEIR, the purpose and general layout of the Program remains unchanged.

The Secretary's Certificate on the DEIR issued on December 16, 2022, required that the MWRA file a SDEIR to address concerns "related to the viability of the proposed receiving shaft site at the Fernald Property in Waltham, which is common to all alternatives considered for the project for the northern alignment." The Certificate requested that alternative locations that could replace the DEIR Fernald Property site be disclosed and the potential impacts of those alternative sites be analyzed. In response to the Certificate, the MWRA considered other sites for the terminus of the North Tunnel, Segment 1, in place of the DEIR Fernald Property site. A description of the process to identify alternative sites for the North Tunnel terminus in place of the DEIR Fernald Property site is provided in **SDEIR Section 2.2.1, Revised North**

Tunnel Terminus Site, along with a summary of the two sites that were identified as potentially viable options for the terminus of the North Tunnel in place of the DEIR Fernald Property site.

As described in **SDEIR Section 1.1.1**, a property owned by UMass located at 240 Beaver Street and a different area of the former Walter E. Fernald State School property (referred to as the Lower Fernald Property site) closer to Waverley Oaks Road were identified as candidate sites for the northern terminus of the North Tunnel, Segment 1. The UMass Property site would serve as the northern terminus of the North Tunnel, Segment 1, in SDEIR Alternatives 3A and 4A. Unlike the DEIR Fernald Property site previously considered in the DEIR, the UMass Property site considered in the SDEIR would be a large connection shaft site instead of a receiving location for the TBM. For the UMass Property large connection shaft site, the TBM would be disassembled in the tunnel, parts would be transported back through the tunnel and removed through the launch shaft with the shell of the TBM left abandoned in the ground at the large connection site, or the TBM may be backed out the whole length to the launching site at Tandem Trailer. The Lower Fernald Property site would serve as the northern terminus of the North Tunnel, Segment 1, in SDEIR Alternative 10A. The Lower Fernald Property site would be a receiving site for the TBM and would have a larger shaft site diameter than the large connection for the UMass Property site. The change in the proposed site for the terminus of the North Tunnel, Segment 1, revises the alignment of the tunnel which was also assessed in relation to wetlands and waterways, water supply, and Article 97 resources. See **SDEIR Section 2.2, Changes Since the DEIR**, for more information on changes since the DEIR.

This SDEIR evaluates the existing conditions for the two new sites, conducts an impact assessment, and identified mitigation where needed. The SDEIR also updates environmental resource analysis for each SDEIR Alternative incorporating the new sites and the refined tunnel alignment (see **SDEIR Chapter 3 to Chapter 14** for documentation of these findings). The assessment reaffirmed that SDEIR Alternative 4A is the Preferred Alternative, and that the two-back up alternatives are SDEIR Alternative 3A and 10A. See **SDEIR Section 2.7, SDEIR Alternatives Evaluation and Methodology** and **SDEIR Section 2.8, Selecting the Preferred Alternative**, which describe the alternatives evaluation process and the selection of the preferred alternative, respectively.

This SDEIR responds to the comments raised in the Certificate and by commenters. See **SDEIR Chapter 15 for Responses to Comments**.

Certificate Comment C-9

The SDEIR should identify additional MEPA thresholds that will be exceeded, including any not identified in this Certificate, based on the location of the proposed shaft sites and other design refinements (i.e., removal of public shade trees, etc.)

Response to C-9

As discussed, the **DEIR Section 1.4, Regulatory Context (pg. 1-15),** MEPA review is required when:

- A project is undertaken by a state agency, requires a permit from a state agency, or involves financial assistance or a land transfer by a state agency
- One or more thresholds, as defined in 301 CMR 11.03, are met or exceeded

As described in the DEIR, the Program is subject to the preparation of a Mandatory EIR pursuant to 301 CMR 11.03(4)(a)(3) because it requires State Agency Actions and involves the construction of one or more new water mains 10 or more miles in length. The project also exceeds the additional ENF threshold pursuant to 301 CMR 11.03(1)(b)3 for the conversion of land held for natural resources purposes in accordance with the Amendments to the Constitution of the Commonwealth Article 97 (Article 97) to any purpose not in accordance with Article 97. The MWRA filed an ENF with the MEPA Office on March 31, 2021, to initiate MEPA review and the Secretary of the EEA issued an ENF Certificate on May 7, 2021.

As requested by the Secretary's Certificate, MEPA thresholds that would be exceeded by the Program are identified below:

- **301 CMR 11.03(1)(b)(3)**: Disposition or change in use of land or an interest in land subject to Article 97 of the Amendments to the Constitution of the Commonwealth
- **301 CMR 11.03(1)(b)(1)**: Direct alteration of 25 or more acres of land
- **301 CMR 11.03(3)(b)(1)(f)**: Alteration of ½ or more acres of any other wetlands
- **301 CMR 11.03(6)(b)(2)(b)**: Construction, widening or maintenance of a roadway or its right-of-way that will cut five or more living public shade trees of 14 or more inches in diameter at breast height.

Certificate Comment C-14

The SDEIR should identify and describe state, federal and local permitting and review requirements associated with the project and provide an update on the status of each of these pending actions. It should include a description and analysis of applicable statutory and regulatory standards and requirements, and a discussion of the project's consistency with those standards. The SDEIR should clearly describe the permits and/or regulatory approvals required for each component of the project.

Response to Comment C-14

The permits anticipated to be required for the Program are summarized in **SDEIR Table 1-1**, followed by a detailed description of the applicability of Federal (**SDEIR Section 1.4.2**), state (**SDEIR Section 1.4.3**) and municipal (**SDEIR Section 1.4.4**) standards or requirements for various Program components. **SDEIR Table 1-2** includes the status of each permit, approval, or action at the time of the filing of the SDEIR.

2 Alternatives

2.1 Introduction

On December 16, 2022, the Commonwealth of Massachusetts Secretary of the Executive Office of Energy and Environmental Affairs (EEA) issued a Certificate on the Draft Environmental Impact Report (DEIR) for the Massachusetts Water Resources Authority (MWRA) Metropolitan Water Tunnel Program (Program). The Secretary's Certificate identified a Scope for the Supplemental Draft Environmental Impact Report (SDEIR), which included specific requests related to the selection and analysis of alternatives. **SDEIR Section 2.10** lists the comments from the Certificate specific to alternatives and provides supplemental analysis and/or clarifying information in response per the Scope in the DEIR Certificate.

In response to comments received on the DEIR, this chapter provides an updated assessment of the ability of each alternative to achieve the Program goals while minimizing environmental impacts. This updated analysis of alternatives describes the process used to identify the Preferred Alternative and two backup alternatives as requested in the Secretary's Certificate on the DEIR.

Included is a comparison of the alternatives with respect to their potential impacts on environmental resource areas, including environmental justice (EJ), land alteration and protected open space, wetlands and waterways, water supply, impervious area and stormwater management, climate change, air quality and greenhouse gas (GHG) emissions, transportation, rare species and wildlife habitat, noise and vibration, cultural and historic resources, and hazardous materials.

2.2 Changes Since the DEIR

The Secretary's Certificate required that the SDEIR identify and analyze alternative sites for the terminus site of the proposed North Tunnel, Segment 1 alignment, which was previously identified in the DEIR as the Fernald Property receiving site in the City of Waltham. In response to the Secretary's request, and in accordance with the Scope the Secretary outlined in the Certificate on the DEIR, the MWRA identified additional sites for review as potential alternative sites for the North Tunnel terminus. Since the filing of the DEIR, additional information on the utility (electrical) infrastructure supporting the proposed project is available and is reported below.

2.2.1 Revised North Tunnel Terminus Site

As described in **DEIR Chapter 3, Alternatives, Section 3.3, Tunnel Alignment Elements Considered in DEIR (pg. 3-4)**, the North Tunnel is proposed to extend for approximately 4.5 miles from a critical connection point at the Hultman Aqueduct near the Interstate 90 (I-90)/Interstate 95 (I-95) interchange in the Town of Weston north to a critical connection point at the Weston Aqueduct Supply Main Three (WASM3) near the City of Waltham/Town of Belmont municipal boundary line. Constructing the proposed North Tunnel terminus shaft site with a connection to WASM3 would provide redundancy not only for WASM3, but also

for transmission mains that provide water for the Town of Belmont at the Belmont Pumping Station and to the Northern Intermediate High system in the Town of Arlington.

In place of the DEIR Fernald Property site, the MWRA identified several potential sites within the vicinity of WASM3 in Waltham and Belmont, and to broaden the options, also considered sites with different site functions. Different site functions that were considered included tunnel boring machine (TBM) receiving sites and large connection sites. A large connection site was considered where the TBM would not be retrieved at the end of the tunnel but rather disassembled in the tunnel, parts would be transported back through the tunnel and removed through the launch shaft with the shell of the TBM left abandoned in the ground at the large connection site, or the TBM may be backed out the whole length to the launching site at Tandem Trailer. In addition, the MWRA reevaluated potential sites near WASM3 that were previously considered earlier in the Program. As described in the **DEIR Section 3.3.5.1, Required Connection Points (pg. 3-8)**, the study area for the additional potential sites considered that critical connection points to the existing water distribution system must be located within a reasonable distance to the supply main for a near-surface piping connection.

Consistent with **DEIR Section 3.5.1, Identify Nodes and Identify Shaft Sites by Function in Vicinity of Nodes (pg. 3-17)**, the initial level of analysis for identifying potential alternative sites for the northern terminus of the North Tunnel considered availability of land, existing ownership, proximity to WASM3, sufficient site size to accommodate the evaluated function, existing site conditions (grading, existing use, etc.), accessibility to/from interstate highways, the ability to have permanent access to the site for periodic maintenance and operation, and a high-level environmental screening. The MWRA initiated contact with each respective property owner in early 2023 to discuss the landowners' potential interest in conveying the site for the Program. Site visits and field inspections (where allowed and pre-approved by the property owner) were conducted to obtain information on existing conditions. For some potential sites, data and observations collected as part of site visits that were conducted earlier in Program planning and the Massachusetts Environmental Policy Act (MEPA) process were revisited. The initial level of analysis for identifying potential Program sites was conducted to identify any "fatal flaws" that would end further analysis of the potential site.

Based on conversations with the respective property owners and the factors mentioned above, two sites were identified as potentially viable options for the terminus of the North Tunnel in place of the DEIR Fernald Property site:

1) The University of Massachusetts (UMass) Property site – Located in Waltham, the UMass Property site is on property owned by the Commonwealth of Massachusetts under care, custody, and control of UMass. The site is roughly 1,000 feet southwest of the DEIR Fernald Property site and situated south of the former Walter E. Fernald State School. The UMass Property site is north of Beaver Street and consists of vacant/unpaved open space within Lawrence Meadow, an approximately 31-acre area that surrounds the Samuel D. Warren Estate. As described in **SDEIR Section 2.3.1**, the UMass Property site would accommodate a large connection shaft in SDEIR Alternatives 3A and 4A, and is located approximately 800 feet west of WASM3, which is located in Waverley Oaks Road.

2) The Lower Fernald Property site – Also located in Waltham, the Lower Fernald Property site is roughly 1,000 feet southeast of the DEIR Fernald Property site and located on property associated with the former Walter E. Fernald State School. The Lower Fernald Property site is near the intersection of Waverley Oaks Road and Chapel Road, adjacent to WASM3. As described in **SDEIR Section 2.3.2**, the Lower Fernald Property site would accommodate a TBM receiving shaft in SDEIR Alternative 10A.

Table 2-1 lists the launching, receiving, and large connection sites in the three SDEIR Alternatives with the northern terminus site revised to the UMass Property site in SDEIR Alternatives 3A and 4A, and the Lower Fernald Property site in SDEIR Alternative 10A, which are considered in place of the DEIR Fernald Property site. All other sites associated with the SDEIR Alternatives remain unchanged from the DEIR.

Table 2-1 Launching, Receiving, and Large Connection Shaft Sites in SDEIR Alternatives

Site	Alternative 3A	Alternative 4A	Alternative 10A
UMass Property (Large Connection)	X	X	
Lower Fernald Property (Receiving)			X
Tandem Trailer/Park Road East (Launching) [1]	*X*	*X*	
Bifurcation (Launching)	*X*		
Park Road West (Receiving)		*X*	
Park Road West (Large Connection)			*X*
Highland Avenue Northwest (Receiving)	*X*		
Highland Avenue Northwest/Southwest (Launching)		*X*	*X*
Highland Avenue Northeast/Southeast (Launching)	*X*	*X*	*X*
American Legion (Receiving)	*X*	*X*	*X*

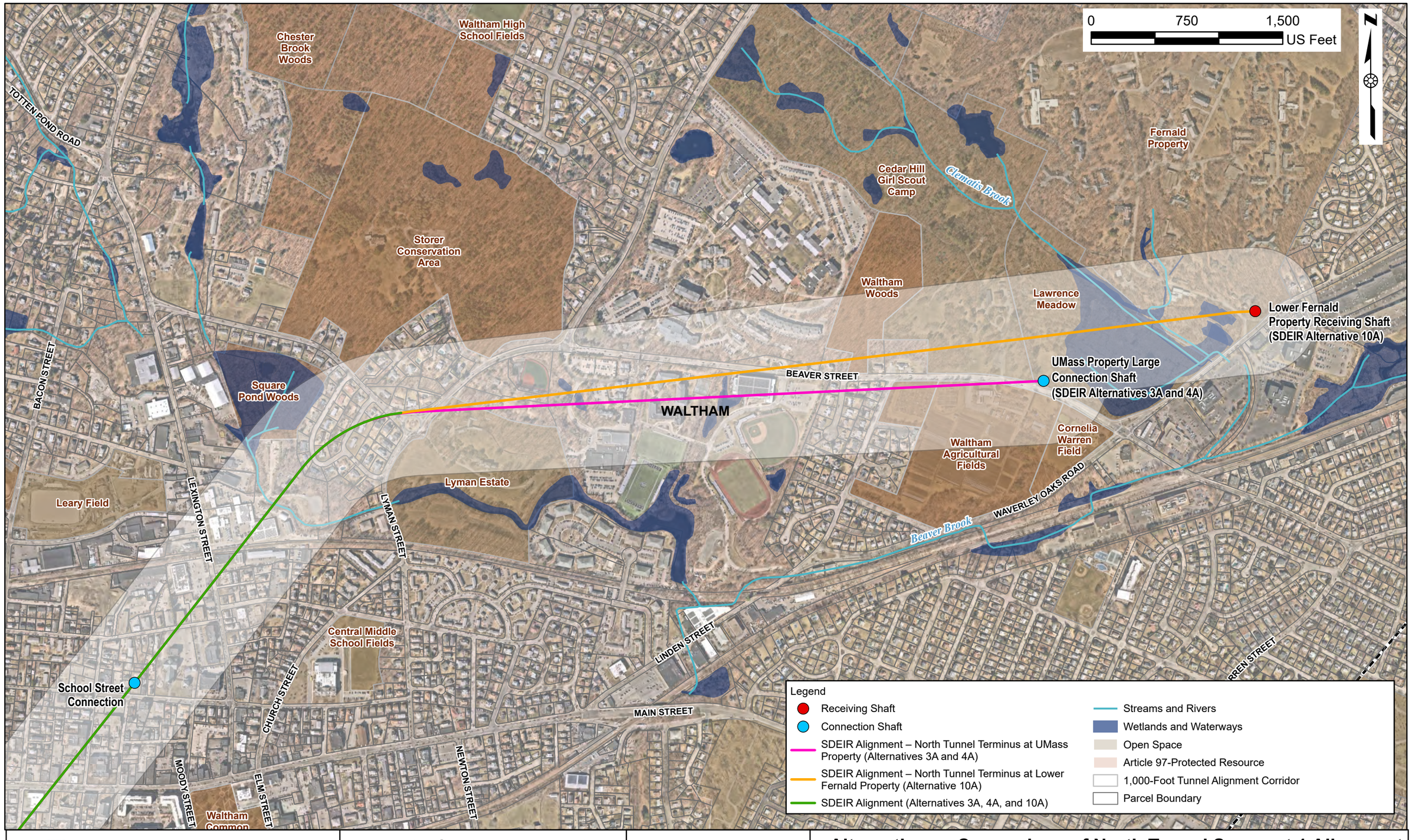
1 The Tandem Trailer launching shaft site would include a connection tunnel to the Park Road East large connection shaft in SDEIR Alternatives 3A and 4A to provide the required connection to the Hultman Aqueduct.

Italicized text within the table indicates no change from the DEIR.

Use of the UMass Property site or the Lower Fernald Property site in place of the DEIR Fernald Property site would alter the northernmost portion of the North Tunnel Segment 1 alignment described in the DEIR. This change includes the alignment from the proposed School Street connection site (common to all SDEIR Alternatives) to the northern terminus site (UMass Property site in SDEIR Alternatives 3A and 4A, or Lower Fernald Property site in SDEIR Alternative 10A). **Figure 2-1** illustrates the difference in the preliminary tunnel alignment between the SDEIR Alternatives from the School Street connection shaft site to the northern terminus of the North Tunnel, Segment 1. South of the School Street connection site, the preliminary alignment of North Tunnel Segment 1 would remain the same as described in the DEIR. South Tunnel Segment 2 and South Tunnel Segment 3 would remain the same as described in the DEIR.

2.2.2 Electrical Service

The MWRA continues to coordinate the details of providing temporary electrical service to the proposed TBM launching sites with utility provider Eversource. Work Order applications have been submitted for providing electrical service to the Highland Avenue Northeast and Northwest sites in Needham and the Tandem Trailer site in Weston. Eversource engineers are determining which existing substations will feed these new services and which route will be taken to feed these new services. This process is anticipated to be further refined as the Program progresses into final design, which is anticipated in 2024. It is anticipated that all other sites could be served by the existing electrical grid.



Metropolitan Water Tunnel Program

MWRA Contract No. 7159
Supplemental Draft Environmental Impact Report 2023

CDM Smith in association with vhb
Jacobs GREEN INTERNATIONAL AFFILIATES, INC.

Alternatives – Comparison of North Tunnel Segment 1 Alignment School Street Connection Site to North Tunnel Terminus

Figure 2-1

Waltham, MA

Source: VHB, MassGIS, CDM Smith, Jacobs

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2.3 Alternative Sites for the North Tunnel Terminus

This section provides a description of the two alternative sites considered for the terminus of the proposed North Tunnel, Segment 1, in place of the DEIR Fernald Property site: the UMass Property site in SDEIR Alternatives 3A and 4A, and the Lower Fernald Property site in SDEIR Alternative 10A. All other launching, receiving, large connection, connection, and isolation valve sites associated with the SDEIR Alternatives remain unchanged from the DEIR. Included for the UMass Property site and the Lower Fernald Property site is a description of the anticipated construction period activities and final site conditions.

2.3.1 UMass Property (Large Connection Shaft)

The UMass Property site would serve as a TBM large connection shaft, which would provide a near-surface pipeline connection point to WASM3 for SDEIR Alternatives 3A and 4A. The UMass Property site is located off Beaver Street, north of the Waltham Agricultural Fields. The site consists of a mix of brush, shrubs, and open fields. The ground surface elevations generally decrease from north to south across the site. Site access would be from Beaver Street.

Figure 2-2 shows a schematic layout of the UMass Property site and includes the temporary construction area limits of disturbance (LOD), which total approximately 0.9 acres. The final site schematic layout and construction logistics may vary as they would be planned and designed by the contractor. Temporary construction facilities on the UMass Property site would include trailers, parking areas, and a staging area for working adjacent to shaft construction. The generated excavated material would be disposed offsite daily. Construction-generated groundwater would be collected on site and treated prior to its release to the adjacent wetland. Temporary power for the site would be provided through temporary services from the existing power grid by Eversource. The shaft excavated diameter would be approximately 13 feet in rock with a 10-foot steel-lined finished diameter; concrete backfill would be placed between the steel lining and the excavated shaft surface.

As shown on **Figure 2-2**, the UMass Property site includes an approximately 0.5-acre area surrounding the proposed shaft site and an approximately 0.4-acre area along the public right-of-way on Beaver Street to accommodate a near-surface pipeline. A 72-inch diameter buried steel pipeline approximately 800 feet long would be proposed from the valve chamber traversing southeast to connect to the existing WASM3 at the intersection with Waverley Oaks Road. As shown on **Figure 2-2**, the LOD would also include an area on property owned by UMass located northwest of the intersection between Beaver Street and Waverley Oaks Road to accommodate a temporary groundwater discharge pipe.

Final conditions at the site, shown in **Figure 2-3**, would include a fenced area surrounding the large connection shaft site with a paved driveway, a few parking spaces, some bollards, a stormwater basin, and a concrete top of shaft structure that would extend no more than three feet above ground surface. Areas temporarily disturbed during construction activities would be restored to preconstruction conditions with loam and seed and/or other vegetation or landscaping in coordination with UMass.

2.3.2 Lower Fernald Property (Receiving Shaft)

The Lower Fernald Property site would serve as a TBM receiving shaft and near-surface pipeline connection point to WASM3 for SDEIR Alternative 10A. The site is in eastern Waltham near the former entrance to the abandoned Walter E. Fernald State School. The Lower Fernald Property site consists of a mix of paved (impervious) area, as well as gravel and unpaved spaces. The unpaved space includes deciduous trees, evergreens, and open space. Three abandoned buildings in various states of disrepair are located within the LOD.

The Lower Fernald Property site is situated on a north-south trending hill. Ground surface elevations generally decrease from north to south across the site. The proposed construction shaft would be located near the bottom of the hill on the east side of Chapel Road, at the intersection with Waverley Oaks Road.

Figure 2-4 shows a schematic layout of the Lower Fernald Property site and identifies the temporary construction area LOD. The final site schematic layout and construction logistics would be determined by the construction contractor. Site access would be from Waverley Oaks Road to Chapel Road and to the shaft construction site. The temporary construction area LOD would be approximately 2.3 acres with approximately 1.4 acres reserved for permanent MWRA facilities. Temporary construction facilities on this site would include trailers, parking areas, an excavated material storage area, a staging area for work adjacent to shaft construction, a temporary groundwater discharge pipe, and a water treatment area. While it's anticipated that excavated material generated would be disposed off-site daily, excavated materials storage areas for up to five days of storage will be provided on site. Construction-generated groundwater would be treated prior to its release to the adjacent wetland. Temporary power would be provided through temporary services from the existing power grid by Eversource. The shaft excavated diameter would be approximately 30 feet in rock with a 10-foot steel lined finished diameter; concrete backfill would be placed between the steel lining and the excavated shaft surface.

The site would include a 120-inch piping connection to the proposed tunnel shaft riser that terminates in a capped stub. A below-ground valve chamber is proposed between the tunnel shaft and the capped stub. As shown on **Figure 2-4**, a 72-inch diameter buried steel pipeline approximately 100 feet long would connect the valve chamber to existing WASM3 in Waverley Oaks Road. As shown in **Figure 2-5**, final conditions at the Lower Fernald Property site would include a fenced area surrounding the receiving shaft with a paved driveway and parking area, a stormwater basin, landscaping, and some bollards. The concrete valve chamber and top of shaft structures would extend not more than three feet above ground surface. Areas temporarily disturbed during construction would be restored to preconstruction conditions with loam and seed and/or other vegetation or landscaping where appropriate and in coordination with Waltham.

LEGEND:

- EXISTING MWRA PIPE
- FLY ASH AREA
- LIMIT OF DISTURBANCE
- LIMIT OF PERMANENT EASEMENT/ACQUISITION
- MASSDEP DISPOSAL SITE RTN 3-28049
- PARCEL
- PROPOSED FACILITIES
- PROPOSED PIPE
- PROPOSED SHAFT
- PROPOSED TUNNEL
- TEMPORARY DEWATERING PIPE
- WETLAND DELINEATION
- 100-FT WETLAND BUFFER

NOTES:

1. LOCATIONS OF PROPOSED INFRASTRUCTURE INCLUDING THE TUNNEL, VALVE CHAMBERS AND PIPELINES ARE APPROXIMATE AND WILL BE FURTHER DEVELOPED DURING DESIGN.
2. MWRA WILL OBTAIN SUBTERRANEAN EASEMENTS ALONG THE PROPOSED TUNNEL.
3. MWRA WILL OBTAIN EASEMENTS ALONG THE PIPELINE.
4. MWRA WILL OBTAIN ACCESS EASEMENTS TO THE SHAFT SITE.

APPROXIMATE FENCED IN FLY ASH AREA

LIMIT OF DISTURBANCE FOR SHAFT AREA (~0.5 ACRES)

APPROXIMATE MASSDEP RTN 3-28049 (LEAD, ZINC, AND CADMIUM)

LIMIT OF ACQUISITION (~0.25 ACRES)

PROPOSED SHAFT

APPROXIMATE WETLAND DELINEATION

APPROXIMATE 100-FT WETLANDS BUFFER

PROPOSED TUNNEL

PROPOSED VALVE CHAMBER

PROPOSED 72"X60" REDUCER

PROPOSED 72" STEEL PIPE

TEMPORARY DISCHARGE PIPE

WAVERLEY OAKS ROAD - ROUTE 60

BEAVER STREET

EXISTING MWRA METER 202

LIMIT OF DISTURBANCE FOR PIPELINE (~0.37 ACRES)

CONNECTION TO EXISTING MWRA DISTRIBUTION LINE

PROPOSED 60" BFV AND CHAMBER

PROPOSED HORIZONTAL METER

N

NAD 83

0 150 300

SCALE IN FEET

C:\cdmext\burnettdp\d0725715\S-38 UMass-Receiving Shaft_Site Schematic_Option1.dwg
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Alternatives - Site Schematic

UMass Property Large Connection (SDEIR Alternatives 3A and 4A)
Figure 2-2

Waltham, MA

MassGIS Ortho Imagery 2019

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LEGEND:

- EXISTING MWRA PIPE
- FLY ASH AREA
- LIMIT OF PERMANENT EASEMENT/ACQUISITION
- MASSDEP DISPOSAL SITE RTN 3-28049
- PARCEL
- PROPOSED BOLLARDS
- PROPOSED FACILITIES
- PROPOSED PAVED ACCESS
- PROPOSED FENCE
- PROPOSED PIPE
- PROPOSED SHAFT
- PROPOSED TUNNEL
- WETLAND DELINEATION
- 100-FT WETLAND BUFFER

NOTES:

1. MWRA WILL OBTAIN EASEMENTS ALONG THE PIPELINE.
2. TREES AND LANDSCAPING WILL BE INCLUDED TO OFFSET IMPACTS OF TREES BEING REMOVED AND WILL BE COORDINATED WITH COMMUNITIES AND PROPERTY OWNERS.
3. THE FINAL SITE WILL BE FENCED TO SECURE THE AREA AROUND THE TOP OF SHAFT AND VALVE CHAMBER.
4. LOCATIONS OF PROPOSED INFRASTRUCTURE INCLUDING THE TUNNEL, VALVE CHAMBER, AND PIPELINES ARE APPROXIMATE AND WILL BE FURTHER DEVELOPED DURING DESIGN.
5. MWRA WILL OBTAIN SUBTERRANEAN EASEMENTS ALONG THE PROPOSED TUNNEL.
6. MWRA WILL OBTAIN ACCESS EASEMENTS TO THE SHAFT SITE.

APPROXIMATE FENCED IN FLY ASH AREA
LIMIT OF ACQUISITION (~0.25 ACRES)
APPROXIMATE MASSDEP RTN 3-28049 (LEAD, ZINC, AND CADMIUM)
PROPOSED 8' TALL CHAIN LINK FENCE
PROPOSED SHAFT
PROPOSED PAVED ACCESS
APPROXIMATE WETLAND DELINEATION
PROPOSED BOLLARDS
PROPOSED VALVE CHAMBER
PROPOSED TUNNEL
PROPOSED 72" STEEL PIPE
APPROXIMATE 100-FT WETLANDS BUFFER
BEAVER STREET
PROPOSED 72"X60" REDUCER
WAVERELY OAKS ROAD - ROUTE 60
PROPOSED ACCESS GATE
EXISTING MWRA METER 202
CONNECTION TO EXISTING MWRA DISTRIBUTION LINE
PROPOSED 60" BFV AND CHAMBER
PROPOSED HORIZONTAL METER

N
NAD 83
0 150 300
SCALE IN FEET

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Alternatives - Final Conditions Schematic
UMass Property Large Connection (SDEIR Alternatives 3A and 4A)
Figure 2-3

Waltham, MA

MassGIS Ortho Imagery 2019

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LEGEND:

- EXISTING MWRA PIPE
- LIMIT OF DISTURBANCE
- LIMIT OF PERMANENT EASEMENT/ACQUISITION
- PARCEL
- PROPOSED FACILITIES
- PROPOSED PIPE
- PROPOSED SHAFT
- PROPOSED TUNNEL
- TEMPORARY DEWATERING PIPE
- WETLAND DELINEATION
- 100-FT WETLAND BUFFER

NOTES:

1. LOCATIONS OF PROPOSED INFRASTRUCTURE INCLUDING THE TUNNEL, VALVE CHAMBERS AND PIPELINES ARE APPROXIMATE AND WILL BE FURTHER DEVELOPED DURING DESIGN.
2. MWRA WILL OBTAIN SUBTERRANEAN EASEMENTS ALONG THE PROPOSED TUNNEL.
3. MWRA WILL OBTAIN EASEMENTS ALONG THE PIPELINE.
4. MWRA WILL OBTAIN ACCESS EASEMENTS TO THE SHAFT SITE.

LIMIT OF DISTURBANCE (~2.3 ACRES)

PROPOSED 120" STEEL PIPE

PROPOSED 120" STEEL PIPE STUB

PROPOSED SHAFT

PROPOSED VALVE CHAMBER

PROPOSED 72" STEEL PIPE

PROPOSED METER CHAMBER

CHAPEL ROAD

PROPOSED TUNNEL

TEMPORARY DISCHARGE PIPE

CONNECTION TO EXISTING MWRA DISTRIBUTION LINE

APPROXIMATE WETLAND DELINEATION

LIMIT OF ACQUISITION (~1.4 ACRES)

WAVERLEY OAKS ROAD - ROUTE 60

APPROXIMATE 100-FT WETLANDS BUFFER

N

NAD 83

0 100 200

SCALE IN FEET

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Alternatives - Site Schematic
Lower Fernald Property Receiving (SDEIR Alternative 10A)
Figure 2-4

Waltham, MA

MassGIS Ortho Imagery 2019

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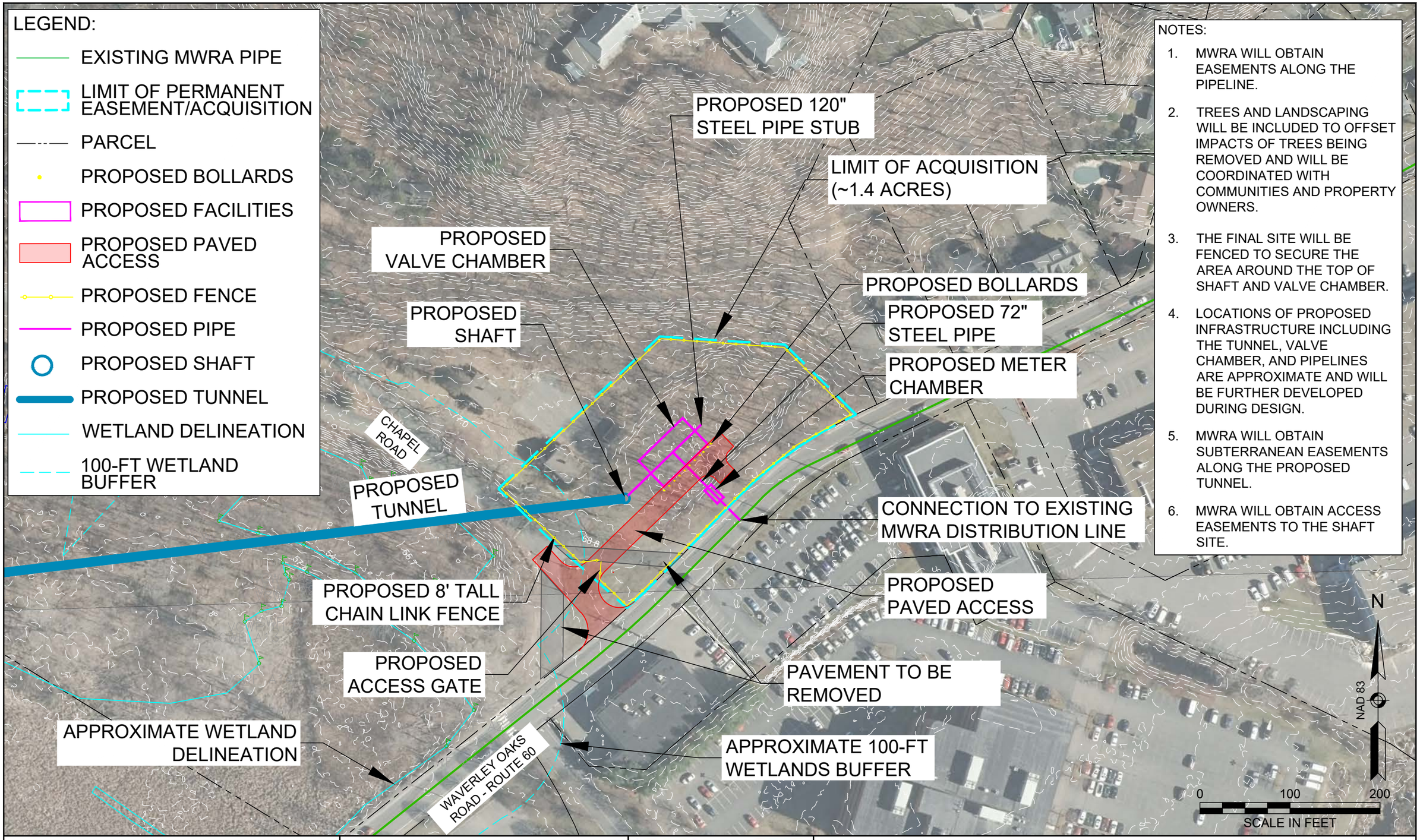
LEGEND:

- EXISTING MWRA PIPE
- LIMIT OF PERMANENT EASEMENT/ACQUISITION
- PARCEL
- PROPOSED BOLLARDS
- PROPOSED FACILITIES
- PROPOSED PAVED ACCESS
- PROPOSED FENCE
- PROPOSED PIPE
- PROPOSED SHAFT
- PROPOSED TUNNEL
- WETLAND DELINEATION
- 100-FT WETLAND BUFFER



NOTES:

1. MWRA WILL OBTAIN EASEMENTS ALONG THE PIPELINE.
2. TREES AND LANDSCAPING WILL BE INCLUDED TO OFFSET IMPACTS OF TREES BEING REMOVED AND WILL BE COORDINATED WITH COMMUNITIES AND PROPERTY OWNERS.
3. THE FINAL SITE WILL BE FENCED TO SECURE THE AREA AROUND THE TOP OF SHAFT AND VALVE CHAMBER.
4. LOCATIONS OF PROPOSED INFRASTRUCTURE INCLUDING THE TUNNEL, VALVE CHAMBER, AND PIPELINES ARE APPROXIMATE AND WILL BE FURTHER DEVELOPED DURING DESIGN.
5. MWRA WILL OBTAIN SUBTERRANEAN EASEMENTS ALONG THE PROPOSED TUNNEL.
6. MWRA WILL OBTAIN ACCESS EASEMENTS TO THE SHAFT SITE.

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PLOTTED: July 11, 2023

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Alternatives - Final Conditions Schematic
Lower Fernald Property Receiving (SDEIR Alternative 10A)
Figure 2-5

Waltham, MA

MassGIS Ortho Imagery 2019

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2.4 Construction Methodology

This section describes the anticipated shaft construction methods at the UMass Property site (SDEIR Alternatives 3A and 4A) and the Lower Fernald Property site (SDEIR Alternative 10A).

2.4.1 UMass Property

The shaft at the UMass Property site in SDEIR Alternatives 3A and 4A would be a large connection shaft, which is smaller in diameter than a receiving shaft. As such, the TBM would not be retrieved at the end of the tunnel but rather disassembled in the tunnel, parts would be transported back through the excavated tunnel bore and portions of the machine extracted at the proposed Tandem Trailer launching site location in Weston with the shell of the TBM left abandoned in the ground at the large connection site; alternatively, the TBM may be backed out the whole length to the launching site at Tandem Trailer.

2.4.1.1 Shaft Construction Method – Large Connection Shaft

In SDEIR Alternatives 3A and 4A, the UMass Property site would be constructed using the raisebore method, which consists of constructing from the tunnel upwards, with limited activities at the surface. In the raisebore method, the excavated material drops to the tunnel level, where it is collected and transported to a launching shaft for removal and disposal, reducing potential impacts at the raisebore site. The final lining (e.g., a 10-foot internal diameter steel pipe) would be installed in the completed hole.

2.4.1.2 Construction Method for Near-Surface Structures, Valve Chambers and Piping

As described in **SDEIR Section 2.2.1**, the UMass Property site would also include a proposed 72-inch piping connection to the proposed tunnel shaft riser. A below-ground valve chamber would be proposed between the tunnel shaft and proposed steel pipe. A buried steel pipeline approximately 800 feet long would be proposed in Beaver Street between the valve chamber adjacent to the shaft and the connection to WASM3 at Waverley Oaks Road.

2.4.2 Lower Fernald Property

In SDEIR Alternative 10A, the Lower Fernald Property site would serve as a larger diameter TBM receiving shaft.

2.4.2.1 Shaft Construction Method – Receiving Shaft

For the large diameter receiving shaft (approximately 30-foot diameter), shaft construction could be achieved using secant piles as discussed in **DEIR Chapter 4.4, Construction Methodology, Section 4.4.2.1, Launching and Receiving Sites (pg. 4.4-2)** and as previously recommended for other TBM launching and receiving shafts including the Tandem Trailer launching shaft. Shaft excavation through the rock would be

performed with drill and blast methods as described in **DEIR Section 4.4.2.1, Launching and Receiving Sites (pg. 4.4-2)**.

2.4.2.2 Construction Method for Near-Surface Structures, Valve Chambers and Piping

The construction method for near-surface structures, valve chambers, and piping at the Lower Fernald Property site would be as previously described for the DEIR Fernald Property site with the exception that the Lower Fernald Property site would likely require less soil removal due to the shorter distance for the connection to WASM3 and less rock removal due to the deeper top of rock elevation at the Lower Fernald Property site.

2.5 Tunnel Segments in SDEIR Alternatives

Table 2-2 identifies the tunnel segments in each of the three SDEIR Alternatives, updating the northern terminus site for North Tunnel, Segment 1, in place of the DEIR Fernald Property site.

Table 2-2 Tunnel Segments in SDEIR Alternatives

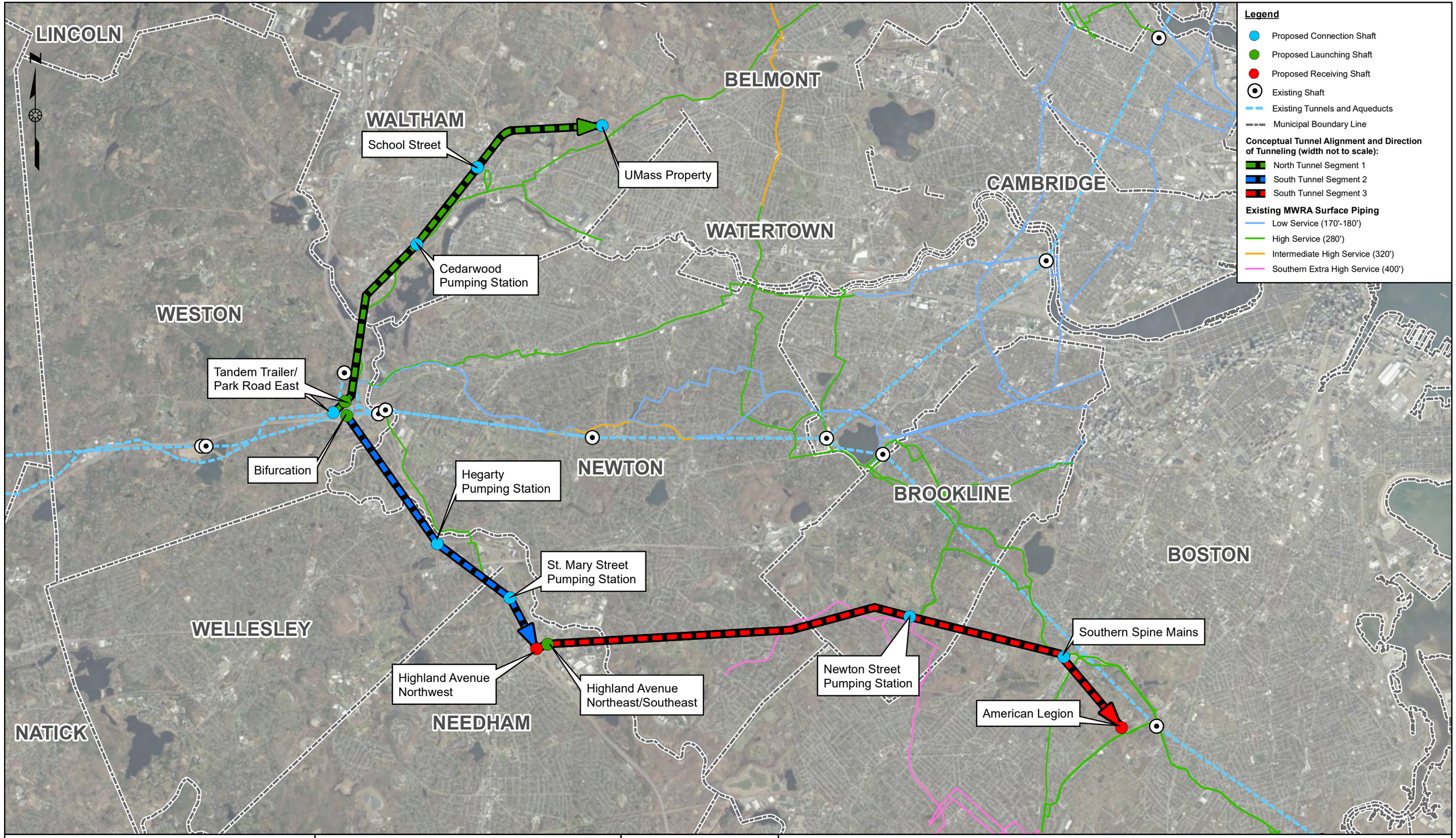
Alternative	Segment 1	Segment 2	Segment 3
3A	**North Tunnel** - Tandem Trailer Launching in Weston to UMass Property Large Connection in Waltham	***South Tunnel*** *- Bifurcation Launching in Weston to Highland Avenue Northwest Receiving in Needham*	***South Tunnel*** *– Highland Avenue Northeast/Southeast Launching in Needham to American Legion Receiving in Boston*
4A	**North Tunnel** - Tandem Trailer Launching in Weston to UMass Property Large Connection in Waltham	***South Tunnel*** *- Highland Avenue Northwest/Southwest Launching in Needham to Park Road West Receiving in Weston*	***South Tunnel*** *- Highland Avenue Northeast/Southeast Launching in Needham to American Legion Receiving in Boston*
10A [1]	***South Tunnel Segment 2*** *- Highland Avenue Northwest/Southwest Launching in Needham to Park Road West Large Connection in Weston* **North Tunnel Segment 1** - Continues from Park Road West Large Connection in Weston to Lower Fernald Property Receiving in Waltham		***South Tunnel*** *- Highland Avenue Northeast/Southeast Launching in Needham to American Legion Receiving in Boston*

1 Alternative 10A uses one TBM for excavating Segment 2 and Segment 1.

Italicized text within the table indicates no change from the DEIR.

2.5.1 SDEIR Alternative 3A

The preliminary tunnel alignment for SDEIR Alternative 3A is depicted in **Figure 2-6.** The tunnel construction would take place in three segments as previously assumed for DEIR Alternative 3.



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0 2,400 4,800 7,200 Feet

SCALE IN FEET
SCALE: 1" = 5,000'

Alternatives
SDEIR Alternative 3A
Figure 2-6

Source: MWRA, CDM Smith, VHB, Jacobs, MassGIS, USGS

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2.5.1.1 SDEIR Alternative 3A - Segment 1

In SDEIR Alternative 3A, the tunnel drive for North Tunnel, Segment 1 would begin from a TBM launching shaft at the Tandem Trailer/Park Road East site, located on the northwest side of the I-90/I-95 interchange in Weston. The drive would proceed approximately 4.5 miles north and east through Weston and Waltham to a TBM large connection shaft site in Waltham at the UMass Property site (in place of the former DEIR Fernald Property site). As assumed for DEIR Alternative 3, connection shafts for North Tunnel, Segment 1 in SDEIR Alternative 3A would be located at the Cedarwood Pumping Station site in Waltham and at the School Street site, also in Waltham. As assumed in DEIR Alternative 3, SDEIR Alternative 3A North Tunnel, Segment 1 would include a connecting tunnel between the TBM launch shaft at the Tandem Trailer site to the Park Road East large connection shaft site in Weston.

2.5.1.2 SDEIR Alternative 3A - Segment 2 [*No Change from the DEIR*]

South Tunnel, Segment 2 in SDEIR Alternative 3A would begin from a TBM launch shaft at the Bifurcation site, located within the I-90/I-95 interchange ramps on the west side of I-95 and to the north of I-90 in Weston. The drive would proceed approximately 3.3 miles to the south and east through Weston, Newton, Wellesley, and Needham, to a TBM receiving shaft at Highland Avenue Northwest, which is the northwest cloverleaf of the Highland Avenue/I-95 interchange in Needham. Connection shafts between the launching and receiving shafts would be located at the Hegarty Pumping Station in Wellesley and at the St. Mary Street Pumping Station in Needham.

2.5.1.3 SDEIR Alternative 3A - Segment 3 [*No Change from the DEIR*]

As assumed in the DEIR, a third tunnel drive (South Tunnel, Segment 3) would begin from a TBM launching shaft at the Highland Avenue Northeast site, located within the northeast cloverleaf of the Highland Avenue/I-95 interchange. The drive would proceed approximately 7 miles, generally to the east and then to the southeast—through Needham, Newton, Brookline, and into Boston—to a TBM receiving shaft at American Legion, located on the north side of the American Legion Highway between Walk Hill Street and Morton Street. Connection shafts between the launching and receiving shafts would be located at Newton Street Pumping Station in Brookline and at Southern Spine Mains in Boston, as assumed in the DEIR.

SDEIR Alternative 3A South Tunnel, Segment 3 would include a connector tunnel to connect the TBM launch shaft at Highland Avenue Northeast with the construction shaft at the Highland Avenue Northwest.

2.5.2 SDEIR Alternative 4A

The conceptual plan for the SDEIR Alternative 4A tunnel alignment is provided in **Figure 2-7**. The tunnel construction would take place in three segments.

2.5.2.1 SDEIR Alternative 4A - Segment 1

The first tunnel TBM drive in SDEIR Alternative 4A (North Tunnel, Segment 1), would be the same as in SDEIR Alternative 3A. The TBM would launch from the Tandem Trailer shaft site and travel to a large connection shaft at the UMass Property site (in place of the Fernald Property receiving shaft site previously assumed in DEIR Alternative 4). SDEIR Alternative 4A would include a connector tunnel from the Tandem Trailer launching shaft site to the Park Road East large connection shaft site (refer to **DEIR Chapter 3, Figure 3.8-3** and **Figure 3.8-4**).

2.5.2.2 SDEIR Alternative 4A - Segment 2 [*No Change from the DEIR*]

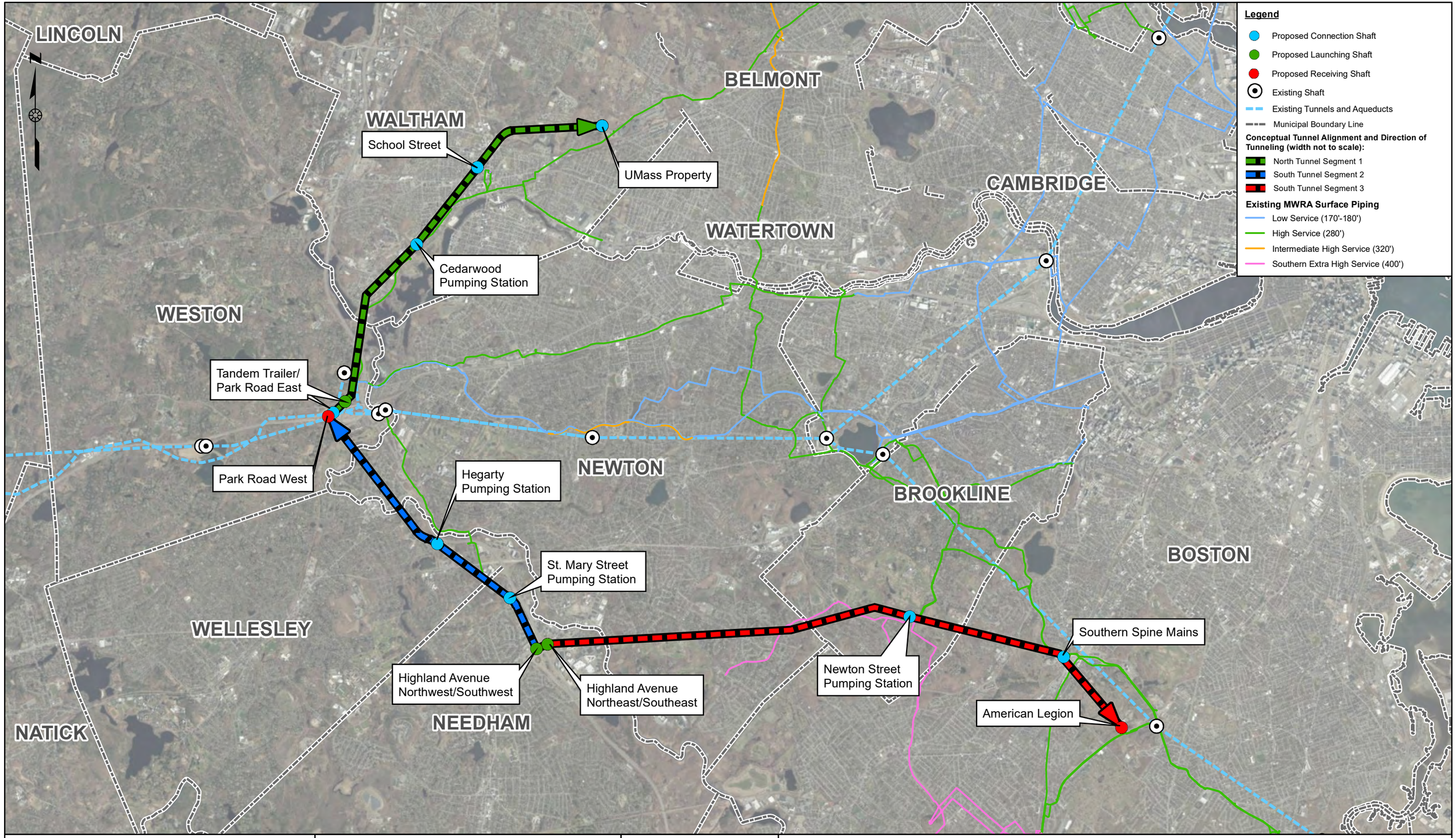
The second tunnel drive (South Tunnel, Segment 2) would begin from a proposed launching shaft at the Highland Avenue Northwest site and drive approximately 3.3 miles northwest towards a proposed receiving shaft at Park Road West, which is located to the west of Park Road in Weston and encircled by the I-90 West to I-95 North exit ramp. Connection shafts between the launching and receiving shafts would be located at Hegarty Pumping Station in Wellesley and at St. Mary Street Pumping Station in Needham.

2.5.2.3 SDEIR Alternative 4A - Segment 3 [*No Change from the DEIR*]

The third tunnel drive (South Tunnel, Segment 3) in SDEIR Alternative 4A would launch from Highland Avenue Northeast/Southeast and receive at the American Legion site. South Tunnel, Segment 3 would include a connector tunnel from the Highland Avenue Northeast/Southeast launching site to the Highland Avenue Northwest construction shaft site, same as assumed in SDEIR Alternative 3A.

2.5.3 SDEIR Alternative 10A

The conceptual plan for the SDEIR Alternative 10A tunnel alignment is provided in **Figure 2-8**. Unlike SDEIR Alternatives 3A and 4A, SDEIR Alternative 10A would be excavated by only two TBMs. Tunnel Segments 1 and 2 would be excavated by one TBM. As assumed in DEIR Alternative 10, SDEIR Alternative 10A would utilize a large connection shaft at Park Road West to separate the North and South Tunnels. South Tunnel, Segment 3 remains the same as assumed in the DEIR and identical to SDEIR Alternatives 3A and 4A.



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0 2,400 4,800 7,200 Feet

SCALE IN FEET
SCALE: 1" = 5,000'

Alternatives
SDEIR Alternative 4A
Figure 2-7

Source: MWRA, CDM Smith, VHB, Jacobs, MassGIS, USGS

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LINCOLN

WALTHAM

School Street

Lower Fernald Property

BELMONT

CAMBRIDGE

Cedarwood
Pumping Station

WATERTOWN

WESTON

Park Road West

Hegarty
Pumping Station

NEWTON

BROOKLINE

BOSTON

St. Mary Street
Pumping Station

WELLESLEY

Southern Spine Mains

Newton Street
Pumping Station

Highland Avenue
Northwest/Southwest

Highland Avenue
Northeast/Southeast

American Legion

NEEDHAM

NATICK

Legend

- Proposed Connection Shaft
- Proposed Launching Shaft
- Proposed Receiving Shaft
- Existing Shaft
- Existing Tunnels and Aqueducts
- Municipal Boundary Line

Conceptual Tunnel Alignment and Direction of Tunneling (width not to scale):

- North Tunnel Segment 1 and South Tunnel Segment 2
- South Tunnel Segment 3

Existing MWRA Surface Piping

- Low Service (170'-180')
- High Service (280')
- Intermediate High Service (320')
- Southern Extra High Service (400')

0 2,400 4,800 7,200 Feet

SCALE IN FEET
SCALE: 1" = 5,000'

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Alternatives
SDEIR Alternative 10A
Figure 2-8

Source: MWRA, CDM Smith, VHB, Jacobs, MassGIS, USGS

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2.5.3.1 SDEIR Alternative 10A – Segments 2 and 1 Combined

As assumed in DEIR Alternative 10, the first tunnel drive (South Tunnel, Segment 2) in SDEIR Alternative 10A would begin from a proposed launching shaft at the Highland Avenue Northwest/Southwest site and drive approximately 3.3 miles northwest towards a proposed large connection shaft at the Park Road West site. Connection shafts would be located at the Hegarty Pumping Station site in Wellesley and at St. Mary Street Pumping Station site in Needham, as previously assumed in the DEIR.

The TBM drive would continue through a large connection at the Park Road West site (North Tunnel, Segment 1) towards the Lower Fernald Property site (in place of the Fernald Property receiving site assumed in the DEIR) for a total length of approximately 8.3 miles. The tunnel alignment from the Park Road West site to the Lower Fernald Property site would be similar to SDEIR Alternatives 3A and 4A except that the SDEIR Alternative 10A alignment would end at the Lower Fernald Property site instead of the UMass Property site.

2.5.3.2 SDEIR Alternative 10A - Segment 3 [*No Change from the DEIR*]

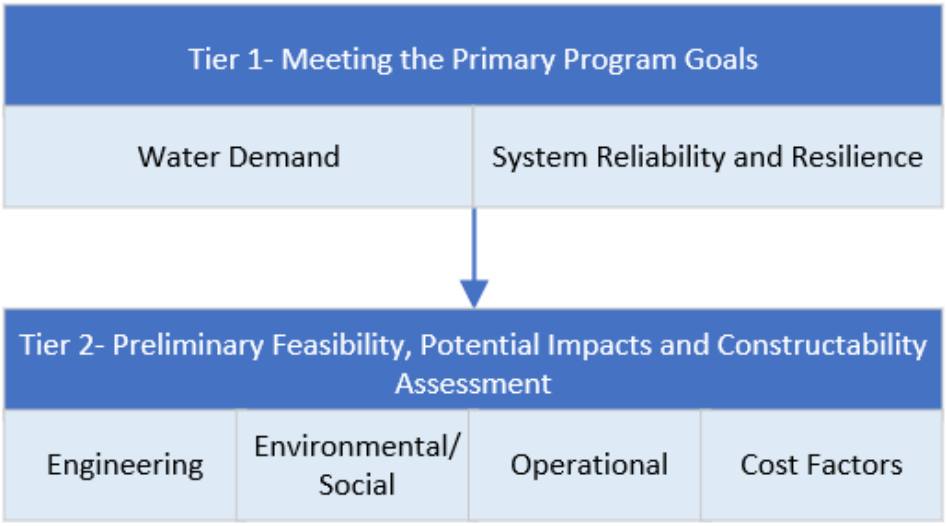
As assumed in the DEIR, South Tunnel, Segment 3 would launch from the Highland Avenue Northeast site and receive at the American Legion site. It would include a connector tunnel from the Highland Avenue Northeast/Southeast launching shaft site to the Highland Avenue Northwest/Southwest launching shaft site.

2.6 Overview of the DEIR Alternatives Evaluation and Methodology

As described in **DEIR Section 3.2, History of the Program (pg. 3-2)**, the MWRA developed and evaluated a range of alternatives and selected a two-tunnel alternative that was first presented in the MEPA Environmental Notification Form (ENF) for the Program. The ENF included an Alternatives Screening Report that documented the ENF Alternatives screening process. The ENF built on a preliminary alternatives analysis that identified 28 tunnel alignment alternatives, including 13 north tunnel alternatives and 15 south tunnel alternatives (see **DEIR Appendix C, Alternatives Analysis Supporting Documentation**).

DEIR Section 3.2.4, ENF Screening Process and Evaluation Criteria (pg. 3-3), summarizes how two tiers of screening criteria were developed and applied against each of the 28 alternatives in the ENF. The Tier 1 screening criteria addressed the primary Program goals, and alternatives that did not meet the primary Program goals were eliminated from further consideration. Tier 2 featured a high-level assessment of each alternative in terms of its feasibility, potential impacts, and constructability. **Figure 2-9** illustrates the two-tier alternative screening process.

Figure 2-9 Two-Tier Alternative Screening Process



This two-tier screening process resulted in the two-tunnel concept proposed in the ENF. Operationally, both tunnels begin in the Town of Weston as both are supplied from existing infrastructure (the Hultman Aqueduct and MetroWest Water Supply Tunnel). The North Tunnel would begin in Weston and extend approximately 4.5 miles to the north, with the TBM excavation ending near the Waltham/Belmont line with a connection to the existing 60-inch diameter WASM3. The South Tunnel would begin in Weston and extend approximately 10 miles to the south, with a connection to the distribution pipes near Shaft 7C of the Dorchester Tunnel. Beginning and end points of the tunnel for construction purposes (i.e., launching and receiving shaft sites) vary by alternative.

Building on the evaluation of alternatives in the ENF, the next step was to set the general location of the tunnel alignments and associated launching, receiving, large connection, and connection sites and identify tunnel alignments made up of segments and routes. The goal was to identify a subset of tunnel alignment alternatives that would proceed through detailed environmental review and assessment in the DEIR.

Since the candidate alternatives are made up of different combinations of launching, receiving, large connection, and connection sites and different tunnel segments, a multicriteria decision tool was developed to consistently apply the evaluation criteria and sub-criteria to each site or tunnel segment, and to score the alternative components to compare one against the other and in combination. **DEIR Appendix C** describes how the multicriteria decision tool was used to evaluate and score the 10 candidate alternatives' components and alignments.

As described in **DEIR Section 3.5, Candidate Tunnel Alignment Alternatives to be Evaluated in the DEIR (pg. 3-14)**, the tunnel alignment evaluation process began with identifying nodes[1] and shaft sites and functions within each node, which were screened for advancement into 10 candidate DEIR

1 A node is a site along or at the end of a tunnel segment where a shaft would be constructed. Nodes may include multiple possible shaft sites and corresponding functions.

Alternatives that were further evaluated. The technical studies, environmental resource impact assessments included in the DEIR, geotechnical investigations, and field surveys described in **DEIR Chapter 4, Existing Conditions and Environmental Assessment**, informed the evaluation process. The screening of the 10 candidate DEIR Alternatives included an evaluation and scoring of each of the Program sites individually, and then cumulatively for the entire tunnel alignment (**DEIR Section C.3.1.2**). **DEIR Table C-4, Evaluation Criteria and Scoring (pgs. C-9** to **C-13)**, provides a summary of the evaluation criteria categories and sub-criteria, and the associated scoring. **DEIR Section 3.6, Candidate DEIR Alignment Alternatives Evaluation and Scoring Findings (pg. 3-28)**, describes the results of the scoring for each of the 10 candidate DEIR Alternatives and **DEIR Figure 3.7-1**, provides a graphical representation of the scoring results. The screening resulted in the selection of three tunnel alignment alternatives, which underwent further detailed analysis in the DEIR. Based on the assessment and comparative evaluation, the alternatives that proceeded into the analysis were DEIR Alternatives 3, 4, and 10. Among these alternatives, each site was analyzed in detail, with the intent of identifying a Preferred Alternative and two back-up alternatives. The three tunnel alignment alternatives assessed in the DEIR were advanced through both preliminary (Tier 1) and secondary (Tier 2) screening due to their favorability compared to the other alternatives. As requested in the Secretary's Certificate on the ENF, the DEIR Alternatives analysis detailed the process of the development of the Preferred Alternative and two backup alternatives. The three DEIR Alternatives are described in **DEIR Section 3.8. DEIR Alternatives (pg. 3-68)**. **DEIR Section 3.9, Selecting the Preferred Alternative (pg. 3-153)**, describes the process of how the Preferred Alternative was selected.

2.7 SDEIR Alternatives Evaluation and Methodology

As with the DEIR Alternatives, the SDEIR Alternatives were evaluated using the same methodology that built on the preliminary alternatives analysis conducted prior to and in support of the ENF.

2.7.1 Tunnel Alignment Alternatives Evaluated in the SDEIR

Table 2-3 summarizes the three DEIR Alternatives and identifies the three alternatives that are evaluated in the SDEIR:

- SDEIR Alternative 3A – Similar to DEIR Alternative 3 but would use the UMass Property site in place of the DEIR Fernald Property site for the terminus of North Tunnel, Segment 1. All other sites in SDEIR Alternative 3A remain the same as in DEIR Alternative 3.
- SDEIR Alternative 4A – Similar to DEIR Alternative 4 but would use the UMass Property site in place of the DEIR Fernald Property site for the terminus of North Tunnel, Segment 1. All other sites in SDEIR Alternative 4A remain the same as in DEIR Alternative 4.
- SDEIR Alternative 10A – Similar to DEIR Alternative 10 but would use the Lower Fernald Property site in place of the DEIR Fernald Property site for the terminus of North Tunnel, Segment 1. All other sites in SDEIR Alternative 10A remain the same as in DEIR Alternative 10.

Table 2-3 Alternative Alignments Evaluated in the DEIR and SDEIR

DEIR Alternative 3	**SDEIR Alternative 3A**	***DEIR Alternative 4***	**SDEIR Alternative 4A**	***DEIR Alternative 10***	**SDEIR Alternative 10A**
Fernald Property Receiving	UMass Property Large Connection	*Fernald Property Receiving*	UMass Property Large Connection	*Fernald Property Receiving*	Lower Fernald Property Receiving
↑	↑	↑	↑	↑	↑
Tandem Trailer Launching	*Tandem Trailer Launching*	*Tandem Trailer Launching*	*Tandem Trailer Launching*	*Park Road West Large Connection*	*Park Road West Large Connection*
				↑	↑
Bifurcation Launching	*Bifurcation Launching*	*Park Road West Receiving*	*Park Road West Receiving*		
↓	↓	↑	↑		
Highland Avenue Northwest Receiving	*Highland Avenue Northwest Receiving*	*Highland Avenue Northwest/ Southwest Launching*	*Highland Avenue Northwest/ Southwest Launching*	*Highland Avenue Northwest/ Southwest Launching*	*Highland Avenue Northwest/ Southwest Launching*
Highland Avenue Northeast/ Southeast Launching	*Highland Avenue Northeast/ Southeast Launching*	*Highland Avenue Northeast/ Southeast Launching*	*Highland Avenue Northeast/ Southeast Launching*	*Highland Avenue Northeast/ Southeast Launching*	*Highland Avenue Northeast/ Southeast Launching*
↓	↓	↓	↓	↓	↓
American Legion Receiving	*American Legion Receiving*	*American Legion Receiving*	*American Legion Receiving*	*American Legion Receiving*	*American Legion Receiving*

Notes: Cells shaded in color denote the critical connection points to the existing distribution system: green shading = WASM3 node, blue shading = Hultman Aqueduct node, orange shading = Highland Avenue Interchange node, and purple shading = Shaft 7C node.

A node is a site along or at the end of a tunnel segment where a shaft would be constructed. Nodes may include multiple possible shaft sites and corresponding functions.

Arrows identify the proposed direction of the tunnel boring.

Italicized text within the table indicates no change from the DEIR.

As shown in **Table 2-3**, the tunnel facilities would function as an independent North Tunnel from the Hultman Aqueduct extending north to either the UMass Property site or the Lower Fernald Property site and an independent South Tunnel from the Hultman Aqueduct extending south to the American Legion site. All alternatives include the same six intermediate connection shaft sites that would enable the tunnel system to connect to MWRA or local municipal distribution systems/infrastructure. An isolation valve on the Hultman Aqueduct would also be common to all alternatives. Therefore, these sites did not factor into selection of the Preferred Alternative.

Consistent with the process used to evaluate the alternative alignments in the ENF and the DEIR, the SDEIR Alternatives were compared to one another by the evaluation criteria of engineering, land availability,

environmental, social/community, operations, cost, and schedule. A rating of favorable (green), neutral (yellow), or unfavorable (red) was assigned for each evaluation criteria for each alternative. Each category was considered equally important. **DEIR Appendix C** provides a summary of the evaluation steps that resulted in the identification of the three DEIR Alternatives that moved into the impact assessment in the DEIR. **Table 2-4** presents the evaluation criteria ratings for DEIR Alternatives 3, 4 and 10, and includes the ratings for the three SDEIR Alternatives, which are described in the following sections.

Table 2-4 Rating of DEIR and SDEIR Alternatives

Alternative	3	3A	4	4A	10	10A
Tunnel Alignment [1]	TT→FE B→NW NE→AL	TT→UM B→NW NE→AL	TT→FE NW→PW NE→AL	TT→UM NW→PW NE→AL	NW→FE (PW) NE→AL	NW→LFE (PW) NE→AL
Engineering / Constructability	🟢	🟢	🟢	🟢	🟡	🟡
Land Availability [2]	🔴	🟡	🔴	🟡	🔴	🟡
Environmental	🟡	🟡	🟢	🟢	🟢	🟢
Social / Community	🟡	🟡	🟡	🟡	🟢	🟡
Operations	🟢	🟢	🟢	🟢	🟢	🟢
Cost [3]	🟡	🟡	🟡	🟡	🟡	🟡
Schedule (tunnel(s) in service)	🟢	🟢	🟢	🟢	🟡	🟡
Retain Alternative	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**

Key: 🟢 *Favorable (green)* 🟡 *Neutral (yellow)* 🔴 *Unfavorable (red)*

1 *Site Abbreviations: TT - Tandem Trailer; FE - Fernald Property, B - Bifurcation, NW - Highland Avenue Northwest; NE - Highland Avenue Northeast; AL - American Legion; PW - Park Road West; LFE - Lower Fernald Property, UM - UMass Property; (PW) – Park Road West large connection shaft; → indicates tunnel mining direction.*

2 *In the DEIR, the land availability evaluation criterion was previously rated neutral (yellow) for DEIR Alternatives 3 and 4 and was rated favorable (green) in DEIR Alternative 10. Based on comments received on the DEIR (see **SDEIR Chapter 15, Responses to DEIR Certificate Comments and Comment Letters**), and based on discussions with the Mayor of the City of Waltham, the DEIR Fernald Property site in Waltham is not viable. Therefore, the land availability rating has been revised to unfavorable (red) for all three DEIR Alternatives as shown above. Since all DEIR Alternatives previously included the DEIR Fernald Property site, the land availability rating previously presented in **DEIR Figures 3.7-1** and **C-4** should now be considered unfavorable (red), and all 10 DEIR Alternatives are thereby discontinued from further analysis per the methodology described in **DEIR Section 3.5.1**. All other evaluation ratings for the DEIR Alternatives remain the same as previously assumed in the DEIR.*

3 *Construction cost only for the differential in capital construction costs among the alternatives.*

As shown in **Table 2-4**, no evaluation criteria are rated as unfavorable (red) in the three SDEIR Alternatives. The evaluation criteria ratings for each SDEIR Alternative identify that each presents a viable alternative for further evaluation and review. Therefore, the three SDEIR Alternatives are evaluated in further detail in **SDEIR Section 2.8**, supplemented by the impact assessments for each technical resource in the respective SDEIR chapters (e.g., land alteration/Article 97, noise and vibration, transportation, etc.).

The land availability evaluation criterion rating is marked as unfavorable (red) in all three DEIR Alternatives (see **Table 2-4**) based on comments received on the DEIR from the City of Waltham and the Secretary (see **SDEIR Section 2.9** and **SDEIR Chapter 15, Responses to DEIR Certificate Comments and Comment Letters**), along with discussions held with the City of Waltham. The input received communicated that the DEIR Fernald Property site in Waltham is not a viable location for a Program site. Therefore, the land availability evaluation criterion was updated as unfavorable for all DEIR Alternatives. All other evaluation criteria ratings for the DEIR Alternatives remain the same as previously assumed in the DEIR.

Since the DEIR Fernald Property site was deemed not viable as a Program site, the SDEIR Alternatives were developed to incorporate an alternative site for the terminus of the North Tunnel in place of the DEIR Fernald Property site (as described in **SDEIR Section 2.1.1**). As shown in **Table 2-4**, with the northern terminus site revised to the UMass Property site in SDEIR Alternatives 3A and 4A, and to the Lower Fernald Property site in SDEIR Alternative 10A, the land availability evaluation criterion is rated neutral (yellow) in all SDEIR Alternatives. In early 2023, the MWRA held discussions with UMass regarding the potential use of the UMass Property site and with the City of Waltham regarding the potential use of the Lower Fernald Property site. Discussions to date indicate that UMass is supportive regarding a potential transfer of the necessary portion of the UMass-owned property to the MWRA (see **SDEIR Section 2.8.2** for more information).

2.8 Selecting the Preferred Alternative

Consistent with the process described in **DEIR Chapter 3, Alternatives**, and as shown in **Table 2-4**, the SDEIR Alternatives were screened against seven evaluation criteria: engineering/constructability, land availability, environmental, social/community, operations, cost, and schedule. The geotechnical investigations, field surveys, and technical studies for each resource category informed the process to select a Preferred Alternative and two back-up alternatives. In addition, the key findings from the impact assessments performed for each resource category (e.g., transportation, cultural and historic resources, etc.) that are documented in **DEIR Chapter 4, Existing Conditions and Environmental Assessment**, supplemented with information in the technical chapters of the SDEIR, were used to inform the evaluation.

A numerical scoring framework was developed to compare the three SDEIR Alternatives. To support the selection of the Preferred Alternative, each SDEIR Alternative was scored across the seven evaluation criteria described in **SDEIR Section 2.7**. A score of 1 was assigned to a given SDEIR Alternative if it was considered the "Least Preferred" for a certain evaluation criterion. A score of 3 was assigned if the SDEIR Alternative was considered "Preferred." A score of 2 or "Moderate" was assigned if the given SDEIR alternative ranked in the middle compared to the other SDEIR Alternatives. All evaluation criteria were considered equally important and were not weighted. Where appropriate, the SDEIR alternatives could

be scored the same rating for an evaluation criterion if they presented similar characteristics (i.e., two different "Preferred" ratings for a given evaluation criterion). The SDEIR Alternative with the highest overall score would be considered the Preferred Alternative. All SDEIR Alternatives were evaluated in the impact assessments included in the DEIR and SDEIR technical chapters.

2.8.1 Engineering/Constructability Considerations

Consistent with the DEIR, SDEIR Alternatives 3A, 4A, and 10A were evaluated in consideration of the following engineering/constructability considerations:

- Availability of utilities (water distribution system, electrical service)
- Launch shaft groundwater discharge location
- Flushing/disinfection and dewatering options
- Proximity to highways
- Proximity to geologic faults
- Tunnel segment length
- Proximity to sensitive existing Infrastructure

All three SDEIR Alternatives have comparable characteristics for availability of utilities, flushing/disinfection and dewatering options, proximity to highways and proximity to sensitive existing infrastructure. As assumed in the DEIR Alternatives, all SDEIR Alternatives include the same isolation valve site on the Hultman Aqueduct in Weston and the same six connection shaft sites: School Street and Cedarwood Pumping Station in Waltham, Hegarty Pumping Station in Wellesley, St. Mary Street Pumping Station in Needham, Newton Street Pumping Station in Brookline, and Southern Spine Mains in Boston. Therefore, these sites did not factor into identification of the Preferred Alternative.

2.8.1.1 Groundwater Discharge

Consistent with the DEIR assumptions, SDEIR Alternatives 3A and 4A include groundwater discharge locations to Seaverns Brook near the I-90/I-95 interchange in Weston and the Charles River from the I-95/Highland Avenue interchange in Needham as described in **DEIR Chapter 4, Section 4.6, Wetlands and Waterways**. SDEIR Alternative 10A includes only one groundwater discharge location at the Charles River from the I-95/Highland Avenue interchange in Needham, as assumed for DEIR Alternative 10.

2.8.1.2 Geologic Features

All three SDEIR Alternatives would cross the same geologic features including faults along their alignments. The Northern Boundary Fault would be crossed by all three SDEIR Alternatives near Recreation Road in Weston. SDEIR Alternatives 4A and 10A would approach the fault from the southeast from the Highland Avenue Northwest/Southwest launching shaft site after approximately three miles of excavation with a TBM. SDEIR Alternative 3A would approach the fault from the northwest from the Bifurcation launching shaft site within the first 1,000 feet of excavation and a contractor would have more flexibility to cross the fault with a lengthened starter tunnel constructed using drill and blast or excavated with the TBM without impacting other segments of work.

2.8.1.3 Tunnel Segments

The anticipated lengths for each tunnel segment in the three SDEIR Alternatives are shown in **Table 2-5**.

Table 2-5 Approximate Length of SDEIR Tunnel Segments

Alternative	North Tunnel Segment 1		South Tunnel Segment 2		South Tunnel Segment 3		Total Approx. Length (miles)
	Description	Approx. Length (miles)	Description	Approx. Length (miles)	Description	Approx. Length (miles)	
3A	*Tandem Trailer/ Park Road East Launching* to UMass Property Large Connection	*4.5*	*Bifurcation Launching to Highland Avenue Northwest Receiving*	*3.3*	*Highland Avenue Northeast/Southeast Launching to American Legion Receiving*	*6.8*	***14.6***
4A	*Tandem Trailer/ Park Road East Launching* to UMass Property Large Connection	*4.5*	*Highland Avenue Northwest/ Southwest Launching to Park Road West Receiving*	*3.3*	*Highland Avenue Northeast/Southeast Launching to American Legion Receiving*	*6.8*	***14.6***
10A [1]	*Highland Avenue Northwest to Park Road West to* Lower Fernald Property Receiving			*8.3*	*Highland Avenue Northeast/Southeast Launching to American Legion Receiving*	*6.8*	***15.1***

Note: 1 One TBM would mine the tunnel for both Tunnel Segment 1 and Segment 2 in Alternative 10A.
Italicized text within the table indicates no change from the DEIR.

SDEIR Alternatives 3A and 4A have essentially the same tunnel segment lengths at approximately 4.5 miles (North Tunnel, Segment 1), 3.3 miles (South Tunnel, Segment 2), and 6.8 miles (South Tunnel, Segment 3), respectively. SDEIR Alternative 10A has longer tunnel segment lengths at approximately 8.3 miles (combined North Tunnel, Segment 1 and South Tunnel, Segment 2) and 6.8 miles (South Tunnel, Segment 3) and is the longest tunnel overall. South Tunnel Segment 3 is the same length for all SDEIR Alternatives and thus is not a differentiating factor. The shorter Tunnel Segments 1 and 2 for SDEIR Alternatives 3A and 4A compared to SDEIR Alternative 10A provide additional flexibility and less overall risk for tunnel construction. SDEIR Alternative 4A has the additional benefit of a potential Value Engineering option later in the design phase to combine the Highland Avenue launching shaft sites.

Based on these engineering/constructability considerations, SDEIR Alternative 4A is Preferred (Score 3), followed by SDEIR Alternative 3A (Score 2), with SDEIR Alternative 10A rated the Least Preferred (Score 1).

2.8.2 Land Availability Considerations

Consistent with the evaluation process for the DEIR Alternatives, the SDEIR Alternatives were evaluated based on the following land availability factors:

- Site availability
- Space and right-of-way for construction
- Space and right-of-way for permanent facilities
- Possibility of precluding other beneficial uses

SDEIR Chapter 4, Land Alteration and Article 97, **DEIR Chapter 4.9, Land Use**, and **DEIR Chapter 4.13, Community Resources and Open Space**, informed the process to select the Preferred Alternative and two backup alternatives per the land availability considerations.

The MWRA has initiated discussions with UMass regarding use of the UMass Property site as proposed in the SDEIR. The discussions have been favorable, and UMass has been supportive regarding a potential transfer of the necessary portion of the property to the MWRA.

The Lower Fernald Property site was suggested by the Mayor of Waltham in February 2023 as a potentially suitable site to serve as a replacement for the DEIR Fernald Property receiving shaft site. The extent of the potential temporary and permanent impacts to the Lower Fernald Property site were sent to the Mayor in March 2023.

The anticipated process for securing the UMass Property site would likely be more straightforward than the Lower Fernald Property site and would therefore be more favorable regarding land availability. The three SDEIR Alternatives are otherwise comparable when considering space and rights-of-way for permanent facilities and possibility for precluding other beneficial uses, since all proposed sites can accommodate permanent facilities.

However, Massachusetts Department of Transportation (MassDOT) Project No. 606783, "Newton-Weston-Bridge Bundle, Replacement and Rehabilitation at I-90/I-95 Interchange Including Ramp G (DB)," in Weston presents a potential risk regarding land availability for the Bifurcation site. It is anticipated that the land would be available after the MassDOT construction is completed. The MassDOT schedule is for construction to occupy that site from 2023 through 2027.[2] Any delays in schedule may impact the availability of access to the Bifurcation launching shaft site in SDEIR Alternative 3A.

Based on these land availability considerations, SDEIR Alternative 4A is Preferred (Score 3), followed by SDEIR Alternatives 3A and 10A (Score 2).

2 Massachusetts Department of Transportation, "Newton-Weston-Bridge Bundle, Replacement and Rehabilitation at I-90/I-95 Interchange Including Ramp G (DB)," Project No. 606783, https://hwy.massdot.state.ma.us/ProjectInfo/Main.asp?ACTION=ViewProject&PROJECT_NO=606783 (accessed May 24, 2023).

2.8.3 Environmental Considerations

Each alternative was evaluated according to the presence of the following environmental factors:

- State and federally listed threatened and endangered species (see **SDEIR Chapter 10, Rare Species and Wildlife Habitat**, and **DEIR Chapter 4.5, Rare Species and Wildlife Habitat**)
- Massachusetts Contingency Plan (MCP) sites (see **SDEIR Chapter 13, Hazardous Materials, Materials Handling, and Recycling**, and **DEIR Chapter 4.8, Hazardous Materials, Materials Handling, and Reuse**)
- Article 97 lands (see **SDEIR Chapter 4, Land Alteration/Article 97**, and **DEIR Chapter 4.13, Community Resources and Open Space**)
- Wetlands and waterways (see **SDEIR Chapter 5, Wetlands and Waterways**, and **DEIR Chapter 4.6, Wetlands and Waterways**)
- Groundwater and water supply infrastructure (see **SDEIR Chapter 6, Water Supply and Water Management Act**, and **DEIR Chapter 5, Water Supply and Water Management Act**)

The technical studies, impact assessments, geotechnical investigations, site investigations, and field work described in the SDEIR and in **DEIR Chapter 4, Existing Conditions and Environmental Assessment**, informed the process to select the Preferred Alternative and two back-up alternatives per the environmental considerations listed above.

The three SDEIR Alternatives would be comparable in terms of potential impacts to state- and federally listed threatened and endangered species, land alteration and Article 97 lands, and MCP sites. All three alternatives generally traverse the same horizontal alignment and would have comparable potential impacts on wetlands, wells, or surface water bodies along the tunnel alignment. SDEIR Alternative 10A, given it would include two launching sites compared to three in SDEIR Alternatives 3A and 4A, is more favorable in terms of groundwater management and potential impact on surface water bodies.

Based on these environmental considerations, all three SDEIR Alternatives have comparable potential environmental impacts, taking potential mitigation measures into account (Score 3).

2.8.4 Social/Community Considerations

Each alternative was evaluated according to the presence of the social/community considerations:

- Cultural and historic resources (potential adverse effects on National Register of Historic Places) (see **SDEIR Chapter 12, Cultural and Historic Resources**, and **DEIR Chapter 4.7, Cultural and Historic Resources**)
- Community impacts (adverse effects on use of local parks, playgrounds, bus routes, schools, or other community resources) (see **SDEIR Chapter 4, Land Alteration/Article 97**, and **DEIR Chapter 4.13, Community Resources and Open Space**)
- EJ (see **SDEIR Chapter 3, Outreach and Environmental Justice**, and **DEIR Chapter 2, Outreach and Environmental Justice**)
- Traffic disruption (see **SDEIR Chapter 9, Transportation**, and **DEIR Chapter 4.10, Transportation**)
- Air emissions (see **SDEIR Chapter 8, Air Quality and Greenhouse Gas Emissions**, and **DEIR Chapter 4.11, Air Quality and Greenhouse Gas Emissions**)
- Noise (**SDEIR Chapter 11, Noise and Vibration**, and **DEIR Chapter 4.12, Noise and Vibration**)

The relevant technical studies, environmental resource impact assessments included in the DEIR and SDEIR, geotechnical investigations, site investigations, and field work described in the SDEIR and in **DEIR Chapter 4, Existing Conditions and Environmental Assessment**, informed the process to select the Preferred Alternative and two back-up alternatives per the social/community considerations listed above.

Across all Program sites, the three SDEIR Alternatives have comparable potential impacts to land use, community resources and open space, EJ, traffic, air quality and GHG emissions, and noise and vibration. There would be a minor difference in social/community considerations between SDEIR Alternative 3A/4A compared to SDEIR Alternative 10A due to the new terminus sites considered for the North Tunnel, Segment 1. Compared to the UMass Property site (SDEIR Alternatives 3A and 4A), the Lower Fernald Property site (SDEIR Alternative 10A) is anticipated to experience a greater temporary increase in traffic, vibration, and air quality and GHG emissions during construction activities since a receiving shaft would be constructed instead of a large connection shaft site.

As detailed in **SDEIR Section 12.2, Cultural and Historic Resources Impact Assessment**, two resources contributing to the Walter E. Fernald State School Historic District (WLT.AB) in Waltham are in the Program's construction area LOD and would be impacted (demolished) in SDEIR Alternative 10A. One non-contributing resource located within the Lower Fernald Property site LOD (a concrete block garage) would also be demolished. The Program is not anticipated to cause any adverse impacts to historic resources in SDEIR Alternative 3A or 4A.

As described in **SDEIR Chapter 11, Noise and Vibration, Section 11.2, Noise and Vibration Impact Assessment**, the number of sensitive receptors subject to potential adverse construction noise impacts would be similar across the SDEIR Alternatives (24 receptors in SDEIR Alternative 10A compared to 23 receptors in SDEIR Alternatives 3A and 4A).

Based on these social/community considerations, SDEIR Alternatives 3A and 4A are rated as Preferred (Score 3) and SDEIR Alternative 10A is rated as Least Preferred (Score 1).

2.8.5 Operational Considerations

Each alternative was evaluated against the following operational considerations

- Flexibility of Operations
- Maintenance Provisions

As assumed in the DEIR, the SDEIR Alternatives are comparable regarding flexibility of operations and making provision for maintenance activities. Each alternative includes the necessary valving to isolate critical sections of MWRA infrastructure including dedicated connections to the Hultman Aqueduct for the North Tunnel and the South Tunnel, the Hultman Aqueduct Isolation Valve, and the Highland Avenue Northeast Isolation Valve. Maintenance considerations have been coordinated with MWRA Operations personnel and were included in the sizing and layout of all permanent facilities to facilitate the proactive and safe maintenance of these critical infrastructure elements.

Based on these operational considerations, all three SDEIR Alternatives 3A, 4A, and 10A are comparable and are rated Preferred (Score 3).

2.8.6 Cost Considerations

As the overall depth of the tunnels and components included in each SDEIR Alternative are similar, the approach to include cost as a consideration was to use the relative cost differential for major components that differed between the alternatives, consistent with the approach described in the DEIR. Each alternative was evaluated against the following cost considerations:

- Relative Cost Differential for TBM Electric Service
- Number of Shafts
- Construction Duration
- Tunnel Length
- Excavation Efficiency

2.8.6.1 Differential Cost of Electrical Service

The cost to deliver a new electrical service to each TBM launching site was estimated for Tandem Trailer/Park Road East launching, Bifurcation launching, Highland Avenue Northwest/Southwest launching, and Highland Avenue Northeast/Southeast launching sites. Through ongoing discussions with Eversource, construction cost estimates were developed that include the necessary duct bank improvements, additional conductors, and on-site utility grade switchgear for each location.

SDEIR Alternative 10A includes launching at Highland Avenue Northwest/Southwest and Highland Avenue Northeast/Southeast and is the base cost option. SDEIR Alternative 4A includes launching at Tandem Trailer/Park Road East, Highland Avenue Northwest/Southwest, and Highland Avenue Northeast/Southeast with the additional site adding $13 million more than the base cost option. SDEIR Alternative 3A includes launching at Tandem Trailer/Park Road East, Bifurcation, and Highland Avenue Northeast/Southeast with the additional site adding $18 million more than the base cost option.

2.8.6.2 Number of Construction Shafts

The total number of shafts was also an area of cost differential among the three SDEIR Alternatives. Through an evaluation of prior similar projects and recently bid tunneling projects, construction cost estimates were developed for each type of shaft. SDEIR Alternative 10A includes two launching shafts, two receiving shafts, one large connection shaft, six connection shafts (11 total shafts), and is the base cost option. SDEIR Alternatives 3A and 4A include three launching shafts, two receiving shafts, two large connection shafts, six connection shafts (13 total shafts) with the additional shafts adding $32 million more than the base cost option.

2.8.6.3 Construction Duration

The total project construction duration was also an area of cost differential among the three SDEIR Alternatives. Construction durations were estimated based on assumptions related to several key factors including tunnel segment procurement readiness (i.e., when a tunnel segment would be sufficiently designed, necessary permits obtained, and land acquired to allow for procurement to proceed),

construction packaging, construction phasing and sequencing, and tunnel construction excavation and lining rates. Construction duration will continue to be evaluated as design progresses.

SDEIR Alternatives 3A and 4A have the same overall estimated project construction duration of approximately seven years, and that is the base cost option. SDEIR Alternative 10A has an overall estimated project construction duration of approximately seven years and six months for an additional cost of $12 million over the base cost option.

2.8.6.4 Tunnel Length

The total length of tunnel was also an area of cost differential among the three SDEIR Alternatives. Through an evaluation of prior similar projects and recently bid tunneling projects, construction cost estimates were developed for similar sized tunnels. SDEIR Alternatives 3A and 4A are essentially the same length at approximately 14.6 miles and are considered the base cost option. SDEIR Alternative 10A, at approximately 15.1 miles, includes an additional half mile of tunnel at an additional cost of $35 million.

2.8.6.5 Excavation Efficiency

The overall excavation efficiency was also an area of cost differential among the three alternatives. Excavation efficiency reduces as the tunnel segments get longer as the systems needed to support the TBM excavation operations and final concrete operations including materials, people and equipment all need to travel longer to and from the launching shaft. For this analysis it is assumed that excavation efficiency begins to reduce after approximately five miles of tunnel length. For South Tunnel, Segment 3, all SDEIR Alternatives have the same configuration of Highland Avenue Northeast Launching and American Legion Receiving so that segment does not result in a cost differentiator. For South Tunnel, Segment 2, SDEIR Alternative 3A has the Bifurcation launching and Highland Avenue Northwest receiving and SDEIR Alternative 4A has essentially the reverse with Highland Avenue Northeast launching and Park Road West receiving at approximately 3.3 miles. For North Tunnel, Segment 1, SDEIR Alternatives 3A and 4A have the same configuration with Tandem Trailer launching and UMass Property large connection shaft site at approximately 4.5 miles. SDEIR Alternative 10A combines the tunnel excavation operation for South Tunnel, Segment 2 and North Tunnel, Segment 1 with a configuration of Highland Avenue Northwest launching to Park Road West large connection to Lower Fernald Property receiving shaft site at approximately 8.3 miles. This approximately 8.3-mile tunnel drive would begin to reduce excavation efficiency after approximately five miles at an added cost of $25 million for SDEIR Alternative 10A.

These relative cost differentials among the alternatives are summarized in **Table 2-6**.

Table 2-6 Cost Comparison

Category	Alternative 3A	Alternative 4A	Alternative 10A
TBM Electrical Service	$18 million	$13 million	$0
Number of Shafts	$32 million	$32 million	$0
Duration	$0	$0	$12 million
Tunnel Length	$0	$0	$35 million
Excavation Efficiency	$0	$0	$25 million
Totals	**$50 million**	**$45 million**	**$72 million**

Note – Cost estimates provided for construction are in 2022 dollars.

Based on these cost considerations, SDEIR Alternative 4A is Preferred (Score 3), followed by SDEIR Alternative 3A (Score 2) and SDEIR Alternative 10A (Score 1).

2.8.7 Schedule Considerations

Each alternative was evaluated against the following schedule considerations:

- Timing to put Tunnel(s) in Service
- Flexibility of Implementation

As assumed for DEIR Alternatives 3 and 4, SDEIR Alternatives 3A and 4A have an overall estimated construction duration of seven years where the South Tunnel would be operational in approximately seven years and the North Tunnel in approximately six years. SDEIR Alternative 10A has an overall estimated construction duration of approximately 7.5 years where the South Tunnel would be operational in approximately 7.5 years and the North Tunnel in approximately 7.25 years after the beginning of construction for each tunnel. The exact timing and sequence of these alternatives would be determined as design advances. The overall assumptions for durations and sequence are outlined in **DEIR Chapter 4, Section 4.3, Analysis Conditions (pg. 4.3-1)** and **Section 4.4, Construction Methodology (pg. 4.4-1)**.

SDEIR Alternative 3A has the flexibility of contract packaging as there are three distinct tunnel segments: North Tunnel, Segment 1 (Tandem Trailer to UMass Property site), South Tunnel, Segment 2 (Bifurcation to Highland Avenue Northwest) and South Tunnel, Segment 3 (Highland Avenue Northeast to American Legion). These three segments could be packaged as two or three construction packages with two or three TBMs.

Similarly, SDEIR Alternative 4A has the flexibility of contract packaging as there are three distinct tunnel Segments, North Tunnel, Segment 1 (Tandem Trailer to UMass Property site), South Tunnel, Segment 2 (Highland Avenue Northwest to Park Road West) and South Tunnel, Segment 3 (Highland Avenue Northeast to American Legion). These three segments could consist of two or three construction packages with two or three TBMs. SDEIR Alternative 4A has the added potential of combining the Highland Avenue Northwest and Northeast launch shaft sites if a contractor sees that as beneficial.

SDEIR Alternative 10A has the least flexibility in contract packaging compared to the other two alternatives, as tunnel Segments 1 and 2 are included in the same tunnel drive and this combination would put both the North Tunnel and South Tunnel on the critical path schedule with limited contract packaging options.

Based on these schedule considerations, SDEIR Alternatives 3A and 4A are both considered preferred (Score 3), followed by SDEIR Alternative 10A, which was considered least preferred (Score 1).

2.8.8 Identifying the Preferred Alternative

Table 2-7 summarizes the results of the alternatives evaluation across the seven evaluation criteria. All three SDEIR Alternatives provide the required hydraulic, redundancy, and operational features to achieve the MWRA's expressed goals.

Table 2-7 Summary Ranking of Evaluation Criteria and Recommended Preferred Alternative

Criteria	Alternative 3A	Alternative 4A	Alternative 10A
Engineering/Constructability	2	3	1
Land Availability	2	3	2
Environmental	3	3	3
Social/Community	3	3	1
Operations	3	3	3
Cost	2	3	1
Schedule	3	3	1
Cumulative Score	**18**	**21**	**12**
Overall Evaluation	**Backup**	**Preferred**	**Backup**

3 = Preferred, 2 = Moderate, 1 = Least Preferred

All three SDEIR Alternatives were considered to have similar potential environmental impacts based on the discussion in **SDEIR Section 2.8.3** and based on the evaluation of potential impacts included in the DEIR and SDEIR technical chapters (with mitigation measures incorporated where necessary). Therefore, based on the engineering/constructability, land availability, social/community, cost differential, and contract packaging flexibility evaluation criteria, **SDEIR Alternative 4A is identified as the Preferred Alternative**. As shown in **Table 2-7**, SDEIR Alternative 4A received a "Preferred" rating (score of 3) in each of the seven evaluation criteria and a resulting total score of 21. SDEIR Alternative 3A received the second highest total score (18), followed by Alternative 10A (12).

2.9 Impact Assessment Comparison of SDEIR Alternatives

This section provides a supplemental comparison of the three SDEIR Alternatives based on the key findings from the impact assessments performed for each respective environmental resource category (see **Table 2-8**). As detailed in **SDEIR Section 2.8**, the results of the impact assessments were used to inform the seven evaluation criteria, particularly for the land availability, environmental, and social/community categories.

The impact assessments presented comparable findings across the three SDEIR Alternatives (see **Table 2-8**). SDEIR Alternatives 3A and 4A are anticipated to have fewer potential impacts related to historic resources (i.e., the social/community category discussed in **SDEIR Section 2.8.4**). SDEIR Alternative 10A, given it would include two launching sites compared to three in Alternatives 3A and 4A, is more favorable in terms of groundwater management and potential impact on surface water bodies.

It is important to note that the potential environmental impacts associated with each of the three alternatives are generally similar, with mitigation measures incorporated where necessary, and were not a determining factor in identifying the Preferred Alternative.

Table 2-8 Comparison of SDEIR Alternatives Impact Assessment

Category/ Chapter	Description of Potential Impacts	Alternative 3A - Sites Subject to Potential Impacts	Alternative 4A - Sites Subject to Potential Impacts	Alternative 10A - Sites Subject to Potential Impacts
Environmental Justice **SDEIR Chapter 3** **DEIR Chapter 2**	EJ block groups within one mile of Program sites	115	115	112
	Program sites with potential temporary adverse construction-related impacts to EJ populations (resource category with potential impact) [no EJ populations would be disproportionately impacted]	• UMass Property (transportation, noise, hazardous materials) • *American Legion (transportation and noise)* • *School Street (transportation, noise, and hazardous materials)* • *Cedarwood Pumping Station (noise)* • *Hegarty Pumping Station (noise)* • *St. Mary Street Pumping Station (transportation)* • *Newton Street Pumping Station (transportation, noise, and hazardous materials)* • *Southern Spine Mains (transportation and hazardous materials)*	• UMass Property (transportation, noise, and hazardous materials) • *American Legion (transportation and noise)* • *School Street (transportation, noise, and hazardous materials)* • *Cedarwood Pumping Station (noise)* • *Hegarty Pumping Station (noise)* • *St. Mary Street Pumping Station (transportation)* • *Newton Street Pumping Station (transportation, noise, and hazardous materials)* • *Southern Spine Mains (transportation and hazardous materials)*	• Lower Fernald Property (transportation) • *American Legion (transportation and noise)* • *School Street (transportation, noise, and hazardous materials)* • *Cedarwood Pumping Station (noise)* • *Hegarty Pumping Station (noise)* • *St. Mary Street Pumping Station (transportation)* • *Newton Street Pumping Station (transportation, noise, and hazardous materials)* • *Southern Spine Mains (transportation and hazardous materials)*

Table 2-8 Comparison of SDEIR Alternatives Impact Assessment

Category/ Chapter	Description of Potential Impacts	Alternative 3A - Sites Subject to Potential Impacts	Alternative 4A - Sites Subject to Potential Impacts	Alternative 10A - Sites Subject to Potential Impacts
Environmental Justice **SDEIR Chapter 3** **DEIR Chapter 2**	Program sites with LOD located in EJ block groups	• *American Legion* • *School Street* • *Cedarwood Pumping Station* • *Hegarty Pumping Station* • *Newton Street Pumping Station* • *Southern Spine Mains* • *Hultman Aqueduct Isolation Valve*	• *American Legion* • *School Street* • *Cedarwood Pumping Station* • *Hegarty Pumping Station* • *Newton Street Pumping Station* • *Southern Spine Mains* • *Hultman Aqueduct Isolation Valve*	• *American Legion* • *School Street* • *Cedarwood Pumping Station* • *Hegarty Pumping Station* • *Newton Street Pumping Station* • *Southern Spine Mains* • *Hultman Aqueduct Isolation Valve*
	Portions of the anticipated construction vehicle routes between the highway and the Program sites would travel through or within a 0.5-mile distance from EJ block groups that have existing unfair or inequitable burdens (low birth rate and/or elevated blood lead prevalence)	• UMass Property • *American Legion* • *School Street* • *Cedarwood* • *Newton Street* • *Southern Spine Mains*	• UMass Property • *American Legion* • *School Street* • *Cedarwood* • *Newton Street* • *Southern Spine Mains*	• Lower Fernald Property • *American Legion* • *School Street* • *Cedarwood* • *Newton Street* • *Southern Spine Mains*
Land Alteration/ Article 97 **SDEIR Chapter 4** **DEIR Chapter 4.9** and **DEIR Chapter 4.13**	Temporary construction area LOD (total acres)	42.4 acres	36.1 acres	32.0 acres
	Estimated increase in impervious area (acres)	2.7 acres	2.4 acres	2.3 acres
	Permanent easement or land acquisition required to support shaft and valve chambers	8.4 acres	8.0 acres	7.9 acres

Table 2-8 Comparison of SDEIR Alternatives Impact Assessment

Category/ Chapter	**Description of Potential Impacts**	**Alternative 3A - Sites Subject to Potential Impacts**	**Alternative 4A - Sites Subject to Potential Impacts**	**Alternative 10A - Sites Subject to Potential Impacts**
Land Alteration/ Article 97 **SDEIR Chapter 4** **DEIR Chapter 4.9** and **DEIR Chapter 4.13**	Sites protected by Article 97 within construction area LOD for which a land disposition may be required (for the portion of land used in final conditions)	*3.8 acres total:* • *Ouellet Park (Hegarty Pumping Station) [0.1 acres]* • *Southwest Corridor Park/ Arborway I (Southern Spine Mains) [0.2 acres]* • *Morton Street Property (American Legion) [3.5 acres]*	*3.8 acres total:* • *Ouellet Park (Hegarty Pumping Station) [0.1 acres]* • *Southwest Corridor Park/ Arborway I (Southern Spine Mains) [0.2 acres]* • *Morton Street Property (American Legion) [3.5 acres]*	*3.8 acres total:* • *Ouellet Park (Hegarty Pumping Station) [0.1 acres]* • *Southwest Corridor Park/ Arborway I (Southern Spine Mains) [0.2 acres]* • *Morton Street Property (American Legion) [3.5 acres]*
	Article 97 properties within 1,000-foot corridor of tunnel alignment (properties directly above may require a subterranean easement)	37	36	34
Wetlands and Waterways **SDEIR Chapter 5** **DEIR Chapter 4.6**	Impacts to state-regulated Riverfront Areas (RA) due to top-of-shaft and/or valve structures and associated pavement	• *Tandem Trailer/Park Road East* • *Hegarty Pumping Station* • *Hultman Aqueduct Isolation Valve*	• *Tandem Trailer/Park Road East* • *Hegarty Pumping Station* • *Hultman Aqueduct Isolation Valve*	• *Hegarty Pumping Station* • *Hultman Aqueduct Isolation Valve*
	Impacts to Bordering Land Subject to Flooding (BLSF) and Bank for rip rap splash pads at dewatering discharge locations	• *Tandem Trailer/Park Road East* • *Bifurcation* • *Highland Avenue*	• *Tandem Trailer/Park Road East* • *Highland Avenue*	• *Highland Avenue*
	Impacts to state-regulated Bank, Land Under Waterway (LUW) and federally regulated waterways (WW) for rip rap splash pads at dewatering discharge locations	• *Tandem Trailer/Park Road East* • *Bifurcation* • *Highland Avenue*	• *Tandem Trailer/Park Road East* • *Highland Avenue*	• *Highland Avenue*

Table 2-8 Comparison of SDEIR Alternatives Impact Assessment

Category/ Chapter	Description of Potential Impacts	Alternative 3A - Sites Subject to Potential Impacts	Alternative 4A - Sites Subject to Potential Impacts	Alternative 10A - Sites Subject to Potential Impacts
Wetlands and Waterways **SDEIR Chapter 5** **DEIR Chapter 4.6**	Impact to state-regulated Riverfront Area(s) due to construction staging	• *Tandem Trailer/Park Road East* • *Bifurcation* • *Highland Avenue* • *American Legion* • *Hegarty Pumping Station* • *Hultman Aqueduct Isolation Valve*	• *Tandem Trailer/Park Road East* • *Highland Avenue* • *American Legion* • *Hegarty Pumping Station* • *Hultman Aqueduct Isolation Valve*	• *Highland Avenue* • *American Legion* • *Hegarty Pumping Station* • *Hultman Aqueduct Isolation Valve*
	Temporary impacts to state-regulated Bordering Vegetated Wetland (BVW) and federally jurisdictional Vegetated Wetlands (VW) due to a near-surface pipeline for a connection to existing water supply infrastructure	• *American Legion*	• *American Legion*	• *American Legion*
	Construction of dewatering discharge pipes and rip rap splash pads would cause temporary impacts to Bank, WW and LUW	• *American Legion*	• *American Legion*	• *American Legion*
Water Supply and Water Management Act **SDEIR Chapter 6** **DEIR Chapter 5**	Potential for groundwater drawdown	*All sites*	*All sites*	*All sites*
	Public water supply wells (domestic, irrigation, and geothermal) within one-half mile of proposed tunnel alignment	77	83	83

Table 2-8 Comparison of SDEIR Alternatives Impact Assessment

Category/ Chapter	Description of Potential Impacts	Alternative 3A - Sites Subject to Potential Impacts	Alternative 4A - Sites Subject to Potential Impacts	Alternative 10A - Sites Subject to Potential Impacts
Climate Change **SDEIR Chapter 7 DEIR Chapter 6**	Sites with high exposure to extreme precipitation causing urban flooding	*All sites*	*All sites*	*All sites*
	Sites with exposure to extreme precipitation causing riverine flooding	• *3 sites have high exposure* • *4 sites have moderate exposure*	• *3 sites have high exposure* • *4 sites have moderate exposure*	• *1 site has high exposure* • *4 sites have moderate exposure*
	Sites with high exposure to extreme heat	*All sites*	*All sites*	*All sites*
Air Quality and Greenhouse Gas Emissions **SDEIR Chapter 8 DEIR Chapter 4.11**	Peak 12-Month Construction Period Emissions	• *Nitrous oxide (NOx) = 33.7 tons* • *Volatile organic compounds (VOC) = 2.5 tons* • *Greenhouse gas (GHG) = 6,210.1 tons*	• *NOx = 33.7 tons* • *VOC = 2.5 tons* • *GHG = 6,209.7 tons*	• *NOx = 33.4 tons* • *VOC = 2.6 tons* • *GHG = 6,149.5 tons*
	Total 10-Year Modeled Construction Duration Emissions	• *NOx = 122.8 tons* • *VOC = 9.1 tons* • *GHG = 25,738.8 tons*	• *NOx = 122.6 tons* • *VOC = 9.0 tons* • *GHG = 25,669.9 tons*	• *NOx = 123.0 tons* • *VOC = 9.1 tons* • *GHG = 25,158.3 tons*

Table 2-8 Comparison of SDEIR Alternatives Impact Assessment

Category/ Chapter	Description of Potential Impacts	Alternative 3A - Sites Subject to Potential Impacts	Alternative 4A - Sites Subject to Potential Impacts	Alternative 10A - Sites Subject to Potential Impacts
Transportation **SDEIR Chapter 9 DEIR Chapter 4.10**	Temporary increase in daily traffic volumes on Study Area roadways for the modeled peak day	• *Non-highway: 0.1% to 2.0% temporary increase* • *Highway: 0.2% to 0.7% temporary increase*	• *Non-highway: 0.1% to 1.8% temporary increase* • *Highway: 0.2% to 0.7% temporary increase*	• *Non-highway: 0.1% to 1.9% temporary increase* • *Highway: 0.1% to 0.7% temporary increase*
	Maximum average daily trips (ADT) of diesel trucks in one quarter of a year (all sites)	389 (Year 3, Quarter 4)	393 (Year 3, Quarter 4)	312 (Year 3, Quarter 2 to Year 4, Quarter 2)
	Maximum ADT of diesel trucks in one quarter of a year (northern terminus of North Tunnel, UMass Property compared to Lower Fernald Property)	18 (Year 8, Quarter 2 to 4)	18 (Year 8, Quarter 2 to 4)	27 (Year 1, Quarter 4)
	Sites potentially subject to more than 150 ADT of diesel trucks during temporary construction activities if shift change were to take place in the peak hour in a worst-case scenario (quantity and duration) [1]	• *Highland Avenue Northeast/ Southeast (156 truck trips per day for 7 quarters)* • *Bifurcation (152 truck trips per day for 3 quarters)* • *Tandem Trailer (156 truck trips per day for 5 quarters)*	• *Highland Avenue Northwest/ Southwest (156 truck trips per day for 3 quarters)* • *Highland Avenue Northeast/ Southeast (156 truck tips per day for 7 quarters)* • *Tandem Trailer (156 truck trips per day for 5 quarters)*	• *Highland Avenue Northwest/ Southwest (156 truck trips per day for 9 quarters)* • *Highland Avenue Northeast/ Southeast (156 truck trips per day for 7 quarters)*

Table 2-8 Comparison of SDEIR Alternatives Impact Assessment

Category/ Chapter	Description of Potential Impacts	Alternative 3A - Sites Subject to Potential Impacts	Alternative 4A - Sites Subject to Potential Impacts	Alternative 10A - Sites Subject to Potential Impacts
Transportation **SDEIR Chapter 9** **DEIR Chapter 4.10**	Installation of near-surface piping would require traffic management measures including lane closure, sidewalk closures, and/or detours	• *American Legion* • *School Street* • *UMass Property* • *Highland Avenue sites*	• *American Legion* • *School Street* • *UMass Property* • *Highland Avenue sites*	• *American Legion* • *School Street* • *Lower Fernald Property* • *Highland Avenue sites*
Rare Species and Wildlife Habitat **SDEIR Chapter 10** **DEIR Chapter 4.5**	Tree clearing to accommodate construction	11.9 acres	6.0 acres	6.0 acres
	Potential "incidental take" of Northern Long-Eared Bat (NLEB) habitat under the Endangered Species Act (ESA) due to clearing of vegetation within the LOD and changes in wildlife habitat characteristics	*All sites*	*All sites*	*All sites*
Noise and Vibration **SDEIR Chapter 11** **DEIR Chapter 4.12**	Number of receptors subject to potential adverse construction noise impacts prior to mitigation	23 receptors	23 receptors	24 receptors
Cultural and Historic Resources **SDEIR Chapter 12** **DEIR Chapter 4.7**	Demolition of resources contributing to a historic district	N/A	N/A	• Lower Fernald Property (2 resources contributing to Walter E. Fernald State School Historic District (WLT.AB))

Table 2-8 Comparison of SDEIR Alternatives Impact Assessment

Category/ Chapter	Description of Potential Impacts	Alternative 3A - Sites Subject to Potential Impacts	Alternative 4A - Sites Subject to Potential Impacts	Alternative 10A - Sites Subject to Potential Impacts
Hazardous Materials, Materials Handling, and Recycling **SDEIR Chapter 13** **DEIR Chapter 4.8**	State-Listed Disposal Sites within Study Area with Potential to Impact Soil or Groundwater (Residual Contamination may be Present)	31	29	34
	Potentially Impacted Groundwater Present and Dewatering and Remediation General Permit Potentially Required	*6 sites*	*5 sites*	*5 sites*
	Potentially Impacted Soil Present	*8 sites*	*7 sites*	*6 sites*
	Approximate excavated material removed from the tunnel and disposed offsite	941,000 cubic yards (CY) total	941,000 CY total	955,000 CY

1 The assessment of ADT of diesel trucks was based on a conservative, worst-case scenario where approximately 70 feet of excavation per day is assumed, and that construction would only occur on business days. The average rate for excavation is likely to be less than 60 feet per day, translating to fewer than 150 additional ADT by diesel trucks. The annual ADT generated by the Program would be around 111 average daily trips per year. The sequence of constructing each element within a construction package will be at the discretion of the selected contractor(s).

Italicized text within the table indicates no change from the DEIR.

2.10 Technical Analysis to Respond to Certificate Comments

The Secretary's Certificate on the DEIR identified a Scope for the SDEIR, which included specific requests related to the selection and analysis of alternatives. This section transcribes the comments from the Certificate specific to alternatives and provides supplemental analysis and/or clarifying information in response per the Scope. References to SDEIR sections are provided in **bold**. Refer also to **SDEIR Chapter 15, Responses to Comments,** for the full list of delineated comments received on the DEIR.

Certificate Comment C-1

I find that substantive issues remain to be addressed related to the viability of the proposed receiving shaft site at the Fernald Property in Waltham, which is common to all alternatives considered for the project for the northern alignment.

Response to Comment C-1

The MWRA had identified the Fernald Property as a possible end point for the North Tunnel, Segment 1, as early as 2016 and has been working with the City of Waltham on siting the shaft site on the property since that time. The Fernald Property is over 150 acres and there are several areas within the Property that could support shaft and tunnel construction/permanent facility operations. The portion of the Fernald Property presented in the DEIR (the DEIR Fernald Property site) for a shaft site had been evaluated as presented in the DEIR and was previously discussed with the City staff, Mayor and City Council. However, that portion of the site is not the only portion of the Property that could support construction and operation of the permanent facilities. Based on the comments received from the City of Waltham on the DEIR, the MWRA has had additional discussions with the City of Waltham (i.e., Mayor) regarding an alternative siting for the tunnel work, which is now proposed to be at a portion of the Fernald Property closer to Waverley Oaks Road (the SDEIR Lower Fernald Property site).

Certificate Comment C-2

Potential alternate receiving locations that could replace the Fernald Property have not been disclosed nor have the impacts of any such locations been analyzed.

Response to Comment C-2

Alternative shaft site locations, within or outside the overall Fernald Property, that could replace the DEIR Fernald Property site were not previously presented as the DEIR Fernald Property site as a receiving shaft location was previously discussed with City of Waltham personnel, understood to be acceptable to the City, impacts were evaluated to be minimal/mitigatable/manageable, and aligned with the MWRA's goals for the Program. Based on the comments since received from the City of Waltham on the DEIR, the MWRA has evaluated shaft site locations outside the Fernald Property including the UMass property for which impact are presented in this SDEIR.

Certificate Comment C-3

Comments from the City of Waltham raise concerns with the adequacy of information presented in the DEIR regarding the Fernald Property. These comments appear to throw into question the viability of the Fernald site in Waltham as the receiving shaft location for the northern tunnel alignment. The Fernald site is identified as the receiving shaft location for the northern alignment for all ten DEIR Alternatives, and no alternate locations in Waltham or Belmont were considered. The SDEIR should address the comments raised by the City of Waltham and continue to study alternatives for the northern tunnel alignment.

Response to Comment C-3

The MWRA had identified the Fernald Property as a possible end point for the North Tunnel, Segment 1, as early as 2016. There are several areas within the Fernald Property that could support shaft and tunnel construction/permanent facility operations. The portion of the Fernald Property presented in the DEIR for a shaft site (DEIR Fernald Property site) had been evaluated as presented in the DEIR and was previously discussed with the City of Waltham. Based on the comments received from the City of Waltham on the DEIR, the MWRA has had additional discussions with the City of Waltham (i.e., Mayor) regarding an alternative siting for the tunnel work, which is now proposed to be at a portion of the Fernald Property closer to Waverley Oaks Road (SDEIR Lower Fernald Property site). In addition, the MWRA has evaluated shaft site locations outside the Fernald Property including the UMass property for which impacts are presented in this SDEIR.

Certificate Comment C-4

The SDEIR should also clarify how environmental factors were considered in the choice of a Preferred Alternative for the tunnel alignments, and if less impactful alternatives were dismissed, provide a clear justification for the dismissal.

Response to Certificate Comment C-4

As described in **SDEIR Section 2.8** and in **DEIR Section 3.9, Selecting the Preferred Alternative (pg. 3-153)**, the alternatives were evaluated against environmental factors within the evaluation criteria of land availability, environmental, social/community. The technical studies, environmental resource impact assessments included in the DEIR and SDEIR, geotechnical investigations, and field surveys described in the SDEIR and in **DEIR Chapter 4, Existing Conditions and Environmental Assessment**, informed the process to select the Preferred Alternative and two back-up alternatives.

As described in **SDEIR Section 2.8.2** through **SDEIR Section 2.8.4**, the following environmental factors were evaluated:

- Space and right-of-way for construction
- Space and right-of-way for permanent facilities
- Possibility of precluding other beneficial uses
- State and federally listed threatened and endangered species
- MCP sites

- Article 97 lands
- Wetlands and waterways
- Groundwater and water supply infrastructure
- Cultural and historic Resources
- Community impacts
- Environmental justice
- Traffic disruption
- Air emissions
- Noise

As shown in **Table 2-7**, the top ranked SDEIR Alternative is Alternative 4A, followed by Alternative 3A and then Alternative 10A. All three SDEIR Alternatives were considered to have similar potential environmental impacts based on the discussion in **SDEIR Section 2.8.3** and based on the evaluation of potential impacts included in the DEIR and SDEIR technical chapters.

Certificate Comment C-12

The SDEIR should include updated site plans for existing and post-development conditions for each project alternative (preferred and backup) that clearly identify environmental resources, either existing land ownership or acquisitions, easements and associated rights (e.g., rail operations, sewer lines, drainage culverts, etc.) required for project construction, and roadway and intersection jurisdictions.

Response to Certificate Comment C-12

Updated site plans depicting the two alternative sites considered for the terminus of the proposed North Tunnel, Segment 1, are provided in **SDEIR Section 2.3**. **Figure 2-2** provides a schematic layout of the UMass Property site that identifies the temporary construction area LOD, and **Figure 2-3** provides the proposed post-development final conditions. Similarly, for the Lower Fernald Property site, a schematic layout with the LOD depicted is provided in **Figure 2-4**, and the proposed post-development conditions are shown in **Figure 2-5**.

The environmental resources in the study area associated with the UMass Property site and the Lower Fernald Property site are depicted for each environmental resource category in each respective technical resource chapter of the SDEIR as listed below.

- **Chapter 1 – Program Description and Permitting**
- **Chapter 2 – Alternatives**
- **Chapter 3 – Outreach and Environmental Justice/Appendix A**
- **Chapter 4 – Land Alteration and Article 97**
- **Chapter 5 – Wetlands and Waterways/Appendix B**
- **Chapter 6 – Water Supply and Water Management Act/Appendix C**
- **Chapter 7 – Climate Change/Appendix D**
- **Chapter 8 – Air Quality and Greenhouse Gas Emissions/Appendix E**
- **Chapter 9 – Transportation/Appendix F**

- **Chapter 10 – Rare Species and Wildlife Habitat**
- **Chapter 11 – Noise and Vibration**
- **Chapter 12 – Cultural and Historic Resources/Appendix G**
- **Chapter 13 – Hazardous Materials, Materials Handling, and Recycling**
- **Chapter 14 – Mitigation/Appendix H**

All other Program sites associated with the SDEIR Alternatives are the same as described and depicted in the DEIR. Conceptual plans by site for the DEIR Alternatives illustrating the existing conditions, as well as the proposed temporary and permanent limits of disturbance, are provided against each environmental resource evaluated in **DEIR Chapter 4, Existing Conditions and Environmental Assessment**. This includes rare species and wildlife habitat in **Figure 4.5-1** through **Figure 4.5-16**, wetlands and waterways in **Figure 4.6-1** through **Figure 4.6-16**, cultural and historic resources in **Figure 4.7-1** through **Figure 4.7-16**, hazardous materials/materials handling/recycling in **Figures 4.8-1** through **Figure 4.8-16**, land use including land ownership in **Figure 4.9-1** through **Figure 4.9-16**, transportation in **Figure 4.10-1** through **Figure 4.10-37**, noise in **Figure 4.12-2** through **Figure 4.12-17**, and community resources in **Figure 4.13-1** through **Figure 4.13-25**. Wetlands and water supply infrastructure are illustrated in **Figure 5.1-1** through **Figure 5.1-24** of **DEIR Chapter 5, Water Supply and Water Management Act**. The identified EJ populations within each Designated Geographic Area are provided in **DEIR Chapter 2, Outreach and Environmental Justice**, in **Figure 2.4-1** through **Figure 2.4-19**. Figures depicting the final conditions at each site are included in **Section 3.8** of **DEIR Chapter 3, Alternatives Analysis**.

Certificate Comment C-16

The DEIR provides a comprehensive analysis of alternatives; however, it relies exclusively on one receiving shaft site for all North Tunnel options (Fernald Property) which appears to be uncertain based on comments from the City of Waltham. In addition, MWRA has preliminarily identified an alternative receiving shaft site location in proximity of the WASM8 [WASM3] in Belmont, which could serve as an alternative to Fernald Property. The details of this alternative location have not been disclosed.

Response to Comment C-16

The MWRA had identified the Fernald Property as a possible end point for the North Tunnel, Segment 1, as early as 2016. There are several areas within the Fernald Property that could support shaft and tunnel construction/permanent facility operations. The portion of the Fernald Property presented in the DEIR for a shaft site (DEIR Fernald Property site) had been evaluated as presented in the DEIR and was previously discussed with the City of Waltham.

As described in the Certificate on the DEIR, the Secretary required that the SDEIR identify and analyze alternative sites for the terminus of the proposed North Tunnel alignment in place of the DEIR Fernald Property site. In response to the Secretary's request, and in accordance with the scope outlined in the Certificate on the DEIR, new alternative sites were considered for the terminus of the proposed North Tunnel alignment (refer to **SDEIR Section 2.2.1**). The Lower Fernald Property site was suggested by the City of Waltham in February 2023 as a potentially suitable site to serve as a replacement for the portion of the Fernald Property depicted in the DEIR. The revised location is adjacent to the Chapel Road/Waverley

Oaks intersection. In addition, the MWRA has evaluated shaft site locations outside the Fernald Property including the UMass Property site for which potential impacts are evaluated in this SDEIR.

MWRA performed an initial assessment of sites in Belmont but determined that the sites were not available for use in the Tunnel Program, and therefore not viable alternatives to the DEIR Fernald Property site. As such, these sites were dismissed from further evaluation.

Certificate Comment C-17

The SDEIR should confirm MWRA's commitment to use the Fernald Property with demonstrated concurrence from the City of Waltham or disclose the environmental impacts associated with alternative receiving shaft site location(s).

Response to Comment C-17

As described in **SDEIR Section 2.8.2**, MWRA has initiated conversations with representatives of UMass regarding use of the UMass Property site as proposed in the SDEIR. The discussions have been favorable, and UMass has been supportive regarding a potential transfer of the necessary portion of the property to MWRA.

The UMass Property site is part of the new preferred alternative and one back up alternative.

The Lower Fernald Property site was suggested by the Mayor of Waltham in February 2023 as a potentially suitable site to serve as a replacement for the DEIR Fernald Property receiving shaft site. The revised shaft site is closer to and on the north side of the intersection of Waverley Oaks Road and Chapel Road.

The revised SDEIR Lower Fernald Property site is part of the 2nd back up alternative.

The environmental impacts associated with shaft sites at both sites are presented in the SDEIR.

Certificate Comment C-18

Specifically, the SDEIR should include a discussion that describes and estimates the environmental impacts associated with any new alternatives presented in the DEIR including changes in shaft sites. To the extent a change in shaft site location necessitates a new or revised north tunnel alignment, the details of any such revision and associated impacts should be discussed.

Response to Certificate Comment C-18

As described in **DEIR Chapter 3, Alternatives Analysis**, the DEIR Alternatives were evaluated using a thorough and transparent methodology that built on the alternatives analysis conducted prior to and in support of the ENF. The alternatives screening approach to identifying the DEIR Alternatives was an iterative process that used a set of evaluation criteria that were applied in detail as the alternatives' identification and evaluation process proceeded. The DEIR Alternatives screening evaluated and scored each of the DEIR tunnel alignment shaft and connection sites individually, and then cumulatively for the entire tunnel alignment, considering the relative ability of the respective alternatives to achieve the project goals while minimizing environmental impacts. High-level DEIR evaluation criteria included:

Engineering/Constructability; Land Availability; Environmental; Social/Community; Operations; Cost; and Schedule. **DEIR Section 3.3, Tunnel Alignment Elements Considered in DEIR (pg. 3-4)** and **DEIR Section 3.4, DEIR Alternative Evaluation and Methodology (pg. 3-12)** describe the tunnel alignment elements considered in the DEIR and how the multi-criteria decision tool was used to evaluate and score the alternatives' components and alignments.

SDEIR Section 2.8 includes a description of how the previous evaluation methodology was used evaluate the SDEIR Alternatives, which incorporate the two new alternative sites, the UMass Property site and the Lower Fernald Property site.

The potential environmental impacts associated with the Program, by alternative and by site, are quantified in **DEIR Chapter 4** for each respective environmental resource area and are updated in the respective sections of this SDEIR site.

Certificate Comment C-19

The DEIR indicates that the three DEIR Alternatives (preferred and backup) generally traverse the same horizontal alignment and would have comparable potential impacts on wetlands, wells or surface water bodies along the tunnel alignment. However, it does not indicate if any dismissed alternative included less impacts to environmental resources that the preferred or backup alternatives selected. The SDEIR [should] clarify if any of the other seven alternatives that were dismissed would include less environmental impacts.

Response to Certificate Comment C-19

As described in **DEIR Chapter 3, Alternatives Analysis**, and **DEIR Appendix C**, the 10 candidate DEIR Alternatives were evaluated against multiple environmental factors within the evaluation criteria of land availability, environmental, and social/community (**DEIR Figure C-1**).

As described in **DEIR Section 3.9.3, Environmental Considerations (pg. 3-155)**, each of the 10 candidate DEIR Alternatives were evaluated according to the presence of the following environmental factors:

- State and federally listed threatened and endangered species (see **DEIR Chapter 4.5, Rare Species and Wildlife Habitat**)
- Massachusetts Contingency Plan (MCP) sites (see **DEIR Chapter 4.8, Hazardous Materials, Materials Handling, and Reuse**)
- Article 97 lands (see **DEIR Chapter 4.13, Community Resources and Open Space**)
- Wetlands and waterways (see **DEIR Chapter 4.6, Wetlands and Waterways**)
- Groundwater and water supply infrastructure (see **DEIR Chapter 5, Water Supply and Water Management Act**)

As described in **DEIR Section 3.9.2, Land Availability Considerations (pg. 3-155)**, each of the 10 candidate DEIR Alternatives were also evaluated based on the following land availability factors (**DEIR Chapter 4.9, Land Use**, and **DEIR Chapter 4.13, Community Resources and Open Space**, informed the evaluation process):

- Site availability
- Space and right-of-way for construction
- Space and right-of-way for permanent facilities
- Possibility of precluding other beneficial uses

Furthermore, as described in **DEIR Section 3.9.4, Social/Community Considerations (pg. 3-156)**, each alternative was evaluated according to the presence of the following social/community considerations:

- Cultural and historic resources (potential adverse effects on National Register of Historic Places) (see **DEIR Chapter 4.7, Cultural and Historic Resources**)
- Community impacts (adverse effects on use of local parks, playgrounds, bus routes, schools, or other community resources) (see **DEIR Chapter 4.13, Community Resources and Open Space**)
- EJ (see **DEIR Chapter 2, Outreach and Environmental Justice**)
- Traffic disruption (see **DEIR Chapter 4.10, Transportation**)
- Air emissions (see **DEIR Chapter 4.11, Air Quality and Greenhouse Gas Emissions**)
- Noise (**DEIR Chapter 4.12, Noise and Vibration**)

The technical studies, environmental resource impact assessments included in the DEIR, geotechnical investigations, and field surveys described in **DEIR Chapter 4, Existing Conditions and Environmental Assessment**, informed the evaluation process. The screening of the 10 candidate DEIR Alternatives included an evaluation and scoring of each of the Program sites individually, and then cumulatively for the entire tunnel alignment (**DEIR Section C.3.1.2**). **DEIR Table C-4, Evaluation Criteria and Scoring**, provides a summary of the evaluation criteria categories and sub-criteria, and the associated scoring.

DEIR Section 3.6, Candidate DEIR Alignment Alternatives Evaluation and Scoring Findings (pg. 3-28), describes the results for each of the 10 candidate DEIR Alternatives. **DEIR Figure 3.7-1** provides a graphical representation of the scoring results of the 10 candidate DEIR Alternatives. This graphic shows that the three shortlisted alternatives were more favorable or neutral compared to the other seven DEIR Alternatives in the environmental and land availability categories.

Given that the 10 candidate DEIR Alternatives use the same launching, receiving, and large connection sites but in different configurations, except for DEIR Alternative 8 that included Riverside Park, the potential environmental impacts were generally the same across alternatives. DEIR Alternative 8, which was dismissed, scored lower in the environmental category because it included an active recreational parcel at Riverside Park. DEIR Alternative 8 stands out as being least favorable of the 10 candidate DEIR Alternatives due to potential impacts to Riverside Park. The Park is actively used for recreation and DEIR Alternative 8 could impact planned future use as recreation. Riverside Park is also an Article 97 property within the Charles River Reservation. The site is within the flood zone of the Charles River and access would have to be shared with other entities. In addition, use of Riverside Park would require a connecting pipeline to be built beneath Massachusetts Bay Transit Authority (MBTA) tracks. These factors led to DEIR

Alternative 8's elimination from further consideration. In addition, DEIR Alternative 7 includes a double launching site from Highland Avenue Northeast, which could increase the intensity of environmental impacts at that location. The remaining DEIR Alternatives are made up of the same set of sites, in various different combinations and with varying functions, and thus have similar environmental impacts.

As described in **DEIR Chapter 4, Existing Conditions and Environmental Assessment**, the DEIR Alternatives were comparable in terms of potential impacts to state- and federally listed threatened and endangered species, Article 97 lands, and MCP sites. All DEIR Alternatives would have similar potential impacts on wetlands, wells, or surface water bodies along the tunnel alignment. All DEIR Alternatives include the same six connection shaft sites, so environmental considerations for the connection shaft sites were the same across all alternatives.

The three shortlisted alternatives were also more favorable or neutral compared to the other seven DEIR Alternatives in the social/community category with the exception of DEIR Alternative 2, which scored more favorably than DEIR Alternatives 3 and 4. As described in **DEIR Section 3.6.2.1, Overall Evaluation: Alternative 2 (pg. 3-32)**, DEIR Alternative 2 avoids TBM launching and receiving at the Hultman Aqueduct node (in favor of the Highland Avenue sites), thus reducing the possible risk associated with the timing of MassDOT Project No. 606783. However, DEIR Alternative 2 was less favorable than DEIR Alternatives 3 and 4 due to scheduling and engineering/constructability.

Certificate Comment C-20

The SDEIR should clearly indicate if the Preferred Alternative is also the most environmentally preferred or provide justification why it was selected over a less environmentally impactful alternative.

Response to Certificate Comment C-20

The assessments of potential environmental impacts presented comparable findings across the three SDEIR Alternatives (**Table 2-8**). SDEIR Alternatives 3A and 4A are anticipated to have fewer potential impacts related to historic resources (i.e., the social/community category discussed in **SDEIR Section 2.8.4**). SDEIR Alternative 10A, given it would include two launching sites compared to three in SDEIR Alternatives 3A and 4A, is more favorable in terms of groundwater management and potential impact on surface water bodies.

It is important to note that the potential environmental impacts associated with each of the three alternatives are generally similar, with mitigation measures incorporated where necessary, and were not a determining factor in identifying the Preferred Alternative.

3 Outreach and Environmental Justice

3.1 Introduction

In accordance with the Secretary's Certificate on the Draft Environmental Impact Report (DEIR) and the two Massachusetts Environmental Policy Act (MEPA) Environmental Justice (EJ) Protocols,[1,2] this chapter of the Supplemental Draft Environmental Impact Report (SDEIR) documents outreach conducted since the DEIR filing on the Metropolitan Water Supply Tunnel Program (Program), including:

- Updated EJ Outreach to Stakeholders (**SDEIR Section 3.2**)
- Updated EJ Outreach Plan (**SDEIR Section 3.3**)
- A description and analysis of EJ populations that are within each Designated Geographic Area (DGA) (**SDEIR Section 3.4**). This section provides:
    - Details on EJ populations present within one mile of each Program site (**SDEIR Section 3.4.2**)
    - Analysis of potential impacts to EJ populations during construction and final conditions (**SDEIR Section 3.4.3** and **SDEIR Section 3.4.4**)
    - Avoidance, minimization, and mitigation strategies (**SDEIR Section 3.4.5**)
- Responses to comments received on the DEIR from the Commonwealth of Massachusetts, Secretary of Energy and Environmental Affairs (EEA), and agency comment letters (SDEIR Section 3.5).

The state environmental review process requires public outreach and consideration of designated EJ populations. The Massachusetts Water Resources Authority (the MWRA) participates in the EJ task force led by the EEA. The MWRA will follow EEA guidelines pertaining to outreach to and inclusion of the EJ communities in locations where Program sites may be located or where the proposed tunnel alignments may traverse. After the Environmental Notification Form (ENF) was filed, MEPA finalized two MEPA EJ Protocols, *MEPA Public Involvement Protocol for Environmental Justice Populations* and *MEPA Interim Protocol for Analysis of Project Impacts on Environmental Justice Populations*, which are effective as of January 1, 2022, for all new filings. Additionally, MEPA amended its regulations under 301 Code of Massachusetts Regulations (CMR) 11.00, which were promulgated on December 24, 2021, amended January 6, 2023. Although this DEIR is not a new filing and therefore not subject to the finalized protocols and amended regulations put forth by MEPA, the MWRA is voluntarily complying with these updates to the greatest extent possible and is conducting appropriate and comprehensive outreach and analysis of EJ populations within the Program Study Area.

1 *MEPA Public Involvement Protocol for Environmental Justice Populations*, effective January 1, 2022.

2 *MEPA Interim Protocol for Analysis of Project Impacts on Environmental Justice Populations*, effective January 1, 2022.

The Program Study Area consists of the communities in which the MWRA evaluated tunnel alignments as part of the water supply program. Each of the Program sites along the alignments where construction at the surface would occur has its own DGA, which is a one-mile radius around the site. The proposed sites include two new sites that are being considered as terminus sites for the North Tunnel, Segment 1: the University of Massachusetts (UMass) Property large connection shaft site in SDEIR Alternatives 3A and 4A, and the Lower Fernald Property receiving shaft site in SDEIR Alternative 10A. Analysis of EJ populations and their demographic characteristics was conducted within these DGAs, as well as along proposed truck routes and tunnel alignments. Collectively, the DGAs surrounding each Program site or tunnel alignment make up the EJ Study Area.

This chapter is written in accordance with the scope identified in the Secretary's Certificate on the DEIR and the EEA's MEPA *Environmental Justice Policy* and EJ Protocols (the *MEPA Public Involvement Protocol for Environmental Justice Populations* and *MEPA Interim Protocol for Analysis of Project Impacts on Environmental Justice Populations*). An EJ population is defined in **DEIR Chapter 2, Section 2.4.3.1, Definition of an EJ Population (pg. 2-14)**, and takes into consideration income, minority status, English language isolation, and Department of Public Health vulnerable health criteria.

3.1.1 Summary of Findings

Key findings of the Program related to EJ are summarized below.

- The MWRA provides wholesale water and sewer services to 3.1 million people and more than 5,500 businesses in 61 communities in eastern and central Massachusetts, which includes several EJ communities as indicated by the DPH's EJ Tool and the EEA's Massachusetts 2020 Environmental Justice Populations mapping tool (EJ Maps Viewer). The MWRA's assets are critical infrastructure for serving residents, communities, and the economy in eastern Massachusetts. The reliable delivery of water is essential to protecting public health, providing sanitation and fire protection, and supporting a viable economy in these communities. Construction of the Program would allow the MWRA to take its aging existing water tunnel system offline to be rehabilitated without interrupting water service to over 2.5 million water customers in the communities.
- While there are anticipated adverse impacts for some resource areas, no disproportionate adverse effects to EJ populations are anticipated for any of the proposed Program sites, nor within 0.5 miles of proposed truck routes.
- The UMass Property site, Lower Fernald Property site, American Legion site, School Street site, Cedarwood Pumping Station, Newton Street Pumping Station, and Southern Spine Mains are each located within a U.S. Census block group that has existing environmental unfair or inequitable burdens as established by Massachusetts Department of Public Health (DPH) vulnerable health criteria.
- The DGAs of the UMass Property site, Lower Fernald Property site, American Legion site, School Street site, St. Mary's Street Pumping Station site, Newton Street Pumping Station site, and Southern Spine Mains site are located within EJ populations that could experience potential temporary traffic impacts. The remaining sites DGAs have no EJ populations that would be subject to Program-related construction vehicle routes.

- There are existing populations with low birth weight health vulnerabilities located within the DGAs of the sites list above and along the anticipated construction truck routes; however, Program activities are not anticipated to have an adverse impact on these populations. No disproportionate adverse effects would be anticipated, and the MWRA will work with the Departments of Public Works (DPWs) and Transportation departments of each affected municipality to establish appropriate transportation-related mitigation measures.
- Potential adverse noise impacts are anticipated to be mitigated at all Program sites and therefore no disproportionate adverse effects to EJ populations are anticipated following mitigation.
- Construction activities at the UMass Property site, School Street site, Newton Street Pumping Station site, and Southern Spine Mains site may have adverse effects to nearby EJ populations due to contamination discovered during construction activities. However, contaminated materials would be appropriately mitigated. While there are existing communities with elevated blood lead health vulnerabilities at the sites listed above both within the DGA and along the anticipated construction truck routes, potential adverse impacts would be mitigated at all Program sites. Therefore, no disproportionate adverse effects to EJ populations are anticipated following mitigation.
- No adverse impacts from wetlands, waterways, or water supply to EJ populations are anticipated. Thus, no disproportionate adverse effects to EJ populations are anticipated.
- No adverse impacts from climate change exposure to EJ populations are anticipated. Thus, no disproportionate adverse effects to EJ populations are anticipated.
- No adverse impacts from community and open space resources on EJ populations are anticipated. Thus, no disproportionate adverse effects to EJ populations are anticipated following mitigation.

3.2 Updated Outreach to Stakeholders

Through individual community meetings, working group collaboration, regular updates to the Board of Directors and Advisory Board, the MWRA has continued to conduct extensive outreach within the Program Study Area to identify key stakeholders.

Table 3-1 summarizes stakeholder outreach that was conducted since the DEIR filing, as well as outreach with communities and with State agencies with care, custody, and control of potential Program sites. No interpretation services were requested for meetings held to date.

Table 3-1 Stakeholder Outreach Conducted Since the DEIR Filing

Stakeholder	Date	Location	Topic
Executive Office of Energy and Environmental Affairs (EEA) and Massachusetts Environmental Policy Act Office (MEPA) Office	3/9/23	Virtual	EEA# 16355 SDEIR Coordination
Massachusetts Environmental Policy Act Office (MEPA) Office	7/18/2023	Virtual	EEA# 16355 SDEIR Coordination
Massachusetts Department of Transportation (MassDOT)	11/1/22	Virtual	Tandem Trailer Coordination
City of Boston	12/21/22	Virtual	Tunnel Program Introduction –City of Boston Neighborhood Program
Jamaica Plain Neighborhood Council	4/4/23	Virtual	Tunnel Program Summary and Geotechnical Investigation Overview
Town of Brookline	12/16/2022	Virtual	Geotechnical Investigations Coordination
Town of Needham	11/22/22	Virtual	Select Board Meeting
Town of Needham	12/19/22	Virtual	Geotechnical Investigations Coordination
Town of Needham	7/6/23	In-person	Program Update
City of Newton	1/27/23	Virtual	Geotechnical Investigations Coordination
Weston Fire Dept.	1/23/23	Virtual	Community Emergency Response
Needham Fire Dept.	1/23/23	Virtual	Community Emergency Response
Waltham Fire Dept.	1/23/23	Virtual	Community Emergency Response
Newton Fire Dept.	1/23/23	Virtual	Community Emergency Response
University of Massachusetts	2/10/23	Virtual	Tunnel Program Introduction
University of Massachusetts	3/21/23	Virtual	225 Beaver St, Waltham, MA
Town of Wellesley	10/6/22	Virtual	Follow-up meeting, Hegarty Pump Station Parcel Ownership & Acquisition Process
Town of Wellesley	11/15/22	Virtual	Board of Public Works – Program Update
Town of Wellesley	12/7/22	Virtual	Geotechnical Investigations Coordination
Town of Weston	12/20/22	Virtual	Geotechnical Investigations Coordination
Town of Weston	1/10/23	Virtual	Select Board Meeting
Town of Weston	1/6/23	Virtual	Geotechnical Investigations Coordination – Conservation Commission
Water Supply Citizens' Advisory Committee (WSCAC)	1/10/23	Virtual	Program Update

3.2.1 Working Group

The MWRA formed a working group that includes representatives of each of the 10 communities within the Program Study Area and representatives from the MWRA Advisory Board, the Water Supply Citizens Advisory Committee to the MWRA (WSCAC), and the Metropolitan Area Planning Council (MAPC). The MWRA has held a number of meetings with the working group (see **SDEIR Table 3-1**). 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, as well as to provide a mechanism for ongoing updates regarding field work planned in the communities. The working group meetings to date are summarized below. It is envisioned these meetings will continue through the MEPA review process.

The MWRA held the first working group meeting on April 7, 2021, which coincided with publication of the Environmental Monitor that included the Program's ENF. This working group meeting provided members with an overview of the Program, information on planned field activities in the communities, and information regarding the MEPA review process, including how to submit comments on the ENF. The MWRA held the second working group meeting on June 2, 2021, at which the MWRA provided a Program update and detailed information about the planned geotechnical field program. The MWRA held the third working group meeting on August 4, 2021, at which the MWRA provided a Program update and an overview of the anticipated shaft and tunnel construction methods so members could gain an initial understanding of potential work and associated impacts in their communities.

The MWRA held the fourth working group meeting on December 4, 2021, at which the MWRA provided a Program update, a description of the alternatives' evaluation process, and an overview of the 10 alternatives to be evaluated and narrowed down to the three alternatives carried in the DEIR. Note that the three alternatives were not identified in this meeting but were the subject of the subsequent meeting.

The MWRA held the fifth working group meeting on June 15, 2022, at which the MWRA provided a Program update and the three shortlisted alternatives resulting from the alternatives evaluation process. The three alternatives presented at this meeting had not yet been ranked as the preferred and two backup alternatives. Additional evaluation followed this meeting.

The MWRA held the sixth working group meeting on September 22, 2022, at which the MWRA provided a Program update and the results of the detailed analysis resulting in the determination of the preferred and two backup alternatives carried in the DEIR. This was the last working group meeting prior to filing the DEIR.

Additional presentations with individual communities will continue through the MEPA process and into the design phases of the Program.

3.2.2 Community Representatives

In addition to working group meetings, MWRA staff has held meetings with individual communities to introduce the Program to additional community staff and to brief staff on community-specific items that may be of interest, including fieldwork, traffic, noise and vibration, environmental considerations among other topics. The MWRA Program Team will follow up with additional meetings and/or presentations to

each of the host communities as requested by the communities to present to the host communities' city council/select members or to interested community members. In addition, the MWRA Program Team will continue to communicate with each individual community on Program activities through the community nominated working group member.

As shown in **DEIR Chapter 2, Outreach and Environmental Justice, Table 2.2-1**, and **SDEIR Table 3-1**, to date, over 40 meetings were held with the communities in which sites are located. Topics included a Program overview, fieldwork coordination, summary of potential construction period impacts and mitigation, and emergency services coordination.

3.2.3 State Agencies

The MWRA met with EEA, the MEPA Office, Massachusetts Department of Transportation (MassDOT), Division of Capital Asset Management and Maintenance (DCAMM), Massachusetts Department of Conservation and Recreation (DCR), Massachusetts Department of Environmental Protection (MassDEP), Massachusetts Department of Youth Services, and other State agencies. Meetings have already been held with some state regulatory agencies, including MEPA staff and MassDEP to provide an overview of the Program and to seek preliminary guidance on the permitting strategy. The MWRA has coordinated with Massachusetts Historical Commission (MHC) during field investigations as well as in advance of the DEIR and SDEIR filings. Ongoing outreach with state agencies will be carried out as the Preliminary Design phase progresses, which will be scheduled to occur prior to major submittals, and more frequently as needed to provide updates on the Program or to address specific issues.

3.2.4 MWRA Board of Directors

The MWRA has and will continue to offer briefings for the MWRA Board of Directors to update them on Program status, including the filing of public documents. **Table 3-2** summarizes these meetings and includes a link to the Staff Summary and presentation materials.

Table 3-2 MWRA Board of Directors' Meetings

Date	Location	Topic
4/17/2019	Charlestown Navy Yard	Update on Tunnel Hydraulics and Program Support Services Key Personnel: Contract 7655
10/16/2019	Charlestown Navy Yard	Program Update
5/27/2020	Virtual	Geotechnical Investigation and Environmental Impact Report: CDM Smith, Inc. Contract 7159 and Program Update
12/16/2020	Virtual	Program Update
2/17/2021	Virtual	Program Update and Filing of Environmental Notification Form
10/20/2021	Virtual	Program Update
9/14/2022	Virtual	Program Update
5/24/2023	Deer Island Treatment Plant with Virtual Access	Program Update

1 *All MWRA Board of Directors meeting materials, presentations, and approved minutes may be found on the MWRA's website at https://www.mwra.com/02org/html/bodmtg.htm.*

3.2.5 MWRA Advisory Board

The MWRA has conducted briefings and anticipates ongoing briefings and meetings with the MWRA Advisory Board, which represents the MWRA's member communities. Ongoing meetings with members from each of the communities within the Program Study Area may be held if requested by community representatives. Since the DEIR filing, MWRA staff presented a Program Update to the MWRA Advisory Board on November 17, 2022.

3.2.6 Environmental Advocacy Groups

The MWRA commenced and will continue comprehensive outreach to environmental advocacy groups.

3.2.7 Public Information Sessions and Workshops

The MWRA will hold public information sessions and/or workshops as requested by communities or other stakeholders.

3.3 Updated Environmental Justice Outreach Plan

The MWRA has and will continue to tailor outreach to EJ communities throughout the Program planning, design, and construction to facilitate their involvement in the environmental review process. The DEIR analysis identified EJ communities within the Program Study Area (see **DEIR Section 2.4.4, Methodology, [pg. 2-15]**), for each of the proposed launching, receiving, large connection, and connection sites, and will use a combination of methods to enable participation in the environmental review process. The Program Study Area consists of the communities within which the MWRA evaluated tunnel alignments as part of the water supply program. Each of the Program sites has its own DGA, which is the one-mile radius around the site. EJ analysis was conducted within these DGAs, encompassing EJ block groups that fall partially or

fully within the DGA. Collectively, the DGAs surrounding each Program site make up the EJ Study Area. Outreach methods include translating outreach materials to languages prevalent in EJ communities within the EJ Study Area, publishing notices in foreign language local newspapers, and using various social media platforms and media outlets to reach the intended population. The MWRA will hold public information sessions or workshops as requested. Interpretation services will automatically be provided for communities where at least 5 percent of census tract population speak a specific language; and for all other communities, the MWRA will provide interpreters as requested.

The Climate Roadmap Act requires that, "[i]f a proposed project affects an environmental justice population," the Secretary of EEA shall require additional measures to improve public participation by the EJ population. To be consistent with 301 CMR 11.05(4), the MWRA voluntarily proposes to provide advance notification of the Program no later than 45 days, and no earlier than 90 days, prior to filing to community-based organizations (CBOs) and tribes based on a recommended list provided by the EEA EJ Director. The MWRA committed to and implemented the following public involvement strategies. Progress on the strategies is summarized in **Table 3-3**.

- Holding community meetings (i.e., in-person, via phone, and via Zoom) upon request by anyone contacted through advance notification provided or upon further dissemination of a written project summary, in a variety of formats and at a time of day that will ensure greatest level of participation.
- Wide dissemination of a written project summary (with translation into relevant languages or upon request) with basic project details.
- Wide dissemination of fact sheets (with translation into relevant languages) for key topics such as traffic, noise and vibration, shaft site selection process, and natural and cultural resource impacts (see examples on the MWRA's webpage: https://www.mwra.com/mwtp/resources.html).
- Hosting a project website or making project information available through other similar electronic means on local municipality websites.
- Ensuring outreach is communicated in clear, understandable language and in a user-friendly format.
- Use of non-English and/or community-specific media outlets to publicize the project, including local newspapers.

Table 3-3 documents a summary of the updated outreach plan post-DEIR filing.

Table 3-3 Outreach Plan/Update

Timing	Outreach Type	Outreach Details
Since Project Initiation	MWRA Website	Regular updates to dedicated page on MWRA website on the Program.
Fall 2022	Advertisement	Translated project and meeting information will be provided based on languages spoken by at least 5 percent of census tract population in each community. An Advance Notification Form (EJ Screening Form) was provided to Community Based Organizations ahead of the DEIR filing. (https://www.mwra.com/mwtp/resources.html) In addition, advertise upcoming meetings through www.MWRA.com, organizational social media, and via the MWRA's subscription-based notification system
Fall 2022	Fact Sheet Dissemination	Fact sheets on Environmental Resources, Noise and Vibration, Air Quality, Shaft Selection, Traffic, and Water Supply were prepared and posted on the MWRA's website. All the fact sheets were translated into Spanish, Haitian Creole, and Chinese (https://www.mwra.com/mwtp/resources.html)
Fall 2022-Winter 2023	Public Meetings	MWRA presented at Select Board meetings in the towns of Weston and Needham. These meetings had the option of virtual attendance. Offer interpretation services during the meeting based on languages spoken by at least 5 percent of census tract population in each community. Take meeting minutes as a record of community feedback. Established point of contact at MWRA and within project communities that residents can contact regarding questions or concerns throughout the course of the Program.
Prior to SDEIR Filing	Notifications	Translated project and meeting information will be provided based on languages spoken by at least 5 percent of census tract population in each community. An Advance Notification Form (EJ Screening Form) was provided to Community Based Organizations ahead of the SDEIR filing. (https://www.mwra.com/mwtp/resources.html) In addition, if meetings are requested, they will be advertised through www.MWRA.com, organizational social media, and via the MWRA's subscription-based notification system
Post SDEIR Filing	Public Meetings	MWRA will hold public meetings in the communities within DGAs as requested by the community. Provide notifications of meeting through social media, traditional media outlets, www.MWRA.com, and the MWRA's subscription-based notification system. Provide notifications of meeting through social media, traditional media outlets, www.MWRA.com, and the MWRA's subscription-based notification system. Offer interpretation services during the meeting based on languages spoken by at least 5 percent of census tract population in each community. Offer interpretation services for other languages spoken within the community (<5 percent of the census tract population) as requested. Take meeting minutes as a record of community feedback.
Prior to Final Environmental Impact Report (FEIR) Filing	Public Meeting Follow-up	Translate meeting minutes of public meetings to languages spoken by at least 5 percent of census tract population in each DGA. Post minutes from public meetings on the Program website; share minutes with municipal and other key contacts in project communities; request that project communities to make these minutes available for viewing on municipal websites. Incorporate project feedback gathered at community meetings and adjustments

Table 3-3 Outreach Plan/Update

Timing	Outreach Type	Outreach Details
		made based on that feedback into final draft of FEIR prior to submission.
Design Phase	Public Meetings	Hold public meetings with a virtual option for community members who are unable to attend in person. Offer interpretation services during the meeting based on languages spoken by at least 5 percent of census tract population in each community. Present details regarding project design and provide full-size plan sets for viewing by meeting attendees. Discuss anticipated program-related impacts and allow time for Q&A period regarding these impacts. Take meeting minutes as a record of community feedback. Post minutes from public meetings on the Program website; share minutes with municipal and other key contacts in project communities; request that project communities make these minutes available for viewing on municipal websites. Implement design changes to the greatest extent practicable based on community feedback. Finalize designs and share project status with communities through www.MWRA.com, organizational social media, and via MWRA's automated notification system.
Pre-Construction Phase	Advertisement	Distribute public meeting notice to local newspapers in project communities for posting at least 2 weeks prior to virtual pre-construction meeting. Mail flyers with project timeline, MWRA and municipal contact information, and pre-construction meeting information to residents and businesses of project communities with focus on abutters in proximity to work zones and residents within the DGA. Translated notices will be provided based on languages spoken by at least 5 percent of census tract population in each community.
Pre-Construction Phase	Public Meeting	A recorded virtual pre-construction meeting, provided in all languages spoken by at least 5 percent of census tract population in each community, will be held for members of all project communities. Finalized details regarding the project design, construction, and proposed construction timeline and work hours will be presented to meeting attendees. A Q&A period will be held at the end of the presentation so that any project-related questions or concerns may be addressed. Take meeting minutes as a record of community feedback; share completed minutes with municipal contacts in project communities so that they may be posted online. Circulate recording of public meeting to public access stations within project communities so that it may be periodically aired prior to project commencement.
Construction Phase	Ongoing Updates of Project Status	Project updates will be provided on a regular basis to project communities through www.MWRA.com, organizational social media, via MWRA's subscription-based notification system, and on municipal websites in communities within the EJ Study Area. Translations of project updates will be provided based on languages spoken by at least 5 percent of census tract population in each community. Email addresses and phone numbers of project contacts at MWRA will be made available so that residents can reach out with project concerns. Virtual project update meetings will be held on a quarterly basis for all project communities. These meetings will be recorded and provided in all languages spoken by at least 5 percent of census tract population in each community; recordings will be shared and circulated to public access stations within project

Table 3-3 Outreach Plan/Update

Timing	Outreach Type	Outreach Details
		communities so that they may be periodically aired throughout the duration of the project until a new meeting is recorded.

3.4 Environmental Justice Impact Assessment

In accordance with the scope for the SDEIR outlined in the Secretary's Certificate on the DEIR, this section assesses the two new terminus sites for North Tunnel, Segment 1, and the associated refined tunnel alignment. It provides an existing conditions assessment documenting EJ populations within 1 mile of the sites (study area known in the methodology as the DGA) and evaluates temporary and permanent impacts to EJ populations for the North Tunnel alignment alternative sites. This section also addresses the additional requirements outlined in the Secretary's Certificate for the full Program. Avoidance, minimization, and mitigation measures were considered**. Figure 3-1** and **Figure 3-2** illustrate EJ populations within each DGA. **Table 3-4** through **Table 3-6** present summaries of potential construction period and final condition impacts for the new SDEIR terminus sites for the North Tunnel, Segment 1.

To determine if there is a disproportionate burden on EJ communities, impacts and potential mitigation for each of the alternatives during construction period and for final conditions were identified.[3]

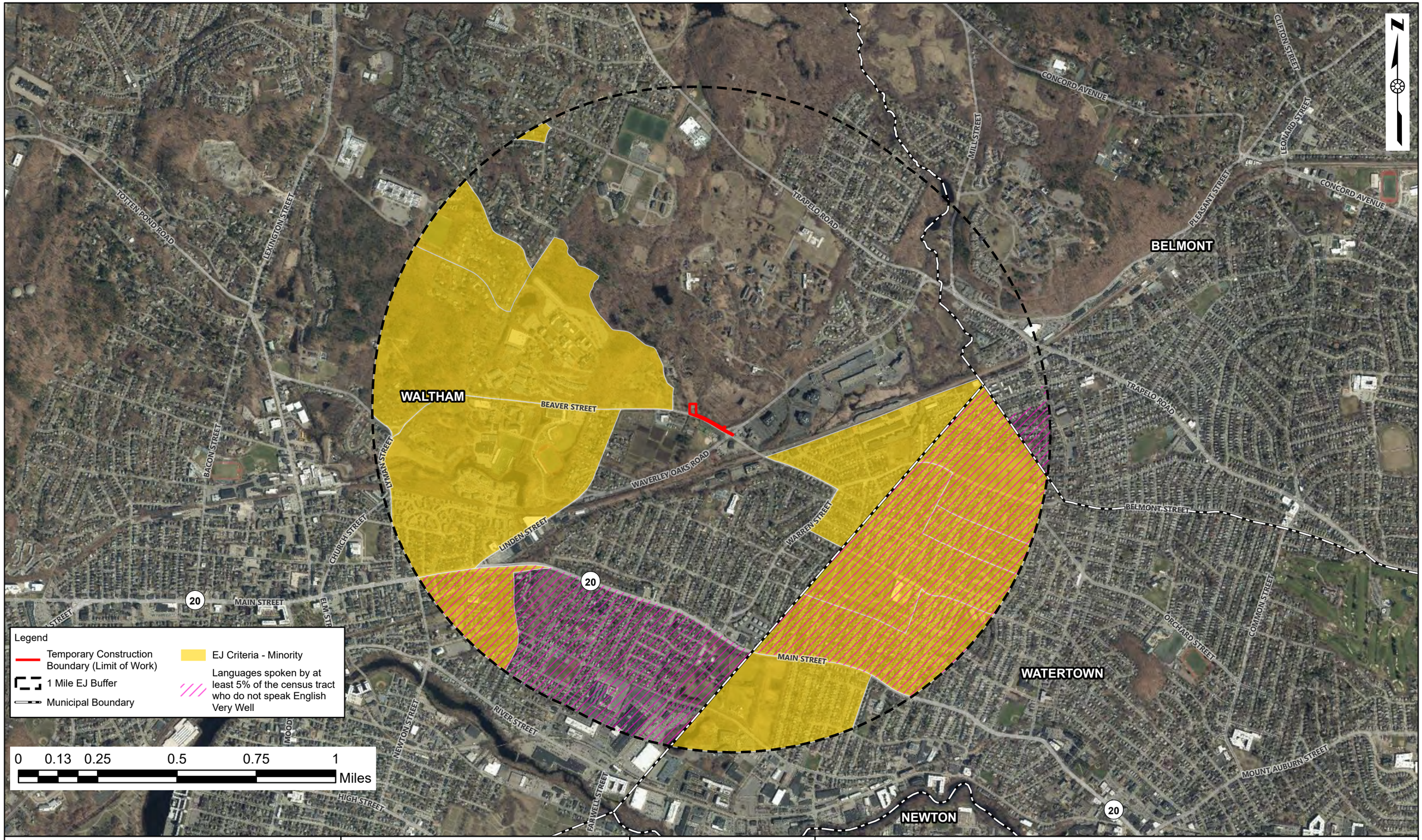
- If there is no impact, either before or after planned mitigation, there would be no disproportionate adverse effect.
- If there is an impact that is felt equally by both EJ communities and non-EJ communities, there would be an adverse impact but no disproportionate adverse effect.
- If only EJ communities were impacted, even if there are no non-EJ communities in close proximity, there would be a disproportionate impact. This is a compounded concern if non-EJ communities would benefit from the Program but would not experience adverse impacts.
- If the impacted EJ community also has an identified vulnerable health criterion, any exacerbations of a health criterion (e.g., particulate matter from soil movement during construction activities) would have to be identified and mitigated.

While there are anticipated adverse impacts for some resource areas, **no disproportionate adverse effects to EJ populations are anticipated for any of the proposed Program sites, nor within 0.5 miles of proposed truck routes.** Proposed mitigation measures to address adverse impacts are summarized in **SDEIR Chapter 14, Mitigation**. The important new infrastructure would provide redundancy for the MWRA's existing Metropolitan Tunnel System, which would substantially benefit EJ and non-EJ populations by reducing the risk of interrupted water supply during unexpected events. **SDEIR Section 3.4.3** through **SDEIR Section 3.4.5** elaborate on resource area construction period activities and

3 EEA. 2022. *Final MEPA Interim Protocol for Analysis of Project Impacts on Environmental Justice Populations*. https://www.mass.gov/doc/final-mepa-interim-protocol-for-analysis-of-project-impacts-on-environmental-justice-populations-effective-date-of-january-1-2022/download.

final condition impacts, and mitigation for the UMass Property site and Lower Fernald Property site. See **DEIR Section 2.4.5**, **Existing Conditions (pgs. 2-25** to **2-94)** for existing conditions and analysis for the DEIR proposed sites.

As directed in the Certificate, consideration is given to transportation, air quality and greenhouse gas (GHG) emissions, noise and vibration, hazardous materials, wetlands and waterways/natural resources, climate change, and community and open space resources.



Metropolitan Water Tunnel Program	MWRA Contract No. 7159 Supplemental Draft Environmental Impact Report 2023	CDM Smith in association with vhb Jacobs GREEN INTERNATIONAL AFFILIATES, INC.	Environmental Justice Populations UMass Property Large Connection Shaft Site (Alternatives 3A and 4A) Figure 3-1 Waltham, MA Source: MWRA, CDM Smith, VHB, Jacobs, MassGIS

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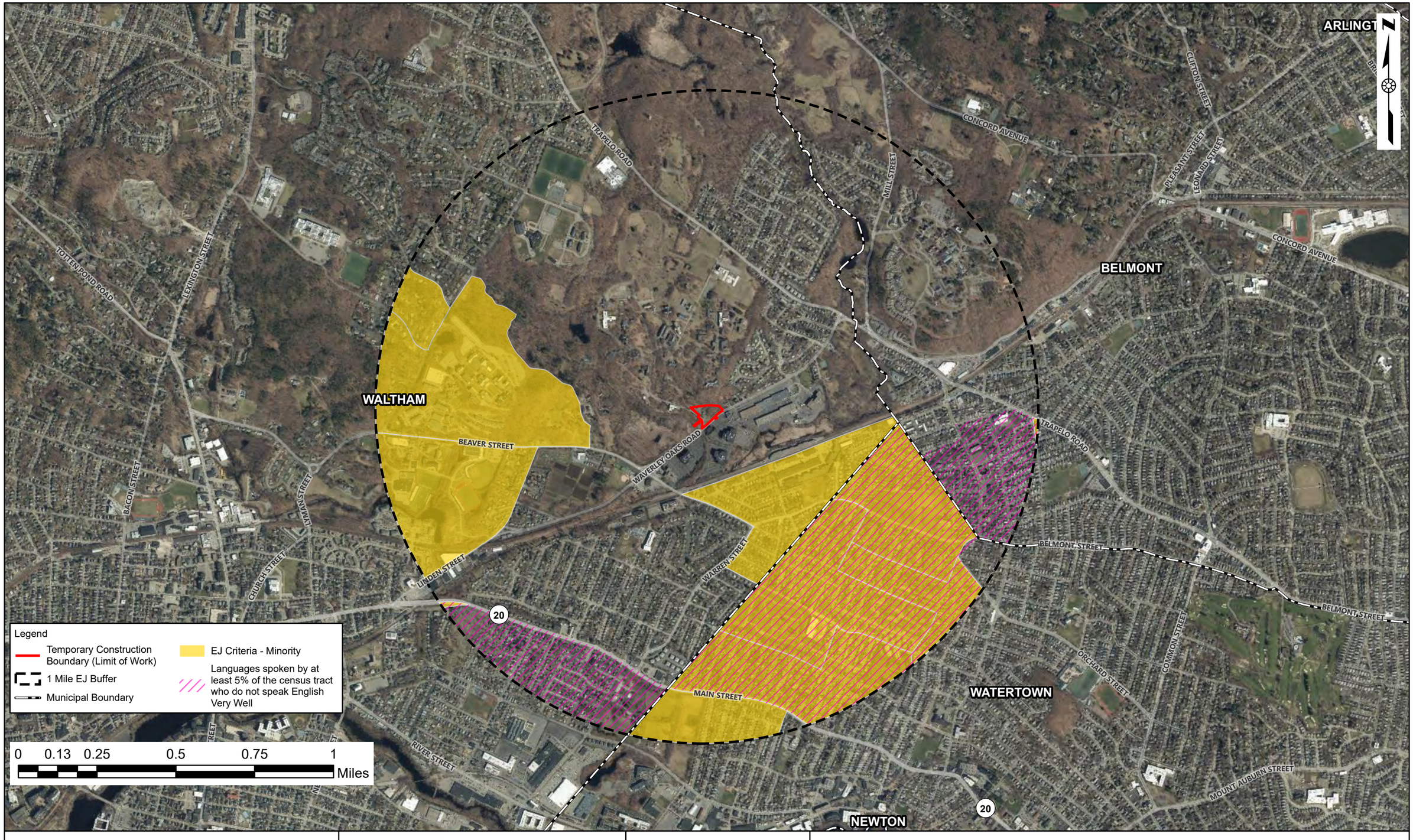

Metropolitan Water Tunnel Program	MWRA Contract No. 7159 Supplemental Draft Environmental Impact Report 2023	CDM Smith in association with vhb Jacobs GREEN INTERNATIONAL AFFILIATES, INC.	Environmental Justice Populations Lower Fernald Property Receiving Shaft Site (Alternative 10A) Figure 3-2 Waltham, MA Source: MWRA, CDM Smith, VHB, Jacobs, MassGIS

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Table 3-4 Potential Program-Related Impacts to EJ Populations – Alternative 3A

Alt.	Proposed Site	EJ Block Groups Within 1 Mile?	LOD within EJ Block Group?	Phase of Potential Impact	Transportation (Impact/Disp. Impact)		Air Quality and GHG (Impact/Disp. Impact)		Noise and Vibration (Impact/Disp. Impact)		Hazardous Materials (Impact/Disp. Impact)		Wetlands, Waterways, and Water Supply (Impact/Disp. Impact)		Climate Change (Impact/Disp. Impact)		Community and Open Space Resources (Impact/Disp. Impact)	
3A	UMass Property (Large Connection)	Yes	No	Construction	**Y**	N	N	N	**Y**	N	**Y**	N	N	N	N	N	N	N
				Final	N	N	N	N	N	N	N	N	N	N	N	N	N	N
	Bifurcation (Launching)	*Yes*	*No*	*Construction*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
				Final	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
	Tandem Trailer and Park Road East (Launching)	*Yes*	*No*	*Construction*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
				Final	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
	Highland Avenue Northwest/ Southwest (Receiving)	*Yes*	*No*	*Construction*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
				Final	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
	Highland Avenue Northeast/ Southeast (Launching)	*Yes*	*No*	*Construction*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
				Final	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
	American Legion (Receiving)	*Yes*	*Yes*	*Construction*	***Y***	*N*	*N*	*N*	***Y***	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
				Final	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
	School Street (Connection)	*Yes*	*Yes*	*Construction*	***Y***	*N*	*N*	*N*	***Y***	*N*	***Y***	*N*	*N*	*N*	*N*	*N*	*N*	*N*
				Final	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
	Cedarwood Pumping Station (Connection)	*Yes*	*Yes*	*Construction*	*N*	*N*	*N*	*N*	***Y***	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
				Final	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
	Hegarty Pumping Station (Connection)	*Yes*	*Yes*	*Construction*	*N*	*N*	*N*	*N*	***Y***	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
				Final	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
	St. Mary Street Pumping Station (Connection)	*Yes*	*No*	*Construction*	***Y***	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
				Final	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
	Newton Street Pumping Station (Connection)	*Yes*	*Yes*	*Construction*	***Y***	*N*	*N*	*N*	***Y***	*N*	***Y***	*N*	*N*	*N*	*N*	*N*	*N*	*N*
				Final	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
	Southern Spine Mains (Connection)	*Yes*	*Yes*	*Construction*	***Y***	*N*	*N*	*N*	*N*	*N*	***Y***	*N*	*N*	*N*	*N*	*N*	*N*	*N*
				Final	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
	Hultman Aqueduct Isolation Valve (Connection)	*Yes*	*Yes*	*Construction*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
				Final	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*

Source: Commonwealth of Massachusetts, Environmental Justice Maps Viewer, November 2022, https://www.mass.gov/info-details/massgis-data-2020-environmental-justice-populations.

N = No, Y = Yes, LOD = limit of disturbance, Disp. = disproportionate impact.

Italicized text within the table indicates no change from the DEIR.

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Table 3-5 Potential Program-Related Impacts to EJ Populations – Alternative 4A

Alt.	Proposed Site	EJ Block Groups Within 1 Mile?	LOD within EJ Block Group?	Phase of Potential Impact	Transportation (Impact/Disp. Impact)		Air Quality and GHG (Impact/Disp. Impact)		Noise and Vibration (Impact/Disp. Impact)		Hazardous Materials (Impact/Disp. Impact)		Wetlands, Waterways, and Water Supply (Impact/Disp. Impact)		Climate Change (Impact/Disp. Impact)		Community and Open Space Resources (Impact/Disp. Impact)	
4A	UMass Property (Large Connection)	Yes	No	Construction	**Y**	N	N	N	**Y**	N	**Y**	N	N	N	N	N	N	N
				Final	N	N	N	N	N	N	N	N	N	N	N	N	N	N
	Tandem Trailer and Park Road East (Launching)	*Yes*	*No*	*Construction*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
				Final	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
	Park Road West (Receiving)	*No*	*No*	*Construction*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
				Final	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
	Highland Avenue Northwest/Southwest (Launching)	*Yes*	*No*	*Construction*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
				Final	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
	Highland Avenue Northeast/Southeast (Launching)	*Yes*	*No*	*Construction*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
				Final	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
	American Legion Receiving (Receiving)	*Yes*	*Yes*	*Construction*	***Y***	*N*	*N*	*N*	***Y***	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
				Final	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
	School Street (Connection)	*Yes*	*Yes*	*Construction*	***Y***	*N*	*N*	*N*	***Y***	*N*	***Y***	*N*	*N*	*N*	*N*	*N*	*N*	*N*
				Final	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
	Cedarwood Pumping Station (Connection)	*Yes*	*Yes*	*Construction*	*N*	*N*	*N*	*N*	***Y***	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
				Final	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
	Hegarty Pumping Station (Connection)	*Yes*	*Yes*	*Construction*	*N*	*N*	*N*	*N*	***Y***	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
				Final	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
	St. Mary Street Pumping Station (Connection)	*Yes*	*No*	*Construction*	***Y***	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
				Final	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
	Newton Street Pumping Station (Connection)	*Yes*	*Yes*	*Construction*	***Y***	*N*	*N*	*N*	***Y***	*N*	***Y***	*N*	*N*	*N*	*N*	*N*	*N*	*N*
				Final	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
	Southern Spine Mains (Connection)	*Yes*	*Yes*	*Construction*	***Y***	*N*	*N*	*N*	*N*	*N*	***Y***	*N*	*N*	*N*	*N*	*N*	*N*	*N*
				Final	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
	Hultman Aqueduct Isolation Valve (Connecting)	*Yes*	*No*	*Construction*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
				Final	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*

Source: Commonwealth of Massachusetts, Environmental Justice Maps Viewer, November 2022, https://www.mass.gov/info-details/massgis-data-2020-environmental-justice-populations.

N = No, Y = Yes, LOD = limit of disturbance, Disp. = disproportionate impact.

Italicized text within the table indicates no change from the DEIR.

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Table 3-6 Potential Program-related Impacts to EJ Populations – Alternative 10A

Alt	Proposed Site	EJ Block Groups Within 1 Mile?	LOD within EJ Block Group?	Phase of Potential Impact	Transportation (Impact/Disp. Impact)		Air Quality and GHG (Impact/Disp. Impact)		Noise and Vibration (Impact/Disp. Impact)		Hazardous Materials (Impact/Disp. Impact)		Wetlands, Waterways, and Water Supply (Impact/Disp. Impact)		Climate Change (Impact/Disp. Impact)		Community and Open Space Resources (Impact/Disp. Impact)	
10A	Lower Fernald Property (Receiving)	Yes	No	Construction	**Y**	N	N	N	**Y**	N	N	N	N	N	N	N	N	N
				Final	N	N	N	N	N	N	N	N	N	N	N	N	N	N
	Park Road West (Large Connection)	*Yes*	*No*	*Construction*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
				Final	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
	Highland Avenue Northwest/ Southwest (Launching)	*Yes*	*No*	*Construction*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
				Final	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
	Highland Avenue Northeast/ Southeast (Launching)	*Yes*	*No*	*Construction*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
				Final	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
	American Legion (Receiving)	*Yes*	*Yes*	*Construction*	***Y***	*N*	*N*	*N*	***Y***	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
				Final	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
	School Street (Connection)	*Yes*	*Yes*	*Construction*	***Y***	*N*	*N*	*N*	***Y***	*N*	***Y***	*N*	*N*	*N*	*N*	*N*	*N*	*N*
				Final	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
	Cedarwood Pumping Station (Connection)	*Yes*	*Yes*	*Construction*	*N*	*N*	*N*	*N*	***Y***	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
				Final	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
	Hegarty Pumping Station (Connection)	*Yes*	*Yes*	*Construction*	*N*	*N*	*N*	*N*	***Y***	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
				Final	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
	St. Mary Street Pumping Station (Connection)	*Yes*	*No*	*Construction*	***Y***	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
				Final	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
	Newton Street Pumping Station (Connection)	*Yes*	*Yes*	*Construction*	***Y***	*N*	*N*	*N*	***Y***	*N*	***Y***	*N*	*N*	*N*	*N*	*N*	*N*	*N*
				Final	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
	Southern Spine Mains (Connection)	*Yes*	*Yes*	*Construction*	***Y***	*N*	*N*	*N*	*N*	*N*	***Y***	*N*	*N*	*N*	*N*	*N*	*N*	*N*
				Final	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
	Hultman Aqueduct Isolation Valve (Connecting)	*Yes*	*Yes*	*Construction*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*
				Final	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*	*N*

Source: Commonwealth of Massachusetts, Environmental Justice Maps Viewer, November 2022, https://www.mass.gov/info-details/massgis-data-2020-environmental-justice-populations.

N = No, Y = Yes, LOD = limit of disturbance, Disp. = disproportionate impact.

Italicized text within the table indicates no change from the DEIR.

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3.4.1 Environmental Justice Impact Methodology

The SDEIR utilizes the same methodology as the DEIR for establishing the DGA, assessing existing unfair and inequitable environmental burden, and analysis for the two new sites and SDEIR Alternatives. The 2022 *MEPA Interim Protocol for Analysis of Project Impacts on Environmental Justice Populations* outlines the data sources within the DPH EJ Tool to assess existing unfair or inequitable environmental burden. The Protocol notes that "measuring the individual effects of a multitude of past and current activities is a complex endeavor" and identifies municipality vulnerable health data and potential sources of pollution data as potential markers of existing unfair or inequitable environmental burden.

The SDEIR EJ analysis provides required data, identifies existing unfair or inequitable environmental burden from the vulnerable health data available on a census tract level (i.e., low birth weight and elevated blood lead prevalence greater than 110 percent of the statewide rate). The SDEIR also depicts these two vulnerable health criteria within 0.5 miles of all truck routes, in addition to the DGA census tracts previously analyzed in the DEIR. For the SDEIR, the analysis was augmented to evaluate EJ communities along truck routes, as requested in the Certificate.

The ENF was filed with MEPA prior to the promulgation of the EJ requirements, and the Program is therefore not subject to the finalized EJ Protocols and amended regulations; regardless, the MWRA continues to voluntarily comply with these updates to the greatest extent possible and will conduct appropriate and comprehensive outreach and analysis of EJ populations within the EJ Study Area.

Under the 2021 EJ Policy, projects that impact air quality by meeting or exceeding MEPA review thresholds under 301 CMR 11.03(8)(a) and (b) or that generates 150 or more average daily trips (ADT) of diesel vehicle traffic over a duration of one year or more, excluding public transit trips, must identify EJ block groups and conduct public outreach to those EJ populations within 5 miles of the project site. Since this Program is voluntarily complying with the 2021 EJ Policy and 2022 EJ Protocols to the greatest extent possible, and Program sites are separated geographically and intersect distinct EJ populations, the MWRA conducted a conservative analysis of net new ADT of diesel vehicle traffic over one year or more at each site instead of analyzing cumulative ADT across all Program sites.

The DEIR estimated the potential for up to 156 ADT of diesel trucks at Program launching sites in the worst-case scenario. These launching sites include Tandem Trailer (SDEIR Alternatives 3A and 4A), Bifurcation (SDEIR Alternative 3A), Highland Avenue Northwest/Southwest (SDEIR Alternatives 4A and 10A), and Highland Avenue Northeast/Southeast (all SDEIR Alternatives) as shown in **SDEIR Appendix F, Transportation Supporting Documentation, F.1, Updated Transportation Impact Assessment, Tables F.1-7**, **F.1-8**, and **F.1-16**. The 156 ADT value was not based on an annual average; the DEIR estimation was calculated only over the number of days construction would occur per year. **The annual average ADT generated by the Program during construction activities would be around 111 average daily trips per year**. This conclusion is reached by taking the maximum number of daily truck trips (156) and multiplying that by the typical workdays in a year (260) and dividing that amount over a full 365 days to identify the number of annual ADT. Based on the EJ guidance for an impact assessment, the annual ADT 111 is below the 150 ADT threshold and thus a one-mile radius for the EJ assessment is appropriate.

For the purposes of the SDEIR, a worst-case analysis is assessed which assumes approximately 70 feet excavation per day by a tunnel boring machine (TBM) and that construction would only occur on business days. The average rate for excavation is likely to be less than 60 feet per day, translating to fewer than 150 additional ADT by diesel trucks. Although the excavation in some days may reach or exceed 70 feet a day, the likelihood of exceeding 60 feet a day continuously for over four consecutive quarters (one year) is extremely low. Accordingly, the estimated number trucks is a conservative estimate considering the full duration of construction. As demonstrated in the DEIR and this SDEIR, based on the conservative estimate of ADT, the roadways can accommodate the truck traffic with no need for mitigation.

Details of the existing EJ populations, languages spoken by at least 5 percent of the population that do not speak English "very well," relevant DPH data, and the Resilient Massachusetts Action Team (RMAT) Tool outputs are identified and summarized for the two new alternative sites: the UMass Property site (SDEIR Alternatives 3A and 4A) and the Lower Fernald Property site (SDEIR Alternative 10A).

3.4.2 Environmental Justice Existing Conditions

The following section summarizes the characteristics of EJ populations within the DGAs of the Program sites and documents the existing unfair or inequitable environmental burdens that may be present in the DGA associated with the UMass Property site and the Lower Fernald Property site. For existing conditions of the Program sites evaluated in the DEIR, see the **DEIR Section 2.4.5.2**, **Launching and Receiving Sites**, **(pg. 2-67**-**2-80)**, and **DEIR Section 2.4.5.3**, **Connection and Isolation Valve Sites (pg. 2-81** to **2-96)**.

Figure 3-1 and **Figure 3-2** depict the EJ populations and languages spoken data within 1 mile of the two additional sites, the UMass Property site and the Lower Fernald Property site. **Table 3-7** summarizes the number of EJ block groups present within the EJ Study Area, approximate area of EJ block groups in terms of the site's DGA, and whether the Program site's limit of disturbance (LOD) is located within an EJ block group. For the depiction of EJ populations and languages spoken within the DGAs for the DEIR proposed sites, see the **DEIR Chapter 2, Figure 2.4-4** through **DEIR Chapter 2, Figure 2.4-19**. EJ populations are present within one mile of all Program sites, except the Park Road West site. **Table 3-8** and **Table 3-9** show if a site has at least one block group that has a DPH health vulnerability, at both the census tract and community level, and is elaborated on further in **SDEIR Section 3.4.2.1** and **SDEIR Section 3.4.2.2**. For more detailed DPH data on the DEIR proposed sites, refer to **DEIR Appendix B, Environmental Justice Supporting Documentation**.

Block groups within one mile of the two new additional sites, UMass Property and Lower Fernald Property sites, are within census tracts that have Elevated Blood Lead Prevalence and Low Birth Weight rates that are higher than 110 percent of the statewide rate.

Data on the Heart Attack and Childhood Asthma criteria are only available at the community level. **SDEIR Appendix A, Environmental Justice Supporting Documentation Table A-1** and **Table A-2** present these vulnerabilities, as well as Elevated Blood Lead Prevalence and Low Birth Weight Rate per 1,000 at the community level, respectively, for all municipalities that fall within the DGAs. Vulnerable health criteria at the community level in municipalities within the UMass Property site and Lower Fernald Property site

DGAs (Belmont, Waltham, and Watertown) did not have rates greater than 110 percent of the statewide rate.

Table 3-7 Summary of Environmental Justice Populations by Site

Proposed Site (Alternative)	Number of EJ Block Groups within 1 mile	Approximate Area of EJ Block Groups in a site's DGA (%)	LOD within EJ Block Group?	Languages Spoken by at least 5% of census tract population[1]
UMass Property, Waltham (3A, 4A)	10	41%	No	Spanish or Spanish Creole Chinese
Lower Fernald Property, Waltham (10A)	11	31%	No	Spanish or Spanish Creole Chinese
Tandem Trailer and Park Road East, Weston (3A, 4A)	*2*	*2%*	*No*	*Chinese*
Bifurcation, Weston (3A)	*2*	*<1%*	*No*	*Chinese*
Park Road West, Weston (4A, 10A)	*0*	*0%*	*No*	*None*
Highland Avenue NW/ SW, Needham (3A, 4A, 10A)	*1*	*<1%*	*No*	*Chinese*
Highland Avenue NE/ SE, Needham (3A, 4A, 10A)	*1*	*<1%*	*No*	*Chinese*
American Legion, Boston (3A, 4A, 10A)	*18*	*75%*	***Yes***	*Spanish or Spanish Creole* *French Creole*
Connection Sites (Common to all Alternatives)				
School Street, Waltham	*25*	*83%*	***Yes***	*Spanish or Spanish Creole* *Chinese*
Cedarwood Pumping Station, Waltham	*21*	*79%*	***Yes***	*Spanish or Spanish Creole* *Chinese*
Hegarty Pumping Station, Wellesley	*1*	*13%*	***Yes***	*Chinese*
St. Mary Street Pumping Station, Needham	*1*	*1%*	*No*	*Chinese*
Newton Street Pumping Station, Brookline	*9*	*80%*	***Yes***	*None*
Southern Spine Mains, Boston	*22*	*44%*	***Yes***	*Spanish or Spanish Creole* *French Creole*
Hultman Aqueduct Isolation Valve, Weston	*2*	*<1%*	*No*	*Chinese*

Source: Commonwealth of Massachusetts, Environmental Justice Maps Viewer, November 2022, https://www.mass.gov/info-details/massgis-data-2020-environmental-justice-populations.

1 Data are from "Languages Spoken in Massachusetts" tab of the EJ Maps Viewer to determine languages spoken by at least 5 percent of population in the census tract who do not speak English very well.

Italicized text within the table indicates no change from the DEIR.

Table 3-8 Census Tract DPH Health Criteria Summary by Site Within 1 Mile of Sites

Proposed Site (Alternative)	EJ Population Present?	> 110% Statewide Rate?[1]		Existing Unfair or Inequitable Burden?
		Elevated Blood Lead Prevalence[2]	Low Birth Weight	
UMass Property (3A,4A)	Yes	**Yes**	**Yes**	**Yes**
Lower Fernald Property (10A)	Yes	**Yes**	**Yes**	**Yes**
Tandem Trailer/Park Road East (3A, 4A)	*Yes*	*No*	*No*	*No*
Bifurcation (3A)	*Yes*	*No*	*No*	*No*
Park Road West (4A,10A)	*No*	*No*	*No*	*No*
Highland Avenue Northwest/Southwest (3A, 4A, 10A)	*Yes*	*No*	*No*	*No*
Highland Avenue Northeast/Southeast (3A, 4A, 10A)	*Yes*	*No*	*No*	*No*
American Legion (3A, 4A, 10A)	*Yes*	***Yes***	***Yes***	***Yes***
Connection Sites (Common to all Alternatives)				
School Street	*Yes*	***Yes***	***Yes***	***Yes***
Cedarwood Pumping Station	*Yes*	***Yes***	***Yes***	***Yes***
Hegarty Pumping Station	*Yes*	*No*	*No*	*No*
St. Mary Street Pumping Station	*Yes*	*No*	*No*	*No*
Newton Street Pumping Station	*Yes*	*No*	***Yes***	***Yes***
Southern Spine Mains	*Yes*	***Yes***	***Yes***	***Yes***
Hultman Aqueduct Isolation Valve	*Yes*	*No*	*No*	*No*

Source: Commonwealth of Massachusetts, Environmental Justice Maps Viewer, November 2022, https://www.mass.gov/info-details/massgis-data-2020-environmental-justice-populations.

1 The determination of greater than 110% statewide rate was made by comparing the rate per 1,000 or 10,000 to the 110% statewide rate per 1,000 or 10,000.

2 For determining prevalence, children can be counted only once per year, but can appear in multiple years. Prevalence is the number of tests in a given blood lead level category out of all the children screened in that year within specific age ranges, per 1,000 children.

Italicized text within the table indicates no change from the DEIR.

Table 3-9 Community DPH Health Criteria by Site

Proposed Site (Alternative)	EJ Population Present?	Community	> 110% Statewide Rate?[1]			
			Elevated Blood Lead Prevalence[2]	Low Birth Weight	Heart Attack	Pediatric Asthma ED Visits
UMass Property (3A/4A)	No	Belmont	No	No	No	No
	Yes	Waltham	No	No	No	No
	Yes	Watertown	No	No	No	No
Lower Fernald Property (10A)	Yes	Waltham	No	No	No	No
	Yes	Watertown	No	No	No	No
Tandem Trailer and Park Road East (3A/4A)	*No*	*Newton*	*No*	*No*	*No*	*No*
	Yes	*Waltham*	*No*	*No*	*No*	*No*
	No	*Wellesley*	*No*	*No*	*No*	*No*
	No	*Weston*	*No*	*No*	*No*	*No*
Bifurcation (3A)	*No*	*Newton*	*No*	*No*	*No*	*No*
	Yes	*Waltham*	*No*	*No*	*No*	*No*
	No	*Wellesley*	*No*	*No*	*No*	*No*
	No	*Weston*	*No*	*No*	*No*	*No*
Park Road West (4A/10A)	*No*	*Newton*	*No*	*No*	*No*	*No*
	No	*Waltham*	*No*	*No*	*No*	*No*
	No	*Wellesley*	*No*	*No*	*No*	*No*
	No	*Weston*	*No*	*No*	*No*	*No*
Highland Avenue Northwest/Southwest (3A/4A, 10A)	*No*	*Needham*	*No*	*No*	*No*	*No*
	Yes	*Newton*	*No*	*No*	*No*	*No*
	No	*Wellesley*	*No*	*No*	*No*	*No*
Highland Avenue Northeast/Southeast (3A/4A, 10A)	*No*	*Needham*	*No*	*No*	*No*	*No*
	Yes	*Newton*	*No*	*No*	*No*	*No*
	No	*Wellesley*	*No*	*No*	*No*	*No*
American Legion (3A/4A, 10A)	*Yes*	*Boston*	*No*	***Yes***	*No*	*No*
Connection Sites Common to all Alternatives (3A/4A, 10A)						
School Street	*Yes*	*Waltham*	*No*	*No*	*No*	*No*
Cedarwood Pumping Station	*Yes*	*Waltham*	*No*	*No*	*No*	*No*
	Yes	*Newton*	*No*	*No*	*No*	*No*
Hegarty Pumping Station	*No*	*Needham*	*No*	*No*	*No*	*No*
	No	*Newton*	*No*	*No*	*No*	*No*
	Yes	*Wellesley*	*No*	*No*	*No*	*No*
St. Mary Street Pumping Station	*No*	*Needham*	*No*	*No*	*No*	*No*
	No	*Newton*	*No*	*No*	*No*	*No*
	Yes	*Wellesley*	*No*	*No*	*No*	*No*
Newton Street Pumping Station	*Yes*	*Boston*	*No*	*Yes*	*No*	*No*
	Yes	*Brookline*	*No*	*No*	*No*	*No*
	No	*Newton*	*No*	*No*	*No*	*No*
Southern Spine Mains	*Yes*	*Boston*	*No*	***Yes***	*No*	*No*
	Yes	*Brookline*	*No*	*No*	*No*	*No*

Table 3-9 Community DPH Health Criteria by Site

Proposed Site (Alternative)	EJ Population Present?	Community	> 110% Statewide Rate?[1]			
			Elevated Blood Lead Prevalence[2]	Low Birth Weight	Heart Attack	Pediatric Asthma ED Visits
Hultman Aqueduct Isolation Valve	*No*	*Newton*	*No*	*No*	*No*	*No*
	Yes	*Waltham*	*No*	*No*	*No*	*No*
	No	*Wellesley*	*No*	*No*	*No*	*No*
	No	*Weston*	*No*	*No*	*No*	*No*

ED = Emergency Department

Source: Commonwealth of Massachusetts, Executive Office of Energy and Environmental Affairs, Environmental Justice Maps Viewer, November 2022, https://www.mass.gov/info-details/massgis-data-2020-environmental-justice-populations.

1 The determination of greater than 110% statewide rate was made by comparing the rate per 1,000 or 10,000 to the 110% statewide rate per 1,000 or 10,000.

2 For determining prevalence, children can be counted only once per year, but can appear in multiple years. Prevalence is the number of tests in a given blood lead level category out of all the children screened in that year within specific age ranges, per 1,000 children.

Italicized text within the table indicates no change from the DEIR.

3.4.2.1 Alternative 3A/4A Existing Conditions

UMass Property

The UMass Property site's LOD is not within an EJ block group. Ten EJ block groups were identified within the DGA. The DPH EJ Tool identified existing potential sources of pollution, elevated blood lead prevalence and low birth weight rate cases as greater than 110 percent of the statewide rate for three census tracts with EJ populations present within the UMass Property site's DGA. The DPH EJ Tool does not identify a definitive connection between the existing potential sources of pollution and the elevated blood lead prevalence and low birth weight cases; however, the rates are considered an existing unfair or inequitable environmental and health burden on EJ populations.

Existing unfair or inequitable environmental and health burdens on EJ populations are present for the UMass Property site. Existing conditions are as follows:

- **EJ Criteria:** Ten EJ block groups were identified within the DGA, and one census tract has a language other than English spoken by at least 5 percent of the population within the DGA, as seen in **Figure 3-1** and **Table 3-10.** Five of the block groups have census tracts with Spanish or Spanish Creole-speaking populations, and one census tract has a Chinese-speaking population. The EJ block groups in close proximity to the Fernald Property meet the minority EJ criterion.
- **Elevated Blood Level/Low birth weight rates:** Census tracts 3688, 3689.02, and 3701.01, which contain EJ block groups, are identified as having elevated blood lead prevalence and low birth weight rates greater than the 110 percent of the statewide rate. Two other census tracts have rates greater than the 110 percent of the statewide rates for elevated blood lead prevalence and low birth weight.
- **Pollution Sources:** There are 29 potential sources of pollution as identified by DPH data within the UMass Property site's DGA; these include large quantity generators and toxic users, MassDEP Tier Classified 21E sites and Tier II facilities, MassDEP sites with activity and use limitations (AULs), and

underground storage tanks (USTs). Sites and facilities include gasoline stations, energy plants and storage, automobile repair, and service businesses. See **SDEIR Appendix A, Table A-4** through **Table A-6**, for DPH health criteria and sources of pollution.

- **Climate Change:** The UMass Property site scored the following exposure ratings in the RMAT Tool; however, as noted above, its LOD is not within an EJ block group:
    - Sea-level Rise and Storm Surge: Not Exposed
    - Extreme Precipitation – Urban Flooding: High Exposure
    - Extreme Precipitation – Riverine Flooding: Moderate Exposure
    - Extreme Heat: High Exposure

The LOD of the UMass Property site is not within an EJ block group, therefore existing climate burdens were not identified by the RMAT Tool under existing conditions.

3.4.2.2 Alternative 10A Existing Conditions

Lower Fernald Property

The Lower Fernald Property site's LOD is not within an EJ block group. Eleven EJ block groups were identified within the DGA, as seen in **Figure 3-2** and **Table 3-11**. The DPH EJ Tool identified potential sources of existing pollution, elevated blood lead prevalence, and low birth weight rate cases as greater than 110 percent of the statewide rate for four census tracts with EJ populations are present within the Lower Fernald Property site's DGA. The DPH EJ Tool does not identify a definitive connection between the existing potential sources of pollution and the elevated blood lead prevalence and low birth weight cases; however, the rates are considered an existing unfair or inequitable environmental and health burden on EJ populations.

Existing unfair or inequitable environmental and health burdens on EJ populations are present for the Lower Fernald Property site. Existing conditions are as follows:

- **EJ Criteria:** Five of the block groups have census tracts with Spanish or Spanish Creole-speaking populations, and one block group has a census tract with a Chinese-speaking population. The EJ block groups in proximity to the Lower Fernald Property site meet the minority EJ criterion.
- **Elevated Blood Level/Low birth weight rates:** Census tracts 3576, 3688, 3689.02, and 3701.01, which contain EJ block groups, are identified as having elevated blood lead prevalence and low birth weight rates greater than the 110 percent of the statewide rate. Two other census tracts have rates greater than the 110 percent of the statewide rates for elevated blood lead prevalence and low birth weight.

- **Potential Pollution Sources**: There are 29 potential sources of pollution as identified by DPH data within the Lower Fernald Property site's DGA; these include large quantity generators and toxic users, MassDEP Tier Classified 21E sites and Tier II facilities, MassDEP sites with AULs, and USTs. Sites and facilities include gasoline stations, energy plants and storage, automobile repair, and service businesses. See **SDEIR Appendix A, Table A-7** through **A-9**, for DPH health criteria and sources of pollution.
- **Climate Change:** The Lower Fernald Property site scored the following exposure ratings in the RMAT Tool; however, as noted above, its LOD is not within an EJ block group:
    - Sea-level Rise and Storm Surge: Not Exposed
    - Extreme Precipitation – Urban Flooding: High Exposure
    - Extreme Precipitation – Riverine Flooding: Moderate Exposure
    - Extreme Heat: High Exposure

The LOD of the Lower Fernald Property site is not within an EJ block group, therefore the existing climate burdens were not identified by the RMAT Tool under existing conditions.

Table 3-10 Environmental Justice Block Groups Within 1 Mile of UMass Property Site

Block Group	Census Tract	Municipality	Total Population	Total Households	Median Household Income	Total Minority Population	Percentage of Households with English Isolation	Languages Spoken by at least 5% of census tract population[1]	EJ Criterion Description
–	3576.02	Belmont	–	–	–	–	–	Chinese (7%)	–
4	3688.00	Waltham	1,686	606	$155,565	50.7%	1.5%	Spanish or Spanish Creole (12%)	Minority
1	3689.01	Waltham	3,019	173	$111,750	33.4%	0%	–	Minority
3	3689.01	Waltham	2,297	1,148	$70,481	46.2%	2.3%	–	Minority
1	3689.02	Waltham	3,263	878	$69,423	52.6%	12.1%	–	Minority
1	3691.00	Waltham	1,029	342	$88,333	39.4%	2.3%	–	Minority
1	3701.01	Watertown	1,396	587	$123,264	28.1%	0%	Spanish or Spanish Creole (5%)	Minority
2	3701.01	Watertown	1,986	715	$118,032	31.4%	1.8%	Spanish or Spanish Creole (5%)	Minority
3	3701.01	Watertown	1,969	811	$119,598	29.7%	0%	Spanish or Spanish Creole (5%)	Minority
4	3701.01	Watertown	2,108	828	$85,156	34.1%	3.7%	Spanish or Spanish Creole (5%)	Minority
1	3701.02	Watertown	1,928	1,031	$104,475	26.3%	3.8%	–	Minority

Source: Commonwealth of Massachusetts, Executive Office of Energy and Environmental Affairs, Environmental Justice Maps Viewer, November 2022, https://www.mass.gov/info-details/massgis-data-2020-environmental-justice-populations.

1 Data is from "Languages Spoken in Massachusetts" tab of the EJ Maps Viewer to determine languages spoken by at least 5 percent of population in the census tract who do not speak English very well. Data from the "Languages Spoken in Massachusetts" tab of the EJ Maps Viewer identified a language spoken in a census tract that was not present in the 1-mile radius. This census tract was included for consistency and completeness, but only the language, percent spoken by, and municipality would be included.

Note: Data listed as 0 is listed how it is presented in the EJ Maps Viewer data. Some of this data might be missing or intentionally 0.

Table 3-11 Environmental Justice Block Groups Within 1 Mile of Lower Fernald Property Site

Block Group	Census Tract	Municipality	Total Population	Total Households	Median Household Income	Total Minority Population	Percentage of Households with English Isolation	Languages Spoken by at least 5% of census tract population[1]	EJ Criterion Description
1	3576.00	Belmont	1,118	391	$94,427	45.6%	5.6%	Chinese (7%)	Minority
4	3688.00	Waltham	1,686	606	$155,565	50.7%	1.5%	Spanish or Spanish Creole (12%)	Minority
1	3689.01	Waltham	3,019	173	$111,750	33.4%	0%	–	Minority
3	3689.01	Waltham	2,297	1,148	$70,481	46.2%	2.3%	–	Minority
1	3689.02	Waltham	3,263	878	$69,423	52.6%	12.1%	–	Minority
1	3691.00	Waltham	1,029	342	$88,333	39.4%	2.3%	–	Minority
1	3701.01	Watertown	1,396	587	$123,264	28.1%	0%	Spanish or Spanish Creole (5%)	Minority
2	3701.01	Watertown	1,986	715	$118,032	31.4%	1.8%	Spanish or Spanish Creole (5%)	Minority
3	3701.01	Watertown	1,969	811	$119,598	29.7%	0%	Spanish or Spanish Creole (5%)	Minority
4	3701.01	Watertown	2,108	828	$85,156	34.1%	3.7%	Spanish or Spanish Creole (5%)	Minority
1	3701.02	Watertown	1,928	1,031	$104,475	26.3%	3.8%	–	Minority

Source: Commonwealth of Massachusetts, Executive Office of Energy and Environmental Affairs, Environmental Justice Maps Viewer, November 2022, https://www.mass.gov/info-details/massgis-data-2020-environmental-justice-populations.

1 Data is from "Languages Spoken in Massachusetts" tab of the EJ Maps Viewer to determine languages spoken by at least 5 percent of population in the census tract who do not speak English very well. Data from the "Languages Spoken in Massachusetts" tab of the EJ Maps Viewer identified a language spoken in a census tract that was not present in the 1-mile radius. This census tract was included for consistency and completeness, but only the language, percent spoken by, and municipality would be included.

Note: Data listed as 0 is listed how it is presented in the EJ Maps Viewer data. Some of this data might be missing or intentionally 0.

3.4.2.3 Anticipated Truck Routes Existing Conditions

As requested by the Secretary, populations in EJ census tracts within 0.5 miles of the anticipated truck routes were reviewed to determine which EJ populations are in areas that are also subject to an existing unfair or inequitable environmental health burden per the DPH vulnerable health criteria data. **Table 3-12** and **Figure 3-3** through **Figure 3-19** identify which Program site have portions of the anticipated construction truck routes within a 0.5-mile distance to census tracts with an existing unfair or inequitable burden. These existing burdens include elevated blood lead prevalence and/or low birth weight rate cases greater than 110 percent of the statewide rate. The analysis was conducted for all Program sites evaluated in SDEIR Alternatives 3A, 4A, and 10A.

Table 3-12 Existing Unfair or Inequitable Burden Within 0.5-Miles of Anticipated Truck Routes

Site	Census Tract	City/Town	Elevated Blood Lead Levels		Low Birth Weight		Existing Unfair or Inequitable Health Burden?
			Rate per 1,000	>110% Statewide Rate?[1]	Rate per 10,000	>110% Statewide Rate?[1]	
Launching, Receiving, and Large Connection Shaft Sites							
UMass Property	3576.00	Waltham	-	-	0	No	No
	3577.00	Waltham	0	No	-	-	No
	3583.00[2]	Waltham	-	-	284.1	**Yes**	**Yes**
	3681.01[2]	Waltham	8.8	No	186	No	No
	3681.02[2]	Waltham	-	-	241.5	**Yes** [L]	**Yes**
	3682.00[2]	Waltham	-	-	231.8	No	No
	3683.00[2]	Waltham	9.6	No	321.7	**Yes** [L]	**Yes**
	3684.00[2]	Waltham	9	No	141.2	No	No
	3687.00[2]	Waltham	35.9	**Yes**	-	-	**Yes**
	3688.00[2]	Waltham	17.2	**Yes**	268.7	**Yes** [L]	**Yes**
	3689.01[2]	Waltham	-	-	301.7	**Yes** [L]	**Yes**
	3689.02[2]	Waltham	-	-	194.6	No	No
	3691.00[2]	Waltham	-	-	247.3	**Yes**	**Yes**
	3701.01[2]	Waltham	10.7	No	243.3	**Yes**	**Yes**
Lower Fernald Property	3576.00	Waltham	-	-	0	No	No
	3577.00	Waltham	0	No	-	-	No
	3583.00[2]	Waltham	-	-	284.1	**Yes**	**Yes**
	3681.01[2]	Waltham	8.8	No	186	No	No
	3681.02[2]	Waltham	-	-	241.5	**Yes** [L]	**Yes**
	3682.00[2]	Waltham	-	-	231.8	No	No
	3683.00[2]	Waltham	9.6	No	321.7	**Yes** [L]	**Yes**
	3684.00[2]	Waltham	9	No	141.2	No	No
	3687.00[2]	Waltham	35.9	**Yes**	-	-	**Yes**
	3688.00[2]	Waltham	17.2	**Yes**	268.7	**Yes** [L]	**Yes**
	3689.01[2]	Waltham	-	-	301.7	**Yes** [L]	**Yes**
	3689.02[2]	Waltham	-	-	194.6	No	No
	3691.00[2]	Waltham	-	-	247.3	**Yes**	**Yes**
	3701.01[2]	Waltham	10.7	No	243.3	**Yes**	**Yes**

Table 3-12 Existing Unfair or Inequitable Burden Within 0.5-Miles of Anticipated Truck Routes

Site	Census Tract	City/Town	Elevated Blood Lead Levels		Low Birth Weight		Existing Unfair or Inequitable Health Burden?
			Rate per 1,000	>110% Statewide Rate?[1]	Rate per 10,000	>110% Statewide Rate?[1]	
Highland Avenue Northeast/ Southeast	4035.00	Needham	-	-	194.8	No	No
Highland Avenue Northwest/ Southwest	4035.00	Needham	-	-	194.8	No	No
American Legion	924.00[2]	Boston	26	Yes	480	**Yes**	**Yes**
	1001.00[2]	Boston	24.5	Yes	460	**Yes** [L]	**Yes**
	1002.00[2]	Boston	18	Yes	529.1	**Yes** [L]	**Yes**
	1003.00[2]	Boston	25.7	Yes	426.5	**Yes** [L]	**Yes**
	1004.00[2]	Boston	35.2	Yes	391.5	**Yes** [L]	**Yes**
	1005.00[2]	Boston	16.6	Yes	343	**Yes**	**Yes**
	1006.01[2]	Boston	24.8	Yes	408.8	**Yes**	**Yes**
	1008.00[2]	Boston	22.9	Yes	264	**Yes** [L]	**Yes**
	1009.00[2]	Boston	22.5	Yes	-	-	**Yes**
	1010.01[2]	Boston	23	Yes	371.6	**Yes**	**Yes**
	1010.02[2]	Boston	11.4	No	402.3	**Yes** [L]	**Yes**
	1011.01[2]	Boston	17.4	Yes	406.1	**Yes** [L]	**Yes**
	1011.02[2]	Boston	30.2	Yes	448.3	**Yes** [L]	**Yes**
	1101.03[2]	Boston	23.3	Yes	247.3	**Yes**	**Yes**
	4172.00[2]	Boston	13.9	No	140	No	No
	4173.00	Boston	0	No	-	-	No
	4175.02[2]	Boston	-	-	289.4	**Yes**	**Yes**
	9803.00[2]	Boston	0	No	0	No	No
Connection Shaft and Isolation Valve Sites							
School Street	3682.00[2]	Waltham	-	-	231.8	No	No
	3683.00[2]	Waltham	9.6	No	321.7	**Yes** [L]	**Yes**
	3684.00[2]	Waltham	9	No	141.2	No	No
	3687.00[2]	Waltham	35.9	**Yes**	-	-	**Yes**
	3688.00[2]	Waltham	17.2	**Yes**	268.7	**Yes**	**Yes**
	3689.01[2]	Waltham	-	-	301.7	**Yes**	**Yes**
	3689.02	Waltham	-	-	194.6	No	No
Cedarwood Pumping Station	3682.00[2]	Waltham	-	-	231.8	No	No
	3683.00[2]	Waltham	9.6	No	321.7	**Yes** [L]	**Yes**
	3684.00[2]	Waltham	9	No	141.2	No	No
	3686.00[2]	Waltham	15.9	No	224.4	No	No
	3688.00[2]	Waltham	17.2	**Yes**	268.7	**Yes**	**Yes**
Hegarty Pumping Station	3742.00	Wellesley	0	No	397.4	**Yes**	**Yes**
	4035.00	Wellesley	-	-	194.8	No	No

Table 3-12 Existing Unfair or Inequitable Burden Within 0.5-Miles of Anticipated Truck Routes

Site	Census Tract	City/Town	Elevated Blood Lead Levels		Low Birth Weight		Existing Unfair or Inequitable Health Burden?
			Rate per 1,000	>110% Statewide Rate?[1]	Rate per 10,000	>110% Statewide Rate?[1]	
St. Mary Street Pumping Station	4035.00	Needham	-	-	194.8	No	No
Newton Street Pumping Station	3738.00[2]	Brookline	10.4	No	-	-	No
	3742.00	Brookline	0	No	397.4	**Yes**	**Yes**
	4012.00[2]	Brookline	-	-	409.8	**Yes** [L]	**Yes**
	4035.00	Brookline	-	-	194.8	No	No
Southern Spine Mains	924.00[2]	Boston	26	**Yes**	480	**Yes**	**Yes**
	1001.00[2]	Boston	24.5	**Yes**	460	**Yes** [L]	**Yes**
	1002.00[2]	Boston	18	**Yes**	529.1	**Yes** [L]	**Yes**
	1003.00[2]	Boston	25.7	**Yes**	426.5	**Yes** [L]	**Yes**
	1004.00[2]	Boston	35.2	**Yes**	391.5	**Yes** [L]	**Yes**
	1005.00[2]	Boston	16.6	**Yes**	343	**Yes**	**Yes**
	1006.01[2]	Boston	24.8	**Yes**	408.8	**Yes**	**Yes**
	1008.00[2]	Boston	22.9	**Yes**	264	**Yes** [L]	**Yes**
	1009.00[2]	Boston	22.5	**Yes**	-	-	**Yes**
	1010.01[2]	Boston	23	**Yes**	371.6	**Yes**	**Yes**
	1010.02[2]	Boston	11.4	No	402.3	**Yes** [L]	**Yes**
	1011.01[2]	Boston	17.4	**Yes**	406.1	**Yes** [L]	**Yes**
	1011.02[2]	Boston	30.2	**Yes**	448.3	**Yes** [L]	**Yes**
	1101.03[2]	Boston	23.3	**Yes**	247.3	**Yes** [L]	**Yes**
	1202.01[2]	Boston	18.1	**Yes**	241.4	**Yes** [L]	**Yes**
	1203.01[2]	Boston	13.9	No	215.4	No	No
	1204.00[2]	Boston	18.5	**Yes**	235.6	No	**Yes**
	4163.00[2]	Boston	19.4	**Yes**	-	-	**Yes**
	4172.00[2]	Boston	13.9	No	140	No	No
	4173.00	Boston	0	No	-	-	No
	4175.02[2]	Boston	-	-	289.4	**Yes**	**Yes**
	9803.00[2]	Boston	0	No	0	No	No
	9810.00	Boston	0	No	0	No	No

Sources: Commonwealth of Massachusetts, Department of Public Health, Environmental Justice Tool, 2023.

Notes: Year Range 2016-2020 for Elevated Blood Lead Levels and 2011-2015 for Low Birth Weight. The year range differs for Elevated Blood Lead Levels from the DEIR year ranges, which used 2015-2019, due to best available data.

1 The determination of greater than 110% statewide rate was made by comparing the rate per 1,000 to the 110% statewide rate per 1,000 or 10,000, respectively. 110% of the statewide rate for Elevated Blood Lead levels is a case count of 16.4835813, and a case count of 238.5 for Low Birth Weight.

2 An EJ block group is within this census tract and the 0.5-mile radius.

L *Census tract contains an EJ block groups that meets the low birth weight vulnerable health criteria AND are also adjacent to proposed construction truck route intersections.*

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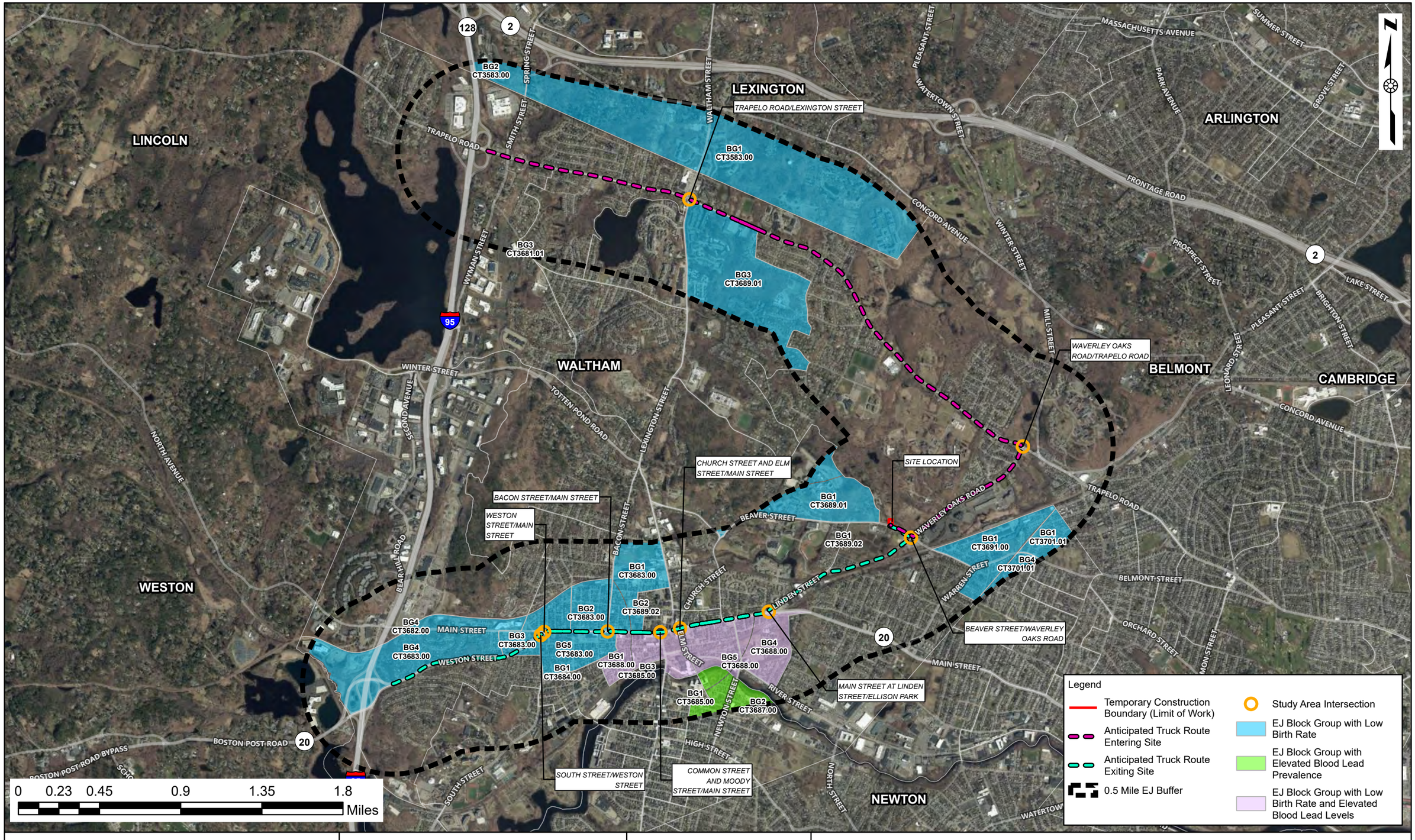

Metropolitan Water Tunnel Program

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Environmental Justice

Anticipated Construction Truck Routes in Proximity to EJ Block Groups Meeting Vulnerable Health Criteria

UMass Property Large Connection Shaft Site

Figure 3-3

Waltham, MA

Source: MassGIS, MWRA

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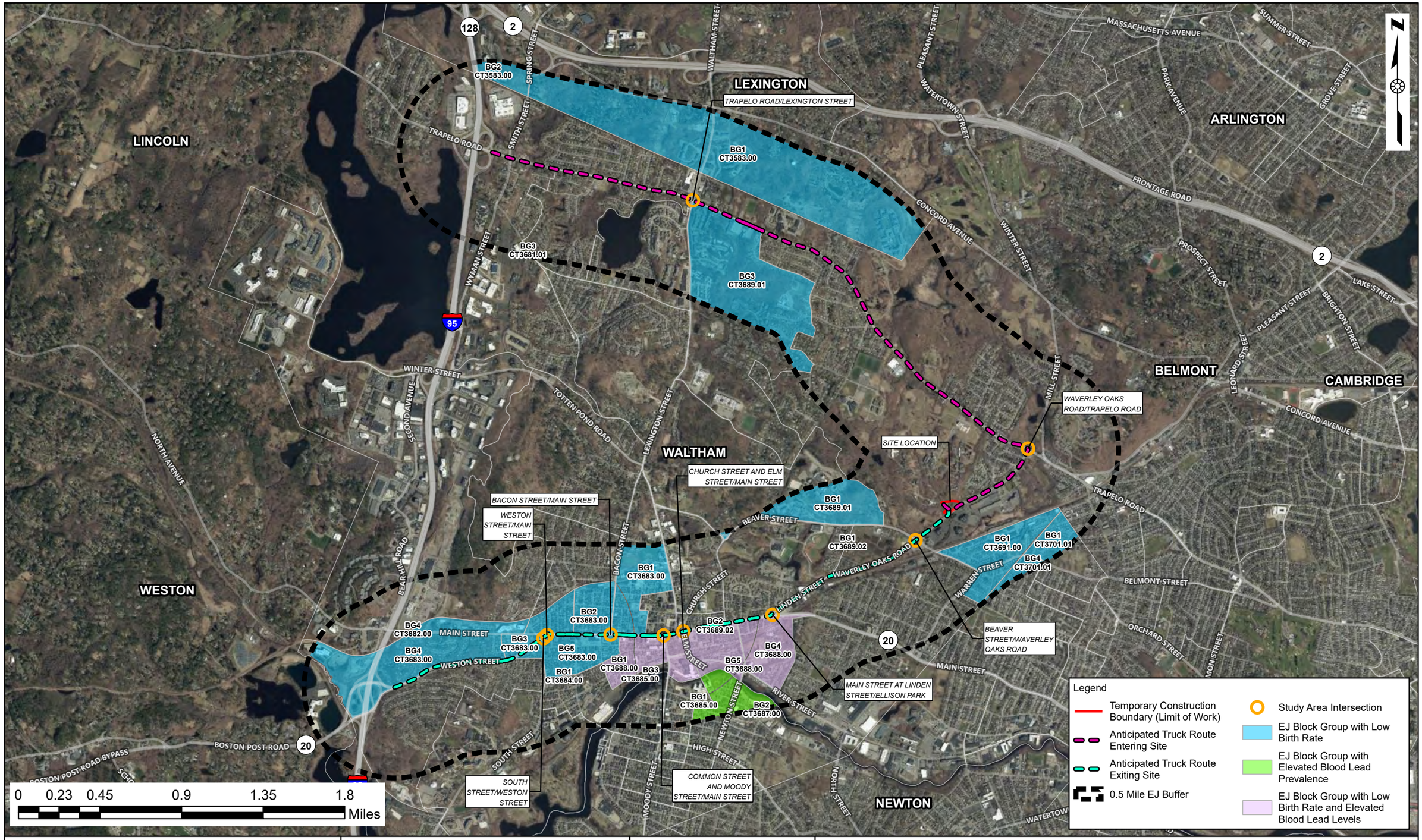

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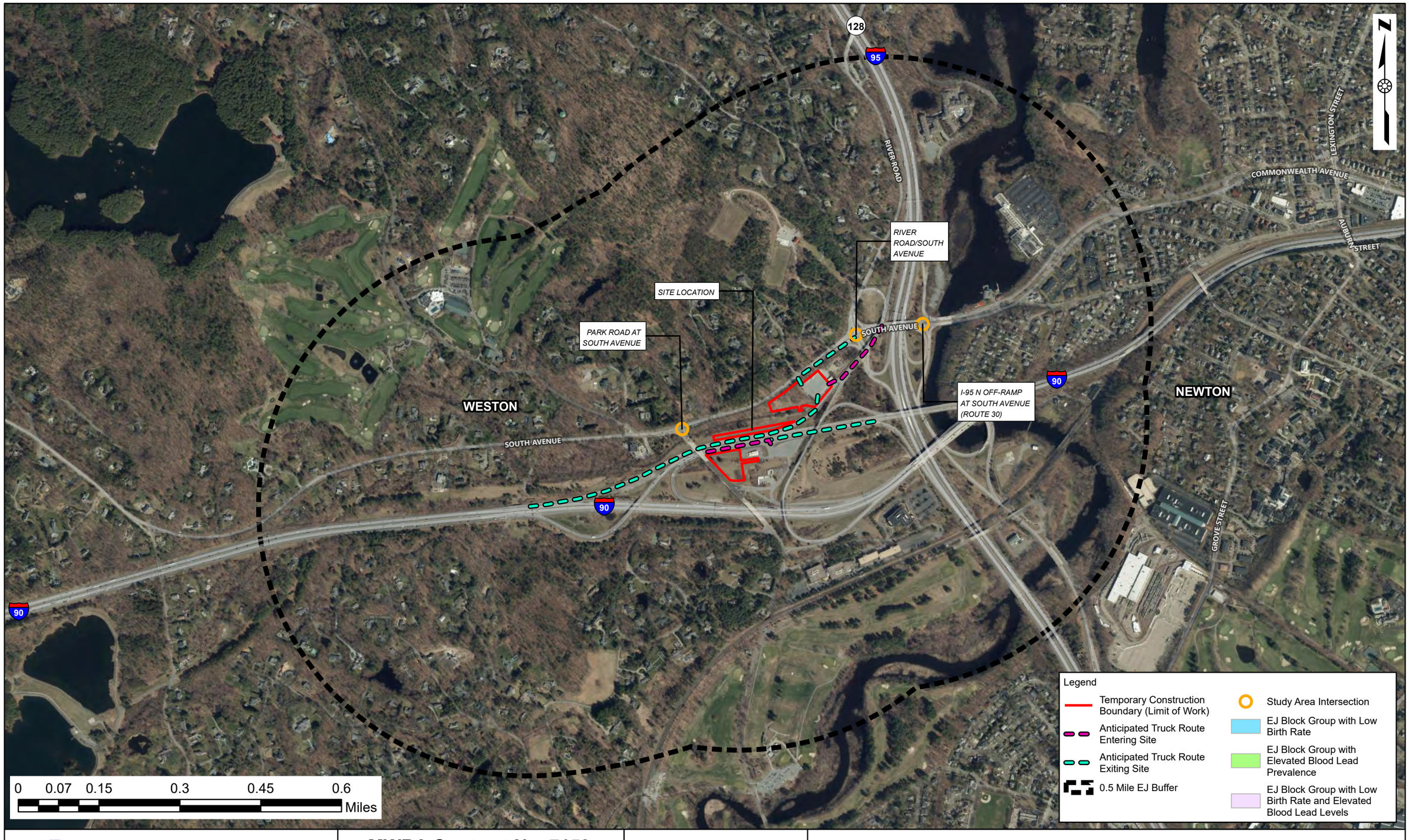

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Environmental Justice

Anticipated Construction Truck Routes in Proximity to EJ Block Groups Meeting Vulnerable Health Criteria

Tandem Trailer/Park Road East Launching Shaft Site

Figure 3-5

Weston, MA

Source: MassGIS, MWRA

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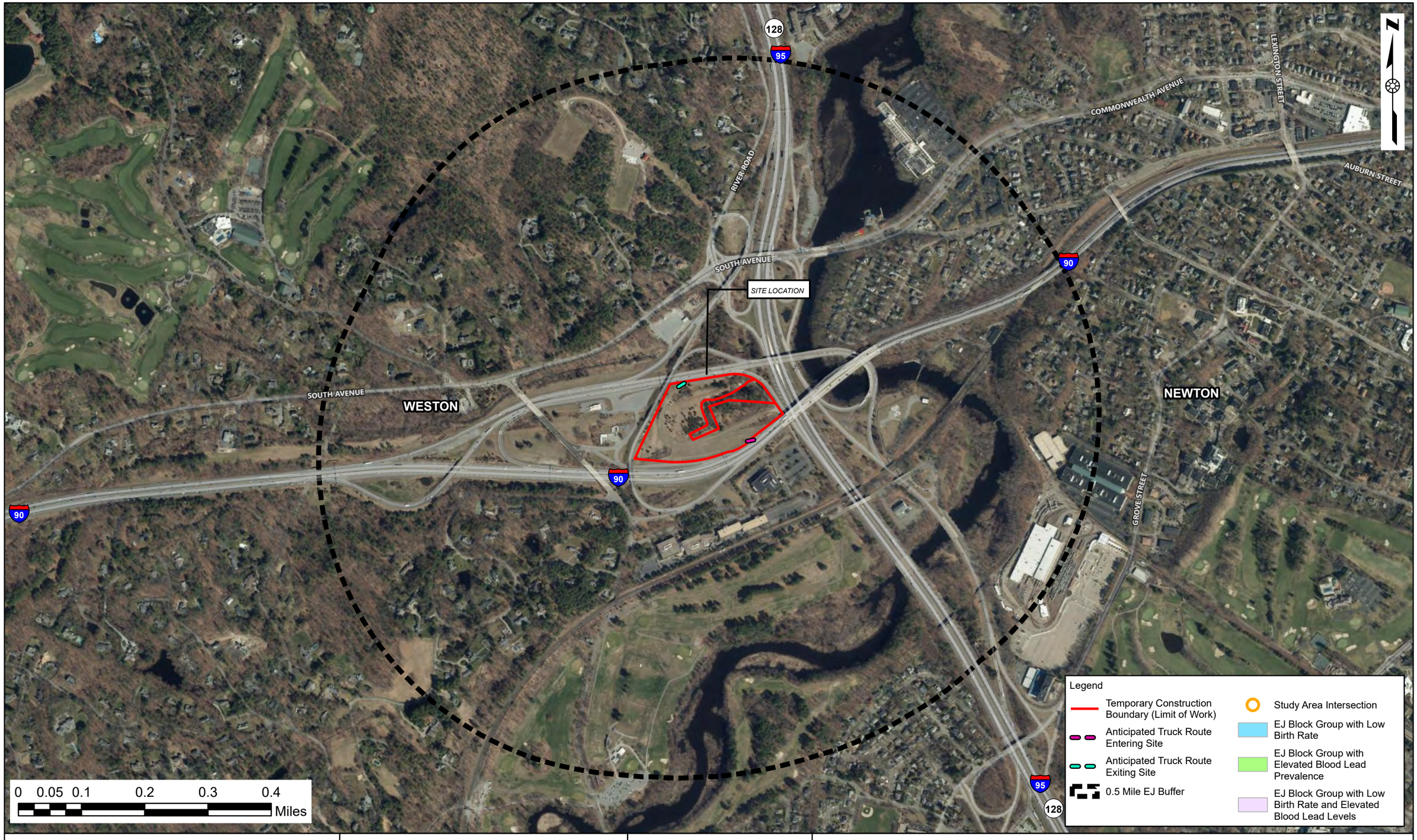

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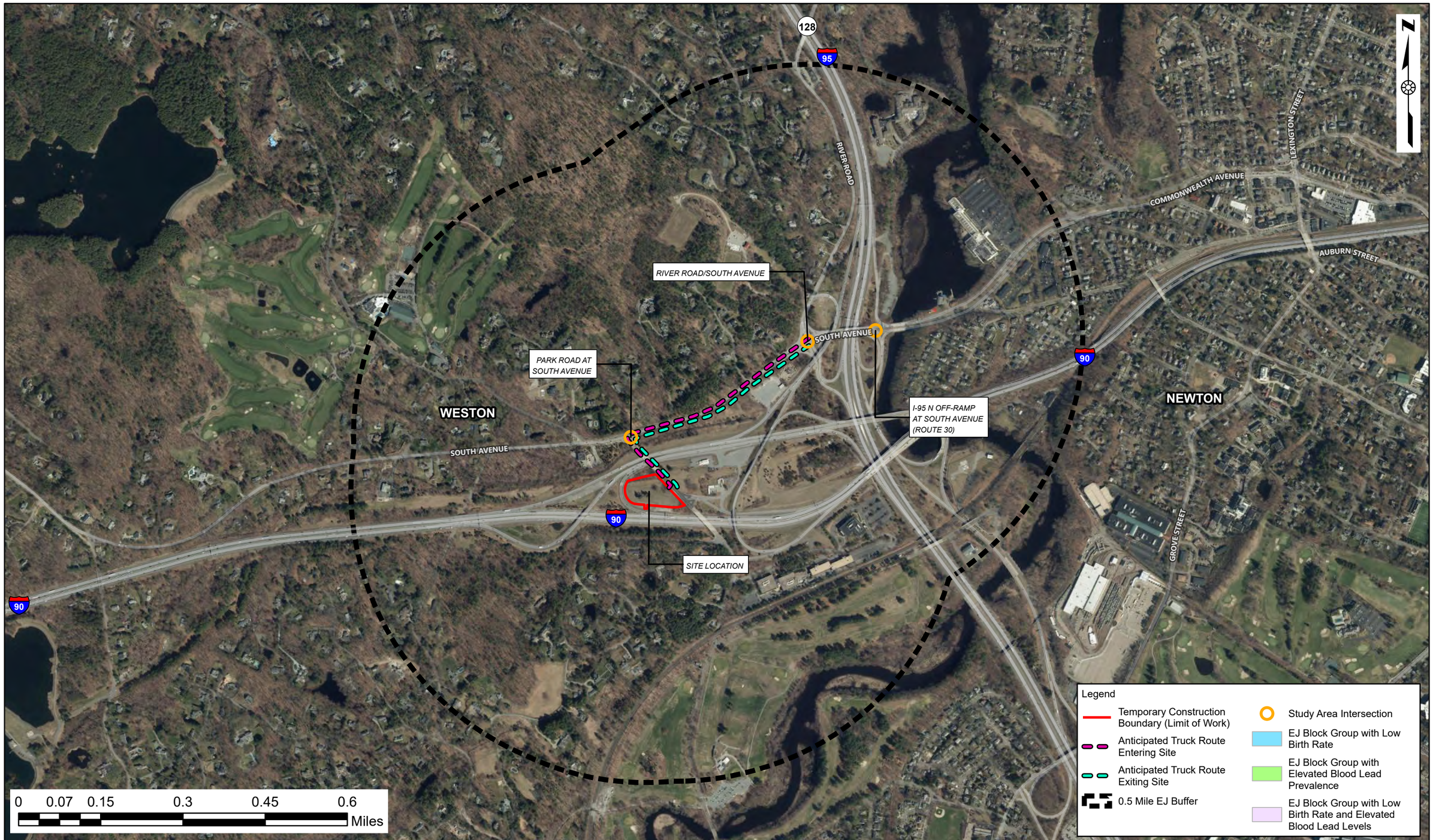

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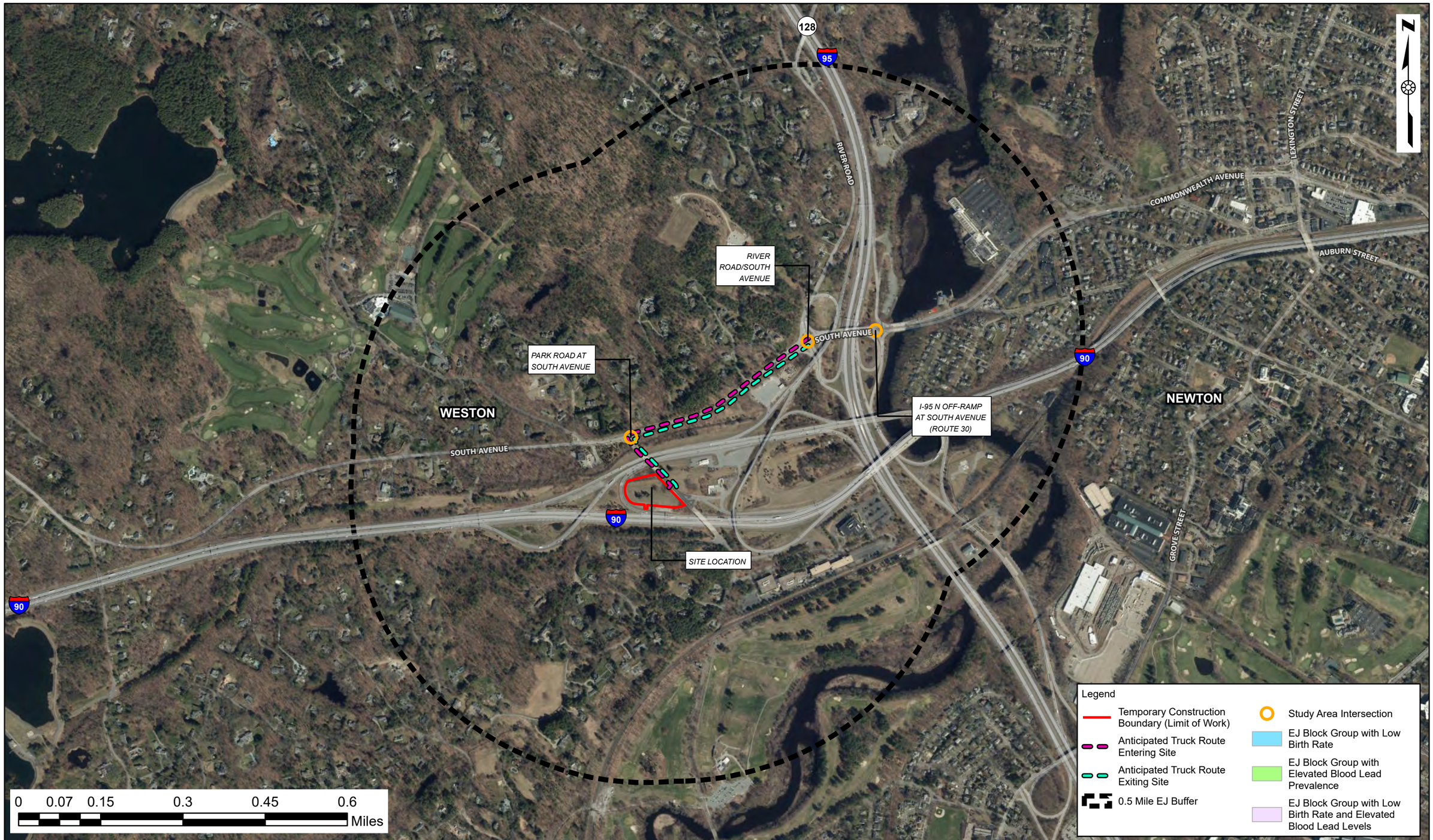

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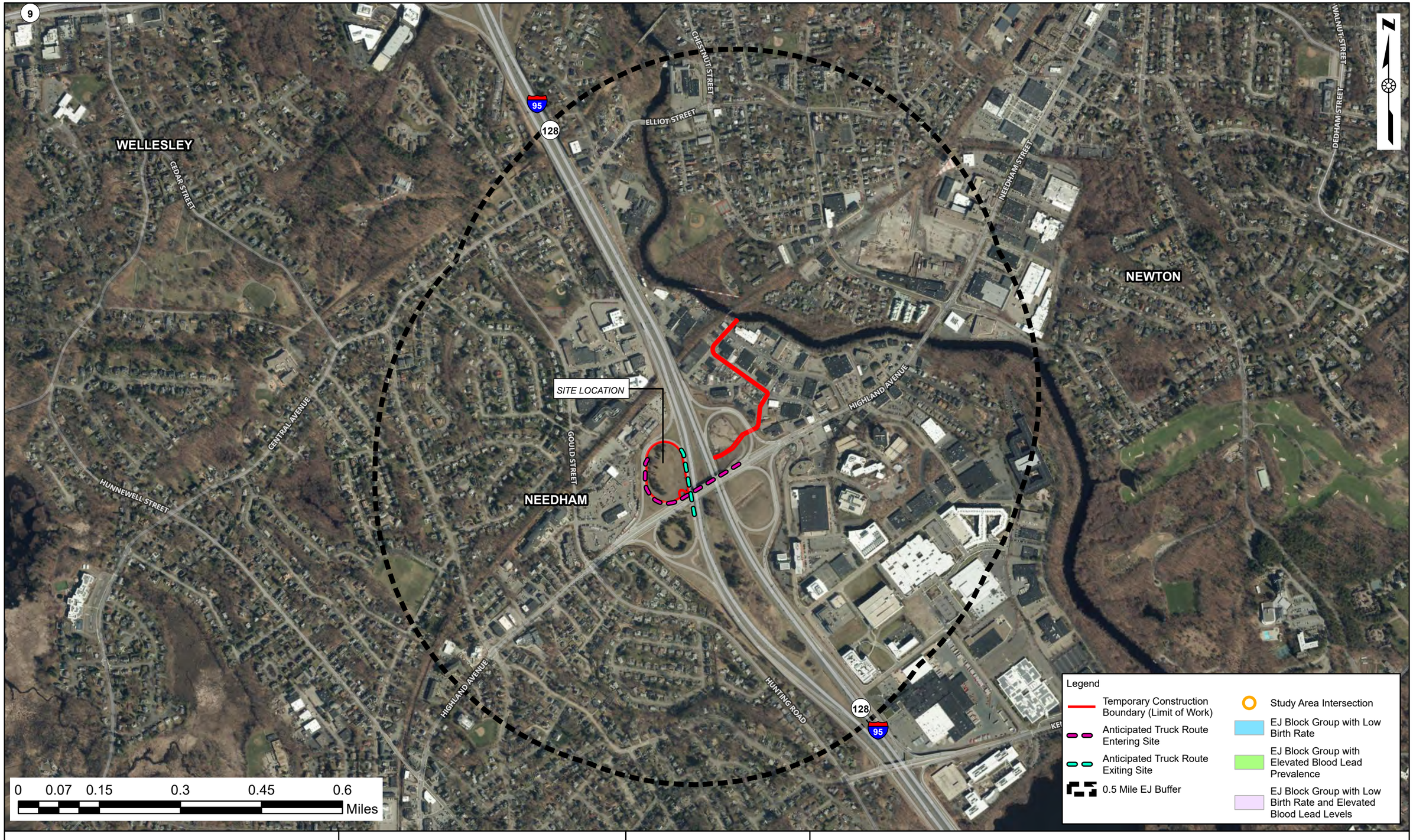

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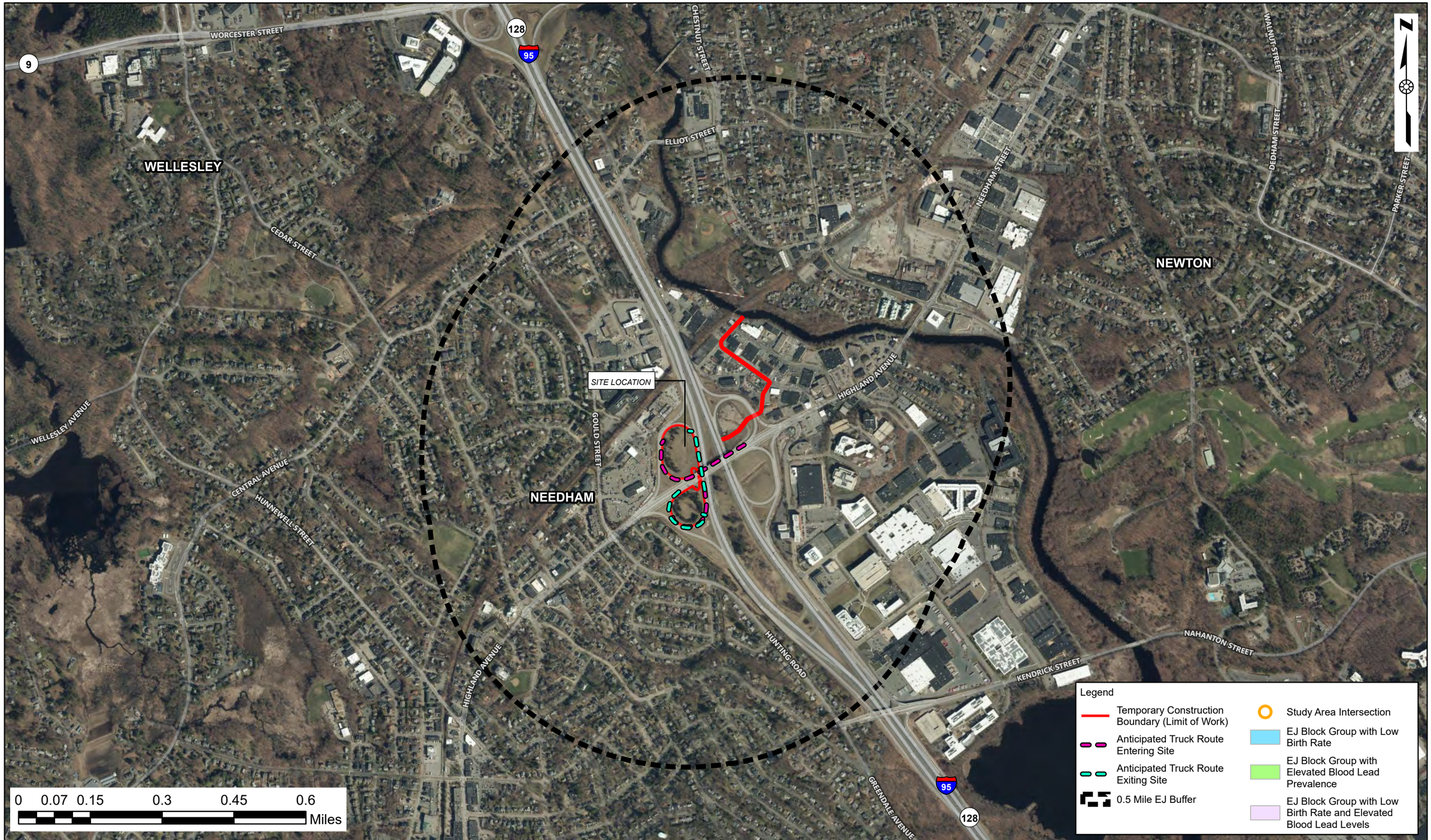

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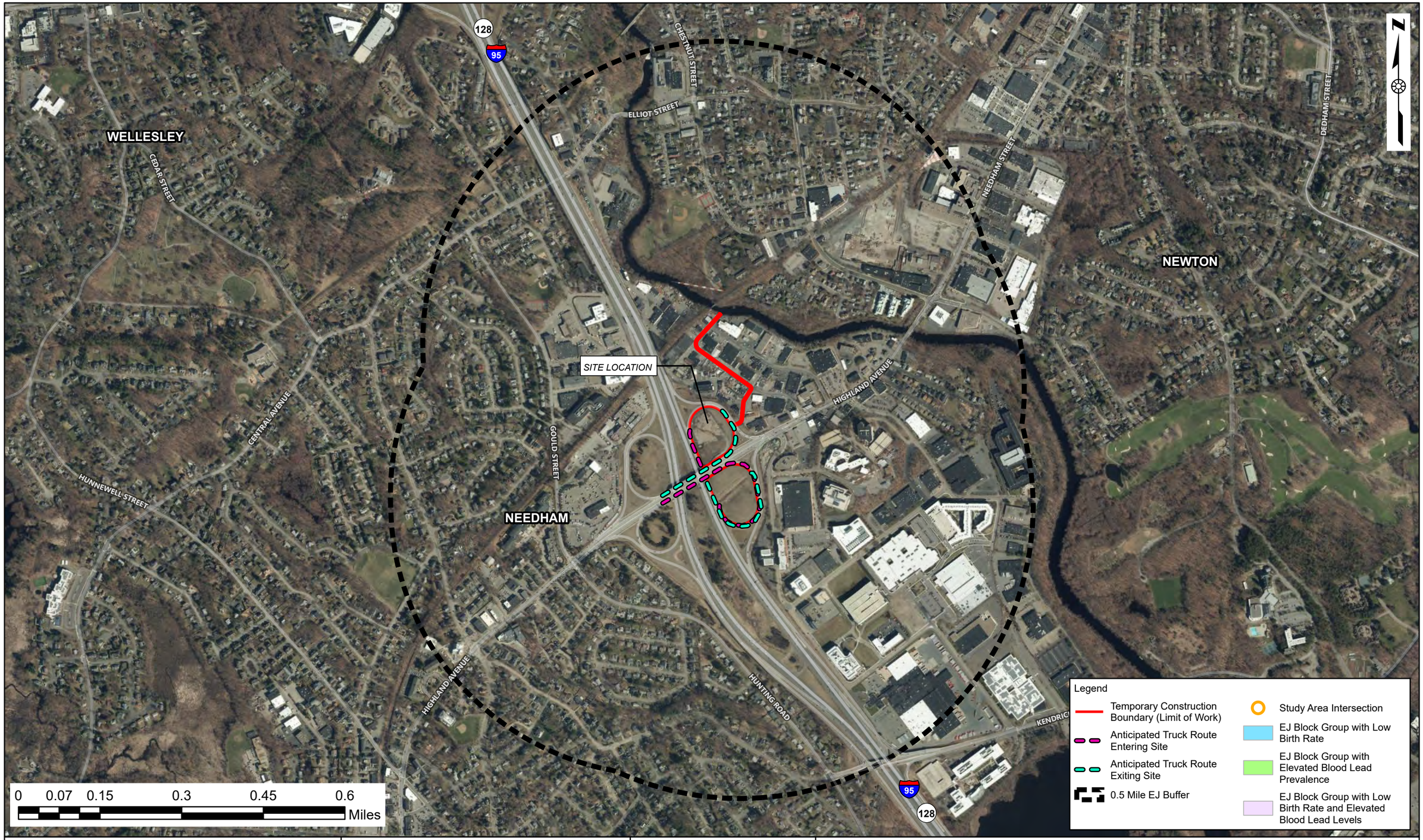

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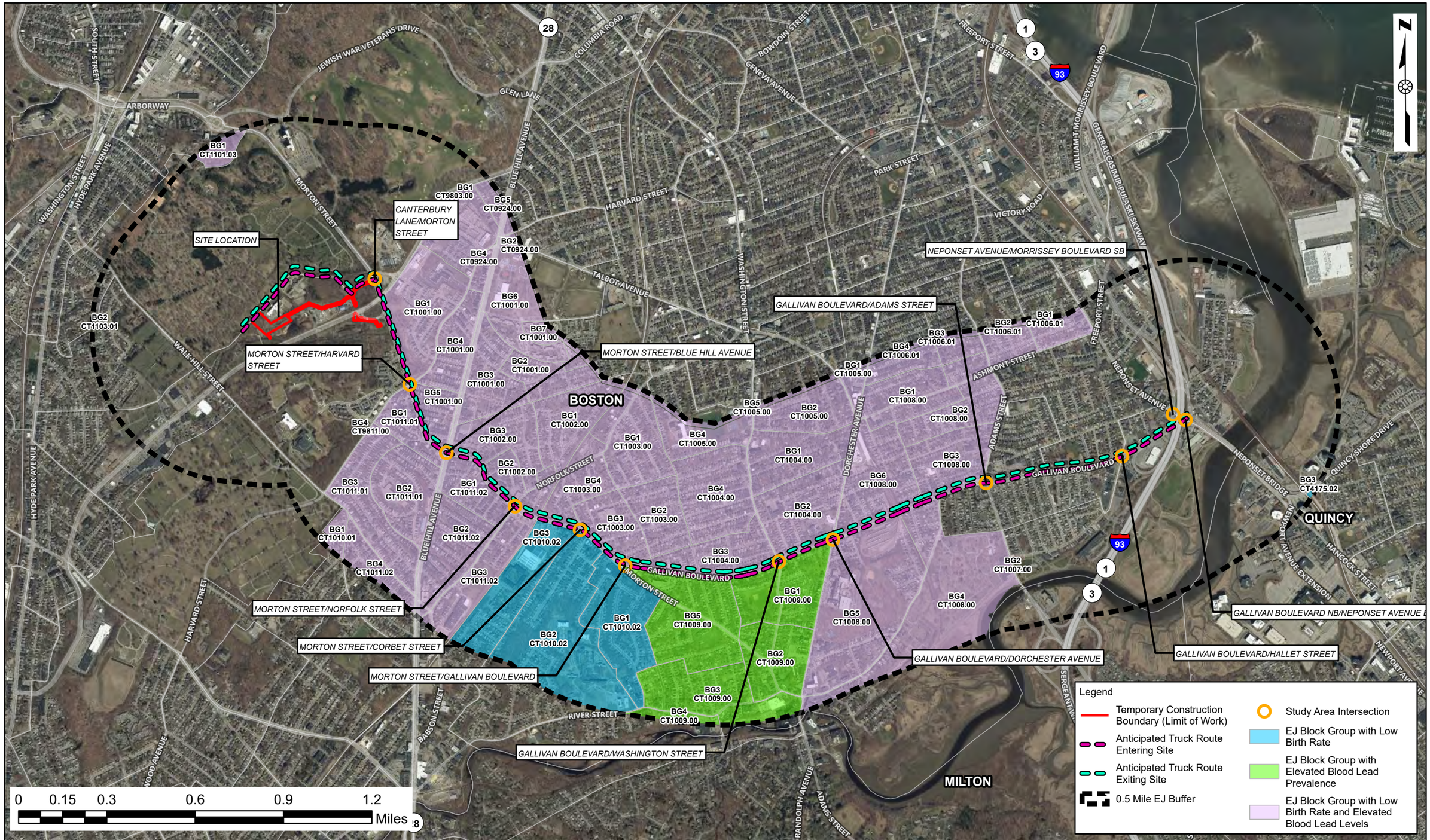

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Environmental Justice

Anticipated Construction Truck Routes in Proximity to EJ Block Groups Meeting Vulnerable Health Criteria

American Legion Receiving Shaft Site

Figure 3-12

Boston, MA

Source: MassGIS, MWRA

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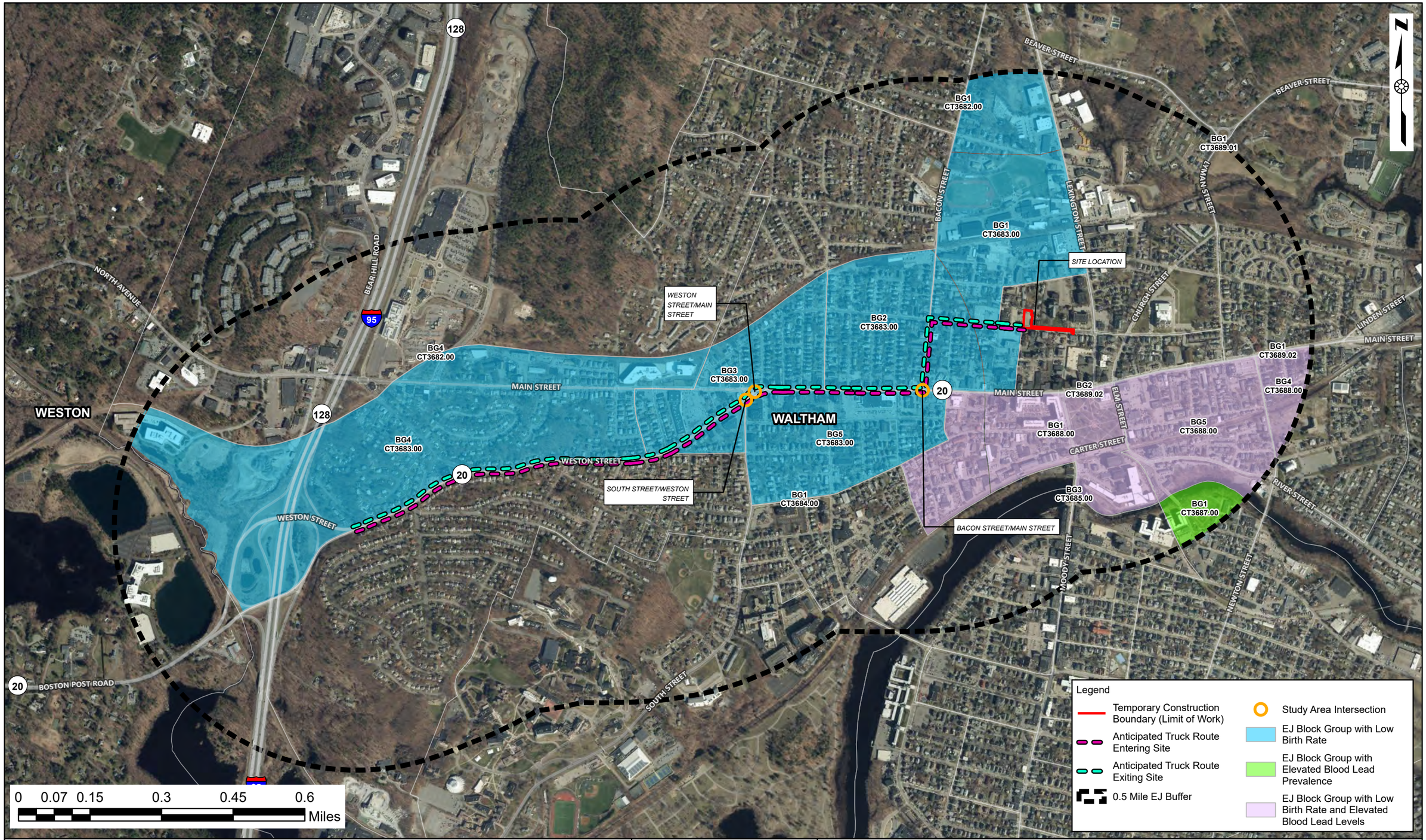

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Environmental Justice
Anticipated Construction Truck Routes in Proximity to EJ Block Groups Meeting Vulnerable Health Criteria
School Street Connection Shaft Site
Figure 3-13

Waltham, MA

Source: MassGIS, MWRA

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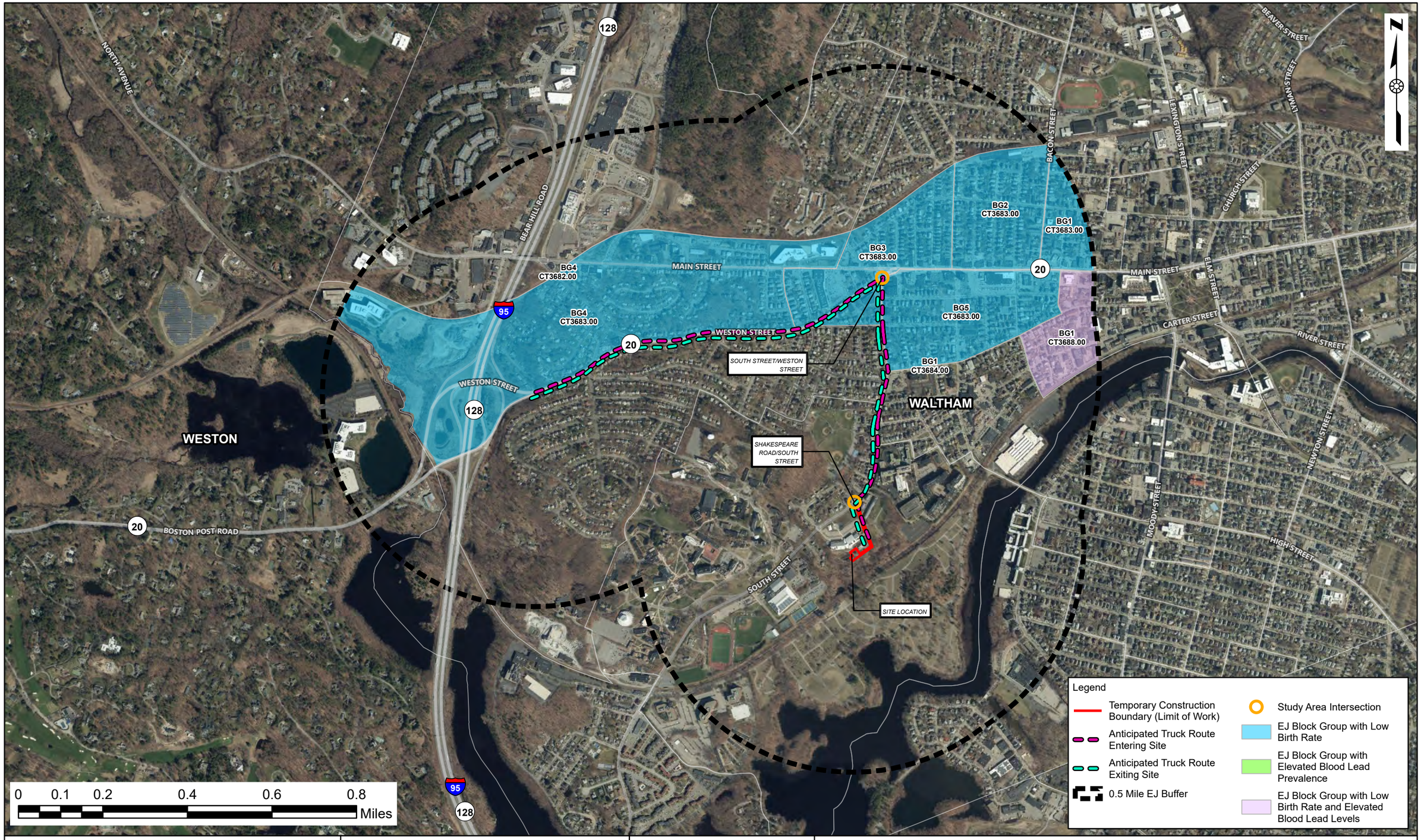

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Environmental Justice

Anticipated Construction Truck Routes in Proximity to EJ Block Groups Meeting Vulnerable Health Criteria

Cedarwood Pumping Station Connection Shaft Site

Figure 3-14

Waltham, MA

Source: MassGIS, MWRA

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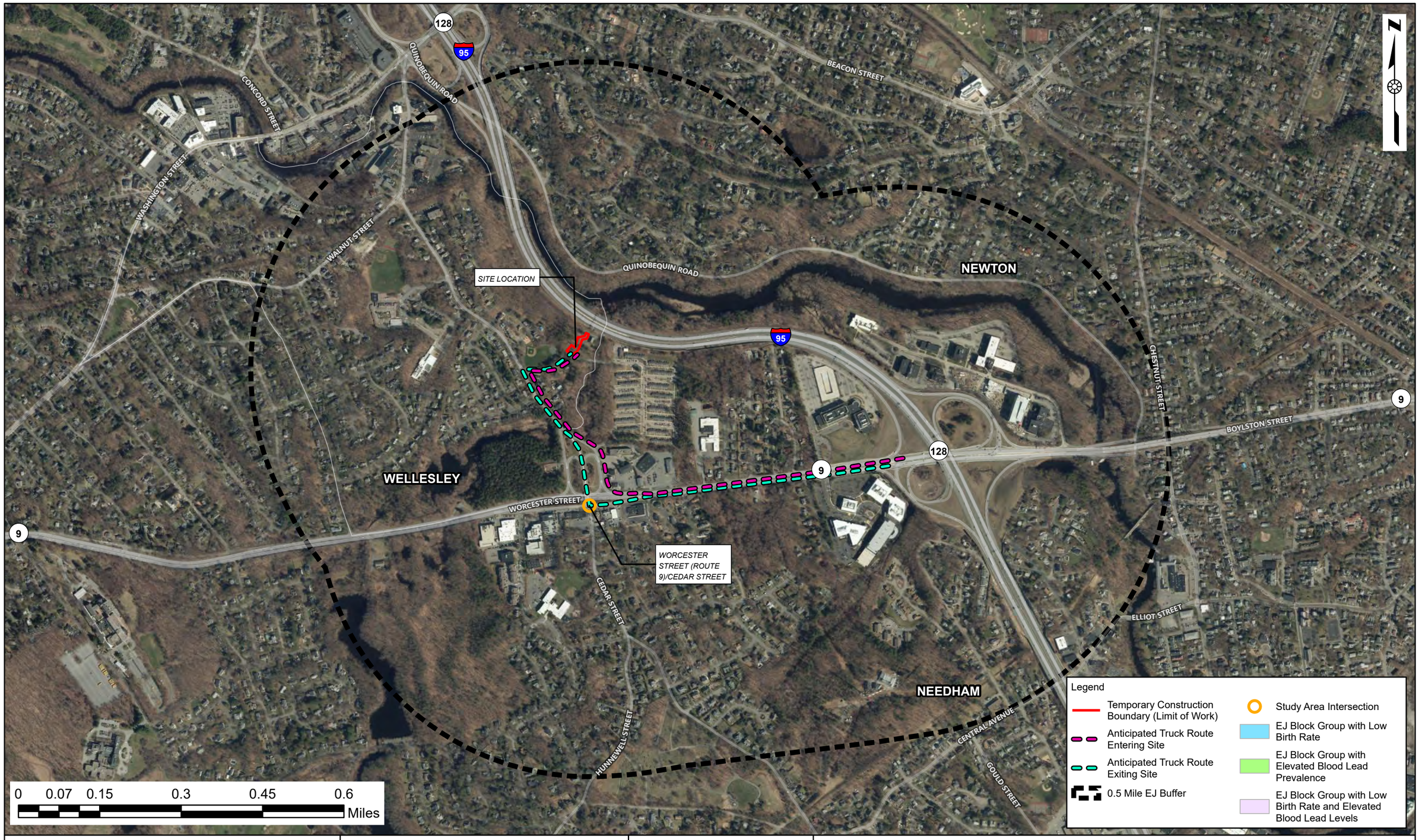

Metropolitan Water Tunnel Program	**MWRA Contract No. 7159** **Supplemental Draft Environmental Impact Report 2023**	CDM Smith in association with vhb Jacobs GREEN INTERNATIONAL AFFILIATES, INC.	**Environmental Justice** **Anticipated Construction Truck Routes in Proximity to EJ Block Groups Meeting Vulnerable Health Criteria** **Hegarty Pumping Station Connection Shaft Site** **Figure 3-15** Wellesley, MA Source: MassGIS, MWRA

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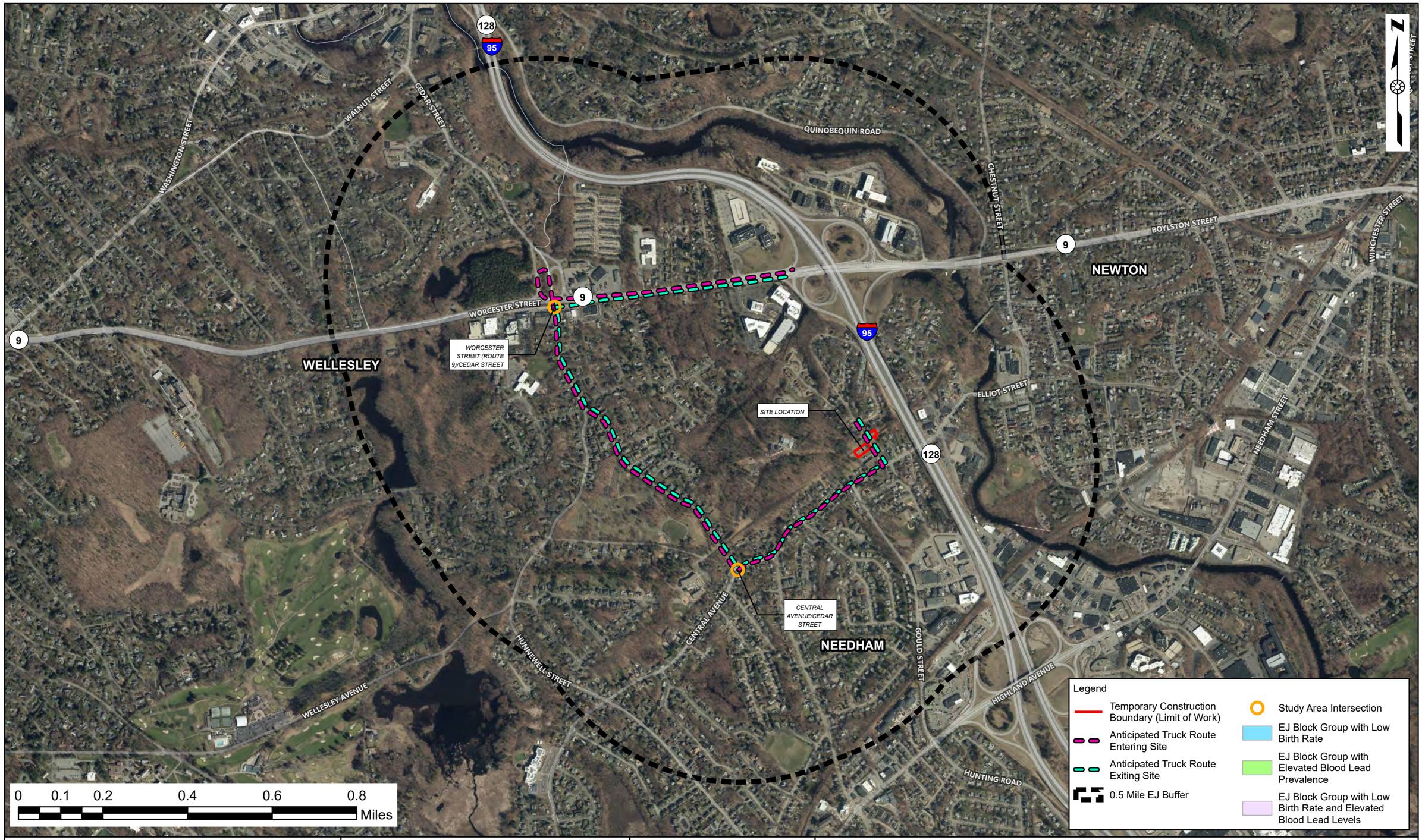

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Environmental Justice

Anticipated Construction Truck Routes in Proximity to EJ Block Groups Meeting Vulnerable Health Criteria

St. Mary Street Pumping Station Connection Shaft Site

Figure 3-16

Needham, MA

Source: MassGIS, MWRA

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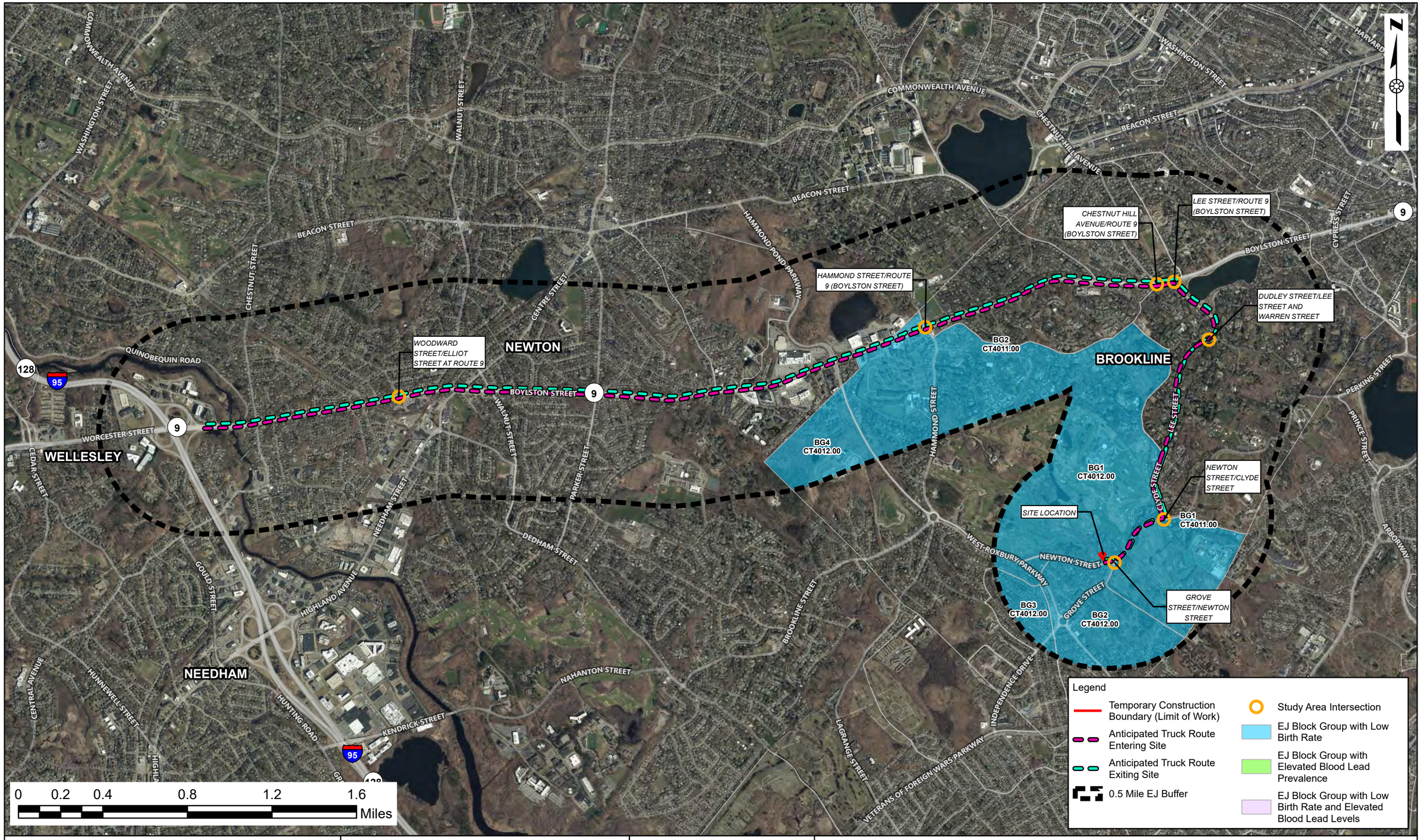

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Environmental Justice

Anticipated Construction Truck Routes in Proximity to EJ Block Groups Meeting Vulnerable Health Criteria

Newton Street Pumping Station Connection Shaft Site

Figure 3-17

Brookline, MA

Source: MassGIS, MWRA

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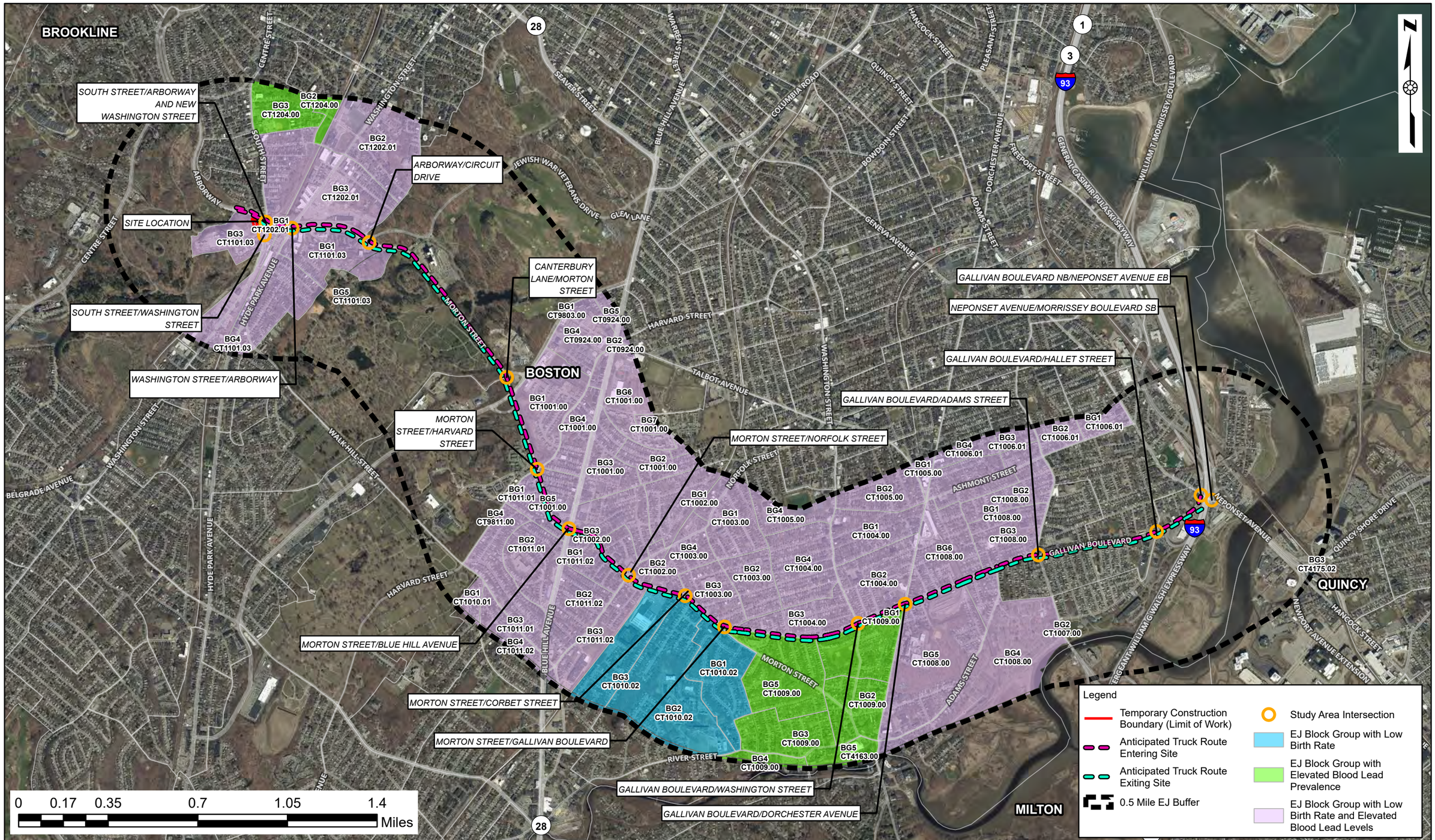

Metropolitan Water Tunnel Program

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Environmental Justice

Anticipated Construction Truck Routes in Proximity to EJ Block Groups Meeting Vulnerable Health Criteria

Southern Spine Mains Connection Shaft Site

Figure 3-18

Boston, MA

Source: MassGIS, MWRA

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3.4.3 Environmental Justice Construction Period Impacts

This section discusses potential construction-period impacts to identified EJ populations, and off-site sources that could result in a cumulative adverse environmental impact on EJ populations.

Table 3-13 details the main DPH EJ vulnerable health criteria that were identified within the DGA and the environmental conditions related to these health concerns. General Program activity that could exacerbate these existing health concerns, specifically related to typical environmental causes, are included in **Table 3-13**. DPH sources of pollution data, specifically proximity to facilities and sites that pose an existing threat to public health, can further exacerbate main DPH EJ vulnerable health criteria. Program activities would not be anticipated to further exacerbate existing health vulnerabilities in and around the Program sites due to the location and type of project activity occurring at those locations. Program activities would not interact with any of the identified sources of pollution. Cleanup activities would be initiated at sites with encountered areas of soil and groundwater contamination, benefitting populations with existing health vulnerabilities.

Table 3-13 Potential Exacerbating Activities of DPH EJ Vulnerable Health Criteria

Health Criteria	Environmental Causation	Possible Contributing Construction Activities
Heart Attack	Exposure to air pollution (e.g., Particulate Matter [PM])	Emissions from diesel trucks, vehicles, and construction equipment
Elevated Blood Lead	Soil and drinking water contamination (e.g., lead drinking water distribution pipes)	Drilling and excavation of contaminated soil, and construction dewatering of contaminated groundwater or surface water
Low Birth Weight	Exposure to air pollution (e.g., PM and other environmental contaminants)	Emissions from diesel trucks, vehicles, and construction equipment
Pediatric Asthma	Exposure to air pollution (e.g., PM, which includes dust particles)	Emissions from diesel trucks, vehicles, and construction equipment

Source: Massachusetts Department of Public Health, Environmental Public Health Tracking and Data, 2022.

The potential for temporary Program-related construction period activities to disproportionally impact EJ populations were evaluated for the following environmental resource categories:

- **Transportation** (see **SDEIR Chapter 9, Transportation**, and **DEIR Chapter 4.10, Transportation**)
- **Air Quality and GHG Emissions** (see **SDEIR Chapter 8, Air Quality and Greenhouse Gas Emissions**, and **DEIR Chapter 4.11, Air Quality and Greenhouse Gas Emissions**)
- **Noise and Vibration** (see **SDEIR Chapter 11, Noise and Vibration**, and **DEIR Chapter 4.12, Noise and Vibration**)
- **Hazardous Materials** (see **SDEIR Chapter 13, Hazardous Materials, Materials Handling, and Recycling**, and **DEIR Chapter 4.8, Hazardous Materials, Materials Handling, and Reuse**)
- **Wetlands and Waterways** (see **SDEIR Chapter 5, Wetlands and Waterways**, and **DEIR Chapter 4.6, Wetlands and Waterways**)
- **Water Supply and Water Management Act** (see **SDEIR Chapter 6, Water Supply and Water Management Act**, and **DEIR Chapter 5, Water Supply and Water Management Act**)

- **Climate Change** (see **SDEIR Chapter 7, Climate Change**, and **DEIR Chapter 6, Climate Change**)
- **Article 97 lands** (see **SDEIR Chapter 4, Land Alteration and Article 97**, **DEIR Chapter 4.9, Land Use**, and **DEIR Chapter 4.13, Community Resources and Open Space**)
- **Community and Open Space Resources** (see **SDEIR Chapter 4, Land Alteration and Article 97**, and **DEIR Chapter 4.13, Community Resources and Open Space**)

The EJ impact assessment methodology is consistent with the methodology described in **DEIR Section 2.4.4, Methodology (pg. 2-15)**.

3.4.3.1 Alternative 3A/Alternative 4A Construction Period Impacts

In SDEIR Alternatives 3A and 4A, the northern terminus of the North Tunnel, Segment 1, would be at the UMass Property site instead of the DEIR Fernald Property site previously considered in the DEIR. All other Program sites would remain the same as assumed in the DEIR for DEIR Alternatives 3 and 4.

UMass Property

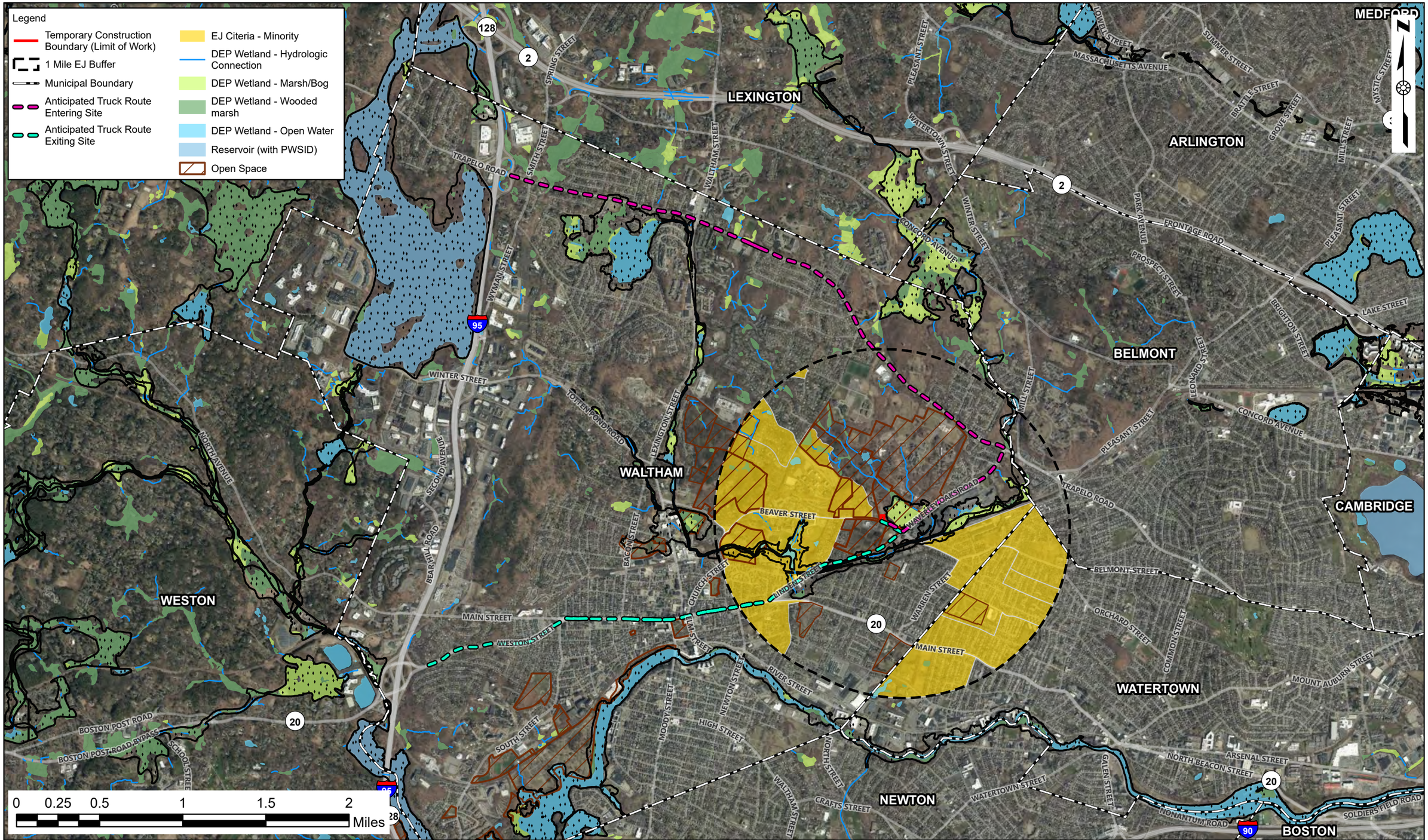
The UMass Property site in the City of Waltham would be the site of a large connection shaft. The TBM would not be removed at this location, but rather dismantled and extracted at the tunnel launch site (Tandem Trailer). The following sections provide analysis consistent with the DEIR to incorporate the UMass Property site in SDEIR Alternatives 3A and 4A in place of the DEIR Fernald Property site. See **Figure 3-20** for the resource areas and EJ block groups in the Study Area associated with the UMass Property site.

For an analysis of potential Program-related impacts on EJ populations and populations with existing unfair or inequitable environmental health burdens in proximity to construction vehicle routes, please see **SDEIR Section 3.4.3.3**.

Transportation

The Program assumes that construction-related traffic to/from a given Program site would take the most direct route to/from the interstate highway. Utilizing the most direct route minimizes construction vehicle traffic on local roads and emissions, which would be the least impactful routing to all populations.

For the UMass Property site, most traffic expected to be generated by construction activities would be due to construction workers driving to and from the sites for their shifts. The highest increase in traffic would occur where there is a shift change in the evening, when workers from the first shift will leave the sites at approximately the same time that workers for the second shift will arrive. Construction worker trips are not expected to occur during the evening peak hour as shift change is usually at approximately 3:00 PM and the peak hour for roadway traffic volumes generally occurs between 4:00 and 6:00 PM. The maximum expected overall number of daily construction worker trips would be up to 40 construction worker trips would be expected to arrive at the UMass Property site in the morning peak hour and depart in the evening peak hour for a maximum duration of 12 weeks. See the updated Traffic Impact Assessment (TIA) in **SDEIR Appendix F.1** for further information.



Metropolitan Water Tunnel Program	**MWRA Contract No. 7159** **Supplemental Draft Environmental Impact Report 2023**	CDM Smith in association with vhb Jacobs GREEN INTERNATIONAL AFFILIATES, INC.	**Environmental Justice Populations and Resource Areas** **UMass Property Large Connection Shaft Site** **Figure 3-20** Waltham, MA Source: MWRA, CDM Smith, VHB, Jacobs, MassGIS

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No significant adverse impacts nor disproportionate adverse effects from traffic to EJ populations would be anticipated. Temporary increases in traffic during Program-related construction activities would be shared by EJ and non-EJ populations. Measures that would be considered to mitigate potential traffic impacts, if necessary and where appropriate, are described in **SDEIR Section 9.2.4, Transportation Avoidance, Minimization, and Mitigation**, and are summarized in **SDEIR Chapter 9**, **Table 9-11**.

Air Quality and GHG Emissions

As described in **SDEIR Chapter 8, Air Quality and Greenhouse Gas Emissions**, Program-related emissions would be primarily associated with off-road equipment and, more specifically, construction equipment temporarily used at launching sites. **Table 3-14** and **Table 3-15** provide the estimated peak 12-month construction period emissions for nitrogen oxides (NOx), volatile organic compounds (VOCs), and GHG in SDEIR Alternatives 3A and 4A, including for off-road (at Program sites) and on-road emissions.

Table 3-14 Alternative 3A Peak 12-Month Construction Period Emissions (Tons)

Pollutant	Peak 12-Month Period	Off-Road (Site Related) Emissions	On-Road Emissions	Total Peak 12-Month Period Emissions
NO_x	Year 4 Q3 – Year 5 Q2	33.7	0.0	33.7
VOC	Year 4 Q3 – Year 5 Q2	2.5	0.0	2.5
GHG	Year 4 Q3 – Year 5 Q2	6,190.6	19.5	6,210.1

Table 3-15 Alternative 4A Peak 12-Month Construction Period Emissions (Tons)

Pollutant	Peak 12-Month Period	Off-Road (Site Related) Emissions	On-Road Emissions	Total Peak 12-Month Period Emissions
NO_x	Year 4 Q3 – Year 5 Q2	33.7	0.0	33.7
VOC	Year 4 Q3 – Year 5 Q2	2.5	0.0	2.5
GHG	Year 4 Q3 – Year 5 Q2	6,190.6	19.1	6,209.7

Table 3-16 summarizes the estimated peak 12-month period and total 10-year modeled construction duration emissions for NOx, VOC, and GHG calculated for each SDEIR Alternative. As shown in **Table 3-16**, emissions calculated for each SDEIR Alternative are expected to be similar to one another and would occur at a variety of geographically diverse sites, limiting potential health impacts. Program-related construction emissions would be below the General Conformity *de minimis* thresholds and would represent a fraction of the total statewide emissions.

No significant adverse air quality or GHG emissions impacts are anticipated at any of the proposed Program sites. Accordingly, Program-related construction emissions are not anticipated to exacerbate existing environmental or health burdens of EJ or non-EJ populations. No disproportionate adverse effects to EJ populations would be anticipated.

As described in **SDEIR Section 8.3, Air Quality and GHG Impact Assessment**, Program-related construction activities in SDEIR Alternative 3A are expected to temporarily add approximately 0.1 percent to 2.0 percent additional vehicles to local roadways (non-highways) on the modeled peak day compared to existing conditions. In SDEIR Alternative 4A, Program-related construction activities are expected to temporarily add approximately 0.1 percent to 1.8 percent additional vehicles to local roadways (non-highway) during construction activities. Program-related traffic along highways in SDEIR Alternatives 3A and 4A are each anticipated to temporarily add approximately 0.2 percent to 0.7 percent of total daily volumes on the modeled peak day.

Project activities are not anticipated to exacerbate existing unfair or inequitable environmental burdens**. No significant construction-period impacts related to air quality and GHG are anticipated from any of the three SDEIR Alternatives, for EJ nor non-EJ populations.**

Table 3-16 Summary Comparison of Emissions (Tons per Year) Among Alternatives

Alternative	NOx Emissions (Tons)				VOC Emissions (Tons)				GHG Emissions (Tons)		
	General Conformity *de minimis* threshold	MA 2017 Inventory Total On- and Off-Highway Vehicles	Program Peak 12-Month Period	Program Total 10-Year Modeled Duration	General Conformity *de minimis* threshold	MA 2017 Inventory Total On- and Off-Highway Vehicles	Program Peak 12-Month Period	Program Total 10-Year Modeled Duration	2018 MA GHG Emissions (Tons CO_2e)	Program Peak 12-Month Period	Program Total 10-Year Modeled Duration
3A	100.0	67,598	33.7	122.8	50.0	44,177	2.5	9.1	75,300,000	6,210.1	25,738.8
4A	100.0	67,598	33.7	122.6	50.0	44,177	2.5	9.0	75,300,000	6,209.7	25,669.9
10A	100.0	67,598	33.4	123.0	50.0	44,177	2.6	9.1	75,300,000	6,149.5	25,158.3

MA = Massachusetts, CO_2e = Carbon dioxide equivalent

Sources: U.S. Environmental Protection Agency, General Conformity, "De Minimis Tables," updated July 20, 2022, https://www.epa.gov/general-conformity/de-minimis-tables (accessed June 12, 2023); U.S. Environmental Protection Agency, National Emissions Inventory, 2017, https://www.epa.gov/air-emissions-inventories/2017-national-emissions-inventory-nei-data#dataq (accessed June 12, 2023); Commonwealth of Massachusetts, Executive Office of Energy and Environmental Affairs, "GHG Emissions and Mitigation Policies," https://www.mass.gov/info-details/ghg-emissions-and-mitigation-policies (accessed June 12, 2023).

Noise and Vibration

SDEIR Chapter 11, **Noise and Vibration**, evaluated potential noise impacts using the 65 dBA threshold for residential uses (U.S. Department of Housing and Urban Development [HUD] regulation 24 Code of Federal Regulations [CFR] Part 51)[4] and an increase of sound level more than 10 dBA above ambient (background) noise threshold per the MassDEP Noise Control Regulation.[5] **Tables 3-24** and **3-25** provided in **SDEIR Section 3.5** identify the noise-sensitive receptors that may be subject to adverse noise impacts in SDEIR Alternatives 3A and 4A during temporary Program-related construction activities.

Table 3-17 provides a summary of the construction noise assessment results at the UMass Property site and identifies that one receptor (R36) may be subject to a potential noise impact during temporary construction activities. This receptor, R36, is not located in an EJ block group. **Therefore, no disproportionate adverse effect would be anticipated**. It is important to note that American Community

4 U.S. Department of Housing and Urban Development, 24 CFR Part 51, Subpart B, Noise Abatement and Control.

5 The Commonwealth of Massachusetts Department of Environmental Protection (DEP), Noise Control Regulation 310 CMR 7.10, M.G.L. Chapter 111, Section 142B and 142D, https://www.airandnoise.com/MA310CMR710/.

Survey (ACS) Census data utilized by the EJ Maps Viewer and associated data layers do not designate EJ criteria for individual households. Thus, block group EJ criteria designations are used for the assessment of disproportionate adverse effect.

Table 3-17 Construction Noise Assessment Results, UMass Property

Site	Receptor	Highest (L_{eq}) Noise Level Increase (dBA)	Day-night Level (L_{dn}) Construction Noise Level (dBA)	Potential Noise Impact (Y/N)	Within EJ Block Group (Y/N)
UMass Property	R2 [A]	6	63	N	N
	R36	**25**	56	**Y**	N
	R37	9	65	N	N
	R38 [A]	7	64	N	N
	R39 [A]	2	58	N	N

Sources: VHB, 2023; U.S. Department of Housing and Urban Development (HUD), 24 CFR Part 51, Subpart B, Noise Abatement and Control; Commonwealth of Massachusetts, Executive Office of Environmental Affairs, Massachusetts Department of Environmental Protection and Massachusetts Division of Air Quality Control Policy 90-001, February 1, 1990, https://www.mass.gov/doc/massdep-noise-policy/download (accessed April 18, 2023).

Note: Bold and highlighted values indicate unmitigated construction noise levels would exceed applicable criteria, including the HUD noise regulation, which states levels over 65 dBA are Normally Unacceptable, and the MassDEP Noise Level Policy, which establishes a noise limit of a 10 dBA increase over existing ambient levels during the nighttime period.

A Receptor is institutional use that is not sensitive to noise at night.

Vibration levels in each of the SDEIR Alternatives would be below the thresholds for potential structural damage. As there would be no blasting or adverse vibration impacts at the UMass Property site (see **SDEIR Chapter 11, Noise and Vibration**), **no disproportionate adverse effects from construction activity vibration to EJ populations would be anticipated.**

Hazardous Materials

Based on the existing conditions assessment, six state-listed disposal sites were identified within the Study Area associated with the UMass Property site, all of which have the potential to impact soil and groundwater within the LOD. According to the latest regulation documentation for RTN 3-8049, fly ash was disposed in close proximity of the LOD for the UMass property site and likely extends into the work area. Therefore, the approximately 12,300 cubic yards of soil generated during the construction of the large connection shaft at the UMass Property site would likely contain measurable concentrations of OHM, requiring proper management during construction. Suitable locations for disposal of contaminated excavated material would be identified so that EJ populations would not bear an unequal burden.

As part of construction for the connection shaft at the UMass Property site, approximately 300 cubic yards of excess soil is anticipated to be generated and excavations associated with surface connections are anticipated to generated approximately 12,000 cubic yards of excess soil. Tunnel excavated material from the UMass Property site would be removed at the Tandem Trailer and Park Road East site. Excess soil generated during shaft construction and surface connections would require off-site disposal or reuse. Most of the excavated material from the tunnel would be clean, crushed rock, which can be reused beneficially at other locations. Uncontaminated excavated material may be used as embankment or road-

paving materials. Suitable locations for reuse and disposal of excavated material would be identified to limit impacts to all populations, including EJ populations.

To prevent future impacts to human health and the environment, rock and excavated material removed during construction under Alternatives 3A and 4A would be stored using appropriate containment within an appropriate facility. With planned mitigation and proper handling, no adverse impacts would be anticipated and thus, no disproportionate adverse effects for EJ populations would be anticipated. Improvement of disposal sites would be anticipated for any contamination present on site. Existing environmental and health burdens on EJ populations would not be exacerbated by Program activities, and may be improved through disposal site improvement, if encountered during construction.

During construction, dewatering effluent may be temporarily discharged to the adjacent wetland that drains to Clematis Brook. According to the existing conditions assessment, these wetlands are associated with the disposal site under RTN 3-28049. Lead-impacted sediment and soil are still present within the wetlands; the disposal site has not achieved regulatory closure and is regulated under a Temporary Solution Statement. Therefore, mitigation measures would need to be implemented during the discharge to these wetlands to avoid exacerbating the contaminated sediments. Due to the potential to encounter impacted groundwater during construction, dewatering effluent treatment and a United States Environmental Protection Agency (USEPA) National Pollutant Discharge Elimination System (NPDES) Dewatering and Remediation General Permit (DRGP) would likely be required to facilitate discharge. Additionally, coordination with the Licensed Site Professional (LSP)-of-record for RTN 3-28049 will be conducted prior to discharging to the wetlands along Clematis Brook. Construction activities would not occur within the wetland and mitigation measures would be implemented for the discharges to the wetlands along Clematis Brook to avoid exacerbating the existing contamination or environmental and health burdens.

As no significant adverse impacts related to hazardous materials are anticipated, there would be **no disproportionate adverse effects to EJ populations in the Study Area associated with the UMass Property site**.

Wetlands, Waterways, and Water Supply (noted as Natural Resources in the DEIR)

Potential construction period impacts at the UMass Property site may include off-site erosion and sedimentation, scour and potential water quality degradation due to dewatering discharges, and potential groundwater drawdown. As stated in **DEIR Chapter 4.6, Wetlands and Waterways, Sections 4.6.5, Construction Period Impacts (pg. 4.6-127)** and **DEIR Section 4.6.6, Final Conditions (pg. 4.6-153)**, any impacts due to construction activities would be mitigated through development and implementation of appropriate Best Management Practices (BMPs), treatment of dewatering discharges to meet applicable water quality standards, management of groundwater inflows, and compliance with MassDEP Stormwater Management Standards. Compliance with each of the ten MassDEP Stormwater Management Standards is further described in **DEIR Section 4.6.7.8**, **Compliance with MassDEP Stormwater Management Standards (pg. 4.6-179)**. **Therefore, adverse impacts on neighboring EJ communities due to project-related construction-period impacts would not be anticipated. As no adverse impacts would be anticipated, no disproportionate adverse effects due to stormwater would be anticipated.**

Construction period impacts on existing floodplains were evaluated by comparing the flow rates of dewatering discharges at each site to those of the potential receiving waterbodies. The U.S. Geological Survey (USGS) Stream Stats: Stream Flow Statistics and Spatial Analysis Tool (web application) was utilized to estimate the flow rates in the existing receiving waterbodies. The web application was used to delineate drainage areas for waterways adjacent to potential Program sites and then to get basin characteristics and estimates of flow statistics for the selected sites. The analysis tool uses regression equations with available geographic information system (GIS) information and recorded flood flows from existing stream gages to estimate the flow rates at ungauged locations. **The analysis indicates that the proposed dewatering discharge volumes would not contribute significantly to existing flood impacts. As no adverse impacts would be anticipated, no disproportionate adverse effects due to flooding would be anticipated.**

At the UMass Property site, where 100 gallons per minute (GPM) of dewatering flow would be discharged to Clematis Brook, impacts to both Clematis Brook and the downstream Beaver Brook were assessed. Flow estimates for the 100-year flood event (1 percent) for Clematis Brook and Beaver Brook were estimated to be approximately 84,381 GPM and 267,055 GPM respectively. Therefore, dewatering discharges made to Clematis Brook from the UMass Property site are estimated to be only 0.1 percent of the 100-year flood volume for Clematis Brook and 0.04 percent of the 100-year flood volume for Beaver Brook. Based on these estimates, it is anticipated that construction period dewatering discharges from this site would not contribute significantly to existing flood impacts and therefore would be assumed to have no adverse impact.

During construction at the launching and receiving sites, water would be generated, which would mainly come from groundwater inflows into the tunnel excavation. Construction of the tunnel would include use of TBMs along the proposed alignment. Although this construction method minimizes disruption at the surface as compared to open trench construction, there is the potential to temporarily affect water supply wells along the tunnel route by lowering the groundwater level during construction. In these areas of concern, the TBM would simultaneously drill and pre-grout from the tunnel heading in advance of tunnel excavation. This ground improvement technique would reduce the volume of groundwater inflow into the tunnel, which would help to mitigate any potential impacts to water supply wells. See **SDEIR Chapter 6**, **Water Supply and Water Management Act** for further discussion.

Under anticipated conditions, there would be no water supply impacts, and adverse impacts would be minimized and mitigated to the greatest extents feasible. Thus, **no disproportionate adverse effects to EJ populations would be anticipated associated with water supply.**

Climate Change

The temporary construction area LOD estimated for the UMass Property site is approximately 0.9 acres total. The site would include a top-of-shaft structure, valve chamber, and stormwater basin with paved access provided from Beaver Street. The temporary LOD includes an approximately 0.5-acre area surrounding the proposed shaft site and approximately 0.4 acres to accommodate a subterranean pipeline traveling from the shaft site southeast along Beaver Street to connect to Weston Aqueduct Supply Main Number Three (WASM3) at the intersection with Waverley Oaks Road. The LOD for the pipeline

includes an area northwest of the intersection between Beaver Street and Waverley Oaks Road to accommodate a temporary discharge pipe. Construction-related activities would primarily take place underground with limited disruption to the surface above. Upon completion of construction, the area would be vacated and reseeded/revegetated, where necessary and as appropriate. Construction of the proposed large connection shaft site, paved access area, fencing, and associated permanent infrastructure would take place outside the Federal Emergency Management Agency (FEMA) Special Flood Hazard Area (SFHA) associated with Clematis Brook.

See **SDEIR Section 3.4.3.1** for air quality and GHG emissions analysis, and **SDEIR Chapter 7, Climate Change**, for more detailed climate change exposure and impact information.

For all proposed sites, best management practices would be implemented during construction to reduce potential climate-related risks and to build redundancy and resiliency into the Program. For the UMass Property site, no EJ populations exist within the LOD. No construction period adverse impacts on climate change exposure would be anticipated, and thus no disproportionate adverse effects on EJ populations would be anticipated. No impacts to baseline environmental or health conditions of EJ or non-EJ populations would be anticipated as a result of construction-period activities or Program-related GHG emissions. **No disproportionate adverse effects for climate change exposure of EJ communities would be anticipated associated with Alternatives 3A and 4A.**

Community Resources and Open Space

Open space and community resources identified within the DGA of the UMass Property site are the Lawrence Meadow, Cornelia Warren Field, Waltham Agricultural Fields, and Cedar Hill Girl Scout Camp. Temporary use of Lawrence Meadow would be needed for construction. The estimated construction area LOD would encompass approximately 0.9 acres.

Construction is not anticipated to impact the existing use of Lawrence Meadow, as it is used for conservation and has limited public access. Use of the Cornelia Warren Field, Waltham Agricultural Fields, and Cedar Hill Girl Scout Camp would not be impacted by the Program. **No disproportionate adverse effects to EJ populations from impacts to community or open space resources would be anticipated.**

3.4.3.2 Alternative 10A Construction Period Impacts

In SDEIR Alternative 10A, the northern terminus of the North Tunnel, Segment 1, would be at the Lower Fernald Property site instead of the DEIR Fernald Property site previously considered in the DEIR. All other Program sites would remain the same as previously assumed in DEIR Alternative 10.

Lower Fernald Property

The Lower Fernald Property site in the City of Waltham would be a receiving shaft site at the northern terminus of the North Tunnel, Segment 1, in SDEIR Alternative 10A. The following sections provide updated analysis, consistent with the DEIR construction impact analysis, to incorporate the Lower Fernald Property site in place of the DEIR Fernald Property site. See **Figure 3-21** for the resource area impacts in relation to the EJ block groups for the Lower Fernald Property site.

For an analysis of potential Program-related impacts on EJ populations and populations with existing unfair or inequitable environmental health burdens in proximity to construction vehicle routes, please see **SDEIR Section 3.4.3.3**.

Transportation

The Lower Fernald Property site's DGA is located within EJ populations that would experience temporary increases in traffic during Program-related construction activities. The least impactful routing to all populations is using the most direct routes to the interstates and minimizing traffic on local roads.

For the Lower Fernald Property site, most traffic expected to be generated by construction activities would be due to construction workers driving to and from the sites for their workday shifts. The highest potential increase in traffic would occur where there is a shift change in the evening, when workers from the first shift would leave the sites at approximately the same time that workers for the second shift would arrive. Construction worker trips are not expected to occur during the evening peak hour as shift change is usually at approximately 3:00 PM and the peak hour for roadway traffic volumes generally occurs between 4:00 and 6:00 PM. The maximum expected overall number of daily construction worker trips would be up to 64 construction worker trips would be expected to arrive at the Lower Fernald Property site in the morning and depart in the evening for a maximum duration of 12 weeks. Further information is provided in the updated TIA in **SDEIR Appendix F.1**.

Temporary increases in traffic during Program-related construction activities would be shared by EJ and non-EJ populations. Measures that would be considered to mitigate potential traffic impacts, if necessary and where appropriate, are described in **SDEIR Section 9.2.4, Transportation Avoidance, Minimization, and Mitigation**, and are summarized in **Table 9-11**. Further information is provided in the updated TIA in **SDEIR Appendix F.1**.

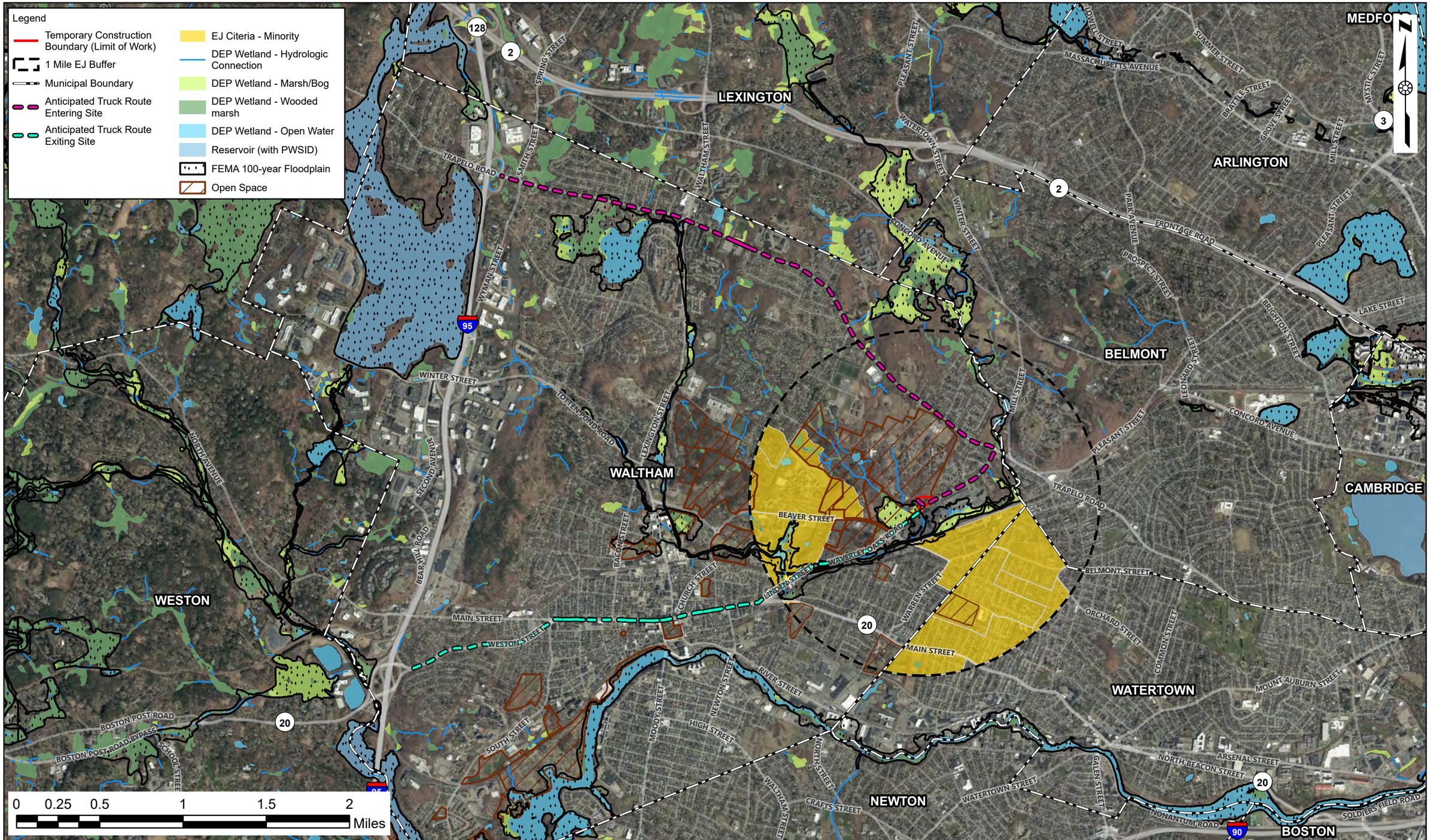
Air Quality and GHG Emissions

Table 3-18 shows the estimated peak 12-month construction period emissions of NOx, VOC, and GHG, including off-road (at Program sites) and on-road emissions.

Table 3-18 Alternative 10A Peak 12-Month Construction Period Emissions (Tons)

Pollutant	Peak 12-Month Period	Off-Road (Site Related) Emissions)	On-Road Emissions	Total Peak 12-Month Period Emissions
NOx	Year 6 Q3 – Year 7 Q2	33.0	0.3	33.4
VOC	Year 6 Q2 – Year 7 Q1	2.5	0.1	2.6
GHG	Year 6 Q3 – Year 7 Q2	5,991.7	157.8	6,149.5

As described in **SDEIR Section 3.4.3.1**, and as shown in **Table 3-16**, the peak 12-month period and total 10-year modeled construction duration emissions for NOx, VOC, and GHG calculated for each SDEIR Alternative are not expected to be significantly different from each other and would occur at a variety of geographically diverse sites, limiting potential health impacts. As shown in **Table 3-16** and as described in **SDEIR Chapter 8, Air Quality and Greenhouse Gas Emissions**, Program-related construction emissions would be below the General Conformity *de minimis* thresholds and would represent a fraction of the total statewide emissions.



Metropolitan Water Tunnel Program	**MWRA Contract No. 7159** **Supplemental Draft Environmental Impact Report 2023**	CDM Smith in association with vhb Jacobs GREEN INTERNATIONAL AFFILIATES, INC.	**Environmental Justice Populations and Resource Areas** **Lower Fernald Property Receiving Shaft Site** **Figure 3-21** Waltham, MA Source: MWRA, CDM Smith, VHB, Jacobs, MassGIS

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As described in **SDEIR Chapter 8, Section 8.3.4, Avoidance, Minimization, and Mitigation Measures**, the MWRA intends to incorporate measures to reduce emissions from Program-related construction activities to minimize Program-related emissions; for example, these include using an electrified TBM instead of a TBM powered by fossil fuels, limiting vehicle idling, requiring use of Ultra Low Sulfur Diesel Fuel, and implementing dust control measures.

No adverse air quality or GHG emissions impacts are anticipated at any of the proposed Program sites. Accordingly, Program-related construction emissions are not anticipated to exacerbate existing environmental or health burdens of EJ or non-EJ populations. No disproportionate adverse effects to EJ populations would be anticipated.

In SDEIR Alternative 10A, Program-related construction activities are expected to temporarily add approximately 0.1 percent to 1.9 percent additional vehicles to local roadways on the peak day compared to existing conditions. Program-related traffic (and associated emissions) along highways is anticipated to temporarily add approximately 0.1 percent to 0.7 percent of total daily volumes on the modeled peak day, which conservatively assumes that construction would occur at all shafts simultaneously (see **SDEIR Chapter 9, Transportation**).

Project activities are not anticipated to exacerbate existing unfair or inequitable environmental burdens. **No significant construction-period impacts related to air quality and GHG emissions are anticipated from any of the three SDEIR Alternatives, for EJ nor non-EJ populations.**

Noise and Vibration

Table 3-19 summarizes the construction noise assessment results at the Lower Fernald Property site in Alternative 10A in relation to EJ block groups. Based on the construction noise impact assessment described in **SDEIR Chapter 11**, **Section 11.2.2, Noise Construction Period Impacts**, four receptors near the Lower Fernald Property site (R1, R36, R44, and R45) may be subject to temporary construction noise impacts in SDEIR Alternative 10A prior to implementing minimization and mitigation measures. These receptors are not within an EJ block group and thus no disproportionate adverse effect would be anticipated. It is important to note that ACS Census data utilized by the EJ Maps Viewer and associated data layers do not designate EJ criteria for individual households. Thus, block group EJ criteria designations are used for the assessment of disproportionate adverse effect.

Table 3-19 Construction Noise Assessment Results, Lower Fernald Property

Site	Receptor	Highest (L_{eq}) Noise Level Increase (dBA)	Day-Night Level (L_{dn}) Construction Noise Level (dBA)	Adverse Impact (Y/N)	Within an EJ Block Group (Y/N)
Lower Fernald Property	R1	**18**	**74**	**Y**	N
	R2[A]	-	55	N	N
	R36	**16**	55	**Y**	N
	R40	6	62	N	N
	R41	4	60	N	N
	R42	1	57	N	N
	R43	-	56	N	N
	R44	**10**	**66**	**Y**	N
	R45	**12**	**68**	**Y**	N

Sources: VHB, 2023; U.S. Department of Housing and Urban Development (HUD), 24 CFR Part 51, Subpart B, Noise Abatement and Control; Commonwealth of Massachusetts, Executive Office of Environmental Affairs, Massachusetts Department of Environmental Protection and Massachusetts Division of Air Quality Control Policy 90-001, February 1, 1990, https://www.mass.gov/doc/massdep-noise-policy/download (accessed April 18, 2023).

*Note: **Bold** and highlighted values indicate unmitigated construction noise levels would exceed applicable criteria, including the HUD noise regulation, which states levels over 65 dBA are Normally Unacceptable, and the MassDEP Noise Level Policy, which establishes a noise limit of a 10 dBA increase over existing ambient levels during the nighttime period.*

A Receptor is institutional use that is not sensitive to noise at night.

Cells marked by "-" do not show an increase in noise levels from ambient noise levels to construction noise levels.

Vibration levels in each of the SDEIR Alternatives would be below the thresholds for potential structural damage. As described in **SDEIR Chapter 11**, **Section 11.3.2.2, Alternative 10A**, vibration levels due to construction activities at the Lower Fernald Property site considered in SDEIR Alternative 10A are expected to be below the thresholds for perceptible vibration and damage in structures due to the distances between the construction activity and adjacent vibration-sensitive land use. Therefore, no disproportionate adverse effects from construction activity vibration to EJ populations would be anticipated.

Hazardous Materials

As part of construction for the receiving shaft approximately 2,000 cubic yards of excess soil is anticipated to be generated and excavations associated with surface connections are anticipated to generated approximately 3,000 cubic yards of excess soil. Tunnel excavated material from the Lower Fernald Property site would be removed at the Park Road West site. Excess soil generated during shaft construction and surface connections will require off-site disposal or reuse. Most of the excavated material from the tunnel would be clean, crushed rock, which can be reused beneficially at other locations. Uncontaminated excavated material may be used as embankment or road-paving materials. Suitable locations for reuse and disposal of excavated material would be identified so that EJ populations would not bear an unequal burden.

Based on the existing conditions assessment, 13 state-listed disposal sites were identified within the Study Area associated with the Lower Fernald Property site, 12 of which have the potential to impact soil and groundwater within the construction area LOD. Therefore, the approximately 5,000 cubic yards of soil

that would be generated during the construction of the receiving shaft at the Lower Fernald Property site would likely contain measurable concentrations of oils and hazardous materials (OHM), requiring proper management during construction. Suitable locations for disposal of contaminated excavated material would be identified so that EJ populations would not bear an unequal burden.

To prevent potential impacts to human health and the environment, rock and excavated material removed during construction under SDEIR Alternative 10A would be stored using appropriate containment within an appropriate facility. With planned mitigation and proper handling, no adverse impacts would be anticipated and thus, no disproportionate adverse effects for EJ populations would be anticipated. Improvement of disposal sites would be anticipated for any contamination present on site. Existing environmental and health burdens on EJ populations would not be exacerbated by Program-related activities, and may be improved through disposal site improvement, if encountered during construction.

Three buildings within the Lower Fernald Property site are anticipated to require demolition during Program-related construction activities at the site. Based on the age of the buildings (i.e., between 1925 and 1970) there is the potential for hazardous building materials to be present, such as asbestos containing material (ACM), including roof flashing, tiles, and other materials as well as lead-based paint and other hazardous building materials. Therefore, a hazardous building material assessment would be conducted prior to demolition. Materials from the demolition of buildings at the Lower Fernald Property site would be disposed of at appropriately licensed facilities and would be removed and disposed of in a way that would not adversely impact EJ populations.

During construction, dewatering effluent may be temporarily discharged to the adjacent wetland that drains to Clematis Brook. According to the existing conditions assessment, these wetlands are associated with the disposal site under RTN 3-28049. Lead-impacted sediment and soil are still present within the wetlands; the disposal site has not achieved regulatory closure and is regulated under a Temporary Solution Statement. Therefore, mitigation measures would need to be implemented during the discharge to these wetlands to avoid exacerbating the contaminated sediments. Due to the potential to encounter impacted groundwater during construction, dewatering effluent treatment and a USEPA NPDES DRGP would likely be required to facilitate discharge. Additionally, coordination with the LSP-of-record for RTN 3-28049 will be conducted prior to discharging to the wetlands along Clematis Brook. Construction activities would not occur within the wetland and mitigation measures would be implemented for the discharges to the wetlands along Clematis Brook to avoid exacerbating the existing contamination or environmental and health burdens.

As no significant adverse impacts related to hazardous materials are anticipated, there would be **no disproportionate adverse effects to EJ populations in the Study Area associated with the Lower Fernald Property site**.

Wetlands, Waterways, and Water Supply noted as Natural Resources in the DEIR

Potential construction period impacts at the Lower Fernald Property site may include impacts due to off-site erosion and sedimentation, scour and potential water quality degradation due to dewatering discharges, and potential groundwater drawdown. As stated in **DEIR Chapter 4.6, Wetlands and Waterways, Sections 4.6.5, Construction Period Impacts (pg. 4.6-127)** and **DEIR Section 4.6.6, Final Conditions (pg. 4.6-153)**, any impacts due to construction activities would be mitigated through development and implementation of appropriate BMPs, treatment of dewatering discharges to meet applicable water quality standards, management of groundwater inflows, and compliance with the MassDEP Stormwater Management Standards. Compliance with each of the ten MassDEP Stormwater Management Standards is further described in **DEIR Section 4.6.7.8**, **Compliance with MassDEP Stormwater Management Standards (pg. 4.6-179)**. Therefore, adverse impacts on neighboring EJ communities due to project-related construction-period impacts would not be anticipated. **As no adverse impacts would be anticipated, therefore no disproportionate adverse effects to EJ populations due to wetlands or waterway impacts would be anticipated.**

Construction period impacts on existing floodplains were evaluated by comparing the flow rates of dewatering discharges at each site to those of the potential receiving waterbodies. The USGS Stream Stats: Stream Flow Statistics and Spatial Analysis Tool (web application) was utilized to estimate the flow rates in the existing receiving waterbodies. The web application was used to delineate drainage areas for waterways adjacent to potential Program sites and then to get basin characteristics and estimates of flow statistics for the selected sites. The analysis tool uses regression equations with available GIS information and recorded flood flows from existing stream gages to estimate the flow rates at ungauged locations. The analysis indicates that the proposed dewatering discharge volumes would not contribute significantly to existing flood impacts. **As no adverse impacts would be anticipated, no disproportionate adverse effects due to flooding would be anticipated.**

At the Lower Fernald Property site, where 300 GPM of dewatering flow will be discharged to Clematis Brook, potential impacts to both Clematis Brook and the downstream Beaver Brook were assessed. Flow estimates for the 100-year flood event (1 percent) for Clematis Brook and Beaver Brook were estimated to be approximately 84,381 GPM and 267,055 GPM respectively. Therefore, dewatering discharges made to Clematis Brook from the Fernald Property site are estimated to be only 0.4 percent of the 100-year flood volume for Clematis Brook and 0.1 percent of the 100-year flood volume for Beaver Brook. **Based on these estimates, it is anticipated that construction period dewatering discharges from this site would not contribute significantly to existing flood impacts and therefore would be assumed to have no adverse impact.**

EJ block group 1, census tract 3689.01 is buffered from Clematis Brook by forested area associated with Forest Street Park. EJ block group block group 1, census tract 3691 is located across the right-of-way (ROW) from Beaver Brook. Due to the anticipated 0.4 percent and 0.1 percent respective contributions to the 100-year flood volume, and the physical separation between the 100-year floodplain and the EJ block groups by natural and ROW features, project activities would not exacerbate flood risk to proximal EJ populations. **Thus, no disproportionate adverse effects are anticipated due to stormwater or other flood impacts.**

During construction at the launching and receiving sites, construction water would be generated, which would mainly come from groundwater inflows into the tunnel excavation. Construction of the new tunnel system would include use of TBMs along the proposed alignment. Although this construction method minimizes disruption at the surface as compared to open trench construction, there is the potential to temporarily affect water supply wells along the tunnel route by lowering the groundwater level during construction. In these areas of concern, the TBM would simultaneously drill and pre-grout from the tunnel heading in advance of tunnel excavation. See **SDEIR Chapter 6**, **Water Supply and Water Management Act**, for further information.

This ground improvement technique would reduce the volume of groundwater inflow into the tunnel, which would help to mitigate any potential impacts to water supply wells. **Thus, no disproportionate adverse effects to EJ populations relating to groundwater would be anticipated.**

Climate Change

The temporary construction area LOD for the Lower Fernald Property site is approximately 2.3 acres. The LOD includes a connection to WASM3 at Waverley Oaks Road and a temporary discharge pipe southwest of the intersection between Chapel Road and Waverley Oaks Road. Construction-related activities would primarily take place underground with limited disruption to the surface above. Upon completion of construction, the area would be vacated and reseeded/revegetated, where necessary and as appropriate. Construction of the proposed receiving shaft site, paved access area, fencing, and associated permanent infrastructure would take place outside the FEMA SFHA associated with Clematis Brook.

See above for air quality and GHG impact analysis, and **SDEIR Chapter 7, Climate Change**, for information on climate change-related risks and exposures.

For all proposed sites, best management practices would be implemented during construction to reduce potential climate-related risks and to build redundancy and resiliency into the Program. For the Lower Fernald Property site, no EJ populations exist with the LOD. No construction period adverse impacts on climate change exposure would be anticipated, and thus no disproportionate adverse effects on EJ populations would be anticipated. No impacts to baseline environmental or health conditions of EJ or non-EJ populations would be anticipated as a result of construction-period activities or Program-related GHG emissions. **No disproportionate adverse effects for climate change exposure of EJ communities would be anticipated.**

Community Resources and Open Space

Approximately 2.3 acres of the Walter E. Fernald State School Property site would be needed to accommodate temporary construction activities at the Lower Fernald Property receiving site in SDEIR Alternative 10A.

Construction is not anticipated to impact the existing use of Walter E. Fernald State School Property site, as it is used for conservation and has no public access. Areas temporarily disturbed during construction would be restored to preconstruction conditions in coordination with Waltham**. No disproportionate adverse effects to EJ populations from impacts to community or open space resources would be anticipated.**

3.4.3.3 Anticipated Truck Routes Construction Period Impacts

In response to the Secretary's Certificate, additional EJ analysis was conducted to assess potential traffic and air quality impacts from the anticipated construction vehicle routes between each Program site and the interstate highway. Routes were established for each Program site location by identifying the most direct route along main state and local roadways to/from the nearest highway. Using the most direct route seeks to minimize construction vehicle travel time and mileage, and the resulting Program-related traffic and emissions. **Figure 3-3** through **Figure 3-19** depict the anticipated construction vehicle routes to be used during temporary Program-related construction activities to/from each Program site and the nearest interstate highway. **Figure 3-20** through **Figure 3-36** identify which anticipated construction vehicle routes travel through block groups containing EJ populations. Block groups containing EJ populations within a 0.5-mile distance from the anticipated routes that have existing unfair or inequitable environmental burdens were identified per the DPH vulnerable health criteria data (low birth rate and elevated blood lead prevalence) and are also shown on **Figure 3-3** through **Figure 3-19**. Study Area intersections along the anticipated routes are also identified and labeled in **Figure 3-3** through **Figure 3-19**.

Table 3-12 in **SDEIR Section 3.4.2.3**, provides a corresponding list of the census tracts containing populations with existing unfair or inequitable burdens within 0.5-miles of the anticipated truck routes. **Table 3-20** lists the intersections along the truck routes and the block groups containing EJ populations that are within 0.5-miles of the anticipated truck routes.

Table 3-20 EJ Block Groups and Vulnerable Health Criteria Along Anticipated Construction Vehicle Routes

Site (Alternative)	Intersection	EJ Block Groups	Existing Unfair or Inequitable Health Burden?		Route Description/ Figure Reference
			Elevated Blood Lead Levels	Low Birth Weight	
UMass Property Large Connection (3A, 4A) / Lower Fernald Property Receiving (10A)	Trapelo Road and Lexington Street	BG 6, CT 3689.01	No	Yes	Routes only intersect with the boundary of EJ block groups on a necessary main road, Main Street/Weston Street (Route 20). UMass Property **Figure 3-3** and **Figure 3-20** Lower Fernald Property **Figure 3-4** and **Figure 3-21**
		BG 5, CT 3689.01	No	**Yes**	
		BG 2, CT 3681.01	No	**Yes**	
	Trapelo Road and Waverley Oaks Road	None	-	-	
	Beaver Street and Waverley Oaks Road	None	-	-	
	Main Street and Linden Street/Ellison Park	BG 4, CT 3688	**Yes**	**Yes**	
		BG 1, CT 3689.02	No	No	
	Main Street and Church Street/Elm Street	BG 1, CT 3688	**Yes**	**Yes**	
		BG 2, CT 3689.02	No	No	
		BG 5, CT 3688	**Yes**	**Yes**	
	Main Street and Common Street/Moody Street	BG 2, CT 3689.02	No	No	
		BG 1, CT 3688	**Yes**	**Yes**	
	Main Street and Bacon Street	BG 2, CT 3683	No	**Yes**	
		BG 1, CT 3683	No	**Yes**	
		BG 5, CT 3683	No	**Yes**	
	Main Street and Weston Street	BG 3, CT 3683	No	**Yes**	
		BG 5, CT 3683	No	**Yes**	
	Weston Street and South Street	BG 3, CT 3683	No	**Yes**	
		BG 5, CT 3683	No	**Yes**	
Tandem Trailer and Park Road East Launching (3A, 4A)	South Avenue and River Road	None	-	-	Routes stay close to the LOD, and no EJ block groups are nearby. **Figure 3-5** and **Figure 3-22**
	I-95 NB off-ramp at Route 30	None	-	-	
Bifurcation Launching (3A)	None	None	-	-	Routes stay close to the LOD, and no EJ block groups are nearby. **Figure 3-6** and **Figure 3-23**
Park Road West Receiving (4A)/Large Connection (10A)	South Avenue and River Road	None	-	-	Park Road West Receiving **Figure 3-7** and **Figure 3-24** Park Road West Large Connection **Figures 3-8** and **3-25**
	I-95 NB off-ramp at Route 30	None	-	-	
	South Avenue and Park Road	None	-	-	

Table 3-20 EJ Block Groups and Vulnerable Health Criteria Along Anticipated Construction Vehicle Routes

Site (Alternative)	Intersection	EJ Block Groups	Existing Unfair or Inequitable Health Burden?		Route Description/ Figure Reference
			Elevated Blood Lead Levels	Low Birth Weight	
Highland Avenue Northwest Receiving (3A)	None	None	-	-	The site is within the I-95/Highland Avenue interchange and routes have direct access to I-95; no EJ block groups are within the Study Area. **Figure 3-9** and **Figure 3-26**
Highland Avenue Northwest/Southwest Launching (4A, 10A)	None	None	-	-	The site is within the I-95/Highland Avenue interchange and routes have direct access to I-95; no EJ block groups are within the Study Area. **Figure 3-10** and **Figure 3-27**
Highland Avenue Northeast/Southeast Launching (All)	None	None	-	-	The site is within the I-95/Highland Avenue interchange and routes have direct access to I-95; no EJ block groups are within the Study Area. **Figure 3-11** and **Figure 3-28**

Table 3-20 EJ Block Groups and Vulnerable Health Criteria Along Anticipated Construction Vehicle Routes

Site (Alternative)	Intersection	EJ Block Groups	Existing Unfair or Inequitable Health Burden?		Route Description/ Figure Reference
			Elevated Blood Lead Levels	Low Birth Weight	
American Legion Receiving (All)	Morton Street and Canterbury Lane	BG 1, CT 9803	No	No	There are no alternative routes that would avoid EJ block groups. Construction vehicles would take the most direct route to I-93 using four-lane Route 203 (Morton Street and Gallivan Boulevard) to limit potential impacts. Alternative routes such as via Columbia Road or Pond Street/Jamaicaway are less direct and would result in more travel time on local roads in the vicinity of EJ block groups. **Figure 3-12** and **Figure 3-29**
		BG 3, CT 9811	No	No	
	Morton Street and Harvard Street	BG 3, CT 1011.01	**Yes**	**Yes**	
		BG 5, CT 1001	**Yes**	**Yes**	
		BG 1, CT 1001	**Yes**	**Yes**	
	Morton Street and Blue Hill Avenue	BG 5, CT 1001	**Yes**	**Yes**	
		BG 3, CT 1002	**Yes**	**Yes**	
		BG 1, CT 1011.02	**Yes**	**Yes**	
		BG 3, CT 1011.01	**Yes**	**Yes**	
	Morton Street and Norfolk Street	BG 1, CT 1011.02	**Yes**	**Yes**	
		BG 2, CT 1002	**Yes**	**Yes**	
		BG 3, CT 1011.02	**Yes**	**Yes**	
	Morton Street and Corbet Street	BG 4, CT 1003	**Yes**	**Yes**	
		BG 3, CT 1003	**Yes**	**Yes**	
		BG 3, CT 1010.02	**Yes**	**Yes**	
		BG 2, CT 1010.02	**Yes**	**Yes**	
	Morton Street and Gallivan Boulevard/Woodmere Street	BG 3, CT 1003	**Yes**	**Yes**	
		BG 3, CT 1009	**Yes**	No	
		BG 1, CT 1010.02	**Yes**	**Yes**	
	Gallivan Boulevard and Washington Street	BG 3, CT 1004	**Yes**	**Yes**	
		BG 2, CT 1004	**Yes**	**Yes**	
		BG 1, CT 1009	**Yes**	**Yes**	
	Gallivan Boulevard and Dorchester Avenue	BG 2, CT 1004	**Yes**	**Yes**	
		BG 6, CT 1008	**Yes**	**Yes**	
		BG 1, CT 1009	**Yes**	**Yes**	
		BG 5, CT 1008	**Yes**	**Yes**	
	Gallivan Blvd. and Adams St./Granite Ave.	BG 3, CT 1008	**Yes**	**Yes**	
	Gallivan Blvd. and Hallet Street	BG 2, CT 1007	No	No	
	Neponset Ave. and Morrissey Blvd. SB	BG 2, CT 1007	No	No	
		BG 1, CT 1006.03	No	No	
	Gallivan Blvd. NB and Neponset Ave. EB	BG 2, CT 1006.03	No	No	
		BG 2, CT 1007	No	No	

Table 3-20 EJ Block Groups and Vulnerable Health Criteria Along Anticipated Construction Vehicle Routes

Site (Alternative)	Intersection	EJ Block Groups	Existing Unfair or Inequitable Health Burden?		Route Description/ Figure Reference
			Elevated Blood Lead Levels	Low Birth Weight	
School Street Connection (All)	Main Street and Bacon Street	BG 2, CT 3683	No	**Yes**	There would be no opportunities for routes to avoid EJ block groups. Routes only intersect with the boundary of EJ block groups on a necessary main road, Main Street/Weston Street (Route 20), and on the connecting roadways. **Figure 3-13** and **Figure 3-30**
		BG 1, CT 3683	No	**Yes**	
		BG 5, CT 3683	No	**Yes**	
	Main Street and Weston Street	BG 3, CT 3683	No	**Yes**	
		BG 5, CT 3683	No	**Yes**	
	Weston Street and South Street	BG 3, CT 3683	No	**Yes**	
		BG 5, CT 3683	No	**Yes**	
Cedarwood Pumping Station Connection (All)	Weston Street and South Street	BG 3, CT 3683	No	**Yes**	Routes remain along the boundary of as few EJ block groups as possible. **Figure 3-14** and **Figure 3-31**
		BG 5, CT 3683	No	**Yes**	
	South Street and Shakespeare Road	BG 6, CT 3684	No	No	
Hegarty Pumping Station Connection (All)	Central Avenue at Cedar Street	None	-	-	Routes travel on a main road, Worcester Street (Route 9), and avoid as many EJ block groups as possible outside the LOD. **Figure 3-15** and **Figure 3-32**
	Cedar Street and Route 9 EB Ramp	BG 2, CT 4041	No	No	
St. Mary Street Pumping Station Connection (All)	Central Avenue at Cedar Street	None	-	-	Routes intersect with the boundary of an EJ block group on a road necessary to get to Worcester Street (Route 9). **Figure 3-16** and **Figure 3-33**
	Cedar Street and Route 9 EB Ramp	BG 2, CT 4041	No	No	
Newton Street Pumping Station Connection (All)	Route 9 and Woodward Street/Elliot St.	BG 2, CT 3741	No	No	There would be no opportunities for routes to avoid EJ block groups. Vehicles take the most direct route to limit potential impacts. **Figure 3-17** and **Figure 3-34**
	Route 9 (Boylston Street) and Hammond Street	BG 1, CT 4012.02	No	No	
		BG 2, CT 4011	No	**Yes**	
	Route 9 (Boylston Street) and Chestnut Hill Avenue	BG 3, CT 4011	No	**Yes**	
		BG 3, CT 4011	No	**Yes**	
		BG 1, CT 4011	No	**Yes**	
	Route 9 (Boylston Street) and Lee Street	BG 1, CT 4011	No	**Yes**	
		BG 3, CT 4011	No	**Yes**	
	Dudley Street and Lee Street/Warren St.	BG 1, CT 4011	No	**Yes**	
	Newton Street and Clyde Street	BG 1, CT 4011	No	**Yes**	
		BG 1, CT 4012.02	No	No	
	Newton Street and Grove Street	BG 1, CT 4012.02	No	No	
		BG 2, CT 4012.01	No	No	

Table 3-20 EJ Block Groups and Vulnerable Health Criteria Along Anticipated Construction Vehicle Routes

Site (Alternative)	Intersection	EJ Block Groups	Existing Unfair or Inequitable Health Burden?		Route Description/ Figure Reference
			Elevated Blood Lead Levels	Low Birth Weight	
Southern Spine Mains Connection (All)	South Street and New Washington Street	BG 2, CT 1201.04	No	No	There are no alternative routes that would avoid EJ block groups. Construction vehicles would take the most direct route to I-93 is using four-lane Route 203 (Morton Street and Gallivan Boulevard) to limit potential impacts. By limiting routes to a main road, Route 203, routes avoid EJ groups as much as possible outside the LOD. Alternative routes such as via Columbia Road or Pond Street/Jamaicaway are less direct and would result in more travel time on local roads near EJ block groups. **Figure 3-18** and **Figure 3-35**
		BG 1, CT 1202.01	**Yes**	**Yes**	
	South Street and Washington Street	BG 2, CT 1201.04	No	No	
	Washington Street and New Washington Street	BG 1, CT 1101.05	No	No	
		BG 3, CT 1202.01	**Yes**	**Yes**	
	Arborway and Circuit Drive/Morton Street	BG 1, CT 1101.05	No	No	
		BG 1, CT 9803	No	No	
	Morton Street and Canterbury Lane	BG 1, CT 9803	No	No	
		BG 3, CT 9811	No	No	
	Morton Street and Harvard Street	BG 3, CT 1011.01	**Yes**	**Yes**	
		BG 5, CT 1001	**Yes**	**Yes**	
		BG 1, CT 1001	**Yes**	**Yes**	
	Morton Street and Blue Hill Avenue	BG 5, CT 1001	**Yes**	**Yes**	
		BG 3, CT 1002	**Yes**	**Yes**	
		BG 1, CT 1011.02	**Yes**	**Yes**	
		BG 3, CT 1011.01	**Yes**	**Yes**	
	Morton Street and Norfolk Street	BG 1, CT 1011.02	**Yes**	**Yes**	
		BG 2, CT 1002	**Yes**	**Yes**	
		BG 3, CT 1011.02	**Yes**	**Yes**	
	Morton Street and Corbet Street	BG 4, CT 1003	**Yes**	**Yes**	
		BG 3, CT 1003	**Yes**	**Yes**	
		BG 3, CT 1010.02	No	**Yes**	
		BG 2, CT 1010.02	No	**Yes**	
	Morton Street and Gallivan Boulevard/Woodmere Street	BG 3, CT 1003	**Yes**	**Yes**	
		BG 3, CT 1009	**Yes**	No	
		BG 1, CT 1010.02	No	**Yes**	

Table 3-20 EJ Block Groups and Vulnerable Health Criteria Along Anticipated Construction Vehicle Routes

Site (Alternative)	Intersection	EJ Block Groups	Existing Unfair or Inequitable Health Burden?		Route Description/ Figure Reference
			Elevated Blood Lead Levels	Low Birth Weight	
Southern Spine Mains Connection (All) *continued*	Gallivan Boulevard and Washington Street	BG 3, CT 1004	**Yes**	**Yes**	There are no alternative routes that would avoid EJ block groups. Construction vehicles would take the most direct route to I-93 using four-lane Route 203 (Morton Street and Gallivan Boulevard) to limit potential impacts. By limiting routes to a main road, Route 203, routes avoid EJ groups as much as possible outside the LOD. Alternative routes such as via Columbia Road or Pond Street/Jamaicaway are less direct and would result in more travel time on local roads in the vicinity of EJ block groups. **Figure 3-18** and **Figure 3-35**
		BG 2, CT 1004	**Yes**	**Yes**	
		BG 1, CT 1009	**Yes**	No	
	Gallivan Boulevard and Dorchester Avenue	BG 2, CT 1004	**Yes**	**Yes**	
		BG 6, CT 1008	**Yes**	**Yes**	
		BG 1, CT 1009	**Yes**	No	
		BG 5, CT 1008	**Yes**	**Yes**	
	Gallivan Boulevard and Adams Street/Granite Avenue	BG 3, CT 1008	**Yes**	**Yes**	
	Gallivan Boulevard and Hallet Street	BG 2, CT 1007	No	No	
	Neponset Avenue and Morrissey Boulevard SB	BG 2, CT 1007	No	No	
		BG 1, CT 1006.03	No	No	
	Gallivan Boulevard NB and Neponset Avenue EB	BG 2, CT 1006.03	No	No	
		BG 2, CT 1007	No	No	
Hultman Aqueduct Isolation Valve (All)	None	None	-	-	Routes stay close to the LOD, and no EJ block groups are nearby. **Figure 3-19** and **Figure 3-36**

EB = Eastbound, NB = Northbound, SB = Southbound, BG = Block Group, CT = Census Tract

Launching Sites with Construction Vehicle Routes Near EJ Block Groups

Of the various Program site functions, tunnel launching shaft sites would contribute the largest amount of temporary Program-related traffic and associated emissions. None of the Program launching shaft sites considered in any of the SDEIR Alternatives are in EJ block groups. As listed below and as shown on **SDEIR Figure 3-5, Figure 3-6, Figure 3-10**, and **Figure 3-11**, none of the construction vehicle routes between these launching shaft sites and the highway travel through or within a 0.5-mile distance from EJ block groups, given their proximity to highway ramps (refer also to **Table 3-12** and **Table 3-20**).

- Tandem Trailer/Park Road East launching shaft site (see **Figure 3-5** and **Figure 3-22**) [*SDEIR Alternatives 3A and 4A*]
- Bifurcation launching shaft site (see **Figure 3-6** and **Figure 3-24**) [*SDEIR Alternative 3A*]
- Highland Avenue Northwest/Southwest launching shaft site (see **Figure 3-10** and **Figure 3-27**) [*SDEIR Alternatives 4A and 10A*]
- Highland Avenue Northeast/Southeast launching shaft site (see **Figure 3-11** and **Figure 3-28**) [*all SDEIR Alternatives*]

Receiving, Large Connection, Connection, and Isolation Valve Sites with Construction Vehicle Routes Near EJ Block Groups

The anticipated construction vehicle routes to/from the following Program receiving, large connection, connection, and isolation valve sites are not anticipated to travel through or within a 0.5-mile distance from block groups containing EJ populations (refer also to **Table 3-12** and **Table 3-20**):

- Park Road West receiving shaft site (see **Figure 3-7** and **Figure 3-24**) [*SDEIR Alternative 4A*]
- Park Road West large connection shaft site (see **Figure 3-8** and **Figure 3-25**) [*SDEIR Alternative 10A*]
- Highland Avenue Northwest receiving shaft site (see **Figure 3-9** and **Figure 3-26**) [*SDEIR Alternative 3A*]
- Hultman Aqueduct Isolation Valve site (see **Figure 3-19** and **Figure 3-36**) [*all SDEIR Alternatives*]

Portions of the anticipated construction vehicle routes between the highway and the following Program sites would travel through or within a 0.5-mile distance from block groups containing EJ populations (refer also to **Table 3-12** and **Table 3-20**):

- UMass Property large connection shaft site (see **SDEIR Section 3.4.3.1**; see **Figure 3-3** and **Figure 3-20**) [*SDEIR Alternatives 3A and 4A*]
- Lower Fernald Property receiving shaft site (see **SDEIR Section 3.4.3.2**; see **Figure 3-4** and **Figure 3-21**) [*SDEIR Alternative 10A*]
- American Legion receiving shaft site (see **Figure 3-12** and **Figure 3-29**) [*all SDEIR Alternatives*]
- School Street connection shaft site (see **Figure 3-13** and **Figure 3-30**) [*all SDEIR Alternatives*]
- Cedarwood Pumping Station connection shaft site (see **Figure 3-14** and **Figure 3-31**) [*all SDEIR Alternatives*]
- Hegarty Pumping Station connection shaft site (see **Figure 3-15** and **Figure 3-32**) [*all SDEIR Alternatives*]

- St. Mary Street Pumping Station connection shaft site (see **Figure 3-16** and **Figure 3-33**) [*all SDEIR Alternatives*]
- Newton Street Pumping Station connection shaft site (see **Figure 3-17** and **Figure 3-34**) [*all SDEIR Alternatives*]
- Southern Spine Mains connection shaft site (see **Figure 3-18** and **Figure 3-35**) [*all SDEIR Alternatives*]

Table 3-21 summarizes the estimated maximum number of daily construction worker vehicle trips and diesel truck trips expected to be generated by each shaft site. Portions of the routes to/from these sites would travel through or within a 0.5-mile distance from block groups containing EJ populations. It is important to note that the values in **Table 3-21** represent maximum daily values and average daily trips are anticipated to be less over the full duration of construction. The estimate represents a conservative, worst case estimate of construction sequencing (for more information, see **SDEIR Appendix F.1**, and associated **Table F.1-7**, **Table F.1-8**, and **Table F.1-16**). The sequence of constructing each element within a construction package will be at the discretion of the selected contractor(s).

Table 3-21 Maximum Daily Trips for Sites with Routes Within 0.5-Mile of EJ Populations

Site (Alternative)	Maximum Diesel Truck Trips Per Day	Route Within 0.5-Mile of EJ Block Group	Route Within 0.5-Mile of EJ Block Group with Existing Environmental Burden	
			Elevated Blood Lead Levels	Low Birth Weight
UMass Property Large Connection (3A, 4A)	18	Yes	Yes	Yes
Lower Fernald Property Receiving Site (10A)	27	Yes	Yes	Yes
American Legion Receiving (all)	126	Yes	Yes	Yes
School Street Connection (all)	6	Yes	Yes	Yes
Cedarwood Pumping Station Connection (all)	6	Yes	Yes	Yes
Hegarty Pumping Station Connection (all)	8	Yes	No	No
St. Mary Street Pumping Station Connection (all)	8	Yes	No	No
Newton Street Pumping Station Connection (all)	8	Yes	No	Yes
Southern Spine Mains Connection (all)	10	Yes	Yes	Yes

Most traffic expected to be generated by construction activities would be due to construction workers driving to and from the sites for their workday shifts. The maximum amount of temporary Program-related vehicle trips would occur at launching shaft sites where there is a shift change conservatively modeled to take place during the evening peak hour (construction worker trips are not expected to occur during the evening peak hour as shift change is usually at approximately 3:00 PM and the evening peak hour generally occurs between 4:00 PM and 6:00 PM). As previously mentioned, launching shaft locations are adjacent to highway ramps (i.e., Tandem Trailer, Bifurcation, and Highland Avenue sites) and are therefore not expected to cause a significant traffic impact to local roadways. Furthermore, none of the anticipated construction vehicle routes to/from these launching shaft sites and the highway travel within a 0.5-mile distance from EJ block groups.

No significant adverse impacts nor disproportionate adverse impacts on EJ populations along or within 0.5-miles from the anticipated construction vehicles routes are anticipated.

As described in in **SDEIR Section 9.2.4, Transportation Avoidance, Minimization, and Mitigation**, if construction activities were to result in significant traffic congestion during the peak hour, work within certain roadway may not be permitted during weekday peak hours, which normally occur from 7:00 AM to 9:00 AM and from 4:00 PM to 6:00 PM, in accordance with local ordinances. At locations where the additional traffic due to temporary construction may increase intersection delays, potential mitigation measures, if required, may consist of adjusting traffic signal timings. Adjusting traffic signal timings, if necessary and where appropriate, would be expected to result in either minimal increases or reductions in intersection delay when compared to existing conditions. Further information is provided in the updated TIA in **SDEIR Appendix F.1**.

Receiving, Large Connection, and Connection Sites with Construction Vehicle Routes Near EJ Block Groups with Existing Environmental Burdens

Portions of the anticipated construction vehicle routes between the highway and the following Program sites would travel through or within a 0.5-mile distance from block groups containing EJ populations that have existing unfair or inequitable environmental burdens (low birth rate and/or elevated blood lead prevalence) per DPH vulnerable health criteria data (refer also to **Table 3-12** and **Table 3-20**):

- UMass Property large connection shaft site (see **Figure 3-3**) [*SDEIR Alternatives 3A and 4A*]
- Lower Fernald Property receiving shaft site (see **Figure 3-4**) [*SDEIR Alternative 10A*]
- American Legion receiving shaft site (see **Figure 3-12**) [*all SDEIR Alternatives*]
- School Street connection shaft site (see **Figure 3-13**) [*all SDEIR Alternatives*]
- Cedarwood Pumping Station connection shaft site (see **Figure 3-14**) [*all SDEIR Alternatives*]
- Newton Street Pumping Station connection shaft site (see **Figure 3-17**) [*all SDEIR Alternatives*]
- No portions of the route are within 0.5-miles of block groups containing EJ populations that have elevated blood lead prevalence (only low birth weight rates)
- Southern Spine Mains connection shaft site (see **Figure 3-18**) [*all SDEIR Alternatives*]

Block groups containing EJ populations with existing low birth weight health vulnerabilities are located within a 0.5-mile distance from portions of the construction vehicle routes for the seven Program sites listed above. Block groups containing EJ populations with existing elevated blood lead health vulnerabilities are also located within a 0.5-mile distance from portions of the anticipated truck routes for six of the seven Program sites listed above (no portions of the route to/from the Newton Street Pumping Station are within 0.5-miles of block groups containing EJ populations that have elevated blood lead prevalence, only low birth weight rates).

Per the DPH's list of activities that may potentially exacerbate vulnerable health criteria (see **Table 3-13**), emissions from diesel trucks, vehicles, and construction equipment can exacerbate low birth weight health vulnerabilities. However, as described in **SDEIR Section 8.3.2, Air Quality and GHG Construction Period Impacts**, temporary Program-related construction activities are not anticipated to have a significant adverse impact on air quality or GHG emissions. As described earlier in **SDEIR Section 3.4.3** and as shown in **Table 3-16**, emissions of NOx, PM_{10}, $PM_{2.5}$, and diesel particulate matter (DPM) are all

expected to be below 0.5 tons per year (tpy), and well below the referenced General Conformity *de minimis* thresholds of 100 tpy for NOx, 100 tpy for PM_{10}, and 100 tpy for $PM_{2.5}$ (there are no thresholds for DPM).[6] Lead is no longer used in gasoline and is not used in diesel fuel.

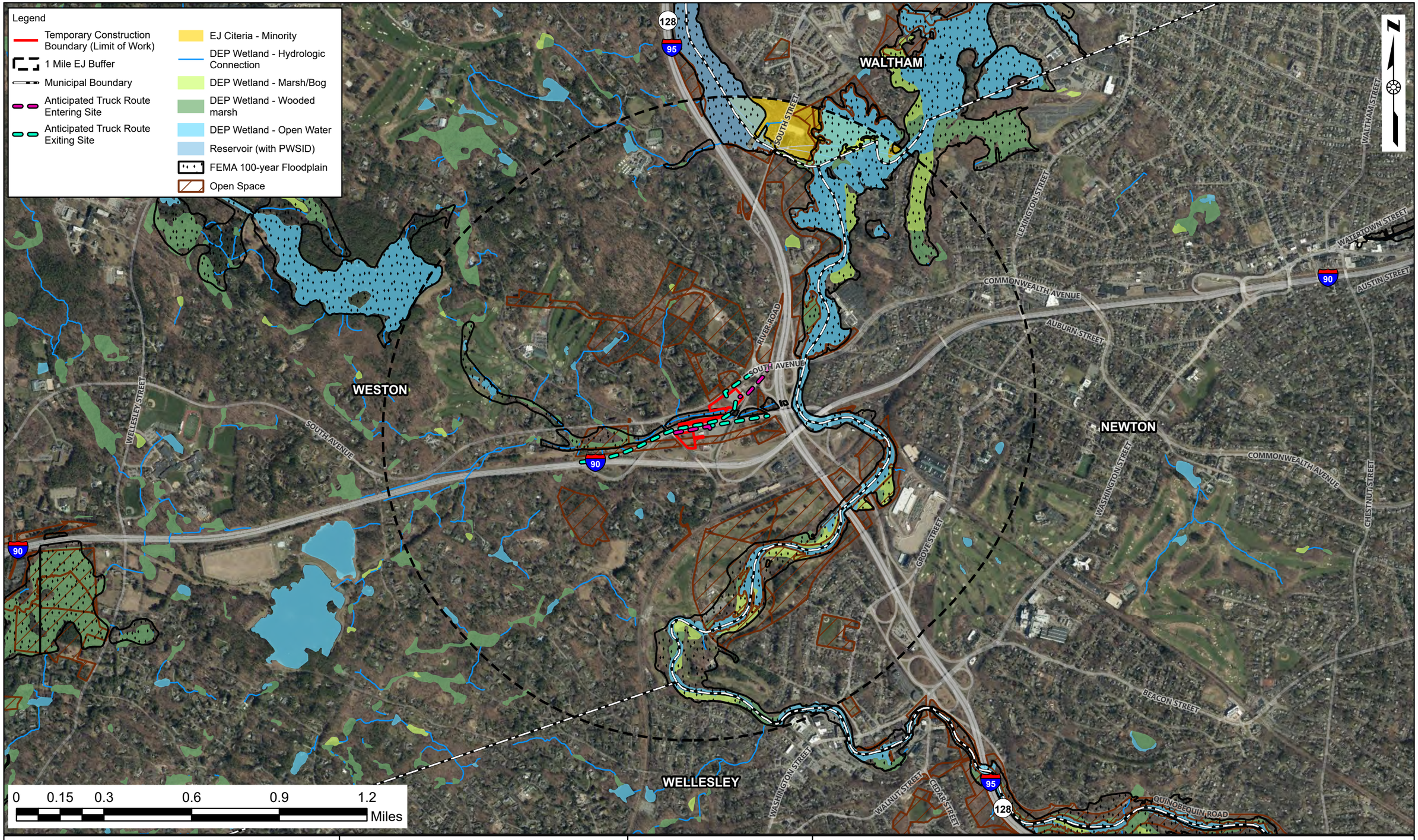
Program-related construction activities are expected to temporarily add approximately 0.1 percent to 2.0 percent additional vehicles to local roadways on the peak day compared to existing conditions. This minor temporary increase would not be expected to materially affect any ambient pollutant concentrations and their comparison to any air quality standards.

The MWRA is dedicated to protecting public health and disadvantaged populations and will work with the DPW and the associated transportation departments of each municipality as necessary to identify appropriate mitigation measures. As described in **SDEIR Section 8.3.4, Air Quality and GHG Avoidance, Minimization, and Mitigation**, the MWRA intends to incorporate measures to reduce emissions from Program-related construction activities to minimize Program-related emissions; for example, these include using an electrified TBM instead of a TBM powered by fossil fuels, limiting vehicle idling, requiring use of Ultra Low Sulfur Diesel Fuel, and implementing dust control measures.

As described in **Table 3-13**, drilling and/or excavation of potentially contaminated soil, or dewatering of potentially contaminated groundwater or surface water are the main Program-related activities that have the potential to exacerbate elevated blood lead health vulnerabilities. The potential for these activities to occur is primarily contained within each Program site's LOD and the area immediately surrounding the site, rather than along the construction vehicle routes to/from the nearest interstate highway. Therefore, the block groups containing EJ populations with existing elevated blood lead health vulnerabilities located within a 0.5-mile distance from a portion of the anticipated truck routes associated with six of the Program sites are not anticipated to be exacerbated by the temporary Program-related construction activities.

If soil or water contaminated with lead is discovered during Program drilling, excavation, or dewatering, the MWRA will work with municipal entities to identify mitigation measures that may be appropriate to reduce the risk of potentially exacerbating elevated blood lead prevalence. As described in **SDEIR Section 13.2.4**, **Hazardous Materials, Materials Handling, and Recycling Avoidance, Minimization, and Mitigation,** the MWRA would implement mitigation measures where necessary to minimize the potential for adverse impacts related to potentially contaminated soil and groundwater that could be encountered during construction.

6 U.S. Environmental Protection Agency, General Conformity, "*De Minimis* Tables," updated July 20, 2022, https://www.epa.gov/general-conformity/de-minimis-tables (accessed June 13, 2023).



Metropolitan Water Tunnel Program	MWRA Contract No. 7159 Supplemental Draft Environmental Impact Report 2023	CDM Smith in association with vhb Jacobs GREEN INTERNATIONAL AFFILIATES, INC.	Environmental Justice Populations and Resource Areas Tandem Trailer/Park Road East Launching Shaft Site Figure 3-22 Weston, MA Source: MWRA, CDM Smith, VHB, Jacobs, MassGIS

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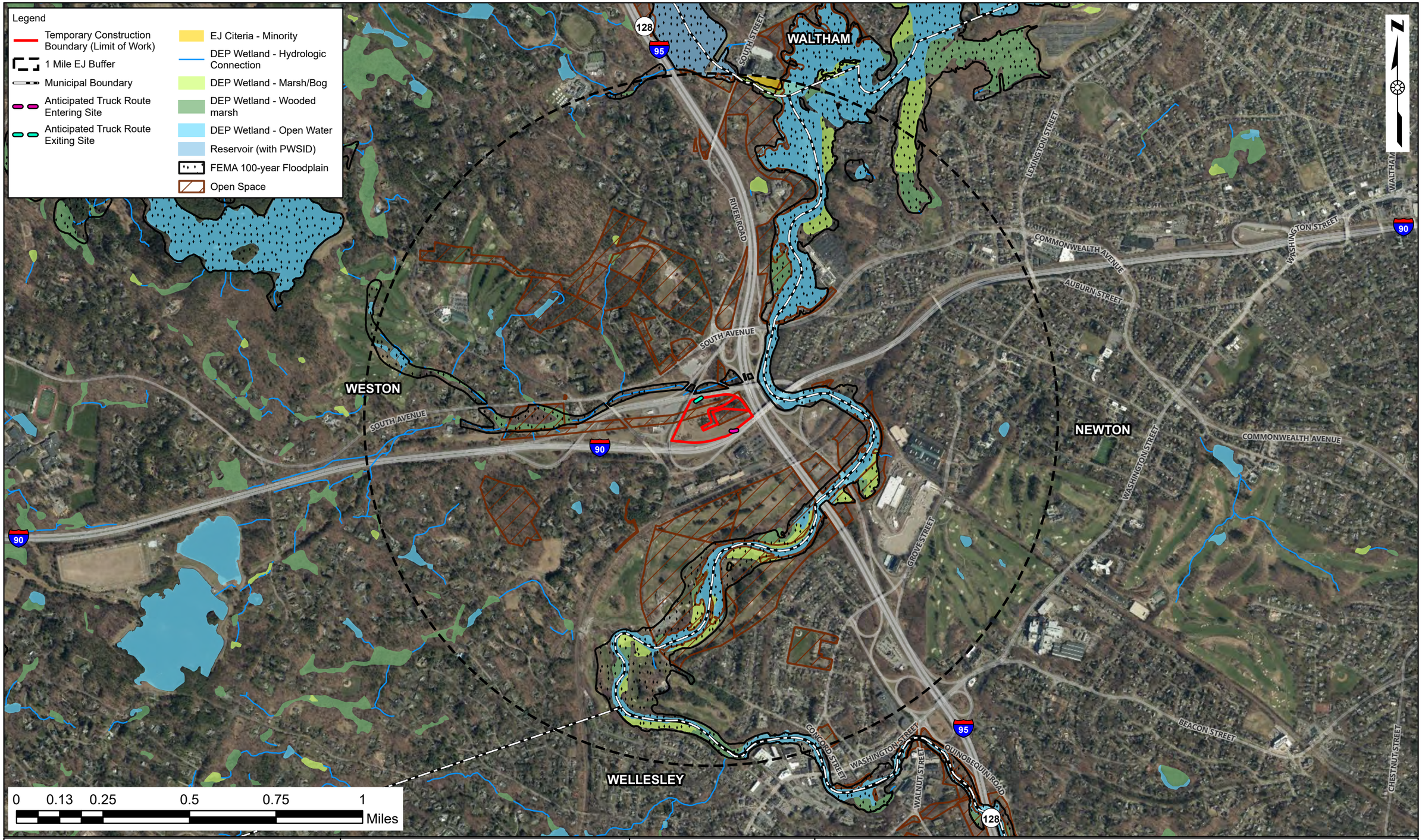

Metropolitan Water Tunnel Program	MWRA Contract No. 7159 Supplemental Draft Environmental Impact Report 2023	CDM Smith in association with vhb Jacobs GREEN INTERNATIONAL AFFILIATES, INC.	**Environmental Justice Populations and Resource Areas** **Bifurcation Launching Shaft Site** **Figure 3-23** Weston, MA Source: MWRA, CDM Smith, VHB, Jacobs, MassGIS

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Legend

- Temporary Construction Boundary (Limit of Work)
- 1 Mile EJ Buffer
- Municipal Boundary
- Anticipated Truck Route Entering Site
- Anticipated Truck Route Exiting Site
- DEP Wetland - Hydrologic Connection
- DEP Wetland - Marsh/Bog
- DEP Wetland - Wooded marsh
- DEP Wetland - Open Water
- Reservoir (with PWSID)
- FEMA 100-year Floodplain
- Open Space

WALTHAM
WESTON
NEWTON
WELLESLEY
SOUTH STREET
RIVER ROAD
LEXINGTON STREET
COMMONWEALTH AVENUE
AUBURN STREET
SOUTH AVENUE
WELLESLEY STREET
GROVE STREET
BEACON STREET
CONCORD STREET
WASHINGTON STREET
WALNUT STREET
QUINOBEQUIN ROAD
128
95
90

0 0.13 0.25 0.5 0.75 1 Miles

Metropolitan Water Tunnel Program	MWRA Contract No. 7159 Supplemental Draft Environmental Impact Report 2023	CDM Smith in association with vhb Jacobs GREEN INTERNATIONAL AFFILIATES, INC.	**Environmental Justice Populations and Resource Areas** **Park Road West Receiving Shaft Site** **Figure 3-24** Weston, MA Source: MWRA, CDM Smith, VHB, Jacobs, MassGIS

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Legend

- Temporary Construction Boundary (Limit of Work)
- 1 Mile EJ Buffer
- Municipal Boundary
- Anticipated Truck Route Entering Site
- Anticipated Truck Route Exiting Site
- DEP Wetland - Hydrologic Connection
- DEP Wetland - Marsh/Bog
- DEP Wetland - Wooded marsh
- DEP Wetland - Open Water
- Reservoir (with PWSID)
- FEMA 100-year Floodplain
- Open Space

WALTHAM
WESTON
NEWTON
WELLESLEY
SOUTH AVENUE
WELLESLEY STREET
RIVER ROAD
SOUTH STREET
LEXINGTON STREET
COMMONWEALTH AVENUE
AUBURN STREET
GROVE STREET
WASHINGTON STREET
BEACON STREET
CONCORD STREET
WALNUT STREET
QUINOBEQUIN ROAD
128
95
90

0 0.13 0.25 0.5 0.75 1 Miles

Metropolitan Water Tunnel Program

MWRA Contract No. 7159
Supplemental Draft
Environmental Impact Report
2023

CDM Smith in association with vhb
Jacobs GREEN INTERNATIONAL AFFILIATES, INC.

Environmental Justice Populations and Resource Areas
Park Road West Large Connection Shaft Site
Figure 3-25

Weston, MA

Source: MWRA, CDM Smith, VHB, Jacobs, MassGIS

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Legend

- Temporary Construction Boundary (Limit of Work)
- 1 Mile EJ Buffer
- Municipal Boundary
- Anticipated Truck Route Entering Site
- Anticipated Truck Route Exiting Site
- DEP Wetland - Hydrologic Connection
- DEP Wetland - Marsh/Bog
- DEP Wetland - Wooded marsh
- DEP Wetland - Open Water
- FEMA 100-year Floodplain
- Open Space

WELLESLEY
NEEDHAM
NEWTON
BROOKLINE
BOSTON
QUINOBEQUIN ROAD
WORCESTER STREET
WASHINGTON STREET
CEDAR STREET
CHESTNUT STREET
ELLIOT STREET
WALNUT STREET
CENTRE STREET
BOYLSTON STREET
WINCHESTER STREET
NEEDHAM STREET
PARKER STREET
DEDHAM STREET
HIGHLAND AVENUE
GOULD STREET
CENTRAL AVENUE
HUNNEWELL STREET
WELLESLEY AVENUE
GREAT PLAIN AVENUE
HUNTING ROAD
KENDRICK STREET
GREENDALE AVENUE
NAHANTON STREET
BROOKLINE STREET
9
95
128

0 0.15 0.3 0.6 0.9 1.2 Miles

N

Metropolitan Water Tunnel Program	MWRA Contract No. 7159 Supplemental Draft Environmental Impact Report 2023	CDM Smith in association with vhb Jacobs GREEN INTERNATIONAL AFFILIATES, INC.	Environmental Justice Populations and Resource Areas Highland Avenue Northwest Receiving Shaft Site Figure 3-26 Needham, MA Source: MWRA, CDM Smith, VHB, Jacobs, MassGIS

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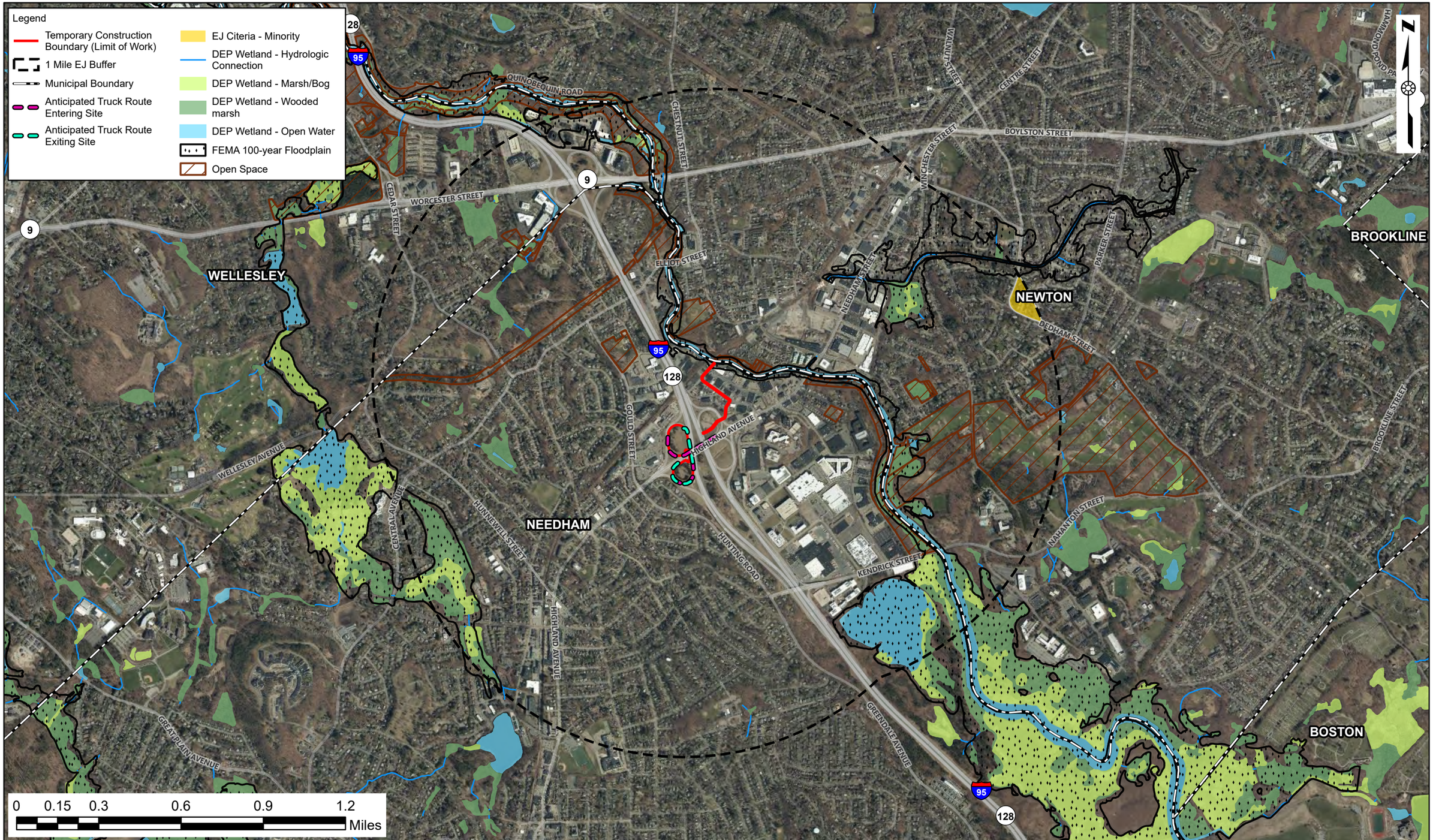

Metropolitan Water Tunnel Program	MWRA Contract No. 7159 Supplemental Draft Environmental Impact Report 2023	CDM Smith in association with vhb Jacobs GREEN INTERNATIONAL AFFILIATES, INC.	**Environmental Justice Populations and Resource Areas** **Highland Avenue Northwest/Southwest Launching Shaft Site** **Figure 3-27** Needham, MA Source: MWRA, CDM Smith, VHB, Jacobs, MassGIS

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Legend

- Temporary Construction Boundary (Limit of Work)
- 1 Mile EJ Buffer
- Municipal Boundary
- Anticipated Truck Route Entering Site
- Anticipated Truck Route Exiting Site
- EJ Citeria - Minority
- DEP Wetland - Hydrologic Connection
- DEP Wetland - Marsh/Bog
- DEP Wetland - Wooded marsh
- DEP Wetland - Open Water
- Open Space

WELLESLEY
NEEDHAM
NEWTON
BROOKLINE
BOSTON
QUINOBEQUIN ROAD
WORCESTER STREET
WELLESLEY AVENUE
GREAT PLAIN AVENUE
CEDAR STREET
CHESTNUT STREET
CENTRAL AVENUE
GOULD STREET
HUNNEWELL STREET
HIGHLAND AVENUE
ELLIOT STREET
HUNTING ROAD
NEEDHAM STREET
WALNUT STREET
CENTRE STREET
WINCHESTER STREET
BOYLSTON STREET
PARKER STREET
DEDHAM STREET
KENDRICK STREET
GREENDALE AVENUE
NAHANTON STREET
BROOKLINE STREET
95
128
9

0 0.15 0.3 0.6 0.9 1.2 Miles

Metropolitan Water Tunnel Program	MWRA Contract No. 7159 Supplemental Draft Environmental Impact Report 2023	CDM Smith in association with vhb Jacobs GREEN INTERNATIONAL AFFILIATES, INC.	Environmental Justice Populations and Resource Areas Highland Avenue Northeast/Southeast Launching Shaft Site Figure 3-28 Needham, MA Source: MWRA, CDM Smith, VHB, Jacobs, MassGIS

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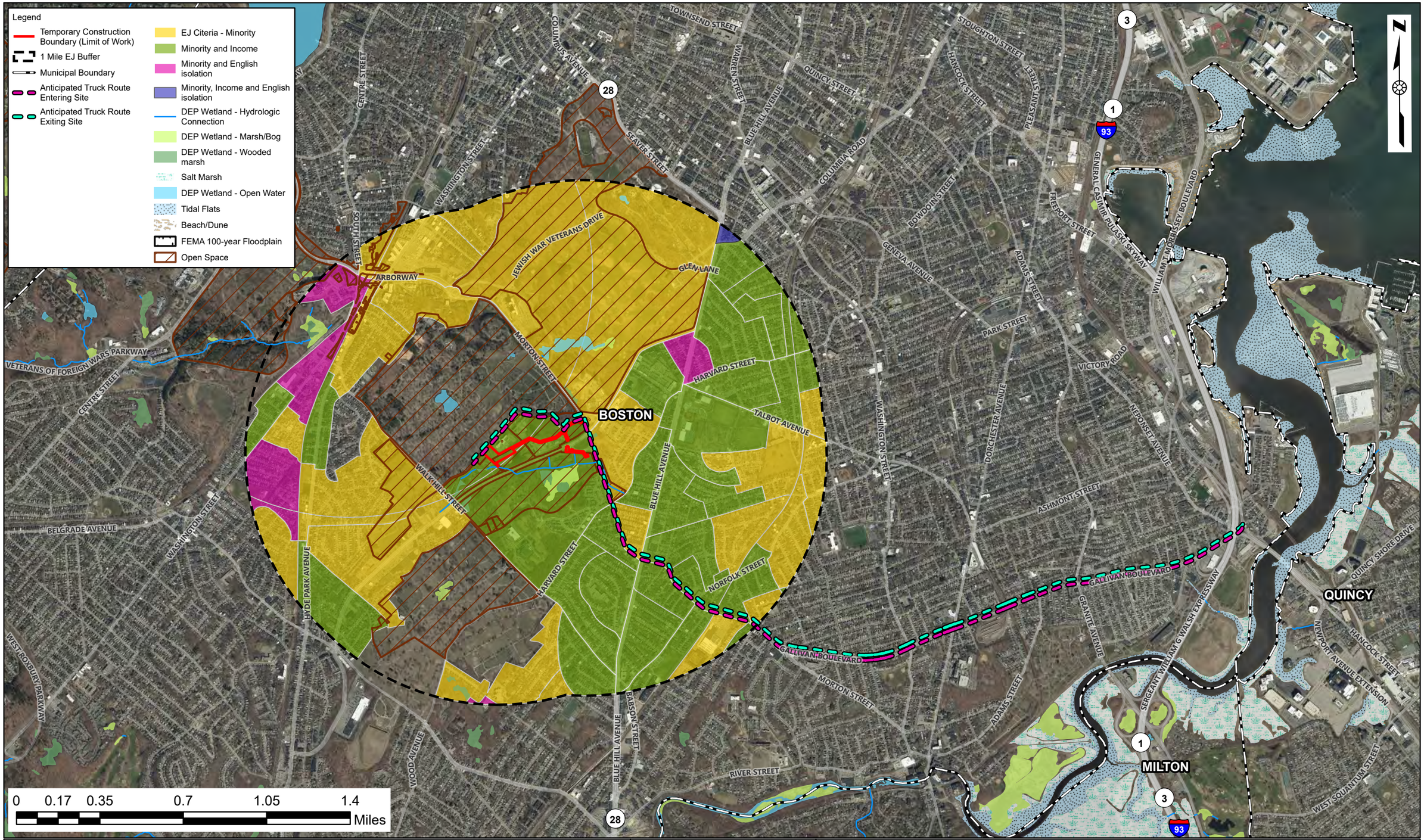

Metropolitan Water Tunnel Program	**MWRA Contract No. 7159** **Supplemental Draft Environmental Impact Report 2023**	CDM Smith in association with vhb Jacobs GREEN INTERNATIONAL AFFILIATES, INC.	**Environmental Justice Populations and Resource Areas** **American Legion Receiving Shaft Site** **Figure 3-29** Boston, MA Source: MWRA, CDM Smith, VHB, Jacobs, MassGIS

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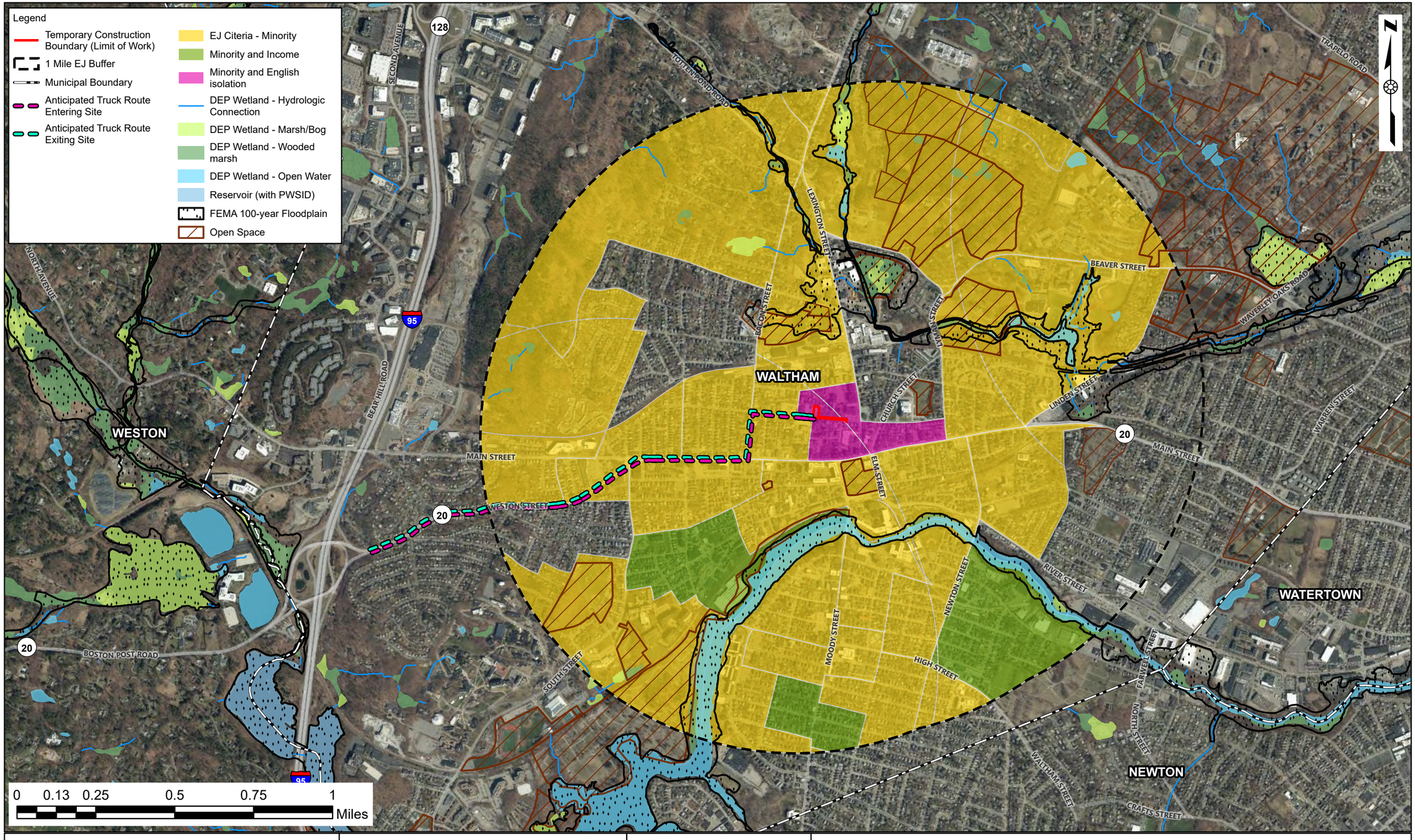
Legend

- Temporary Construction Boundary (Limit of Work)
- 1 Mile EJ Buffer
- Municipal Boundary
- Anticipated Truck Route Entering Site
- Anticipated Truck Route Exiting Site
- EJ Citeria - Minority
- Minority and Income
- Minority and English isolation
- DEP Wetland - Hydrologic Connection
- DEP Wetland - Marsh/Bog
- DEP Wetland - Wooded marsh
- DEP Wetland - Open Water
- Reservoir (with PWSID)
- FEMA 100-year Floodplain
- Open Space



Metropolitan Water Tunnel Program	MWRA Contract No. 7159 Supplemental Draft Environmental Impact Report 2023	CDM Smith in association with vhb Jacobs GREEN INTERNATIONAL AFFILIATES, INC.	Environmental Justice Populations and Resource Areas School Street Connection Shaft Site Figure 3-30 Waltham, MA Source: MWRA, CDM Smith, VHB, Jacobs, MassGIS

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Legend

- Temporary Construction Boundary (Limit of Work)
- 1 Mile EJ Buffer
- Municipal Boundary
- Anticipated Truck Route Entering Site
- Anticipated Truck Route Exiting Site
- EJ Criteria - Minority
- Minority and Income
- Minority and English isolation
- DEP Wetland - Hydrologic Connection
- DEP Wetland - Marsh/Bog
- DEP Wetland - Wooded marsh
- DEP Wetland - Open Water
- Reservoir (with PWSID)
- Open Space

0 0.13 0.25 0.5 0.75 1 Miles

Metropolitan Water Tunnel Program	MWRA Contract No. 7159 Supplemental Draft Environmental Impact Report 2023	CDM Smith in association with vhb Jacobs GREEN INTERNATIONAL AFFILIATES, INC.	**Environmental Justice Populations and Resource Areas** **Cedarwood Pumping Station Connection Shaft Site** **Figure 3-31** Waltham, MA Source: MWRA, CDM Smith, VHB, Jacobs, MassGIS

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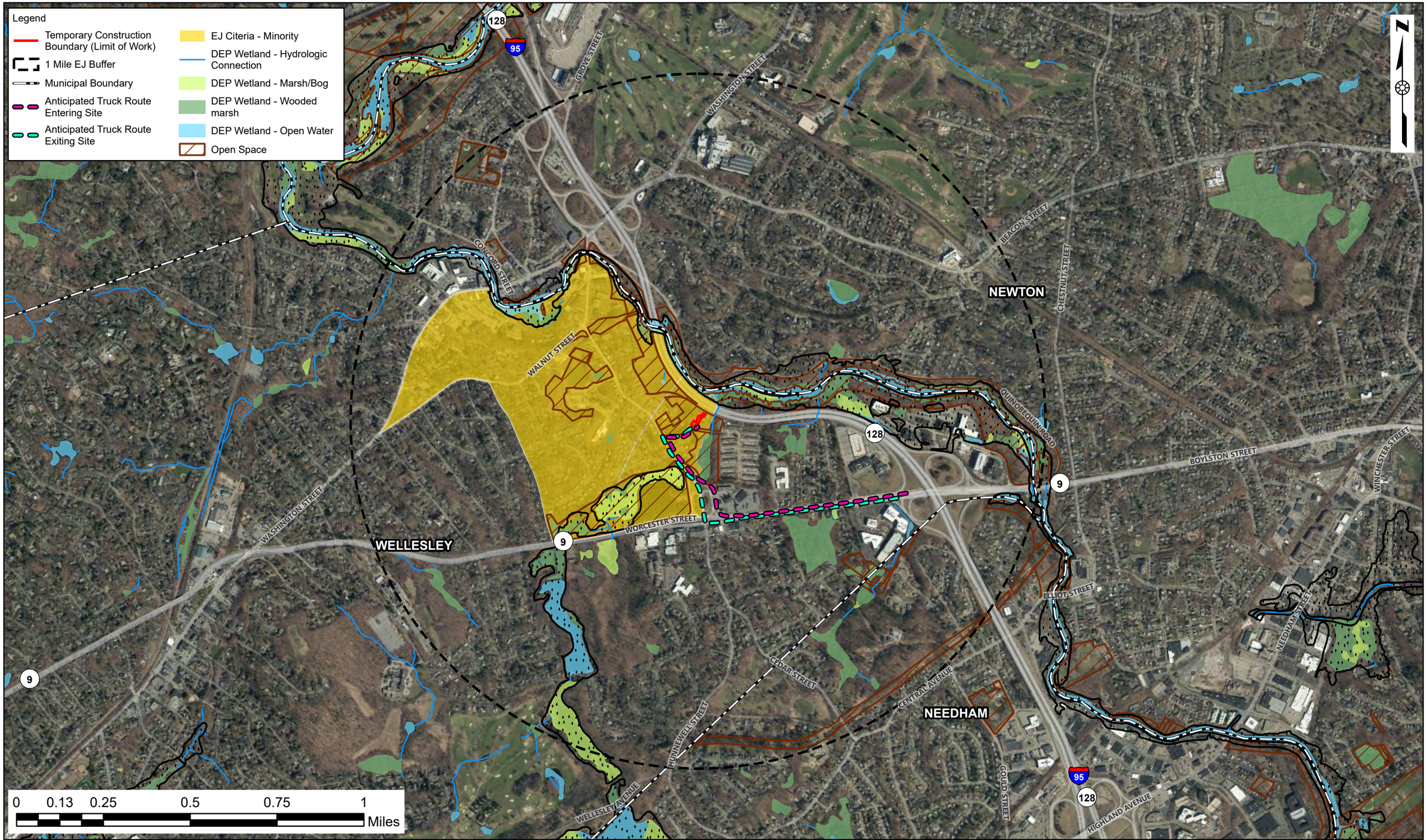

Metropolitan Water Tunnel Program	**MWRA Contract No. 7159** **Supplemental Draft Environmental Impact Report 2023**	CDM Smith in association with vhb Jacobs GREEN INTERNATIONAL AFFILIATES, INC.	**Environmental Justice Populations and Resource Areas** **Hegarty Pumping Station Connection Shaft Site** **Figure 3-32** Wellesley, MA Source: MWRA, CDM Smith, VHB, Jacobs, MassGIS

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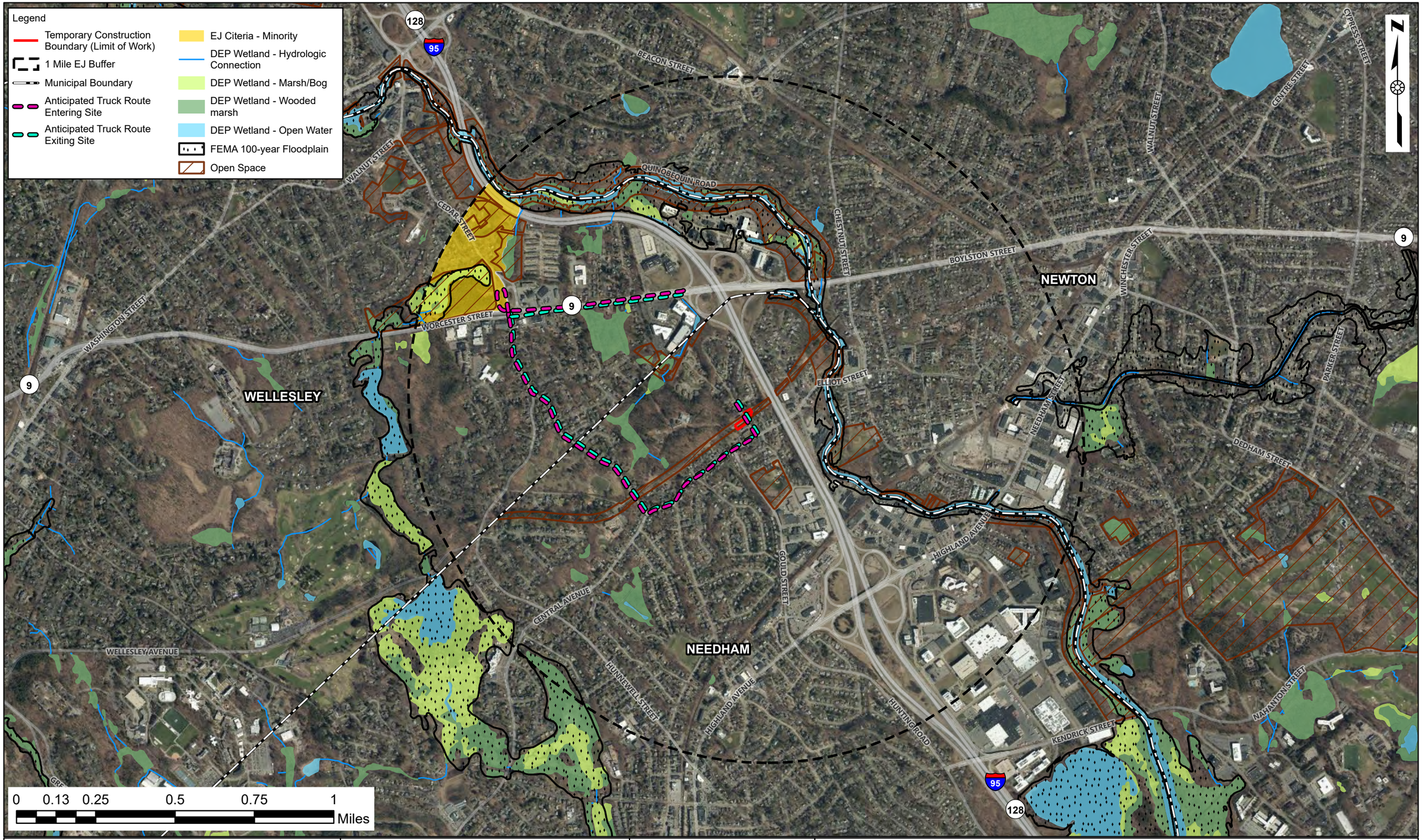

Metropolitan Water Tunnel Program	MWRA Contract No. 7159 Supplemental Draft Environmental Impact Report 2023	CDM Smith in association with vhb Jacobs GREEN INTERNATIONAL AFFILIATES, INC.	**Environmental Justice Populations and Resource Areas** **St. Mary Street Pumping Station Connection Shaft Site** **Figure 3-33** Needham, MA Source: MWRA, CDM Smith, VHB, Jacobs, MassGIS

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Legend

- Temporary Construction Boundary (Limit of Work)
- 1 Mile EJ Buffer
- Municipal Boundary
- Anticipated Truck Route Entering Site
- Anticipated Truck Route Exiting Site
- EJ Citeria - Minority
- DEP Wetland - Hydrologic Connection
- DEP Wetland - Marsh/Bog
- DEP Wetland - Wooded marsh
- DEP Wetland - Open Water
- FEMA 100-year Floodplain
- Open Space

NEWTON
WELLESLEY
NEEDHAM
BROOKLINE
BOSTON

0 0.2 0.4 0.8 1.2 1.6 Miles

Metropolitan Water Tunnel Program	MWRA Contract No. 7159 Supplemental Draft Environmental Impact Report 2023	CDM Smith in association with vhb Jacobs GREEN INTERNATIONAL AFFILIATES, INC.	Environmental Justice Populations and Resource Areas Newton Street Pumping Station Connection Shaft Site Figure 3-34 Brookline, MA Source: MWRA, CDM Smith, VHB, Jacobs, MassGIS

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Legend

- Temporary Construction Boundary (Limit of Work)
- 1 Mile EJ Buffer
- Municipal Boundary
- Anticipated Truck Route Entering Site
- Anticipated Truck Route Exiting Site
- EJ Citeria - Minority
- Income
- Minority and Income
- Minority and English isolation
- DEP Wetland - Hydrologic Connection
- DEP Wetland - Marsh/Bog
- DEP Wetland - Wooded marsh
- Salt Marsh
- DEP Wetland - Open Water
- Tidal Flats
- Beach/Dune
- FEMA 100-year Floodplain
- Open Space

0 0.2 0.4 0.8 1.2 1.6 Miles

Metropolitan Water Tunnel Program	MWRA Contract No. 7159 Supplemental Draft Environmental Impact Report 2023	CDM Smith in association with vhb Jacobs GREEN INTERNATIONAL AFFILIATES, INC.	**Environmental Justice Populations and Resource Areas** **Southern Spine Connection Shaft Site** **Figure 3-35** Boston, MA Source: MWRA, CDM Smith, VHB, Jacobs, MassGIS

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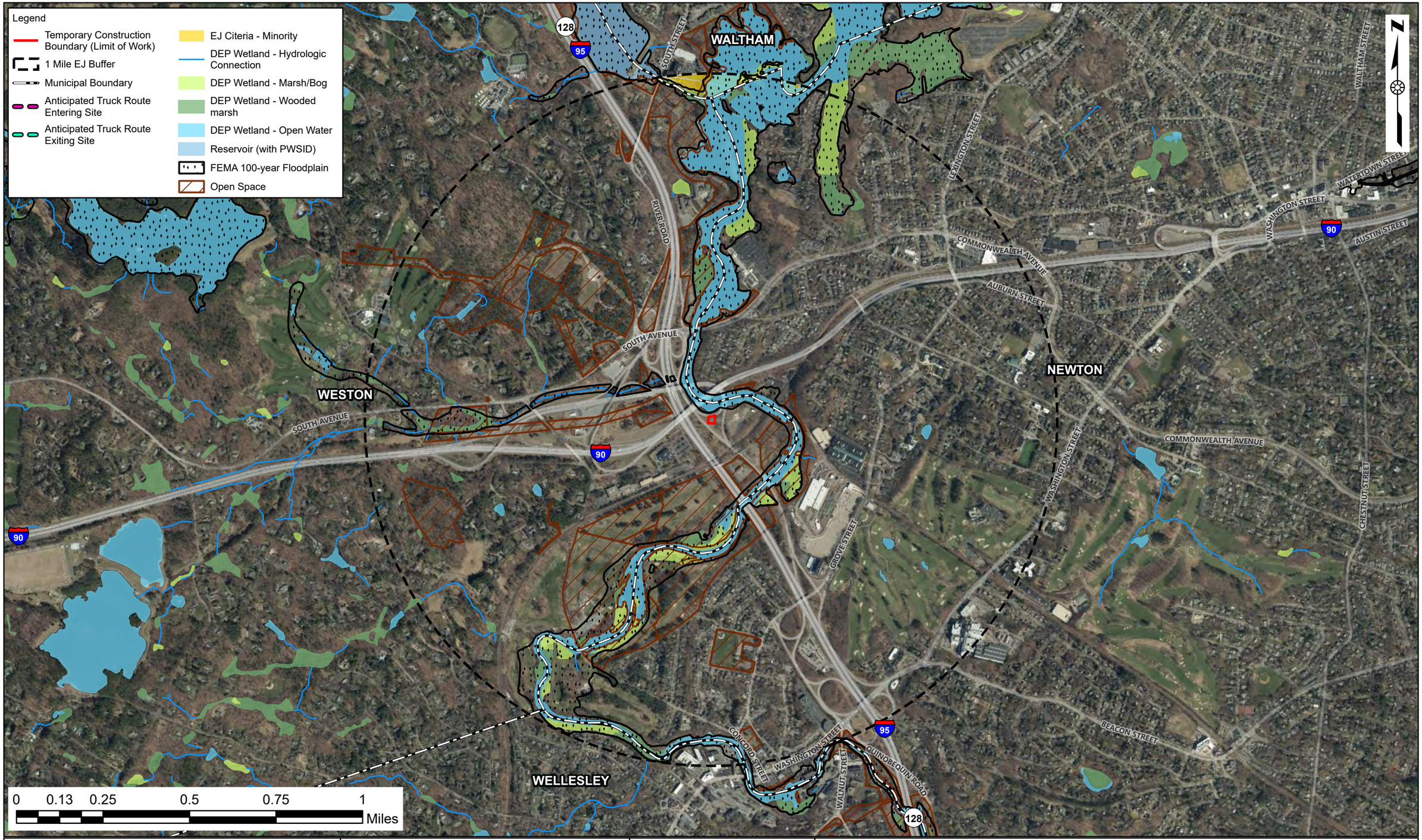

Metropolitan Water Tunnel Program	MWRA Contract No. 7159 Supplemental Draft Environmental Impact Report 2023	CDM Smith in association with vhb Jacobs GREEN INTERNATIONAL AFFILIATES, INC.	**Environmental Justice Populations and Resource Areas** **Hultman Aqueduct Isolation Valve Site** **Figure 3-36** Weston, MA Source: MWRA, CDM Smith, VHB, Jacobs, MassGIS

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3.4.4 Environmental Justice Final Conditions

The following sections discuss the potential EJ impacts associated with the final conditions of the three SDEIR Alternatives.

3.4.4.1 Alternative 3A/Alternative 4A Final Conditions

This section presents potential Final Conditions impacts for SDEIR Alternatives 3A and 4A to determine if there would be disproportionate adverse effects to EJ populations.

UMass Property

Anticipated final conditions are described below.

Transportation

Due to the nature of this Program, regular trip generation associated with the various sites is not anticipated once construction is complete. While MWRA maintenance workers would access the properties for daily inspections, this would result in an average of two vehicle trips per day at any given location (one entering the site and one exiting). Therefore, operational analyses for the Final Condition were not evaluated as part of the transportation impact assessment and no permanent mitigation would be anticipated or recommended. **No long-term disproportionate adverse effects to EJ populations from traffic would be anticipated.** For truck route final conditions, see **SDEIR Section 3.4.4.3**.

Air Quality and GHG Emissions

There would be no permanent fossil-fueled sources of emissions at the finished sites. Sites would have the infrastructure to support portable generators for emergencies but would not have permanent back-up generators on site. The only source of anticipated emissions would be from vehicles accessing the sites for maintenance activities and associated equipment, which would be limited to maintenance and inspection trips. Finished sites would not have any significant continuous electricity use; continuous electricity use would be minor and associated with site lighting, camera systems, unit heaters, or infrequent valve operations. The finished sites would not have buildings with conditioned spaces that would require energy modeling analysis.

Since Program operations are expected to result in negligible emissions of GHGs (and criteria pollutants), no long-term adverse impact would be anticipated. **Therefore, no long-term disproportionate adverse effects to EJ populations from air quality or GHG emissions would be anticipated.**

Noise and Vibration

As described in **SDEIR Section 11.2.3, Noise Final Conditions**, noise associated with ongoing maintenance activities at Program sites in the final conditions would be temporary in nature (e.g., lawn moving and plowing snow) and would not result in significant adverse noise impacts. **Therefore, no long-term disproportionate adverse effects to EJ populations from noise would be anticipated. Similarly, no long-**

term adverse vibration impacts would occur from final conditions. Therefore, no long-term disproportionate adverse effects to EJ populations from vibration would be anticipated.

Hazardous Materials

The Program would likely have a positive effect on confirmed areas of soil contamination within the Program Study Area, including the potential fly ash located on-Site under RTN 3-28049. Reuse of as much excavated soil as possible, including impacted soil with concentrations below the applicable Massachusetts Contingency Plan (MCP) standards, would be the preferred option and would limit the potential impacts associated with off-site disposal, including vehicle emissions and fuel consumption. Remediation of soil that cannot be reused would most likely consist of soil excavation and off-site disposal. All contaminated or potentially contaminated groundwater that will require management during construction will be conducted under a NPDES DRGP. Furthermore, the new deep rock tunnels will be a closed system and the source of the public water is from the Quabbin Reservoir. Overburden groundwater, whether contaminated or not, from the connection shaft will not be able to migrate into and affect the quality of water conveyed within the rock tunnel system.

No long-term disproportionate adverse effects to EJ populations would be anticipated.

Wetlands, Waterways, and Water Supply

There would be no adverse wetland impacts under Final Conditions for the new SDEIR alternative site under Alternative 3A or Alternative 4A. All proposed shafts, valve chambers, and other permanent appurtenances would be located outside identified wetland resource areas. Inspection and maintenance activities on site would not adversely impact wetland resources. **Therefore, no long-term disproportionate adverse effects to EJ populations from wetland impacts would be anticipated.**

Stormwater management systems would be designed for final conditions to meet Stormwater Management Standards. There would be no adverse stormwater impacts**. Therefore, no long-term disproportionate adverse effects to EJ populations from stormwater would be anticipated.**

No permanent or temporary impacts to groundwater resources would occur in association with future permanent operation of the tunnel. As a result of the implementation of avoidance measures to groundwater resources, all proposed shafts, valve chambers, and other permanent appurtenances are located outside identified active water supplies and their protection areas.

There would be no adverse impacts to current groundwater resource conditions once construction is complete. The final construction would include a concrete liner with a minimum thickness of 1 foot as well as impermeable steel piping in areas of weak ground conditions. The tunnel would be pressurized substantially higher than the surrounding groundwater thereby preventing groundwater inflows into the tunnel. **Therefore, no long-term disproportionate adverse effects to EJ populations would be anticipated. The improved water supply redundancy provides a positive effect on EJ populations.** As described in **SDEIR Chapter 1, Program Description and Permitting**, the MWRA provides wholesale water and sewer services to 3.1 million people and more than 5,500 businesses in 61 communities in eastern and central Massachusetts, which includes several EJ communities as indicated by the DPH's EJ Tool and the EEA's Massachusetts 2020 Environmental Justice Populations mapping tool (EJ Maps Viewer). The

MWRA's assets are critical infrastructure for serving residents, communities, and the economy in eastern Massachusetts. The reliable delivery of water is essential to protecting public health, providing sanitation and fire protection, and supporting a viable economy in these communities. Construction of the Program would allow the MWRA to take its aging existing water tunnel system offline to be rehabilitated without interrupting water service to over 2.5 million water customers in the communities.

Climate Change

The Program would primarily be constructed underground with limited disruption to the surface above. Above-ground infrastructure would primarily consist of the shaft site locations and/or water distribution infrastructure. Within the permanent sites, a fenced-off area would surround valve chambers and tunnel shafts that have an access hatch at or above ground level. It is anticipated that the Program would create up to 3 acres of new impervious surface compared to existing conditions, including new pavement proposed for vehicle parking and site access roadways. See **SDEIR Chapter 7, Climate Change**, and **SDEIR Appendix H, RMAT Tool Output Reports**, for more detailed climate change risks and exposures.

No impacts to baseline environmental or health conditions of EJ or non-EJ populations would be anticipated as a result of final conditions. **No long-term disproportionate adverse effects for climate change exposure of EJ communities would be anticipated.**

Community and Open Space Resources

A proposed easement of approximately 0.3 acres of Lawrence Meadow would be required from UMass for the UMass Property site. An inventory of anticipated permanent easements and land acquisition is provided in **SDEIR Section 4.2.3, Land Alteration and Article 97 Resources Final Conditions**.

Lawrence Meadow is not protected by Article 97 and the proposed 0.3-acre easement is not anticipated to interfere with the existing use of Lawrence Meadow as a conservation area. Therefore, **no long-term disproportionate adverse effects to EJ populations are anticipated.**

3.4.4.2 Alternative 10A Final Conditions

This section describes the Final Condition for SDEIR Alternative 10A to determine if there are disproportionate adverse effects to EJ populations.

Lower Fernald Property

The northern terminus of the North Tunnel, Segment 1, would be located at the Lower Fernald Property site in SDEIR Alternative 10A.

Transportation

The Final Condition for SDEIR Alternative 10A would be the same as discussed for SDEIR Alternatives 3A and 4A.

Air Quality and GHG emissions

The Final Condition for SDEIR Alternative 10A would be the same as discussed for SDEIR Alternatives 3A and 4A.

Noise and Vibration

The Final Condition for SDEIR Alternative 10A would be the same as discussed for SDEIR Alternatives 3A and 4A.

Hazardous Materials

The Final Condition for SDEIR Alternative 10A would be the same as discussed for SDEIR Alternatives 3A and 4A, except the Lower Fernald Property site would not include the specific positive effect on the potential existing fly ash remediation.

Wetlands, Waterways, and Water Supply

The Final Condition for SDEIR Alternative 10A would be the same as discussed for SDEIR Alternatives 3A and 4A.

Climate Change

The Final Condition for SDEIR Alternative 10A would be the same as discussed for SDEIR Alternatives 3A and 4A.

Community and Open Space Resources

An inventory of anticipated permanent easements and land acquisition is provided in **SDEIR Section 4.2.3, Land Alteration and Article 97 Resources Final Conditions**. The proposed 1.4-acre easement of property associated with the former Walter E. Fernald State School (approximately 190 acres total) for the Lower Fernald Property site is not anticipated to result in a significant adverse impact. The Lower Fernald Property site is not located within property protected by Article 97 and does not provide public access. Use of the Lower Fernald Property site is not anticipated to interfere with design plans released by the City of Waltham for future recreational use of the former Walter E. Fernald State School property. **Therefore, no long-term disproportionate adverse effects to EJ populations from easements or acquisitions would be anticipated.**

3.4.4.3 Anticipated Truck Routes Final Conditions

Due to the nature of this Program, regular truck trip generation associated with the various sites is not anticipated once construction is complete. Therefore, operational analyses for the Final Condition were not evaluated as part of the transportation impact assessment and no permanent mitigation would be anticipated or recommended. **No long-term disproportionate adverse effects to EJ populations from the temporary increase in Program-related traffic would be anticipated.**

3.4.5 Environmental Justice Avoidance, Minimization, and Mitigation Measures

As demonstrated above, no EJ communities would be disproportionally impacted by any of the three SDEIR Alternatives. Where impacts require mitigation, they will be applied to all populations regardless of EJ designation. For additional information on mitigation, refer to **SDEIR Chapter 14, Mitigation.**

3.5 Technical Analysis to Respond to Certificate Comments

The following section responds to comments identified in the Secretary's Certificate on the DEIR related to the EJ analysis. **Figure 3-21** through **Figure 3-36** identify potential EJ populations within the DGA of each of the Program sites. Refer to **SDEIR Chapter 15, Responses to Comments**, for the full list of delineated comments received on the DEIR.

Certificate Comment C-5

The SDEIR should supplement this EJ analysis in accordance with the Scope.

Response to Comment C-5

See Response to Comments C-22 through C-27.

Certificate Comment C-13

The SDEIR should include a Construction Management Plan that identifies how the project will minimize traffic disruption during construction particularly in areas within or near EJ populations.

Response to Comment C-13

As design progresses, the MWRA would develop requirements for traffic routes and work hour restrictions based on permit conditions and community coordination. These requirements will be documented in the contract documents and serve as the basis for a Construction Management Plan (CMP) to be prepared by the contractors. The CMP will further detail construction and contractor measures to avoid, minimize, and mitigate potential traffic disruptions, and potential air quality and noise impacts. The CMP will document requirements for the contractors to accept and follow prior to the start of construction activity.

The following requirements will be included in the CMP to limit potential impacts to EJ populations and will require contractor sign-off:

- The contractor would perform construction activities associated with near-surface piping within sidewalks or roadways during off-peak times to minimize disturbance to traffic.
- Surface pipe work hours would be context-sensitive; no night work would be conducted in residential areas.

- During construction, traffic signal timings may be adjusted, where necessary and as appropriate, to minimize potential intersection delay due to construction vehicles and trucks.
- Vehicles traveling to and from construction sites will take the most direct route along main roadways to/from highways to minimize traffic and emissions.
- Contractors would limit vehicle idling time in compliance with the Massachusetts idling regulation (310 CMR 7.11). Idling restriction signs will be placed on the premises to remind drivers and construction personnel of the applicable regulations. Drivers and equipment operators would be trained accordingly.
- Contractors would use Ultra Low Sulfur Diesel fuel, and construction contracts would stipulate that all diesel-fuel construction equipment be fitted with after-engine emission controls. Any non-road diesel equipment would have to be rated 50 horsepower or greater to meet the USEPA's Tier 4 emission standards or be retrofitted with appropriate emission-reduction equipment. Emission-reduction equipment could include USEPA-verified or California Air Resources Board (CARB)-verified diesel oxidation catalysts or diesel particulate filters.
- Contractors would be encouraged to use cleaner alternatively fueled equipment (natural gas or electric) rather than diesel-fueled equipment where available and feasible.
- Contractors would be required to implement measures to protect local residents, visitors, passengers, and passers-by from off-site exposure to dust and debris.

Appropriate methods of dust control would be determined according to the surfaces concerned (roadways or disturbed areas) and would include, as applicable, application of water during ground disturbing activities; stone surfacing of construction roads; seeding of areas of exposed or stockpiled soils; wheel washing; using covered trucks; and regular sweeping of paved roadways. Recycling construction waste and demolition materials may also reduce dust emissions.

As described in response to Comments C-5 and C-22, and as shown in **Figures 3-3** to **Figure 3-19**, U.S. Census block groups containing EJ populations are adjacent to some Study Area intersections and along portions of truck routes that would be utilized during temporary Program-related construction activities. This includes routes along EJ block groups that have existing unfair or inequitable environmental burdens per the Massachusetts Department of Public Health (DPH) vulnerable health criteria data (low birth rate and elevated blood lead prevalence.

Work within roadways would be coordinated with the local municipality, the DCR, and/or MassDOT and the owner of the utility, as appropriate. Upon completion of the valve chambers and piping, the disturbed areas will be restored and affected roadways would be repaved. The final pavement restoration details and any necessary detours would be coordinated with the local municipality, DCR and/or MassDOT as appropriate through their respective permitting processes.

As shown in **Figure 3-3** through **Figure 3-19**, block groups containing EJ populations are adjacent to some Study Area intersections and along portions of truck routes that would be utilized during temporary Program-related construction activities. This includes routes along EJ block groups that have existing unfair or inequitable environmental burdens per the DPH vulnerable health criteria data (low birth rate and elevated blood lead prevalence).

Construction vehicle routes were established for each Program site location by identifying the most direct route along main state and local roadways to/from the nearest highway. Using the most direct route seeks to minimize construction vehicle travel time and mileage, and the resulting Program-related traffic (and emissions). Any rerouting of construction vehicles would increase travel times and/or mileage, increasing traffic/trips in both EJ and non-EJ communities. Therefore, the least impactful routing to all populations is using the most direct routes to/from the interstate highway and minimizing traffic on local roads. Since no significant Program-related transportation impacts are anticipated, there would be no significant impacts to baseline environmental or health conditions of EJ or non-EJ populations. Refer to **SDEIR Section 3.4.3.3, Anticipated Truck Routes Construction Period Impacts**, for more information on measures the MWRA will implement as necessary to minimize traffic disruption during construction.

The maximum amount of temporary Program-related traffic would occur at tunnel launching shaft sites when there would be a shift change which was conservatively modeled to take place during the evening peak hour. However, construction worker trips are not expected to occur during the evening peak hour as shift change is usually at approximately 3:00 PM and the evening peak hour generally occurs between 4:00 PM and 6:00 PM. Program launching shaft sites (i.e., Tandem Trailer, Bifurcation, and Highland Avenue sites) are adjacent to highway ramps and are therefore not expected to cause a significant traffic impact to nearby local roadways. As shown on **Figure 3-5, Figure 3-6, Figure 3-10**, and **Figure 3-11**, none of the Program launching shaft sites considered in any of the SDEIR Alternatives are in EJ block groups. Furthermore, given the launching sites' proximity to highway ramps, no construction vehicle routes between these launching shaft sites and the highway travel through EJ block groups. Refer to **SDEIR Chapter 9, Transportation**, for more information on measures the MWRA will implement as necessary to minimize traffic disruption during construction.

Certificate Comment C-21

I expect that the MWRA will continue to actively seek public input and work closely with the Stakeholder Working Group(s) and other stakeholders in developing the SDEIR for this project. The SDEIR should provide an overview of [EJ] outreach activities that have taken place since the DEIR was submitted.

Response to Comment C-21

The MWRA has implemented a robust outreach initiative and continues to seek public input and work closely with stakeholders. **SDEIR Section 3.2** provides an update to the outreach activities conducted by the MWRA since the filing of the DEIR. As listed in **Table 3-1**, over 20 meetings were held with landowners, municipalities, and neighborhood groups since the DEIR filing.

Certificate Comment C-22

The SDEIR should supplement the EJ analysis presented in the DEIR. While the DEIR identifies certain site locations where the DPH EJ Tool data show indication of an existing "unfair or inequitable burden," it does not specifically assess project impacts on the surrounding EJ populations at those locations, other than to state that impacts, such as traffic and emissions, will be relatively minor and insignificant.

Response to Comment C-22

Potential traffic, air quality and GHG emissions impacts on EJ populations are described below. See the response to Certificate Comment C-23 for details on potential Program-related land alteration, Article 97, and noise and vibration impacts in proximity to EJ populations.

Traffic

In response to the Secretary's Certificate, additional EJ analysis was conducted to assess potential traffic and air quality impacts from the anticipated construction vehicle routes between each Program site and the interstate highway. For detailed information refer to **SDEIR Section 3.4.3.3.** Routes were established for each Program site location by identifying the most direct route along main state and local roadways to/from the nearest highway. Using the most direct route seeks to minimize construction vehicle travel time and mileage, and the resulting Program-related traffic and emissions. **SDEIR Figures 3-3** to **3-19** depict the anticipated construction vehicle routes to be used during temporary Program-related construction activities to/from each Program site and the nearest interstate highway. **SDEIR Figures 3-20** through **Figure 3-36** identify which anticipated construction vehicle routes travel through block groups containing EJ populations. Block groups containing EJ populations within a 0.5-mile distance from the anticipated routes that have existing unfair or inequitable environmental burdens were identified per the DPH vulnerable health criteria data (low birth rate and elevated blood lead prevalence) and are also shown on **SDEIR Figures 3-3** to **3-19**. Study Area intersections along the anticipated routes are also identified and labeled in **SDEIR Figures 3-3** to **3-19**.

Table 3-12 in **SDEIR Section 3.4.2.3, Anticipated Truck Routes Existing Conditions**, provides a corresponding list of the census tracts containing populations with existing unfair or inequitable burdens within 0.5-miles of the anticipated truck routes. **SDEIR Table 3-20** lists the intersections along the truck routes and the block groups containing EJ populations that are within 0.5-miles of the anticipated truck routes.

The DGAs of the UMass Property site (see **SDEIR Section 3.4.3.1** and **Figure 3-20**), Lower Fernald Property site (see **SDEIR Section 3.4.3.2** and **Figure 3-21**), American Legion site (**Figure 3-29**), School Street site (**Figure 3-30**), St. Mary's Street Pumping Station site (**Figure 3-33**), Newton Street Pumping Station site (**Figure 3-29**), and Southern Spine Mains site (**Figure 3-35**) are within EJ populations adjacent to roadways along construction vehicle routes that could experience potential temporary increases in traffic during Program construction. The remaining sites have no EJ populations adjacent to the planned construction vehicle routes.

Most traffic expected to be generated by construction activities at the proposed shaft sites would be due to construction workers driving to and from the sites at the beginning and end of their workday shifts. The maximum amount of temporary Program-related traffic would occur at launching shaft sites where there is a shift change conservatively modeled to take place during the evening peak hour (construction worker trips are not expected to occur during the evening peak hour as shift change is usually at approximately 3:00 PM and the evening peak hour generally occurs between 4:00 PM and 6:00 PM). Program launching shaft sites (i.e., Tandem Trailer, Bifurcation, and Highland Avenue sites) are adjacent

to highway ramps and are therefore not expected to cause a significant traffic impact to nearby local roadways. As shown on **SDEIR Figure 3-5, Figure 3-6, Figure 3-10**, and **Figure 3-11**, none of the Program launching shaft sites considered in either of the SDEIR Alternatives are in EJ block groups. Furthermore, given their proximity to highway ramps, no construction vehicle routes between these launching shaft sites and the highway travel through EJ block groups.

Air Quality and GHG Emissions

Table 3-22 presents the intersections included in the analysis for each Program site. The traffic study includes local roadway routes to and from construction locations to the nearest highway interchanges, generally with Interstates I-93 and I-95. Air pollutant emissions were calculated along these local routes, which traverse both EJ and non-EJ areas. As described in **SDEIR Chapter 9, Transportation**, Program-related construction activities are expected to temporarily add approximately 0.1 percent to 2.0 percent additional vehicles to local roadways on the peak day compared to existing conditions. This minor increase would not be expected to materially affect any ambient pollutant concentrations and their comparison to any air quality standards. Program-related traffic (and associated emissions) along highways is anticipated to comprise less than 0.1 percent to 0.7 percent of total daily volumes on the modeled peak day, which conservatively assumes that construction would occur at all shafts simultaneously. See **SDEIR Chapter 9, Transportation**, for more information.

As described in **SDEIR Chapter 8, Air Quality and Greenhouse Gas Emissions**, and as shown in **Table 3-16**, Program-related construction emissions of NOx, VOC, and GHG are a fraction of the total statewide emissions. As shown in **Table 3-16** in **SDEIR Section 3.4.3.1**, the total 10-year modeled construction duration emissions calculated for each SDEIR Alternative are not expected to be significantly different from one other and would occur at a variety of geographically diverse sites, limiting potential health impacts. Temporary Program-related construction emissions of NOx, PM_{10}, $PM_{2.5}$, and DPM are all expected to be below 0.5 tpy, and well below the referenced General Conformity *de minimis* thresholds of 100 tpy for NOx, 100 tpy for PM_{10}, and 100 tpy for $PM_{2.5}$ (there are no thresholds for DPM).[7] Lead is no longer used in gasoline and is not used in diesel fuel. Therefore, the Program is expected to have no lead emissions. Thus, no significant construction-period impacts related to air quality and GHG are anticipated from any of the three SDEIR Alternatives.

Estimated on-road peak 12-month period emissions of NOx, Particulate Matter 10 (PM_{10}), $PM_{2.5}$ and DPM in proximity to EJ block groups are presented in **Table 3-22**.

7 U.S. Environmental Protection Agency, General Conformity, "*De Minimis* Tables," updated July 20, 2022, https://www.epa.gov/general-conformity/de-minimis-tables (accessed June 13, 2023).

Table 3-22 Program-Related On-Road Emissions in Proximity to EJ Block Groups (Tons)

Alternative	Nitrogen Oxides (NOx) Peak 12-Month Period		Particulate Matter (PM_{10}) Peak 12-Month Period		Fine Particulate Matter ($PM_{2.5}$) Peak 12-Month Period	Diesel Particulate Matter (DPM) Peak 12-Month Period			
	EJ Block Groups	Non-EJ Block Groups	EJ Block Groups	Non-EJ Block Groups	EJ Block Groups	Non-EJ Block Groups	EJ Block Groups	Non-EJ Block Groups	
Alternative 3A	0.28	0.14	0.04	0.02	0.01	0.01	0.01	0.00	
Alternative 4A	0.26	0.13	0.03	0.02	0.01	0.00	0.01	0.00	
Alternative 10A	0.30	0.14	0.04	0.02	0.01	0.00	0.01	0.00	

Calculations show that emissions are small, however more pollutants are emitted in EJ areas than in non-EJ areas. This is due to the proximity of EJ neighborhoods to both the construction sites, and to the main state and local thoroughfares used to get to the interstate highways, especially for the American Legion site in Jamaica Plain, and the most direct route along State Road 203 to I-93. Construction vehicle transportation routes between the interstate highways and the Program construction sites are anticipated to take place on local roads, some of which abut EJ communities, assuming that the most direct local routes would be used. Any rerouting of construction vehicles would increase travel times and/or mileage, thus increasing regional emissions totals in both EJ and non-EJ communities. Therefore, the least impactful routing to all populations is using the most direct route to the interstate highway and minimizing traffic on local roads.

As described previously, the maximum amount of temporary Program-related traffic and resulting emissions would occur at launching shaft sites where there is a shift change conservatively modeled to take place during the evening peak hour. Program launching shaft locations are adjacent to highway ramps and are therefore not expected to cause a significant traffic impact to local roadways. As shown on **Figure 3-5**, **Figure 3-6**, **Figure 3-10**, and **Figure 3-11**, none of the Program launching shaft sites considered are in EJ block groups. Furthermore, given their proximity to highway ramps, no routes between these launching shaft sites and the highway travel through EJ block groups.

There are EJ block groups adjacent to intersections along the UMass Property site, Lower Fernald Property site, American Legion site, School Street site, Cedarwood Pumping Station site, Newton Street Pumping Station site, and Southern Spine Mains site anticipated construction truck route that have existing unfair or inequitable environmental burdens for low birth weight rates per the DPH vulnerable health data (see **Figure 3-3**, **Figure 3-4**, **Figure 3-12**, **Figure 3-13**, **Figure 3-14**, **Figure 3-17**, **Figure 3-18,** and **Table 3-12**, respectively). The remaining sites do not have EJ block groups adjacent to anticipated construction truck routes that have existing unfair or inequitable environmental burdens for low birth weight rates. While emissions from diesel trucks, vehicles, and construction equipment can exacerbate low birth weight health vulnerabilities, and there are existing low birth weight health vulnerabilities, project activities are not anticipated to have an adverse impact. However, the MWRA is dedicated to protecting public health and disadvantaged populations and will work with the DPW and Transportation departments of each

municipality if necessary to establish appropriate mitigation to further reduce the risk of exacerbating low birth weight rates.

Project activities are not anticipated to exacerbate existing unfair or inequitable environmental burdens. Since no significant Program-related air quality or GHG emissions impacts are anticipated, there would be no impacts to baseline environmental or health conditions of EJ or non-EJ populations.

Certificate Comment C-23

The SDEIR should discuss, in greater detail, how the various impacts of the project, including land alteration/Article 97, wetlands/stormwater, traffic, and GHG/air emissions, will specifically affect the EJ populations that are identified as incurring existing environmental burdens.

Response to Comment C-23

Land Alteration and Article 97

Permanent easements and land acquisition would be required to accommodate the Program. As shown in **Table 3-23**, some of the permanent, aboveground easements and land acquisitions would include portions of existing community resources and open space, including portions of three Article 97 properties. The proposed easement areas or land acquisition areas would be small in overall property size (acreage) in relation to the total area and would contain only the critical Program infrastructure needed for operation and maintenance of the tunnel system. Use of the sites for the Program is not anticipated to significantly interfere with or detract from the existing use. Subterranean easements of land that the tunnel runs underneath would also be required but are not anticipated to impact future property use.

Ouellet Park (Hegarty Pumping Station connection shaft site) playground infrastructure, fields, and courts are not near the proposed connection shaft site; the 0.1-acre acquisition is not anticipated to impede the existing recreational amenities or public access at Ouellet Park (7.3-acre park). The 0.2-acre portion of Southwest Corridor Park/Arborway I to be used by the Program is not anticipated to interfere with the existing recreational use of the Greenway nor the adjacent community garden. DCR's Morton Street property (American Legion receiving shaft site) does not provide recreational activities.

For the UMass Property site (Lawrence Meadow) (see **SDEIR Section 3.4.3.1**), Hegarty Pumping Station connection shaft site (Ouellet Playground), and Southern Spine Mains connection shaft site (Southwest Corridor Park/Arborway I), the proposed acquisition is not anticipated to change the existing recreational amenities or public access. For the Lower Fernald Property site (Walter E. Fernald State School Property) and American Legion site (Morton Street), the property does not have existing public access or recreational amenities. Final conditions at the Program sites would consist of a fenced-in top of shaft structure that is anticipated to be less than three feet above ground level. The proposed acquisitions and/or easements are not anticipated to exacerbate any existing environmental and health burdens nor limit public access to open space and recreational resources for EJ populations. Therefore, no disproportionate adverse effects would be anticipated.

Table 3-23 Permanent Easements or Land Acquisition Required at Open Space and Recreational Resources

Site (Alternative)	Property	Owner	Estimated Size of Easement or Acquisition (acres)	Article 97 Protection	Within EJ Block Group	Potential Impact on EJ Community
Launching, Receiving, and Large Connection Sites						
UMass Property (3A and 4A)	Lawrence Meadow	Commonwealth of Massachusetts under care, custody, control of UMass	0.3 (acquisition)	No	No	The 0.3-acre acquisition is not anticipated to significantly change the existing use of the 31-acre Lawrence Meadow for conservation.
Lower Fernald Property (10A)	Former Fernald State School Property (Non-Community Preservation Act Funded)	City of Waltham	1.4 (acquisition)	No	No	The property does not have existing public access or recreational amenities.
American Legion (All)	Morton Street	Commonwealth of Massachusetts under care, custody, control of DCR	3.5 (2.0-acre easement and 1.5-acre acquisition)	Yes	Yes	The property does not have existing public access or recreational amenities.
Connection Sites (Common to All Alternatives)						
Hegarty Pumping Station	Ouellet Park	Town of Wellesley	0.1 (acquisition)	TBD	Yes	The 0.1-acre acquisition is not anticipated to impede the existing recreational amenities or public access at Ouellet Park (7.3 acres total).
Southern Spine Mains	Southwest Corridor Park/ Arborway I	Commonwealth of Massachusetts under care, custody, control of DCR	0.2 (acquisition)	Yes	Yes	The 0.2-acre acquisition is not anticipated to interfere with the existing recreational use of the greenway nor the adjacent community garden.

TBD = To be determined

Wetlands and Stormwater

Impacts to existing wetlands due to program development would be minimal and primarily would consist of temporary impacts. Permanent impacts would include those to state-regulated Riverfront Areas due to top-of-shaft and/or valve structures and associated pavement at three locations (Hegarty Pumping Station, Tandem Trailer and Hultman Aqueduct Isolation Valve). In addition to wetlands impacts being minor and primarily temporary. All temporarily impacted areas would be restored and revegetated upon completion of construction. As no adverse impacts would be anticipated, no disproportionate adverse effects due to wetland impacts would be anticipated.

Construction period and post-construction development impacts at the project locations may include impacts from erosion control, peak discharge rates, groundwater recharge, total suspended solids removal, construction management, and long-term maintenance. As stated in **DEIR Chapter 4.6, Wetlands and Waterways, Sections 4.6.5, Construction Period Impacts (pg. 4.6-127)** and **DEIR Section 4.6.6, Final Conditions (pg. 4.6-153)**, any impacts resulting in changes to existing stormwater characteristics as defined above will be mitigated in accordance with the MassDEP Stormwater Management Standards. Therefore, effects on neighboring EJ communities due to project-related stormwater impacts are not anticipated. Compliance with each of the ten MassDEP Stormwater Management Standards is further described in **DEIR Section 4.6.7.8**, **Compliance with MassDEP Stormwater Management Standards** (**pg. 4.6-179)**.

Traffic

See Response to Certificate Comment C-22

Air Quality and GHG Emissions

See Response to Certificate Comment C-22

Noise and Vibration

Tables 3-24 through **3-26** identify the noise-sensitive receptors that may be subject to adverse noise impacts during temporary Program-related construction activities. It is important to note that ACS Census data utilized by the EJ Maps Viewer and associated data layers do not designate EJ criteria for individual households. Thus, block group EJ criteria designations are used for the assessment of disproportionate adverse effect.

As previously described in **DEIR Chapter 2**, **Section 2.4.6**, **Construction Period Impacts (pg. 2-104**), and as described in **SDEIR Section 11.2.4, Noise Avoidance, Minimization, and Mitigation**, minimization and mitigation measures would be implemented at all Program sites subject to potential noise impacts, and not just the five sites with DGAs located within EJ communities. **Potential adverse impacts are anticipated to be mitigated at all Program sites and therefore no disproportionate adverse noise and vibration effects to EJ populations are anticipated.**

Table 3-24 Construction Noise Assessment Results, Alternative 3A

Site	Receptor	Existing Ambient Sound Level			Construction Noise Level (dBA)				Potential Impact	Within EJ Block Group
		Day (L_{90})	Night (L_{90})	Day-night Level (L_{dn})	First Shift (L_{eq})	Second Shift (L_{eq})	Night (L_{eq})	Day-night Level (L_{dn})		
Launching, Receiving, and Large Connection Sites										
UMass Property Large Connection	R2 [1]	60	51	73	66	N/A	N/A	63	No	No
UMass Property Large Connection	R36	35	35	48	60	N/A	N/A	**56**	**Yes**	No
UMass Property Large Connection	R37 [1]	60	51	73	69	N/A	N/A	65	No	No
UMass Property Large Connection	R38 [1]	60	51	73	67	N/A	N/A	64	**No**	No
UMass Property Large Connection	R39 [1]	60	51	73	62	N/A	N/A	58	No	No
Tandem Trailer/Park Road East Launching	R13	72	55	72	68	68	51	**73**	**Yes**	No
Tandem Trailer/Park Road East Launching	R14	72	55	72	62	62	45	**66**	**Yes**	No
Tandem Trailer/Park Road East Launching	R15	72	55	71	62	62	44	**66**	**Yes**	No
Tandem Trailer/Park Road East Launching	R16	72	55	72	52	52	35	56	No	No
Bifurcation Launching	R13	72	55	72	57	55	40	60	No	No
Bifurcation Launching	R14	72	55	72	55	54	38	59	No	No
Bifurcation Launching	R15	72	55	71	53	52	36	57	No	No
Bifurcation Launching	R16	72	55	72	45	43	28	48	No	No
Highland Ave Northeast/Southeast Launching	R23 [1]	61	55	61	50	49	33	54	No	No
Highland Ave Northwest Receiving	R24	56	51	56	54	52	37	57	No	No
American Legion Receiving	R33	51	45	51	71	70	54	**75**	**Yes**	**Yes**
American Legion Receiving	R34 [1]	56	48	56	60	58	43	63	No	Yes

Table 3-24 Construction Noise Assessment Results, Alternative 3A

Site	Receptor	Existing Ambient Sound Level			Construction Noise Level (dBA)				Potential Impact	Within EJ Block Group
		Day (L_{90})	Night (L_{90})	Day-night Level (L_{dn})	First Shift (L_{eq})	Second Shift (L_{eq})	Night (L_{eq})	Day-night Level (L_{dn})		
Connection and Isolation Valve Sites (Common to All Alternatives)										
School Street	R3	65	55	65	80	N/A	N/A	**76**	**Yes**	**Yes**
School Street	R4	65	55	65	82	N/A	N/A	**78**	**Yes**	**Yes**
School Street	R5	65	55	65	84	N/A	N/A	**80**	**Yes**	**Yes**
School Street	R6	65	55	65	76	N/A	N/A	**72**	**Yes**	**Yes**
School Street	R7	65	55	65	82	N/A	N/A	**78**	**Yes**	**Yes**
School Street	R8	65	55	65	81	N/A	N/A	**77**	**Yes**	**Yes**
School Street	R9	65	55	65	77	N/A	N/A	**73**	**Yes**	**Yes**
Cedarwood Pumping Station	R10	59	46	59	58	N/A	N/A	54	No	Yes
Cedarwood Pumping Station	R11 [1]	59	46	59	79	N/A	N/A	**76**	**Yes**	**Yes**
Cedarwood Pumping Station	R12	59	46	59	69	N/A	N/A	**65**	**Yes**	**Yes**
Hegarty Pumping Station	R17	58	47	58	71	N/A	N/A	**67**	**Yes**	**Yes**
Hegarty Pumping Station	R18	58	47	60	74	N/A	N/A	**70**	**Yes**	**Yes**
St. Mary Street Pumping Station	R19	57	50	57	78	N/A	N/A	**75**	**Yes**	No
St. Mary Street Pumping Station	R20	57	50	57	79	N/A	N/A	**75**	**Yes**	No
St. Mary Street Pumping Station	R21	57	50	57	77	N/A	N/A	**73**	**Yes**	No
St. Mary Street Pumping Station	R22	57	50	57	54	N/A	N/A	50	No	No
Newton Street Pumping Station	R25	52	37	52	78	N/A	N/A	**74**	**Yes**	**Yes**
Newton Street Pumping Station	R26	52	37	52	72	N/A	N/A	**68**	**Yes**	**Yes**
Newton Street Pumping Station	R27	52	37	64	78	N/A	N/A	**74**	**Yes**	**Yes**

Table 3-24 Construction Noise Assessment Results, Alternative 3A

Site	Receptor	Existing Ambient Sound Level			Construction Noise Level (dBA)				Potential Impact	Within EJ Block Group
		Day (L_{90})	Night (L_{90})	Day-night Level (L_{dn})	First Shift (L_{eq})	Second Shift (L_{eq})	Night (L_{eq})	Day-night Level (L_{dn})		
Newton Street Pumping Station	R28	52	37	52	82	N/A	N/A	**78**	**Yes**	**Yes**
Southern Spine Mains	R29	66	55	66	58	N/A	N/A	55	No	No
Southern Spine Mains	R30	66	55	66	51	N/A	N/A	48	No	Yes
Southern Spine Mains	R31	65	50	65	62	N/A	N/A	59	No	Yes
Southern Spine Mains	R32 [1]	65	50	65	54	N/A	N/A	50	No	Yes
Hultman Aqueduct Isolation Valve	R13	72	55	72	57	55	40	60	No	No
Hultman Aqueduct Isolation Valve	R14	72	55	72	55	54	38	59	No	No
Hultman Aqueduct Isolation Valve	R15	72	55	71	53	52	36	57	No	No
Hultman Aqueduct Isolation Valve	R16	72	55	72	45	43	28	48	No	No
Total Receptors Subject to Potential Impacts in Alternative 3A:									**23**	**16**

Sources: VHB, 2023; U.S. Department of Housing and Urban Development (HUD), 24 CFR Part 51, Subpart B, Noise Abatement and Control; Commonwealth of Massachusetts, Executive Office of Environmental Affairs, Massachusetts Department of Environmental Protection and Massachusetts Division of Air Quality Control Policy 90-001, February 1, 1990, https://www.mass.gov/doc/massdep-noise-policy/download (accessed April 18, 2023).

*Note: **Bold and** highlighted values indicate unmitigated construction noise levels would exceed applicable criteria, including the HUD noise regulation, which considers exterior noise levels between 65 and 75 dBA (Ldn) to be Normally Unacceptable, and noise levels above 75 dBA (Ldn) to be Unacceptable; and the MassDEP Noise Level Policy, which establishes a noise limit of a 10 dBA increase over existing ambient levels during the nighttime period.*

1 Receptor is institutional use that is not sensitive to noise at night.

Table 3-25 Construction Noise Assessment Results, Alternative 4A

Site	Receptor	Existing Ambient Sound Level			Construction Noise Level (dBA)				Potential Impact	Within EJ Block Group
		Day (L_{90})	Night (L_{90})	Day-night Level (L_{dn})	First Shift (L_{eq})	Second Shift (L_{eq})	Night (L_{eq})	Day-night Level (L_{dn})		
Launching, Receiving, and Large Connection Sites										
UMass Property Large Connection	R2 [1]	60	51	73	66	N/A	N/A	63	No	No
UMass Property Large Connection	R36	35	35	48	60	N/A	N/A	**56**	**Yes**	No
UMass Property Large Connection	R37 [1]	60	51	73	69	N/A	N/A	65	No	No
UMass Property Large Connection	R38 [1]	60	51	73	67	N/A	N/A	64	No	No
UMass Property Large Connection	R39 [1]	60	51	73	62	N/A	N/A	58	No	No
Park Road West Receiving	R13	72	55	72	55	54	38	59	No	No
Park Road West Receiving	R14	72	55	72	58	57	41	62	No	No
Park Road West Receiving	R15	72	55	71	61	60	44	65	No	No
Park Road West Receiving	R16	72	55	72	54	52	37	57	No	No
Highland Ave. Northwest/Southwest Launching	R24	56	51	56	54	52	37	57	No	No
Highland Ave. Northeast/Southeast Launching	R23 [1]	61	55	61	50	49	33	54	No	No
American Legion Receiving	R33	51	45	51	71	70	54	**75**	**Yes**	**Yes**
American Legion Receiving	R34 [1]	56	48	56	60	58	43	63	No	Yes
Receptors Subject to Potential Impacts at Connection & Isolation Valve Sites (Common to All Alternatives):									**18**	**15**
Total Receptors Subject to Potential Impacts in Alternative 4A:									**23**	**16**

Sources: VHB, 2023; U.S. Department of Housing and Urban Development (HUD), 24 CFR Part 51, Subpart B, Noise Abatement and Control; Commonwealth of Massachusetts, Executive Office of Environmental Affairs, Massachusetts Department of Environmental Protection and Massachusetts Division of Air Quality Control Policy 90-001, February 1, 1990, https://www.mass.gov/doc/massdep-noise-policy/download (accessed April 18, 2023).

*Note: **Bold and** highlighted values indicate unmitigated construction noise levels would exceed applicable criteria, including the HUD noise regulation, which considers exterior noise levels between 65 and 75 dBA (Ldn) to be Normally Unacceptable, and noise levels above 75 dBA (Ldn) to be Unacceptable; and the MassDEP Noise Level Policy, which establishes a noise limit of a 10 dBA increase over existing ambient levels during the nighttime period.*

1 Receptor is institutional use that is not sensitive to noise at night.

Table 3-26 Construction Noise Assessment Results, Alternative 10A

Site	Receptor	Existing Ambient Sound Level			Construction Noise Level (dBA)				Potential Impact	Within EJ Block Group
		Day (L_{90})	Night (L_{90})	Day-night Level (L_{dn})	First Shift (L_{eq})	Second Shift (L_{eq})	Night (L_{eq})	Day-night Level (L_{dn})		
Launching, Receiving, and Large Connection Sites										
Lower Fernald Receiving	R1	60	51	73	71	69	54	**74**	**Yes**	No
Lower Fernald Receiving	R2 [1]	60	51	73	52	50	N/A	55	No	No
Lower Fernald Receiving	R36	35	35	48	51	50	34	**55**	**Yes**	No
Lower Fernald Receiving	R40	60	51	73	58	57	41	62	No	No
Lower Fernald Receiving	R41	60	51	73	56	55	39	60	No	No
Lower Fernald Receiving	R42	60	51	73	54	52	37	57	No	No
Lower Fernald Receiving	R43	60	51	73	53	51	36	56	No	No
Lower Fernald Receiving	R44	60	51	73	63	61	46	**66**	**Yes**	No
Lower Fernald Receiving	R45	60	51	73	64	63	47	**68**	**Yes**	No
Highland Ave Northeast/Southeast Launching	R23 [1]	61	55	61	50	49	33	54	No	No
Highland Ave Northwest/Southwest Launching	R24	56	51	56	54	52	37	57	No	No
Park Road West Large Connection	R13	72	55	72	56	56	38	60	No	No
Park Road West Large Connection	R14	72	55	72	59	58	41	63	No	No
Park Road West Large Connection	R15	72	55	71	61	60	44	**65**	**Yes**	No
Park Road West Large Connection	R16	72	55	72	54	54	37	59	No	No

Table 3-26 Construction Noise Assessment Results, Alternative 10A

Site	Receptor	Existing Ambient Sound Level			Construction Noise Level (dBA)				Potential Impact	Within EJ Block Group
		Day (L_{90})	Night (L_{90})	Day-night Level (L_{dn})	First Shift (L_{eq})	Second Shift (L_{eq})	Night (L_{eq})	Day-night Level (L_{dn})		
American Legion Receiving	R33	51	45	51	71	70	54	**75**	**Yes**	**Yes**
American Legion Receiving	R34 [1]	56	48	56	60	58	43	63	No	Yes
Receptors Subject to Potential Impacts at Connection & Isolation Valve Sites (Common to All Alternatives):									**18**	**15**
Total Receptors Subject to Potential Impacts in Alternative 10A:									**24**	**16**

Sources: VHB, 2023; U.S. Department of Housing and Urban Development (HUD), 24 CFR Part 51, Subpart B, Noise Abatement and Control; Commonwealth of Massachusetts, Executive Office of Environmental Affairs, Massachusetts Department of Environmental Protection and Massachusetts Division of Air Quality Control Policy 90-001, February 1, 1990, https://www.mass.gov/doc/massdep-noise-policy/download (accessed April 18, 2023).

*Note: **Bold and** highlighted values indicate unmitigated construction noise levels would exceed applicable criteria, including the HUD noise regulation, which considers exterior noise levels between 65 and 75 dBA (Ldn) to be Normally Unacceptable, and noise levels above 75 dBA (Ldn) to be Unacceptable; and the MassDEP Noise Level Policy, which establishes a noise limit of a 10 dBA increase over existing ambient levels during the nighttime period.*

1 Receptor is institutional use that is not sensitive to noise at night.

Certificate Comment C-24

The SDEIR should discuss whether the anticipated routes of travel for construction period trucks and traffic will extend adjacent to any of those neighborhoods, and whether EJ populations may be disproportionately affected by Article 97 dispositions of parkland and other land takings/easements that may be needed for the project.

Response to Comment C-24

Traffic

Refer to the response to Certificate Comment C-22 for details on potential Program-related traffic impacts in proximity to EJ populations.

Land Alteration /Article 97

Refer to the response to Certificate Comment C-23 for details on potential Program-related Article 97 impacts in proximity to EJ populations.

Certificate Comment C-25

The SDEIR should confirm that the project will not generate more than 150 new ADT associated with diesel vehicle trips (Table 4.2-5 appears to indicate the project may produce up to 158 truck trips per day during the construction period).

Response to Comment C-25

The analysis estimated the potential for up to 156 ADT of diesel truck trips at the Highland Avenue Interchange based on a worst-case estimate. The worst-case estimate assumes approximately 70 feet excavation per day by a TBM and that construction would only occur on business days. The average rate for excavation is likely to be less than 60 feet per day, translating to fewer than 150 additional ADT by diesel trucks. Although the excavation in some days may reach or exceed 70 feet a day, the likelihood of exceeding 60 feet a day continuously for over four consecutive quarters (one year) is extremely low. Accordingly, the estimated number of trucks represents a conservative estimate considering the full duration of construction.

The annual average ADT generated by the project would be around 111 average daily trips per year. This conclusion is reached by taking the maximum number of daily truck trips (156) and multiplying that by the typical workdays in a year (260) and dividing that amount over a full 365 days to identify the number of annual ADT. Based on the EJ guidance for an impact assessment, the annual ADT 111 is below the 150 ADT threshold and thus a 1-mile radius for the EJ assessment is appropriate.

The transportation analysis assesses the work week ADT to confirm the roadways will be able to accommodate the anticipated annual traffic, while the air quality/GHG analysis considers trips as an annual average in the region.

Certificate Comment C-26

The SDEIR should discuss whether stormwater or other flood impacts, including from extreme storm events that may occur during the construction period, may affect EJ populations due to their proximity to any applicable infrastructure.

Response to Comment C-26

Construction period impacts on existing floodplains for all alternatives were evaluated by comparing the flow rates of dewatering discharges at each site to those of the potential receiving water bodies. The USGS Stream Stats: Stream Flow Statistics and Spatial Analysis Tool (web application) was utilized to estimate the flow rates in the existing receiving waterbodies. As documented in **SDEIR Section 5.1.1.1, Summary of Findings** and discussed further below, the proposed discharge volumes would be a small percentage of the projected storm flow volumes from all storm events in all alternatives.

At the Lower Fernald Property site, where 300 GPM of dewatering flow would be discharged to Clematis Brook, potential impacts to both Clematis Brook and the downstream Beaver Brook were assessed. Flow estimates for the 100-year flood event (1 percent) for Clematis Brook and Beaver Brook were estimated to be approximately 84,381 GPM and 137,343 GPM respectively. Therefore, dewatering discharges made to Clematis Brook from the Lower Fernald Property site are estimated to be only 0.4 percent of the 100-year flood volume for Clematis Brook and 0.2 percent of the 100-year flood volume for Beaver Brook. Based on these estimates, it is anticipated that construction period dewatering discharges from the Lower Fernald Property site would not contribute significantly to existing flood impacts.

Additionally, EJ block group, BG 1, CT 3689.01, is buffered from Clematis Brook by forested area associated with Forest Street Park. BG 1, CT 3691 is located across the ROW from Beaver Brook. Due to the anticipated 0.4 percent and 0.1 percent respective contributions to the 100-year flood volume, and the physical separation between the 100-year floodplain and the EJ block groups by natural and ROW features, project activities would not exacerbate flood risk to proximal EJ populations or existing environmental and health burdens. **Thus, no disproportionate adverse effects are anticipated due to stormwater or other flood impacts.**

At the Tandem Trailer/Park Road East launching and Park Road West receiving sites, where 300 GPM of dewatering flow would be discharged to Seaverns Brook, impacts to both Seaverns Brook and the downstream Charles River were assessed. Flow estimates for the 100-year flood event (1 percent) for Seaverns Brook and Charles River were estimated to be approximately 267,055 GPM and 3,774,682 GPM respectively. Therefore, dewatering discharges made to Seaverns Brook from the Tandem Trailer/Park Road East launching and Park Road West receiving sites are estimated to be only 0.1 percent of the 100-year flood volume for Seaverns Brook and less than 0.01 percent of the 100-year flood volume for Charles River.

The maximum cumulative discharge volume that the Charles River may receive from each contributing discharge (inclusive of discharges directly to the Charles as well as to upstream tributaries Clematis Brook/Beaver Brook and Seaverns Brook) is 6,560 GPM associated with SDEIR Alternative 10A discharges. This added volume represents approximately 6.5 percent of the 50 percent duration average flow and 0.17 percent and 0.24 percent of the anticipated 100-year and 25-year flood flows, respectively. **Based on these estimates, it is anticipated that construction period dewatering discharges from this site would not contribute significantly to existing flood impacts.**

Program activities would not exacerbate flood risk to proximal EJ populations or existing environmental and health burdens. **Thus, no disproportionate adverse effects are anticipated due to stormwater or other flood impacts.**

The Park Road West large connection site does not have any EJ populations within the DGA, and therefore would not have any adverse impacts, exacerbation of existing environmental and health burdens, or disproportionate adverse effects to EJ populations from stormwater or other flood impacts.

At the Highland Avenue Northwest launching and Northeast launching sites, where 6,110 GPM of dewatering flow will be discharged to Charles River, impacts were assessed. Flow estimates for the 100-year flood event (one percent) for Charles River were estimated to be approximately 3,774,682 GPM respectively. Therefore, dewatering discharges made to Charles River from the Highland Avenue Northwest and Northeast sites are estimated to be 0.2 percent of the 100-year flood volume.

The maximum cumulative discharge volume that the Charles River may receive from each contributing discharge (inclusive of discharges directly to the Charles as well as to upstream tributaries Clematis Brook/Beaver Brook and Seaverns Brook) is 6,560 GPM associated with SDEIR Alternative 10A discharges. This added volume represents approximately 6.5 percent of the 50 percent duration average flow and 0.17 percent and 0.24 percent of the anticipated 100-year and 25-year flood flows, respectively. Based on these estimates, it is anticipated that construction period dewatering discharges from this site would not contribute significantly to existing flood impacts.

Additionally, EJ block group BG 1, CT 3740, is distanced away from the Charles River and is not in its floodplain. Program activities would not exacerbate flood risk to proximal EJ populations or existing environmental and health burdens. **Thus, no disproportionate adverse effects are anticipated due to stormwater or other flood impacts.**

At the American Legion receiving site, where 300 GPM of dewatering flow will be discharged to Canterbury Brook/Stony Brook, impacts were assessed. Flow estimates for the 100-year flood event (1 percent) for Canterbury Brook/Stony Brook were estimated to be approximately 171,005 GPM respectively. Therefore, dewatering discharges made to Canterbury Brook/Stony Brook from the American Legion receiving site are estimated to be 0.2 percent of the 100-year flood volume. Based on these estimates, it is anticipated that construction period dewatering discharges from this site would not contribute significantly to existing flood impacts.

Additionally, the floodplain around Canterbury Brook/Stony Brook is considered a lower risk area than standard the 100-year floodplain (denoted as a one percent drainage area less than one square mile).

There is a tree buffer from residential areas, which include EJ populations, mostly from the Boston Nature Center, and a roadway buffer near floodplain areas. Due to the anticipated 0.2 percent contribution to the 100-year flood volume, the lower risk from the FEMA-labeled floodplain, and the physical separation between the 100-year floodplain and the EJ block groups nearby by natural and ROW features, Program activities would not exacerbate flood risk to proximal EJ populations or existing environmental and health burdens. **Thus, no disproportionate adverse effects are anticipated due to stormwater or other flood impacts.**

Drilling and excavation of contaminated soil, and construction dewatering of contaminated groundwater or surface water has the potential to exacerbate elevated blood lead health vulnerabilities. In the event that soil or water contaminated with lead is discovered during Program drilling, excavation, or dewatering, the MWRA will work with municipal entities to establish appropriate mitigation.

Sites that are not discussed above would not have adverse stormwater impacts, and Program activities would not exacerbate flood risk to proximal EJ populations or existing environmental and health burdens. **Thus, no disproportionate adverse effects are anticipated due to stormwater or other flood impacts for the remaining sites.**

Certificate Comment C-27

The SDEIR should supplement the climate change and GHG/air quality analyses in accordance with the scope below.

Response to Comment C-27

Climate Change

No disproportionate adverse effects for climate change exposure of EJ communities would be anticipated associated with the three SDEIR Alternatives during construction and in final conditions. For all proposed sites, best management practices and site preparation would be implemented during construction to reduce potential climate-related risks and to build redundancy and resiliency into the Program. No construction period adverse impacts on climate change exposure would be anticipated, and thus no disproportionate adverse effects on EJ populations would be anticipated.

The Program would primarily be constructed underground with limited disruption to the surface above. Above-ground infrastructure would primarily consist of the shaft site locations and/or water distribution infrastructure. Within the permanent sites, a fenced-off area would surround valve chambers and tunnel shafts that have an access hatch at or above ground level. It is anticipated that the Program would create up to 3 acres of new impervious surface compared to existing conditions, including new pavement proposed for vehicle parking and site access roadways. See **SDEIR Chapter 7, Climate Change**, and **SDEIR Appendix D, RMAT Tool Output Reports**, for information on climate change-related risks and exposures.

No impacts to baseline environmental or health conditions of EJ or non-EJ populations would be anticipated as a result of final conditions. **No disproportionate adverse effects for climate change exposure of EJ communities would be anticipated.**

Air Quality and GHG Emissions

The SDEIR provides the supplemental information requested related to the analyses of air quality and GHG emissions. Please see **SDEIR Chapter 8, Air Quality and Greenhouse Gas Emissions**, for the analysis of air quality and GHG emissions-related impacts and the Response to Certificate Comments C-48, C-49, and C-50 contained therein. See Response to Comments C-5 and C-22.

Certificate Comment C-50

The SDEIR should clarify what traffic study area (including specific intersections) was used to calculate the emissions presented in the mesoscale analysis and indicate whether EJ populations are present near any of the intersections that were studied. To the extent additional EJ populations are identified outside the traffic study area but along routes of travel for construction related traffic, the SDEIR should estimate the anticipated increase in traffic and air emissions at intersections adjacent to those EJ populations. To the extent data is available, the revised air quality analysis should report emissions of $PM_{2.5}$, PM_{10}, NOx, lead, and DPM at the specified locations above.

Response to Comment C-50

See Response to Comment C-22, in addition, the following information is provided.

The traffic study includes local roadway routes to and from construction locations to the nearest highway interchanges, generally with Interstate 93 (I-93) and I-95. Air pollutant emissions were calculated along these local routes, which traverse both EJ and non-EJ areas.

On the modeled peak day, the Program is expected to temporarily add 0.1 percent to 2.0 percent additional vehicles to local roadways. This minor increase would not be expected to materially affect any ambient pollutant concentrations and their comparison to any air quality standards. A detailed description of local roadway traffic is provided in **SDEIR Chapter 9, Transportation**.

Program-related traffic outside the Study Area would primarily include construction-related trucks and employee vehicles along the interstate highways. Given the existing volumes of traffic on I-93 and I-95, Program-related traffic (and associated generated emissions) is anticipated to be a comparatively small percentage of the total highway traffic (and emissions) and any increases outside the Study Area attributable to the Program would be minimal. Program-generated traffic on the highways is estimated to temporarily add 0.1 percent to 0.7 percent of total daily volumes on the modeled peak day, which conservatively assumes that construction would occur at all shafts simultaneously. A more detailed description of highway traffic increases is provided in **SDEIR Chapter 9, Transportation**.

The mesoscale analysis is the same as the transportation Study Area and included distances from Program site to the nearest interstate highway. **SDEIR Section 3.4.1, Environmental Justice Impact Methodology**,

defines the transportation Study Area used to calculate the emissions presented in the mesoscale analysis and identifies the roadway intersections analyzed in both the transportation and air quality analyses (refer also to **SDEIR Chapter 9, Transportation**). **SDEIR Table 3-20** identifies which of the intersections in the analysis include U.S. Census block groups containing potential EJ populations. **SDEIR Chapter 8, Table 8-14** presents the peak 12-month period of construction emissions of NOx and particulates from Program-related construction vehicles and identifies how the emissions are distributed on local roads adjacent to block groups identified as containing EJ populations versus non-EJ block groups.

As shown in **Table 8-14**, emissions of NOx, PM_{10}, $PM_{2.5}$, and DPM are all expected to be below 0.5 tpy, and well below the referenced General Conformity *de minimis* thresholds of 100 tpy for NOx, 100 tpy for PM_{10}, and 100 tpy for $PM_{2.5}$ (there are no thresholds for DPM).[8] Lead is no longer used in gasoline and is not used in diesel fuel. Therefore, the Program is expected to have no lead emissions.

Calculations show that emissions are small, however more pollutants are emitted in EJ areas than in non-EJ areas. This is due to the proximity of EJ neighborhoods to both the construction sites, and to the main state and local thoroughfares used to get to the interstate highways, especially for the American Legion site in Jamaica Plain, and the most direct route along State Road 203 to I-93. Construction vehicle transportation routes between the interstate highways and the Program construction sites are anticipated to take place on local roads, some of which abut EJ communities, assuming that the most direct local routes would be used. Any rerouting of construction vehicles would increase travel times and/or mileage, thus increasing regional emissions totals in both EJ and non-EJ communities. Therefore, the least impactful routing to all populations is using the most direct routes to the interstates and minimizing traffic on local roads.

The maximum amount of temporary Program-related traffic and resulting emissions would occur at tunnel launching shaft sites where there is a shift change conservatively modeled to take place during the evening peak hour (construction worker trips are not expected to occur during the evening peak hour as shift change is usually at approximately 3:00 PM). Program launching shaft locations (i.e., Tandem Trailer, Bifurcation, and Highland Avenue sites) are adjacent to highway ramps and are therefore not expected to cause a significant traffic impact to nearby local roadways. As shown on **Figure 3-5**, **Figure 3-6**, **Figure 3-10**, and **Figure 3-11**, none of the Program launching shaft sites considered in either of the SDEIR Alternatives are in EJ block groups. Furthermore, given their proximity to highway ramps, no construction vehicle routes between these launching shaft sites and the highway travel through EJ block groups.

Since no significant Program-related air quality or GHG emissions impacts are anticipated, there would be no impacts to baseline environmental or health conditions of EJ or non-EJ populations.

8 U.S. Environmental Protection Agency, General Conformity, "*De Minimis* Tables," updated July 20, 2022, https://www.epa.gov/general-conformity/de-minimis-tables (accessed June 13, 2023).

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4 Land Alteration and Article 97

4.1 Introduction

This chapter of the Supplemental Draft Environmental Impact Report (SDEIR) includes an updated assessment of land use, community resources, open space, and Article 97 resources to incorporate the two new alternative sites that are considered for the terminus of the North Tunnel, Segment 1, in place of the Fernald Property site that was previously evaluated in the Draft Environmental Impact Report (DEIR). The University of Massachusetts (UMass) Property large connection shaft site is included in SDEIR Alternatives 3A and 4A, and the Lower Fernald Property receiving shaft site is included in SDEIR Alternative 10A. All other Program sites associated with the SDEIR Alternatives remain unchanged from the DEIR. Included in this chapter is an evaluation of existing conditions, construction period impacts, and final conditions, as well as best practices to avoid, minimize, and mitigate potential impacts.

The Secretary's Certificate on the DEIR, issued on December 16, 2022, identified a Scope for the SDEIR that included specific requests related to land use, community resources, open space, and properties protected by Article 97 of the Article of Amendment to the Constitution of the Commonwealth of Massachusetts (Article 97). **SDEIR Section 4.3** includes the applicable comments from the Certificate and provides supplemental analysis and/or clarifying information in response. Certificate comments related to how land alteration/Article 97 may affect environmental justice (EJ) populations are discussed in **SDEIR Chapter 3, Outreach and Environmental Justice**. Refer to **SDEIR Chapter 15, Responses to Comments**, for the full list of delineated comments received on the DEIR.

In the Scope for the SDEIR, the Secretary requested a combined "Land Alteration/Article 97" chapter to provide the information and analyses requested in the Certificate. In accordance with the Scope, this chapter provides supplemental information and analysis related to land use, open space, community resources, and Article 97 into a consolidated chapter. In the DEIR, information on land use is contained in **DEIR Chapter 4.9**, **Land Use**, and information related to community resources and open space, including Article 97 resources, is contained in **DEIR Chapter 4.13, Community Resources and Open Space**.

4.1.1 Summary of Findings

Consistent with the analysis of the tunnel launching shaft, receiving shaft, large connection shaft, connection shaft, and isolation valve sites evaluated in the DEIR, the two new alternative sites considered in place of the DEIR Fernald Property receiving shaft site are generally located within previously disturbed land. Both new alternative sites are on either state-owned or municipality-owned land (state-owned in the case of the UMass Property site and municipality-owned (City of Waltham) in the case of the Lower Fernald Property site).

The key findings related to Land Alteration and Article 97 for the three SDEIR Alternatives are listed below. Findings are consistent with those previously identified in the DEIR.

- Proposed shafts, valve chambers, meters and connecting pipelines would be underground structures.
- Proposed sites would be located on state- or municipality-owned land.
- Relocation of residential units would not be required; Program sites would be located away from residential uses and protected and recreational open spaces to the extent feasible.
- Permanent above-ground features, such as concrete slabs and concrete vaults or top of shafts, are not anticipated to extend more than three feet above finished grade.
- Areas temporarily disturbed during construction would be restored to preconstruction conditions where possible in accordance with the respective property owners.
- The Program may require the removal of public shade trees as defined in Massachusetts General Law Chapter 87; potential public shade trees will be identified pending advancement of site design and the MWRA would not plant, trim, cut, or remove a public shade tree without permission of the Tree Warden (and/or in coordination with the park commissioner, the Massachusetts Department of Conservation and Recreation (DCR), and/or the Massachusetts Department of Transportation (MassDOT) where appropriate) and would follow the necessary requirements for public hearings and public notification in accordance with Chapter 87, as well as Chapter 40, Section 15C (the "Scenic Roads Act"), where applicable.
- Trees removed during construction would be replaced where required and as appropriate.
- Fencing and proper signage would be installed surrounding shaft areas, where appropriate.

Existing open space areas protected by Article 97 through the Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs (EEA) Article 97 Land Disposition Policy would be avoided to the greatest extent practicable. As previously assumed in the DEIR, three sites may require the disposition[1] of land protected under Article 97:

- The Hegarty Pumping Station connection shaft site (Ouellet Park) (Article 97 status to be determined)
- Southern Spine Mains connection shaft site (Southwest Corridor Park/Arborway I)
- The American Legion receiving shaft site (Morton Street Property)

Three other sites have resources that are protected under Article 97 but would not result in an Article 97 land disposition since the protected resources (Hultman Aqueduct and Sudbury Aqueduct) are owned by the Commonwealth of Massachusetts under the care, custody, and control of the MWRA, namely:

- Park Road East large connection shaft site (Hultman Aqueduct) [paired with the Tandem Trailer launching shaft site]
- Bifurcation launching shaft site (Hultman Aqueduct)
- St. Mary Street Pumping Station connection shaft site (Sudbury Aqueduct)

Any proposed change in use or disposition of land or interests in land subject to Article 97 would seek to comply with the Public Lands Preservation Act (PLPA) and its established requirements and process per *An*

1 Per the Article 97 Land Disposition Policy, "an Article 97 land disposition is defined as a) any transfer or conveyance of ownership or other interests; b) any change in physical or legal control; and c) any change in use, in and to Article 97 land or interests in Article 97 land owned or held by the Commonwealth or its political subdivisions, whether by deed, easement, lease or any other instrument effectuating such transfer, conveyance or change."

Act Preserving Open Space in the Commonwealth (Chapter 274 of the Acts of 2022, M.G.L. c. 3, § 5A). For more on Article 97 and the PLPA, see **SDEIR Section 4.3**.

4.2 Land Alteration and Article 97 Impact Assessment

This section describes and evaluates the existing land uses, community resources, open space, and Article 97 properties in the vicinity of the two new alternative sites considered for the terminus of the North Tunnel, Segment 1, in place of the DEIR Fernald Property receiving shaft site. All other Program sites remain the same as described in **DEIR Chapter 4.9**, **Land Use**, and **DEIR Chapter 4.13, Community Resources and Open Space**. An analysis of the Program's potential environmental impacts relative to land alteration and the creation of impervious area is provided, updating where necessary the summary total information provided in the DEIR. Included is a comparison of the SDEIR Alternatives with respect to their potential impacts on land use, community resources, open space, and Article 97 properties, including consistency with the EEA Article 97 Land Disposition Policy.[2] This section of the SDEIR also describes the measures to avoid, minimize, and mitigate potential land alteration/Article 97 impacts.

4.2.1 Land Alteration and Article 97 Existing Conditions

The methodology used to assess existing conditions remains unchanged from the DEIR as described in **DEIR Section 4.9.3, Methodology (pg. 4.9-2)** and **DEIR Section 4.13.3, Methodology (pg. 4.13-23)**. As described in the DEIR, the Study Area for land use, community resources, open space, and Article 97 properties consists of the area within a 500-foot distance from the extents of the proposed temporary construction area limits of disturbance (LOD) boundary for each Program site. The construction area LOD includes the area proposed for site access, excavation, staging, near-surface pipeline connections, temporary water treatment areas, dewatering discharge locations, and other construction-related activities. Land uses, community resources, open space, and Article 97 properties within 500 feet of the construction area LOD surrounding the UMass Property site and the Lower Fernald Property site were reviewed for compatibility with the Program. Consistent with **DEIR Chapter 4.13, Section 4.13.3.1, Study Area (pg. 4.13-2)**, the Study Area for community resources, open space, and Article 97 resources also includes a 1,000-foot-wide corridor (500 feet on either side of the proposed tunnel alignments) along the tunnel alignment for each SDEIR Alternative to identify which properties may require a subterranean easement.

Consistent with MEPA regulations set forth in 301 Code of Massachusetts Regulations (CMR) Section,[3] 11.00 et seq., the land use analysis quantified the estimated total area of land alteration, the net change in impervious area, potential land transfer and easement areas, and identified lands held for natural resources purposes in accordance with Article 97, as well as public shade trees as defined in Massachusetts General

2 Commonwealth of Massachusetts, Executive Office of Environmental Affairs, "Article 97 Land Disposition Policy," February 19, 1998, www.mass.gov/files/documents/2018/06/06/article97_LandDisposition_Policy.pdf (accessed May 8, 2023).

3 Commonwealth of Massachusetts, Massachusetts Environmental Policy Act Office, 301 Code of Massachusetts Regulations 11.00: Massachusetts Environmental Policy Act Regulations, "EIR Preparation and Filing," Section 11.03, Review Thresholds, https://www.mass.gov/regulations/301-CMR-1100-mepa-regulations#11-07-eir-preparation-and-filing (accessed August 1, 2022).

Law Chapter 87.[4] In accordance with 301 CMR 11.07, "EIR Preparation and Filing," this section also describes the conditions of the built environment and human use of the two new alternative sites considered for the northern terminus of the North Tunnel, Segment 1, their immediate surroundings, and the region, including existing infrastructure, zoning districts, and other relevant land use designations or plans.[5]

As described in **DEIR Section 4.13.1, Resource Definition (pg. 4.13-1)**, scenic qualities, open space, and recreational resources are defined by MEPA as resource areas to evaluate in an Environmental Impact Report (EIR).[6] In accordance with this requirement, this section reviews and evaluates recreational, scenic, and open spaces, as well as other community resources in the area.

Land use describes the human use of land and represents the economic and cultural activities such as agricultural, residential, industrial, and recreational uses that are practiced at a given place.[7]

Community resources are open spaces that are available to the public and include land with scenic and recreational space hosting amenities such as agriculture, parks, and conservation land. Community resources also include schools, hospitals, places of religious significance, and community and social services and the land associated with them. Properties hosting these amenities will also be discussed in this subsection and referred to as community resources.

Open space refers to properties that the Massachusetts geographic information system (MassGIS) or local zoning designates as undeveloped. Open space may be protected by Article 97 or local zoning laws. Not all open space is available for public use. Properties in this section that are considered open space and not accessible to the public is referred to as open space properties.

Aboveground construction activities would take place at up to 13 different Program sites, depending on the SDEIR Alternative. **Table 4-1** provides a summary comparison of the land use characteristics associated with the three SDEIR Alternatives, including the proposed change in impervious surface compared to existing conditions, the total temporary construction area LOD, permanent easements or land acquisition, and Article 97 land disposition anticipated to be required. The table has been updated since the DEIR to reflect the two new alternative sites for the northern terminus of North Tunnel, Segment 1. The italicized text in the table denotes where the land use characteristics have not changed since the DEIR. As shown, the characteristics that have been updated since the DEIR include the estimated total temporary construction area LOD (two to four acres less than assumed in the DEIR, depending on the SDEIR Alternative) and the estimated total permanent easement or acquisition area (two to three acres less than assumed in the DEIR,

4 Commonwealth of Massachusetts, General Laws of Massachusetts, Part I, Title XIV, Chapter 87, Section 1: "Shade Trees," 2020.

5 Commonwealth of Massachusetts, Massachusetts Environmental Policy Act Office, 301 Code of Massachusetts Regulations 11.00: Massachusetts Environmental Policy Act Regulations, "EIR Preparation and Filing," Section 11.07.6.g.viii, https://www.mass.gov/regulations/301-CMR-1100-mepa-regulations#11-07-eir-preparation-and-filing (accessed September 13, 2022).

6 Commonwealth of Massachusetts, Massachusetts Environmental Policy Act Office, 301 Code of Massachusetts Regulations 11.00: Massachusetts Environmental Policy Act Regulations, "EIR Preparation and Filing," Section 11.03, Review Thresholds, www.mass.gov/regulations/301-CMR-1100-mepa-regulations#11-07-eir-preparation-and-filing (accessed May 9, 2023).

7 United States Environmental Protection Agency, "Land Use," updated October 4, 2022, https://www.epa.gov/report-environment/land-use (accessed June 12, 2023).

depending on the SDEIR Alternative). The total proposed change in impervious surface cover would be the same as previously assumed in the DEIR (two to three acres, depending on the SDEIR Alternative).

Table 4-1 Summary Comparison of Land Alteration/Article 97 Considerations by Alternative

Land Use Characteristics	Alternative 3A	Alternative 4A	Alternative 10A
Proposed change in impervious surface cover	*2.7 acres*	*2.4 acres*	*2.3 acres*
Estimated total temporary construction area limits of disturbance	42.4 acres	36.1 acres	32.0 acres
Estimated permanent easements or land acquisition required to support the shaft and valve chambers (excluding the tunnel alignment, access and pipeline easements, and existing MWRA-owned lands or lands with an existing MWRA easement)	*Minimum of 9*	*Minimum of 9*	*Minimum of 7*
Estimated total permanent easement or acquisition area (excluding the underground tunnel alignment and existing MWRA-owned lands or lands with an existing MWRA easement)	8.4 acres	8.0 acres	7.9 acres
Total Program sites [1]	*13*	*13*	*12*
Article 97 Properties (not under the care, custody, and control of the MWRA) within construction area limits of disturbance	*3* *1 Ouellet Park (Hegarty Pumping Station)* *2 Southwest Corridor Park/ Arborway I (Southern Spine Mains)* *3 Morton Street Property (American Legion)*	*3* *1 Ouellet Park (Hegarty Pumping Station)* *2 Southwest Corridor Park/ Arborway I (Southern Spine Mains)* *3 Morton Street Property (American Legion)*	*3* *1 Ouellet Park (Hegarty Pumping Station)* *2 Southwest Corridor Park/ Arborway I (Southern Spine Mains)* *3 Morton Street Property (American Legion)*
Estimated Article 97 land disposition area within the proposed Hegarty Pumping Station site (Ouellet Park under care, custody, control of the Town of Wellesley [Article 97 status TBD]), Southern Spine Mains site (Southwest Corridor Park/Arborway I under care, custody, control of the Commonwealth of Massachusetts Department of Conservation and Recreation (DCR)), and American Legion site (Morton Street Property under care, custody, control of DCR)	*3.8 acres* *(0.1 acres of Ouellet Park, 0.2 acres of Southwest Corridor Park, and 3.5 acres of the Morton Street Property)*	*3.8 acres* *(0.1 acres of Ouellet Park, 0.2 acres of Southwest Corridor Park, and 3.5 acres of the Morton Street Property)*	*3.8 acres* *(0.1 acres of Ouellet Park, 0.2 acres of Southwest Corridor Park, and 3.5 acres of the Morton Street Property)*
Article 97 Properties within a 1,000-Foot Corridor of the Preliminary Tunnel Alignment	37	36	34

1 The Tandem Trailer launching shaft site would include a connection tunnel to the Park Road East large connection shaft in SDEIR Alternatives 3A and 4A to provide the required connection to the Hultman Aqueduct. The total number of Program sites considers the area around the Tandem Trailer launching shaft and the area around the Park Road East large connection shaft as one site paired.

Italicized text within the table indicates no change from the DEIR.

The UMass Property site and Lower Fernald Property site do not contain Article 97 property that would require a disposition. Up to three additional subterranean easements may be required for properties protected by Article 97 within the SDEIR tunnel alignment Study Area (1,000-foot corridor along the preliminary tunnel alignment). **Table 4-2** lists community resources and open space identified within 500 feet of the temporary construction area LOD for sites used in the SDEIR Alternatives.

Table 4-2 Community Resources and Open Space within Study Area of Program Sites

Site (Alternative)	Property Name	Property Owner/ Maintainer (if applicable)	Property Use	Property Size (acres) [2]	Property Type
Launching, Receiving, and Large Connection Shaft Sites					
UMass Property (3A, 4A)	Lawrence Meadow	Commonwealth of Massachusetts/ University of Massachusetts	Conservation	31.0	Open Space and Community Resource
	Cornelia Warren Field [1]	City of Waltham	Recreation	4.8	Open Space and Community Resource
	Waltham Agricultural Fields [1]	City of Waltham	Agriculture/ Conservation	28.0	Open Space and Community Resource
	Cedar Hill Girl Scout Camp	Girl Scouts of America – Patriots Trail Council	Recreation/ Conservation	75.5	Open Space and Community Resource
Lower Fernald Property (10A)	Fernald Property (Non-CPA Funded)	City of Waltham	Conservation/ Recreation	50.0	Open Space
	Lawrence Meadow	Commonwealth of Massachusetts/ University of Massachusetts	Conservation	31.0	Open Space and Community Resource
	Fernald Property (CPA Funded)[1]	City of Waltham	Conservation/ Recreation	140.0	Open Space
Tandem Trailer/Park Road East (3A, 4A)	*Loring Road Covered Storage Tanks [1]*	*Commonwealth of Massachusetts/MWRA*	*Water Supply*	*41.0*	*Open Space*
	Cutters Bluff Property	*Weston Forest and Trail Association*	*Conservation*	*4.3*	*Community Resource*
	Fitzgerald Well [1]	*Town of Weston*	*Water Supply (abandoned)*	*0.9*	*Open Space*
	Hultman Aqueduct [1]	*Commonwealth of Massachusetts/MWRA*	*Water Supply*	*5.8*	*Open Space*
Park Road West (4A, 10A)[3]	*Hultman Aqueduct [1]*	*Commonwealth of Massachusetts/MWRA*	*Water Supply*	*10.9*	*Open Space*
Bifurcation (3A)	*Hultman Aqueduct [1]*	*Commonwealth of Massachusetts/MWRA*	*Water Supply*	*10.9*	*Open Space*
	Nickerson Well [1]	*Town of Weston*	*Water Supply (abandoned)*	*0.7*	*Open Space*
	Fitzgerald Well [1]	*Town of Weston*	*Water Supply (abandoned)*	*0.9*	*Open Space*

Table 4-2 Community Resources and Open Space within Study Area of Program Sites

Site (Alternative)	Property Name	Property Owner/ Maintainer (if applicable)	Property Use	Property Size (acres) [2]	Property Type
Highland Avenue Northwest/ Southwest (All)	Charles River Pathway [1]	Oak Park Realty	Conservation	1.8	Open Space and Community Resource
Highland Avenue Northeast/ Southeast (All)	Charles River Pathway [1]	Oak Park Realty	Conservation	1.8	Open Space and Community Resource
American Legion (All)	Morton Street [1]	Commonwealth of Massachusetts/DCR	Conservation	31.5	Open Space
	Boston Nature Center	Massachusetts Audubon Society	Recreation/ Conservation/ Agriculture	62.3	Community Resource
	St. Michaels Cemetery	Italian Catholic Cemetery Association	Religious Site	40.0	Community Resource
	Franklin Park [1]	Commonwealth of Massachusetts/City of Boston	Recreation	397.0	Open Space and Community Resource
	Forest Hills Cemetery	Private	Religious Site	273.9	Community Resource
Connection Shaft and Isolation Valve Sites (Common to All Alternatives)					
School Street	St. Mary's Church	St. Mary's Church	Religious Site	3.6	Community Resource
	Waltham Housing Authority	City of Waltham	Housing	2.0	Community Resource
Cedarwood Pumping Station	William Stanley Elementary School	City of Waltham	Education	11.8	Community Resource
	Beth Israel Memorial Park	The Temple of Beth Israel	Open Space	7.7	Community Resource
	Mt. Feake Cemetery	City of Waltham	Religious Site	86.1	Community Resource
	Nipper Maher Park	City of Waltham	Recreation	19.6	Open Space and Community Resource
Hegarty Pumping Station	Ouellet Park [1]	Town of Wellesley Parks and Recreation Department	Recreation	7.3	Open Space and Community Resource
	Wellesley Water Supply Land [1]	Town of Wellesley	Water Supply	6.5	Open Space
	Charles River Reservation[1]	Commonwealth of Massachusetts/DCR	Recreation	65.0	Open Space and Community Resource
	Wellesley Housing Authority	Town of Wellesley	Housing	16.9	Community Resource
St. Mary Street Pumping Station	Sudbury Aqueduct [1]	Commonwealth of Massachusetts/MWRA	Water Supply	13.5	Open Space

Table 4-2 Community Resources and Open Space within Study Area of Program Sites

Site (Alternative)	Property Name	Property Owner/ Maintainer (if applicable)	Property Use	Property Size (acres) [2]	Property Type
Newton Street Pumping Station	*Newton St. Parcel* [1]	*Town of Brookline*	*Water Supply*	*0.1*	*Open Space*
	Robert T. Lynch Memorial Golf Course[1]	*Town of Brookline*	*Recreation*	*123.0*	*Community Resource*
	The Country Club	*The Country Club*	*Recreation*	*232.8*	*Community Resource*
Southern Spine Mains	*Southwest Corridor Park/ Arborway I* [1]	*Commonwealth of Massachusetts/DCR/ MBTA*	*Recreation*	*1.9*	*Community Resource and Open Space*
	South Street Community Garden	*Commonwealth of Massachusetts*	*Agriculture*	*0.4*	*Community Resource*
	Arnold Arboretum [1]	*City of Boston/ Harvard University*	*Conservation/ Recreation*	*159.7*	*Community Resource and Open Space*
	Department of Public Health	*Commonwealth of Massachusetts*	*Laboratory*	*11.4*	*Community Resource*
	Arborway [1]	*Commonwealth of Massachusetts/ DCR*	*Conservation/ Recreation*	*4.3*	*Community Resource and Open Space*
Hultman Aqueduct Isolation Valve	*Nickerson Well* [1]	*Town of Weston*	*Water Supply (abandoned)*	*0.7*	*Open Space*

1 Property may be protected under Article 97 (Article 97 properties to be confirmed as design progresses).

2 Total size of the open space or community resource property. The specific area (quantity or acres) within the Study Area has not been determined.

***Shaded** areas are located on the Program site; nonshaded areas are within the Study Area and not within the temporary construction area limits of disturbance (LOD).*

DCR - Commonwealth of Massachusetts, Department of Conservation and Recreation

MWRA - Massachusetts Water Resources Authority

MassDOT - Massachusetts Department of Transportation

MBTA - Massachusetts Bay Transit Authority

CPA - Community Preservation Act

Italicized text within the table indicates no change from the DEIR.

4.2.1.1 Alternative 3A/Alternative 4A Existing Conditions

The following section addresses existing conditions for land use, community resources, open space, and Article 97 at the UMass Property site considered in SDEIR Alternatives 3A and 4A. The existing conditions associated with all other Program sites used in SDEIR Alternative 3A and Alternative 4A remain the same as described in the DEIR.

UMass Property

The UMass Property site in Waltham would be the northernmost point of North Tunnel, Segment 1, in SDEIR Alternatives 3A and 4A. As shown on **Figure 4-1**, the temporary LOD for the proposed UMass Property site includes an approximately 0.5-acre area surrounding the proposed shaft site and an approximately 0.4-acre

area along the public right-of-way on Beaver Street to accommodate a near-surface pipeline. The proposed pipeline would travel from the shaft site southeast to connect to the existing Weston Aqueduct Supply Main Number Three (WASM3) at the intersection with Waverley Oaks Road. The LOD would also include an area northwest of the intersection between Beaver Street and Waverley Oaks Road to accommodate a temporary discharge pipe. The temporary LOD totals approximately 0.9 acres.

Land Use

The following describes the UMass Property site location, ownership, land cover, land use, and access:

- General Location: East side of Waltham off Beaver Street, north of the Waltham Agricultural Fields and south of the former Walter E. Fernald State School property.
- Property Owner: Commonwealth of Massachusetts under care, custody, and control of UMass.
- Existing On-Site Land Use: The UMass Property site is vacant/unpaved and located on open space within Lawrence Meadow, an approximately 31-acre area that surrounds the Samuel D. Warren Estate and was historically used for agriculture.[8] Lawrence Meadow is zoned by the City of Waltham as conservation/recreation.[9] Lawrence Meadow is not protected by Article 97.[10]
- Existing On-Site Land Cover: The site primarily consists of mowed grassland and scrub/shrub vegetation, with some deciduous trees along the site's southern border with Beaver Street. As described in **SDEIR Chapter 10, Rare Species and Wildlife Habitat**, **Section 10.2.1.1 Alternative 3A/4A Existing Conditions**, tree species present within the UMass Property site boundary include Norway maple, white oak, and tree of heaven; snags are also present. The U.S. Fish and Wildlife Service (USFWS) Information for Planning and Conservation (IPaC) online tool indicates that the Northern Long-Eared Bat (NLEB) and the monarch butterfly may be present within the site. Wetlands associated with Clematis Brook are located east of the site's boundary.
- Access: Access to the site would be from Beaver Street as shown on **Figure 4-1**. The approximate site address is 225 Beaver Street, Waltham, MA 02452.
- Surrounding Land Uses: Farther to the north and east of the UMass Property site beyond Lawrence Meadow is land associated with the former Walter E. Fernald State School property. South of the UMass Property site across Beaver Street includes protected open space associated with Cornelia Warren Field (Article 97) and the Waltham Agricultural Fields (Article 97), which are both on property owned by Waltham and zoned conservation/recreation land.[11] Cornelia Warren Field (Article 97) is approximately 5 acres and contains recreational facilities, while the Waltham Agricultural Fields (Article 97) encompass approximately 28 acres of land used for agricultural purposes. The Cedar Hill Girl Scout Camp

8 City of Waltham, Massachusetts, "2015-2022 Open Space & Recreation Plan," https://www.city.waltham.ma.us/sites/g/files/vyhlif6861/f/u151/open_space_plan.pdf (accessed May 9, 2023).

9 City of Waltham, Massachusetts, "Zoning District Map of Waltham, Massachusetts," revised June 29, 2017, https://www.city.waltham.ma.us/sites/g/files/vyhlif6861/f/uploads/zoning_map_-_city_color_scheme_-_30x30_6-29-2017.pdf (accessed April 20, 2023).

10 City of Waltham, Massachusetts, "2015-2022 Open Space & Recreation Plan," https://www.city.waltham.ma.us/sites/g/files/vyhlif6861/f/u151/open_space_plan.pdf (accessed May 9, 2023).

11 City of Waltham purchased the Waltham Agricultural Fields from UMass on March 1, 2022 (formerly referred to as the UMass Field Station), using Community Protection Act (CPA) funding (https://walthamfieldstation.org/).

(approximately 76 acres), which is operated by the Girl Scouts of Eastern Massachusetts and owned by the Girl Scouts of America, is located on open space to the west and northwest of the UMass Property site on land zoned "Residence A2" by Waltham.[12] As described in **SDEIR Chapter 12, Cultural and Historical Resources, Section 12.2.1.1 Alternative 3A/Alternative 4A Existing Conditions**, the Samuel D. Warren House is located on a rise at the north end of Lawrence Meadow, approximately 450 feet from the northern boundary of the UMass Property site LOD.

Community Resources and Open Space within the Study Area

The following resources (see **Figure 4-1**) are within a 500-foot buffer of the UMass Property site:

- The Cornelia Warren Field borders the LOD to the south across Beaver Street. This 4.8-acre property is used for recreation and is owned by the City of Waltham. The property underwent renovations and reopened in 2020 with a new playground, sport fields, and parking. The property is protected under Article 97.[13] The property is zoned by the City of Waltham as conservation and recreation.[14]
- The Waltham Agricultural Fields (previously known as UMass College of Agriculture Field Station) borders the LOD to the south across Beaver Street. This 28-acre property was acquired by the City of Waltham in 2022 and is used for agriculture purposes. The property consists of agriculture fields that are accessible to the surrounding community. The property is protected by Article 97.[15] It is zoned by the City of Waltham as conservation and recreation.
- Cedar Hill Girl Scout Camp is privately owned by the Girl Scouts of America, Patriot's Trail Council. The property is located about 75-feet northwest of the LOD and is approximately 76 acres in size. It is zoned as conservation and recreation[16] and used for specialized public recreation.[17] The Cedar Hill Girl Scout Camp is not protected by Article 97.

12 City of Waltham, Massachusetts, "Zoning District Map of Waltham, Massachusetts," revised June 29, 2017, https://www.city.waltham.ma.us/sites/g/files/vyhlif6861/f/uploads/zoning_map_-_city_color_scheme_-_30x30_6-29-2017.pdf (accessed April 20, 2023).

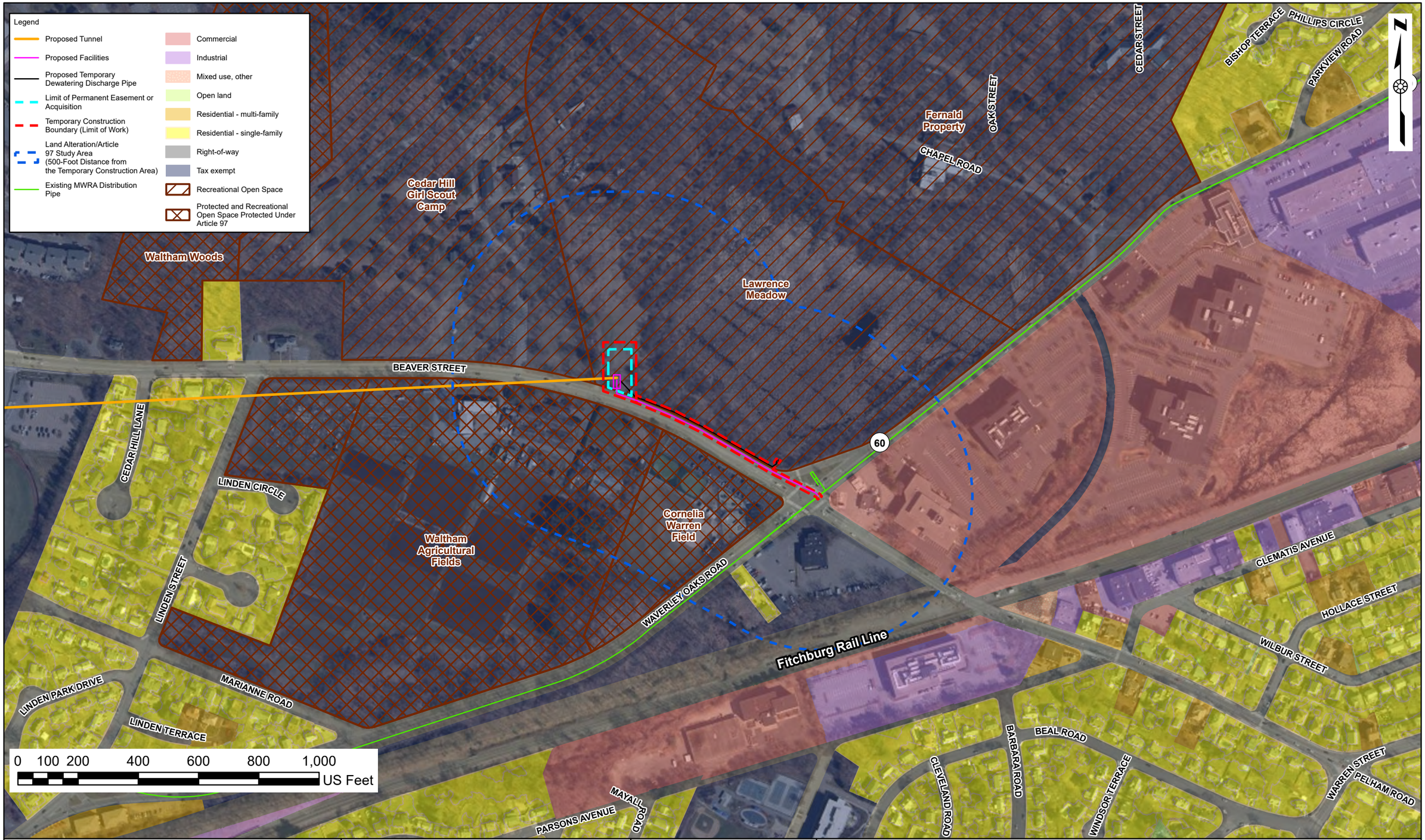
13 City of Waltham, Massachusetts, "2015-2022 Open Space & Recreation Plan," https://www.city.waltham.ma.us/sites/g/files/vyhlif6861/f/u151/open_space_plan.pdf (accessed May 9, 2023).

14 City of Waltham, Massachusetts, "Zoning District Map of Waltham, Massachusetts," revised June 29, 2017, https://www.city.waltham.ma.us/sites/g/files/vyhlif6861/f/uploads/zoning_map_-_city_color_scheme_-_30x30_6-29-2017.pdf (accessed April 20, 2023).

15 City of Waltham, Massachusetts, "2015-2022 Open Space & Recreation Plan," https://www.city.waltham.ma.us/sites/g/files/vyhlif6861/f/u151/open_space_plan.pdf (accessed May 9, 2023).

16 City of Waltham, Massachusetts, "Zoning District Map of Waltham, Massachusetts," revised June 29, 2017, https://www.city.waltham.ma.us/sites/g/files/vyhlif6861/f/uploads/zoning_map_-_city_color_scheme_-_30x30_6-29-2017.pdf (accessed April 20, 2023).

17 City of Waltham, Massachusetts, "2015-2022 Open Space & Recreation Plan," https://www.city.waltham.ma.us/sites/g/files/vyhlif6861/f/u151/open_space_plan.pdf (accessed May 9, 2023).



Metropolitan Water Tunnel Program	MWRA Contract No. 7159 Supplemental Draft Environmental Impact Report 2023	CDM Smith in association with vhb Jacobs GREEN INTERNATIONAL AFFILIATES, INC.	**Land Alteration and Article 97** **UMass Property Large Connection Shaft Site (Alternatives 3A and 4A)** **Figure 4-1** Waltham, MA Source: MassGIS, Land Cover and Land Use Data, 2016, MWRA

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Legend

- Proposed Tunnel
- Proposed Facilities
- Proposed Temporary Dewatering Discharge Pipe
- Limit of Permanent Easement or Acquisition
- Temporary Construction Boundary (Limit of Work)
- Land Alteration/Article 97 Study Area (500-Foot Distance from the Temporary Construction Area)
- Existing MWRA Distribution Pipe
- Commercial
- Industrial
- Mixed use, other
- Open land
- Residential - multi-family
- Residential - single-family
- Right-of-way
- Tax exempt
- Unknown
- Recreational Open Space
- Protected and Recreational Open Space Protected Under Article 97
- Municipal Boundary

WALTHAM
CHERRY LANE
PINE STREET
MAPLE STREET
HILL STREET
CEDAR STREET
OAK STREET
Fernald Property
Cedar Hill Girl Scout Camp
CHAPEL ROAD
Lawrence Meadow
BEAVER STREET
Waltham Agricultural Fields
Cornelia Warren Field
TIP TOP TERRACE
SHAWMUT ROAD
FREEMONT TERRACE
SHIRLEY ROAD
UPTON ROAD
PARKVIEW ROAD
WILSON ROAD
BISHOP TERRACE
PHILLIPS CIRCLE
60
WAVERLEY OAKS ROAD
Fitchburg Rail Line
CLEMATIS AVENUE
WAVERLEY STREET
HOLLACE STREET
WILTON STREET
WILBUR STREET
CIRCUIT LANE
N
0 100 200 400 600 800 1,000 US Feet

Metropolitan Water Tunnel Program	MWRA Contract No. 7159 Supplemental Draft Environmental Impact Report 2023	CDM Smith in association with vhb Jacobs GREEN INTERNATIONAL AFFILIATES, INC.	**Land Alteration and Article 97** **Lower Fernald Property Receiving Shaft Site (Alternative 10A)** **Figure 4-2** Waltham, MA Source: MassGIS, Land Cover and Land Use Data, 2016, MWRA

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4.2.1.2 Alternative 10A Existing Conditions

The following section describes the existing conditions for land use, community resources, open space, and Article 97 resources at the Lower Fernald Property site, which would be a receiving shaft site in SDEIR Alternative 10A. The existing conditions for all other sites used in SDEIR Alternative 10A remain the same as described previously in the DEIR.

Lower Fernald Property

The Lower Fernald Property site in Waltham would be the northern terminus of North Tunnel, Segment 1, in SDEIR Alternative 10A (see **Figure 4-2**). The site borders Waverley Oaks Road (Route 60) and is located at the Chapel Road entrance to the abandoned Walter E. Fernald State School. The proposed site would include a connection to the existing MWRA WASM3 distribution line at Waverley Oaks Road and a temporary discharge pipe southwest of the intersection between Chapel Road and Waverley Oaks Road. The temporary construction area LOD is approximately 2.3 acres.

Land Use

The following describes the location, ownership, land use, land cover, and access to the Lower Fernald Property site:

- General Location: East side of Waltham on former Walter E. Fernald State School property near the intersection of Chapel Road and Waverley Oaks Road.
- Property Owner: City of Waltham.
- Existing On-Site Land Use: The Lower Fernald Property site is on the southern area of former Walter E. Fernald State School property, which consists of open space zoned by Waltham as conservation/recreation.[18] Three ancillary abandoned buildings associated with the former school are located within the site's temporary construction area LOD, including two separate cottages formerly used for housing staff members and an exterior garage (see **SDEIR Chapter 12, Cultural and Historical Resources**, for more information). An asphalt parking lot exists behind the two abandoned residential units. A paved access road connects the parking lot and garage to Chapel Road. The LOD also includes the paved, Y-shaped driveway entrance to Chapel Road from Waverley Oaks Road.
- Existing On-Site Land Cover: The site was previously disturbed and consists of a mix of paved (impervious) area, as well as gravel and unpaved spaces. The paved space within the site's temporary construction area LOD boundary includes portions of Chapel Road, Waverley Oaks Road (Route 60), a former parking lot, and an access road. The unpaved space includes deciduous trees, evergreens, and open space. As described in **SDEIR Chapter 10, Rare Species and Wildlife Habitat**, the wooded areas on the Lower Fernald Property site include species such as Norway maple, white oak, tree of heaven,

18 City of Waltham, Massachusetts, "Zoning District Map of Waltham, Massachusetts," revised June 29, 2017, https://www.city.waltham.ma.us/sites/g/files/vyhlif6861/f/uploads/zoning_map_-_city_color_scheme_-_30x30_6-29-2017.pdf (accessed April 20, 2023).

and black cherry. Snags are also present on the site. The USFWS IPaC online tool indicates that the NLEB and the monarch butterfly may be present within the site.

- Access: Access to the site would be from Chapel Road via its connection to Waverley Oaks Road (Route 60) as shown on **Figure 4-2**. The approximate site address is 345 Waverley Oaks Road, Waltham, MA 02452.
- Surrounding Land Uses: The former Walter E. Fernald State School property consists of approximately 190 acres with more than 75 abandoned buildings. The Lower Fernald Property site is located within a National Historic Register District associated with the former Walter E. Fernald State School (see **SDEIR Section 12.2.1.2, Alternative 10A Existing Conditions**).[19] Commercial and industrial land uses are located south and east of the Lower Fernald Property site across Waverley Oaks Road. Northeast of the site along Waverley Oaks Road includes a residential neighborhood (see **Figure 4-2**). Land to the southwest of the Lower Fernald Property site consists of open space associated with Lawrence Meadow, which is owned by UMass and zoned conservation/recreation land. Wetland areas associated with Clematis Brook are situated southwest of the site, primarily within Lawrence Meadow.

Community Resources and Open Space within the Study Area

The former Walter E. Fernald State School operated from 1848 to 2014 as the first institution in the U.S. for the treatment and care of people with developmental and intellectual disabilities.[20] Waltham purchased the property in December 2014 after the former publicly funded institution closed in November 2014. The former Walter E. Fernald State School property consists of approximately 190 acres in total and is zoned for conservation and recreation; there is no public access to the property.[21] Approximately 140 acres in the northernmost portion of the parcel were purchased by the City of Waltham using Community Preservation Act (CPA) funds.[22] The portion of former Walter E. Fernald State School property purchased with CPA funds may be protected by Article 97 as it was purchased with the intended use as open space and zoned for open space and recreation.[23, 24] The proposed temporary construction area LOD for the Lower Fernald Property site is not within the portion of lands purchased with CPA funds (i.e., is not protected by Article 97) and is available for redevelopment through a Memorandum of Agreement between the City of Waltham, Massachusetts Historical Commission, and Massachusetts Division of Capital Asset Management and Maintenance.

19 U.S. Department of the Interior, National Park Service, "Walter E. Fernald State School," https://www.nps.gov/places/walter-fernald-state-school.htm (accessed March 28, 2023).

20 City of Waltham, "Walter E Fernald Development Center," https://www.city.waltham.ma.us/walter-e-fernald-developmental-center (accessed May 14, 2023).

21 City of Waltham, Massachusetts, "Zoning District Map of Waltham, Massachusetts," revised June 29, 2017, https://www.city.waltham.ma.us/sites/g/files/vyhlif6861/f/uploads/zoning_map_-_city_color_scheme_-_30x30_6-29-2017.pdf (accessed April 20, 2023).

22 City of Waltham, Massachusetts, "2015-2022 Open Space & Recreation Plan," https://www.city.waltham.ma.us/sites/g/files/vyhlif6861/f/u151/open_space_plan.pdf (accessed May 9, 2023).

23 Community Preservation Coalition, "Acquisition of Surplus Fernald Property," https://www.communitypreservation.org/acquisition-surplus-fernald-property-0

24 Mass Land, "Article 97 by Dedication," March 24, 2018, https://massland.org/sites/default/files/files/MLCC%202018%20Art%2097%20dedication%20CPA%20.pdf.

In 2022, the City of Waltham Recreation Department released design plans for recreational facilities on a portion of the CPA-funded land on the former Walter E. Fernald State School property, north and west of the proposed Lower Fernald Property site. A Notice of Intent (NOI) was filed with the Waltham Conservation Commission for the "Fernald Property Improvement Project – Phase I" on January 4, 2023.[25] Per the NOI, a memorial area, frisbee golf course, golf chipping area, parking, access road, walkways, and drainage improvements are planned within portions of two CPA-funded parcels (Parcel 1 and Parcel 2A-1). The Parcel 1 (104 acres total; acquired with CPA funds) boundary is more than 700 feet north of the Lower Fernald Property site. The Parcel 2A-1 (15 acres total; acquired with CPA funds) boundary is more than 1,100 feet west of the Lower Fernald Property site.[26]

The northern boundary of Lawrence Meadow (see **Figure 4-2**) is approximately 250 feet southwest of the Lower Fernald Property site. As described in **SDEIR Section 4.2.2.1**, Lawrence Meadow is an approximately 31-acre open space area bordering the temporary construction area LOD to the west. It is owned by the Commonwealth of Massachusetts under the care, custody, and control of UMass and zoned by the City of Waltham for conservation and recreation. Lawrence Meadow is not protected by Article 97.

4.2.1.3 Tunnel Alignment Existing Conditions

Use of one of the two new alternative sites considered for the terminus of the proposed North Tunnel, Segment 1, in place of the DEIR Fernald Property site would revise the northernmost portion of the preliminary tunnel alignment described in the DEIR. Use of the UMass Property large connection shaft site in SDEIR Alternatives 3A and 4A, or the Lower Fernald Property receiving shaft site in SDEIR Alternative 10A, would revise the tunnel alignment from the School Street connection shaft site to the northern terminus site. South of the School Street connection shaft site, the preliminary alignment of the North Tunnel, Segment 1, would remain the same as described in the DEIR. South Tunnel, Segment 2, and South Tunnel, Segment 3, would remain the same as previously described in the DEIR.

As described in **SDEIR Chapter 1, Program Description and Permitting**, the depth of the tunnel would range from approximately 200 feet to 400 feet below ground surface. Thus, the tunnel alignment would be below ground and would not disrupt open space or community resources at the surface; however, a subterranean easement would be required for properties that the tunnel alignment passes underneath, including those that are protected by Article 97. Therefore, as described in **DEIR 4.13.4.3, Tunnel Alignments (pg. 4.13-9)**, the analysis of community resources and open space used a Study Area for the tunnel alignments in addition to the Study Area used surrounding the construction area LOD around each Program site.

25 City of Waltham, Massachusetts, Waltham Conservation Commission, Public Notice of the January 2023 Notice of Intent, https://www.city.waltham.ma.us/conservation-commission/files/01-19-2023-noi-190-282-trapelo-road-fernald (accessed May 14, 2023).

26 City of Waltham, Massachusetts, "Capital Improvement Projects: Parks and Facilities," updated March 2023, https://www.city.waltham.ma.us/recreation-department/pages/capital-improvement-projects (accessed May 14, 2023).

The Study Area for the tunnel alignments considered a 1,000-foot-wide corridor centered around the preliminary tunnel alignment (500-foot distance extending from either side of the alignment). The tunnel alignment Study Area was used to identify Article 97 resources that may require a subterranean easement should the tunnel be located directly underneath a given property. Since the proposed tunnel would be up to approximately 12 feet in diameter, the 1,000-foot corridor tunnel alignment Study Area represents a conservative estimate of properties that may require a subterranean easement.

Alternative 3A, North Tunnel Segment 1 Article 97 Existing Resources

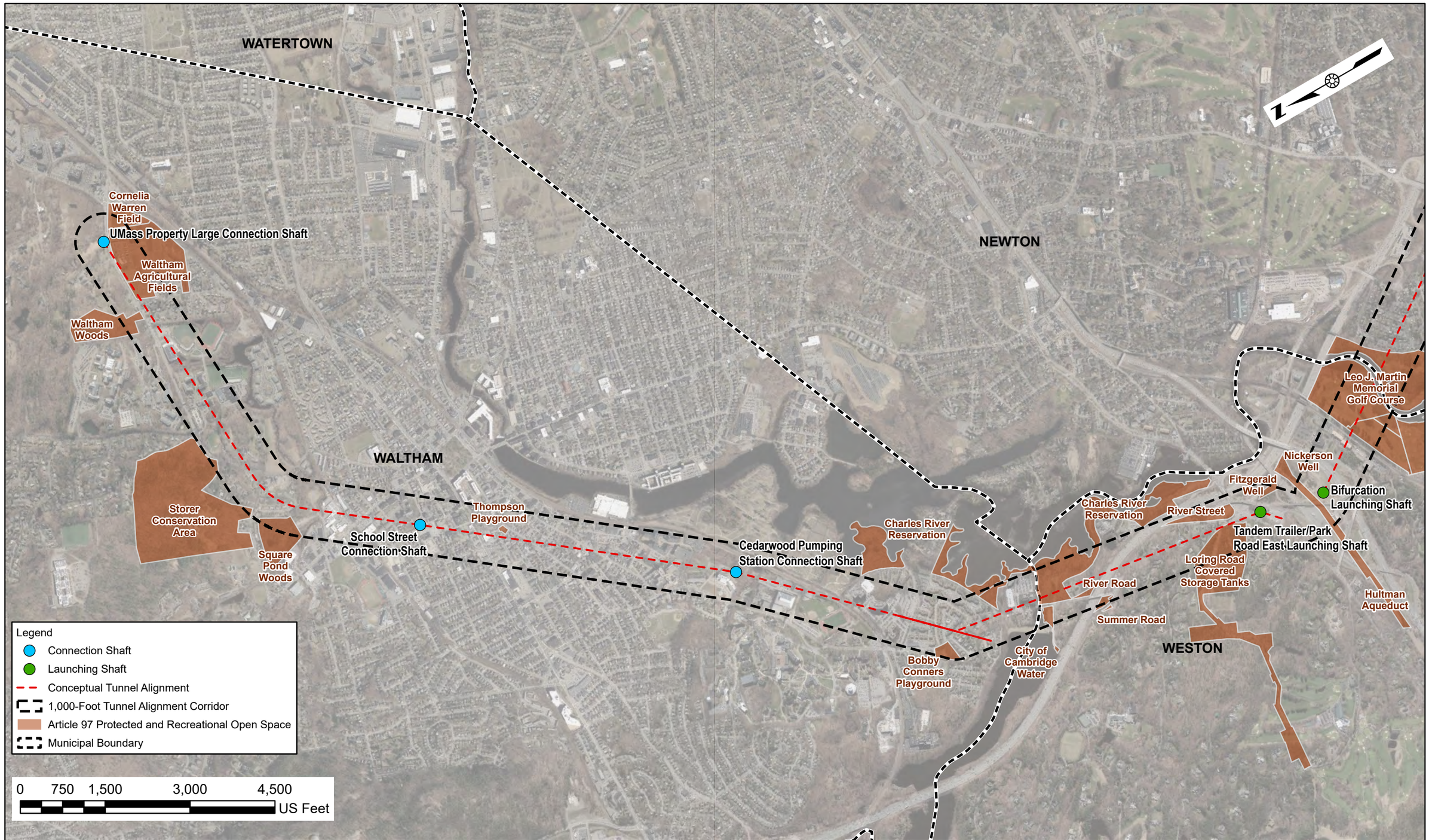
This section describes Article 97 properties that may require subterranean easements for North Tunnel, Segment 1, which would terminate at the UMass Property site in SDEIR Alternative 3A. **Table 4-3** identifies the launching, receiving, and large connection shaft sites for the three tunnel segments in SDEIR Alternative 3A.

Table 4-3 Alternative 3A Tunnel Segments and Launching, Receiving, and Large Connection Shaft Sites

Tunnel Segment	Launching Site	Large Connection Site	Receiving Site
North Tunnel Segment 1	*Tandem Trailer*	UMass Property	N/A
South Tunnel Segment 2	*Bifurcation*	*N/A*	*Highland Avenue Northwest*
South Tunnel Segment 3	*Highland Avenue Northeast*	*N/A*	*American Legion*

Italicized text within the table indicates no change from the DEIR.

The SDEIR Alternative 3A North Tunnel, Segment 1, alignment travels from the Tandem Trailer launching shaft site to the UMass Property large connection shaft site and is located within the Town of Weston and City of Waltham. The Article 97 properties within the North Tunnel, Segment 1, alignment corridor in SDEIR Alternative 3A are summarized from north to south in **Table 4-4** and shown in **Figure 4-3**. The Article 97 properties within the South Tunnel, Segment 2, corridor and the South Tunnel, Segment 3, corridor remain the same as previously assumed in the DEIR.



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Land Alteration and Article 97

Article 97 Properties Within North Tunnel, Segment 1 Alignment Study Area – Alternative 3A

Figure 4-3

Waltham, Weston, Wellesley, Newton
Needham, Brookline, and Boston, MA

Source: VHB, MassGIS

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Table 4-4 Article 97 Properties within 1,000-Foot Corridor of North Tunnel Segment 1 Alignment – Alternatives 3A and 4A

Property Name	City/Town	Property Owner/ Maintainer (if applicable)	Property Use	Property Size (Acres)[1]	Parcels Within 1,000-Foot Alignment Corridor
Cornelia Warren Field	*Waltham*	*City of Waltham*	*Recreation*	*4.7*	1
Waltham Agricultural Fields	*Waltham*	*City of Waltham*	*Agriculture*	*25.4*	1
Waltham Woods	Waltham	City of Waltham	Conservation	11.7	1
Storer Conservation Area	Waltham	City of Waltham	Conservation/ Recreation	72.3	1
Square Pond Woods	Waltham	City of Waltham	Conservation	5.0	1
Thompson Playground (Article 97 status unknown)	*Waltham*	*City of Waltham*	*Recreation*	*0.4*	1
Bobby Connors Playground	*Waltham*	*City of Waltham*	*Recreation*	*2.2*	1
Charles River Reservation I	*Waltham, Weston*	*Commonwealth of Massachusetts/DCR*	*Conservation/ Recreation*	*52.4*	3
City of Cambridge Water (Article 97 status unknown)	*Weston*	*City of Cambridge*	*Water Supply/ Conservation*	*1.6*	1
River Road	*Weston*	*Town of Weston*	*Conservation*	*0.7*	1
Summer Road	*Weston*	*Town of Weston*	*Conservation*	*0.8*	1
River Street	*Weston*	*Commonwealth of Massachusetts/DCR*	*Conservation*	*1.9*	1
Loring Road Covered Tanks	*Weston*	*Commonwealth of Massachusetts/MWRA*	*Water Supply/ Recreation*	*38.5*	1
Fitzgerald Well	*Weston*	*Town of Weston*	*Water Supply (abandoned)*	*0.9*	1
Hultman Aqueduct	*Weston*	*Commonwealth of Massachusetts/MWRA*	*Water Supply*	*10.9*	2

1 Total size of the Article 97 property. The specific acreage within the Study Area has not been determined.

"Article 97 status unknown" indicates the Article 97 status of the property was listed as unknown by MassGIS and deed research. As design progresses, the properties listed unknown along the alignment will be confirmed through coordination with the appropriate agencies and municipalities.

Italicized text within the table indicates no change from the DEIR.

The revised northern terminus of the North Tunnel, Segment 1, at the UMass Property site in Alternative 3A in place of the DEIR Fernald Property site would result in three additional properties protected under Article 97 that may require a subterranean easement.

These three properties include:

- Waltham Woods: A 12-acre property owned by the City of Waltham and used for conservation.[27]
- Storer Conservation Area: A 72-acre conservation and recreation property owned by the City of Waltham, that contains walking trails and parking facilities.[28]
- Square Pond Woods: A 5-acre conservation area owned by the City of Waltham. It has no public access.

All other Article 97 properties that may require a subterranean easement for Alternative 3A North Tunnel, Segment 1, remain the same as discussed in **DEIR Section 4.9.5.1, Alternative 3 (pg. 4.9-58)** (refer to the italicized text in **Table 4-4**).

Alternative 4A North Tunnel Segment 1 Article 97 Existing Resources

This section describes Article 97 properties that may require subterranean easements for North Tunnel, Segment 1, in Alternative 4A, which would terminate at the UMass Property site. **Table 4-5** identifies the launching, receiving, and large connection shaft sites for the three tunnel segments in Alternative 4A.

Table 4-5 Alternative 4A Tunnel Segments and Launching, Receiving, and Large Connection Shaft Sites

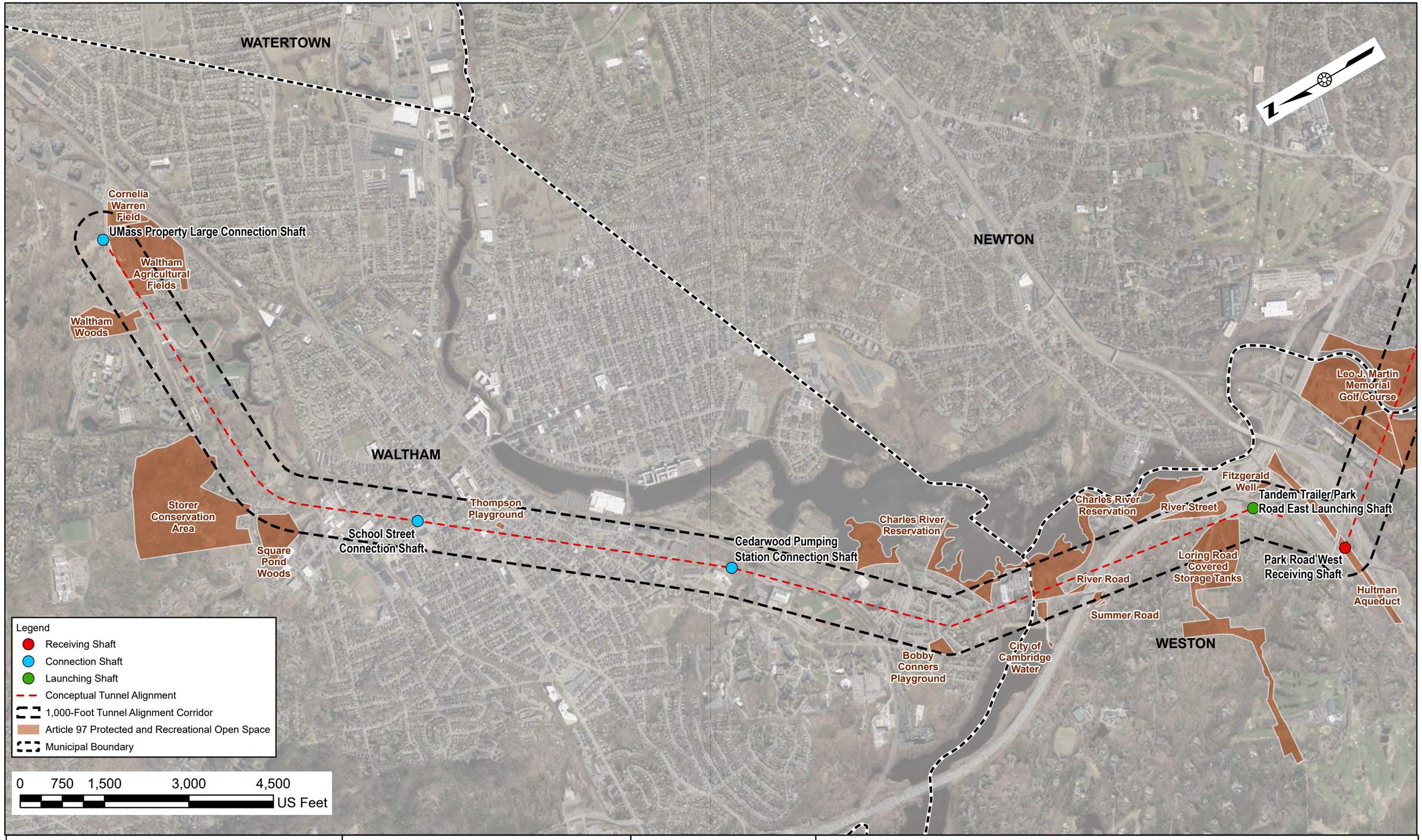
Tunnel Segment	Launching Site	Large Connection Site	Receiving Site
North Tunnel Segment 1	*Tandem Trailer*	UMass Property	N/A
South Tunnel Segment 2	*Highland Avenue Northwest*	*N/A*	*Park Road West*
South Tunnel Segment 3	*Highland Avenue Northeast*	*N/A*	*American Legion*

Italicized text within the table indicates no change from the DEIR.

As in Alternative 3A, the Alternative 4A North Tunnel, Segment 1, alignment would travel from the Tandem Trailer launching shaft site to the UMass Property large connection shaft site (see **Figure 4-4**). The Article 97 properties within the preliminary North Tunnel, Segment 1, alignment corridor in Alternative 4A are the same as in Alternative 3A (refer to **Table 4-4**). The Article 97 properties within the South Tunnel, Segment 2, corridor and the South Tunnel, Segment 3, corridor would remain the same as previously assumed in the DEIR. The revised northern terminus of the North Tunnel, Segment 1, at the UMass Property site in Alternative 4A in place of the DEIR Fernald Property site would result in three additional properties protected under Article 97 that may require a subterranean easement: Waltham Woods, Storer Conservation Area, and Square Pond Woods.

27 City of Waltham, Massachusetts, "2015-2022 Open Space & Recreation Plan," https://www.city.waltham.ma.us/sites/g/files/vyhlif6861/f/u151/open_space_plan.pdf (accessed May 9, 2023).

28 City of Waltham, Massachusetts, "2015-2022 Open Space & Recreation Plan," https://www.city.waltham.ma.us/sites/g/files/vyhlif6861/f/u151/open_space_plan.pdf (accessed May 9, 2023).



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Land Alteration and Article 97

Article 97 Properties Within North Tunnel, Segment 1 Alignment Study Area – Alternative 4A

Figure 4-4

Waltham, Weston, Wellesley, Newton
Needham, Brookline, and Boston, MA

Source: VHB, MassGIS

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Alternative 10A North Tunnel Segment 1 Article 97 Existing Resources

This section describes Article 97 properties that may require subterranean easements for North Tunnel, Segment 1, in the tunnel alignment Study Area for SDEIR Alternative 10A. **Table 4-6** identifies the launching, receiving, and large connection shaft sites for the tunnel segments in SDEIR Alternative 10A.

Table 4-6 Alternative 10A Tunnel Segments and Launching, Receiving, and Large Connection Shaft Sites

Tunnel Segment	Launching Site	Large Connection Site	Receiving Site
North Tunnel Segment 1 and South Tunnel Segment 2	*Highland Avenue Northwest*	*Park Road West*	Lower Fernald Property
South Tunnel Segment 3	*Highland Avenue Northeast*	*N/A*	*American Legion*

Italicized text within the table indicates no change from the DEIR.

SDEIR Alternative 10A combines North Tunnel, Segment 1, and South Tunnel, Segment 2, into one tunnel. As previously assumed in the DEIR, South Tunnel, Segment 2, would launch at the Highland Avenue Northwest site with a large connection at the Park Road West site. North Tunnel, Segment 1, proceeds from Park Road West site to the Lower Fernald Property receiving shaft site. From the proposed receiving shaft site at the Lower Fernald Property site to the Highland Avenue Northwest launching shaft site (with a large connection shaft at the Park Road West site), the SDEIR Alternative 10A North Tunnel, Segment 1, alignment is located within the Town of Weston and City of Waltham. The Article 97 properties within the preliminary North Tunnel, Segment 1, alignment corridor in SDEIR Alternative 10A are summarized from north to south in **Table 4-7** and are shown in **Figure 4-5**. The Article 97 properties within the South Tunnel, Segment 2, corridor and the South Tunnel, Segment 3, corridor would remain the same as assumed in the DEIR.

Table 4-7 Article 97 Properties within 1,000-Foot Corridor of North Tunnel, Segment 1, Alignment – Alternative 10A

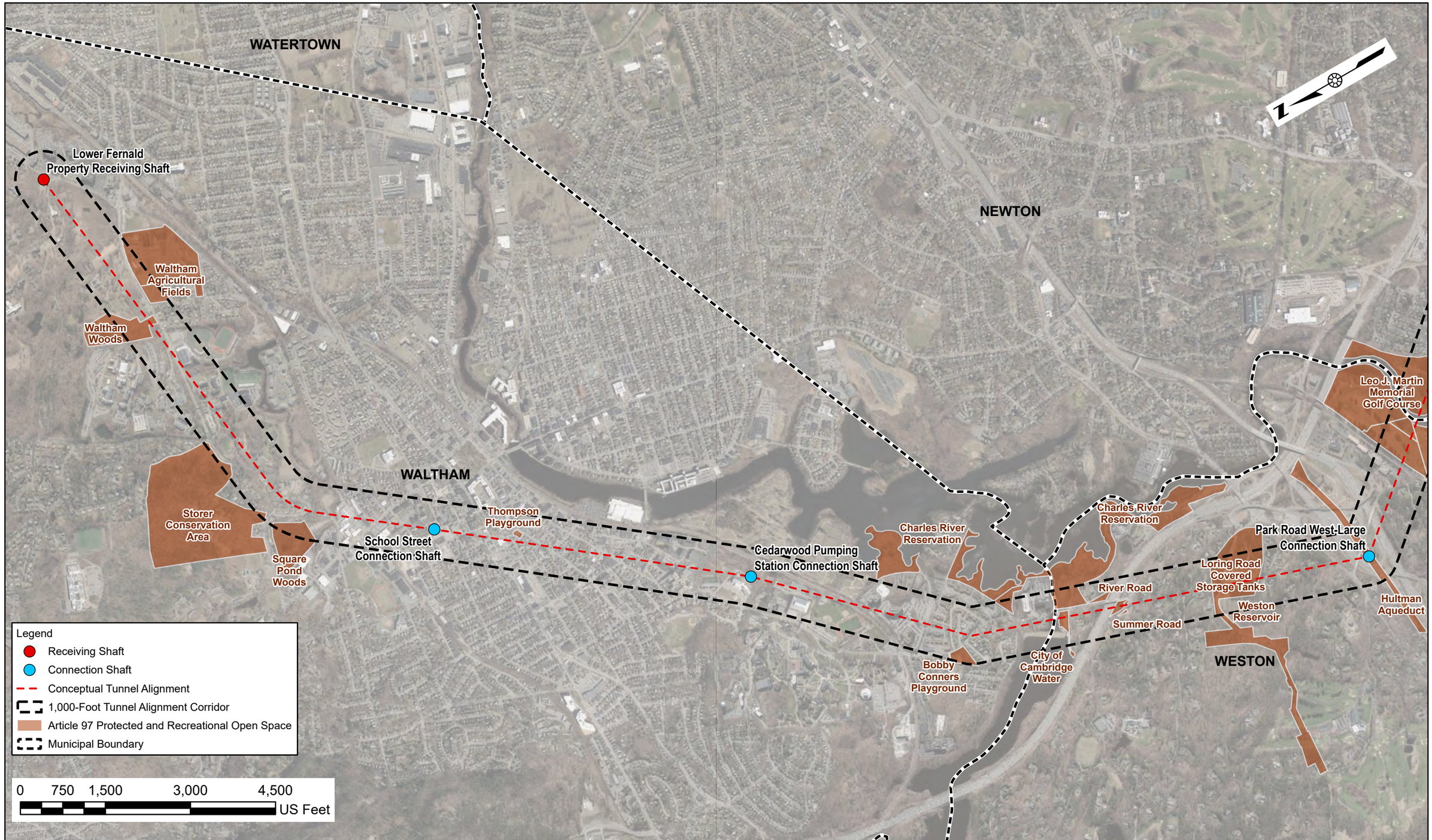
Property Name	City/ Town	Property Owner/ Maintainer (if applicable)	Property Use	Property Size (Acres) [1]	Parcels Within 1,000-Foot Alignment Corridor
Waltham Agricultural Fields	*Waltham*	*City of Waltham*	*Agriculture*	*25.4*	1
Waltham Woods	Waltham	City of Waltham	Conservation	11.7	1
Storer Conservation Area	Waltham	City of Waltham	Conservation/ Recreation	72.3	1
Square Pond Woods	Waltham	City of Waltham	Conservation	5.0	1
Thompson Playground (Article 97 status unknown)	*Waltham*	*City of Waltham*	*Recreation*	*0.4*	1
Bobby Connors Playground	*Waltham*	*City of Waltham*	*Recreation*	*2.2*	1
Charles River Reservation	*Waltham, Weston*	*Commonwealth of Massachusetts/DCR*	*Conservation/ Recreation*	*33.4*	1
City of Cambridge Water (Article 97 status unknown)	*Weston*	*City of Cambridge*	*Water Supply/ Conservation*	*1.7*	1
River Road	*Weston*	*Town of Weston*	*Conservation*	*0.7*	1
Summer Road	*Weston*	*Town of Weston*	*Conservation*	*1.1*	2
Loring Road Covered Storage Tanks	*Weston*	*Commonwealth of Massachusetts/MWRA*	*Water Supply/ Recreation*	*46.5*	3
Charles River Reservation I	*Newton, Wellesley*	*Commonwealth of Massachusetts/DCR*	*Recreation/ Conservation*	*77.7*	7
Hultman Aqueduct	*Weston*	*Commonwealth of Massachusetts/MWRA*	*Water Supply*	*10.9*	2

1 Total size of the Article 97 property. The specific acreage within the Study Area has not been determined.

"Article 97 status unknown" indicates the Article 97 status of the property was listed as unknown by MassGIS and deed research. As design progresses, the properties listed unknown along the alignment will be confirmed through coordination with the appropriate agencies and municipalities.

Italicized text within the table indicates no change from the DEIR.

The revised northern terminus of the North Tunnel, Segment 1, at the Lower Fernald Property site in SDEIR Alternative 10A in place of the DEIR Fernald Property site would result in three additional properties protected under Article 97 that may require a subterranean easement. These three properties are shown in the non-italicized text in **Table 4-7** and are the same as described for SDEIR Alternatives 3A and 4A (Waltham Woods, Storer Conservation Area, and Square Pond Woods). With the revised terminus, Cornelia Warren Field would no longer be located within the tunnel alignment Study Area in SDEIR Alternative 10A.



Metropolitan Water Tunnel Program

MWRA Contract No. 7159
Supplemental Draft Environmental Impact Report 2023

CDM Smith in association with vhb
Jacobs GREEN INTERNATIONAL AFFILIATES, INC.

Land Alteration and Article 97

Article 97 Properties Within North Tunnel, Segment 1 Alignment Study Area – Alternative 10A

Figure 4-5

Waltham, Weston, Wellesley, Newton
Needham, Brookline, and Boston, MA

Source: VHB, MassGIS

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4.2.2 Land Alteration and Article 97 Construction Period Impacts

As described in **DEIR Section 4.9.5, Construction Period Impacts (4.9-57)** and **Section 4.13.5, Construction Period Impacts (pg. 4.13-84)**, construction-period impacts would be associated with the physical construction of the deep-rock tunnels and would primarily take place underground with limited disruption to land uses in the surface above. Above-ground construction-related impacts would primarily be associated with the shaft site locations where lined shafts would connect the deep-rock tunnel to the surface and/or water distribution infrastructure, and where the associated ground-level construction staging areas would be located. Construction activities would be contained within the designated temporary construction area LOD for each site to minimize the area of potential disruptions at the surface.

The total tunnel shaft site above-ground construction temporary LOD would encompass approximately 32 to 42 acres of land, depending on SDEIR alternative. Depending on the site type and function, construction-related activities within the LOD would include:

- Tunnel excavation
- On-site access
- Temporary staging of construction equipment and supplies such as cranes, tunnel boring machines (TBMs), pumps, generators, ventilation and electrical equipment, and batch plants
- Truck and vehicle parking and trailer storage
- A collection area for temporarily storing and managing the excavated materials removed from the tunnel before it is hauled off-site via truck haul routes to the nearest highway
- Temporary water treatment systems to treat water before it is discharged

The proposed construction staging areas are generally located within previously disturbed, vacant land. This includes existing state-owned and municipality-owned land. No private lands are anticipated to be used for construction of the Program sites. The affected state-owned land consists of lands under care, custody, and control of the MWRA, DCR, Department of Youth Services (DYS), UMass, and MassDOT, including MassDOT right-of-way (ROW) land associated with I-90, I-95, Park Road, and Highland Avenue.

Temporary easements are anticipated to be required to accommodate the construction of tunnel shaft sites, isolation valve sites, connecting pipelines, and associated infrastructure, and the areas for staging construction materials and equipment on properties not under care, custody, and control of MWRA or where an existing MWRA easement does not exist. Coordination would take place prior to construction to develop agreements to temporarily use these properties during construction. Use of these areas is not anticipated to have an adverse effect on land use as these areas are primarily vacant, are located on state- or municipality-owned land, and the proposed use would be temporary. See **Table 4-1** for a summary comparison of the estimated change in impervious area, number of sites, and anticipated permanent easements or acquisition required for SDEIR Alternatives 3A, 4A, and 10A.

Table 4-8 summarizes the differences among SDEIR Alternatives 3A, 4A, and 10A in terms of tunnel Program sites and identifies which sites are located on protected open space or recreational land and/or lands held for natural resources purposes in accordance with Article 97.

Table 4-8 Land Use – Summary Comparison – Alternatives 3A, 4A, and 10A

Site	City/ Town	Property Owner	LOD on Article 97 Resource?	Alternative		
				3A	4A	10A
UMass Property	Waltham	Commonwealth of Massachusetts under care, custody, control of University of Massachusetts	No	Large Connection	Large Connection	n/a
Lower Fernald Property	Waltham	Waltham	No	n/a	n/a	Receiving
School Street	*Waltham*	*Commonwealth of Massachusetts under care, custody, control of MWRA*	*No*	*Connection*	*Connection*	*Connection*
Cedarwood Pumping Station	*Waltham*	*Waltham*	*No*	*Connection*	*Connection*	*Connection*
Tandem Trailer/ Park Road East	*Weston*	*Commonwealth of Massachusetts under care, custody, control of MassDOT; MWRA has care, custody, control of area associated with Hultman Aqueduct (Article 97)*	*Yes (MWRA Hultman Aqueduct [Park Road East])*	*Launching/ Large Connection*	*Launching/ Large Connection*	*n/a*
Bifurcation	*Weston*	*Weston and Commonwealth of Massachusetts under care, custody, control of MassDOT; MWRA has care, custody, control of Hultman Aqueduct area (Article 97)*	*Yes (MWRA Hultman Aqueduct)*	*Launching*	*n/a*	*n/a*
Park Road West	*Weston*	*Commonwealth of Massachusetts under care, custody, control of MassDOT; MWRA has care, custody, control of area associated with Hultman Aqueduct (Article 97)*	*Yes (MWRA Hultman Aqueduct)*	*n/a*	*Receiving*	Large Connection
Hultman Aqueduct Isolation Valve	*Weston*	*Commonwealth of Massachusetts under care, custody, control of MassDOT; MWRA has care, custody, control of area associated with Hultman Aqueduct (Article 97)*	*Yes (MWRA Hultman Aqueduct)*	*Isolation Valve*	*Isolation Valve*	*Isolation Valve*
Hegarty Pumping Station	*Wellesley*	*Wellesley*	*TBD (Ouellet Park)*	*Connection*	*Connection*	*Connection*
St. Mary Street Pumping Station	*Needham*	*Needham and Commonwealth of Massachusetts under care, custody, control of MWRA and DCR*	*Yes (MWRA Sudbury Aqueduct)*	*Connection*	*Connection*	*Connection*
Highland Avenue NW	*Needham*	*Needham and Commonwealth of Massachusetts under care, custody, control of MassDOT*	*No*	Receiving	*n/a*	*n/a*
Highland Avenue NW/SW	*Needham*	*Needham and Commonwealth of Massachusetts under care, custody, control of MassDOT*	*No*	*n/a*	*Launching*	*Launching*

Table 4-8 Land Use – Summary Comparison – Alternatives 3A, 4A, and 10A

Site	City/ Town	Property Owner	LOD on Article 97 Resource?	Alternative		
				3A	4A	10A
Highland Avenue NE/SE	*Needham*	*Needham and Commonwealth of Massachusetts under care, custody, control of MassDOT*	*No*	*Launching*	*Launching*	*Launching*
Newton Street Pumping Station	*Brookline*	*Commonwealth of Massachusetts under care, custody, control of MWRA*	*No*	*Connection*	*Connection*	*Connection*
Southern Spine Mains	*Boston*	*Commonwealth of Massachusetts under care, custody, control of DCR*	*Yes [1] (SW Corridor Park/ Arborway I)*	*Connection*	*Connection*	*Connection*
American Legion	*Boston*	*Commonwealth of Massachusetts under care, custody, control of DCR and DYS*	*Yes [1] (Morton Street Property)*	Receiving	Receiving	Receiving
		Total Program Sites:		**13**	**13**	**12**

1 Site located on lands held for natural resources purposes in accordance with Article 97.
NW: Northwest; NE: Northeast; SW: Southwest; SE: Southeast
Italicized text within the table indicates no change from the DEIR.

4.2.2.1 Alternative 3A/Alternative 4A Construction Period Impacts

This section discusses potential construction period impacts to land use, community resources, open space, and Article 97 at the UMass Property site in place of the DEIR Fernald Property site. The construction period impacts at all other Program sites are the same as previously described in **DEIR Section 4.9.5, Construction Period Impacts (4.9-57)** and **Section 4.13.5, Construction Period Impacts (pg. 4.13-84)**.

SDEIR Alternatives 3A and 4A would each require three launching shaft sites, two receiving shaft sites, one large connection shaft site, six connection shaft sites, and one isolation valve site. All sites are located on state- or municipality-owned land. SDEIR Alternatives 3A and 4A would use land owned by Waltham, Wellesley, Needham, and the Commonwealth of Massachusetts under care, custody, and control of the MWRA, MassDOT, UMass, DCR, and DYS. It is anticipated that nine different sites would require above-ground permanent easements or land acquisition in SDEIR Alternative 3A or 4A (not including below-ground easements for the tunnel alignment or easements along proposed near-surface pipelines).

As shown in **Table 4-9**, the temporary construction area LOD in SDEIR Alternative 3A is estimated to encompass approximately 42 acres. SDEIR Alternative 3A would result in approximately 3 acres of new impervious area compared to existing conditions and is anticipated to require approximately 8 acres of permanent easements or land acquisition for the areas supporting the shafts and valve chambers.

As shown in **Table 4-10**, the temporary construction area LOD in SDEIR Alternative 4A is estimated to encompass approximately 36 acres. SDEIR Alternative 4A would result in approximately 2 acres of new impervious area compared to existing conditions and is anticipated to require approximately 8 acres of permanent easements or land acquisition for the areas supporting the shafts and valve chambers.

UMass Property

As shown on **Figure 4-1** and as described in **SDEIR Section 4.2.2.1**, the temporary construction area LOD for the UMass Property site is anticipated to be approximately 0.9 acres total. It would include an approximately 0.5-acre area to support construction of the below-ground large connection shaft and above-ground valve chamber, and approximately 0.4 acres along the north side of Beaver Street to accommodate construction of the connecting near-surface pipeline to existing WASM3 at Waverley Oaks Road. A temporary discharge pipe would be constructed northwest of the Beaver Street and Waverley Oaks Road intersection to discharge treated groundwater to the adjacent wetland (see **Figure 4-1**). Areas temporarily disturbed during construction would be restored to preconstruction conditions in coordination with UMass.

Construction is not anticipated to impact the existing use of Lawrence Meadow, as it is used for conservation and has limited public access. The existing use of the Cornelia Warren Field, Waltham Agricultural Fields, and Cedar Hill Girl Scout Camp would not be impeded by the Program.

Table 4-9 Estimated Land Alteration and Impervious Area in Alternative 3A

Proposed Program Site	City/ Town	Property Owner(s)	Estimated Construction Limits of Disturbance [1]	Estimated Change in Impervious Area [1]	Estimated Permanent Easement/Acquisition Area for Shaft and Valve Chamber [2]	Notes
Segment 1, North Tunnel						
UMass Property (Large Connection)	Waltham	Commonwealth of Massachusetts under care, custody, control of UMass	0.9 acres	0.1 acres	0.3 acres	Construction area LOD includes connection to MWRA distribution line; requires acquisition from UMass
School Street (Connection)	*Waltham*	*Commonwealth of Massachusetts under care, custody, control of MWRA*	*0.6 acres*	*0.0 acres*	*n/a (not required)*	*Construction area LOD includes connection to MWRA distribution line*
Cedarwood Pumping Station (Connection)	*Waltham*	*Waltham*	*0.7 acres*	*0.1 acres*	*0.1 acres*	*Requires acquisition from Waltham*
Hultman Aqueduct Isolation Valve	*Weston*	*Commonwealth of Massachusetts under care, custody, control of MassDOT; existing MWRA easement*	*0.3 acres*	*0.1 acres*	*n/a (not required)*	*Within an existing MWRA easement*
Tandem Trailer (Launching) [paired with Park Road East]	*Weston*	*Commonwealth of Massachusetts under care, custody, control of MassDOT*	*4.0 acres*	*0.0 acres*	*0.2 acres*	*Requires permanent easement*
Park Road East (Large Connection)	*Weston*	*Commonwealth of Massachusetts under care, custody, control of MassDOT; MWRA has care, custody, control of area associated with Hultman Aqueduct (Article 97)*	*1.5 acres*	*0.2 acres*	*0.9 acres*	*Requires permanent easement*
Segment 1, North Tunnel, Total: [3]			**8.0 acres**	***0.5 acres***	**1.5 acres**	

Table 4-9 Estimated Land Alteration and Impervious Area in Alternative 3A

Proposed Program Site	City/ Town	Property Owner(s)	Estimated Construction Limits of Disturbance [1]	Estimated Change in Impervious Area [1]	Estimated Permanent Easement/Acquisition Area for Shaft and Valve Chamber [2]	Notes
Segment 2, South Tunnel						
Bifurcation (Launching)	*Weston*	*Weston and Commonwealth of Massachusetts under care, custody, control of MassDOT; MWRA has care, custody, control of area associated with Hultman Aqueduct (Article 97)*	*12.2 acres*	*0.7 acres*	*1.5 acres*	*Requires additional permanent easement for area within I-90/I-95 interchange; dewatering pipe in existing MWRA easement*
Hegarty Pumping Station (Connection)	*Wellesley*	*Wellesley*	*0.3 acres*	*0.1 acres*	*0.1 acres*	*Requires acquisition of 0.1 acres of Ouellet Park (Article 97 (TBD))*
St. Mary Street Pumping Station (Connection)	*Needham*	*Needham and Commonwealth of Massachusetts under care, custody, control of MWRA and DCR*	*0.6 acres*	*0.1 acres*	*n/a (not required)*	
Highland Ave. Northwest (Receiving)	*Needham*	*Needham and Commonwealth of Massachusetts under care, custody, control of MassDOT*	*5.6 acres*	*0.0 acres*	*n/a (not required)*	*LOD includes dewatering discharge pipeline northeast to Charles River*
Segment 2, South Tunnel, Total: [3]			***18.7 acres***	***0.8 acres***	***1.6 acres***	

Table 4-9 Estimated Land Alteration and Impervious Area in Alternative 3A

Proposed Program Site	City/ Town	Property Owner(s)	Estimated Construction Limits of Disturbance [1]	Estimated Change in Impervious Area [1]	Estimated Permanent Easement/Acquisition Area for Shaft and Valve Chamber [2]	Notes
Segment 3, South Tunnel						
Highland Ave. Northeast/ Southeast (Launching)	*Needham*	*Needham and Commonwealth of Massachusetts under care, custody, control of MassDOT*	*9.5 acres (4.8 northeast; 4.7 southeast)*	*0.7 acres*	*1.5 acres*	*LOD includes dewatering discharge pipeline northeast to Charles River*
Newton Street Pumping Station (Connection)	*Brookline*	*Commonwealth of Massachusetts under care, custody, control of MWRA*	*0.3 acres*	*0.1 acres*	*n/a (not required)*	
Southern Spine Mains (Connection)	*Boston*	*Commonwealth of Massachusetts under care, custody, control of DCR*	*0.5 acres*	*0.1 acres*	*0.2 acres*	*Requires acquisition of 0.2 acres of Southwest Corridor Park/Arborway I (Article 97)*
American Legion (Receiving)	*Boston*	*Commonwealth of Massachusetts under care, custody, control of DCR and DYS*	*5.4 acres*	*0.5 acres*	*3.5 acres*	*Requires acquisition for the shaft and valve (1.5 acres), including portions of Morton Street Property (Article 97); includes permanent easement (2.0 acres) for pipeline connection*
Segment 3, South Tunnel Total: [3]			***15.8 acres***	***1.4 acres***	***5.3 acres***	
GRAND TOTAL: [3]			**42.4 ACRES**	***2.7 ACRES***	**8.4 ACRES**	

1 The site areas (acreages) are conservatively estimated based on the October 2022 concept site plans (UMass Property site acres are based on March 2023 concept site plans). The size of the temporary construction LOD boundary was established to accommodate proposed construction-related activities, including tunnel excavation, excavation laydown areas, on-site access, surface pipelines, temporary staging of construction equipment and supplies (such as cranes, TBM, pumps, generators, ventilation and electrical equipment, and batch plants), truck and vehicle parking, trailer storage, a collection area for temporarily managing excavation materials, temporary water treatment areas, dewatering discharge, and related activities.

2 The permanent easement/acquisition areas (acreages) include the area surrounding the proposed shaft and valve chamber and near-surface pipeline connections, where applicable. Subterranean easements along the tunnel alignment and easements along proposed pipelines are not included. The acreages are conservatively estimated based on the area required to accommodate permanent above-ground infrastructure in the post-construction condition. For example, and dependent on the function of a proposed site, this may include valve chambers, fencing, signage, top of shaft structures, and access road pavement.

3 Totals may not add due to rounding.

Italicized text within the table indicates no change from the DEIR.

Table 4-10 Estimated Land Alteration and Impervious Area in Alternative 4A

Proposed Program Site	City/ Town	Property Owner(s)	Estimated Construction Limits of Disturbance [1]	Estimated Change in Impervious Area [1]	Estimated Permanent Easement/Acquisition Area for Shaft and Valve Chamber [2]	Notes
Segment 1, North Tunnel						
UMass Property (Large Connection)	Waltham	Commonwealth of Massachusetts under care, custody, control of UMass	0.9 acres	0.1 acres	0.3 acres	Construction area LOD includes connection to MWRA distribution line; requires acquisition from UMass
School Street (Connection)	*Waltham*	*Commonwealth of Massachusetts under care, custody, control of MWRA*	*0.6 acres*	*0.0 acres*	*n/a (not required)*	*Construction area LOD includes connection to MWRA distribution line*
Cedarwood Pumping Station (Connection)	*Waltham*	*Waltham*	*0.7 acres*	*0.1 acres*	*0.1 acres*	*Requires acquisition from Waltham*
Hultman Aqueduct Isolation Valve	*Weston*	*Commonwealth of Massachusetts under care, custody, control of MassDOT; existing MWRA easement*	*0.3 acres*	*0.1 acres*	*n/a (not required)*	*Within an existing MWRA easement*
Tandem Trailer (Launching) [paired with Park Road East]	*Weston*	*Commonwealth of Massachusetts under care, custody, control of MassDOT*	*4.0 acres*	*0.0 acres*	*0.2 acres*	*Requires a permanent easement; requires easement for pipeline*
Park Road East (Large Connection)	*Weston*	*Commonwealth of Massachusetts under care, custody, control of MassDOT; MWRA has care, custody, control of area associated with Hultman Aqueduct (Article 97)*	*1.5 acres*	*0.2 acres*	*0.9 acres*	*Requires permanent easement*
Segment 1, North Tunnel, Total: [3]			**8.0 acres**	***0.5 acres***	**1.5 acres**	

Table 4-10 Estimated Land Alteration and Impervious Area in Alternative 4A

Proposed Program Site	City/ Town	Property Owner(s)	Estimated Construction Limits of Disturbance [1]	Estimated Change in Impervious Area [1]	Estimated Permanent Easement/Acquisition Area for Shaft and Valve Chamber [2]	Notes
Segment 2, South Tunnel						
Highland Ave. Northwest/ Southwest (Launching)	*Needham*	*Needham and Commonwealth of Massachusetts under care, custody, control of MassDOT*	*8.7 acres (5.6 northwest; 3.1 southwest)*	*0.0 acres*	*n/a (not required)*	*LOD includes dewatering discharge pipeline northeast to Charles River*
St. Mary Street Pumping Station (Connection)	*Needham*	*Needham and Commonwealth of Massachusetts under care, custody, control of MWRA and DCR*	*0.6 acres*	*0.1 acres*	*n/a (not required)*	
Hegarty Pumping Station (Connection)	*Wellesley*	*Wellesley*	*0.3 acres*	*0.1 acres*	*0.1 acres*	*Requires acquisition of 0.1 acres of Ouellet Park (Article 97 (TBD))*
Park Road West (Receiving)	*Weston*	*Commonwealth of Massachusetts under care, custody, control of MassDOT; MWRA has care, custody, control of area associated with Hultman Aqueduct (Article 97)*	*2.7 acres*	*0.4 acres*	*1.1 acres*	*Requires a permanent easement.*
Segment 2, South Tunnel, Total: [3]			***12.3 acres***	***0.6 acres***	***1.2 acres***	

Table 4-10 Estimated Land Alteration and Impervious Area in Alternative 4A

Proposed Program Site	City/ Town	Property Owner(s)	Estimated Construction Limits of Disturbance [1]	Estimated Change in Impervious Area [1]	Estimated Permanent Easement/Acquisition Area for Shaft and Valve Chamber [2]	Notes
South Tunnel, Segment 3						
Highland Ave. Northeast/Southeast (Launching)	*Needham*	*Needham and Commonwealth of Massachusetts under care, custody, control of MassDOT*	*9.5 acres (4.8 Northeast; 4.7 Southeast)*	*0.7 acres*	*1.5 acres*	*Requires permanent easement; LOD includes dewatering discharge pipeline northeast to Charles River*
Newton Street Pumping Station (Connection)	*Brookline*	*Commonwealth of Massachusetts under care, custody, control of MWRA*	*0.3 acres*	*0.1 acres*	*n/a (not required)*	
Southern Spine Mains (Connection)	*Boston*	*Commonwealth of Massachusetts under care, custody, control of DCR*	*0.5 acres*	*0.1 acres*	*0.2 acres*	*Requires acquisition of 0.2 acres of Southwest Corridor Park/Arborway I (Article 97)*
American Legion (Receiving)	*Boston*	*Commonwealth of Massachusetts under care, custody, control of DCR and DYS*	*5.4 acres*	*0.5 acres*	*3.5 acres*	*Requires acquisition for the shaft and valve (1.5 acres), including portions of the Morton Street Property (Article 97); includes permanent easement (2.0 acres) for near-surface pipeline connection*
South Tunnel, Segment 3, Total [3]			***15.8 acres***	***1.4 acres***	***5.3 acres***	
GRAND TOTAL: [3]			**36.1 ACRES**	***2.4 ACRES***	**8.0 ACRES**	

1 The site areas (acreages) are conservatively estimated based on October 2022 concept site plans (UMass Property site areas are based on March 2023 concept site plans). The size of the temporary construction LOD boundary was established to accommodate proposed construction-related activities, including tunnel excavation, excavation laydown areas, on-site access, near-surface pipelines, temporary staging of construction equipment and supplies (such as cranes, TBM, pumps, generators, ventilation and electrical equipment, and batch plants), truck and vehicle parking, trailer storage, a collection area for temporarily managing excavation materials, temporary water treatment areas, dewatering discharge, and related activities.

2 The permanent easement/acquisition areas (acreages) include the area surrounding the proposed shaft and valve chamber and near-surface pipeline connections, where applicable. Subterranean easements along the tunnel alignment and easements along proposed pipelines are not included. The acreages are conservatively estimated based on the area required to accommodate permanent above-ground infrastructure and associated access in the post-construction condition. For example, and dependent on the function of a proposed site, this may include valve chambers, fencing, signage, top of shaft structures, and access road pavement.

3 Totals may not add due to rounding.

Italicized text within the table indicates no change from the DEIR.

4.2.2.2 Alternative 10A Construction Period Impacts

This section discusses potential construction period impacts to land use, community resources, open space, and Article 97 at the Lower Fernald Property site in place of the DEIR Fernald Property site. The construction period impacts at all other Program sites are the same as previously described in **DEIR Section 4.9.5, Construction Period Impacts (4.9-57)** and **Section 4.13.5, Construction Period Impacts (pg. 4.13-84).**

All sites are located on state- or municipality-owned land. Alternative 10A would use land owned by Waltham, Wellesley, Needham, and the Commonwealth of Massachusetts under the care, custody, and control of the MWRA, MassDOT, DCR, and DYS. As shown in **Table 4-11**, the temporary construction LOD in SDEIR Alternative 10A is estimated to encompass approximately 32 acres. SDEIR Alternative 10A would result in approximately 2 acres of new impervious area compared to existing conditions and is anticipated to require approximately 8 acres of permanent easements or land acquisition for the areas supporting the shafts and valve chambers. Of the sites considered in SDEIR Alternative 10A, it is anticipated that seven different sites would require above-ground permanent easements or land acquisition (not including below-ground easements for the tunnel alignment or easements along proposed pipelines).

Lower Fernald Property

As shown on **Figure 4-2** and as described in **SDEIR Section 4.2.2.2**, the temporary construction area LOD for the Lower Fernald Property site is approximately 2.3 acres and would include the area surrounding the Chapel Road and Waverley Oaks Road intersection. Temporary construction facilities at this site are anticipated to include staging and parking areas, trailers, and an excavated material storage area. The LOD would include an area southeast of the shaft area to accommodate a buried steel near-surface pipeline traveling approximately 100 feet to Waverley Oaks Road to connect to the existing WASM3. An area for a temporary groundwater discharge pipe south of Chapel Road is also included (see **Figure 4-2**). Areas temporarily disturbed during construction would be restored to preconstruction conditions in coordination with Waltham.

Construction is not anticipated to impact the existing use of the former Walter E. Fernald State School property, as it is used for conservation and has no public access. As described in **SDEIR Section 4.2.2.2**, use of the Lower Fernald Property site is not anticipated to interfere with the published design plans released by the City of Waltham Recreation Department for future recreational facilities on the former Walter E. Fernald State School property. The design plans indicate that the nearest planned recreational development would be located more than 700 feet north of the Lower Fernald Property site.[29, 30]

29 City of Waltham, Massachusetts, "Capital Improvement Projects: Parks and Facilities," updated March 2023, https://www.city.waltham.ma.us/recreation-department/pages/capital-improvement-projects (accessed May 14, 2023).

30 City of Waltham, Massachusetts, Waltham Conservation Commission, Public Notice of the January 2023 Notice of Intent, https://www.city.waltham.ma.us/conservation-commission/files/01-19-2023-noi-190-282-trapelo-road-fernald (accessed May 14, 2023).

Table 4-11 Estimated Land Alteration and Impervious Area in Alternative 10A

Proposed Program Site	City/ Town	Property Owner(s)	Estimated Construction Limits of Disturbance[1]	Estimated Change in Impervious Area[1]	Estimated Permanent Easement/Acquisition Area for Shaft and Valve Chamber [2]	Notes
Combined Segments 1 and 2						
Lower Fernald Property (Receiving)	Waltham	Waltham	2.3 acres	0.1 acres	1.4 acres	Requires acquisition from Waltham
School Street (Connection)	*Waltham*	*Commonwealth of Massachusetts under care, custody, control of MWRA*	*0.6 acres*	*0.0 acres*	*n/a (not required)*	*LOD includes connection to MWRA transmission line*
Cedarwood Pumping Station (Connection)	*Waltham*	*Waltham*	*0.7 acres*	*0.1 acres*	*0.1 acres*	*Requires permanent easement from Waltham*
Hultman Aqueduct Isolation Valve	*Weston*	*Commonwealth of Massachusetts under care, custody, control of MassDOT; existing MWRA easement*	*0.3 acres*	*0.1 acres*	*n/a (not required)*	*Within an existing MWRA easement*
Park Road West (Large Connection)	*Weston*	*Commonwealth of Massachusetts under care, custody, control of MassDOT; MWRA has care, custody, control of area associated with Hultman Aqueduct (Article 97)*	*2.7 acres*	*0.5 acres*	*1.1 acres*	*Requires permanent easement*
Hegarty Pumping Station (Connection)	*Wellesley*	*Wellesley*	*0.3 acres*	*0.1 acres*	*0.1 acres*	*Requires acquisition of 0.1 acres of Ouellet Park (Article 97 (TBD))*
St. Mary Street Pumping Station (Connection)	*Needham*	*Needham and Commonwealth of Massachusetts under care, custody, control of MWRA and DCR*	*0.6 acres*	*0.1 acres*	*n/a (not required)*	
Highland Ave. Northwest/ Southwest (Launching)	*Needham*	*Needham and Commonwealth of Massachusetts under care, custody, control of MassDOT*	*8.7 acres (5.6 northwest; 3.1 southwest)*	*0.0 acres*	*n/a (not required)*	*LOD includes dewatering discharge pipeline northeast to Charles River*
Combined Segments 1 and 2 Total: [3]			**16.2 acres**	***1.0 acres***	**2.7 acres**	

Table 4-11 Estimated Land Alteration and Impervious Area in Alternative 10A

Proposed Program Site	City/ Town	Property Owner(s)	Estimated Construction Limits of Disturbance[1]	Estimated Change in Impervious Area[1]	Estimated Permanent Easement/Acquisition Area for Shaft and Valve Chamber [2]	Notes
Segment 3						
Highland Ave. Northeast/ Southeast (Launching)	*Needham*	*Needham and Commonwealth of Massachusetts under care, custody, control of MassDOT*	*9.5 acres (4.8 northeast; 4.7 southeast)*	*0.7 acres*	*1.5 acres (northeast)*	*Requires permanent easement; LOD includes dewatering discharge pipeline northeast to Charles River*
Newton Street Pumping Station (Connection)	*Brookline*	*Commonwealth of Massachusetts under care, custody, control of MWRA*	*0.3 acres*	*0.1 acres*	*n/a (not required)*	
Southern Spine Mains (Connection)	*Boston*	*Commonwealth of Massachusetts under care, custody, control of DCR*	*0.5 acres*	*0.1 acres*	*0.2 acres*	*Requires acquisition of 0.2 acres of Southwest Corridor Park/Arborway I (Article 97)*
American Legion (Receiving)	*Boston*	*Commonwealth of Massachusetts under care, custody, control of DCR and DYS*	*5.4 acres*	*0.5 acres*	*3.5 acres*	*Requires acquisition for shaft and valve (1.5 acres), including portions of Morton Street Property (Article 97); includes permanent easement (2.0 acres) for near-surface pipeline*
South Tunnel, Segment 3, Total [3]			**15.8 acres**	***1.4 acres***	**5.3 acres**	
GRAND TOTAL: [3]			**32.0 ACRES**	***2.3 ACRES***	**7.9 ACRES**	

1 The site areas (acreages) are conservatively estimated based on the October 2022 concept site plans (Lower Fernald Property site acres are based on March 2023 concept site plans). The size of the temporary construction LOD boundary was established to accommodate proposed construction-related activities, including tunnel excavation, excavation laydown areas, on-site access, near-surface pipelines, temporary staging of construction equipment and supplies (such as cranes, TBM, pumps, generators, ventilation and electrical equipment, and batch plants), truck and vehicle parking, trailer storage, a collection area for temporarily managing excavation materials, temporary water treatment areas, dewatering discharge, and related activities.

2 The permanent easement/acquisition areas (acreages) include the area surrounding the proposed shaft and valve chamber and near-surface pipeline connections, where applicable. Subterranean easements along the tunnel alignment and easements along proposed pipelines are not included. The acreages are conservatively estimated based on the area required to accommodate permanent above-ground infrastructure and associated access in the post-construction condition. For example, and dependent on the function of a proposed site, this may include valve chambers, fencing, signage, top of shaft structures, and access road pavement.

3 Totals may not add due to rounding.

Italicized text within the table indicates no change from the DEIR.

4.2.3 Land Alteration and Article 97 Resources Final Conditions

In the post-construction condition, most of the proposed facilities, such as shafts, valve chambers, meters, and connecting pipelines, would be underground. Above-ground surface features associated with the Program would be limited and include top-of-shaft structures, valve chambers, fencing, signage, vehicle access roads, and parking areas. It is anticipated that the Program would create up to 3 acres of new impervious surface compared to existing conditions including new pavement proposed for vehicle parking and site access roadways. Concrete vaults or top-of-shafts and concrete slabs are not anticipated to extend more than three feet above ground surface. As assumed in the DEIR, the Program would be compatible with the existing and future land use plans, open space plans, and zoning plans and policies established by the municipalities and planning agencies across the Study Area.

Permanent easements or land acquisition for each of the three SDEIR Alternatives are summarized in **Table 4-9**, **Table 4-10**, and **Table 4-11**. Within the permanent easements or land acquisition areas, a fenced-off area would surround valve chambers and tunnel shafts. It is anticipated that SDEIR Alternatives 3A and 4A would each require nine acquisitions or permanent easements totaling approximately 8 acres and SDEIR Alternative 10A would require seven acquisitions or permanent easements totaling approximately 8 acres.

Additionally, subterranean easements of Article 97 protected open space may be required for properties overlaying the tunnel alignment. As described in **SDEIR Section 4.2.3**, a 1,000-foot corridor around the preliminary tunnel alignment (500 feet on either side) was used to identify existing Article 97 properties that may require a subterranean easement, depending on the final tunnel alignment. Finally, the differences among SDEIR Alternatives 3A, 4A, and 10A are described in **SDEIR Section 4.2.3**.

4.2.3.1 Alternative 3A/Alternative 4A Site Final Conditions

The following Section describes final conditions for the UMass Property site considered in SDEIR Alternatives 3A and 4A in place of the DEIR Fernald Property site. Final conditions for all other Program sites remain the same as described in the DEIR.

UMass Property

As shown on **Figure 4-1**, the UMass Property site would include a large connection shaft and valve chamber, chain-link fencing, a paved driveway from Beaver Street, access gate, stormwater basin, bollards, and a concrete top of shaft structure and valve structure anticipated to extend no more than 3 feet above ground surface. A buried steel near-surface pipeline would extend from the proposed valve chamber to the southeast for approximately 800 feet along Beaver Street to the intersection with Waverley Oaks Road where the pipe would connect to the existing WASM3 (see **Figure 4-1**). As described in **SDEIR Section 4.2.3.1**, land acquisition of approximately 0.3 acres of Lawrence Meadow would be required from UMass for the area supporting the large connection shaft and valve chamber. Lawrence Meadow is not protected by Article 97 and the 0.3-acre acquisition is not anticipated to significantly interfere with the existing use of the 31-acre Lawrence Meadow as a conservation area.

4.2.3.2 Alternative 10A Site Final Conditions

The following section describes final conditions for the Lower Fernald Property site considered in SDEIR Alternative 10A in place of the DEIR Fernald Property receiving shaft site. Final conditions for all other Program sites remain the same as described in the DEIR.

Lower Fernald Property

As shown in **Figure 4-2**, final conditions at the Lower Fernald Property site would include the proposed receiving shaft and valve chamber, chain-link fencing, a paved driveway and parking area, an access gate, stormwater basin, bollards, and a concrete top of shaft structure and valve structure anticipated to extend no more than 3 feet above ground surface. The permanent facilities would be contained within an approximately 1.4-acre area surrounded by a chain link fence. A buried steel near-surface pipeline approximately 100 feet long would exist underground from the valve chamber out to Waverley Oaks Road to connect to the existing WASM3 (see **Figure 4-2**). Access to the site would be provided via a new paved driveway from Chapel Road. Improvements would be made at the intersection between Chapel Road and Waverley Oaks Road so that Chapel Road forms a T-shaped intersection with Waverley Oaks Road in place of the existing Y-shaped intersection. Existing pavement associated with the Y-shaped intersection would be removed and the area would be reseeded.

Land acquisition of about 1.4 acres is anticipated to be required from the City of Waltham for the area supporting the shaft and valve chamber. The Lower Fernald Property site is not located within property protected by Article 97. As described in **SDEIR Section 4.2.2.2** and **SDEIR Section 4.2.3.2**, use of the Lower Fernald Property site is not anticipated to interfere with design plans released by the City of Waltham for future recreational use of the former Walter E. Fernald State School property. The design plans indicate that the nearest planned recreational development would be located more than 700 feet north of the Lower Fernald Property site.[31, 32]

4.2.3.3 Tunnel Alignment

Neither the UMass Property site nor the Lower Fernald Property site are located on Article 97 land and therefore would not cause a disposition. As described in **SDEIR Section 4.2.2.3**, a subterranean easement would be required for portions of Article 97 properties located above the tunnel alignment, which would trigger the need for approval by the Legislature. Article 97 properties located within a 1,000-foot corridor of the preliminary tunnel alignment corridor (500 feet on either side of the alignment) are listed by SDEIR Alternative in **Table 4-12** from north to south and shown on **Figures 4-3** to **4-5**. As design progresses, the MWRA will determine which properties listed would be directly under the tunnel alignment and require subterranean easements.

31 City of Waltham, Massachusetts, "Capital Improvement Projects: Parks and Facilities," updated March 2023, https://www.city.waltham.ma.us/recreation-department/pages/capital-improvement-projects (accessed May 14, 2023).

32 City of Waltham, Massachusetts, Waltham Conservation Commission, Public Notice of the January 2023 Notice of Intent, https://www.city.waltham.ma.us/conservation-commission/files/01-19-2023-noi-190-282-trapelo-road-fernald (accessed May 14, 2023).

Table 4-12 Article 97 Properties Within 1,000-Foot Corridor of Preliminary Tunnel Alignment

Property Name	Location	Property Owner/ Maintainer (if applicable)	Alternative 3A	Alternative 4A	Alternative 10A
Cornelia Warren Field	*Waltham*	*City of Waltham*	*X*	*X*	
Waltham Agricultural Fields	*Waltham*	*City of Waltham*	*X*	*X*	*X*
Waltham Woods	Waltham	City of Waltham	X	X	X
Storer Conservation Area	Waltham	City of Waltham	X	X	X
Square Pond Woods	Waltham	City of Waltham	X	X	X
Thompson Playground (Article 97 status unknown)	*Waltham*	*City of Waltham*	*X*	*X*	*X*
Bobby Connors Playground	*Waltham*	*City of Waltham*	*X*	*X*	*X*
Charles River Reservation I	*Waltham, Weston*	*Commonwealth of Massachusetts/DCR*	*X*	*X*	*X*
City of Cambridge Water (Article 97 status unknown)	*Weston*	*City of Cambridge*	*X*	*X*	*X*
River Road	*Weston*	*Town of Weston*	*X*	*X*	*X*
Summer Road	*Weston*	*Town of Weston*	*X*	*X*	*X*
River Street	*Weston*	*Town of Weston*	*X*	*X*	
Loring Road Covered Tanks	*Weston*	*Commonwealth of Massachusetts/MWRA*	*X*	*X*	*X*
Fitzgerald Well (abandoned)	*Weston*	*Town of Weston*	*X*	*X*	
Hultman Aqueduct	*Weston*	*Commonwealth of Massachusetts/MWRA*	*X*	*X*	*X*
Nickerson Well (abandoned)	*Weston*	*Town of Weston*	*X*		
Leo J. Martin Memorial Golf Course	*Weston, Newton*	*City of Newton*	*X*	*X*	*X*
Hamilton Park/Lower Falls Playground (Article 97 status unknown)	*Newton*	*City of Newton*	*X*	*X*	*X*
Charles River Reservation II	*Wellesley, Newton*	*Commonwealth of Massachusetts/DCR*	*X*	*X*	*X*
Cochituate Aqueduct Trail	*Wellesley*	*Town of Wellesley*	*X*	*X*	*X*
Schofield Tennis Courts	*Wellesley*	*Town of Wellesley*		*X*	*X*
Ouellet Park	*Wellesley*	*Town of Wellesley*	*X*	*X*	*X*
Wellesley Water Supply Land	*Wellesley*	*Town of Wellesley*	*X*	*X*	*X*
Hurd Brook CR (Article 97 status unknown)	*Newton*	*Sun Life Assurance Company of Canada*	*X*	*X*	*X*
Sudbury Aqueduct	*Needham*	*Commonwealth of Massachusetts/DCR*	*X*	*X*	*X*
Chester F Mills Field (Article 97 status unknown)	*Needham*	*Town of Needham*	*X*	*X*	*X*
Riverside Terrace (Article 97 status unknown)	*Needham*	*Town of Needham*	*X*	*X*	*X*
Charles River Reservation III	*Newton*	*Commonwealth of Massachusetts/DCR*	*X*	*X*	*X*
Goddard Christina Conservation Area	*Newton*	*City of Newton*	*X*	*X*	*X*

Table 4-12 Article 97 Properties Within 1,000-Foot Corridor of Preliminary Tunnel Alignment

Property Name	Location	Property Owner/ Maintainer (if applicable)	Alternative 3A	Alternative 4A	Alternative 10A
Nahanton Park (Article 97 status unknown)	*Newton*	*City of Newton*	*X*	*X*	*X*
Gables Condominium CR (Article 97 status unknown)	*Newton*	*Green Company Inc.*	*X*	*X*	*X*
Baldpate Meadow	*Newton*	*City of Newton*	*X*	*X*	*X*
Skyline Park (Article 97 status unknown)	*Brookline*	*Town of Brookline*	*X*	*X*	*X*
Robert T. Lynch Memorial Golf Course	*Brookline*	*Town of Brookline*	*X*	*X*	*X*
Newton Street Parcel	*Brookline*	*Town of Brookline*	*X*	*X*	*X*
Arnold Arboretum	*Boston*	*City of Boston*	*X*	*X*	*X*
Arborway	*Boston*	*Commonwealth of Massachusetts/DCR*	*X*	*X*	*X*
Southwest Corridor Park	*Boston*	*Commonwealth of Massachusetts/DCR and MBTA*	*X*	*X*	*X*
		Total:	**37**	**36**	**34**

"Article 97 status unknown" indicates the Article 97 status of the property was listed as unknown by MassGIS and deed research. As design progresses, the properties listed unknown along the alignment will be confirmed through coordination with the appropriate agencies and municipalities.

CR - Conservation Restriction

DCR - Commonwealth of Massachusetts Department of Conservation and Recreation

MBTA - Massachusetts Bay Transportation Authority

Italicized text within the table indicates no change from the DEIR.

4.2.4 Land Alteration and Article 97 Avoidance, Minimization, and Mitigation

The following section identifies the MWRA's actions to avoid, minimize, and mitigate potential impacts to land use, community resources, and open space, including Article 97 lands.

4.2.4.1 Land Use

As described in **SDEIR Section 4.2.3**, potential impacts associated with the Program would primarily be related to construction at the surface of the sites, management of material removed from the tunnel, and treatment of groundwater inflow. Construction activities at each shaft site would be contained within the temporary LOD boundary to minimize the area of potential disturbance. Most construction-related activities for the Program would take place below the surface with limited disruption to aboveground land uses.

The total construction area LOD would encompass up to 42 acres, depending on the selected SDEIR Alternative. The Program is anticipated to result in the creation of up to 3 acres of new impervious surface compared to existing conditions. Construction-period impacts would be temporary in nature, and, upon

completion of construction, the appearance of the sites would be similar to existing conditions apart from concrete slabs visible at the surface, where applicable. To minimize potential impacts, the proposed Program sites and associated temporary construction staging areas would:

- Be located on state- or municipality-owned land, including sites adjacent to existing MWRA infrastructure and MassDOT ROW land, and land owned by the Commonwealth of Massachusetts under care, custody, and control of the MWRA
- Not require the relocation of residential units
- Be located away from residential uses and protected and recreational open spaces to the extent feasible
- Include permanent above-ground features, such as concrete slabs and concrete vaults or top of shafts, that are not anticipated to extend more than three feet above finished grade
- Not involve the construction of above-ground buildings
- Restore areas temporarily disturbed during construction to preconstruction conditions
- Replace trees, where required and as appropriate
- Include fencing and proper signage surrounding shaft excavation areas, where appropriate

Tree Clearing, Protection, and Replanting

Land alteration and tree clearing required to construct the Program would be limited to the greatest extent practicable. The MWRA would implement tree impact avoidance and protection strategies where feasible. Shaft sites considered in SDEIR Alternatives 3A, 4A, and 10A primarily consist of previously disturbed areas and ROW space that contains a mix of open land, grassland, and shrubs, with some deciduous trees and evergreens present.

As described in the DEIR, the Program may require the removal of public shade trees as defined in Massachusetts General Law Chapter 87, which defines "public shade trees" as "All trees within a public way or on the boundaries thereof..."[33] The Tree Warden of the respective city or town holding jurisdiction is responsible for the care, control, protection, and maintenance of public shade trees, except those within a state highway or those in public parks, and shall enforce all the provisions of law for the preservation of such trees; MassDOT has care and control of trees within the state highway layout area and park commissioners have jurisdiction over trees in public parks unless the park commissioner grants the Tree Warden control in writing.[34]

Massachusetts General Law, Chapter 40, Section 15C (the "Scenic Roads Act"), augments Chapter 87 with additional requirements concerning the removal of trees on designated scenic roads such as the Arborway (located north of the proposed Southern Spine Mains connection shaft site), which is a nationally registered historic parkway under care, custody, and control of the DCR.[35] The Scenic Roads Act protects

33 Commonwealth of Massachusetts, *General Laws of Massachusetts*, Part I, Title XIV, Chapter 87, Section 1: "Shade Trees," 2020.

34 Commonwealth of Massachusetts, Department of Conservation and Recreation, Bureau of Forestry, "Laws Protecting Community Trees," https://www.mass.gov/doc/laws-protecting-trees/download (accessed September 15, 2022).

35 Commonwealth of Massachusetts, *General Laws of Massachusetts*, Part I, Title VII, Chapter 40, Section 15C: "Scenic Road Designations; Improvements; Fines," 2020.

the aesthetic, environmental, and historical values of Massachusetts' rural roads by preserving bordering trees and stone walls. In accordance with the Scenic Roads Act, trees along designated scenic roads shall not be cut or removed without a public hearing except with the prior written consent of the municipal planning board.

Trees located on proposed launching shaft, receiving shaft, large connection shaft, connection shaft, and isolation valve sites meeting the definition of public shade trees will be identified pending advancement of site design and finalization of the associated construction area LOD. Coordination with the appropriate Tree Warden(s), park commissioner(s), DCR, and/or MassDOT where appropriate would be conducted by the MWRA as required to identify any public shade trees that may need to be removed, cut, or trimmed as part of the Program. In accordance with the requirements of Chapter 87, the MWRA would not plant, trim, cut, or remove a public shade tree without permission of the Tree Warden (and/or in coordination with MassDOT, DCR, or the park commissioner as applicable) and would follow the requirements for public hearings and public notification where appropriate. The MWRA would also coordinate with the Tree Warden(s) regarding the planting of replacement trees, as necessary and where appropriate.

As described in **SDEIR Chapter 10, Rare Species and Wildlife Habitat**, trees and vegetation present on certain sites may be habitat for protected biological resources, including the endangered NLEB. In accordance with the Endangered Species Act (ESA) of 1973, specific provisions for tree removal would be followed to reduce the potential for adverse impacts on NLEB. No construction work is proposed within a quarter mile of a NLEB hibernacula (shelter) or within 150 feet of a known maternity roost tree. Tree removal would not take place until the USFWS confirms that ESA requirements for NLEB have been met and all required permits obtained. Consultation in accordance with ESA would be undertaken with the USFWS prior to construction during the final design and permitting phase. Upon completion of the Program, the MWRA would implement landscaping and/or tree planting where possible and where appropriate to minimize potential impacts associated with land alteration.

4.2.4.2 Community Resources and Open Space

Use of open space land and community resources has been minimized, particularly for Article 97 lands, during the site-selection process and alternatives analysis as described in **SDEIR Chapter 2, Alternatives**. Existing sites held for natural resources purposes in accordance with the EEA Article 97 Land Disposition Policy would be avoided to the greatest extent practicable. The Program's proposed use of a portion of following three sites (common to all SDEIR Alternatives) may require an Article 97 land disposition:

- **Ouellet Park** – The Hegarty Pumping Station connection shaft site is within Ouellet Park, which is owned by the Town of Wellesley. Approximately 0.1 acres of land acquisition is anticipated to be required (to be confirmed in final design). Temporary use of approximately 0.3 acres of the site is anticipated during construction.
- **Southwest Corridor Park/Arborway I** – The Southern Spine Mains connection shaft site is within Southwest Corridor Park/Arborway I, which is owned by the Commonwealth of Massachusetts under care, custody, and control of DCR. Approximately 0.2 acres of land acquisition is anticipated to be

required (to be confirmed in final design). Temporary use of up to 0.5 acres of Southwest Corridor Park/Arborway I is anticipated to be required during construction.

- **Morton Street Property** – A portion of the American Legion receiving shaft site is within the Morton Street Property owned by the Commonwealth of Massachusetts under care, custody, and control of DCR. Approximately 1.5 acres of Morton Street Property land acquisition is anticipated to be required for the shaft and valve chamber and up to 2.0 acres of permanent easement would be required for the near-surface pipeline (to be confirmed in final design). Temporary use of up to 3.5 acres of the Morton Street Property is anticipated to be required during construction.

Table 4-13 summarizes how the MWRA would seek to comply with the conditions outlined in the Article 97 Land Disposition Policy for use of a portion of the three sites protected by Article 97, as applicable.

As assumed in the DEIR, the MWRA would need to obtain subterranean easements for portions of Article 97 properties that overlay the belowground tunnel alignment. As described in **SDEIR Section 4.2.2.3** and listed in **Table 4-12**, properties protected by Article 97 within a 1,000-foot corridor of the preliminary tunnel alignment (500 feet on either side) were identified for each SDEIR Alternative (refer to **Figures 4-3**, **4-4**, and **4-5**). A subterranean easement with approval by the Legislature would be required for properties listed that are directly above the tunnel alignment.

Table 4-13 Program Compliance with Article 97 Land Disposition Policy

Policy Condition	Compliance
All other options to avoid the Article 97 disposition have been explored and no feasible and substantially equivalent alternatives exist (monetary considerations notwithstanding).	**Ouellet Park (Article 97 status TBD) at Hegarty Pumping Station Connection Shaft Site:** The Program would require a connection to the existing Hegarty Pumping Station, which is surrounded by land that may be protected by Article 97. Approximately 0.1 acre of Ouellet Park would be needed for the proposed connection shaft site. Wellesley Water Supply Land, located south of the Hegarty Pumping Station, is protected by Article 97 and local zoning that designates it as a place for groundwater recharge. Therefore, no feasible and substantially equivalent alternatives are available to avoid potential Article 97 land. **DCR Morton Street Property at American Legion Receiving Shaft Site:** To create redundancy, the Program requires a connection to the Dorchester Tunnel. Shaft 7C, located in the southwest corner of the American Legion Highway and Morton Street intersection, is the preferred connection point to pipelines near the Dorchester Tunnel. Other sites near Shaft 7C include open space properties that host public amenities such as the Forest Hills Cemetery, Franklin Park, and Mass Audubon's Boston Nature Center. Unlike the surrounding open space, DCR's Morton Street property does not host public amenities/recreational activities. No other feasible and substantially equivalent alternatives that avoid Article 97 land are available. **Southwest Corridor Park/Arborway I at Southern Spine Mains Connection Shaft Site**: The Program would require a connection to the Southern Spine Mains pipelines in the vicinity of the Arborway (Route 203) and Washington Street to create redundancy in the Southern High-Pressure Zone. These twin mains are located within the western lanes of the Arborway, so other options for connection in this area would still require a connection through the Arborway. Approximately 0.2 acres of Southwest Corridor Park/Arborway I are anticipated to be required for the Program. Other parcels of Southwest Corridor Park, which are Article 97 land, are within 500 feet of the proposed site LOD. The 52-acre Southwest Corridor Park is a linked system of parks comprising a "greenway" along a roughly 4-mile corridor from the MBTA Back Bay Station to Forest Hills Station. The parks are zoned for residential use and recreational open space and are in the Greenbelt Overlay District. No other feasible and substantially equivalent alternatives are available.

Table 4-13 Program Compliance with Article 97 Land Disposition Policy

Policy Condition	Compliance
The disposition of the subject parcel and its proposed use do not destroy or threaten a unique or significant resource (e.g., significant habitat, rare or unusual terrain, or areas of significant public recreation), as determined by EEA and its agencies.	The disposition of approximately 0.1 acres of Ouellet Park (Article 97 status TBD), approximately 3.5 acres of DCR's Morton Street Property, and approximately 0.2 acres of Southwest Corridor Park/Arborway I would not destroy or threaten a unique or significant resource. Trees and vegetation present on the sites subject to Article 97 disposition may provide existing habitat for protected biological resources, including the endangered NLEB. Land alteration and tree clearing required to construct the Program would be limited to the extent practicable. The MWRA would implement tree impact avoidance and protection strategies where feasible. As described in **SDEIR Chapter 10, Rare Species and Wildlife Habitat**, no construction work is proposed within a quarter mile of a NLEB hibernacula (shelter) or within 150 feet of a known maternity roost tree. In accordance with the ESA, specific provisions for tree removal would be followed to reduce the potential for adverse impacts on NLEB. Tree removal would not take place until the USFWS confirms that ESA requirements for NLEB have been met and all required permits obtained. Consultation in accordance with ESA would be undertaken with the USFWS prior to construction during the final design and permitting phase. Upon completion of the Program sites, the MWRA would implement landscaping and/or tree planting where possible and where appropriate to minimize potential impacts. Ouellet Park (Hegarty Pumping Station) public playground infrastructure, fields, and courts are not near the proposed connection shaft site; the 0.1-acre acquisition is not anticipated to impede the existing recreational amenities or public access at Ouellet Park (7.3-acre park). The 0.2-acre portion of Southwest Corridor Park/Arborway I to be used by the Program is not anticipated to interfere with the existing recreational use of the greenway nor the adjacent community garden. DCR's Morton Street property (American Legion site) does not provide recreational activities. The Hegarty Pumping Station connection shaft site, Southern Spine Mains connection shaft site, and American Legion receiving shaft site, in their finished condition, would include the proposed shaft and valve chamber, chain-link fencing, a paved driveway and parking area, an access gate, and a concrete top of shaft structure and valve structure anticipated to extend no more than 3 feet above ground surface. The permanent facilities would be surrounded by a chain link fence. The shafts would be covered with a hatch that is at or slightly above ground level. The site terrains are and would remain consistent with surrounding terrain. The finished condition is not anticipated to impact local wildlife. Use of a portion of each of the three properties would be minor in overall property size (acreage) in relation to the total area, and use of the sites for the Program is not anticipated to significantly interfere with or detract from the existing use.

Table 4-13 Program Compliance with Article 97 Land Disposition Policy

Policy Condition	Compliance
As part of the disposition, real estate of equal or greater fair market value or value in use of proposed use, whichever is greater, and significantly greater resource value as determined by EEA and its agencies, are granted to the disposing agency or its designee, so that the mission and legal mandate of EEA and its agencies and the constitutional rights of the citizens of Massachusetts are protected and enhanced.	The MWRA will work with the EEA, the DCR, and the Town of Wellesley as necessary to identify appropriate mitigation to compensate for the dispositions occurring at Ouellet Park (Article 97 TBD), the Southwest Corridor Park/Arborway I, and the DCR Morton Street property.
The minimum acreage necessary for the proposed use is proposed for disposition and, to the maximum extent possible, the resources of the parcel proposed for disposition continue to be protected.	The proposed dispositions, to be confirmed in final design, include approximately 0.1 acres of Ouellet Park (Article 97 status TBD), 0.2 acres of Southwest Corridor Park/Arborway I, and 1.5 acres of the DCR Morton Street Property (a 2.0-acre permanent easement of the DCR Morton Street Property would also be required for the near-surface pipeline). These acreages are small in relation to the total Article 97 property area and would contain only the critical Program infrastructure needed for operation and maintenance of the tunnel system. The MWRA will continue to work with the DCR and the Town of Wellesley as design for the Program progresses to ensure that the layout of the Program sites minimizes potential impacts associated with Article 97 resources.
The disposition serves an Article 97 purpose or another public purpose without detracting from the mission, plans, policies, and mandates of EEA and its appropriate department or division.	The potential disposition of approximately 0.1 acres of Ouellet Playground (Article 97 TBD) at the Hegarty Pumping Station connection shaft site, 0.2 acres of Southwest Corridor Park/Arborway I (Article 97) at the Southern Spine Mains connection shaft site, and 3.5 acres of the DCR's Morton Street Property at the American Legion receiving shaft site would be used to enhance redundancy for the existing water supply infrastructure within the Greater Boston Area. The reliable delivery of water is essential to protecting public health, providing sanitation, fire protection, and supporting a viable economy. Wellesley and Boston, where the properties are located, would benefit from the Program as they are communities that rely on this infrastructure for water supply.
The disposition of a parcel is not contrary to the express wishes of the person(s) who donated or sold the parcel or interests therein to the Commonwealth.	The MWRA has coordinated with the Town of Wellesley Natural Resources Commission (owner of Ouellet Playground (Article 97 TBD)) and DCR (owner of the Southwest Corridor Park/Arborway I (Article 97) and the Morton Street property (Article 97)) as part of the MEPA process and both parties have expressed understanding and support for the Program. The MWRA will continue to coordinate with the Town of Wellesley and the DCR regarding use of the Article 97 land and minimization of potential impacts.

4.3 Technical Analysis to Respond to Certificate Comments

The Secretary's Certificate on the DEIR identified a Scope for the SDEIR, which included specific requests related to land alteration and Article 97. This section transcribes the comments from the Certificate and the comment letters specific to land alteration and Article 97 and provides supplemental analysis and/or clarifying information in response per the Scope. The Certificate also included a comment related to how Article 97 land dispositions may affect EJ populations, which is discussed in **SDEIR Chapter 3, Environmental Justice**. Refer also to **SDEIR Chapter 15, Responses to Comments,** for the full list of delineated comments received on the DEIR.

Certificate Comment C-6

DCR comments note that with the recent passage of St. 2022, c. 274, An Act Preserving Open Space in the Commonwealth, additional requirements may apply to a transfer of Article 97 property.

Response to C-6

The MWRA has reviewed the enactment of *An Act Preserving Open Space in the Commonwealth* (Chapter 274 of the Acts of 2022),[36] also known as the PLPA, and is committed to working with the DCR and other agencies to meet the additional requirements for the transfer of Article 97 property.

Approved in November 2022, the PLPA complements the existing Article 97 policy by establishing a process for notifying the Secretary of the EEA and the public of a proponent's plans to perform a take of Article 97 protected lands before the proponent approaches the legislature for the disposition. The PLPA applies to Program sites requiring Article 97 disposition and the MWRA will be subject to the requirements of the 2022 PLPA. In accordance with the requirements of the PLPA, the MWRA will notify the Secretary and public by submitting the proposed disposition request within the PLPA portal (forthcoming as of July 2023[37]) and perform additional notification as required by the EEA as part of the MEPA process. Prior to the submission, the MWRA will coordinate with the current owner/maintainer of the parcel of interest, as required by the PLPA.

As outlined in the PLPA, the MWRA will need to prepare a brief alternatives analysis in the EEA portal submission for site use and select an acceptable replacement parcel or request a waiver from the Secretary to modify or eliminate the replacement land requirement. Alternatively, the MWRA may request to provide in-lieu funding for part or all of the replacement land.

36 Commonwealth of Massachusetts, Chapter 274, An Act Preserving Open Space in the Commonwealth, https://malegislature.gov/Laws/SessionLaws/Acts/2022/Chapter274#:~:text=Acts%20%282022%29%20Chapter%20274%20AN%20ACT,PRESERVING%20OPEN%20SPACE%20IN%20THE%20COMMONWEALTH (accessed March 24, 2023).

37 Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs, "Article 97 & The Public Lands Preservation Act," https://www.mass.gov/info-details/article-97-the-public-lands-preservation-act (accessed July 15, 2023).

The MWRA will seek to comply with applicable requirements specified in the 2022 PLPA in association with the Commonwealth's "Guidance on Public Lands Preservation Act Implementation."[38] The MWRA will continue to work with the appropriate agencies regarding the most appropriate option for each applicable site subject to the PLPA and the Article 97 policy.

Certificate Comment C-28

Provide an update on the project's consistency with the Article 97 Policy.

Response to C-28

The MWRA has been closely coordinating with DCR regarding potential construction at DCR-controlled properties, and associated Article 97 requirements. As summarized in **Table 4-1**, described in **SDEIR Section 4.2.5.2**, and as previously assumed in the DEIR (see **DEIR Section 4.13.4.5, Compliance with Article 97 Land Disposition Policy (pg. 4.13-81)**), the Program's proposed use of a portion of the following three sites (common to all SDEIR Alternatives) may require an Article 97 land disposition:

- **Ouellet Park** – The Hegarty Pumping Station connection shaft site is within Ouellet Park, which is owned by the Town of Wellesley. Approximately 0.1 acres of land acquisition is anticipated to be required (to be confirmed in final design). Temporary use of approximately 0.3 acres of the site is anticipated during construction.
- **Southwest Corridor Park/Arborway I** – The Southern Spine Mains connection shaft site is within Southwest Corridor Park/Arborway I, which is owned by the Commonwealth of Massachusetts under care, custody, and control of DCR. Approximately 0.2 acres of land acquisition is anticipated to be required (to be confirmed in final design). Temporary use of up to 0.5 acres of Southwest Corridor Park/Arborway I is anticipated to be required during construction.
- **Morton Street Property** – A portion of the American Legion receiving shaft site is within the Morton Street Property owned by the Commonwealth of Massachusetts under care, custody, and control of DCR. Approximately 1.5 acres of Morton Street Property land acquisition is anticipated to be required for the shaft and valve chamber and up to 2.0 acres of permanent easement would be required for the near-surface pipeline (to be confirmed in final design). Temporary use of up to 3.5 acres of the Morton Street Property is anticipated to be required during construction.

Refer to **Table 4-13** for a summary of how the MWRA would comply with the conditions outlined in the Article 97 Land Disposition Policy, as applicable.

As described in **SDEIR Section 4.2.2.3** and listed in **Table 4-12**, properties protected by Article 97 within a 1,000-foot corridor of the preliminary tunnel alignment (500 feet on either side) were identified for each SDEIR Alternative (refer to **Figure 4-3**, through **Figure 4-5**). A subterranean easement would be required for properties listed that are directly above the tunnel alignment.

38 Commonwealth of Massachusetts, "Guidance on Public Lands Preservation Act Implementation," February 2023, https://www.mass.gov/doc/guidance-on-public-lands-preservation-act-implementation-january-2023/download (accessed May 9, 2023).

Certificate Comment C-29

As requested by DCR, the SDEIR should describe how MWRA will minimize the size and extent of impacts to DCR land. MWRA should work closely with DCR to identify mitigation for the loss of Article 97 conservation lands as the shaft, staging and tunnel locations are finalized. Provide summary of the outcome of consultations with DCR regarding Article 97 protection and mitigation.

Response to C-29

The MWRA has held a number of meetings with DCR to present conceptual plans and to discuss site layout and utilization at the DCR Morton Street Property (American Legion) and the Southern Spine Mains connection to minimize land required by MWRA for construction and long-term operation at the sites. The MWRA will continue to coordinate closely with DCR regarding potential construction at DCR-controlled properties, and associated Article 97 requirements. A list of meetings with DCR since the Environmental Notification Form (ENF) filing is included in **DEIR Chapter 2, Outreach and Environmental Justice, Table 2.2-1**.

The MWRA has continued to coordinate with the DCR to identify replacement land required for the disposition of a portion of Southwest Corridor Park/Arborway I (approximately 0.2 acres) for the proposed Southern Spine Mains connection shaft site and a portion of the DCR Morton Street Property (approximately 1.5 acres of the DCR Morton Street Property (in addition, 2.0 acres would require a permanent easement of the DCR Morton Street Property) for the proposed American Legion receiving shaft site. These acreages are small in relation to the total Article 97 property area and would contain only the critical Program infrastructure needed for operation and maintenance of the tunnel system. Refer to **Table 4-12** and the Response to Certificate Comment C-6.

Certificate Comment C-30

The SDEIR should provide an update on the borings and geotechnical analysis underway, including presenting the results of any analysis completed by the time of the SDEIR filing.

Response to C-30

Eighteen (18) deep test borings were drilled as part of the preliminary design for the Program. The majority of these test borings are located at shaft sites. In addition, surface geophysical surveys have been conducted at 43 locations along the preliminary tunnel alignment. Bedrock outcrop mapping was conducted at 25 locations in the Program Study Area where bedrock is exposed and accessible. This data, along with geotechnical and geologic data collected as part of past projects (e.g., past MWRA projects, MassDOT work, etc.) was analyzed to develop an understanding of both the geologic and hydrological setting for the Program area, understand conditions which influence shaft and tunnel design and construction methods (e.g., top of rock elevation, location and limits of geologic faults, permeability, strength, abrasively, mineralogy, lithology, stability, etc.). This data, along with a number of factors, including hydraulic connections to critical infrastructure, land availability and land use, and environmental impacts was used to select shaft site and the preliminary tunnel alignment. The preliminary tunnel alignment between shaft sites included in the DEIR and SDEIR will be further refined throughout the design

phases of the Project. The results of these investigations and analysis are currently being compiled and will be incorporated into the final design and/or included in the construction documents.

Certificate Comment C-31

The SDEIR should clearly describe the plans to conduct geotechnical analysis during the course of construction, how such analysis may affect any choice of routing or excavation methods along the chosen tunnel alignment, and what steps MWRA will take to secure easements from landowners along the tunnel alignment route.

Response to C-31

The MWRA executed a contract in early 2023 to drill up to 40 additional deep test borings during the next phase of design at the remaining shaft sites and along the preliminary tunnel alignment. These investigations will build on those conducted as part of the preliminary design and will further inform the design including locations of discreet sections of tunnel alignment between shaft sites (e.g., between School Street and the end of the North Tunnel in Waltham), extent and type of initial tunnel support type or final liner (e.g., concrete or steel), etc. This additional data will also help estimate tunnel construction production rates and Program costs.

During final design of each tunnel segment, the tunnel alignment (both horizontal and vertical) between shaft sites will be finalized. Subterranean easements along the tunnel alignment will be required. The easements are envisioned to consist of a zone surrounding the tunnel horizon but not extend to, nor affect, land use at the ground surface. Easements will be obtained from each landowner prior to construction. The steps will vary based on the landowner but all will include recording of the easement. It is not expected that geotechnical analysis (if) conducted during construction will change the tunnel alignment.

Certificate Comment C-32

The SDEIR should discuss what contingency plans will be in place in the event of unforeseen circumstances, such as geotechnical conditions or opposition from landowners, that may preclude the project's ability to site the tunnel alignment in the exact location anticipated prior to commencing excavation.

Response to C-32

Considering that the majority of the preliminary design phase investigations and significant geotechnical and geologic data collected as part of past projects borings are located at shaft sites, it is not expected that unforeseen geotechnical conditions at a shaft site revealed during late investigation phases would warrant modifications of a shaft site location. In the event that a geologic condition is revealed during later investigations that warrants an adjustment to the tunnel alignment between shaft sites, the tunnel and corresponding subterranean easements will be modified prior to construction. Subterranean easements for the tunnel will not extend to nor impact land use at the surface. However, if landowner opposition to a subterranean easement were to occur an evaluation of the impacts of modifying the tunnel alignment or exercising eminent domain as allowed by MWRA's enabling act will be made.

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5 Wetlands and Waterways

5.1 Introduction

This Chapter includes an assessment of wetlands and waterways impacts at each of the two new Supplemental Draft Environmental Impact Report (SDEIR) Alternative sites and associated Alternatives. The new terminal sites for the North Tunnel are the University of Massachusetts (UMass) Property site and the Lower Fernald Property site, both located in Waltham, Massachusetts. As requested in the Executive Office of Energy and Environmental Affairs (EEA) Secretary's Certificate on the Draft Environmental Impact Report (DEIR), this Chapter also provides responses to the "Wetlands and Waterways" section of the Scope of the DEIR Certificate. Refer to **SDEIR Chapter 15, Responses to Comments**, for the full list of delineated comments received on the DEIR.

5.1.1 Summary of Findings

Key findings of the Program as they relate to wetland resources are summarized below. **Table 5-1** below provides a summary of wetland impacts by municipality for each DEIR Alternative.

Key findings associated with the two new alternative sites considered in the SDEIR for the terminus of the North Tunnel, Segment 1, in place of the DEIR Fernald Property site include:

- No direct impacts to wetland resources are anticipated at either the UMass Property site (Alternatives 3A and 4A) or Lower Fernald Property site (Alternative 10A)

Key findings associated with the three SDEIR Alternatives, which are consistent with the findings of the three DEIR Alternatives, are:

- There would be no permanent impacts to state-regulated Bordering Vegetated Wetland (BVW) or federally jurisdictional Vegetated Wetlands (VW) due to Program construction or operation.
- The Program would require temporary impacts to BVW and VW for connection to the existing water supply infrastructure at the American Legion site.
- The Program would require permanent and temporary impacts to Land Under Water (LUW)/Waterway (WW), Bank, and Bordering Land Subject to Flooding (BLSF) for rip rap splash pads at permanent dewatering discharge locations (Tandem Trailer or Bifurcation and Highland Avenue), depending on the SDEIR Alternative. Compensatory flood storage volume would be provided at appropriate elevations within the same floodplains.
- The program would require temporary impacts to LUW/WW, Bank and Riverfront Area (RA) at the American Legion site for rip rap splash pads at the temporary dewatering discharge location.
- The pipeline connection to Hegarty Pumping Station would require temporary and permanent impacts to RA.

- Permanent impacts to RA would be required for top of shaft/valve structures and associated paved access roads and parking at the Tandem Trailer site and at the Hultman Aqueduct Isolation Valve site.
- During construction, there would be the potential for wetlands and surface waters on or adjacent to construction sites to be impacted by erosion and sedimentation from disturbed areas. Implementation of appropriate Best Management Practices (BMPs) in accordance with the Stormwater Pollution Prevention Plan (SWPPP) to be prepared by the construction contractors under the National Pollutant Discharge Elimination System (NPDES) Construction General Permit (CGP) would avoid and minimize wetland and surface water impacts.
- During construction, there would be the potential for impacts to water quality in surface waters in tunnel dewatering discharges and in discharges related to tunnel cleaning, disinfection, and flushing. Prior to discharge, all flows would be treated as necessary to meet water quality standards for the receiving water body and other requirements of environmental permits issued for the Program. These standards and requirements would be included in contract documents so that construction-period discharges would not adversely impact surface water quality.
- During construction, there would be the potential for groundwater drawdown, due to tunnel inflows, to temporarily impact water levels in surface waters and wells. Grouting of water-bearing rock features in advance of the tunnel boring machine (TBM) excavation activities and after its passage would reduce groundwater inflows to avoid and minimize impacts of groundwater drawdown. If necessary, alternative water supplies would be provided as described in **SDEIR Appendix C, Draft Water Supply Contingency Plan.**
- No impacts to surface or groundwater resources would be anticipated in the Final Conditions. The completed tunnel would be lined and pressurized substantially higher than the surrounding groundwater thereby preventing groundwater inflow into the tunnel.
- No impacts to water quality are anticipated in the Final Conditions. Stormwater runoff from impervious surfaces at Program sites would be treated and managed in accordance with the Massachusetts Department of Environmental Protection (MassDEP) Stormwater Management Standards. Loss of annual recharge resulting from new impervious area at Program sites would be minimized in accordance with the Stormwater Management Standards.

Table 5-1 Summary Comparison of SDEIR Alternatives

Description of Potential Impacts	Alternative 3A – Sites Subject to Potential Impacts	Alternative 4A – Sites Subject to Potential Impacts	Alternative 10A – Sites Subject to Potential Impacts
Impacts to state-regulated Riverfront Areas (RA) due to top-of-shaft and/or valve structures and associated pavement	*3 sites:* · *Tandem Trailer/Park Road East* · *Hegarty Pumping Station* · *Hultman Aqueduct Isolation Valve*	*3 sites:* · *Tandem Trailer/* · *Park Road East* · *Hegarty Pumping Station* · *Hultman Aqueduct Isolation Valve*	*2 sites:* · *Hegarty Pumping Station* · *Hultman Aqueduct Isolation Valve*
Impacts to Bordering Land Subject to Flooding (BLSF) and Bank for rip rap splash pads at dewatering discharge locations	*3 sites:* · *Tandem Trailer/Park Road East* · *Bifurcation* · *Highland Avenue*	*2 sites:* · *Tandem Trailer* · *Highland Avenue*	*1 site:* · *Highland Avenue*
Impacts to state-regulated Bank, Land Under Waterway (LUW) and federally regulated waterways (WW) for rip rap splash pads at dewatering discharge locations	*3 sites:* · *Tandem Trailer/Park Road East* · *Bifurcation* · *Highland Avenue*	*2 sites:* · *Tandem Trailer/Park Road East* · *Highland Avenue*	*1 site:* · *Highland Avenue*
Impact to state-regulated Riverfront Area(s) due to construction staging	*6 sites:* · *Tandem Trailer/Park Road East* · *Bifurcation* · *Highland Avenue* · *American Legion* · *Hegarty Pumping Station* · *Hultman Aqueduct Isolation Valve*	*5 sites:* · *Tandem Trailer/Park Road East* · *Highland Avenue* · *American Legion* · *Hegarty Pumping Station* · *Hultman Aqueduct Isolation Valve*	*4 sites:* · *Highland Avenue* · *American Legion* · *Hegarty Pumping Station* · *Hultman Aqueduct Isolation Valve*
Temporary impacts to state regulated Bordering Vegetated Wetland (BVW) and federally jurisdictional Vegetated Wetlands (VW) due to a near-surface pipeline for a connection to existing water supply infrastructure	*1 site:* · *American Legion*	*1 site:* · *American Legion*	*1 site:* · *American Legion*
Construction of dewatering discharge pipes and rip rap splash pads would cause temporary impacts to Bank, WW, and LUW	*1 site:* · *American Legion*	*1 site:* · *American Legion*	*1 site:* · *American Legion*

Italicized text within the table indicates no change from the DEIR.

5.2 Wetlands and Waterways Impact Assessment

The following section describes the existing conditions for wetland and waterways resources for the two new SDEIR Alternative sites and Alternatives 3A, 4A, and 10A. It also evaluates anticipated construction-phase impacts and the anticipated impacts under the final conditions for those sites. Resources assessed include wetlands and surface waters such as streams, rivers, and ponds. Avoidance, minimization, and mitigation measures that would be employed during Program design or would be implemented in the construction and operation phases of the Program are also described. Information on the existing quality and usage of the wetlands and waterways is based on publicly accessible information.

5.2.1 Wetlands and Waterways Existing Conditions

Wetland resource areas in the vicinity of the two new SDEIR Alternatives sites, the UMass property site and the Lower Fernald Property site, were reviewed as part of the assessment of existing conditions. An emergent BVW and diffuse channel conveying perennial stream Clematis Brook were identified adjacent to but outside of the limit of work at the UMass Property site (**Figure 5-1**). Wetland resource areas in the vicinity of the Lower Fernald Property site were inspected and field delineated on April 7 and 8, 2022 (**Figure 5-2**). **SDEIR Section 5.2.1.1** and **SDEIR Section 5.2.1.2** summarize the wetland conditions for Alternatives 3A, 4A, and 10A.

All Program sites are located within the Charles River Watershed, which drains approximately 308 square miles through 23 towns and cities in eastern Massachusetts to the Boston Harbor. The two new alternative SDEIR sites are in the upper Charles River basin. The Watertown Dam delineates the upper and middle basins of the Charles River from the lower basin. The UMass Property site and the Lower Fernald Property site would discharge dewatering and stormwater runoff to tributaries of the Charles River.

The Charles River Watershed has two nutrient-focused Total Maximum Daily Loads (TMDLs). The upper and middle basins have goals of 65 percent reduction in total phosphorus (TP), and the lower basin has a goal of 62 percent reduction in TP. The Charles River also has a TMDL for bacteria that recommends measures to reduce pathogen/bacteria inputs to the river such as illicit connection of sewage to storm drains, failing sewer infrastructure, Combined Sewer Overflows, and stormwater discharges (including sheet flow runoff). Enhanced nutrient reduction from stormwater discharges to municipal storm drains may be required by municipalities within the Charles River Watershed to meet MS4 Permit requirements associated with the nutrient focused TMDLs.

5.2.1.1 Alternative 3A/Alternative 4A Existing Conditions

UMass Property

No wetland resources were identified within the limit of disturbance (LOD) for the large connection shaft construction to the tunnel or for the surface connection to the Weston Aqueduct Supply Main 3 (WASM3) See **Figure 5-1**.

The UMass Property site is adjacent to an approximately 17-acre emergent Bordering Vegetated Wetland (BVW) associated with Clematis Brook, a perennial stream. The BVW is located to the east, outside of the UMass Property site, and is dominated by common cattail (*Typha latifolia,* obligate [OBL]) and common reed (*Phragmites australis,* facultative wetland [FACW]). Clematis Brook flows through the northern portion of the wetland in a diffuse channel but is not within 200 feet of the LOD. A summary of wetland resource areas at all Program sites is included in **Table 5-1**.

A desktop review was completed to identify other water resources within the vicinity of the UMass Property site. No DEP Approved Zone I, Zone II, or Interim Wellhead Protection Areas, Outstanding Resource Waters, Surface Water Supply Protection Areas (Zone A, B, C), Natural Heritage and Endangered Species Program (NHESP) Vernal Pools, or Public Water Supplies were identified at or in the vicinity of the UMass Property site.

The nearest surface water resource to the UMass Property site is Clematis Brook, located to the northeast of the UMass Property site. At this location, Clematis Brook enters the large wetland discussed above without a major conveyance channel. The Federal Emergency Management Agency (FEMA) has identified a Zone A Special Flood Hazard Area at elevation 51 feet within the BVW associated with Clematis Brook, which is considered BLSF. Downstream, the wetland discharges to Beaver Brook (MA72-28), a natural bottom channel and the first named receiving water downstream of the UMass Property site. Beaver Brook ultimately discharges to the Charles River. See **Figure 5-1**.

Per the MassDEP's 2018/2020 Integrated List of Waters[1], Beaver Brook is a Category 5 water with the following impairments:

- Non-pollutant impairments
- Flow regime modification
- Other anthropogenic substrate alterations
- Water chestnut growth
- Pollutant impairments
  - Algae
  - Chloride
  - Dissolved oxygen
  - Escherichia Coli (E. Coli)
  - Organic enrichment (sewage) biological indicators
  - Total phosphorus
  - Sedimentation/siltation

1 https://www.mass.gov/doc/final-massachusetts-integrated-list-of-waters-for-the-clean-water-act-20182020-reporting-cycle/download

5.2.1.2 Alternative 10A Existing Conditions

Lower Fernald Property

No wetland resources were identified at the Lower Fernald Property site within the LOD for the receiving shaft construction to the tunnel or for the surface connection to WASM3.

On April 7 and 8, 2022, wetland resource areas in the vicinity of the Lower Fernald Property site were inspected and field delineated (see **Figure 5-2**). Two locations were flagged with tapes labeled "Wetland Boundary" at the locations labeled A-1 to A-14 and B-1 to B-19. Soils, vegetation, and hydrological indicators were examined at each location.

Location A is a marsh dominated by common cattail and common reed. The delineation started at the edge of Waverley Oaks Road at the outer edge of BVW, which was also the edge of the estimated mean annual high-water line to the Clematis Brook, a perennial stream.

Location B was most likely BVW to Clematis Brook before the installation of railroad tracks adjacent to this part of the site. Today Location B is an isolated wetland with dominant plants, including red maple (*Acer rubrum*, facultative [FAC]), green ash (*Fraxinus pensylvanicum*, [FACW]), American elm (*Ulmus americana*, FACW), glossy buckthorn (*Frangula alnus*, FAC), and Tartarian honeysuckle (*Lonicera tartarica*, facultative upland [FACU]). While Location B meets the physical characteristics of "Isolated Land Subject to Flooding," on April 7 and 8, 2022, portions of the surface of the land were wet, but there was no accumulation of surface water. A summary of wetland resource areas at all Program sites is included in **Table 5-2**.

A desktop review was completed to identify other water resources within vicinity of the Lower Fernald Property site. No DEP Approved Zone I, Zone II, or Interim Wellhead Protection Areas, Outstanding Resource Waters, Surface Water Supply Protection Areas (Zone A, B, C), NHESP Vernal Pools, or Public Water Supplies were identified at or in the vicinity of the site.

The nearest surface water resource to the Lower Fernald Property site is Clematis Brook, located to the southwest of the Site but not within 200 feet of the LOD. At this location, Clematis Brook occurs within a large wetland (Wetland A) without a major conveyance channel. FEMA has identified a Zone A Special Flood Hazard Area at elevation 51 feet within the BVW associated with Clematis Brook, which is considered BLSF. Downstream, the wetland discharges to Beaver Brook (MA72-28), a natural bottom channel and the first named receiving water downstream of the Site. A water quality assessment for Beaver Brook is included in **SDEIR Section 5.2.1.1**.

Table 5-2 Wetland Resource Areas Summary – Launching, Receiving, and Large Connection Sites

Site (Alternative)	Town/ City	Wetland Flag Number[1]	Cowardin Type and Description[2]	Bank	LUW/ WW	BVW/ VW	IVW	RA	BLSF	ILSF
UMass Property (3A, 4A)	Waltham	N/A No wetlands within the LOD	PEM and BVW (marsh)	-	-	✓	-	-	✓	-
Lower Fernald Property (10A))	Waltham	A-1 to A-14 No wetlands within the LOD	PEM and BVW (marsh)	✓	✓	✓	-	-	✓	-
		B-1 to B-19	PFO/PSS – IVW, which was likely BVW to Clematis Brook prior to development in the area	-	-	-	✓	-	✓	-
Tandem Trailer/ Park Road East (3A, 4A)	*Weston*	*A-1 to A-6*	*PFO - Seaverns Brook (perennial stream)*	✓	✓	-	-	✓	✓	-
		B-1 to B-9	*PFO - An isolated wetland that could be characterized as a BVW to two roadway culverts that drain from significantly higher elevations*	-	-	-	✓	-	-	-
		F-1 to F-38	*PFO - Intermittent drainage channels with some BVW*	✓	✓	✓	-	-	-	-
Bifurcation (3A)	*Weston*	*B-1 to B-7*	*PFO - Seaverns Brook within a concrete channel with some BVW to the east*	✓	✓	✓	-	✓	✓	-
		C-1 to C-16	*PFO - An intermittent stream with asphalt side walls and BVW*	✓	✓	✓	-	-	-	-
		D-1 to D-19	*PFO - Drainage with a corrugated metal lined culvert (starts at D-11 and D-12)*	-	✓	✓	-	-	-	-
		E-1 to E-22	*PFO - Drainage channel to the north which drains to a culvert under I-90*	✓	✓	-	-	-	-	-
Park Road West (10A)	*Weston*	*A-1 to A-12*	*PFO -Intermittent stream and BVW.*	✓	✓	✓	-	-	-	-
		B-1 to B-5	*PFO - BVW to intermittent stream.*	✓	✓	✓	-	-	-	-

Table 5-2 Wetland Resource Areas Summary – Launching, Receiving, and Large Connection Sites

Site (Alternative)	Town/ City	Wetland Flag Number[1]	Cowardin Type and Description[2]	Bank	LUW/ WW	BVW/ VW	IVW	RA	BLSF	ILSF
Highland Avenue Northwest (3A)	*Needham*	*None*	*NA*	-	-	-	-	-	-	-
Highland Avenue Northwest/ Southwest (4A, 10A)	*Needham*	*None*	*NA*	-	-	-	-	-	-	-
Highland Avenue Northeast/ Southeast	*Needham*	*A-1 to A-12*	*PSS/PEM - A drainage channel which is either non-jurisdictional based on the date of construction or could be considered an intermittent stream.*	✓	✓	✓	-	-	-	-
American Legion	*Boston*	*A-1 to A-16*	*PFO - An intermittent stream that drained to the east and then south*	✓	✓	✓	-	-	-	-
		B-1 to B-12	*PFO - An intermittent stream off the north side of the American Legion Highway and to the west starting near a cemetery and extending east to land that is currently occupied by the Landscape Express company*	✓	✓	✓	-	-	-	-
		C-1 to C-12	*PFO - A continuation of intermittent drainage from the west to the east*	✓	✓	✓	-	-	-	-
		D-1 to D-22	*PEM/PFO - A drainage channel east off the northern side of American Legion Highway and drained from the west to the east*	✓	✓	✓	-	-	-	-
		E-1 to E-16	*PFO - BVW to intermittent stream drainage*	✓	✓	✓	-	-	-	-

1 Wetland Flags are identified in DEIR Figure 4.6-1 through DEIR Figure 4.6-16.

2 Cowardin Types: OW = Open Water, PEM = Palustrine Emergent, PFO = Palustrine Forested, PSS = Palustrine Scrub/Shrub
Wetland Classifications: LUW/WW = Land Under Water, BVW = Bordering Vegetated Wetland, VW=Vegetated Wetland, IVW = Isolated Vegetated Wetland (federal only), RA = Riverfront Area, BLSF = Bordering Land Subject to Flooding, ILSF = Isolated Land Subject to Flooding

NA: Not applicable

Italicized text within the table indicates no change from the DEIR.

Legend

- Proposed Tunnel
- Proposed Facilities
- Proposed Temporary Dewatering Discharge Pipe
- Limit of Permanent Easement or Acquisition
- Temporary Construction Boundary (Limit of Work)
- Existing MWRA Distribution Pipe
- Wetland Flag
- Bordering Vegetated Wetland
- Perennial Watercourse
- Bordering Vegetated Wetland/ Perennial Watercourse
- Intermittent Watercourse
- 100' Wetland Buffer
- 100' Wetland/Inner Riparian Buffer
- Inner Riparian Buffer (0-100')
- Outer Riparian Buffer (100'-200')
- FEMA 100-Year Floodplain
- Parcel Boundary
- Shoreline
- Hydrologic Connection
- Wetland Limit
- Closure Line
- Marsh/Bog
- Wooded Marsh
- Open Water

Wetland C (Flags C1-C10)

Wetland B (Flags B1-B19)

Wetland A (Flags C25-C41)

Wetland D (Flags C11-C24)

Wetland A (Flags A1-A14)

A

B

C

D

Clematis Brook

Beaver Brook

CHAPEL ROAD

OAK STREET

CEDAR STREET

BISHOP TERRACE

PHILLIPS CIRCLE

PARKVIEW ROAD

CEDAR HILL LANE

LINDEN CIRCLE

FLORAL CIRCLE

LINDEN STREET

LINDEN PARK DRIVE

MARIANNE ROAD

LINDEN TERRACE

WAVERLEY OAKS ROAD

BEAVER STREET

CLEMATIS AVENUE

HOLLACE STREET

WILBUR STREET

WARREN STREET

PELHAM ROAD

BEAL ROAD

BARBARA ROAD

CLEVELAND ROAD

WINDSOR TERRACE

MAYALL ROAD

PARSONS AVENUE

60

0 100 200 400 600 800 1,000 US Feet

N

Metropolitan Water Tunnel Program	MWRA Contract No. 7159 Supplemental Draft Environmental Impact Report 2023	CDM Smith in association with vhb Jacobs GREEN INTERNATIONAL AFFILIATES, INC.	**Wetlands and Waterways** **UMass Property Large Connection Shaft Site (Alternatives 3A and 4A)** **Figure 5-1** Waltham, MA Source: MWRA, CDM Smith, VHB, Jacobs, MassGIS

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Legend

- Proposed Tunnel
- Proposed Facilities
- Proposed Temporary Dewatering Discharge Pipe
- Limit of Permanent Easement or Acquisition
- Temporary Construction Boundary (Limit of Work)
- Existing MWRA Distribution Pipe
- Wetland Flag
- Bordering Vegetated Wetland
- Perennial Watercourse
- Bordering Vegetated Wetland/ Perennial Watercourse
- Intermittent Watercourse
- 100' Wetland Buffer
- 100' Wetland/Inner Riparian Buffer
- Inner Riparian Buffer (0-100')
- Outer Riparian Buffer (100'-200')
- FEMA 100-Year Floodplain
- Parcel Boundary
- Shoreline
- Hydrologic Connection
- Wetland Limit
- Closure Line
- Marsh/Bog
- Wooded Marsh
- Open Water
- Municipal Boundary

WALTHAM

Wetland D (Flags D1-D24)

Wetland C (Flags C1-C10)

Wetland B (Flags B1-B19)

Wetland A (Flags C25-C41)

Wetland D (Flags C11-C24)

Wetland A (Flags A1-A14)

CHERRY LANE
PINE STREET
MAPLE STREET
CEDAR STREET
HILL STREET
OAK STREET
CHAPEL ROAD
TIP TOP TERRACE
SHAMMUT ROAD
FREEMONT TERRACE
UPTON ROAD
SHIRLEY ROAD
PARKVIEW ROAD
WILSON ROAD
BISHOP TERRACE
PHILLIPS CIRCLE
WAVERLEY OAKS ROAD
BEAVER STREET
Clematis Brook
Beaver Brook
CLEMATIS AVENUE
HOLLACE STREET
WILBUR STREET
WAVERLEY STREET
WILTON STREET
CIRCUIT LANE

60

A
B
C
D

0 100 200 400 600 800 1,000
US Feet

N

Metropolitan Water Tunnel Program

MWRA Contract No. 7159
Supplemental Draft Environmental Impact Report 2023

in association with CDM Smith vhb Jacobs GREEN INTERNATIONAL AFFILIATES, INC.

Wetlands and Waterways
Lower Fernald Property Receiving Shaft Site (Alternative 10A)
Figure 5-2

Waltham, MA

Source: MWRA, CDM Smith, VHB, Jacobs, MassGIS

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5.2.1.3 Tunnel Alignments

Wetlands and surface waters along the tunnel alignments were identified based on existing data sources as described in **DEIR Chapter 4.6, Wetlands and Waterways, Section 4.6.3, Methodology (pg. 4.6-9)** and were not field delineated.

The following wetlands and waterbodies are within 1,000 feet of the SDEIR North Tunnel, Segment 1 alignment alternatives that terminate either at the UMass Property or Lower Fernald Property sites. Wetlands and waterbodies along each of the other tunnel segments are the same as identified in **DEIR Section 4.6.3, Methodology (pg. 4.6-9).** The tunnel would be located between approximately 200 and 400 feet below ground surface within the rock, well below the bottom elevation of the surface waterbodies. The waterbodies are common to all three alternatives.

- Clematis Brook, Waltham
- Beaver Brook, Waltham
- Chester Brook/Lyman Pond, Waltham
- Charles River, Waltham, Weston, Newton

See **Figure 5-3** and **Figure 5-4** for wetlands and waterways along the Alternative 3A and 4A North Tunnel, Segment 1 alignment, and **Figure 5-5** and **Figure 5-6** for wetlands and waterways along the Alternative 10A North Tunnel, Segment 1 alignment.

5.2.2 Wetlands and Waterways Construction Period Impacts

There would be no direct wetland impacts associated with the two new SDEIR alternative sites.

Direct wetland impacts, including temporary and permanent (which could be associated with shaft construction or dewatering) are not anticipated as a result of construction on the two new SDEIR Alternative sites. Each of the three SDEIR Alternatives was assessed for the presence of wetland resources along the revised tunnel alignments and within and adjacent to proposed sites, and the impacts associated with them. Impacts were evaluated for the UMass Property and Lower Fernald Property sites and discussed below. Construction period impacts associated with other sites that were part of the DEIR alternatives have not changed and can be referenced in **DEIR Section 4.6.5, Construction Period Impacts (pg. 4.6-127).**

Temporary impacts are unavoidable disturbances to wetlands during construction of the Program but would not impact the wetland beyond the construction period.

Temporary impacts associated with the two new SDEIR Alternative sites would include indirect impacts from the migration of exposed soils, which would cease once construction is complete and sites are stabilized. To avoid and minimize construction-period impacts, the construction contractors would be required to provide erosion and sedimentation control plans prior to commencement of any work that would include ground disturbance. Disturbed areas would be restored to preconstruction conditions and revegetated. The proposed interconnection pipelines would be constructed below ground within the

existing roadway layout and affected areas would be restored to preconstruction conditions following pipeline installation. No wetland crossings or wetland impacts are proposed. During construction, the Program would meet the requirements of the United States Environmental Protection Agency (USEPA) NPDES 2022 CGP[2] (or the CGP in effect at the time of construction) since all SDEIR Alternatives would cumulatively disturb more than 1 acre of land (as further described in **Table 5-11, Table 5-12,** and **Table 5-13**).

The Program would include implementation of erosion and sedimentation controls during each phase of construction through implementation of a NPDES SWPPP. All Program sites would be covered by a SWPPP that specifies proper erosion and sedimentation control for disturbed areas at each site and outlines procedures aimed at minimizing the transport of sediment into nearby waters. The SWPPP would be adhered to at all sites and throughout all phases of the Program implementation and would be adapted to fit the contractor's equipment, weather conditions, and construction activity for each site. The contents of the SWPPP are further described in **SDEIR Section 5.2.5**.

There would be no permanent wetland impacts associated with the two new SDEIR alternative sites.

Permanent impacts, which would be the loss of a wetland resource area following construction, may result from wetland fill, dredging, or waterway alteration. No permanent direct or indirect wetland impacts are anticipated at either of the new SDEIR Alternative sites due to shaft and tunnel construction, construction dewatering practices, or establishment of surface connections to existing facilities.

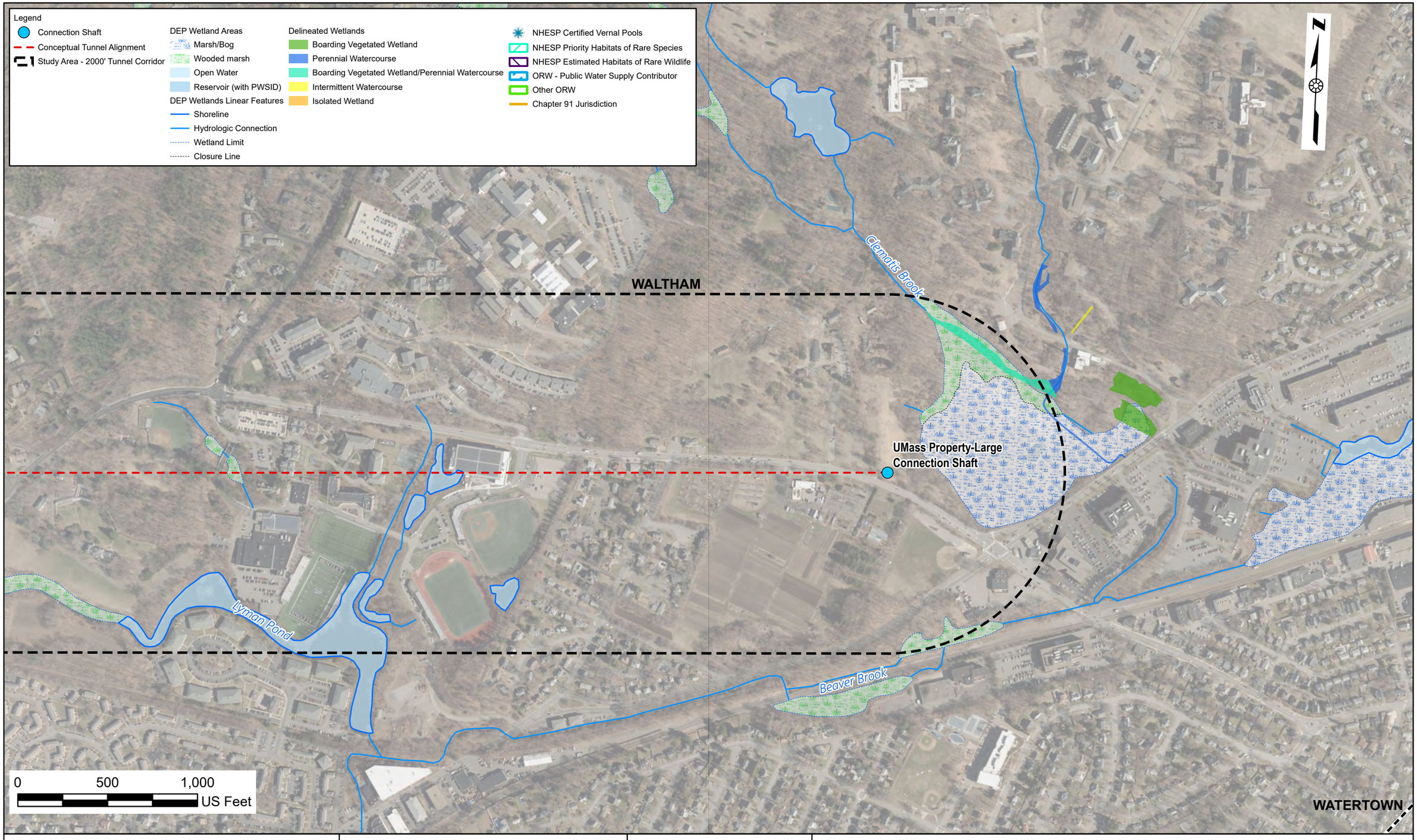
Potential impacts due to construction dewatering as well as temporary wetland impacts are described below for the two new sites.

5.2.2.1 Alternative 3A/Alternative 4A Construction Period Impacts

UMass Property

At the UMass Property site, Alternatives 3A and 4A would include a raised bore shaft and associated staging area, which would be adjacent to wetland resources associated with Clematis Brook (see SDEIR **Figure 5-1**). Appropriate erosion and sedimentation controls would be implemented on-site to protect adjacent wetlands, as detailed in the NPDES SWPPP to be developed and implemented by the contractor prior to construction. These measures would include installation of perimeter erosion controls, such as compost filter tubes, straw bales, and/or siltation fence and other BMPs as needed. During shaft construction, dewatering of approximately 100 gallons per minute (GPM) of groundwater inflow would be required. The groundwater would be treated at a temporary water treatment facility within the staging area and discharged to the adjacent wetland that drains to Clematis Brook via an approximately 12-inch diameter pipe with a Flared End Section (FES) (as shown in **SDEIR Figure 5-1**).

2 US Environmental Protection Agency. 2022. National Pollutant Discharge Elimination System General Permit for Discharges from Construction Activities. US EPA, February 17, 2022, https://www.epa.gov/system/files/documents/2022-01/2022-cgp-final-permit.pdf



Metropolitan Water Tunnel Program	MWRA Contract No. 7159 Supplemental Draft Environmental Impact Report 2023	CDM Smith in association with vhb Jacobs GREEN INTERNATIONAL AFFILIATES, INC.	**Wetlands and Waterways Overview Map** **North Tunnel Terminus at UMass Property (Alternatives 3A and 4A)** **Figure 5-3** Waltham, MA Source: MWRA, CDM Smith, VHB, Jacobs, MassGIS

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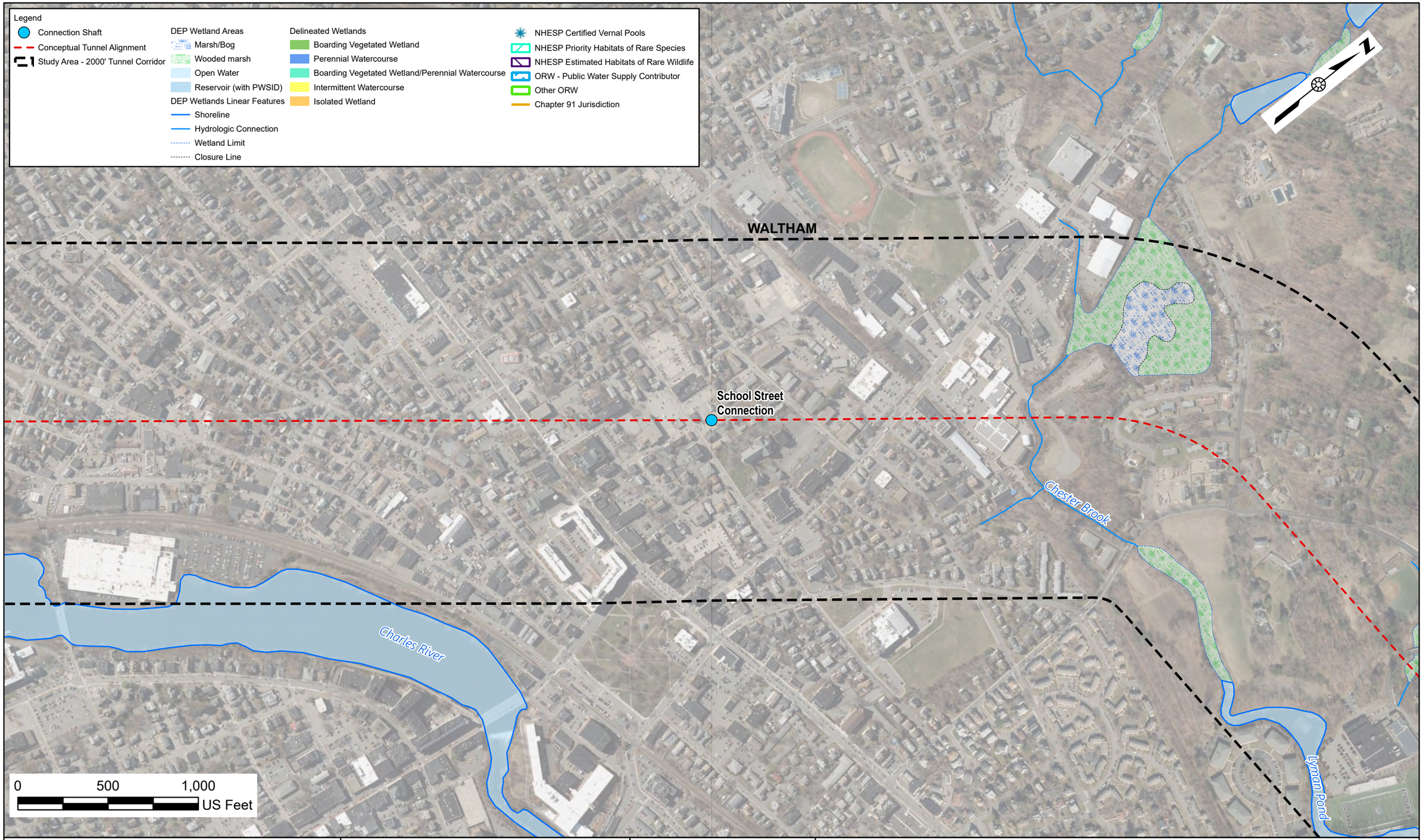

Metropolitan Water Tunnel Program	MWRA Contract No. 7159 Supplemental Draft Environmental Impact Report 2023	CDM Smith in association with vhb Jacobs GREEN INTERNATIONAL AFFILIATES, INC.	**Wetlands and Waterways Overview Map** **North Tunnel Terminus at UMass Property (Alternatives 3A and 4A)** **Figure 5-4** Waltham, MA Source: MWRA, CDM Smith, VHB, Jacobs, MassGIS

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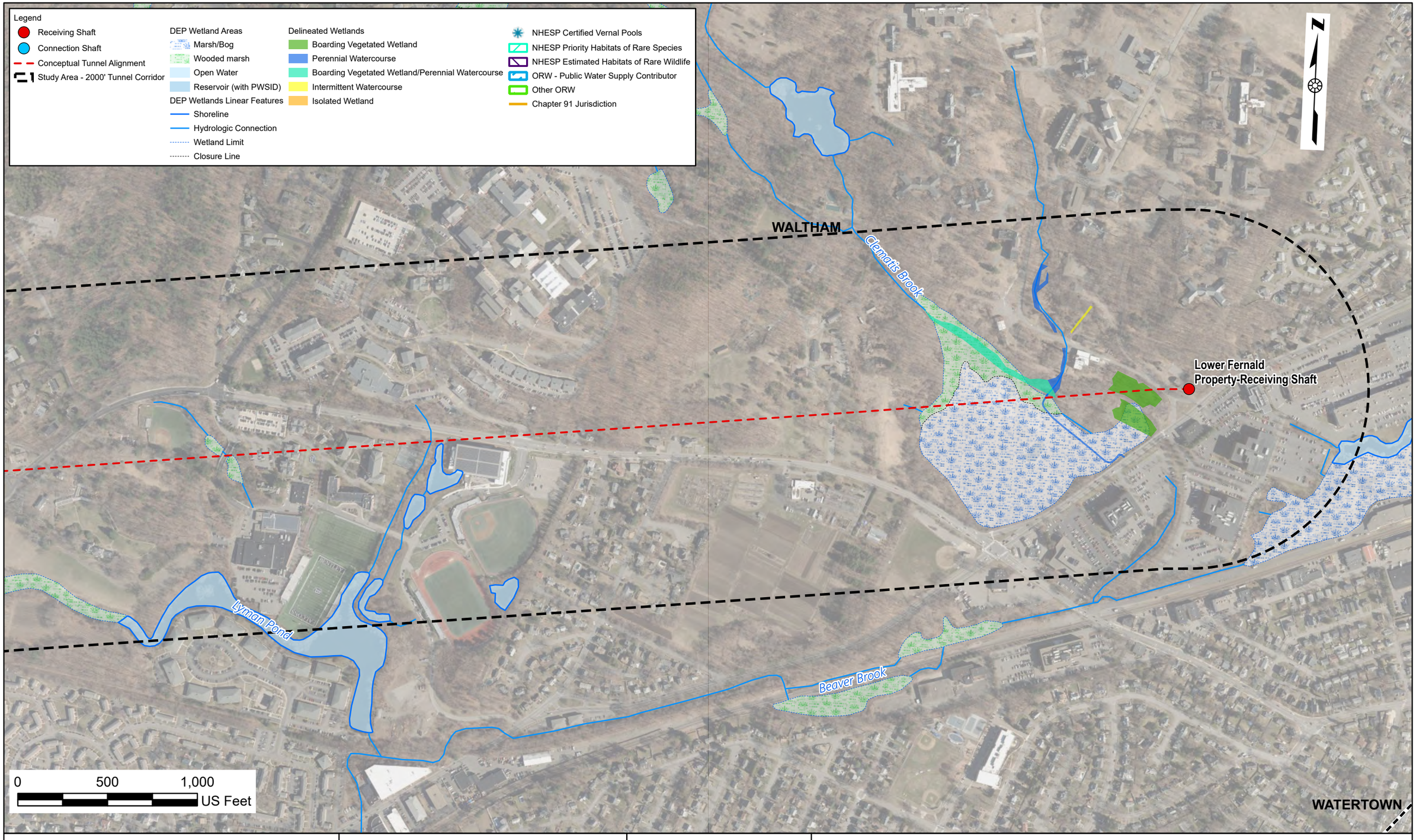

Metropolitan Water Tunnel Program	**MWRA Contract No. 7159** **Supplemental Draft Environmental Impact Report 2023**	CDM Smith in association with vhb Jacobs GREEN INTERNATIONAL AFFILIATES, INC.	**Wetlands and Waterways Overview Map** **North Tunnel Terminus at Lower Fernald Property (Alternative 10A)** **Figure 5-5** Waltham, MA Source: MWRA, CDM Smith, VHB, Jacobs, MassGIS

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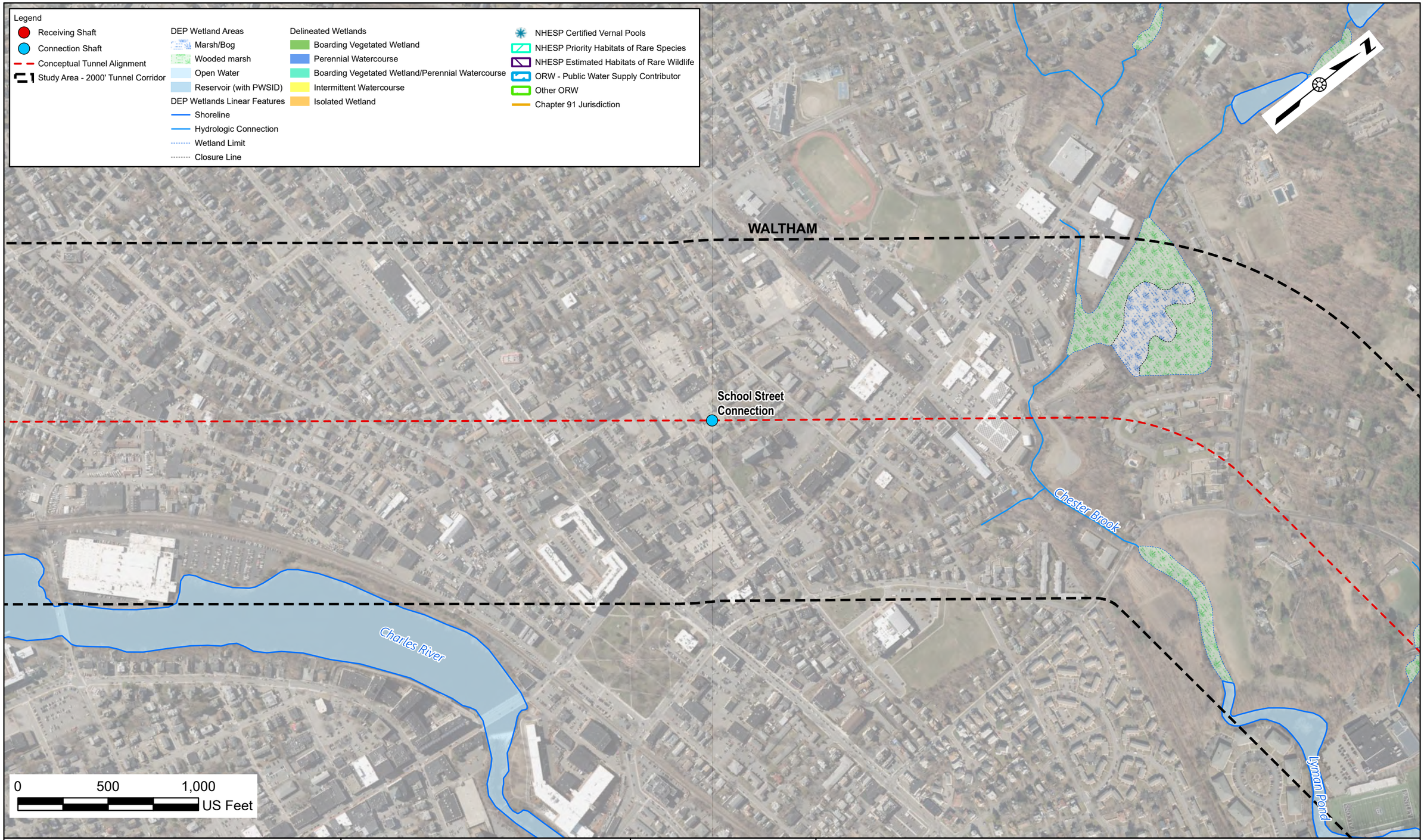

Metropolitan Water Tunnel Program	MWRA Contract No. 7159 Supplemental Draft Environmental Impact Report 2023	CDM Smith in association with vhb Jacobs GREEN INTERNATIONAL AFFILIATES, INC.	**Wetlands and Waterways Overview Map** **North Tunnel Terminus at Lower Fernald Property (Alternative 10A)** **Figure 5-6** Waltham, MA Source: MWRA, CDM Smith, VHB, Jacobs, MassGIS

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At the discharge location an approximately 91-square-foot riprap splash pad would be temporarily installed adjacent to the wetland resource areas associated with Clematis Brook to mitigate potential scour due to the discharge. The temporary dewatering discharge pipeline and FES would be installed outside of the limits of the BVW and BLSF and the site would be restored to preconstruction contours and vegetation upon completion of construction.

The new impervious surfaces consisting of a paved driveway and paved parking area would result in an increase in stormwater runoff (see **SDEIR Section 5.2.4** for a discussion of changes to impervious cover at each site). Mitigation for the associated increase in peak discharge would include the construction of a stormwater management basin at the north end of the site, in accordance with the MassDEP Stormwater Management Standards. New point source discharges would include only treated discharges from the proposed stormwater management basin. Restoration of the site would be completed as agreed to between the MWRA and the University of Massachusetts for the final conditions.

As discussed in **SDEIR Chapter 3, Outreach Environmental Justice, Section 3.4.3.1, Alternative 3A/Alternative 4A Construction Period Impacts,** construction period impacts on wetlands and waterways would have no adverse impact on identified environmental justice (EJ) populations for the UMass Property site. **Table 5-3** and **Table 5-4** summarize the temporary and permanent direct wetland impacts anticipated at each of the Program sites included in Alternatives 3A and 4A.

Table 5-3 Alternative 3A - Wetland Impacts at Launching, Receiving, and Large Connection Sites

Site and Structure/Activity	Resource Area(s) Affected	Temporary Impacts	Permanent Impacts	Total Impacts
UMass Property Large Connection				
No wetland impacts	None	0	0	0
SUBTOTAL	**None**	**0**	**0**	**0**
Tandem Trailer/Park Road East Launching				
Discharge Pipe & Splash Pad	*Bank (lf)*	*8*	*26*	*34*
	BLSF (sf)	*300*	*368*	*668*
	LUW/WW (sf)	*652*	*368*	*1020*
Construction Staging Area	*RA*	*105,722*	*0*	*105,722*
Top-of-Shaft Structure	*RA*	*0*	*1,685*	*1,685*
SUBTOTAL	***Bank (lf)***	***8***	***26***	***34***
	BLSF (sf)	***300***	***368***	***668***
	LUW/WW (sf)	***652***	***368***	***1,020***
	RA (sf)	***105,722***	***1,685***	***107,407***
Bifurcation Launching				
Discharge Pipe & Splash Pad	*Bank (lf)*	*8*	*26*	*34*
	BLSF	*250*	*368*	*618*
	LUW/WW (sf)	*652*	*368*	*1,020*
Construction Staging Area	*RA*	*33,987*	*0*	*33,987*
SUBTOTAL	***Bank (lf)***	***8***	***26***	***34***
	BLSF	***250***	***368***	***618***
	LUW/WW (sf)	***652***	***368***	***1,020***
	RA	***33,987***	***0***	***33,987***
Highland Avenue Sites				
Discharge Pipe	*RA*	*4,322*	*0*	*4,322*
Discharge Pipe & Splash Pad	*Bank (lf)*	*8*	*26*	*34*
	BLSF (sf)	*1,340*	*660*	*2,000*
	LUW/WW (sf)	*652*	*368*	*1,020*
SUBTOTAL	***Bank (lf)***	***8***	***26***	***34***
	BLSF (sf)	***1,340***	***660***	***2,000***
	LUW/WW (sf)	***652***	***368***	***1,020***
	RA (sf)	***4,322***	***0***	***4,322***

Table 5-3 Alternative 3A - Wetland Impacts at Launching, Receiving, and Large Connection Sites

Site and Structure/Activity	Resource Area(s) Affected	Temporary Impacts	Permanent Impacts	Total Impacts
American Legion Receiving				
Discharge Pipe & Splash Pad[1]	Bank (lf)	19	0	19
	LUW/WW (sf)	380	0	380
Discharge Pipe	*RA (sf)*	*845*	*0*	*845*
Connection Pipeline	*BVW/VW (sf)*	*1,558*	*0*	*1,558*
SUBTOTAL	***BVW/VW (sf)***	***1,558***	***0***	***1,558***
	Bank (lf)	**8**	**11**	**19**
	LUW/WW (sf)	**289**	**91**	**380**
	RA (sf)	***845***	***0***	***845***
TOTAL	**BVW/VW (sf)**	**1,558**	**0**	**1,558**
	Bank (lf)	**43**	**78**	**121**
	BLSF (sf)	**1,890**	**1,396**	**3,286**
	LUW/WW (sf)	**2,336**	**1,104**	**3,440**
	RA (sf)	**144,876**	**1,685**	**146,561**

1 These values have been updated from the DEIR to reflect that discharge pipe and splash pad to be installed at the American Legion site for dewatering would be temporary and would be removed and the impacted area would be restored to existing conditions at the end of construction.

RA – Riverfront Area, BLSF – Bordering Land Subject to Flooding, BVW – Bordering Vegetated Wetlands, VW – Vegetated Wetlands

Italicized text within the table indicates no change from the DEIR

Table 5-4 Alternative 4A - Wetland Impacts at Launching, Receiving, and Connection Sites

Site and Structure/Activity	Resource Area(s) Affected	Temporary Impacts	Permanent Impacts	Total Impacts
UMass Property Large Connection				
No wetland impacts	None	0	0	0
SUBTOTAL	None	0	0	0
Tandem Trailer/Park Road East Launching				
Discharge Pipe & Splash Pad	*Bank (lf)*	*8*	*26*	*34*
	BLSF (sf)	*300*	*368*	*668*
	LUW/WW (sf)	*652*	*368*	*1020*
Construction Staging Area	*RA*	*105,722*	*0*	*105,722*
Top-of-Shaft Structure	*RA*	*0*	*1,685*	*1,685*
SUBTOTAL	***Bank (lf)***	***8***	***26***	***34***
	BLSF (sf)	***300***	***368***	***668***
	LUW/WW (sf)	***652***	***368***	***1,020***
	RA (sf)	***105,722***	***1,685***	***107,707***
Highland Avenue Sites				
Discharge Pipe	*RA*	4,322	0	4,322
Discharge Pipe & Splash Pad	*Bank (lf)*	8	26	34

Table 5-4 Alternative 4A - Wetland Impacts at Launching, Receiving, and Connection Sites

Site and Structure/Activity	Resource Area(s) Affected	Temporary Impacts	Permanent Impacts	Total Impacts
	BLSF (sf)	1,340	660	2,000
	LUW/WW (sf)	652	368	1,020
SUBTOTAL	***Bank (lf)***	**8**	**26**	**34**
	BLSF (sf)	**1,340**	**660**	**2,000**
	LUW/WW (sf)	**652**	**368**	**1,020**
	RA (sf)	**4,322**	**0**	**4,322**
American Legion Receiving				
Discharge Pipe & Splash Pad[1]	Bank (lf)	19	0	19
	LUW/WW (sf)	380	0	380
Discharge Pipe	*RA (sf)*	*845*	*0*	*845*
Connection Pipeline	*BVW/VW (sf)*	*1,558*	*0*	*1,558*
SUBTOTAL	**BVW/VW (sf)**	**1,558**	**0**	**1,558**
	Bank (lf)	**8**	**11**	**19**
	LUW/WW (sf)	**289**	**91**	**380**
	RA (sf)	**845**	**0**	**845**
TOTAL	**BVW/VW (sf)**	**1,558**	**0**	**1,558**
	Bank (lf)	**35**	**52**	**87**
	BLSF (sf)	**1,640**	**1,028**	**2,668**
	LUW/WW (sf)	**1,684**	**736**	**2,420**
	RA (sf)	**110,889**	**1,685**	**112,874**

1 These values have been updated from the DEIR to reflect that discharge pipe and splash pad to be installed at the American Legion site for dewatering would be temporary and would be removed and the impacted area would be restored to existing conditions at the end of construction.

RA – Riverfront Area, BLSF – Bordering Land Subject to Flooding, BVW – Bordering Vegetated Wetlands, VW – Vegetated Wetlands

Italicized text within the table indicates no change from the DEIR.

5.2.2.2 Alternative 10A Construction Period Impacts

Lower Fernald Property

At the Lower Fernald Property site, Alternative 10A would include a TBM receiving shaft and associated staging area, which would be adjacent to wetland resources associated with Clematis Brook (see **Figure 5-2**). Appropriate erosion and sedimentation controls would be implemented on-site to protect adjacent wetlands, as detailed in the NPDES SWPPP to be developed and implemented by the contractor prior to construction. These measures would include installation of perimeter erosion controls, such as compost filter tubes, straw bales, and/or siltation fence and other BMPs as needed. During shaft construction, dewatering of approximately 300 GPM of groundwater inflow would be required. The groundwater would be treated at a temporary water treatment facility within the staging area and discharged to the adjacent wetland that drains to Clematis Brook, to the South of Chapel Road, via an approximately 12-inch diameter pipe with a FES (as shown in **Figure 5-2**).

At the discharge location an approximately 91-square-foot riprap splash pad would be temporarily installed outside of the wetland resources areas associated with Clematis Brook to mitigate potential scour due to the discharge. The pipeline would be buried, and the site would be restored to preconstruction contours and vegetation upon completion of construction. The temporary dewatering discharge pipeline and FES would be installed outside of all wetland resource areas.

The new impervious surfaces consisting of a paved access road and paved parking area would result in an increase in stormwater runoff (see **SDEIR Section 5.2.4** for a discussion of changes to impervious cover at each site). Mitigation for the potential increase in peak discharge would include the construction of a stormwater management basin on the east side of the site in accordance with the MassDEP Stormwater Management Standards. New point source discharges would include only treated discharges from the proposed stormwater management basin. Restoration of the site would be completed as agreed to between the MWRA and the City of Waltham for the final conditions.

As discussed in **SDEIR Section 3.4.3.2, Alternative 10A Construction Period Impacts** construction period impacts on wetlands and waterways would have no adverse impact on identified EJ populations for the Lower Fernald Property site. **Table 5-5** summarizes the temporary and permanent direct wetland impacts anticipated at each of the Program sites included in Alternative 10A.

Table 5-5 Alternative 10A - Wetland Impacts at Proposed Launching and Receiving Sites

Shaft Site & Structure/Activity	Resource Area(s) Affected	Temporary Impacts (sf)	Permanent Impacts (sf)	Total Impacts (sf)
Lower Fernald Property Receiving				
N/A	None	0	0	0
SUBTOTAL	None	0	0	0
Highland Avenue Sites				
Discharge Pipe	*RA*	*4,322*	*0*	*4,322*
Discharge Pipe and *Splash Pad*	*Bank (lf)*	*8*	*36*	*44*
	BLSF (sf)	*1,340*	*660*	*2,000*
	LUW/WW (sf)	*1,034*	*726*	*1,760*
SUBTOTAL	***Bank (lf)***	***8***	***36***	***44***
	BLSF (sf)	***1,340***	***660***	***2,000***
	LUW/WW (sf)	***1,034***	***726***	***1,760***
	RA (sf)	***4,322***	***0***	***4,322***
American Legion Receiving				
Discharge Pipe & Splash Pad[1]	Bank (lf)	19	0	19
	LUW/WW (sf)	380	0	380
Discharge Pipe	*RA (sf)*	*845*	*0*	*845*
Connection Pipeline	*BVW/VW (sf)*	*1,558*	*0*	*1,558*
SUBTOTAL	**BVW/VW (sf)**	**1,558**	**0**	**1,558**
	Bank (lf)	**8**	**11**	**19**
	LUW/WW (sf)	**289**	**91**	**380**
	RA (sf)	**845**	**0**	**845**
TOTAL	**BVW/VW (sf)**	**1,558**	**0**	**1,558**
	Bank (lf)	**27**	**36**	**63**
	BLSF (sf)	**1,340**	**660**	**2,000**
	LUW/WW (sf)	**1,414**	**726**	**2,140**
	RA (sf)	**5,167**	**0**	**5,167**

1 These values have been updated from the DEIR to reflect that discharge pipe and splash pad to be installed at the American Legion site for dewatering would be temporary and would be removed and the impacted area would be restored to existing conditions at the end of construction.

RA – Riverfront Area, BLSF – Bordering Land Subject to Flooding, BVW – Bordering Vegetated Wetlands, VW – Vegetated Wetlands

Italicized text within the table indicates no change from the DEIR.

Table 5-6 includes a summary of temporary and permanent impacts to wetland resource areas at each of the proposed Program sites for Alternatives 3A, 4A, and 10A.

Table 5-6 Summary of Wetland Impacts by Municipality Alternatives 3A, 4A, 10A

Sites by Municipality	Resource Area(s) Affected	Alternative 3A			Alternative 4A			Alternative 10A		
		Temporary Impacts (sf/lf)	Permanent Impacts (sf/lf)	Total Impacts (sf/lf)	Temporary Impacts (sf/lf)	Permanent Impacts (sf/lf)	Total Impacts (sf/lf)	Temporary Impacts (sf/lf)	Permanent Impacts (sf/lf)	Total Impacts (sf/lf)
Waltham										
UMass Property	None	0	0	0	0	0	0	0	0	0
Lower Fernald Property	None	0	0	0	0	0	0	0	0	0
School Street	*None*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Cedarwood Pumping Station	*None*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
SUBTOTAL WALTHAM	**None**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Weston										
Tandem Trailer/ Park Road East	*Bank (lf)*	*8*	*26*	*34*	*8*	*26*	*34*	*0*	*0*	*0*
	BLSF (sf)	*300*	*368*	*668*	*300*	*368*	*668*	*0*	*0*	*0*
	LUW/WW (sf)	*652*	*368*	*1,020*	*652*	*368*	*1,020*	*0*	*0*	*0*
	RA (sf)	*105,722*	*1,685*	*107,407*	*105,722*	*1,685*	*107,407*	*0*	*0*	*0*
Bifurcation	*Bank (lf)*	*8*	*26*	*34*	*0*	*0*	*0*	*0*	*0*	*0*
	BLSF (sf)	*250*	*368*	*618*	*0*	*0*	*0*	*0*	*0*	*0*
	LUW/WW (sf)	*652*	*368*	*1,020*	*0*	*0*	*0*	*0*	*0*	*0*
	RA (sf)	*33,987*	*0*	*33,987*	*0*	*0*	*0*	*0*	*0*	*0*
Park Road West	*None*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Hultman Aqueduct Isolation Valve	*RA (sf)*	*7,837*	*2,989*	*10,826*	*7,837*	*2,989*	*10,826*	*7,837*	*2,989*	*10,826*
SUBTOTAL WESTON	**Bank (sf)**	**16**	**52**	**68**	**8**	**26**	**34**	**0**	**0**	**0**
	BLSF (lf)	**550**	**736**	**1,286**	**300**	**368**	**668**	**0**	**0**	**0**

Table 5-6 Summary of Wetland Impacts by Municipality Alternatives 3A, 4A, 10A

Sites by Municipality	Resource Area(s) Affected	Alternative 3A			Alternative 4A			Alternative 10A		
		Temporary Impacts (sf/lf)	Permanent Impacts (sf/lf)	Total Impacts (sf/lf)	Temporary Impacts (sf/lf)	Permanent Impacts (sf/lf)	Total Impacts (sf/lf)	Temporary Impacts (sf/lf)	Permanent Impacts (sf/lf)	Total Impacts (sf/lf)
	LUW/WW (sf)	**1,304**	**736**	**2,040**	**652**	**368**	**1,020**	**0**	**0**	**0**
	RA (sf)	**147,546**	**4,674**	**152,220**	**113,559**	**4,674**	**118,233**	**7,837**	**2,989**	**10,826**
Wellesley										
Hegarty Pumping Station	*RA (sf)*	*5,757*	*157*	*5,914*	*5,757*	*157*	*5,914*	*5,757*	*157*	*5,914*
SUBTOTAL WELLESLEY	***RA (sf)***	***5,757***	***157***	***5,914***	***5,757***	***157***	***5,914***	***5,757***	***157***	***5,914***
Needham										
Highland Avenue Sites	*Bank (lf)*	*8*	*26*	*34*	*8*	*26*	*34*	*8*	*36*	*44*
	BLSF (sf)	*1,340*	*660*	*2,000*	*1,340*	*660*	*2,000*	*1,340*	*660*	*2,000*
	LUW/WW (sf)	*652*	*368*	*1,020*	*652*	*368*	*1,020*	*1,034*	*726*	*1,760*
	RA (sf)	*4,322*	*0*	*4,322*	*4,322*	*0*	*4,322*	*4,322*	*0*	*4,322*
St. Mary Street Pumping Station	*None*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
SUBTOTAL NEEDHAM	***Bank (lf)***	***8***	***26***	***34***	***8***	***26***	***34***	***8***	***36***	***44***
	BLSF (sf)	***1,340***	***660***	***2,000***	***1,340***	***660***	***2,000***	***1,340***	***660***	***2,000***
	LUW/WW (sf)	***652***	***368***	***1,020***	***652***	***368***	***1,020***	***1,034***	***726***	***1,760***
	RA (sf)	***4,322***	***0***	***4,322***	***4,322***	***0***	***4,322***	***4,322***	***0***	***4,322***

Table 5-6 Summary of Wetland Impacts by Municipality Alternatives 3A, 4A, 10A

Sites by Municipality	Resource Area(s) Affected	Alternative 3A			Alternative 4A			Alternative 10A		
		Temporary Impacts (sf/lf)	Permanent Impacts (sf/lf)	Total Impacts (sf/lf)	Temporary Impacts (sf/lf)	Permanent Impacts (sf/lf)	Total Impacts (sf/lf)	Temporary Impacts (sf/lf)	Permanent Impacts (sf/lf)	Total Impacts (sf/lf)
Brookline										
Newton Street Pumping	*None*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
SUBTOTAL BROOKLINE	***None***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***
Boston										
American Legion[1]	*BVW/VW (sf)*	*1,558*	*0*	*1,558*	*1,558*	*0*	*1,558*	*1,558*	*0*	*1,558*
	Bank (lf)	19	0	19	19	0	19	19	0	19
	LUW/WW (sf)	380	0	380	380	0	380	380	0	380
	RA (sf)	*845*	*0*	*845*	*845*	*0*	*845*	*845*	*0*	*845*
Southern Spine Mains	*None*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
SUBTOTAL BOSTON	**BVW/VW (sf)**	**1,558**	**0**	**1,558**	**1,558**	**0**	**1,558**	**1,558**	**0**	**1,558**
	Bank (lf)	**19**	**0**	**19**	**19**	**0**	**19**	**19**	**0**	**19**
	LUW/WW (sf)	**380**	**0**	**380**	**380**	**0**	**380**	**380**	**0**	**380**
	RA (sf)	**845**	**0**	**845**	**845**	**0**	**845**	**845**	**0**	**845**

Table 5-6 Summary of Wetland Impacts by Municipality Alternatives 3A, 4A, 10A

Sites by Municipality	Resource Area(s) Affected	Alternative 3A			Alternative 4A			Alternative 10A		
		Temporary Impacts (sf/lf)	Permanent Impacts (sf/lf)	Total Impacts (sf/lf)	Temporary Impacts (sf/lf)	Permanent Impacts (sf/lf)	Total Impacts (sf/lf)	Temporary Impacts (sf/lf)	Permanent Impacts (sf/lf)	Total Impacts (sf/lf)
GRAND TOTAL	BVW/VW (sf)	1,558	0	1,558	1,558	0	1,558	1,558	0	1,558
	Bank (sf)	43	78	121	35	52	87	27	36	63
	BLSF (sf)	1,890	1,396	3,286	1,640	1,028	2,668	1,340	660	2,000
	LUW/WW (sf)	2,336	1,104	3,440	1,684	736	2,420	1,414	726	2,140
	RA (sf)	158,470	4,831	163,301	124,483	4,831	129,314	18,761	3,146	21,907

1 The discharge pipe and splash pad to be installed at the American Legion site for dewatering would be temporary and would be removed and the impacted area would be restored to existing conditions at the end of construction.

RA – Riverfront Area, BLSF – Bordering Land Subject to Flooding, BVW – Bordering Vegetated Wetlands, VW – Vegetated Wetlands, LUW/WW- Land Under Waterbodies and Waterways.

Italicized text within the table indicates no change from the DEIR.

5.2.2.3 Tunnel Alignments

Tunnel alignments for the three SDEIR Alternatives would be located in deep rock, with the lowest elevation at the launching shafts.[3] The TBMs would proceed from the launching shafts driving at an upward grade to the receiving shafts or large connection sites, which would also be in deep rock. This would allow for gravity drainage of groundwater back to the launching sites during construction. The tunnel profiles, tunnel alignments, and invert depths of the launching and receiving shafts would vary slightly among the SDEIR Alternatives (as described in **SDEIR Chapter 2, Alternatives, Section 2.10, Construction Methodology**).

Given the deep depths of the proposed tunnels, a direct hydrologic connection between the tunnels and surface waters and wetlands would be unlikely, however unmitigated groundwater drawdown during tunnel construction could, in extreme cases, reduce the levels of local water bodies. Therefore, the Program would employ mitigation practices to address the potential impacts to surface waters and wetlands along the alignment, as discussed in **SDEIR Section 5.2.4** and described in more detail in the **DEIR Section 4.6.5.3, Tunnel Alignments – All Alternatives (pg. 4.6-149)**.

Alternative Alignment 3A

Shaft construction at the UMass Property site would result in dewatering volumes of approximately 100 GPM, while larger volumes of dewatering due to tunnel construction would occur at each of the tunnel launching sites. **Table 5-7** summarizes the impacts to receiving water flows from dewatering discharges at launching, receiving, and large connection sites in Alternatives 3A.

To estimate the flow rates in the existing receiving waterbodies, the U.S. Geological Survey (USGS) Stream Stats: Stream Flow Statistics and Spatial Analysis Tool (web application) was utilized,[4] as described in **DEIR Appendix D.2, USGS Stream Stats Results**. The web application was used to delineate drainage areas for waterways adjacent to potential Program sites and then to get basin characteristics and estimates of flow statistics for the selected sites. The analysis tool uses regression equations with available geographic information systems (GIS) information and recorded flood flows from existing stream gages to estimate the flow rates at un-gaged locations.[5]

The Stream Stats results for potential receiving water bodies at the SDEIR sites are summarized in **Tables 5-7** for Alternatives 3A. Where sufficient information was available, flow volumes were estimated for average flow conditions (50 percent Flow-Duration), and low-flow conditions (95 percent Flow-Duration). In all cases, flows for the 100-year (1 percent) and 25-year (4 percent) flood events were estimated. Additionally, the USGS Current Water Data for Massachusetts was referenced to identify available stream flow data from any nearby gauges.

For the UMass Property site receiving water (Clematis Brook), additional flow is estimated to add less than 1 percent of the total 25-year event storm flow.

3 SDEIR tunnel alignments are preliminary and would be refined during final design.

4 https://www.usgs.gov/mission-areas/water-resources/science/streamstats-streamflow-statistics-and-spatial-analysis-tools?qt-science_center_objects=0#qt-science_center_objects (accessed 8/17/2021).

5 Magnitude of Flood Flows at Selected Annual Exceedance Probabilities for Streams in Massachusetts (usgs.gov).

Table 5-7 Alternative 3A - Impacts to Dewatering Receiving Waters at Launching, Receiving, and Large Connection Sites

Site		UMass Large Connection	UMass Large Connection	*Tandem Trailer/ Park Road East Launching and Bifurcation Launching*	*Highland Avenue Northwest Receiving and Northeast Launching*	*American Legion Receiving*
Waterway Name		Clematis Brook	Beaver Brook	*Seaverns Brook*	*Charles River*	*Canterbury Brook/ Stony Brook*
Nearby USGS Stream Gauge #		1104500[1]	1104500[1]	*N/A*	*1104200[2]*	*N/A*
USGS Stream Gauge Name		Charles River at Waltham[1]	Charles River at Waltham[1]	*N/A*	*Charles River at Wellesley[2]*	*N/A*
Discharge Volume	***GPM***	100	100	*3,350*	*2,900*	*300*
50 % Duration (avg. flow)	***CFS***	0.89	4.95	*2.39*	*224*	*1.6*
	GPM	398	2,222	*1,073*	*100,539*	*598*
	Discharge Ratio	0.251	0.045	*3.122*	*0.029*	*0.502*
95 % Duration (low flow)	***CFS***	0.03	0.32	*0.16*	*30.6*	*0.5*
	GPM	15	145	*70*	*13,734*	*224*
	Discharge Ratio	6.667	0.690	*47.538*	*0.211*	*1.339*
100-year flood -1%	***CFS***	188	595	*306*	*8410*	*381*
	GPM	84,381	267,055	*137,343*	*3,774,682*	*171,005*
	Discharge Ratio	0.001	0.0004	*0.024*	*0.001*	*0.002*
25-year flood -4%	***CFS***	129	415	*212*	*6060*	*266*
	GPM	57,899	186,266	*95,153*	*2,719,925*	*119,390*
	Discharge Ratio	0.002	0.001	*0.035*	*0.001*	*0.003*

1 Source: https://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=01104500

2 Source: https://waterdata.usgs.gov/nwis/inventory?site_no=01104200

CFS: Cubic feet per second

GPM: Gallons per minute

Italicized text within the table indicates no change from the DEIR

Alternative Alignment 4A Tunnel Alignment

Similar to Alternative 3A, shaft construction at the UMass Property site would result in dewatering volumes of approximately 100 GPM, while larger volumes of dewatering due to tunnel construction would occur at each of the tunnel launching sites. **Table 5-8** summarizes the impacts to receiving water flows from dewatering discharges at launching, receiving, and large connection sites in Alternatives 4A.

The Stream Stats results for potential receiving water bodies at the SDEIR sites are summarized in **Tables 5-8** for Alternatives 4A. For the UMass Property receiving water (Clematis Brook), additional flow is estimated to add less than 1 percent of the total 25-year event storm flow.

Table 5-8 Alternative 4A - Impacts to Dewatering Receiving Waters at Launching/Receiving Sites and Large Connection Sites

Site		UMass Property Large Connection	UMass Property Large Connection	*Tandem Trailer/Park Road East Launching and Park Road West Receiving*	*Highland Avenue Northwest Launching and Northeast Launching*	*American Legion Receiving*
Waterway Name		Clematis Brook	Beaver Brook	*Seaverns Brook*	*Charles River*	*Canterbury Brook/Stony Brook*
Nearby USGS Stream Gauge #		1104500[1]	1104500[1]	*N/A*	*1104200[2]*	*N/A*
USGS Stream Gauge Name		Charles River at Waltham[1]	Charles River at Waltham[1]	*N/A*	*Charles River at Wellesley[2]*	*N/A*
Discharge Volume	***GPM***	100	100	*2,160*	*4,130*	*300*
50 % Duration (avg. flow)	***CFS***	0.89	4.95	*2.39*	*224*	*1.6*
	GPM	398	2,222	*1,073*	*100,539*	*598*
	Discharge Ratio	0.251	0.045	*2.013*	*0.041*	*0.502*
95 % Duration (low flow)	***CFS***	0.03	0.32	*0.16*	*30.6*	*0.5*
	GPM	15	145	*70*	*13,734*	*224*
	Discharge Ratio	6.667	0.690	*30.651*	*0.301*	*1.339*
100-year flood -1%	***CFS***	188	595	*306*	*8410*	*381*
	GPM	84,381	267,055	*137,343*	*3,774,682*	*171,005*
	Discharge Ratio	0.001	0.0004	*0.016*	*0.001*	*0.002*
25-year flood -4%	***CFS***	129	415	*212*	*6060*	*266*
	GPM	57,899	186,266	*95,153*	*2,719,925*	*119,390*
	Discharge Ratio	0.002	0.001	*0.023*	*0.002*	*0.003*

1 Source: https://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=01104500

2 Source: https://waterdata.usgs.gov/nwis/inventory?site_no=01104200

CFS: Cubic feet per second

GPM: Gallons per minute

Italicized text within the table indicates no change from the DEIR

Alternative Alignment 10A Tunnel Alignment

Shaft construction at the Lower Fernald Property site would result in dewatering volumes of approximately 300 GPM, while larger volumes of dewatering due to tunnel construction would occur at each of the tunnel launching sites. **Table 5-9** summarizes the impacts to receiving water flows from dewatering discharges at launching, receiving, and large connection sites in Alternatives 10A.

The Stream Stats results for potential receiving water bodies at the SDEIR sites are summarized in **Tables 5-9** for Alternatives 10A. For the Lower Fernald Property receiving water (Clematis Brook), additional flow is estimated to add less than 1 percent of the total 25-year event storm flow.

Table 5-9 Alternative 10A - Impacts to Dewatering Receiving Waters at Launching, Receiving, and Large Connection Sites

Site		Lower Fernald Property Receiving	Lower Fernald Property Receiving	*Park Road West Large Connection*	*Highland Avenue Northwest Launching and Northeast Launching*	*American Legion Receiving*
Waterway Name		Clematis Brook	Beaver Brook	*Seaverns Brook via Drainage Swale*	*Charles River*	*Canterbury Brook/Stony Brook*
Nearby USGS Stream Gauge #		1104500[1]	1104500[1]	*N/A*	*1104200*[2]	*N/A*
USGS Stream Gauge Name		Charles River at Waltham[1]	Charles River at Waltham[1]	*N/A*	*Charles River at Wellesley*[2]	*N/A*
Discharge Volume	***GPM***	300	300	*150*	*6,110*	*300*
50 % Duration (avg. flow)	***CFS***	0.89	4.95	*2.39*	*224*	*1.6*
	GPM	398	2,222	*1,073*	*100,539*	*598*
	Discharge Ratio	0.754	0.135	*0.140*	*0.061*	*0.502*
95 % Duration (low flow)	***CFS***	0.03	0.32	*0.16*	*30.6*	*0.5*
	GPM	15	145	*70*	*13,734*	*224*
	Discharge Ratio	19.430	2.069	*2.129*	*0.445*	*1.339*
100-year flood -1%	***CFS***	188	595	*306*	*8410*	*381*
	GPM	84,381	267,055	*137,343*	*3,774,682*	*171,005*
	Discharge Ratio	0.004	0.001	*0.001*	*0.002*	*0.002*
25-year flood -4%	***CFS***	129	415	*212*	*6060*	*266*
	GPM	57,899	186,266	*95,153*	*2,719,925*	*119,390*
	Discharge Ratio	0.005	0.002	*0.002*	*0.002*	*0.003*

1 Source: https://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=01104500

2 Source: https://waterdata.usgs.gov/nwis/inventory?site_no=01104200

CFS: Cubic feet per second

GPM: Gallons per minute

Italicized text within the table indicates no change from the DEIR

All Alternatives

While shaft construction at the UMass Property and Lower Fernald Property sites would result in dewatering volumes of approximately 100 to 300 GPM, respectively, larger volumes of dewatering due to

tunnel construction would occur at each of the tunnel launching sites. Impacts to receiving waters from tunnel dewatering volumes are discussed below.

If the entirety of the approximately 14.5 miles of fully excavated tunnel were to be dewatered at one location, then it is estimated that the maximum required pumping and treatment capacity would be approximately 6,110 GPM if the entire tunnel length was fully mined and unlined (as shown in Alternative 10A in **Table 5-9** where all dewatering would be performed at the Highland Avenue sites). This estimate was determined based on observations during construction of the MetroWest Water Supply Tunnel Program which was constructed using similar methods. However, the calculated maximum dewatering rates (see **Table 5-10**) are expected to only be observed near the completion of construction when the tunnel section has been excavated to its maximum length prior to final lining.

Table 5-10 Proposed Tunnel Construction Dewatering Discharge Volumes and Locations by Alternative

Alternative	Tunnel Segment	Launch Site	Tunnel Diameter (ft)	Length (mi)	Estimated Total Dewatering (GPM)	Estimated Total Dewatering (MGD)	Proposed Discharge Location
3A	*North Tunnel, Segment 1*	*Tandem Trailer*	*15*	*4.6*	*1,860*	*2.7*	*Seaverns Brook*[1]
	South Tunnel, Segment 2	*Bifurcation*	*15*	*3.3*	*1,340*	*1.9*	*Seaverns Brook*
	South Tunnel, Segment 3	*Highland Ave NE*	*15*	*6.8*	*2,750*	*4.0*	*Charles River*
4A	*North Tunnel, Segment 1*	*Tandem Trailer*	*15*	*4.6*	*1,860*	*2.7*	*Seaverns Brook*
	South Tunnel, Segment 2	*Highland Ave NW*	*15*	*3.4*	*1,380*	*2.0*	*Charles River*
	South Tunnel, Segment 3	*Highland Ave NE*	*15*	*6.8*	*2,750*	*4.0*	*Charles River*
10A	*North Tunnel, Segment 1*	*Highland Ave NW*	*15*	*8.3*	*3,360*	*4.8*	*Charles River*
	South Tunnel, Segment 2	*Highland Ave NE*	*15*	*6.8*	*2,750*	*4.0*	*Charles River*

1 Seaverns Brook ultimately drains to the Charles River.

GPM: Gallons per minute

MGD: Million gallons per day

Italicized text within the table indicates no change from the DEIR.

5.2.3 Wetlands and Waterways Final Conditions

Final conditions for proposed sites after site restoration would include maintenance of vegetation within cleared areas (e.g., mowing); inspection and maintenance of shafts, valve chambers, and associated utilities; maintenance of access roadways and parking areas (e.g., snow plowing); and maintenance of stormwater management areas. Shafts, valve chambers, parking areas, and stormwater management features would be located in small, fenced-in areas. Proposed final conditions are described for each new SDEIR alternative site below. Final conditions associated with other sites in the DEIR alternatives have not changed and can be referenced in **DEIR Section 4.6.6, Final Conditions (pg.4.6-153)**. See **DEIR Section 4.6.2.9, Massachusetts Stormwater Management and Standards (pg. 4.6-9)** and **DEIR Section 4.6.7.8, Compliance with MassDEP Stormwater Management Standards (pg. 4.6-179)** for the assessment of compliance with the Massachusetts Stormwater Management Standards, which would be met at all DEIR and SDEIR alternative sites to the extent practicable.

No permanent or temporary wetland or surface water impacts would occur in association with future operation of the tunnel at either of the two new SDEIR Alternative sites. As described further below, as a result of the implementation of wetland and surface-water resource area impact avoidance measures, all proposed shafts, valve chambers, and other permanent appurtenances would be outside identified wetland and water-resource areas at the two new alternative sites.

5.2.3.1 Alternative 3A/Alternative 4A Wetlands and Waterways Final Conditions

There would be no wetland impacts under final conditions for the UMass Property site under Alternative 3A or Alternative 4A. All proposed shafts, valve chambers, and other permanent appurtenances would be located outside identified wetland resource areas and the 100-foot buffer zone, based on available information.

UMass Property

No site components are proposed to be installed within wetland resource areas or the 100-foot buffer zone at the UMass Property site. Inspection and maintenance activities on site would not adversely impact wetland resources.

As discussed in **SDEIR Section 3.4.4.1, Alternative 3A/Alternative 4A Final Conditions** impacts on wetlands and waterways associated with final conditions would have no adverse impact on identified EJ populations for the UMass Property site.

Table 5-11 and **Table 5-12** summarize the proposed impervious cover estimated for Alternatives 3A and 4A. Proposed final site conditions, including paved access areas and other proposed impervious cover, are indicated in **SDEIR Chapter 2, Alternatives Figure 2-2**. As the final site designs are refined, the proposed impervious cover estimates may change. Under final design, stormwater management systems would be designed to meet state Stormwater Management Standards.

Table 5-11 Proposed Impervious Cover under Final Conditions at Alternative 3A Sites

Site	Change in Impervious Cover (acres)[1]
Launching, Receiving, and Large Connection Sites	
UMass Property (Large Connection)	0.1
Bifurcation (Launching)	*0.7*
Tandem Trailer (Launching)	*0.0*
Park Road East (supporting Tandem Trailer)	*0.2*
Highland Avenue Northwest (Receiving)	*0.0*
Highland Avenue Northeast (Launching)	*0.7*
American Legion (Receiving)	*0.5*
Connection and Isolation Valve Sites	
School Street	*0.0*
Cedarwood Pumping Station	*0.1*
Hegarty Pumping Station	*0.1*
St. Mary Street Pumping Station	*0.1*
Newton Street Pumping Station	*0.1*
Southern Spine Mains	*0.1*
Hultman Aqueduct Isolation Valve	*0.1*
TOTAL	**2.7**

1 Impervious areas (acreages) are conservatively estimated based on DEIR Final Conditions Schematic Figures (included as part of DEIR Figures 3-1 through 3-30). Totals may not add due to rounding.

Italicized text within the table indicates no change from the DEIR.

Table 5-12 Proposed Impervious Cover under Final Conditions at Alternative 4A Sites

Site	Change in Impervious Cover (acres)[1]
Launching, Receiving, and Large Connection Sites	
UMass Property (Large Connection)	0.1
Tandem Trailer (Launching)	*0.0*
Park Road East (supporting Tandem Trailer)	*0.2*
Park Road West (Receiving)	*0.4*
Highland Avenue Northwest	*0.0*
Highland Avenue Northeast (Launching)	*0.7*
American Legion (Receiving)	*0.5*
Connection and Isolation Valve Sites	
School Street	*0.0*
Cedarwood Pumping Station	*0.1*
Hegarty Pumping Station	*0.1*
St. Mary Street Pumping Station	*0.1*
Newton Street Pumping Station	*0.1*
Southern Spine Mains	*0.1*
Hultman Aqueduct Isolation Valve	*0.1*
TOTAL	**2.4**

1 Impervious areas (acreages) are conservatively estimated based on DEIR Final Conditions Schematic Figures (included as part of DEIR Figures 3-1 through 3-30). Totals may not add due to rounding.

Italicized text within the table indicates no change from the DEIR.

5.2.3.2 Alternative 10A Final Conditions

Lower Fernald Property

No site components are proposed to be installed within wetland resource areas or the 100-foot buffer zone at the Lower Fernald Property site. Inspection and maintenance activities on site would not adversely impact wetland resources.

There would be no wetland impacts under final conditions for the Lower Fernald Property under Alternative 10A. All proposed shafts, valve chambers, and other permanent appurtenances would be located outside identified wetland resource areas and the 100-foot buffer zone.

As discussed in **SDEIR Section 3.4.4.2, Alternative 10A Final Conditions** impacts on wetlands and waterways associated with final conditions would have no adverse impact on identified EJ populations for the Lower Fernald Property site.

Table 5-13 summarizes the proposed impervious cover estimated for Alternative 10A. Proposed final site conditions, including paved access areas and other proposed impervious cover, are indicated in **SDEIR Chapter 2, Alternatives Figure 2-4**. As the final site designs are refined, proposed impervious cover estimates may change. Under final design, stormwater management systems would be designed to meet Stormwater Management Standards.

Table 5-13 Proposed Impervious Cover under Final Conditions at Alternative 10A Sites

Site	Change in Impervious Cover (acres)[1]
Launching and Receiving Sites	
Lower Fernald Property	0.1
Park Road West Large Connection	*0.5*
Highland Avenue Northwest	*0.0*
Highland Avenue Northeast	*0.7*
American Legion	*0.5*
Connection and Isolation Valve Sites	
School Street	*0.0*
Cedarwood Pumping Station	*0.1*
Hegarty Pumping Station	*0.1*
St. Mary Street Pumping Station	*0.1*
Newton Street Pumping Station	*0.1*
Southern Spine Mains	*0.1*
Hultman Aqueduct Isolation Valve	*0.1*
TOTAL	**2.3**

1 Impervious areas (acreages) are conservatively estimated based on DEIR Final Conditions Schematic Figures (included as part of DEIR Figures 3-1 through 3-30). Totals may not add due to rounding.

Italicized text within the table indicates no change from the DEIR.

5.2.4 Wetlands and Waterways Avoidance, Minimization, and Mitigation Measures

As a result of implementation of the avoidance measures described in **Section 5.2**, neither of the proposed new SDEIR Alternative sites would involve temporary nor permanent impacts to any federally jurisdictional VW or WW resources, or state-regulated BVW, LUW, Bank, RA or BLSF. See **SDEIR Chapter 14, Mitigation** for a summary of mitigation measures.

Replacing the previously proposed Fernald Property site with the UMass Property and Lower Fernald Property sites results in a net reduction in temporary and permanent impacts to BVW/VW, Bank, LUW/WW and RA. Since no new wetland or waterway impacts would occur at the new SDEIR Alternative sites, wetlands and waterways mitigation would remain as described in **DEIR Section 4.6.7, Avoidance, Minimization, and Mitigation Measures (pg. 4.6-160)** and would include restoration and revegetation of disturbed areas outside the limits of the riprap for impacts to RA and provision of compensatory flood storage volume within the same floodplain sufficient to offset the volume of flood water displaced by the permanent dewatering discharge infrastructure for impacts to BLSF.

The Program would include implementation of erosion and sedimentation controls during each phase of construction through implementation of a NPDES SWPPP. All Program sites would be covered by a SWPPP, to be developed by the contractor prior to construction, that specifies proper erosion and sedimentation control for disturbed areas at each site and outlines procedures aimed at minimizing the transport of

sediment into nearby waters, including temporary stormwater management, dust control, and winter stabilization measures. The SWPPP would be adhered to at all sites and throughout all phases of the Program and would be adapted to fit the contractor's equipment, weather conditions, and construction activity for each site. To minimize impacts, the following sedimentation and erosion control measures and construction methods would be used:

- The program would incorporate BMPs specified by MassDEP and USEPA guidelines.
- Proper implementation of the erosion and sedimentation control program would minimize exposed soil areas through sequencing and temporary stabilization, place structures to manage stormwater runoff and erosion, and establish a permanent vegetative cover or other forms of stabilization as soon as practicable. Stabilization measures may include biodegradable and wildlife friendly erosion control blankets and native seed mixes for vegetative stabilization.
- The structural and non-structural practices proposed for the Program would comply with criteria contained in the 2022 NPDES CGP, including inspection, monitoring and implementation of corrective actions. Nonstructural practices include temporary stabilization, temporary seeding, permanent seeding, pavement sweeping, and dust control.
- Structural practices include erosion-control barriers, stabilized construction exits, temporary sediment basins, diversion swales, temporary check dams, catch basin inlet protection, and dewatering filters.
- Silt fence lines, staked straw bales, compost filter tubes and/or similar devices would be installed along the downgradient slopes at each of the limit-of-work lines to provide erosion and sedimentation controls and define the limits of disturbance for contractor(s).

Mitigation would be provided for all proposed impervious cover generated at all Program sites, including the new SDEIR Alternative sites. As described in **DEIR Section 4.6.7.8, Compliance with MassDEP Stormwater Management Standards (pg. 4.6-179)**, sites would be designed to meet the Massachusetts Stormwater Standards, which are focused on protecting wetlands and water resources through maintenance of predevelopment conditions for such characteristics as recharge, peak flow rates, and water quality. Low Impact Development (LID) and/or structural Stormwater Control Measures (SCMs) would be implemented at each site so that each site meets the Stormwater Standards.

The primary mitigation to reduce the potential for groundwater drawdown during tunnel construction would be probing from the tunnel heading in advance of the excavation to assess water inflows, followed by pre-excavation grouting (also from the tunnel heading) in the event water-bearing features are encountered by the probing. A secondary mitigation to reduce groundwater inflow is drilling and cut-off grouting of water-bearing features in the rock through the walls of the unlined tunnel after the TBM has passed. In the unlikely event that despite use of these measures groundwater drawdown results in an impact to a surface water, a tertiary mitigation is to provide an alternative water supply until the tunnel liner is installed and water levels would be restored. This mitigation measure is described in **DEIR Chapter** 5 Water Supply and Water Management Act and **SDEIR Appendix C**.

5.3 Technical Analysis to Respond to Certificate Comments

The following comments were identified in the Secretary's Certificate on the Draft Environmental Impact Report (DEIR) for the proposed Project.

Certificate Comment C-33

*Update temporary and permanent impacts to wetland resource areas. Clarify impacts associated with each wetland resource area as the DEIR includes conflicting estimates (**Table 4.2-2** versus **Table 7.4-2**).*

Response to C-33

Temporary and permanent impacts to wetland resources areas have been updated and conflicting estimates have been resolved in **SDEIR Table 5-6.**

Certificate Comment C-35

Clarify whether impacts to Bordering Vegetated Wetlands (BVW) and Inland Bank will be permanent or temporary due to the installation of splash pads and culvert outlets. Examine the possibility of moving these structures farther from the BVW.

Response to C-35

As shown above in **SDEIR Table 5-6,** impacts to Land Under Waterbodies and Waterways (LUW/WW), Bordering Land Subject to Flooding (BLSF) and Bank due to the construction of discharge pipes and splash pads would include both temporary and permanent impacts. Temporary impacts would result from pipe trenching and excavation and stabilization for construction of the flared end-sections and riprap splash pads. Following completion of construction, vegetation and shorelines would be restored along the pipe trench and around the splash pad. Permanent impacts would include only the flared end-sections and associated riprap splash pads, providing scour protection and erosion control for dewatering discharges within the waterways. The impact to BVW/WW included in **DEIR Chapter 4.6, Wetlands and Waterways** due to the discharge structures at the prior Fernald Property site has been eliminated due to inclusion of the alternative sites, which do not require BVW/WW impacts for the discharges. It is not feasible to eliminate the proposed impacts to Bank, LUW and WW because to mitigate potential scour impacts to existing resource areas, the discharge must be in proximity to the associated receiving waterbody.

SDEIR Table 5-6 includes a summary of temporary and permanent impacts to wetland resource areas at each of the proposed Program sites for updated Alternatives 3A, 4A, and 10A.

Certificate Comment C-37

Provide plan to monitor the outfalls during dewatering activities to ensure that scour and erosion does not occur, including a contingency plan to address any unexpected negative impacts.

Response to Comment C-37

As part of the requirements of the NPDES CGP, a SWPPP would be prepared by the contractor to document stormwater management during the construction period. Per CGP requirements, the SWPPP would include a description of dewatering practices which are to be installed and maintained in compliance with CGP Part 2.4. Stable, erosion-resistant surfaces would be used to discharge flows from dewatering controls and all dewatering discharges would be in compliance with the velocity dissipation requirements of CGP Part 2.2.11. A dewatering inspection schedule would be developed in accordance with CGP Part 4.3.2 and would include monitoring for scouring and erosion resulting from dewatering practices. Per CGP Part 5, procedures for corrective action would also be included in the SWPPP. Corrective action procedures would include a contingency plan to address any unexpected negative impacts of construction dewatering activities that may be observed during inspection and monitoring. These corrective actions may include splash pad maintenance measures, modifications to pipe sizing, treatment of discharges, or implementation of additional velocity dissipation measures.

CGP Parts 7.2.7 and 7.2.8 summarize how the above requirements must be documented as part of the SWPPP:

"7.2.7 ***Procedures for Inspection, Maintenance, and Corrective Action.*** *Describe the procedures you will follow for maintaining your stormwater controls, conducting site inspections, and, where necessary, taking corrective actions, in accordance with Part 2.1.4, Part 4, and Part 5 of this permit, accordingly. Also include:*

a. *The inspection schedule you will follow, which is based on whether your site is subject to Part 4.2 or Part 4.3, or whether your site qualifies for any of the reduced inspection frequencies in Part 4.4;*
b. *If you will be conducting inspections in accordance with the inspection schedule in Part 4.2.2, Part 4.3, or Part 4.4.1b, the location of the rain gauge or the address of the weather station you will be using to obtain rainfall data;*
c. *If you will be reducing your inspection frequency in accordance with Part 4.4.1b, the beginning and ending dates of the seasonally defined arid period for your area or the valid period of drought;*
d. *If you will be reducing your inspection frequency in accordance with Part 4.4.3, the beginning and ending dates of frozen conditions on your site; and*
e. *Any maintenance or inspection checklists or other forms that will be used.*

7.2.8 ***Procedures for Turbidity Benchmark Monitoring from Dewatering Discharges (if applicable).*** *If you are required to comply with the Part 3.3 turbidity benchmark 2022 Construction General Permit (CGP) Page 45 monitoring requirements, describe the procedures you will follow to collect and evaluate samples, report results to EPA and keep records of monitoring information, and take corrective action when necessary. Include the specific type of turbidity meter you will use for monitoring, as well as any manuals or manufacturer instructions on how to operate and calibrate the meter. Describe any coordinating arrangement you may have with any other permitted operators on the same site with respect to compliance with the turbidity monitoring requirements,*

including which parties are tasked with specific responsibilities. If EPA has approved of an alternate turbidity benchmark pursuant to Part 3.3.2b, include any data and other documentation you relied on to request use of the specific alternative benchmark."

Certificate Comment C-34

Address concerns regarding the impacts of increased volume and velocities of dewatering discharges to several waterways associated with construction of the new tunnels (discharge to Clematis Brook on the Fernald Property, discharge to Canterbury Brook at the American Legion site, and discharge to Seaverns Brook for the launching and receiving shafts for the Bifurcation site).

Certificate Comment C-36

Provide calculations demonstrating that proposed pipes and splash pads, intended to dissipate velocity to avoid eroding effects on the resource areas, have been properly sized to regulate flows and prevent scour.

Response to C-34 and C-36

Construction activities would include the installation of riprap splash pads at the outlet of pipes for dewatering discharges at the UMass Property or Lower Fernald Property sites, Tandem Trailer or Bifurcation sites, Highland Avenue Northeast / Southeast site, and American Legion site, depending on the Alternative.

A description of wetland and waterway construction period impacts is provided in **DEIR Section 4.6.5, Construction Period Impacts (pg. 4.6-127)** for each shaft site. The riprap splash pads were conservatively designed to dissipate higher flow rates than the calculated pipe diameter is expected to convey. Manning's Equation (assuming gravity flow and minimum pipe slope for a given diameter pipe) was used to confirm that pipes were sized conservatively large to convey the expected flow rate from tunnel dewatering activities during construction. Riprap splash pads were then designed conservatively large to be able to dissipate the velocities from a pressure flow condition where flow (Q) and velocity (V) are higher than what is actually expected from tunnel dewatering rates. These calculations (included in **SDEIR Appendix B, Wetlands and Waterways Supporting Documentation**) show that the outlet pipe diameters and dimensions of riprap splash pads presented in the DEIR were conservatively large and would be adequate to mitigate potential scour impacts to adjacent wetland resources. As the design is refined, both the pipe diameters and the riprap splash pads at the pipe ends likely may be able to be reduced. The calculations and nomograph used for sizing the riprap outlet protection is presented in **SDEIR Appendix B,** demonstrating that the proposed pipes and riprap splash pads have been properly sized to regulate flows and prevent scour.

Table 5-14 summarizes the cumulative impacts of dewatering discharges to the Charles River for each SDEIR alternative. The maximum cumulative discharge volume that the Charles River may receive from each contributing discharge (inclusive of discharges directly to the Charles as well as to upstream tributaries Clematis Brook/Beaver Brook and Seaverns Brook) is 6,560 GPM associated with Alternative 10A discharges. This added volume represents approximately 6.5 percent of the 50 percent

duration average flow and 0.17 percent and 0.24 percent of the anticipated 100-year and 25-year flood flows, respectively.

Table 5-14 Cumulative Dewatering Impacts to the Charles River

Alternative		***Alternative 3A***	***Alternative 4A***	***Alternative 10A***
Waterway Name		*Charles River*	*Charles River*	*Charles River*
Nearby USGS Stream Gauge #		*1104200*[1]	*1104200*[1]	*1104200*[1]
USGS Stream Gauge Name		*Charles River at Wellesley*[11]	*Charles River at Wellesley*[11]	*Charles River at Wellesley*[11]
Discharge Volume	***GPM***	*6,350*	*6,390*	*6,560*
50 % Duration (avg. flow)	***CFS***	*224*	*224*	*224*
	GPM	*100,539*	*100,539*	*100,539*
	Discharge Ratio	*0.064*	*0.064*	*0.065*
95 % Duration (low flow)	***CFS***	*30.6*	*30.6*	*30.6*
	GPM	*13,734*	*13,734*	*13,734*
	Discharge Ratio	*0.465*	*0.465*	*0.478*
100-year flood -1%	***CFS***	*8,410*	*8,410*	*8,410*
	GPM	*3,774,682*	*3,774,682*	*3,774,682*
	Discharge Ratio	*0.0017*	*0.0017*	*0.0017*
25-year flood -4%	***CFS***	*6,060*	*6,060*	*6,060*
	GPM	*2,719,925*	*2,719,925*	*2,719,925*
	Discharge Ratio	*0.0023*	*0.0023*	*0.0024*

1 Source: https://waterdata.usgs.gov/nwis/inventory?site_no=01104200

CFS: Cubic feet per second

GPM: Gallons per minute

Italicized text within the table indicates no change from the DEIR.

Certificate Comment C-47

The SDEIR should clarify what infrastructure is proposed to be sited in floodplain, and what measures will be taken to minimize the risk of flooding including through elevation of structures or other wet or dry proofing methods.

Response to C-47

Permanent aboveground infrastructure proposed to be sited within the Federal Emergency Management Agency (FEMA) Special Flood Hazard Area (SFHA) (area subject to inundation by the 100-year flood)[6] would be limited to dewatering discharge pipes and associated splash pads. Three Program sites would have discharge pipes and splash pads within FEMA Special Flood Hazard Areas: the Highland Avenue Northeast/Southeast launching site (Alternatives 3A, 4A, and 10A), Bifurcation launching site (Alternative 3A), and Tandem Trailer/Park Road East launching site (Alternatives 3A and 4A). The discharge pipes and splash pads for dewatering discharges for these three sites are proposed to be sited within FEMA Zone AE, [7] Zone A,[8] and Zone A, respectively. It is not feasible to locate the structures outside of the SFHA because the SFHA overlaps the areas required to be protected from potential scour. No other permanent aboveground infrastructure is proposed to be installed within FEMA Special Flood Hazard Areas. To minimize the risk of flooding, permanent shaft structures were planned to be sited outside of FEMA Special Flood Hazard Areas and would be designed as watertight structures to provide continuous access to the tunnel throughout storm events. Discharge pipes and splash pads would be designed with scour protection and erosion control to minimize impacts to existing waterways.

Certificate Comment C-38

Confirm that stormwater runoff as a result of any increase in impervious areas, however small, will be treated in accordance with the SMS.

Response to C-38

It is anticipated that the Program would add between 2.3 and 2.7 additional acres of impervious surfaces, depending upon the selected alternative. As stated in **DEIR Section 4.6.5, Construction Period Impacts (pg. 4.6-127)** and **DEIR Section 4.6.6, Final Conditions (pg. 4.6-153)**, all stormwater runoff would be treated in accordance with the MassDEP Stormwater Management Standards including that associated with any increase in impervious areas. Stormwater management systems would be designed to manage increases in peak discharge rates, infiltrate the required recharge volume, and remove the required post-construction total suspended solids (TSS) load. Structural stormwater control measures (SCMs) may include surface or subsurface infiltration systems, bioretention, or filtering practices. Specific SCMs to be employed at the site would be refined as part of the final design. How the Program would achieve compliance with each of the ten MassDEP Stormwater Management Standards is further described in **DEIR Section 4.6.7.8, Compliance with MassDEP Stormwater Management Standards (pg. 4.6-179).**

6 The 1-percent annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1-percent chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1-percent annual chance flood.

7 "Zone AE" is a FEMA Special Flood Hazard Area subject to inundation by the 1% annual chance flood (100-year flood) for which base flood elevations are determined.

8 "Zone A" is a FEMA Special Flood Hazard Area subject to inundation by the 1% annual chance flood (100-year flood) for which base flood elevations are not determined.

Certificate Comment C-39

Prepare list or table that specifies all waterways where work will occur in, on, over, or under the waterway, an indication of whether the waterway is jurisdictional pursuant to the regulations at 310 CMR 9.00, and the scope of work that will occur in, on, over, or under any Chapter 91 jurisdictional area.

Certificate Comment C-40

Describe the Program's consistency with Chapter 91 regulations.

Certificate Comment C-41

Describe how tunnels and associated infrastructure installations underneath jurisdictional waterways will be constructed consistent with all criteria pursuant to 310 CMR 9.05(3)(g)(3) to demonstrate these project elements will be exempt from licensing pursuant.

Response to C-39, C-40, and C-41

Project work occurring in, on, over, or under waterways consists of tunnel boring (approximately 200 to 400 feet below grade) and construction of outfalls and associated rip rap splash pads on waterway banks. **Table 5-15** includes a summary of all impacted waterways, the associated impacts, and a discussion of Chapter 91 applicability and the Program's consistency with those regulations. The content included in **Table 5-15** is also summarized below.

Impacts

As further described in **Table 5-15**, work is expected to occur on, in, over, or under the following waterbodies:

- Clematis Brook
- Chester Brook
- Unnamed Tributary (Stony Brook) MA72-27
- Seaverns Brook MA72-44
- Charles River MA72-07
- Rosemary Brook MA72-25
- Hurd Brook
- Canterbury Brook/Stony Brook

Consistency

As further described in **Table 5-15**, all work being completed on, in, over, or under waterways would be installed in accordance with 310 CMR 9.05(3)(g), which states:

> *"(g) placement in a non-tidal river or stream subject to jurisdiction under 310 CMR 9.04(1)(e) of fill or structures for which a final Order of Conditions has been issued under M.G.L. c. 131, §*

40 and 310 CMR 10.00: Wetlands Protection, and which does not reduce the space available for navigation; such fill or structures are limited to:

1. *overhead wires, conduits, or cables to be attached to an existing bridge, without substantial alteration thereof, or constructed and maintained in accordance with the National Electrical Safety Code;*
2. *fish ladders, fishways, and other devices which allow or assist fish to pass by a dam or other obstruction in the waterway;*
3. *pipelines, cables, conduits, sewers, and aqueducts entirely embedded in the soil beneath such river or stream; and*
4. *bulkheads, revetments, headwalls, storm drainage outfalls, and similar structures which do not extend into such river or stream, except as may be necessary for bank stabilization;"*

In accordance with 310 CMR 9.05(3)(g)(3) the tunnel would be entirely embedded in the soil (or bedrock) beneath the waterway. In accordance with 310 CMR 9.05(3)(g)(4), proposed outfalls and splash pads would not extend into the waterway or adjacent wetland. The placement of rip rap splash pads and tunneling of the structure below waterways would not reduce the space available for navigation and therefore may not require Chapter 91 authorization.

Exemptions

As previously stated, and further defined in **Table 5-15**, it is expected that all work occurring on, in, over, or under waterways may be exempt from Chapter 91 authorization as all work would be installed in accordance with 310 CMR 9.05(3)(g)(3) and 310 CMR 9.05(3)(g)(4) and would not reduce the space available for navigation within waterways. Further coordination with MassDEP will be completed during final design to determine applicability of any Chapter 91 exemptions to proposed Program elements and/or requirements to comply with Chapter 91 regulations should the Program not meet exemption criteria.

Table 5-15 Chapter 91 Impacts Assessment and Consistency Description

Location			Impacts	Applicable Alternatives			Chapter 91
Waterway	**Municipality**	**Site/Tunnel Segment**	**Waterway Impact**	**Alt 3A**	**Alt 4A**	**Alt 10A**	**Consistency with 310 CMR 9.05(3)(g)**
N/A	Waltham	UMass Property (3A/4A)	None	(SDEIR Figure 5-1)	(SDEIR Figure 5-1)	-	N/A
Clematis Brook	Waltham	Lower Fernald Property (10A)	None	-	-	**X** (SDEIR Figure 5-2)	N/A
		North Tunnel, Segment 1 (10A)	Tunnel segment proposed to cross below waterbody, approximately 200 to 400 feet below ground surface	N/A	N/A	**X** (SDEIR Figure 5-5)	Construction of the tunnel below waterway would not reduce the space available for navigation and therefore should not require Chapter 91 authorization. In accordance with 310 CMR 9.05(3)(g)(3) the tunnel would be entirely embedded in the soil or bedrock beneath the waterway.
Chester Brook	*Waltham*	*North Tunnel, Segment 1*	*Tunnel segment proposed to cross below waterbody, approximately 200 to 400 feet below ground surface*	**X** *(SDEIR Figure 5-4)*	**X** *(SDEIR Figure 5-4)*	**X** *(SDEIR Figure 5-6)*	*Construction of the tunnel below waterway would not reduce the space available for navigation and therefore should not require Chapter 91 authorization. In accordance with 310 CMR 9.05(3)(g)(3) the tunnel would be entirely embedded in the soil or bedrock beneath the waterway.*

Table 5-15 Chapter 91 Impacts Assessment and Consistency Description

Location			Impacts	Applicable Alternatives			Chapter 91
Waterway	**Municipality**	**Site/Tunnel Segment**	**Waterway Impact**	**Alt 3A**	**Alt 4A**	**Alt 10A**	**Consistency with 310 CMR 9.05(3)(g)**
Unnamed Tributary (Stony Brook) MA72-27	*Waltham/ Weston*	*North Tunnel, Segment 1*	*Tunnel segment proposed to cross below waterbody, approximately 200 to 400 feet below ground surface*	**X** *(DEIR Figure 4.6-20)*	**X** *(DEIR Figure 4.6-31)*	**X** *(DEIR Figure 4.6-42)*	*Construction of the tunnel below waterway would not reduce the space available for navigation and therefore should not require Chapter 91 authorization. In accordance with 310 CMR 9.05(3)(g)(3) the tunnel would be entirely embedded in the soil or bedrock beneath the waterway.*
Seaverns Brook MA72-44	*Weston*	*Tandem Trailer/Park Road East*	*Rip rap splash pad for construction and future tunnel maintenance dewatering*	**X** *(DEIR Figure 4.6-2)*	**X** *(DEIR Figure 4.6-2)*	*N/A*	*Placement of the rip rap splash pad would not reduce the space available for navigation and therefore should not require Chapter 91 authorization. In accordance with 310 CMR 9.05(3)(g)(4), the proposed outfall and splash pad would not extend into the waterway except as is necessary for bank stabilization and erosion control. Splash pads are proposed within the following resource areas: 100' RA, Bank, BLSF, and LUW/WW.*

Table 5-15 Chapter 91 Impacts Assessment and Consistency Description

Location			Impacts	Applicable Alternatives			Chapter 91
Waterway	**Municipality**	**Site/Tunnel Segment**	**Waterway Impact**	**Alt 3A**	**Alt 4A**	**Alt 10A**	**Consistency with 310 CMR 9.05(3)(g)**
		Bifurcation	*Rip rap splash pad for construction and future tunnel maintenance dewatering*	**X** *(DEIR Figure 4.6-3)*	*N/A*	*N/A*	*Placement of the rip rap splash pad would not reduce the space available for navigation and therefore should not require Chapter 91 authorization. In accordance with 310 CMR 9.05(3)(g)(4), the proposed outfall and splash pad would not extend into the waterway except as is necessary for bank stabilization and erosion control. Splash pads are proposed within the following resource areas: 100' RA, Bank, BLSF, and LUW/WW.*
		North Tunnel, Segment 1	*Tunnel segment proposed to cross below waterbody, approximately 200 to 400 feet below ground surface*	**X** *(DEIR Figure 4.6-20)*	**X** *(DEIR Figure 4.6-31)*	**X** *(DEIR Figure 4.6-42)*	*Construction of the tunnel below waterway would not reduce the space available for navigation and therefore should not require Chapter 91 authorization. In accordance with 310 CMR 9.05(3)(g)(3) the tunnel would be entirely embedded in the soil or bedrock beneath the waterway.*

Table 5-15 Chapter 91 Impacts Assessment and Consistency Description

Location			Impacts	Applicable Alternatives			Chapter 91
Waterway	**Municipality**	**Site/Tunnel Segment**	**Waterway Impact**	**Alt 3A**	**Alt 4A**	**Alt 10A**	**Consistency with 310 CMR 9.05(3)(g)**
Charles River MA72-07	*Needham*	*Highland Ave NE and NW*	*Rip rap splash pad for construction and future tunnel maintenance dewatering*	**X** *(DEIR Figures 4.6-6 and 4.6-8)*	**X** *(DEIR Figures 4.6-7 and 4.6-8)*	**X** *(DEIR Figures 4.6-7 and 4.6-8)*	*Placement of the rip rap splash pad would not reduce the space available for navigation and therefore should not require Chapter 91 authorization. In accordance with 310 CMR 9.05(3)(g)(4), the proposed outfall and splash pad would not extend into the waterway except as is necessary for bank stabilization and erosion control. Splash pads are proposed within the following resource areas: Bank, BLSF (at some locations), and LUW/WW.*
	Weston/ Newton	*South Tunnel, Segment 2 (northern crossing)*	*Tunnel segment proposed to cross below waterbody, approximately 200 to 400 feet below ground surface*	**X** *(DEIR Figure 4.6-21)*	**X** *(DEIR Figure 4.6-32)*	**X** *(DEIR Figure 4.6-43)*	*Construction of the tunnel below waterway would not reduce the space available for navigation and therefore should not require Chapter 91 authorization. In accordance with 310 CMR 9.05(3)(g)(3) the tunnel would be entirely embedded in the soil or bedrock beneath the waterway.*
	Newton/ Wellesley	*South Tunnel, Segment 2 (southern crossing)*	*Tunnel segment proposed to cross below waterbody, approximately 200 to 400 feet below ground surface*	**X** *(DEIR Figure 4.6-21)*	**X** *(DEIR Figure 4.6-32)*	**X** *(DEIR Figure 4.6-43)*	*Construction of the tunnel below waterway would not reduce the space available for navigation and therefore should not require Chapter 91 authorization. In accordance with 310 CMR 9.05(3)(g)(3) the tunnel would be entirely embedded in the soil or bedrock beneath the waterway.*

Table 5-15 Chapter 91 Impacts Assessment and Consistency Description

Location			Impacts	Applicable Alternatives			Chapter 91
Waterway	**Municipality**	**Site/Tunnel Segment**	**Waterway Impact**	**Alt 3A**	**Alt 4A**	**Alt 10A**	**Consistency with 310 CMR 9.05(3)(g)**
	Needham/ Newton	*South Tunnel, Segment 3*	*Tunnel segment proposed to cross below waterbody, approximately 200 to 400 feet below ground surface*	**X** *(DEIR Figure 4.6-23)*	**X** *(DEIR Figure 4.6-34)*	**X** *(DEIR Figure 4.6-45)*	*Construction of the tunnel below waterway would not reduce the space available for navigation and therefore should not require Chapter 91 authorization. In accordance with 310 CMR 9.05(3)(g)(3) the tunnel would be entirely embedded in the soil or bedrock beneath the waterway.*
Rosemary Brook MA72-25	*Wellesley*	*South Tunnel, Segment 2*	*Tunnel segment proposed to cross below waterbody, approximately 200 to 400 feet below ground surface*	**X** *(DEIR Figure 4.6-22)*	**X** *(DEIR Figure 4.6-33)*	**X** *(DEIR Figure 4.6-44)*	*Construction of the tunnel below waterway would not reduce the space available for navigation and therefore should not require Chapter 91 authorization. In accordance with 310 CMR 9.05(3)(g)(3) the tunnel would be entirely embedded in the soil or bedrock beneath the waterway.*
Hurd Brook	*Wellesley/ Needham*	*South Tunnel, Segment 3*	*Tunnel segment proposed to cross below waterbody, approximately 200 to 400 feet below ground surface*	**X** *(DEIR Figure 4.6-22)*	**X** *(DEIR Figure 4.6-33)*	**X** *(DEIR Figure 4.6-44)*	*Construction of the tunnel below waterway would not reduce the space available for navigation and therefore should not require Chapter 91 authorization. In accordance with 310 CMR 9.05(3)(g)(3) the tunnel would be entirely embedded in the soil or bedrock beneath the waterway.*

Table 5-15 Chapter 91 Impacts Assessment and Consistency Description

Location			Impacts	Applicable Alternatives			Chapter 91
Waterway	**Municipality**	**Site/Tunnel Segment**	**Waterway Impact**	**Alt 3A**	**Alt 4A**	**Alt 10A**	**Consistency with 310 CMR 9.05(3)(g)**
Canterbury Brook/Stony Brook	*Boston*	*American Legion*	*Temporary rip rap splash pad for construction dewatering*	**X** *(DEIR Figure 4.6-9)*	**X** *(DEIR Figure 4.6-9)*	**X** *(DEIR Figure 4.6-9)*	*Placement of the temporary rip rap splash pad would not reduce the space available for navigation and therefore should not require Chapter 91 authorization. In accordance with 310 CMR 9.05(3)(g)(4), the proposed outfall and splash pad would not extend into the waterway except as is necessary for bank stabilization and erosion control. Splash pads are proposed to be temporarily installed within the following resource areas: 25' RA, Bank and LUW/WW.*

Italicized text within the table indicates no change from the DEIR.

6 Water Supply and Water Management Act

6.1 Introduction

The Secretary's Certificate on the Metropolitan Water Tunnel Program Draft Environmental Impact Report (DEIR) requires a Supplemental DEIR (SDEIR) to update the analysis of the Massachusetts Water Resources Authority (MWRA) Program's potential impacts to groundwater and water supply infrastructure, including public and private wells. This chapter provides an additional impact analysis related to the two new alternative sites for the northern terminus of the North Tunnel, Segment 1: the UMass Property large connection shaft site and the Lower Fernald Property receiving shaft site. The two new SDEIR sites form the terminus points for the North Tunnel under SDEIR Alternatives 3A, 4A and 10A. Groundwater resources assessed include public drinking water wells and available information on private wells. Potential impacts to these resources and measures to avoid, minimize, and mitigate impacts are also addressed. Information on the existing quality and usage of these resources is based on publicly accessible information.

As requested in the Commonwealth of Massachusetts, Executive Office of Energy and Environmental Affairs (EEA) Secretary's Certificate on the DEIR, this chapter also provides responses to the "Water Supply and Water Management Act" section of the Scope of the DEIR Certificate. Refer to **SDEIR Chapter 15, Responses to Comments**, for the full list of delineated comments received on the DEIR.

6.1.1 Summary of Findings

Key findings on impacts of the Program as they relate to water supply and Water Management Act (WMA) are listed below. **Table 6-1** summarizes the potential impacts of each SDEIR Alternative.

Key findings associated with the two new alternative sites considered in the SDEIR for the terminus of the North Tunnel, Segment 1, in place of the DEIR Fernald Property site include:

- No permanent or temporary impacts to groundwater resources would occur in association with future, permanent operation of the Program under SDEIR Alternatives 3A and 4A or SDEIR Alternative 10A.
- Construction-period impacts at the UMass Property site (SDEIR Alternatives 3A and 4A) and the Lower Fernald Property site (SDEIR Alternative 10A) include:
    - Minor volumes of dewatering generated during the excavation process of shaft and valve vault construction.
    - Potential for temporary groundwater drawdown during tunnel construction along alignment, and (to a lesser extent) during shaft construction at shaft sites, which may impact the production of groundwater wells.

Key findings associated with the three SDEIR Alternatives, which are consistent with the findings of the three DEIR Alternatives, include:

- The Program is unlikely to impact local surface water body levels with the planned mitigation requirements for probing and grouting during construction.
- During construction, there would be the potential for surface water and groundwater drawdown due to tunnel inflows to temporarily impact water levels in surface waters and wells. Grouting of water-bearing rock features in advance of the tunnel boring machine (TBM) excavation activities and after its passage would reduce groundwater inflows to avoid and minimize impacts of surface water and groundwater drawdown. If necessary, alternative water supplies will be provided as described in **SDEIR Appendix C, Draft Water Supply Contingency Plan.**
- Avoidance, minimization, and mitigation measures will include:
    - Probing from the tunnel heading in advance of excavation to assess water inflows followed by pre-excavation grouting from the tunnel heading in the event water-bearing features are encountered.
    - Measures to be employed to reduce groundwater inflow into the tunnel will be drilling and cut-off grouting of water-bearing features in the rock through the walls of the unlined tunnel after the TBM has passed.
    - In the event of disruption of water supply from a groundwater well, users will be provided with an alternative water supply until groundwater levels can be restored.
    - In the event of disruption to a surface water, an alternative water supply will be provided until surface water levels can be restored.

Table 6-1 Summary Comparison of SDEIR Alternatives

Description of Potential Impacts	Alternative 3A – Sites Subject to Potential Impacts	Alternative 4A – Sites Subject to Potential Impacts	Alternative 10A – Sites Subject to Potential Impacts
Potential for groundwater drawdown	*All sites*	*All sites*	*All sites*
Public water supply wells (domestic, irrigation, and geothermal) within 0.5 mile of the proposed tunnel alignment	77	83	83

Sources: Commonwealth of Massachusetts, Executive Office of Energy and Environmental Affairs, Data Portal, 2023, https://eeaonline.eea.state.ma.us/portal#!/search/welldrilling; Massachusetts Department of Environmental Protection, Public Water Supplies by Massachusetts Geographic Information System, 2023.

6.2 Water Supply Impact Assessment

Groundwater is an important natural resource that has a variety of uses, including drinking water supplies, irrigation, and industrial uses. The quality of groundwater is influenced by surficial geology, land use, and characteristics of source waters. The uses of water may be limited by its physical and chemical characteristics. Changes in temperature, pH (Potential of Hydrogen, equivalent to $-\log_{10}(H^+)$), dissolved

oxygen (DO) content, and pollutant concentrations due to anthropogenic effects may make groundwater unsuitable for certain uses. See **DEIR Chapter 5, Water Supply and Water Management Act, Section 5.2, Regulatory Framework (pg. 5-2)** for a description of the regulatory framework surrounding groundwater protection.

A desktop review was performed to identify existing groundwater resources and their protection areas for the SDEIR Alternatives. This review used the following data:

- Massachusetts Department of Environmental Protection's (MassDEP's) Public Water Supplies by Massachusetts geographic information system (MassGIS)
- MassDEP Wellhead Protection Areas (Zone II, Zone I, Interim Wellhead Protection Areas [IWPAs]) by MassGIS
- Commonwealth of Massachusetts EEA Mass Well Database
- City of Waltham Engineering Department

Public water supply wells within a 0.5 mile of the North Tunnel, Segment 1 alternative alignments were identified and assessed. For more information on the assessment of potential impacts to water supplies, see **SDEIR Appendix C**. The Updated Draft Water Supply Contingency Plan includes identified courses of action to be taken to provide water service to any affected homeowners and businesses. An updated listing of the wells and of surface waters is included in **SDEIR Appendix C**.

As described in **SDEIR Chapter 3, Outreach and Environmental Justice, Section 3.4.2, Environmental Justice Existing Conditions**, and as shown in **SDEIR Figures 3-19** to **Figure 3-36**, U.S. Census block groups containing environmental justice (EJ) populations are located within a one-mile radius of some Program sites. No disproportionate adverse impacts to EJ populations associated with water supply are anticipated as described in **SDEIR Section 3.4, Environmental Justice Impact Assessment**.

The following section discusses the impact analysis for water supply associated with the two new alternative sites considered for the terminus of the North Tunnel, Segment 1: the UMass Property site and the Lower Fernald Property site.

6.2.1 Water Supply Existing Conditions

Water supply existing conditions for the two new sites at the terminus of the North Tunnel are described below.

6.2.1.1 Alternative 3A/Alternative 4A Water Supply Existing Conditions

UMass Property

The UMass Property site is roughly 1,000 feet southwest of the location of the DEIR Fernald Property site that was previously proposed as the terminus for the North Tunnel, Segment 1, in the DEIR. Three irrigation wells are within a 0.5-mile radius of the UMass Property site. See **Figure 6-1.** These are the same three irrigation wells that were within a 0.5-mile radius of the DEIR Fernald Property site referenced in **DEIR, Section 5.4.1, Launching and Receiving Sites, Table 5.4-2 (pg.5-5)**.

6.2.1.2 Alternative 10A Water Supply Existing Conditions

Lower Fernald Property

The Lower Fernald Property site is roughly 1,000 feet southeast of the DEIR Fernald Property site. There are two irrigation wells within a 0.5-mile radius of the Lower Fernald Property. See **Figure 6-2.** These are the same irrigation wells that were within a 0.5-mile radius of the DEIR Fernald Property referenced in **DEIR, Section 5.4.1, Launching and Receiving Sites, Table 5.4-2 (pg. 5-5)**.

6.2.1.3 Tunnel Alignment Water Supply Existing Conditions

The irrigation wells that are within a 0.5- mile radius of the North Tunnel alignment between the School Street shaft site and the UMass Property site are generally the same as the irrigation wells within a 0.5-mile radius of the North Tunnel alignment (one domestic well and six irrigation wells are no longer within the 0.5-mile radius) between the School Street shaft site and the Fernald Property presented in **DEIR Chapter 5, Water Supply and Water Management Act, Figure 5.4-2** (**pg. 5-9**). One additional irrigation well is within a 0.5-mile radius of the North Tunnel alignment (one domestic well and five irrigation wells are no longer within the 0.5-mile radius) between the School Street shaft site and the Lower Fernald Property site, compared to the DEIR Fernald Property described in the DEIR.

SDEIR Appendix C includes **Table C-1**, **Table C-2**, and **Table C-3** that list irrigation, geothermal, and domestic wells that are within a 0.5 mile of the tunnel alignment in each SDEIR Alternative. The tables include information about the location, type, and depth of each well from data obtained from the EEA and available town and city data.

SDEIR Table 6-2, **Table 6-3** and **Table 6-4** were included in **DEIR Chapter 5, Table 5.4-1 (pg. 5-4), Table 5.4-2 (pg. 5-5),** and **Table 5.4-3 (pg. 5-6)**. The tables have been updated to clearly show that MassDEP approved an application from the Town of Weston to abandon the Fitzgerald and Nickerson Wells. Additionally, the Zone I and IWPA for these wells are no longer protected water supply areas.

Table 6-2 Public Water Supply Wells and their Protection Areas at Launching, Receiving, and Large Connection Sites

Launching and Receiving Site	***Description of Public Water Supply Wells and their Protection Areas***
UMass Property Large Connection Alternatives 3A and 4A	None
Lower Fernald Receiving Alternative 10A	None
Tandem Trailer/Park Road East Launching *Alternatives 3A and 4A*	*This site is within the IWPA to inactive public water supply wells (Nickerson Field G.P. Well (Source ID 3333000-03G) and Route 128 G.P. Well (Source ID 3333000-04G). These wells are abandoned and the IWPA is no longer a protected water supply area.*
Bifurcation Launching *Alternative 3A*	*This site is within the Zone I and IWPA to inactive public water supply wells (Nickerson Field G.P. Well [Source ID 3333000-03G]) and Route 128 G.P. Well (Source ID 3333000-04G). These wells are abandoned and the Zone I and IWPA are no longer protected water supply areas.*
Park Road West Receiving *Alternative 4A*	*This site is within the IWPA to inactive public water supply wells (Nickerson Field G.P. Well [Source ID 3333000-03G]) and Route 128 G.P. Well (Source ID 3333000-04G). These wells are abandoned and the IWPA is no longer a protected water supply area.*
Park Road West Large Connection *Alternative 10A*	*This site is within the IWPA to inactive public water supply wells (Nickerson Field G.P. Well [Source ID 3333000-03G]) and Route 128 G.P. Well (Source ID 3333000-04G). These wells are abandoned and the IWPA is no longer a protected water supply area.*
Highland Avenue Northwest Receiving *Alternative 3A*	*None*
Highland Avenue Northwest/Southwest Launching *Alternatives 3A, 4A, and 10A*	*None*
Highland Ave Northeast/Southeast Launching *Alternatives 3A, 4A, and 10A*	*None*
American Legion Receiving *Alternatives 3A, 4A, and 10A*	*None*

IWPA Interim Wellhead Protection Area
Italicized text within the table indicates no change from the DEIR.

Table 6-3 Groundwater Supply Wells Within 0.5 Mile of Launching, Receiving, and Large Connection Shaft Sites

Site	Domestic Well	Irrigation Well	Geothermal Well	Public Water Supply Well
UMass Property Large Connection (Alternatives 3A and 4A)	0	3	0	0
Lower Fernald Receiving (Alternative 10A)	0	2	0	0
Tandem Trailer/Park Road East Launching [1] *(Alternatives 3A and 4A)*	*2*	*4*	*0*	0
Bifurcation Launching [1] *(Alternative 3A)*	*1*	*3*	*1*	0
Park Road West Receiving [1] *(Alternatives 4A)*	*3*	*6*	*1*	0
Park Road West Large Connection [1] *(Alternative 10A)*	*3*	*6*	*1*	0
Highland Avenue Northwest Receiving *(Alternative 3A)*	*1*	*0*	*0*	*0*
Highland Avenue Northwest/Southwest Launching *(Alternatives 3A, 4A, and 10A)*	*1*	*0*	*0*	*0*
Highland Avenue Northeast/Southeast Launching *(Alternatives 3A, 4A, and 10A)*	*1*	*0*	*0*	*0*
American Legion Receiving *(Alternatives 3A, 4A, and 10A)*	*0*	*0*	*0*	*0*

1 The DEIR listed two public water supply wells in the study area. These have since been removed from the table; as of May 20, 2022 DEP has approved formal abandonment of these two wells. The Zone I and Interim Wellhead Protection Areas are no longer protected water supply areas.

Italicized text within the table indicates no change from the DEIR.

Table 6-4 Water Supply Wells and Surface Water Supplies Within 0.5 Mile of Connection Shaft and Isolation Valve Sites

Site	Domestic Well	Irrigation Well	Geothermal Well	Public Water Supply Well	Surface Water Supply
School Street Connection	*0*	*0*	*0*	*0*	*0*
Cedarwood Pumping Station Connection	*0*	*1*	*0*	*0*	*0*
Hegarty Street Pumping Station Connection	*0*	*0*	*0*	*1*	*1*
St. Mary Street Pumping Station Connection	*0*	*2*	*0*	*0*	*0*
Newton Street Pumping Station Connection	*0*	*1*	*1*	*0*	*0*
Southern Spine Mains Connection	*1*	*3*	*0*	*0*	*0*
Hultman Aqueduct Isolation Valve1	*0*	*0*	*0*	*0*	*0*

1 The DEIR listed two public water supply wells in the study area. These have since been removed from the table; as of May 20, 2022, MassDEP has approved formal abandonment of these two wells. The Zone I and Interim Wellhead Protection Areas are no longer protected water supply areas.

Italicized text within the table indicates no change from the DEIR.

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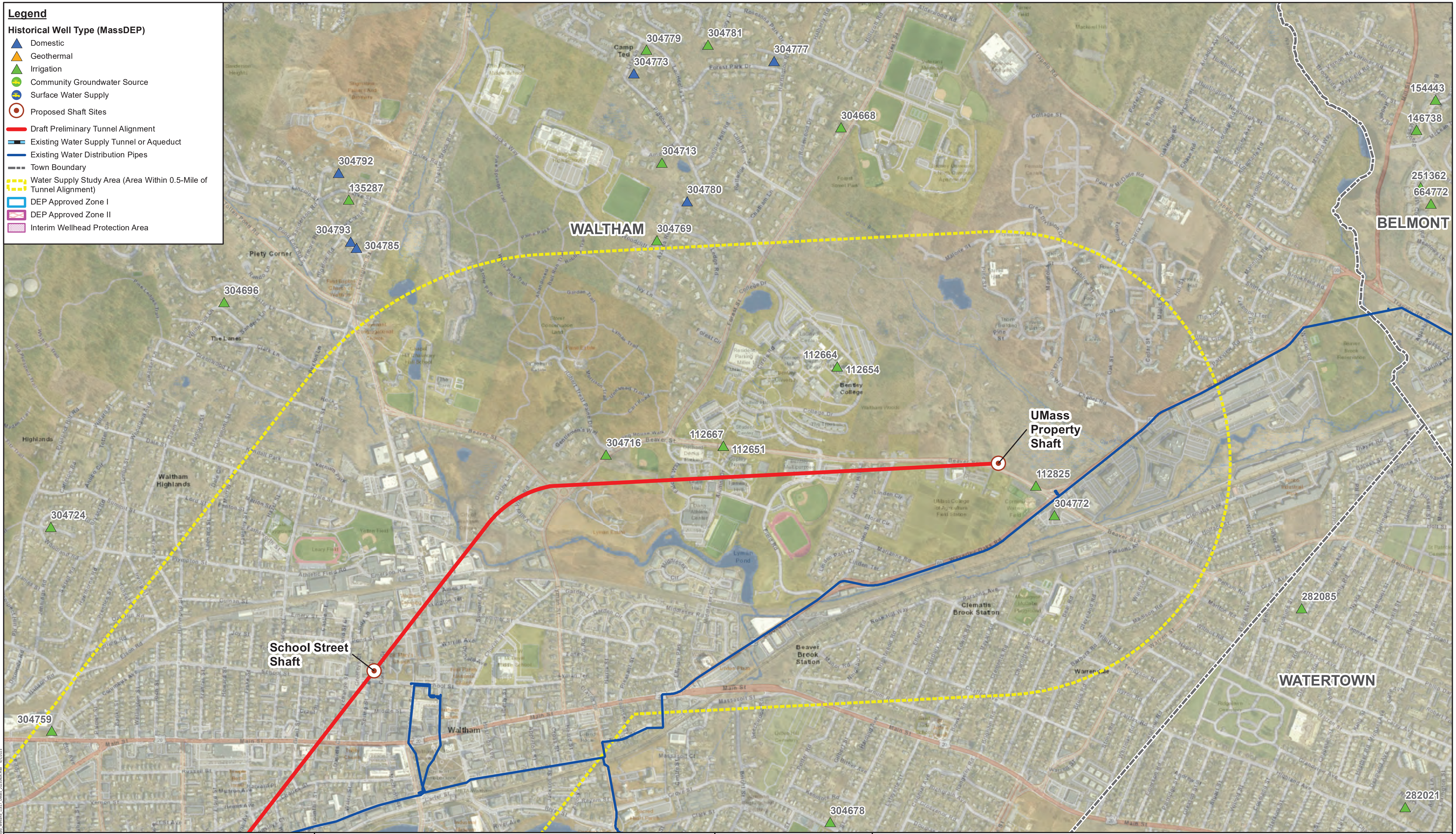
Legend
Historical Well Type (MassDEP)
Domestic
Geothermal
Irrigation
Community Groundwater Source
Surface Water Supply
Proposed Shaft Sites
Draft Preliminary Tunnel Alignment
Existing Water Supply Tunnel or Aqueduct
Existing Water Distribution Pipes
Town Boundary
Water Supply Study Area (Area Within 0.5-Mile of Tunnel Alignment)
DEP Approved Zone I
DEP Approved Zone II
Interim Wellhead Protection Area
WALTHAM
BELMONT
WATERTOWN
UMass Property Shaft
School Street Shaft
304779
304781
304777
304773
304668
154443
146738
251362
664772
304713
304792
135287
304780
304769
304793
304785
304696
112664
112654
112667
112651
304716
112825
304772
304724
282085
304759
304678
282021

Metropolitan Water Tunnel Program

MWRA Contract No. 7159
Supplemental Draft Environmental Impact Report

CDM Smith | In association with vhb | Jacobs | Green International Affiliates, Inc.

0 500 1,000 1,500 Feet
SCALE IN FEET
SCALE: 1" = 1,000'

Water Supply and WMA
North Tunnel Terminus and Water Supply
Locations at UMass Property (Alternatives 3A and 4A)
Figure 6-1

Source: MWRA, CDM Smith, VHB, Jacobs, MassGIS, USGS

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Legend

Historical Well Type (MassDEP)

- Domestic
- Geothermal
- Irrigation
- Community Groundwater Source
- Surface Water Supply
- Proposed Shaft Sites
- Draft Preliminary Tunnel Alignment
- Existing Water Supply Tunnel or Aqueduct
- Existing Water Distribution Pipes
- Town Boundary
- Water Supply Study Area (Area Within 0.5-Mile of Tunnel Alignment)
- DEP Approved Zone I
- DEP Approved Zone II
- Interim Wellhead Protection Area

304779
304781
304777
304773
304668
304713
304792
135287
304780
304793
304785
304769
304696
112664
112654
Lower Fernald Property Shaft
112667
112651
304716
112825
304772
154443
146738
251362
664772
BELMONT
WALTHAM
282085
WATERTOWN
304724
School Street Shaft
304759
304678
282021

Camp Ted
Piety Corner
The Lanes
Highlands
Waltham Highlands
Bentley College
Clematis Brook Station
Beaver Brook Station
Warrendale

0 500 1,000 1,500 Feet

SCALE IN FEET
SCALE: 1" = 1,000'

N

Source: MWRA, CDM Smith, VHB, Jacobs, MassGIS, USGS

Metropolitan Water Tunnel Program

MWRA Contract No. 7159
Supplemental Draft Environmental Impact Report

In association with CDM Smith, vhb, Jacobs, Green International Affiliates, Inc.

Water Supply and WMA
North Tunnel Terminus and Water Supply Locations at Lower Fernald Property (Alternative 10A)
Figure 6-2

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6.2.2 Water Supply Construction Period Impacts

As described in **DEIR Section 5.5, Construction Period Impacts (pg. 5-55),** during construction at the shaft sites, construction water would be generated, which would mainly come from groundwater inflows into the tunnel excavation. Construction of the new tunnel system would include use of TBMs along the proposed alignment. Although this construction method minimizes disruption at the surface as compared to open trench construction, there is the potential to temporarily affect water supply wells along the tunnel route by lowering the groundwater level during construction. In these areas of concern, the TBM would simultaneously drill and pre-grout from the tunnel heading in advance of tunnel excavation. This ground improvement technique would reduce the volume of groundwater inflow into the tunnel, which would help to mitigate any potential impacts to water supply wells. See **SDEIR Section 6.2.4** for more discussion on this mitigation method.

6.2.2.1 Alternative 3A/Alternative 4A Water Supply Construction Period Impacts

UMass Property

During construction at the UMass Property large connection shaft site, minor volumes of dewatering would be generated during the excavation process of shaft and valve vault construction. Minor dewatering and on-site drainage would be managed with the appropriate erosion and sedimentation controls and as much infiltration would occur on site as possible. Dewatering water and stormwater that does not infiltrate on site would be treated and discharged to local receiving waters either through the Municipal Separate Storm Sewer System (MS4) or directly to the water bodies. **DEIR Chapter 4.6 Wetlands and Waterways, Section 4.6.5.4, Tunnel Dewatering and Disinfection (pg. 4.6-151)** provides additional information regarding dewatering treatment and discharge.

Potential construction period impacts to nearby wells and groundwater resources are described in the Draft Water Supply Contingency Plan in **SDEIR Appendix C.** Temporary impacts may include groundwater drawdown during tunnel construction along the tunnel alignment, and to a lesser extent, during shaft construction at shaft sites, which may impact the production of groundwater wells. The Program is unlikely to impact local surface water body levels with the planned requirements for probing and grouting, as described above. Additional information regarding proposed dewatering practices at each individual discharge site (launch shaft) for each Alternative can be found in **DEIR Chapter 4.6**, **Table 4.6-10 (pg. 4.6-152)** and in **SDEIR Chapter 5, Wetlands and Waterways, Section 5.4, Technical Analysis to Respond to Certificate Comments**.

If there is existing contamination present in overburden soil or groundwater, the shaft site where the excavation extends to the ground surface could be impacted. If impacted groundwater or excavated materials were encountered during the construction of the alternatives under consideration, the groundwater or excavated materials would be managed in accordance with applicable regulations. For more information on how management of impacted groundwater or excavated materials would occur, see **DEIR Chapter 4.8 Hazardous Materials, Avoidance, Minimization, and Mitigation**

Measures (pg. 4.8-60) and **SDEIR Chapter 13, Hazardous Materials, Materials Handling, and Recycling, Section 13.2.4, Avoidance, Minimization and Mitigation Measures.**

6.2.2.2 Alternative 10A Water Supply Construction Period Impacts

Lower Fernald Property

Potential construction period impacts to nearby wells and groundwater resources are described in the Draft Water Supply Contingency Plan in **SDEIR Appendix C.** Temporary impacts may include groundwater drawdown during tunnel construction along the tunnel alignment, and to a lesser extent, during shaft construction at shaft sites, which may impact the production of groundwater wells. The Program is unlikely to impact local surface water body levels with the planned requirements for probing and grouting. Additional information regarding proposed dewatering practices at each individual discharge site (launch shaft) for each Alternative can be found in **DEIR Chapter 4.6, Table 4.6-10 (pg. 4.6-152)**, and in **SDEIR, Section 5.4, Technical Analysis to Respond to Certificate Comments.**

During construction at the Lower Fernald Property site, the new shafts and tunnel will experience groundwater inflow from surrounding groundwater resources. This inflow will be managed appropriately, and the water will be treated and then discharged to local receiving waters.

If there is existing contamination present in overburden soil or groundwater, the shaft site where the excavation extends to the ground surface could be impacted. If impacted groundwater or excavated materials were encountered during the construction of the alternatives under consideration, the groundwater or excavated materials would be managed in accordance with applicable regulations. For more information on how management of impacted groundwater or excavated materials would occur, see **DEIR Section 4.8.7, Hazardous Materials, Avoidance, Minimization, and Mitigation Measures (pg. 4.8-60)** and **SDEIR Section 13.2.4, Hazardous Materials, Materials Handling, Recycling and Avoidance, Minimization and Mitigation Measures**.

6.2.2.3 North Tunnel Water Supply Construction Period Impacts

Temporary impacts may include groundwater drawdown during tunnel construction along the tunnel alignment, and to a lesser extent, during shaft construction at shaft sites, which may impact the production of groundwater wells. The Program is unlikely to impact local surface water body levels with the planned requirements for probing and grouting, as described above.

6.2.3 Water Supply Final Conditions

6.2.3.1 Alternative 3A/Alternative 4A Water Supply Final Conditions

UMass Property

No permanent or temporary impacts to groundwater resources would occur in association with future permanent operation of the tunnel under any of the alternatives under consideration. As described

further below, as a result of the implementation of avoidance measures to groundwater resources, all proposed shafts, valve chambers, and other permanent appurtenances are located outside identified active water supplies and their protection areas.

For all three SDEIR Alternatives, no changes to current groundwater resource conditions are expected once construction is complete. Final construction of the tunnel would include a concrete liner with a minimum thickness of one foot as well as impermeable steel piping in areas of weak ground conditions. Additionally, water in the tunnel would be at a substantially higher pressure than the surrounding groundwater thereby preventing groundwater inflows into the tunnel.

When the Program is complete, the top of shaft and valve chamber structures as well as some access road pavement would create additional impervious area. Standard 3 of the MassDEP Stormwater Management Standards requires that new development eliminate or minimize the loss of annual recharge to groundwater resulting from development. To meet this standard, during the design stage, soils data would be reviewed to determine predevelopment annual recharge volumes. The stormwater management systems would be designed to infiltrate the required recharge volume as determined based on soils data and requirements of the Massachusetts Stormwater Handbook. If infiltration stormwater control measures (SCMs) are proposed, test pits would be performed to determine infiltration rates at each site. Appropriate groundwater recharge would be provided at each site based on the soil types if impervious cover is proposed.

6.2.3.2 Alternative 10A Water Supply Final Conditions

Lower Fernald Property

The water supply final conditions for the Lower Fernald Property site, SDEIR Alternative 10A, are the same as the UMass Property site described above.

6.2.4 Water Supply Avoidance, Minimization, and Mitigation

As discussed in **DEIR Section 5.7, Avoidance, Minimization, (pg. 5-57)**, care was taken in the identification of Program sites, with a focus on avoiding and minimizing environmental impacts. The following avoidance, minimization and mitigation measures apply to all of the SDEIR Alternatives. See **SDEIR Chapter 14, Mitigation**, for a summary of mitigation measures.

6.2.4.1 Avoidance

Avoidance of impacts to water supplies and groundwater resources was considered when identifying the proposed areas of construction, including launching, receiving, connection, and isolation valve locations and routes of interconnecting pipelines for the alternatives as described in the DEIR and this SDEIR. When possible, the shafts were located outside of water supply areas and groundwater protection zones. Avoidance of impacts of the tunnel alignments was limited by the location of the shaft sites.

6.2.4.2 Minimization

Where construction of the alternatives would involve unavoidable impacts to water supplies and groundwater resources, all feasible minimization measures were evaluated and would be implemented.

6.2.4.3 Mitigation

Construction mitigation measures related to water supply are the same for all three DEIR alternatives and the two new shafts sites included in this SDEIR, namely the UMass Property site and the Lower Fernald Property site. In areas of concern, the TBM has the capability to simultaneously drill and pre-grout the tunnel heading along the tunnel route, which would reduce the volume of groundwater inflow into the tunnel and help to mitigate any potential impacts to water supply wells.

The contract documents will require a preconstruction survey to be conducted by the contractor to verify the locations of wells and well characteristics prior to construction. A summary of mitigation measures the contractor would implement if water supplies would be impacted during construction is included in **SDEIR Appendix C.**

The primary mitigation to reduce the potential for groundwater drawdown during construction would be probing from the tunnel heading in advance of the excavation to assess water inflows, followed by pre-excavation grouting (also from the tunnel heading) in the event water-bearing features are encountered by the probing. The probing and pre-grouting could be made mandatory before the tunnel proceeds beneath important areas of groundwater well production or beneath sensitive local water bodies; the determination for mandatory probing and grouting (both where this may be required as well as the number and relative position of probe holes or grouting criteria) would be a risk-based assessment during the final design phase of the Program. The specification of mandatory probing and the setting of limits that trigger grouting must be judiciously applied, as performing these activities would require TBM stoppages, which may reduce overall TBM production rate and lead to a longer construction schedule.

A secondary mitigation to reduce groundwater inflow into the tunnel would be drilling and cut-off grouting of water-bearing features in the rock through the walls of the unlined tunnel after the TBM has passed. This type of grouting is not as effective as (and not proposed as a replacement for) the pre-excavation probing and grouting described earlier in this section, mainly because post-excavation cut-off grouting must be performed at lower pressures than pre-excavation grouting (due to the lower confining pressures that exist after tunnel excavation), and therefore is not as effective at penetrating water-bearing features in the rock.

A tertiary mitigation for disruption of water supply from surface waters or groundwater wells is to provide an alternative water supply until groundwater levels can be restored. This mitigation is described in the **SDEIR Appendix C.**

6.2.4.4 Alternative 3A/Alternative 4A Water Supply Mitigation

The mitigation measures for the UMass Property site, included in Alternatives 3A and 4A, are the same as described above.

6.2.4.5 Alternative 10A Water Supply Mitigation

The mitigation measures for the Lower Fernald Property site, included in SDEIR Alternative 10A, are the same as described above.

6.3 Technical Analysis to Respond to Certificate Comments

This section provides the technical analysis required to respond to the comments received in the Secretary's Certificate on the DEIR.

Certificate Comment C-42

The DEIR does not appear to contain the existing capacities of the existing tunnels, and the capacities of the proposed redundant tunnels. The SDEIR should provide these capacities to allow the WRC to determine if there is a possibility of exceeding the present rate of interbasin transfer. The SDEIR should confirm that the transfer of water will be limited to the existing capacity if there is no intent to increase the present rate of interbasin transfer. Specifically, the SDEIR should provide the capacity of the City Tunnel, City Tunnel Extension and Dorchester Tunnel, and also provide the capacity of each of the two new deep rock tunnels.

Response to C-42

The intent of the Program is not to increase total capacity of the system, but to ensure redundancy by providing a backup to the existing Metropolitan Tunnel System if it were ever out of service for planned or unplanned reasons. For example, when the North and South Tunnel are completed, the MWRA anticipates it will take segments of the existing City Tunnel system offline for maintenance and repair. During those periods, MWRA would be relying primarily on the North and South Tunnels to provide water to our metro-Boston area communities. Therefore, the new tunnels must be able to provide water supply capacities that are equivalent to the existing tunnel system.

The capacity of a pressure tunnel is not measured with a single value because the flow through the tunnel is demand-based and depends on water distribution system parameters, such as attaining acceptable hydraulic grade line at key locations including meters and pump stations, ability to maintain storage tank operating ranges, and proper operation of pressure reducing valves.

To respond to the request for existing tunnel capacities, MWRA modeled the water distribution system with 1) existing tunnel system in operation only and 2) the proposed tunnels in operation only under the same flow conditions to see what each system conveys under the same operating conditions. For this comparison, MWRA used the 2060 High Day Demand of 283 million gallons per day (MGD), which is the design flow used when sizing the new tunnels and evaluating ability of the water system to meet required hydraulic conditions. The flows provided below are the maximum through the tunnel in the modeled condition.

Existing tunnels only in operation:

- City Tunnel = approximately 210 MGD

- City Tunnel Extension = approximately 90 MGD
- Dorchester Tunnel = approximately 95 MGD

Note that the City Tunnel supplies the City Tunnel Extension and the Dorchester Tunnel and as such acts as the limiting factor in supply.

New tunnels only in operation:

- North Tunnel = approximately 80 MGD
- South Tunnel = approximately 125 MGD

Certificate Comment C-43

The SDEIR should clearly state if the existing capacity will not be exceeded and what steps will be taken to limit flow to the present rate of interbasin transfer.

Response to C-43

As described in the response to Certificate Comment C-42, the new deep rock tunnels are not intended to increase MWRA's present capacity to supply water or the rate of Interbasin Transfer. The new tunnels are to ensure redundancy by providing a backup to the existing tunnel system when those tunnels are out of service and must be able to provide the equivalent water supply capacities to the existing tunnel system. The volume of water conveyed through the new deep rock tunnels, as well as the existing tunnels, is limited by the existing aqueducts and tunnels upstream (the Hultman Aqueduct and MetroWest Water Supply Tunnel), which are limited by the Norumbega Reservoir. The Norumbega Reservoir sets the hydraulic gradeline for the metropolitan system and the new tunnels, thereby regulating flows downstream. Additionally, at the downstream end of the tunnels, the surface piping restricts how much water can be conveyed to communities.

The addition of a new community to MWRA's service areas requires Water Resource Commission approval under the Interbasin Transfer Act (ITA), in addition to legislative approval as required under MWRA's enabling act, Chapter 372 of the Acts of 1984. All existing and future demands must remain within the safe yield of MWRA's system, which is 300 MGD.

Certificate Comment C-44

The SDEIR should confirm that all construction dewatering will take place in the Charles River Basin and not cross a basin boundary.

Response to Comments C-44

All proposed construction, including tunnel boring, launching, receiving, large connection, and connection shaft site construction, is proposed to occur only within the Charles River Basin, as shown in **Figure 6-3**. No dewatering activities will cross major basin boundaries.

For the SDEIR Alternatives, groundwater volumes associated with temporary dewatering are estimated to vary between less than 100,000 gallons per day (GPD) up to an estimated 8 MGD. This range is dependent on shaft function, location, and extent of tunneling incurred. Because all bedrock infiltration will occur from, and be discharged to, the Charles River Basin, and will not cross a basin boundary, the ITA will not apply to the dewatering portion of the Program.

Certificate Comment C-45

Based on the study area and the preferred South and North Alternative, the project may require WMA Permits in more than one river basin (the tunnel may pass through the Charles and Boston Harbor Basins). The DEIR should clarify the need for this Permit and address the permit criteria at 310 CMR 36.00 that incorporate streamflow criteria (Biological Category, Groundwater Withdrawal Category and Seasonal Groundwater Withdrawal Categories) and potential impacts to coldwater fish resources. MWRA should consult with MassDEP regarding this analysis prior to preparing the DEIR.

Response to Comments C-45

MWRA understands that due to estimated withdrawals over 100,000 GPD, a WMA permit for construction period withdrawals only will be required. There will be no permanent withdrawals. As previously stated, and shown in **SDEIR Figure 6-3**, all proposed construction is to occur within the Charles River Basin, therefore the WMA permit will only pertain to the Charles River Basin. While the tunnel is being constructed, groundwater will infiltrate into the tunnel and will ultimately be discharged at certain locations. See Response to Certificate Comment C-44.

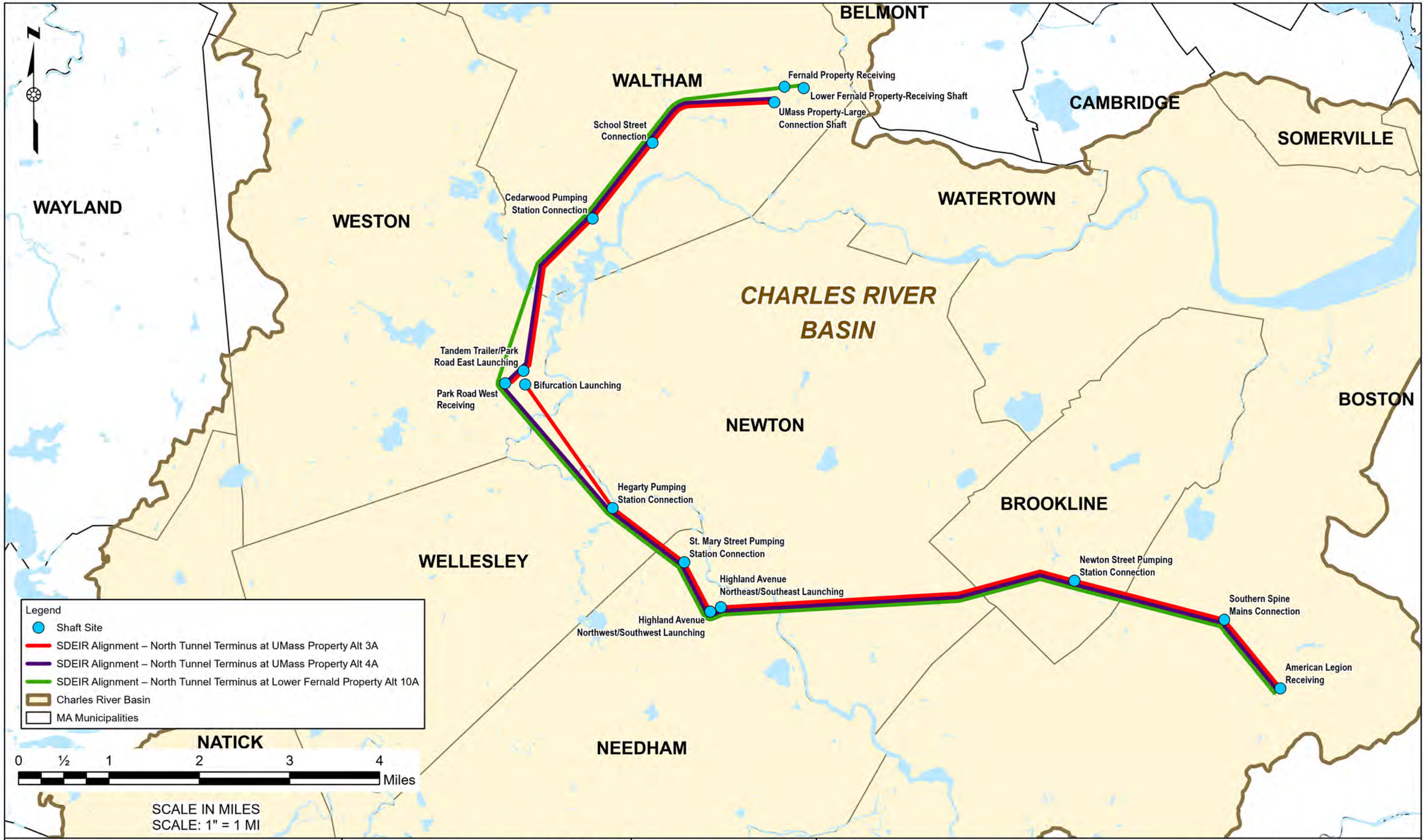
A key WMA consideration for most projects is demonstrating that withdrawals would be minimized, with mitigation credit given for returning flows to the groundwater. This can be accomplished via groundwater recharge. The MWRA has considered groundwater recharge but has concerns over the unanticipated negative consequences this may cause, such as recharged groundwater migrating back into the tunnel, or potentially flooding residents' basements. Because of the potential challenges surrounding groundwater recharge, the MWRA is proposing discharging to surface waters as the primary means of discharge but will continue to evaluate as design progresses to determine if minor recharge volumes can be handled on site. MWRA will continue coordination with MassDEP to identify other appropriate mitigation measures.

The WMA permit incorporates streamflow criteria and potential impacts to coldwater fish resources. Using the WMA Permitting Tool (WMA Tool), impacts to Groundwater Withdrawal Categories and Biologic Categories were evaluated using estimated volumes associated with dewatering. While results of the WMA Tool indicate that some subbasins would fall into a more impacted category, the WMA Tool is not directly applicable to the Program as it assumes all groundwater withdrawals are concentrated at the shaft site rather than distributed along the length of the tunnel. MWRA will continue coordination with MassDEP as the design progress to determine the most appropriate method of determining impacts and the associated mitigation measures.

The Tandem Trailer shaft site has been identified as a proposed location for tunnel dewatering, which will discharge to the Seaverns Brook. Seaverns Brook is classified by the Massachusetts Division of Fisheries and Wildlife as a coldwater fishery that originates from Schenck's Pond at the Authority's Norumbega

Reservoir Facility. As stated in **DEIR Section 4.5.4.1, Launching and Receiving Sites (pg. 4.5 39)**, a 2007 study conducted by MassDEP in Seaverns Brook noted that the only fish species present was a warmwater species and that the seven-day average of the daily maximum temperature indicated higher temperature than normally found in a coldwater fishery.[1] However, given in Seaverns Brook classification of a coldwater fishery, the MWRA will include language in the contract documents to monitor the ambient temperature of the water in the brook and the temperature of discharge water prior to entering Seaverns Brook. Per 314 CMR 4, Class B waterways, the rise in temperature due to a discharge shall not exceed 3 degrees Fahrenheit for a discharge to a designated coldwater fishery. In the event the groundwater temperature is raised in the course of treatment and exceeds this value, contract provisions would be carried to implement mitigation measures, such as underground storage, to lower the temperature of the water to meet the water quality standards before it is discharged.

1 Massachusetts Department of Environmental Protection, Final Massachusetts Integrated List of Waters for the Clean Water Act 2018/2020 Reporting Cycle, Appendix 12, November 2021, https://www.mass.gov/doc/20182020-integrated-list-of-waters-appendix-12-charles-river-watershed-assessment-and-listing-decision-summary/download.



Metropolitan Water Tunnel Program

MWRA Contract No. 7159
Supplemental Draft Environmental Impact Report 2023

CDM Smith in association with vhb
Jacobs GREEN INTERNATIONAL AFFILIATES, INC.

Belmont, Waltham, Watertown, Weston, Newton, Wellesley, Needham, Brookline, Dedham, and Boston, MA

Water Supply and WMA Project Overview

Figure 6-3

Source: MWRA, CDM Smith, VHB, Jacobs, MassGIS

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Certificate Comment C-46

The SDEIR should include a commitment to manage the long-term disposal of rock cuttings excavated in the process of boring the rock tunnels and identify where the long-term deposition of this material will be. Large volumes of this material should not be deposited adjacent to a public water supply because it could increase the total dissolved solids (TDS) content of the water, which would in turn increase the corrosivity of the water.

Response to C-46

As described in **DEIR Section 4.8.5**, **Construction Period Impacts (pg. 4.8-51)**, "The contractor would be responsible for finding suitable locations for reuse or disposal of excavated material from the tunnel excavation. Protocols developed during final design would be followed to identify excavated material that may contain contaminated materials so that it can be handled appropriately and disposed of at suitable locations. Most of the excavated material from all three DEIR Alternatives is anticipated to be clean, crushed rock, which could be reused beneficially at other locations." The final design and contract documents will have testing requirements for disposed materials to comply with either the reuse of rock cuttings and / or permit requirements for disposal. Approved disposal sites would comply with regulations to protect public water supplies.

Excavated material will be tested as needed following removal to determine potential disposal and/or reuse options. Depending on the composition of the excavated material (igneous and metamorphic rocks are generally preferred), the size and shape of the excavated material (how much post-processing is required), and the timing of its removal, some excavated material could be used for embankment, backfill, paving material, or other uses. There is the potential for naturally occurring contaminants such as asbestos-containing rock and arsenic to be present in the rock, and, therefore, excavated material and groundwater generated during the Program would require proper management in accordance with the applicable regulations (see **DEIR Section 4.8.7, Avoidance, Minimization, and Mitigation Measures [4.8-60]**).

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7 Climate Change

7.1 Introduction

This chapter identifies the potential climate change-related risks and exposures for the two new alternative sites considered for the terminus of the proposed North Tunnel, Segment 1, alignment in place of the Fernald Property site previously assessed in the Draft Environmental Impact Report (DEIR). The new sites are the University of Massachusetts (UMass) Property large connection shaft site included in Supplemental Draft Environmental Impact Report (SDEIR) Alternatives 3A and 4A, and the Lower Fernald Property receiving shaft site considered in SDEIR Alternative 10A. All other sites associated with the SDEIR Alternatives remain unchanged from the DEIR. Included in this chapter is an evaluation of existing conditions, construction period impacts, and final conditions, as well as best practices to avoid and minimize climate change-related hazards.

Consistent with the methodology in the DEIR, the Resilient Massachusetts Action Team's Climate Resilience Design Standards Tool (RMAT Tool) was used to determine climate exposures and risk for the two new alternative sites. Best practices that would be implemented to avoid and minimize potential climate risks identified by the RMAT Tool are also identified consistent with the DEIR. The RMAT Tool output reports for the Program sites published in the DEIR were generated using Version 1.1 of the RMAT Tool. The RMAT Tool has since been updated to Version 1.3, released in March 2023, which includes updates to the models for determining riverine flooding exposure due to extreme precipitation. RMAT Tool output reports for the two new alternative sites for the terminus of the North Tunnel (the UMass Property site and Lower Fernald Property site) were produced in RMAT Tool Version 1.3. To maintain a consistent analysis of potential climate change-related exposures across all Program sites, all RMAT Tool output reports for Program sites presented in the DEIR were re-run in Version 1.3 and are included in **SDEIR Appendix D, RMAT Tool Output Reports**.

The use of RMAT Tool Version 1.3 resulted in two sites (Park Road East and American Legion) receiving a "Moderate Exposure" to riverine flooding due to extreme precipitation score instead of a "High Exposure" score that was previously presented in the DEIR (using RMAT Tool Version 1.1). These changes are described in **SDEIR Section 7.2.4**. The RMAT Tool exposure scores for all other Program sites remain unchanged from the DEIR.

The Secretary's Certificate on the DEIR, issued on December 16, 2022, identified a Scope for the SDEIR, which included specific requests related to climate change. **SDEIR Section 7.3**, transcribes a comment from the Certificate related to climate change and flood risk, and provides supplemental, clarifying information in response. Comments received related to greenhouse gas (GHG) emissions and how GHG emissions may affect environmental justice (EJ) populations are separately discussed in **SDEIR Chapter 3, Outreach and Environmental Justice**, and **SDEIR Chapter 8, Air Quality and Greenhouse Gas Emissions**. Comments received related to stormwater and flood risk are discussed in **SDEIR Chapter 5, Wetlands and Waterways**. Refer to **SDEIR Chapter 15, Responses to Comments**, for the full list of delineated comments received on the DEIR.

7.1.1 Summary of Findings

Key findings on potential climate change-related risks and exposures for the Program are summarized below. The key findings remain consistent with those presented in **DEIR Chapter 6, Climate Change**.

Key findings associated with the two new alternative sites considered in the SDEIR for the terminus of the North Tunnel, Segment 1, in place of the DEIR Fernald Property site include:

- The anticipated climate change-related risks and exposures determined by the RMAT tool for the proposed final conditions at the UMass Property site and for the Lower Fernald Property site were the same as for the DEIR Fernald Property site: no exposure to sea-level rise or storm surge, high exposure to urban flooding from extreme precipitation, moderate exposure to riverine flooding from extreme precipitation, and high exposure to extreme heat.
- Final conditions at the UMass Property site (SDEIR Alternatives 3A and 4A) and at the Lower Fernald Property site (SDEIR Alternative 10A) are each anticipated to increase impervious surface by approximately 0.1 acres compared to existing conditions.

Key findings associated with the three SDEIR Alternatives, which are consistent with the findings of the three DEIR Alternatives, include:

- The Program is not anticipated to result in any significant construction-period or final conditions impacts related to climate change.
- Program sites considered in SDEIR Alternatives 3A, 4A, and 10A are primarily previously disturbed open space areas and right-of-way space.
- The RMAT Tool indicated that all Program sites have at least a portion of land within their permanent aboveground footprint area that would have a high exposure to flooding associated with extreme precipitation and a high exposure to extreme heat; no Program sites were identified as exposed to sea level rise or storm surge.
- Based on the findings from the RMAT Tool, avoidance and minimization measures and best practices were identified that would be implemented to reduce climate change-related risks. Accordingly, the Program design incorporates elements that would help minimize potential climate change-related risks such as increased precipitation events and extreme heat exposure, which include:
    - A section of land would remain unpaved (permeable) at each Program site to serve as a stormwater management area.
    - Proposed stormwater-management systems associated with each Program site would be designed to treat stormwater runoff associated with the additional impervious areas planned.
    - Proposed covers, hatches, and isolation valve chambers would be designed to prevent infiltration of floodwaters in the event of flooding.
    - To minimize potential exposure to extreme heat and flooding, land alteration and tree clearing to construct the Program would be limited to the extent practicable. Tree impact avoidance and protection strategies would be implemented by the MWRA where feasible.
    - Areas temporarily disturbed during construction would be restored to pre-construction conditions where possible in accordance with the respective property owners.

- Planting trees and landscaping sites after construction, where required and as feasible, would help recover lost shade to minimize potential Program-related increases in extreme heat risk.
- Restoring sites disturbed during construction with loam and seed would help reduce flood risk by minimizing additional impervious areas and maintaining existing pervious areas to provide infiltration space for floodwater. Loam and seed would also assist in minimizing potential increases in extreme heat risk.

7.2 Climate Change Impact Assessment

As directed by the Secretary's Certificate on the DEIR, and as described in **SDEIR Chapter 2, Alternatives**, two new alternative sites were identified for the terminus of the proposed North Tunnel, Segment 1 alignment. In SDEIR Alternatives 3A and 4A, the terminus would be a large connection shaft site at the UMass Property; in SDEIR Alternative 10A, the terminus would be a receiving shaft site at the Lower Fernald Property. All other sites making up the SDEIR alternatives remain unchanged from the DEIR.

7.2.1 Climate Change Methodology

Consistent with the methodology described in the DEIR (see **DEIR Section 6.4, Regulatory Overview (pg. 6-2)**, the RMAT Tool was used to identify potential climate change-related risks for the two new alternative sites for the terminus of the proposed North Tunnel, Segment 1. The boundary of each new site's permanent aboveground footprint area was input into the RMAT Tool's built-in geographic information system (GIS) map. The footprint area input into the RMAT Tool corresponds to the area surrounding the permanent aboveground Program-related physical assets, including the shaft site and top-of-shaft structure, concrete slabs, paved vehicle access area, fencing, stormwater basin, bollards, and signage, where applicable depending on the type of Program site. The permanent aboveground footprint area input in the RMAT Tool does not include the dewatering discharge outfalls and associated splash pads as described in **SDEIR Section 7.3** and as noted in **Tables 7-1** and **Table 7-2**. See **SDEIR Appendix D** for the RMAT Tool output reports for all Program sites.

As described in **DEIR Section 6.4, Regulatory Overview (pg. 6-2)**, the RMAT Tool is divided into four separate sections: Core Project Information, Ecosystem Services Benefit, Climate Exposure, and Project Assets. For the Program, the categories of "Infrastructure" and "Water Utility" were selected from the RMAT Project Asset choices. Outputs from the RMAT Tool report identify the Program's:

- Criticality (a measure of the asset's value and community importance)
- Ecosystem services benefit
- Exposure (to climate hazards)
- Risk (of suffering severe impacts)

Detailed definitions of these outputs were described in **DEIR Section 6.4, Regulatory Overview (pg. 6-2)**. Based on the Program findings of climate exposure and risk from the RMAT Tool, avoidance and minimization measures and best practices were identified that would be implemented to reduce climate change-related risks. These best practices are consistent with the RMAT Climate Resilience Design

Standards and Guidelines,[1] which supports the RMAT Tool as described in **DEIR Section 6.4.2, RMAT Tool (pg. 6-4)**.

7.2.2 Climate Change Existing Conditions

The following section identifies existing climate change-related conditions at the two new alternative sites considered for the terminus of the proposed North Tunnel, Segment 1 in place of the DEIR Fernald Property site: the UMass Property site in SDEIR Alternatives 3A and 4A, and the Lower Fernald Property site in SDEIR Alternative 10A. All other sites associated with the SDEIR Alternatives are the same as described in the DEIR. Consistent with the DEIR, included is an evaluation of how the existing conditions at each new alternative site may influence the exposure to climate change-related hazards, including the existing land cover and whether any Special Flood Hazard Areas (SFHAs)[2] designated by the Federal Emergency Management Agency (FEMA) are located within the footprint of the permanent shaft site boundary.

Existing land cover and flood risk at the launching, receiving shaft, large connection shaft, connection shaft, and isolation valve sites included in the three SDEIR Alternatives are summarized in **Table 7-1**.

Table 7-1 Existing Land Cover and Flood Risk at Program Sites

Site (Alternative)	City/Town	Existing Predominant Land Cover	Permanent Aboveground Shaft Site Infrastructure Within FEMA SFHA (100-Year Flood Area)?
Launching, Receiving, and Large Connection Shaft Sites			
UMass Property (3A, 4A)	Waltham	Pervious	No
Lower Fernald Property (10A)	Waltham	Mixed [1]	No
Tandem Trailer (paired with Park Road East listed below) (3A, 4A)	*Weston*	*Mixed*	*No* [2,3]
Park Road East (3A, 4A)	*Weston*	*Pervious*	*No*
Bifurcation (3A)	*Weston*	*Pervious*	*No* [3]
Park Road West (4A, 10A)	*Weston*	*Pervious*	*No*
Highland Avenue Northwest (3A)	*Needham*	*Pervious*	*No*
Highland Avenue Northwest/Southwest (4A, 10A)	*Needham*	*Pervious*	*No*
Highland Avenue Northeast/Southeast (3A, 4A, 10A)	*Needham*	*Pervious*	*No* [3]
American Legion (3A, 4A, 10A)	*Boston*	*Pervious*	*No*

1 Commonwealth of Massachusetts, Massachusetts Executive Office of Energy and Environmental Affairs, Resilient Massachusetts Action Team (RMAT), *Climate Resilience Design Standards & Guidelines*, Climate Resilience Design Standards Tool, Version 1.2, *User Guide*, July 2022, https://eea-nescaum-dataservices-assets-prd.s3.amazonaws.com/cms/GUIDELINES/UserGuide_V1.2.pdf.

2 The 1-percent annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1-percent chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1-percent annual chance flood.

Table 7-1 Existing Land Cover and Flood Risk at Program Sites

Site (Alternative)	City/Town	Existing Predominant Land Cover	Permanent Aboveground Shaft Site Infrastructure Within FEMA SFHA (100-Year Flood Area)?
Connection Shaft and Isolation Valve Sites (Common to All Alternatives)			
School Street	*Waltham*	*Impervious*	*No*
Cedarwood Pumping Station	*Waltham*	*Mixed* [1]	*No*
Hegarty Pumping Station	*Wellesley*	*Pervious*	*No*
St. Mary Street Pumping Station	*Needham*	*Mixed* [1]	*No*
Newton Street Pumping Station	*Brookline*	*Pervious*	*No*
Southern Spine Mains	*Boston*	*Mixed* [1]	*No*
Hultman Aqueduct Isolation Valve	*Weston*	*Mixed* [1]	*No*

Source: Federal Emergency Management Agency, National Flood Hazard Layer (NFHL) Viewer, https://hazards-fema.maps.arcgis.com/apps/webappviewer/index.html?id=8b0adb51996444d4879338b5529aa9cd (accessed April 2023).

1 A site is considered to have "Mixed" land cover when there are comparable amounts of pervious and impervious surface.

2 The permanent footprint of the Tandem Trailer launching site would be outside the FEMA Special Flood Hazard Areas (SFHA); the southern boundary of the temporary construction area limits of disturbance is within the FEMA SFHA. Upon completion of construction, the area would be vacated and reseeded/revegetated, where appropriate.

3 Permanent dewatering discharge pipes and associated splash pads are proposed to be located within the FEMA SFHA. The proposed shaft site and all other proposed permanent infrastructure would be outside the FEMA SFHA.

Italicized text within the table indicates no change from the DEIR.

7.2.2.2 Alternative 3A/4A Existing Conditions

The following section discusses existing conditions for climate exposures at the UMass Property site, which is proposed as the terminus of the North Tunnel, Segment 1, in SDEIR Alternatives 3A and 4A in place of the DEIR Fernald Property site. The existing conditions at all other sites in Alternatives 3A and 4A remain unchanged from the DEIR (as summarized in **Table 7-1** and as described in **DEIR Section 6.5, Methodology [pg. 6-4]**).

UMass Property

The UMass Property large connection shaft site is planned to be located on the southwest corner of Lawrence Meadow, an approximately 31-acre open space area that surrounds the Samuel D. Warren Estate. The site is vacant/unpaved and consists of mowed grassland and scrub/shrub vegetation, with some deciduous trees along the site's southern border with Beaver Street. The UMass Property is adjacent to (west of) a wetland area associated with Clematis Brook. The aboveground footprint of the proposed UMass Property large connection shaft site is not located within a FEMA SFHA.

7.2.2.3 Alternative 10A Existing Conditions

The following section discusses existing conditions for climate exposures at the Lower Fernald Property site, which is proposed as the terminus of the North Tunnel, Segment 1, in SDEIR Alternative 10A in place

of the DEIR Fernald Property site. The existing conditions at all other sites in SDEIR Alternative 10A remain unchanged from the DEIR (as summarized in **Table 7-1** and as described in **DEIR Section 6.5, Methodology [pg. 6-4]**).

Lower Fernald Property

The Lower Fernald Property receiving shaft site is planned to be located on the southern area of the former Walter E. Fernald State School property. The site was previously disturbed and consists of a mix of paved (impervious) area along Chapel Road, existing ancillary abandoned buildings, gravel, and open space (pervious). The unpaved open space includes shrubs and deciduous trees, including lightly wooded upland. The aboveground footprint of the proposed Lower Fernald Property receiving shaft site is not located within a FEMA SFHA.

7.2.3 Climate Change Construction Period Impacts

Construction period impacts would be associated with the physical construction of the tunnels and the associated launching shaft, receiving shaft, large connection shaft, connection shaft, and isolation valve sites. Construction-related activities would primarily take place underground with limited disruption to the surface above. Above-ground construction-related impacts would primarily occur at the proposed site locations where tunnel shafts would connect the deep rock tunnel to the surface and/or water distribution infrastructure, and where the ground-level construction staging areas would be located. The proposed sites and associated construction staging areas are generally within previously disturbed open space and right-of-way space. Construction period impacts for climate exposure were identified for the UMass Property and Lower Fernald Property sites using the methodology discussed in **SDEIR Section 7.2.1**. No significant construction-period impacts related to climate change exposure are anticipated for the Program.

7.2.3.1 Alternative 3A/4A Construction Period Impacts

The following section discusses potential flood risk during construction at the UMass Property site in place of the DEIR Fernald Property site. The construction period impacts at all other Program sites are the same as described in the DEIR.

UMass Property

As shown in **SDEIR Chapter 2, Alternatives, Figure 2-1**, the temporary construction area limit of disturbance (LOD) estimated for the UMass Property large connection shaft site is approximately 0.9 acres total. The site would include a top-of-shaft structure, valve chamber, and stormwater basin with paved access provided from Beaver Street. The temporary LOD includes an approximately 0.5-acre area surrounding the proposed shaft site and approximately 0.4 acres to accommodate a subsurface pipeline traveling from the shaft site southeast along Beaver Street to connect to Weston Aqueduct Supply Main Number Three (WASM3) at the intersection with Waverley Oaks Road. The LOD for the pipeline includes an area northwest of the intersection between Beaver Street and Waverley Oaks Road to accommodate

a temporary discharge pipe. Upon completion of construction, the area would be vacated and reseeded/revegetated, where necessary and as appropriate. Construction of the proposed large connection shaft site, paved access area, fencing, and associated permanent infrastructure would take place outside the FEMA SFHA associated with Clematis Brook.

7.2.3.2 Alternative 10A Construction Period Impacts

The following section discusses potential flood risk during construction at the Lower Fernald Property site, which is proposed as the terminus of the North Tunnel, Segment 1, in SDEIR Alternative 10A in place of the DEIR Fernald Property site. The construction period impacts at all other Program sites are the same as described in the DEIR.

Lower Fernald Property

As shown in **SDEIR Chapter 2, Alternatives, Figure 2-3**, the temporary construction area LOD for the Lower Fernald Property site is approximately 2.3 acres. The LOD includes a connection to WASM3 at Waverley Oaks Road and a temporary discharge pipe southwest of the intersection between Chapel Road and Waverley Oaks Road. Upon completion of construction, the area would be vacated and reseeded/revegetated, where necessary and as appropriate. Construction of the proposed receiving shaft site, paved access area, fencing, and associated permanent infrastructure would take place outside the FEMA SFHA associated with Clematis Brook.

7.2.4 Climate Change Final Conditions

The anticipated future climate conditions and the implications these conditions may have on the proposed permanent MWRA infrastructure at the UMass Property site and the Lower Fernald Property site were evaluated consistent with the DEIR. The use of updated RMAT Tool Version 1.3 resulted in two sites (Park Road East and American Legion) receiving a lower exposure score than previously presented in the DEIR. The final conditions and associated RMAT Tool output reports for all other proposed Program launching shaft, receiving shaft, large connection shaft, connection shaft, and isolation valve sites remain the same as previously described in the DEIR.

Permanent aboveground Program-related infrastructure would include the shaft site and top-of-shaft structure, paved vehicle access area, fencing, and associated infrastructure depending on the type of Program site. As previously assumed in the DEIR, it is anticipated that the Program would create up to 3 acres of new impervious surface compared to existing conditions, including new pavement proposed for vehicle parking and site access roadways. Use of the UMass Property site in SDEIR Alternative 3A or 4A would result in an approximately 0.1-acre increase in impervious area compared to existing conditions (see **SDEIR Chapter 2, Alternatives, Figure 2-2**). Similarly, use of the Lower Fernald Property site in SDEIR Alternative 10A would result in an approximately 0.1-acre increase in impervious area compared to existing conditions (see **SDEIR Chapter 2, Alternatives, Figure 2-4**).

The RMAT Tool output reports outline four climate change exposure and risk categories to inform project development and capital planning decision-making. These four categories are:

- Sea level rise and storm surge
- Extreme precipitation-urban flooding
- Extreme precipitation-riverine flooding
- Extreme heat

Climate change exposures are scored by the RMAT Tool from no exposure to high exposure. Possible output scores include "Not Exposed," "Low Exposure," "Moderate Exposure," or "High Exposure." These exposures are scored through the tool by analyzing:

- Project's criticality (asset value and community importance)
- Projected climate change exposures at the project location
- Proposed changes to impervious surface and tree cover as the result of a project
- Other climate-related design considerations

The methodology used within the RMAT Tool is detailed in **DEIR Section 6.5, Methodology (pg. 6-4).**

Climate change exposure risks associated with extreme precipitation and extreme heat that were identified by the RMAT Tool for all Program sites are summarized in **Table 7-2** (no exposures for sea level rise and storm surge were identified). Updated output reports from the RMAT Tool for all Program sites are provided in **SDEIR Appendix D**. Since the filing of the DEIR, the RMAT Tool has been updated to Version 1.3, which updated the modeling used to assess risk and exposure to riverine flooding. The updated RMAT Tool has resulted in revised riverine flooding exposure scores for the Park Road East site and the American Legion site (see **Table 7-2**). Both the Park Road East site (SDEIR Alternatives 3A and 4A) and the American Legion site (all SDEIR Alternatives) previously received a "High Exposure" score for riverine flooding from extreme precipitation in RMAT Tool Version 1.1, which was previously presented in the DEIR. The Park Road East site and the American Legion site received a "Moderate Exposure" score in RMAT Tool Version 1.3. The exposure scores for all other Program sites remain the same as previously presented in the DEIR.

As discussed in **DEIR Section 6.5, Methodology (pg. 6-4)** the RMAT Tool also identifies a project's ecosystem services benefits score based on project goals. Every Program site received a low ecosystem services benefits score as the goals of this Program are not focused on ecological restoration.

Table 7-2 RMAT-Determined Exposures by Site

Site (Alternative)	City/ Town	Estimated Increase in Impervious Surface (acres)	Tree Removal Anticipated	Sea Level Rise and Storm Surge	Extreme Precipitation		Extreme Heat
					Urban Flooding	Riverine Flooding	
Launching, Receiving, and Large Connection Shaft Sites							
UMass Property (3A, 4A)	Waltham	0.1	Yes	Not Exposed	High Exposure	Moderate Exposure	High Exposure
Lower Fernald Property (10A)		0.1	Yes	Not Exposed	High Exposure	Moderate Exposure	High Exposure
Tandem Trailer (3A, 4A)	*Weston*	*0.0*	*Yes*	*Not Exposed*	*High Exposure*	*High Exposure*	*High Exposure*

Table 7-2 RMAT-Determined Exposures by Site

Site (Alternative)	City/ Town	Estimated Increase in Impervious Surface (acres)	Tree Removal Anticipated	Sea Level Rise and Storm Surge	Extreme Precipitation		Extreme Heat
					Urban Flooding	Riverine Flooding	
Launching, Receiving, and Large Connection Shaft Sites							
Park Road East (3A, 4A)		*0.2*	*Yes*	*Not Exposed*	*High Exposure*	Moderate Exposure[1]	*High Exposure*
Bifurcation (3A)		*0.7*	*Yes*	*Not Exposed*	*High Exposure*	*Moderate Exposure*	*High Exposure*
Park Road West (4A, 10A)		*0.4 (Alt. 4A) 0.5 (Alt. 10A)*	*Yes*	*Not Exposed*	*High Exposure*	*Moderate Exposure*	*High Exposure*
Highland Avenue Northwest (3A)	*Needham*	*0.0*	*Yes*	*Not Exposed*	*High Exposure*	*Not Exposed*	*High Exposure*
Highland Avenue NW/SW (4A, 10A)		*0.0*	*Yes*	*Not Exposed*	*High Exposure*	*Not Exposed*	*High Exposure*
Highland Avenue NE/SE (3A, 4A, 10A)		*0.7*	*Yes*	*Not Exposed*	*High Exposure*	*Not Exposed*	*High Exposure*
American Legion (3A, 4A, 10A)	*Boston*	*0.5*	*Yes*	*Not Exposed*	*High Exposure*	Moderate Exposure[1]	*High Exposure*
Connection Shaft and Isolation Valve Sites (Common to All Alternatives)							
School Street	*Waltham*	*0.0*	*No*	*Not Exposed*	*High Exposure*	*Not Exposed*	*High Exposure*
Cedarwood Pumping Station		*0.1*	*Yes*	*Not Exposed*	*High Exposure*	*Moderate Exposure*	*High Exposure*
Hegarty Pumping Station	*Wellesley*	*0.1*	*Yes*	*Not Exposed*	*High Exposure*	*Moderate Exposure*	*High Exposure*
St. Mary Street Pumping Station	*Needham*	*0.1*	*Yes*	*Not Exposed*	*High Exposure*	*Not Exposed*	*High Exposure*
Newton Street Pumping Station	*Brookline*	*0.1*	*Yes*	*Not Exposed*	*High Exposure*	*Not Exposed*	*High Exposure*
Southern Spine Mains	*Boston*	*0.1*	*Yes*	*Not Exposed*	*High Exposure*	*Not Exposed*	*High Exposure*
Hultman Aqueduct Isolation Valve	*Weston*	*0.1*	*No*	*Not Exposed*	*High Exposure*	*Moderate Exposure*	*High Exposure*

Source: Resilient Massachusetts Action Team Climate Resilience Design Standards Tool, Version 1.3, released March 16, 2023, reports generated in June 2023.

1 The Park Road East site and the American Legion site each received a "High Exposure" score for riverine flooding from extreme precipitation in RMAT Tool Version 1.1, which was previously presented in the DEIR. The Park Road East site and the American Legion site received a "Moderate Exposure" score in RMAT Tool Version 1.3.

Acreages of impervious surface have been rounded to the nearest tenth.

Italicized text within the table indicates no change from the DEIR.

7.2.4.1 Alternative 3A/4A Final Conditions

The following section discusses the exposure results from the RMAT Tool for the UMass Property site, which is proposed as the terminus of the North Tunnel, Segment 1, in SDEIR Alternatives 3A and 4A. In addition, RMAT Tool exposure scores for the Park Road East site (paired with Tandem Trailer; SDEIR Alternatives 3A and 4A) and the American Legion site (all SDEIR Alternatives) are discussed below since use of the updated version of the RMAT Tool resulted in revised riverine flooding exposure scores for these sites. The final conditions and the associated RMAT Tool exposure results for all other Program sites are the same as described in the DEIR (refer to **DEIR Section 6.8, Final Conditions [pg. 6-14]**, and **SDEIR Appendix D**).

UMass Property

The RMAT Tool scored the proposed final conditions of the UMass Property site, used in SDEIR Alternative 3A and 4A, as described below and in **Table 7-2**. Refer to **SDEIR Appendix D** for the RMAT Tool output report for the UMass Property site.

- **Sea-Level Rise**: The RMAT Tool identified that the UMass Property site would not be exposed to sea-level rise or storm surge because it is not located within the predicted mean high-water shoreline by 2030, it has not experienced historical coastal flooding, and it is not within the Massachusetts Coast Flood Risk Model boundary.
- **Urban Flooding**: This site was determined to have high exposure to urban flooding from extreme precipitation. While there has been no historical flooding at the site, maximum annual daily rainfall would exceed 10 inches within the useful life of the proposed site's infrastructure. Existing impervious area site cover is less than 10 percent and would increase with the proposed final conditions by an estimated 0.1 acres.
- **Riverine Flooding**: The site was determined to have moderate exposure to riverine flooding from high precipitation. The site received a moderate exposure score as the permanent site footprint has not historically been subject to riverine flooding, is not within a FEMA SFHA, and is not susceptible to riverine erosion.
- **Extreme Heat:** The site was determined to have high exposure to extreme heat since, within the Program's useful life, the number of days above 90 degrees Fahrenheit is projected to increase by more than 30 days per year. Additionally, the site would also experience an increase in impervious area, removal of existing trees along the border with Beaver Street as needed for construction activities, and lack of existing tree canopy.

Park Road East (paired with Tandem Trailer) (updated)

Using Version 1.3 of the RMAT Tool, the Park Road East site (paired with Tandem Trailer), which is part of SDEIR Alternatives 3A and 4A, received a moderate exposure to riverine flooding due to extreme precipitation. Exposure to riverine flooding due to extreme precipitation has been reduced from high exposure as reported in the DEIR (RMAT Tool Version 1.1) to moderate exposure (RMAT Tool Version 1.3). Per the RMAT Tool, the site is not likely susceptible to riverine erosion, whereas the previous version of

the RMAT Tool used for the DEIR stated the site was potentially subject to riverine erosion. Consistent with the RMAT Tool outputs previously reported in the DEIR for the Park Road East site, the permanent site footprint is within 100 feet of a waterbody, has not historically been subject to riverine flooding, and is not within a FEMA SFHA. RMAT Tool exposure scores for sea level rise, urban flooding, and extreme heat remain unchanged from **DEIR Section 6.8, Final Conditions (pg. 6-14)**, as shown in **Table 7-2**.

American Legion (updated)

Version 1.3 of the RMAT Tool updates the exposure to riverine flooding due to extreme precipitation at the American Legion site (common to all SDEIR Alternatives). Exposure to riverine flooding due to extreme precipitation has been reduced from high exposure as reported in the DEIR (RMAT Tool Version 1.1) to moderate exposure (RMAT Tool Version 1.3). The site received a moderate exposure score as the site is not likely susceptible to riverine erosion per the RMAT Tool, whereas the previous version of the RMAT Tool used for the DEIR stated the site was potentially subject to riverine erosion. Consistent with the RMAT Tool outputs previously reported in the DEIR for the American Legion site, the permanent site footprint has not historically been subject to riverine flooding and is not within a FEMA SFHA. Exposure to sea level rise, urban flooding, and extreme heat remain unchanged from **DEIR Section 6.8, Final Conditions (pg. 6-14)**, as shown in **Table 7-2**.

7.2.4.2 Alternative 10A Final Conditions

The following section discusses the exposure results from the RMAT Tool for the Lower Fernald Property site, which is proposed as the terminus of the North Tunnel, Segment 1, in SDEIR Alternative 10A. In addition, the exposure results for the American Legion site were revised due to updates in the RMAT Tool as discussed in the previous section, **SDEIR Section 7.2.4.1**, and are the same for SDEIR Alternative 10A. The final conditions and the associated RMAT Tool exposure results for all other Program sites are the same as described in the DEIR (see **DEIR Section 6.8, Final Conditions [pg. 6-14]** and **SDEIR Appendix D**).

Lower Fernald Property

The RMAT Tool scored the proposed final conditions of the Lower Fernald Property site as described below and in **Table 7-2**. Refer to **SDEIR Appendix D** the RMAT Tool output report for the Lower Fernald Property.

- **Sea-Level Rise**: The RMAT Tool identified that the Lower Fernald Property site would not be exposed to sea-level rise or storm surge because it is not located within the predicted mean high-water shoreline by 2030, it has not experienced historical coastal flooding, and it is not within the Massachusetts Coast Flood Risk Model boundary.
- **Urban Flooding**: This site was determined to have high exposure to urban flooding from extreme precipitation. While there has been no historical flooding at the site, maximum annual daily rainfall is predicted to exceed 10 inches within the useful life of the proposed site's infrastructure. Existing impervious area site cover is between 10 percent and 50 percent and would increase with the proposed final conditions by an estimated 0.1 acres.

- **Riverine Flooding**: The site was determined to have moderate exposure to riverine flooding from high precipitation since the site is within 500 feet of a water body and less than 20 feet above the waterbody. The site received a moderate exposure score as the permanent site footprint has not historically been subject to riverine flooding, is not within a FEMA SFHA, and is not susceptible to riverine erosion.
- **Extreme Heat**: The site was determined to have high exposure to extreme heat since, within the Program's useful life, the number of days above 90 degrees Fahrenheit is projected to increase by more than 30 days per year. The site would also experience an increase in impervious area compared to existing conditions and the removal of existing trees.

7.2.5 Climate Change Avoidance, Minimization, and Mitigation Measures

Consistent with the DEIR, this section identifies how the Program has considered and incorporated climate vulnerability, resiliency, and climate data, where applicable. Since construction methodologies and equipment are generally similar across the three alternatives, avoidance and minimization measures are considered jointly in this section.

7.2.5.1 Fundamental Program Redundancy Goals

As described in the DEIR, the MWRA's assets are critical infrastructure for serving residents and communities in eastern Massachusetts. The reliable delivery of water is essential to protecting public health, providing sanitation, fire protection, and supporting a viable economy. The existing Metropolitan Tunnel System has limited redundancy, and some infrastructure is more than 60 years old, which presents challenges for maintenance, repairs, and/or upgrades to existing infrastructure without potential service interruptions.

The new water supply tunnel segments would connect to existing water supply infrastructure at key locations to achieve system redundancy goals, facilitating a more resilient water supply system for eastern Massachusetts. As prioritized in the MWRA's 2018 Water System Master Plan,[3] having a redundant tunnel system in place is necessary to allow regular inspection, maintenance, and rehabilitation of pipes, valves, and tunnels without service disruption, as well as to reliably respond to infrastructure emergencies. The Program would reduce single points of failure, improving overall water transmission system redundancy and enabling system upgrades that are critical to ensuring the system's continued reliability.

Consistent with Executive Order 569, *Establishing an Integrated Climate Change Strategy for the Commonwealth*,[4] the impacts of climate change are considered as part of the MWRA's capital improvement projects to ensure infrastructure is resilient to climate change-related threats. New MWRA facility rehabilitation includes long-term adaptation measures that consider flooding trends and projected

3 Massachusetts Water Resources Authority, Water System Master Plan, 2018.

4 Commonwealth of Massachusetts, Executive Order 569: *Establishing an Integrated Climate Change Strategy for the Commonwealth*, issued by Governor Charlie Baker, Massachusetts Register Number 1323, September 16, 2016, https://www.mass.gov/executive-orders/no-569-establishing-an-integrated-climate-change-strategy-for-the-commonwealth.

flooding impacts from hurricane and 100-year storm events. Recent rehabilitation at pumping stations has included the addition of drainage pumps and raising critical components such as backup generators.[5] The MWRA has also provided local investment to help protect pipelines from flooding. This includes reinforcing sewer pipes with cured-in-place pipe liners and sealing manhole covers to prevent stormwater infiltration. These and other climate change adaptation, resiliency, and redundancy initiatives are implemented as part of ongoing capital improvement projects to upgrade, protect, and replace aging infrastructure and would be incorporated into the Program design as appropriate.

7.2.5.2 Site Selection Process

Potential climate-related impacts were minimized during an extensive site selection process, which evaluated the location of each potential launching shaft, receiving shaft, large connection shaft, connection shaft, and isolation valve site based on proximity to areas designated by FEMA as having potential flood risk. For example, to minimize potential risks from flooding and climate-related flood impacts, the proposed launching shaft, receiving shaft, large connection shaft, connection shaft, and isolation valve sites were intentionally located to avoid FEMA designated- flood hazard areas where possible; these include the designated Regulatory Floodway,[6] SFHA, and Other Flood Area – Zone X (subject to the 500-year flood). The site-selection process also evaluated each alternative based on system capacity and redundancy through connections to the existing MWRA distribution system.

In the final condition, most of the proposed facilities, such as shafts, valve chambers, meters, and surface pipelines, would be underground. Above-ground surface features would include fencing, signage, paved vehicle access areas, and top of shaft structures. The top of shaft structures and concrete slabs at the surface would typically not extend more than three feet above finished grade and would be designed to prevent infiltration of floodwaters. The surface would be revegetated as appropriate, and as described below.

7.2.5.3 Implementation of RMAT Best Practices

The Program would implement best practices to avoid and minimize climate change-related risks determined by the RMAT Tool. As shown in **Table 7-2**, the RMAT Tool indicated that all proposed sites have at least a portion of land within the site boundary that would have a high exposure to urban flooding associated with extreme precipitation or a high exposure to extreme heat. Risk, a second output from the RMAT Tool, combines a site's exposure with the criticality of the asset as determined through RMAT Tool inputs. Program criticality was conservatively assumed to be high because the infrastructure must be accessible and operable during a natural hazard event (although the Program would enhance water system redundancy as described in **SDEIR Section 7.2.5.1**), serves a large population that includes EJ and climate-vulnerable populations, and would have a high replacement cost.

5 Massachusetts Water Resources Authority, "MWRA's Climate Change Strategy," presentation by Frederick A. Laskey, MWRA Executive Director, June 15, 2018, https://www.mwra.com/environment/climatechange/2018-06-15AdBdClimateChange.pdf.

6 Per FEMA, the Regulatory Floodway "is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights."

As many of the sites identified high risk to climate hazards, RMAT Tool design considerations that incorporate Climate Resilience Design Guidance Best Practices have been incorporated into the design of the Program. Climate Resilience Design Guidance Best Practices as provided through the RMAT Tool are summarized in **Table 7-3**. The following section discusses the design considerations that would assist in reducing risk to climate hazards. As none of the Program's sites are coastal, no best practices and design considerations were considered to reduce risk to sea level rise and storm surge.

Table 7-3 RMAT Best Practice Design Considerations

Considerations	Best Practice
Site Suitability (SS)	1. Reduce exposure to climate hazards
	2. Mitigate adverse climate impacts and provide benefits
	3. Protect, conserve, and restore critical natural resources on-site and off-site
Regional Coordination (RC)	1. Assess regional context of vulnerability
	2. Evaluate impacts beyond site-specific design
	3. Optimize capital investment opportunities
	4. Prioritize services and assets that serve vulnerable populations
Flexible Adaptation Pathways (AP)	1. Embed future capacity and design for uncertainty
	2. Design for incremental change
	3. Encourage climate mitigation and other co-benefits
	4. Prioritize nature-based solutions
	5. Prepare for current and future operational and maintenance needs

Extreme Precipitation Causing Flooding

As identified by the most recent version of the RMAT Tool, during the useful life of the Program, precipitation depth over 24 hours for a 100-year storm event is projected to exceed 10 inches for both the UMass Property site and Lower Fernald Property site (see **SDEIR Appendix D**). Consistent with the majority of the other Program sites, this increase would subject both new alternative sites to urban flood risk and riverine flood risk. Additionally, the increase in impervious surface from the Program (up to 3 acres of total new impervious surface compared to existing conditions as described in **SDEIR Section 5.1.2**, **Final Conditions**) would reduce permeable surface that allows for water infiltration, contributing to flood risk. Due to the criticality of assets that are a part of the Program, best practices to avoid and minimize the impacts of extreme flooding (urban and riverine flooding) identified in the RMAT Tool would be implemented to protect critical components. Proposed covers, hatches, and isolation valve chambers would be designed to prevent infiltration of floodwater in the event of flooding. As described below, best practices to reduce potential impacts on critical infrastructure from flooding include designing stormwater management systems to manage runoff in accordance with the latest guidelines, incorporating designated unpaved areas to support infiltration of stormwater runoff, and restoring areas disturbed during construction with loam and seed and/or other vegetation where appropriate.

Stormwater Management

Climate change-related risks, including increased precipitation events, would be considered in the design of the proposed stormwater management systems associated with each proposed launching shaft, receiving shaft, large connection shaft, connection shaft, and isolation valve site. As described in **SDEIR Section 5.2.4, Wetlands and Waterways Avoidance, Minimization, and Mitigation**, stormwater management systems would be designed to manage stormwater runoff in accordance with the latest Massachusetts Stormwater Handbook published by the Massachusetts Department of Environmental Planning (MassDEP).[7] The proposed stormwater management systems would be designed to treat stormwater runoff associated with the additional impervious areas planned with the Program as discussed in **SDEIR Section 5.2.4**. For the proposed sites where impervious pavement is planned, appropriate groundwater recharge would be provided based on the site's soil type. The design for the Program would incorporate low-impact development standards to the extent practicable at each site. Structural stormwater control measures (SCMs) would be incorporated into each proposed site to meet the requirements of the MassDEP Stormwater Management Standards.

A section of land would remain unpaved (permeable) to support infiltration of stormwater runoff at each proposed launching, receiving, large connection and connection shaft site. The unpaved area would be located at the lowest elevation to catch and absorb stormwater runoff from impervious areas. Proposed covers, hatches, and isolation valve chambers would be designed to prevent infiltration of floodwater in the event of flooding.

Stormwater management system design and the designated unpaved areas to support stormwater management are anticipated to help meet the following RMAT best practice guidelines:

- Site Suitability Guideline 2 (SS-2): Mitigate adverse climate impacts and provide benefits
- Flexible Adaptation Pathways Guideline 1 (AP-1): Embed future capacity and design for uncertainty
- Flexible Adaptation Pathways Guideline 4 (AP-4): Prioritize nature-based solutions

Loam and Seed

Upon completion of the proposed tunnel and valve vaults and connection piping, areas disturbed during construction would be restored with loam and seed. This would help reduce flood risk by minimizing additional impervious areas and maintaining existing pervious areas to provide infiltration space for floodwater. It would also reduce erosion risks by providing greater soil cohesion. The use of loam and seed is anticipated to meet the following RMAT best practice guidelines:

- SS-2: Mitigate adverse climate impacts and provide benefits
- Site Suitability Guideline 3 (SS-3): Protect, conserve, and restore critical natural resources on-site and off-site
- AP-1: Embed future capacity and design for uncertainty
- AP-4: Prioritize nature-based solutions

7 The current version of the *Massachusetts Stormwater Handbook* is dated 2008 at the time of this report.

Extreme Heat

Extreme heat was identified by the RMAT Tool as a climate risk since, within the Program's useful life, the number of days above 90 degrees Fahrenheit is projected to increase by more than 30 days per year. Additionally, the projected annual, summer, and winter average temperatures are expected to increase, the projected heat index "real feel" is expected to increase, and the number and duration of heat waves are expected to increase. The addition of impervious areas may also increase the overall level of heat absorption at the sites compared to existing conditions, contributing to the heat island effect.

To minimize potential impacts from extreme heat, land alteration and tree clearing required to construct the Program would be limited to the greatest extent practicable. MWRA would implement tree impact avoidance and protection strategies where feasible. Shaft sites considered in SDEIR Alternatives 3A, 4A, and 10A primarily consist of previously disturbed areas and right-of-way space that contains a mix of open land, grassland, and shrubs, with some deciduous trees and evergreens present. The Program would remove some trees and vegetation during construction-related activities, which would reduce available shade cover at the proposed sites. See **SDEIR Chapter 10, Rare Species and Wildlife Habitat**, for additional information on tree and vegetation removal. Sites disturbed during construction would be restored with loam and seed, which would assist in reducing potential increases in extreme heat risk, as grass does not absorb and reflect as much heat as paved surfaces. By minimizing tree clearing to the extent practicable, replacing trees and vegetation removed during construction where possible and where appropriate, and revegetating sites using loam and seed, the Program would seek to implement the following RMAT best practice guidelines:

- SS-2: Mitigate adverse climate impacts and provide benefits
- SS-3: Protect, conserve, and restore critical natural resources on-site and off-site
- AP-1: Embed future capacity and design for uncertainty
- AP-4: Prioritize nature-based solutions

7.3 Technical Analysis to Respond to Certificate Comments

One comment, Certificate Comment C-47, was identified in the Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs (EEA) Secretary's Certificate on the DEIR in the "Climate Change" section of the Scope, which is included below. As discussed in the DEIR, no significant impacts to baseline environmental or health conditions of EJ or non-EJ populations are anticipated due to Program-related construction activities or final conditions, including climate change exposure, GHG emissions, stormwater, or flood risk. See **SDEIR Chapter 3, Outreach and Environmental Justice**, for information on potential effects to EJ populations, and **SDEIR Chapter 8, Air Quality and Greenhouse Gas Emissions**, for information on GHG emissions. See **SDEIR Chapter 15, Responses to Comments,** for the full list of delineated comments received on the DEIR in the Certificate and the associated comment letters.

Certificate Comment C-47

The SDEIR should clarify what infrastructure is proposed to be sited in floodplain, and what measures will be taken to minimize the risk of flooding including through elevation of structures or other wet or dry proofing methods.

Response to C-47

The permanent footprints of all Program sites considered are located outside the limits of the FEMA SFHA. Permanent aboveground infrastructure proposed to be located within the FEMA SFHA would be limited to the dewatering discharge pipe outfalls and associated splash pads associated with three Program sites. These three sites include:

- Highland Avenue Northeast/Southeast launching shaft site (SDEIR Alternatives 3A, 4A, and 10A): Permanent dewatering discharge pipe outfall and splash pad would be located within FEMA SFHA (Zone AE)[8] associated with the Charles River.
- Bifurcation launching shaft site (SDEIR Alternative 3A): Permanent dewatering discharge pipe outfall and splash pad would be within FEMA SFHA (Zone A)[9] associated with Seaverns Brook.
- Tandem Trailer/Park Road East launching shaft site (SDEIR Alternatives 3A and 4A): Permanent dewatering discharge pipe outfall and splash pad would be located within FEMA SFHA (Zone A) associated with Seaverns Brook.

No other permanent aboveground Program infrastructure is proposed to be installed within a FEMA SFHA. The permanent discharge pipes and associated rip rap splash pads are required for dewatering discharge and to enable future tunnel maintenance. Locating the discharge pipes and splash pads adjacent to the respective waterway (within the FEMA SFHA) is intended to reduce the possibility of adverse impacts to the existing bank due to dewatering discharge flows. It is not feasible to locate the structures outside of the SFHA because the SFHA overlaps the areas required to be protected from potential scour. No other permanent aboveground infrastructure is proposed to be installed within FEMA Special Flood Hazard Areas. To minimize the risk of flooding, permanent shaft structures were planned to be sited outside of FEMA Special Flood Hazard Areas. Discharge pipes and splash pads would be designed with scour protection and erosion control to minimize impacts to existing waterways and would be designed to be resistant to flood flows. Refer to **SDEIR Section 5.2.4, Wetlands and Waterways Avoidance, Minimization, and Mitigation Measures** and **SDEIR Section 7.2.5** for additional details.

8 "Zone AE" is a FEMA Special Flood Hazard Area subject to inundation by the 1% annual chance flood (100-year flood) for which base flood elevations are determined.

9 "Zone A" is a FEMA Special Flood Hazard Area subject to inundation by the 1% annual chance flood (100-year flood) for which base flood elevations are not determined.

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8 Air Quality and Greenhouse Gas Emissions

8.1 Introduction

This chapter of the Supplemental Draft Environmental Impact Report (SDEIR) includes an assessment of air quality and greenhouse gas (GHG) emissions associated with construction activities at the two new alternative sites that are considered for the terminus of the North Tunnel, Segment 1, in place of the Fernald Property receiving shaft site that was previously evaluated in the Draft Environmental Impact Report (DEIR). The University of Massachusetts (UMass) Property large connection shaft site is included in SDEIR Alternatives 3A and 4A, and the and Lower Fernald Property receiving shaft site is included in SDEIR Alternative 10A. All other Program sites associated with the SDEIR Alternatives remain unchanged from the DEIR.

As described in the Secretary's Certificate on the Environmental Notification Form (ENF) (issued May 7, 2021), the Program is subject to the May 2010 Massachusetts Environmental Policy Act (MEPA) Greenhouse Gas Emissions Policy and Protocol (GHG Policy) and requires the quantification of Program-related GHG emissions. Therefore, also included in this chapter is an updated Program-wide assessment of air quality and GHG emissions associated with the cumulative construction activities at all Program launching shaft, receiving shaft, large connection shaft, connection shaft, and isolation valve sites for each SDEIR Alternative. This chapter presents the results of the emissions modeling for each of the three SDEIR Alternatives, including total cumulative construction-related emissions over the modeled duration of Program construction, as well as the peak 12-month period of construction emissions. Emissions calculated for each quarter of Program construction at each Program site are provided in **SDEIR Appendix E, Air Quality and Greenhouse Gas Emissions Supporting Documentation, Table E-1**.

The Secretary's Certificate on the DEIR, issued on December 16, 2022, identified a Scope for the SDEIR, which included specific requests related to air quality and GHG. **SDEIR Section 8.4** includes the comments from the Certificate specific to air quality and GHG emissions and provides supplemental analysis and/or clarifying information in response per the Scope in the DEIR Certificate. Responses to Certificate comments related to how air quality and GHG emissions may affect environmental justice (EJ) populations are provided in **SDEIR Chapter 3, Outreach and Environmental Justice**. Refer to **SDEIR Chapter 15, Responses to Comments**, for the full list of delineated comments received on the DEIR.

8.1.1 Summary of Findings

Key findings on air quality and GHG emissions estimated for the Program remain consistent with the DEIR and are listed below. **Table 8-1** below provides a comparative summary of the estimated emissions across each SDEIR Alternative.

- None of the DEIR Alternatives were anticipated to result in significant construction-period impacts related to air quality and GHG emissions. Similarly, none of the SDEIR Alternatives would result in adverse construction-period air quality and GHG emissions as described below:
  - Use of the UMass Property site in SDEIR Alternatives 3A and 4A instead of the DEIR Fernald Property site is anticipated to result in a less than 1 percent decrease in peak 12-month period emissions and total 10-year modeled construction emissions for all analyzed pollutants compared to DEIR Alternatives 3 and 4.
  - Similarly, use of the Lower Fernald Property site in SDEIR Alternative 10A in place of the DEIR Fernald Property site is anticipated to result in a less than 1 percent decrease in peak 12-month period and total 10-year modeled construction emissions for all analyzed pollutants compared to DEIR Alternative 10.
- As shown in **Table 8-1**, total peak 12-month period construction emissions and total 10-year modeled construction duration emissions calculated for each SDEIR Alternative are not expected to be significantly different from each other and would occur at a variety of geographically diverse sites, limiting potential health impacts. No significant construction-period impacts related to air quality and GHG emissions are anticipated from any of the three SDEIR Alternatives.
- Program emissions of nitrogen oxides (NOx), volatile organic compounds (VOCs), and GHG are a fraction of the total statewide emissions and are expected to remain small percentages even as statewide emissions of NOx, VOC, and GHG are anticipated to decrease.
- Although General Conformity does not apply to the Program, Program-related construction emissions were compared to the *de minimis* emissions thresholds (for a project in a nonattainment area) for precursors of ozone (100 tpy), NOx (100 tpy), and VOC (50 tpy). Peak 12-month period emissions are all well below the General Conformity *de minimis* thresholds (statewide emissions from the latest inventory are also provided in **SDEIR Section 8.3.2.4** for background context, along with the General Conformity *de minimis* thresholds).

Table 8-1 Summary of Estimated Emissions by SDEIR Alternative (Tons)

Description of Emissions		Alternative 3A	Alternative 4A	Alternative 10A
Peak 12-Month Period of Construction Emissions		Year 4 Q3 – Year 5 Q2	Year 4 Q3 – Year 5 Q2	NOx and GHG: Year 6 Q3 – Year 7 Q2 and VOC: Year 6 Q2 – Year 7 Q1
Total Peak 12-Month Period Emissions	NOx	33.7	33.7	33.4
	VOC	2.5	2.5	2.6
	GHG	6,210.1	6,209.7	6,149.5
Total 10-Year Modeled Construction Duration Emissions	NOx	122.8	122.6	123.0
	VOC	9.1	9.0	9.1
	GHG	25,738.8	25,669.9	25,158.3

NOx – oxides of nitrogen; VOC – volatile organic compounds; GHG – greenhouse gas; Q = Quarter

- Program-related construction activities are expected to temporarily add approximately 0.1 percent to 2.0 percent additional vehicles to local roadways on the modeled peak day compared to existing conditions. This minor increase would not be expected to materially affect any ambient pollutant concentrations and their comparison to any air quality standards.
- Temporary Program-related traffic (and associated emissions) along highways is anticipated to comprise less than 0.1 percent to 0.7 percent of total daily volumes on the modeled peak day, which conservatively assumes that construction would occur at all shafts simultaneously.
- No permanent stationary fossil-fueled sources of emissions would be installed at any of the Program sites. Electricity use at the finished sites would be minor and associated with site lighting, security camera systems, unit heaters, or infrequent valve operations (depending on the type of site).
- Post-construction (operational) activities are estimated to include an average of two vehicle trips per day at any given Program site (one trip entering the site and one trip exiting the site).
- Since post-construction Program operations are expected to result in negligible emissions of GHG (and criteria pollutants), the MWRA is requesting that the MEPA GHG Policy *de minimis* exemption be applied and concur that a quantitative assessment of operational emissions is not required.
- As assumed in the DEIR, the MWRA intends to incorporate measures to minimize Program-related emissions; these include using an electrified tunnel boring machine (TBM) instead of a TBM powered by fossil fuels, limiting vehicle idling, requiring use of Ultra Low Sulfur Diesel Fuel, and implementing dust control measures.

8.2 Air Quality and GHG Emissions Context

8.2.1 National Ambient Air Quality Standards

The 1970 Clean Air Act (CAA), last amended in 1990, was enacted by the U.S. Congress to protect the health and welfare of the public from the adverse effects of air pollution. As required by the CAA, the U.S. Environmental Protection Agency (USEPA) promulgated National Ambient Air Quality Standards (NAAQS) to compare and evaluate ambient air quality against monitored pollutant concentrations.

The NAAQS have been established for six criteria pollutants: nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter (PM) (PM_{10} and $PM_{2.5}$), carbon monoxide (CO), ozone (O_3), and lead (Pb).[1] The NAAQS are listed in **Table 8-2**. The Massachusetts Ambient Air Quality Standards (MAAQS) are identical to the NAAQS.[2]

1 U.S. Environmental Protection Agency, "NAAQS Table," updated March 15, 2023, https://www.epa.gov/criteria-air-pollutants/naaqs-table (accessed April 12, 2023).

2 Commonwealth of Massachusetts, Massachusetts Environmental Policy Act Office, 301 Code of Massachusetts Regulations 6.00: Massachusetts Environmental Policy Act Regulations, "Ambient Air Quality Standards for the Commonwealth of Massachusetts," Section: 6.04, Standards, June 28, 2019, https://www.mass.gov/doc/310-cmr-6-ambient-air-quality-standards-for-the-commonwealth-of-massachusetts/download (accessed May 25, 2023).

Table 8-2 National and Massachusetts Ambient Air Quality Standards

Pollutant	Averaging Period	NAAQS/MAAQS (µg/m³)	
		Primary	Secondary
NO_2	Annual [1]	100	Same
	1-hour [2]	188	None
SO_2	3-hour [3]	None	1300
	1-hour [4]	196	None
$PM_{2.5}$	Annual [1]	12	15
	24-hour [5]	35	Same
PM_{10}	24-hour [3]	150	Same
CO	8-hour [3]	10,000	Same
	1-hour [3]	40,000	Same
Ozone	8-hour [6]	147	Same
Pb	3-month [1]	0.15	Same

1 Not to be exceeded.

2 98th percentile of one-hour daily maximum concentrations, averaged over three years.

3 Not to be exceeded more than once per year.

4 99th percentile of one-hour daily maximum concentrations, averaged over three years.

5 98th percentile, averaged over three years.

6 Annual fourth-highest daily maximum eight-hour concentration averaged over three years.

Sources: U.S. Environmental Protection Agency, "NAAQS Table," updated March 15, 2023, https://www.epa.gov/criteria-air-pollutants/naaqs-table (accessed April 12, 2023); Commonwealth of Massachusetts, Massachusetts Environmental Policy Act Office, 301 Code of Massachusetts Regulations 6.00: Massachusetts Environmental Policy Act Regulations, "Ambient Air Quality Standards for the Commonwealth of Massachusetts," Section: 6.04, Standards, June 28, 2019, https://www.mass.gov/doc/310-cmr-6-ambient-air-quality-standards-for-the-commonwealth-of-massachusetts/download (accessed April 12, 2023).

The NAAQS specify concentration levels for various averaging times and include both "primary" and "secondary" standards. Primary standards are intended to protect human health, whereas secondary standards are intended to protect public welfare from any known or anticipated adverse effects associated with the presence of air pollutants, such as damage to vegetation. The more stringent of the primary or secondary standards are applied when comparing to emissions modeled for a given project.

The NAAQS also reflect various durations of exposure. The short-term periods (24 hours or less) refer to exposure levels that cannot be exceeded more than once a year. Long-term periods refer to limits that cannot be exceeded for exposure averaged over three months or longer.

The USEPA reviews the NAAQS every five years and updates them based on science, health data, economics, and other factors. They are either kept unchanged, strengthened (lowered), or revoked. On rare occasions, a new pollutant (such as PM_{10} in 1987 and $PM_{2.5}$ in 1997) or a new averaging time (e.g., 1-hour NO_2 and SO_2) may be added.

8.2.1.1 Ambient Concentrations

Massachusetts has established Air Quality Control Regions to monitor air quality as required by the USEPA under the provisions of the federal CAA. The Massachusetts Department of Environmental Protection (MassDEP) operates a network of air quality monitors around the state. Existing ambient concentrations in the vicinity of the Program were determined from the closest available monitoring stations. A summary of the existing ambient air quality concentrations is presented in **Table 8-3**.

The closest monitor to the Program study area is at Kenmore Square in Boston. However, this monitor only checks for SO_2, $PM_{2.5}$, and NO_2. Therefore, for PM_{10} and CO data, the monitor at Harrison Avenue in Boston was used as a reference. To estimate existing pollutant levels representative of the area, the most recent air quality monitor data reported by MassDEP to USEPA was obtained for 2019 to 2021. Data for these pollutant and averaging time combinations were obtained from MassDEP's Annual Air Quality Reports and USEPA's AirData website. As shown in **Table 8-3**, ambient air quality concentrations observed at the Kenmore Square and Harrison Avenue monitors are below the applicable NAAQS.

Table 8-3 Observed Ambient Air Quality Concentrations and Comparison to NAAQS

Pollutant	Averaging Time	Form	2019	2020	2021	2019-2021 Background Concentration (µg/m³)	NAAQS	Percent of NAAQS	Location
SO_2 (1)(6)(7)	1-Hour (5)	99th %	5.0	4.7	3.4	4.4	196.0	2%	Kenmore Sq., Boston
	3-Hour	H2H	4.2	4.2	3.4	4.2	1,300.0	0%	Kenmore Sq., Boston
PM_{10}	24-Hour	H2H	27.0	25.0	28.0	28	150.0	19%	Harrison Ave., Boston
$PM_{2.5}$	24-Hour (5)	98th %	12.9	12.9	19.1	15.0	35.0	43%	Kenmore Sq., Boston (FRM)
	Annual (5)	H	5.7	6.3	8.8	6.9	12.0	58%	Kenmore Sq., Boston (FRM)
NO_2 (3)(7)	1-Hour (5)	98th %	82.7	79.0	80.8	80.8	188.0	43%	Kenmore Sq., Boston
	Annual	H	23.3	19.4	19.0	23.3	100.0	23%	Kenmore Sq., Boston
CO (2)(7)	1-Hour	H2H	1,843.9	1,802.7	1,717.9	1,843.9	40,000.0	5%	Harrison Ave., Boston
	8-Hour	H2H	1,146.0	1,260.6	1,146.0	1,260.6	10,000.0	13%	Harrison Ave., Boston
Ozone (4)	8-Hour	H4H	119.7	111.9	117.8	119.7	147.0	81%	Harrison Ave., Boston
Lead (7)	Rolling 3-Month	H	N/A	N/A	N/A	0.000	0.15	0%	Harrison Ave., Boston

H = Highest, 2H = 2nd Highest, 4H = 4th Highest, 98/99th % = probabilistic standard.

FRM = Federal Reference Method monitor.

1 SO_2 reported ppb. Converted to µg/m3 using factor of 1 ppb = 2.62 µg/m³.

2 CO reported in ppm. Converted to µg/m³ using factor of 1 ppm = 1146 µg/m³.

3 NO_2 reported in ppb. Converted to µg/m³ using factor of 1 ppb = 1.88 µg/m³.

4 O_3 reported in ppm. Converted to µg/m³ using factor of 1 ppm = 1963 µg/m³.

5 Background level is the average concentration of the three years.

6 The 24-hour and Annual standards were revoked by EPA on June 22, 2010, Federal Register 75-119, p. 35520.

7 Lead is not reported at any site in Massachusetts after 2017.

Source: From 2019-2021 MassDEP Air Quality Monitor reports or USEPA's AirData Website.

8.2.1.2 Massachusetts Attainment Status

"Attainment" status for a pollutant means that the Air District meets the standards set by the USEPA (federal) or MassDEP (state). Continuous air monitoring (as described above) ensures that these standards are met and maintained. If the air quality in a geographic area meets (i.e., is cleaner than) the national standard, it is designated an "attainment" area; areas that do not meet the national standard are designated "nonattainment" areas. The CAA requires states to develop State Implementation Plans (SIPs): a general plan to attain and maintain the NAAQS in all areas of the country, and a specific plan to attain the standards for each area designated nonattainment for a NAAQS.

For the proposed Program, the existing conditions for air quality and GHG were established by identifying the pollutants of concern and the attainment status applicable to each Program site, consistent with the methodology in the DEIR (see **DEIR Chapter 4.11, Air Quality and Greenhouse Gas Emissions, Section 4.11.3, Methodology [pg. 4.11-3]**). As shown in **SDEIR Table 8-4**, the SDEIR Alternatives include Program sites in Middlesex, Suffolk, and Norfolk counties. All three counties are in attainment (i.e., meeting NAAQS) for the six criteria pollutants NAAQS established by the USEPA; formerly, the three counties were nonattainment areas for the 1997 8-hour ozone standard prior to its revocation.[3]

Table 8-4 Program Construction Site Locations by County

County	Sites	Alternative 3A	Alternative 4A	Alternative 10A
Middlesex County	UMass Property, Waltham	X	X	
	Lower Fernald Property, Waltham			X
	School Street, Waltham	*X*	*X*	*X*
	Cedarwood Pumping Station, Waltham	*X*	*X*	*X*
	Bifurcation, Weston	*X*		
	Tandem Trailer and Park Road East, Weston	*X*	*X*	
	Park Road West, Weston		*X*	*X*
	Hultman Aqueduct Isolation Valve, Weston	*X*	*X*	*X*
Norfolk County	*Hegarty Pumping Station, Wellesley*	*X*	*X*	*X*
	St. Mary Street Pumping Station, Needham	*X*	*X*	*X*
	Highland Avenue Northwest, Needham	*X*		
	Highland Avenue Northwest/Southwest, Needham		*X*	*X*
	Highland Avenue Northeast/Southeast, Needham	*X*	*X*	*X*
	Newton Street Pumping Station, Brookline	*X*	*X*	*X*
Suffolk County	*Southern Spine Mains, Boston*	*X*	*X*	*X*
	American Legion, Boston	*X*	*X*	*X*

Italicized text within the table indicates no change from the DEIR.

3 U.S. Environmental Protection Agency, Nonattainment Areas for Criteria Pollutants (Green Book), updated March 31, 2023, https://www.epa.gov/green-book.

8.2.2 Statewide Air Pollutant and GHG Emissions

The USEPA promulgated the Air Emissions Reporting Requirements (AERR) in December 2008. The AERR consolidated and streamlined previous requirements of several older rules for states and local air pollution control agencies to submit emissions inventories for criteria pollutants to USEPA's Emissions Inventory System. The USEPA uses the submittals, along with other data sources (primarily for air toxics), to build the National Emissions Inventory (NEI). Carbon dioxide and other GHGs are not reported nationally.

The latest available NEI is from 2017. The inventory includes emissions broken down by state and sector (or major tier). The data can be interactively queried on the USEPA website.[4] For Massachusetts, the reported totals of on- and off-highway emissions are presented in **Table 8-5**.

On-road ("highway") sources include emissions from on-road vehicles that use gasoline, diesel, and other fuels. These sources include light duty and heavy-duty vehicle emissions from operation on roads, highway ramps, and during idling. Except for California, the USEPA uses the MOtor Vehicle Emission Simulator (MOVES3) model to compute on-road source emissions based on model inputs provided by state, local, and tribal air agencies.[5]

Nonroad ("off-highway") sources include off-road mobile sources that use gasoline, diesel, and other fuels. Source types include construction equipment, lawn and garden equipment, aircraft ground support equipment, locomotives, and commercial marine vessels. For many nonroad sources, the USEPA uses the MOVES-NONROAD model.

Table 8-5 2017 Emissions Inventory for Massachusetts Vehicles and Mobile Sources

Pollutant	Tier	Emissions (Tons)
Nitrogen Oxides	Highway Vehicles	41,863
Nitrogen Oxides	Off-Highway	25,735
Nitrogen Oxides Total		**67,598**
Volatile Organic Compounds	Highway Vehicles	24,742
Volatile Organic Compounds	Off-Highway	19,435
Volatile Organic Compounds Total		**44,177**

Source: U.S. Environmental Protection Agency, National Emissions Inventory, 2017, https://www.epa.gov/air-emissions-inventories/2017-national-emissions-inventory-nei-data#dataq (accessed April 21, 2023).

As of June 2023, the most recent Massachusetts GHG inventory data available is from 2018, which reports that statewide total GHG emissions were 73.5 million metric tons of carbon dioxide equivalents (CO_2e) in 2018.[6] Emissions of GHGs in 2018 were 22 percent below the Massachusetts 1990 baseline level

4 U.S. Environmental Protection Agency, National Emissions Inventory, 2017, https://www.epa.gov/air-emissions-inventories/2017-national-emissions-inventory-nei-data#dataq (accessed April 21, 2023).

5 U.S. Environmental Protection Agency, MOVES (Motor Vehicle Emission Simulator), Office of Mobile Sources, Ann Arbor, Michigan, January 2022.

6 Commonwealth of Massachusetts, Executive Office of Energy and Environmental Affairs, "GHG Emissions and Mitigation Policies," https://www.mass.gov/info-details/ghg-emissions-and-mitigation-policies (accessed June 1, 2023).

(94.3 million metric tons CO_2e) which was signed into law in 2008. The Commonwealth recently published its Clean Energy and Climate Plan for 2050, which details actions that the state will take to put the Commonwealth on a pathway to achieve Net Zero GHG emissions in 2050.[7]

Transportation is the largest contributor to GHG emissions in Massachusetts. According to the MassDEP 2020 Greenhouse Gas Inventory, the transportation sector was responsible for approximately 37 percent of total 2020 statewide GHG emissions, followed by electric power (20 percent), residential heating and cooling (19 percent), and commercial and industrial heating and cooling (16 percent).

8.3 Air Quality and GHG Impact Assessment

The section reports on air quality and GHG emissions for existing conditions, during the construction period, and under final conditions once the Program is operating. The air quality Study Area for the SDEIR Alternatives includes the launching shaft, receiving shaft, large connection shaft, connection shaft, and isolation valve sites, as well as the truck routes to and from the Program sites and the regional highway system.

This section provides an accounting of the emissions calculated for Program-related construction activities based on the estimated total number of trucks and other mobile sources, as well as all fossil-fuel burning equipment, to be used during the construction period. Included is a breakdown of emissions by construction location (for each launching shaft, receiving shaft, large connection shaft, connection shaft, or isolation valve site) and by each year and quarter of the modeled construction period. Consistent with the DEIR, the construction methodology assumes the use of electrified TBMs instead of TBMs powered by fossil fuels, thus avoiding direct pollutant emissions from one of the largest pieces of construction equipment that would be used.

The section quantifies the amount of GHG emissions associated with these emitting sources and the amount of VOCs and NOx projected to be emitted during construction of the Program. It is expected that the Program would have minimal GHG emissions during its operation (i.e., post-construction) as described in **SDEIR Section 8.3.2.4**. As such, the *de minimis* exemption contained in the MEPA GHG Policy would be applicable for operations, and a quantitative GHG assessment of post-construction Program operations has therefore not been conducted.

7 Commonwealth of Massachusetts, Executive Office of Energy and Environmental Affairs, Massachusetts Clean Energy and Climate Plan for 2050, December 21, 2022, https://www.mass.gov/info-details/massachusetts-clean-energy-and-climate-plan-for-2050 (accessed April 28, 2023).

8.3.1 Air Quality and GHG s Existing Conditions

8.3.1.1 Alternative 3A/Alternative 4A Existing Conditions

Existing conditions for the new SDEIR sites and associated truck routes are described below.

UMass Property

The UMass Property site is roughly 1,000 feet southwest of the location of the Fernald Property site that was previously proposed as the terminus for the North Tunnel, Segment 1, in the DEIR. As shown in **Table 8-4**, the UMass Property site is in Middlesex County, that is an attainment area for all criteria pollutants. No existing stationary sources are located at the UMass Property site.

8.3.1.2 Alternative 10A Existing Conditions

Lower Fernald Property

The Lower Fernald Property site is roughly 1,000 feet southeast of the DEIR Fernald Property site. As shown in **Table 8-4**, the Lower Fernald Property site is in Middlesex County, which is an attainment area for all criteria pollutants. No existing stationary sources are located at the Lower Fernald Property site.

8.3.1.3 Study Area Truck Routes Existing Conditions

An estimate of existing emissions on all assumed Study Area routes to be used by Program-related construction vehicles and equipment was conducted for emissions of NOx, VOC, and GHG.[8] Emissions were calculated for existing on-road traffic using 2023 emission factors for Middlesex County from the USEPA's MOVES3 model, and existing traffic estimates and distances used in the roadway analysis (see **SDEIR Chapter 9, Transportation**).

Consistent with the DEIR, estimates of on-road mobile source emissions were conducted in accordance with the MassDEP *Guidelines for Performing Mesoscale Analysis of Indirect Sources,* which looks at emissions on regional basis. Approximately 95 tons per year (tpy) of NOx, 74 tpy of VOC, and 191,000 tpy of GHG are estimated to be generated on Study Area truck routes in 2023 by existing vehicle traffic (see **SDEIR Appendix E, Table E-2**).

8.3.2 Air Quality and GHG Construction Period Impacts

This section of the SDEIR updates the quantitative modeling of emissions of NO_X, VOCs, and GHG during the Program's anticipated construction period for SDEIR Alternatives 3A, 4A, and 10A. The total number

8 GHGs include air pollutants such as carbon dioxide (CO2), methane, hydrofluorocarbons, and perfluorocarbons. The 2010 MEPA GHG Policy focuses on the evaluation of CO2 emissions because CO2 is the predominant human-caused contributor to global warming (refer to page 3 of the 2010 MEPA GHG Policy available at https://www.mass.gov/doc/greehouse-gas-emissions-policy-and-protocol/download). Consistent with the GHG Policy and the analysis in the DEIR, this evaluation uses the terms GHG and CO2 interchangeably.

of construction vehicles and equipment anticipated to be used for Program-related construction activities at each new North Tunnel terminus alternative site was estimated (the UMass Property site in SDEIR Alternatives 3A and 4A and the Lower Fernald Property site in SDEIR Alternative 10A). Location of equipment and activities, and anticipated construction time periods were inputs to the emissions model.

Construction of the Program is expected to take 8 to 12 years between 2027 and 2040. For emission calculation purposes, construction activities in each of the Program's SDEIR Alternatives were modeled to take place for a total of 10 years (beginning at the start of Year 1 Quarter 1 and ending at the conclusion of Year 10 Quarter 4).

A preliminary schedule of construction activities at each proposed launching shaft, receiving shaft, large connection shaft, connection shaft, and isolation valve site was used to calculate quarterly emissions of NOx, VOC, and GHG for the modeled 10-year duration of Program construction. The actual schedule of construction activities across Program sites would vary depending on contractor bid packaging and other factors. Based on the construction activities planned at each site, the expected number, type, and horsepower of construction equipment was identified. The duration the equipment is expected to remain and operate at each site was estimated based on the number of work hours assumed to be required for each equipment type. The results were used to identify the peak 12-month period of emissions (the four consecutive quarters with the highest rolling cumulative total emissions). Since peak 12-month period totals may be greater than the peak calendar year total, they provide a more conservative estimate of emissions. The estimated construction-period emissions of NOx, VOC, and GHG calculated for SDEIR Alternatives 3A, 4A, and 10A are presented in **SDEIR Appendix E**. **Table E-1** of **SDEIR Appendix E** includes the calculated emissions for every quarter of Program construction for the modeled 10-year duration.

As described in the DEIR (see **DEIR Section 4.11.3, Methodology [pg. 4.11-3]**), off-road construction equipment emissions were quantified by site for each SDEIR Alternative. Emission factors were modeled using the NONROAD module with the USEPA's MOVES model.[9] Emission factors were combined with load factors (representing the average engine rating while in use relative to the rated capacity) and proposed usage times to calculate equipment emissions.[10]

For the on-road emissions inventory, emissions from construction trucks and employee trips (passenger cars) were quantified for each site and for each SDEIR Alternative. Trip information was also provided by duration/phase so temporal differences could be accounted for. Emission factors for construction trucks and employee trips were modeled using MOVES in a grams per mile format. Construction trucks were assumed to be single-unit, short-haul trucks traveling on urban unrestricted roadways on identified truck/equipment haul routes. Employees trips were modeled using the estimated number of passenger car trips to each site. These trips were modeled as light-duty vehicles on urban unrestricted roadways, also using the truck/equipment haul routes. Emission factors were combined with the corresponding vehicle miles traveled (VMT) from each site to the nearest highway to calculate mobile source emissions.

9 U.S. Environmental Protection Agency, MOVES (Motor Vehicle Emission Simulator), Office of Mobile Sources, Ann Arbor, Michigan, January 2022.

10 U.S. Environmental Protection Agency, "Median Life, Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling," EPA-420-R-10-016, July 2010.

8.3.2.1 Air Quality and GHG No-Build Condition Construction Period Impacts

Should the Program not be built (No-Build condition), there would be no emissions associated with either construction or operation of the Program, nor emissions associated with transportation or mobilization of any equipment associated with the Program. Both a baseline existing and future No-Build condition assume the Program would not be built, and no Program-related construction activities would take place. Therefore, Program-generated emissions associated with the No-Build condition are assumed to be 0 tons for the purpose of comparing against the Program alternatives. Emissions estimates provided for the Program alternatives in the following tables and in **SDEIR Appendix E, Table E-1** represent absolute increases from the No-Build condition (i.e., both a baseline level of 0 tons and a future level of 0 tons are assumed).

For the purposes of the SDEIR, roadway related No-Build Conditions are assumed to be the same as existing conditions as described above in **SDEIR Section 8.3.1**. Due to improvements in vehicle technology, the influx of lower- and zero-emission vehicles, and investment in public transportation, baseline future roadway emissions are expected to continue to decrease from existing levels.

8.3.2.2 Alternative 3A/Alternative 4A Construction Period Impacts

As in DEIR Alternatives 3 and 4, the SDEIR Alternative 3A and 4A emissions would be geographically diverse, occurring at multiple launching shaft, receiving shaft, large connection shaft, connection shaft, and isolation valve sites located in three different counties. Emissions are primarily associated with off-road equipment, more specifically, equipment at shaft sites. Construction at the connection shaft sites is not anticipated to be active in the peak 12-month period of construction emissions.

UMass Property

Adjusting the proposed terminus point of the North Tunnel from the DEIR Fernald Property site to the SDEIR UMass Property site (1,000 feet to the southwest) would result in a minor reduction in construction vehicle travel distances to interstate highways. In addition, construction period activities would be slightly reduced since the terminus of the North Tunnel at the UMass Property site would be a large connection shaft site (similar to Park Road East) instead of a receiving shaft site. Fewer pieces of equipment and shorter construction durations for the large connection shaft are factored into the analysis.

Thus, use of the UMass Property site in SDEIR Alternatives 3A and 4A instead of the DEIR Fernald Property site would result in a less than 1 percent decrease in peak 12-month period emissions as well as total 10-year modeled Program construction emissions for all analyzed pollutants compared to DEIR Alternatives 3 and 4.

SDEIR Alternative 3A

As in DEIR Alternatives 3 and 4, the SDEIR Alternative 3A and 4A emissions would be geographically diverse, occurring at multiple launching shaft, receiving shaft, large connection shaft, connection shaft, and isolation valve sites located in three different counties. Emissions are primarily associated with off-

road equipment, more specifically, equipment at shaft sites. Construction at the connection shaft sites is not anticipated to be active in the peak 12-month period of construction emissions.

As assumed in DEIR Alternative 3, SDEIR Alternative 3A construction elements are composed of tunneling in three segments. North Tunnel, Segment 1, would launch at the Tandem Trailer site (with a connector tunnel from the Tandem Trailer site to the Park Road East site) and travel to the UMass Property site (in place of the Fernald Property site assumed in DEIR Alternative 3). As assumed in DEIR Alternative 3, Segment 2, would launch at the Bifurcation site and be received at the Highland Avenue Northwest site, and Segment 3 would launch at the Highland Avenue Northeast site and be received at the American Legion site. The peak 12-month period construction emissions calculated for SDEIR Alternative 3A are shown in **Table 8-6**.

Program-related construction activities in SDEIR Alternative 3A are expected to add approximately 0.1 percent to 2.0 percent additional vehicles to local roadways (non-highways) on the modeled peak day compared to existing conditions (see **SDEIR Chapter 9, Transportation**). In SDEIR Alternative 3A, Program-related traffic (and associated emissions) along highways is anticipated to add approximately 0.2 percent to 0.7 percent of total daily volumes on the modeled peak day, which conservatively assumes that construction would occur at all shafts simultaneously (see **SDEIR Chapter 9, Transportation**).

Table 8-6 Alternative 3A Peak 12-Month Period of Construction Emissions (Tons)

Pollutant	Peak 12-Month Period	Off-Road Emissions	On-Road Emissions	Total Peak 12-Month Period Emissions
NOx	Year 4 Q3 – Year 5 Q2	33.7	0.0	33.7
VOC	Year 4 Q3 – Year 5 Q2	2.5	0.0	2.5
GHG	Year 4 Q3 – Year 5 Q2	6,190.6	19.5	6,210.1

Q = Quarter

As shown in **Table 8-6**, during the peak 12-month period of construction emissions, SDEIR Alternative 3A is estimated to result in pollutant emissions of 33.7 tons of NO_X, 2.5 tons of VOC, and 6,210.1 tons of GHG (see **SDEIR Appendix E, Table E-1** for calculated emissions for each quarter of the modeled 10-year duration of Program construction).

The four consecutive quarters comprising the peak 12-month period of emissions in SDEIR Alternative 3A would occur from the start of Year 4 Q3 to the end of Year 5 Q2. This would be the peak period in SDEIR Alternative 3A because it conservatively assumes that construction activity would occur simultaneously at three launching shaft sites, which are the most emissions-intensive of the different types of Program sites (i.e., launching shaft, receiving shaft, large connection shaft, connection shaft, and isolation valve sites) in term of construction-related activity (an electrified TBM would be used for tunnel boring as described in **SDEIR Section 8.2**). During the anticipated peak 12-month period, tunnel excavation is planned to take place at the Tandem Trailer launching shaft site and concrete lining is anticipated to take place at the Bifurcation launching shaft site. Construction activities at the Highland Avenue Northeast/Southeast launching shaft site would also contribute to the emissions in the last two quarters of the peak 12-month period (Year 5 Q1 and Q2).

Over the modeled 10-year construction period, it is estimated that SDEIR Alternative 3A would generate approximately 122.8 tons of NOx, 9.1 tons of VOC, and 25,738.8 tons of GHG (see **SDEIR Appendix E Table E-1** for calculated emissions for each quarter of the modeled 10-year duration of Program construction, which are also summarized in **Table 8-10** and **SDEIR Section 8.3.2.4** of this document).

SDEIR Alternative 4A

As in SDEIR Alternative 3A, and as previously assumed in DEIR Alternative 4, SDEIR Alternative 4A construction elements involve tunneling in three segments. Segment 1 would be the same as in SDEIR Alternative 3A; Segment 1 would launch from the Tandem Trailer shaft site (with a connector tunnel from the Tandem Trailer site to the Park Road East site) and travel to the UMass Property site (in place of the Fernald Property site assumed in DEIR Alternative 4). Segments 2 and 3 in SDEIR Alternative 4A would be the same as in DEIR Alternative 4. Segment 2 would launch at the Highland Avenue Northwest/Southwest site and be received at the Park Road West site. Segment 3 would be launched at the Highland Avenue Northeast/Southeast site and be received at the American Legion site. The peak 12-month period of construction emissions calculated for SDEIR Alternative 4A are shown in **Table 8-7**.

In SDEIR Alternative 4A, Program-related construction activities are expected to add approximately 0.1 percent to 1.8 percent additional vehicles to local roadways (non-highway) on the peak day compared to existing conditions. In SDEIR Alternative 4A, Program-related traffic (and associated emissions) along highways is anticipated to add approximately 0.2 percent to 0.7 percent of total daily volumes on the modeled peak day, which conservatively assumes that construction would occur at all shafts simultaneously (see **SDEIR Chapter 9, Transportation**).

Table 8-7 Alternative 4A Peak 12-Month Period of Construction Emissions (Tons)

Pollutant	Peak 12-Month Period	Off-Road Emissions	On-Road Emissions	Total Peak 12-Month Period Emissions
NOx	Year 4 Q3 – Year 5 Q2	33.7	0.0	33.7
VOC	Year 4 Q3 – Year 5 Q2	2.5	0.0	2.5
GHG	Year 4 Q3 – Year 5 Q2	6,190.6	19.1	6,209.7

Q = Quarter

As in SDEIR Alternative 3A, the four consecutive quarters comprising the peak 12-month period of construction emissions in SDEIR Alternative 4A would occur from the start of Year 4 Q3 to the end of Year 5 Q2. As shown in **Table 8-7**, during the peak 12-month period of construction emissions, SDEIR Alternative 4A is estimated to result in pollutant emissions of 33.7 tons per year of NOx, 2.5 tons per year of VOC, and 6,209.7 tons per year of GHG. These results are similar to SDEIR Alternative 3A as the same activities are assumed to occur during the same peak timeframe. The primary difference between SDEIR Alternatives 3A and 4A is that emissions would be associated with the Highland Avenue Northwest/Southwest launching shaft site and Park Road West receiving shaft site in SDEIR Alternative 4A instead of the Bifurcation launching shaft site and the Highland Avenue Northwest receiving shaft site in SDEIR Alternative 3A (as previously assumed in the DEIR).

Over the 10-year construction period, it is expected that SDEIR Alternative 4A would generate 122.6 tons of NOx, 9.0 tons of VOC, and 25,669.9 tons of GHG (see **SDEIR Appendix E, Table E-1** for calculated emissions for each quarter of the modeled 10-year duration of Program construction, which are also summarized in **SDEIR Section 8.3.2.4** of this document).

8.3.2.3 Alternative 10A Construction Period Impacts

Lower Fernald Property

Construction at the SDEIR Lower Fernald Property site instead of the DEIR Fernald Property site located approximately 1,000 feet to its northwest is estimated to result in a minor reduction in construction vehicle travel distances to interstate highways, but no changes to onsite construction equipment.

Use of the Lower Fernald Property site in SDEIR Alternative 10A would result in minimal (less than 1 percent decrease compared to the Fernald Property site assumed in DEIR Alternative 10) changes in peak 12-month period and total 10-year modeled Program construction emissions for all analyzed pollutants compared to DEIR Alternative 10.

SDEIR Alternative 10A

SDEIR Alternative 10A construction elements are composed of tunneling in three tunnel segments in two tunnel drives. Segment 2 would be launched at the Highland Avenue Northwest/Southwest site with a large connection shaft at the Park Road West site and then Segment 1 would continue to the Lower Fernald Property site. As assumed in the DEIR, Segment 3 would be launched at the Highland Avenue Northeast site and received at the American Legion site. As assumed in the DEIR, most SDEIR Alternative 10A emissions in the peak 12-month period would occur at the Highland Avenue Northeast and Highland Avenue Northwest launching shaft sites. Emissions are primarily associated with off-road equipment and, more specifically, equipment at launching shaft sites.

The peak 12-month periods of construction emissions calculated for SDEIR Alternative 10A are shown in **Table 8-8**. In SDEIR Alternative 10A, Program-related construction activities are expected to add approximately 0.1 percent to 1.9 percent additional vehicles to local roadways on the peak day compared to existing conditions. Program-related traffic (and associated emissions) along highways is anticipated to add approximately 0.1 percent to 0.7 percent of total daily volumes on the modeled peak day, which conservatively assumes that construction would occur at all shafts simultaneously (see **SDEIR Chapter 9, Transportation**). Thus, the use of the Lower Fernald Property site in SDEIR Alternative 10A would result in minimal (less than 1 percent decrease compared to the Fernald Property site assumed in DEIR Alternative 10) changes in peak 12-month period and total Program emissions for all analyzed pollutants, compared to DEIR Alternative 10.

Table 8-8 Alternative 10A Peak 12-Month Period of Construction Emissions (Tons)

Pollutant	Peak 12-Month Period	Off-Road Emissions	On-Road Emissions	Total Peak 12-Month Period Emissions
NOx	Year 6 Q3 – Year 7 Q2	33.0	0.3	33.4
VOC	Year 6 Q2 – Year 7 Q1	2.5	0.1	2.6
GHG	Year 6 Q3 – Year 7 Q2	5,991.7	157.8	6,149.5

Q = Quarter

The peak 12-month period of construction emissions for SDEIR Alternative 10A is assumed to take place between Year 6 and Year 7 of construction, with the specific four quarters dependent on the pollutant (see **Table 8-8**). This is the peak period because construction activity would be occurring at two launching shaft sites simultaneously. The level of emissions with two launching shaft sites in SDEIR Alternative 10A is similar to the three simultaneous launching shaft sites in SDEIR Alternatives 3A and 4A because both launching shaft sites in SDEIR Alternative 10A would be conducting tunnel concrete lining at the same time; tunnel concrete lining is the most emissions-intensive phase of construction.

During the peak emissions 12-month period of construction emissions, SDEIR Alternative 10A was estimated to result in pollutant emissions of approximately 33.4 tons of NOx, 2.6 tons of VOC, and 6,149.5 tons of GHG. SDEIR Alternative 10A peak 12-month period emissions are similar to SDEIR Alternatives 3A and 4A. Compared to SDEIR Alternatives 3A and 4A, SDEIR Alternative 10A NOx emissions are estimated to be 0.3 tons less, VOC emissions are estimated to be 0.1 tons more, and GHG emissions are estimated to be about 60 tons less.

Over the modeled 10-year construction period, it is expected that SDEIR Alternative 10A would result in approximately 123.0 tons of NOx, 9.1 tons of VOC, and 25,158.3 tons of GHG (see **SDEIR Appendix E, Table E-1** for calculated emissions for each quarter of the modeled 10-year duration of Program construction, which are also summarized in **SDEIR Section 8.3.2.4** of this document).

8.3.2.4 Summary of Construction-Period Emissions for SDEIR Alternatives

No significant construction-period impacts related to air quality and GHG are anticipated from any of the SDEIR Alternatives.

Peak 12-Month Period of Construction Emissions

Table 8-9 presents the emissions totals by SDEIR Alternative and by site for the associated peak 12-month period (as described above). For sites with zero emissions in the table, construction activity is not anticipated to take place at these locations during the peak 12-month period.

Peak 12-month period emissions would not persist at the levels shown in **Table 8-9** during the entire construction period. **Figures 8-1** through **8-3** present the quarterly emissions totals for each alternative for NOx, VOC, and GHG for the modeled 10-year duration of Program construction. The figures show how emissions ebb and flow over the duration of construction. Emission values for every quarter of the modeled 10-year construction period can be found in **SDEIR Appendix E, Table E-1**.

As summarized in **Table 8-10**, the peak 12-month period of construction emissions for each alternative for NOx, VOC, and GHG is expected to be similar, although they would occur at different timeframes during construction depending on SDEIR Alternative.

Established under the CAA (section 176(c)(4)), General Conformity is a method used to ensure that actions taken by federal agencies do not interfere with a state's plans to attain and maintain national standards for air quality. The process uses "*de minimis*" thresholds to which emissions from a given project can be compared to determine if such emissions could be considered detrimental to air quality. These thresholds are determined by pollutant and the area's attainment status with respect to the NAAQS. Projects with emissions below these thresholds are "presumed to conform" with air quality standards and require no further analysis.

Table 8-9 Emissions by Site and Alternative During Peak 12-Month Period of Construction (Tons)

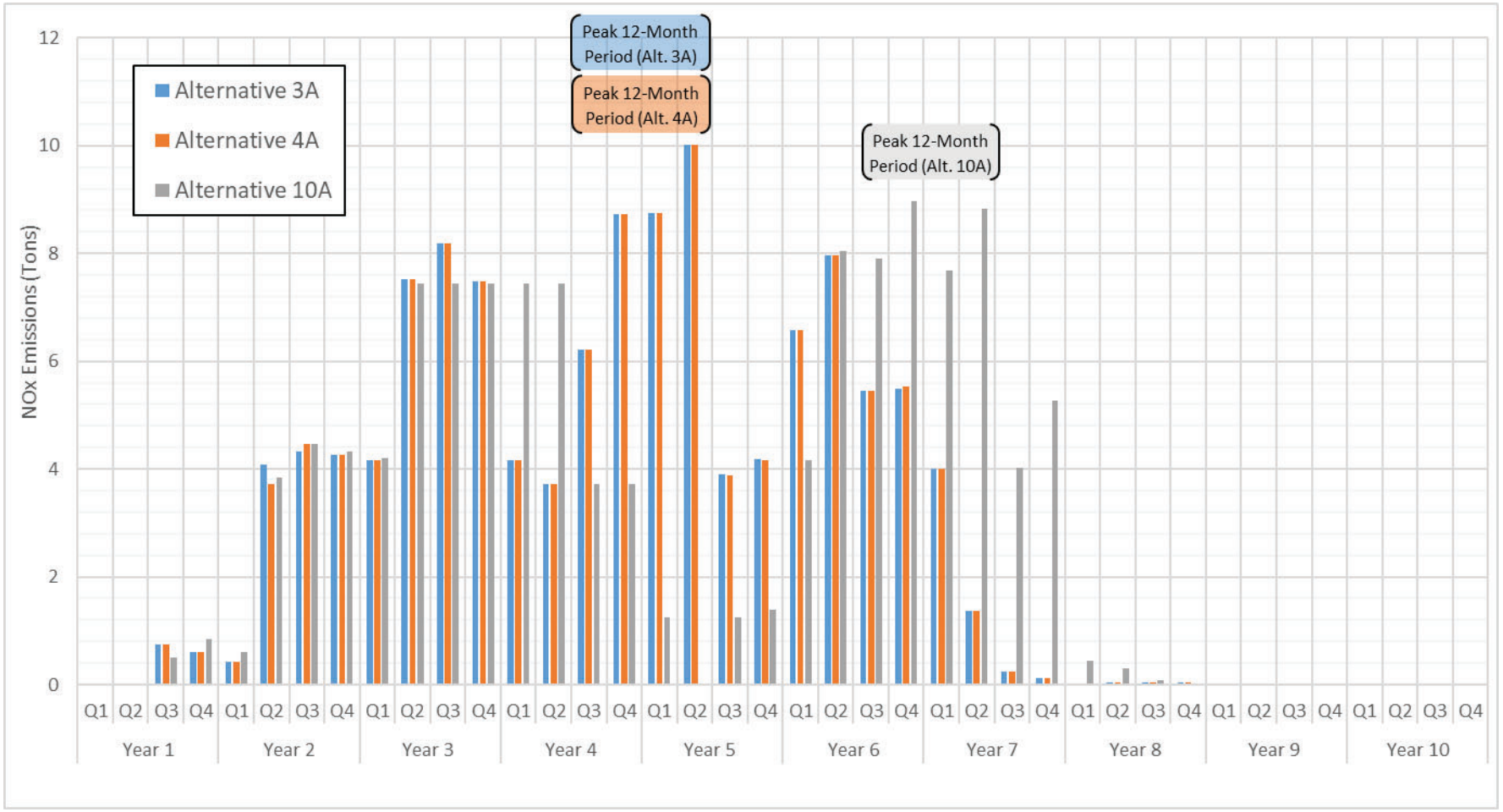
Alternative 3A	**NO_X**	**VOC**	**GHG**
Launching, Receiving, and Large Connection Shaft Sites (3A)	**Peak 12-Month Period Total**	**Peak 12-Month Period Total**	**Peak 12-Month Period Total**
UMass Property Large Connection	0	0	0
Tandem Trailer Launching	*14.87*	*1.11*	*2,669.96*
Park Road East Large Connection	*0*	*0*	*0*
Bifurcation Launching	*10.06*	*0.75*	*1,797.21*
Highland Avenue Northwest Receiving	*3.73*	*0.27*	*843.87*
Highland Avenue Northeast Launching	*5.03*	*0.38*	*899.11*
American Legion Receiving	*0*	*0*	*0*
Connection Shaft and Isolation Valve Sites (3A)			
School Street	*0*	*0*	*0*
Cedarwood Pumping Station	*0*	*0*	*0*
Hegarty Pumping Station	*0*	*0*	*0*
St. Mary Street Pumping Station	*0*	*0*	*0*
Newton Street Pumping Station	*0*	*0*	*0*
Southern Spine Mains	*0*	*0*	*0*
Hultman Aqueduct Isolation Valve	*0*	*0*	*0*
TOTAL PEAK 12-MONTH PERIOD	**33.7**	**2.5**	**6,210.1**

Table 8-9 Emissions by Site and Alternative During Peak 12-Month Period of Construction (Tons)

Alternative 4A	**NO_X**	**VOC**	**GHG**
Launching, Receiving, and Large Connection Shaft Sites (4A)	**Peak 12-Month Period Total**	**Peak 12-Month Period Total**	**Peak 12-Month Period Total**
UMass Property Large Connection	0	0	0
Tandem Trailer Launching	*14.87*	*1.11*	*2,669.96*
Park Road East Large Connection	*0*	*0*	*0*
Park Road West Receiving	*1.26*	*0.09*	*224.40*
Highland Avenue Northwest Launching	*10.06*	*0.75*	*1,796.74*
Highland Avenue Northeast Launching	*7.51*	*0.56*	*1,518.58*
American Legion Receiving	*0*	*0*	*0*
Connection Shaft and Isolation Valve Sites (4A)			
School Street	*0*	*0*	*0*
Cedarwood Pumping Station	*0*	*0*	*0*
Hegarty Pumping Station	*0*	*0*	*0*
St. Mary Street Pumping Station	*0*	*0*	*0*
Newton Street Pumping Station	*0*	*0*	*0*
Southern Spine Mains	*0*	*0*	*0*
Hultman Aqueduct Isolation Valve	*0*	*0*	*0*
TOTAL PEAK 12-MONTH PERIOD	**33.7**	**2.5**	**6,209.7**
Alternative 10A	**NO_X**	**VOC**	**GHG**
Launching, Receiving, and Large Connection Shaft Sites (10A)	**Peak 12-Month Period Total**	**Peak 12-Month Period Total**	**Peak 12-Month Period Total**
Lower Fernald Property Receiving	0	0	0
Park Road West Large Connection	*1.26*	*0.09*	*224.40*
Highland Avenue Northwest Launching	*15.10*	*1.13*	*2,694.62*
Highland Avenue Northeast Launching	*15.10*	*1.13*	*2,694.79*
American Legion Receiving	*1.52*	*0.02*	*346.03*
Connection Shaft and Isolation Valve Sites (10A)			
School Street	*0.37*	*0.05*	*151.62*
Cedarwood Pumping Station	*0*	*0.01*	*0*
Hegarty Pumping Station	*0*	*0.02*	*0*
St. Mary Street Pumping Station	*0*	*0.02*	*0*
Newton Street Pumping Station	*0*	*0.02*	*0*
Southern Spine Mains	*0.02*	*0.05*	*18.19*
Hultman Aqueduct Isolation Valve	*0.02*	*0*	*19.89*
TOTAL PEAK 12-MONTH PERIOD	**33.4**	**2.6**	**6,149.5**

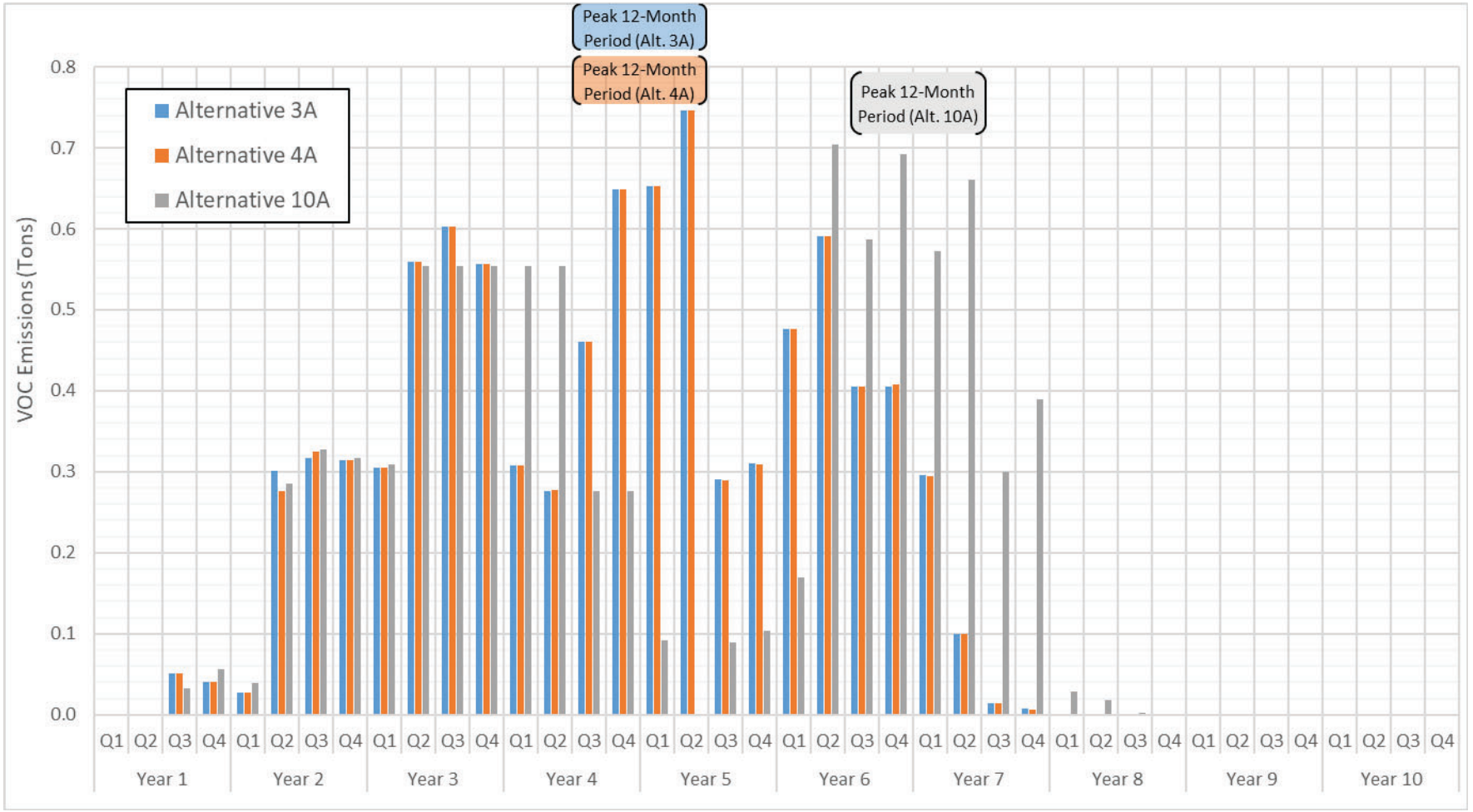
Totals may not add due to rounding.
Italicized text within the table indicates no change from the DEIR.

Figure 8-1 Estimated NOx Emissions (Tons) by Construction Quarter (All Alternatives)



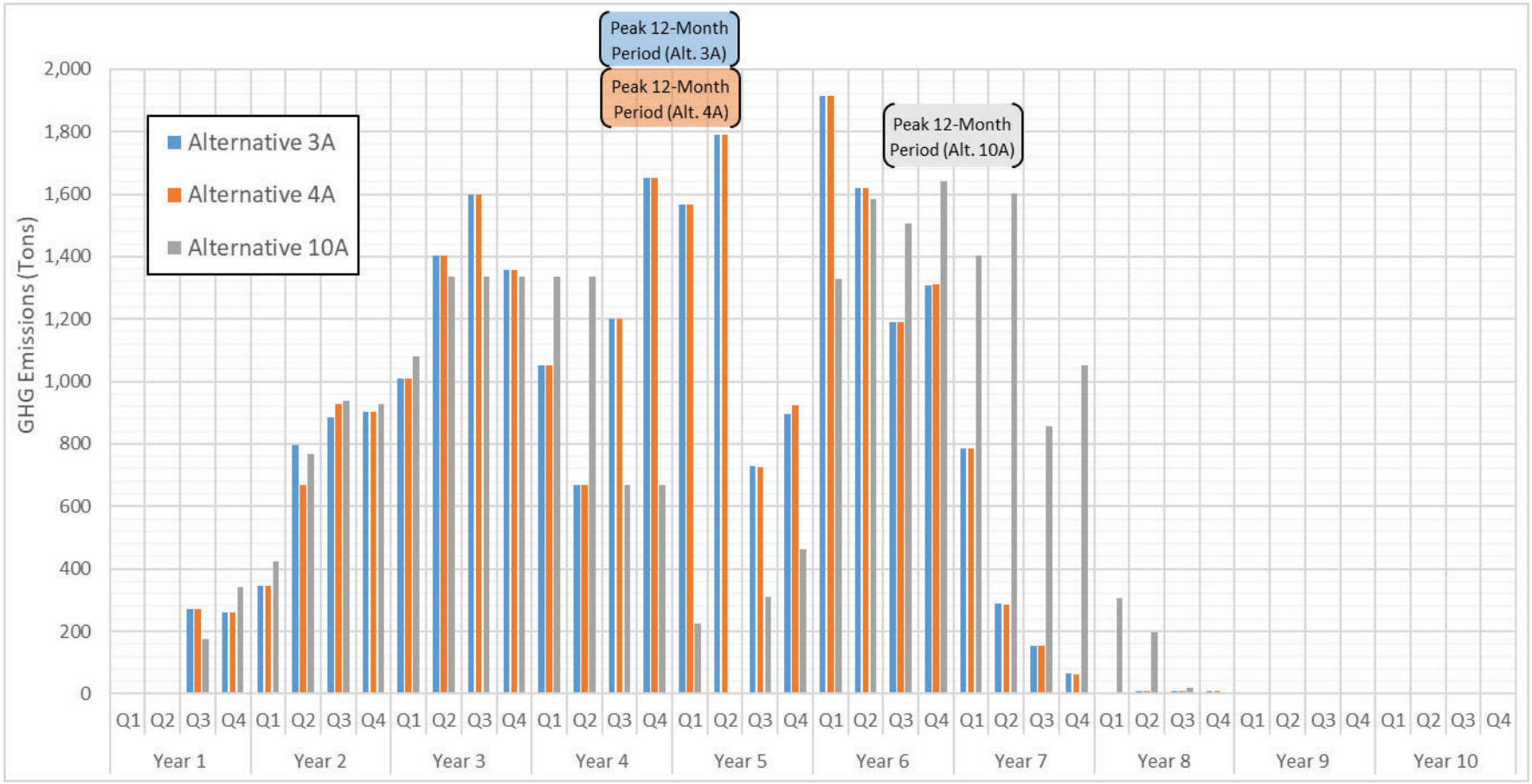
Source: MWRA

Figure 8-2 Estimated VOC Emissions (Tons) by Construction Quarter (All Alternatives)



Source: MWRA

Figure 8-3 *Estimated GHG Emissions (Tons) by Construction Quarter (All Alternatives)*



Source: MWRA

Although General Conformity does not apply to the Program, comparison to the thresholds can present a reasonable context for the emissions associated with the Program. For comparison, the *de minimis* emissions thresholds (for a project in a nonattainment area) are 100 tons per year (tpy) for precursors of ozone, 50 tpy for NOx, and 50 tpy for VOC (there are no General Conformity *de minimis* thresholds for GHG).[11] Peak 12-month period emissions shown in **Table 8-10** are all well below the *de minimis* thresholds. Program emissions (refer to **Table 8-10**) of NOx, VOC, and GHG are a fraction of the total statewide emissions and are expected to remain small percentages even as statewide emissions of NOx, VOC, and GHG are anticipated to decrease (statewide emissions from the latest inventory are also provided in **Table 8-10** for background context, along with the General Conformity *de minimis* thresholds).

10-Year Duration

As shown in **Table 8-10**, the total 10-year modeled construction duration emissions calculated for each SDEIR Alternative are not expected to be significantly different from each other and would occur at a variety of geographically diverse sites, limiting potential health impacts.

During the modeled 10-year period, it is estimated that the non-Program related traffic on the local roadways would generate 940 tons of NOx, 730 tons of VOC, and 1.91 million tons of GHG emissions.[12] As described in **SDEIR Chapter 9, Transportation**, Program-related construction activities are expected to temporarily add approximately 0.1 percent to 2.0 percent additional vehicles to local roadways on the peak day compared to existing conditions. This minor increase would not be expected to materially affect any ambient pollutant concentrations and their comparison to any air quality standards. Temporary Program-related traffic (and associated emissions) along highways is anticipated to comprise less than 0.1 percent to 0.7 percent of total daily volumes on the modeled peak day. See **SDEIR Chapter 9, Transportation**, for more information.

Thus, no significant construction-period impacts related to air quality and GHG are anticipated from any of the three SDEIR Alternatives.

11 U.S. Environmental Protection Agency, General Conformity, "De Minimis Tables," updated July 20, 2022, https://www.epa.gov/general-conformity/de-minimis-tables (accessed June 13, 2023).

12 Based on the USEPA's 2023 MOtor Vehicle Emission Simulator (MOVES3) emission factors. Factors would be expected to decrease over future years due to vehicle emission improvements and alternatively fueled vehicles.

Table 8-10 Summary Comparison of Emissions (Tons) Among Alternatives

Alternative	NOx Emissions (Tons)				VOC Emissions (Tons)				GHG Emissions (Tons)		
	General Conformity *de minimis* threshold (Tons Per Year)	MA 2017 Inventory Total On- and Off-Highway Vehicles	Peak 12-Month Period	Total 10-Year Modeled Duration	General Conformity *de minimis* threshold (Tons Per Year)	MA 2017 Inventory Total On- and Off-Highway Vehicles	Peak 12-Month Period	Total 10-Year Modeled Duration	2018 MA GHG Emissions (Tons CO_2e)	Peak 12-Month Period	Total 10-Year Modeled Duration
3A	100.0	67,598	33.7	122.8	50.0	44,177	2.5	9.1	73,500,000	6,210.1	25,738.8
4A	100.0	67,598	33.7	122.6	50.0	44,177	2.5	9.0	73,500,000	6,209.7	25,669.9
10A	100.0	67,598	33.4	123.0	50.0	44,177	2.6	9.1	73,500,000	6,149.5	25,158.3

MA = Massachusetts

Sources: U.S. Environmental Protection Agency, General Conformity, "De Minimis Tables," updated July 20, 2022, https://www.epa.gov/general-conformity/de-minimis-tables (accessed June 12, 2023); U.S. Environmental Protection Agency, National Emissions Inventory, 2017, https://www.epa.gov/air-emissions-inventories/2017-national-emissions-inventory-nei-data#dataq, updated December 27, 2022 (accessed June 12, 2023); Commonwealth of Massachusetts, Executive Office of Energy and Environmental Affairs, "GHG Emissions and Mitigation Policies," https://www.mass.gov/info-details/ghg-emissions-and-mitigation-policies (accessed June 12, 2023)

8.3.3 Air Quality and GHG Final Conditions (All Alternatives)

There would be no permanent stationary fossil-fueled sources of emissions at the finished Program sites. Sites would have the infrastructure to support portable back-up generators for emergencies but would not have permanent generators on site. After completion of construction, emissions from the Program in the long-term operational condition would be similar for each SDEIR Alternative. Electricity use at the finished sites would be minor and associated with site lighting, security camera systems, unit heaters, or infrequent valve operations (depending on the type of site). The finished sites would not have buildings with conditioned spaces that would require an energy modeling analysis.

Post-construction (operational) activities are estimated to include an average of two vehicle trips per day at any given location (one trip entering the site and one trip exiting the site). The trips would support infrequent maintenance (e.g., snow clearing, mowing grassed areas, valve replacement) as needed.

Since post-construction Program operations are expected to result in negligible emissions of GHG (and criteria pollutants), the MWRA is requesting that the MEPA GHG Policy *de minimis* exemption be applied and concur that a quantitative assessment of operational emissions is not required.

8.3.4 Air Quality and GHG Avoidance, Minimization, and Mitigation Measures

As assumed in the DEIR, the MWRA intends to incorporate the following measures to reduce emissions from Program-related construction activities:

- Where feasible, the MWRA would use electrified construction equipment, including use of an electrified TBM instead of a TBM powered by fossil fuels, which would avoid direct pollutant emissions from one of the largest pieces of construction equipment.
- Contractors would limit vehicle idling time in compliance with the Massachusetts idling regulation (310 Code of Massachusetts Regulations [CMR] 7.11). Idling restriction signs will be placed on the premises to remind drivers and construction personnel of the applicable regulations. Drivers and equipment operators would be trained accordingly.
- Contractors would use Ultra Low Sulfur Diesel fuel, and construction contracts would stipulate that all diesel-fuel construction equipment be fitted with after-engine emission controls. Any non-road diesel equipment would have to be rated 50 horsepower or greater to meet USEPA's Tier 4 emission limits or be retrofitted with appropriate emission-reduction equipment. Emission-reduction equipment could include USEPA-verified or California Air Resources Board (CARB)-verified diesel oxidation catalysts or diesel particulate filters.
- Contractors would be encouraged to use cleaner alternatively fueled equipment (natural gas or electric) rather than diesel-fueled equipment where available and feasible.
- Contractors would be required to implement measures to protect residents, visitors, passengers, and passers-by from off-site exposure to dust and debris.
- Dust control measures would be incorporated to minimize potential fugitive dust emissions associated with construction vehicles tracking dirt and debris offsite and to minimize the potential for

strong winds to disperse dry layers of soils temporarily stored onsite. Appropriate methods of dust control would be determined according to the surfaces concerned (roadways or disturbed areas) and would include, as applicable, application of water during ground-disturbing activities; seeding of areas of exposed soils; wheel washing; using covered trucks; and regular sweeping of paved roadways (see also **SDEIR Chapter 9, Transportation**).

8.4 Technical Analysis to Respond to Certificate Comments

The Secretary's Certificate on the DEIR identified a Scope for the SDEIR, which included specific requests related to air quality and GHG. This section transcribes the comments from the Certificate specific to air quality and GHG emissions and provides supplemental analysis and/or clarifying information in response per the Scope. Responses to comments in the Certificate related to how air quality and GHG emissions may affect EJ populations are provided in **SDEIR Chapter 3, Outreach and Environmental Justice**. Refer also to **SDEIR Chapter 15, Responses to Comments,** for the full list of delineated comments received on the DEIR.

Certificate Comment C-48

The SDEIR should supplement the GHG/air quality analysis presented in the DEIR to clarify how the anticipated emissions associated with the peak construction year compare to Existing and future No Build conditions (both as tpy and percent (%) increases/decrease); if the calculated emissions are assumed to increase from Existing/No Build levels of 0 tpy, this should be stated, and the associated percentages calculated.

Response to C-48

Should the Program not be built (No-Build conditions), there would be no emissions associated with either construction or operation of the Program, nor emissions associated with transportation or mobilization of any equipment associated with the Program. Both a baseline existing and future No-Build condition assume the Program would not be built, and no Program-related construction activities would take place. Therefore, emissions associated with the No-Build conditions are assumed to be 0 tons for the purpose of comparing against the Program alternatives. Emissions estimates provided for the Program alternatives represent absolute increases from the No-Build conditions (i.e., both a baseline level of 0 tons and a future level of 0 tons are assumed).

An estimate of existing emissions on assumed Study Area routes to be used by Program-related construction vehicles and equipment was conducted for emissions of NOx, VOC, and GHG.[13] Emissions were calculated for existing on-road traffic using 2023 emission factors for Middlesex County from the

13 GHGs include air pollutants such as carbon dioxide (CO_2), methane, hydrofluorocarbons, and perfluorocarbons. The 2010 MEPA GHG Policy focuses on the evaluation of CO_2 emissions because CO_2 is the predominant human-caused contributor to global warming (refer to page 3 of the 2010 MEPA GHG Policy available at https://www.mass.gov/doc/greehouse-gas-emissions-policy-and-protocol/download). Consistent with the GHG Policy and the analysis in the DEIR, this evaluation uses the terms GHG and CO_2 interchangeably.

USEPA's MOVES3 model, and existing traffic estimates and distances used in the roadway analysis (see **SDEIR Chapter 9, Transportation**).

For the purposes of the SDEIR, roadway related No-Build conditions are assumed to be the same as existing conditions as described above in **SDEIR Section 8.3.3**. However, due to improvements in vehicle technology, the influx of lower- and zero-emission vehicles, and investment in public transportation, baseline future roadway emissions are expected to continue to decrease from existing levels.

The results of the analysis were used to identify the peak 12-month period of emissions (the four consecutive quarters with the highest rolling cumulative total emissions). Since peak 12-month period totals are always greater than or equal to the peak calendar year total, they provide a more conservative estimate of emissions.

Background information on state-reported GHG emissions levels and ambient air quality has been added in **SDEIR Section 8.2** to provide context of existing and No-Build conditions. **SDEIR Section 8.3.3** compares the calculated GHG emissions for the Program during the peak 12-month period of construction emissions (6,150 to 6,210 tons, depending on SDEIR Alternative) to the statewide GHG emissions totals (73.5 million tons of CO_2e in 2018). Similarly, **SDEIR Section 8.2.2** also presents the latest NEI reported data for Massachusetts on- and off-highway emissions (see **Table 8-9**) to provide additional context in relation to the emissions associated with Program-related construction activities.

Federal NAAQS and MAAQS are described in **SDEIR Section 8.2**, and **Table 8-2** provides the existing ambient air concentrations in the vicinity of the Program using the applicable air monitoring stations operated by MassDEP. Although General Conformity does not apply to the Program, Program-related construction emissions were compared to the *de minimis* emissions thresholds (for a project in a nonattainment area) for precursors of ozone (100 tpy), NOx (100 tpy), and VOC (50 tpy).[14] Peak 12-month period emissions shown in **Table 8-10** are all well below the *de minimis* thresholds.

Regarding comparison to No-Build traffic conditions, and as described in **SDEIR Chapter 9, Transportation**, the Program is expected to add approximately 0.1 percent to 2.0 percent additional vehicles to local roadways on the peak day compared to existing conditions. This minor increase would not be expected to materially affect any ambient pollutant concentrations and their comparison to any air quality standards.

Regarding existing Program-related traffic outside the study area, which primarily includes traffic along the interstate highways, Program-related traffic (and associated emissions) is anticipated to comprise less than 0.1 percent to 0.7 percent of total daily volumes on the modeled peak day, which conservatively assumes that construction would occur at all shafts simultaneously. See **SDEIR Chapter 9, Transportation**, for more information.

14 U.S. Environmental Protection Agency, General Conformity, "De Minimis Tables," updated July 20, 2022, https://www.epa.gov/general-conformity/de-minimis-tables (accessed June 12, 2023).

Certificate Comment C-49

The SDEIR should clarify the total number of years that construction related emissions are anticipated from the project, and what the anticipated rate of decline in emissions is as compared to the peak year (e.g., expect to decline by X% each year from the peak year).

Response to C-49

Program construction is estimated to take approximately 8 to 12 years to complete and is planned to occur between 2027 and 2040. For emission modeling purposes, construction activities in each of the Program's SDEIR Alternatives were modeled to take place for a total of 10 years (beginning at the start of Year 1 Quarter 1 and ending at the conclusion of Year 10 Quarter 4). Emissions calculated for every quarter of Program construction for the modeled 10-year duration are provided in **SDEIR Appendix E, Table E-1**.

The quarterly emissions totals for each alternative for the modeled 10-year duration of Program construction are illustrated in **Figures 8-1** (NOx), **8-2** (VOC), and **8-3** (GHG). The figures show how emissions increase and decrease over the course of construction. **Tables 8-11, 8-12**, and **8-13** provide the estimated percent decline in emissions compared to the peak calendar year.

As described in **SDEIR Section 8.3.3** and in the response to Certificate Comment C-48, the air quality and GHG emissions analysis presented in **SDEIR Chapter 8** focuses on the peak 12-month period of construction emissions (the four consecutive quarters with the highest rolling cumulative total emissions). Peak 12-month period totals provide a more conservative estimate of peak emissions because they are always greater than or equal to the peak calendar year total. However, for the purpose of comparison in response to Certificate Comment C-49, the results of the analysis are presented by calendar year in **Tables 8-11** to **8-13** (emissions calculated for every quarter of Program construction are provided in **SDEIR Appendix E, Table E-1**).

As shown in **Tables 8-11** and **8-12**, the peak calendar year of estimated Program-related NOx and VOC emissions in SDEIR Alternatives 3A and 4A is Year 3. For all SDEIR Alternatives, the estimated peak calendar year for GHG emissions is Year 6. **Tables 8-11** and **8-12** show how NOx, VOC, and GHG emissions are anticipated to decline from the peak calendar year for SDEIR Alternatives 3A and 4A, respectively.

Table 8-11 Alternative 3A Percent Decline in Pollutant Emissions from Peak Calendar Year

Pollutant	Modeled Calendar Year of Construction Activity									
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
NOx Emissions (Tons)	1.4	13.1	27.4	22.8	26.9	25.5	5.7	0.1	0.0	0.0
Percent Decline from Peak Calendar Year	-	-	Peak Calendar Year	-17%	-2%	-7%	-79%	-100%	-100%	-100%
VOC Emissions (Tons)	0.1	1.0	2.0	1.7	2.0	1.9	0.4	0.0	0.0	0.0
Percent Decline from Peak Calendar Year	-	-	Peak Calendar Year	-16%	-1%	-7%	-79%	-100%	-100%	-100%
GHG Emissions (Tons)	531.2	2,929.1	5,364.4	4,572.3	4,981.2	6,029.6	1,296.8	34.0	0.0	0.0
Percent Decline from Peak Calendar Year	-	-	-	-	-	Peak Calendar Year	-78%	-99%	-100%	-100%

Table 8-12 Alternative 4A Percent Decline in Pollutant Emissions from Peak Calendar Year

Pollutant	Modeled Calendar Year of Construction Activity									
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
NOx Emissions (Tons)	1.4	12.9	27.4	22.8	26.8	25.5	5.7	0.1	0.0	0.0
Percent Decline from Peak Calendar Year	-	-	Peak Calendar Year	-17%	-2%	-7%	-79%	-100%	-100%	-100%
VOC Emissions (Tons)	0.1	0.9	2.0	1.7	2.0	1.9	0.4	0.0	0.0	0.0
Percent Decline from Peak Calendar Year	-	-	Peak Calendar Year	-16%	-1%	-7%	-80%	-100%	-100%	-100%
GHG Emissions (Tons)	531.2	2,842.7	5,364.6	4,573.0	5,005.0	6,034.4	1,285.2	34.0	0.0	0.0
Percent Decline from Peak Calendar Year	-	-	-	-	-	Peak Calendar Year	-79%	-99%	-100%	-100%

The peak calendar year of Program-related construction emissions in SDEIR Alternative 10A is estimated to be year 6 of the modeled 10-year construction duration for all three pollutants. **Table 8-13** shows how NOx, VOC, and GHG emissions are anticipated to decline from the peak calendar year.

Table 8-13 Alternative 10A Percent Decline in Pollutant Emissions from Peak Calendar Year

Pollutant	Modeled Calendar Year of Construction Activity									
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
NOx Emissions (Tons)	1.3	13.2	26.5	22.3	3.9	29.1	25.8	0.8	0.0	0.0
Percent Decline from Peak Calendar Year	-	-	-	-	-	Peak Calendar Year	-11%	-97%	-100%	-100%
VOC Emissions (Tons)	0.1	1.0	2.0	1.7	0.3	2.2	1.9	0.1	0.0	0.0
Percent Decline from Peak Calendar Year	-	-	-	-	-	Peak Calendar Year	-11%	-98%	-100%	-100%
GHG Emissions (Tons)	518.5	3,058.0	5,083.8	4,004.9	996.5	6,056.4	4,913.4	526.6	0.1	0.0
Percent Decline from Peak Calendar Year	-	-	-	-	-	Peak Calendar Year	-19%	-91%	-100%	-100%

Certificate Comment C-50

The SDEIR should clarify what traffic study area (including specific intersections) was used to calculate the emissions presented in the mesoscale analysis and indicate whether EJ populations are present near any of the intersections that were studied. To the extent additional EJ populations are identified outside the traffic study area but along routes of travel for construction related traffic, the SDEIR should estimate the anticipated increase in traffic and air emissions at intersections adjacent to those EJ populations. To the extent data is available, the revised air quality analysis should report emissions of $PM_{2.5}$, PM_{10}, NOx, lead, and DPM at the specified locations above.

Response to C-50

The traffic study includes local roadway routes to and from construction locations to the nearest highway interchanges, generally with Interstate 93 (I-93) and I-95. Air pollutant emissions were calculated along these local routes, which traverse both EJ and non-EJ areas.

On the modeled peak day, the Program is expected to temporarily add 0.1 percent to 2.0 percent additional vehicles to local roadways. This minor increase would not be expected to materially affect any ambient pollutant concentrations and their comparison to any air quality standards. A detailed description of local roadway traffic is provided in **SDEIR Chapter 9, Transportation**.

Program-related traffic outside the Study Area would primarily include construction-related trucks and employee vehicles along the interstate highways. Given the existing volumes of traffic on I-93 and I-95, Program-related traffic (and associated generated emissions) is anticipated to be a comparatively small percentage of the total highway traffic (and emissions) and any increases outside the Study Area attributable to the Program would be minimal. Program-generated traffic on the highways is estimated to temporarily add 0.1 percent to 0.7 percent of total daily volumes on the modeled peak day, which

conservatively assumes that construction would occur at all shafts simultaneously. A more detailed description of highway traffic increases is provided in **SDEIR Chapter 9, Transportation**.

The mesoscale analysis is the same as the transportation Study Area and included distances from Program sites to the nearest interstate highway. **SDEIR Section 3.4.1, Environmental Justice Impact Methodology**, defines the transportation Study Area used to calculate the emissions presented in the mesoscale analysis and identifies the roadway intersections analyzed in both the transportation and air quality analyses (refer also to **SDEIR Chapter 9, Transportation**). **SDEIR Chapter 3, Table 3-20** identifies which of the intersections in the analysis include U.S. Census block groups containing potential EJ populations. **SDEIR Chapter 3, Table 3-22**, which is copied below in **Table 8-14**, presents the peak 12-month period of construction emissions of NOx and particulates from Program-related construction vehicles, and identifies how the emissions are distributed on local roads adjacent to block groups identified as containing EJ populations versus non-EJ block groups.

Table 8-14 Program-Related On-Road Emissions in Proximity to EJ Block Groups) (Tons)

	Nitrogen Oxides (NOx) Peak 12-Month Period		Particulate Matter (PM_{10}) Peak 12-Month Period		Fine Particulate Matter ($PM_{2.5}$) Peak 12-Month Period		Diesel Particulate Matter (DPM) Peak 12-Month Period	
Alternative	**EJ Block Groups**	**Non-EJ Block Groups**	**EJ Block Groups**	**Non-EJ Block Groups**	**EJ Block Groups**	**Non-EJ Block Groups**	**EJ Block Groups**	**Non-EJ Block Groups**
Alternative 3A	0.28	0.14	0.04	0.02	0.01	0.01	0.01	0.00
Alternative 4A	0.26	0.13	0.03	0.02	0.01	0.00	0.01	0.00
Alternative 10A	0.30	0.14	0.04	0.02	0.01	0.00	0.01	0.00

As shown in **Table 8-14**, emissions of NOx, PM_{10}, $PM_{2.5}$, and diesel particulate matter (DPM) are all expected to be below 0.5 tpy, and well below the referenced General Conformity *de minimis* thresholds of 100 tpy for NOx, 100 tpy for PM_{10}, and 100 tpy for $PM_{2.5}$ (there are no thresholds for DPM).[15] Lead is no longer used in gasoline and is not used in diesel fuel. Therefore, the Program is expected to have no lead emissions.

Calculations show that emissions are small, however more pollutants are emitted in EJ areas than in non-EJ areas. This is due to the proximity of EJ neighborhoods to both the construction sites, and to the main state and local thoroughfares used to get to the interstate highways, especially for the American Legion site in Jamaica Plain, and the most direct route along State Road 203 to I-93. Construction vehicle transportation routes between the interstate highways and the Program construction sites are anticipated to take place on local roads, some of which abut EJ communities, assuming that the most direct local routes would be used. Any rerouting of construction vehicles would increase travel times and/or mileage, thus increasing regional emissions totals in both EJ and non-EJ communities. Therefore, the least impactful

15 U.S. Environmental Protection Agency, General Conformity, "*De Minimis* Tables," updated July 20, 2022, https://www.epa.gov/general-conformity/de-minimis-tables (accessed June 13, 2023).

routing to all populations is using the most direct routes to/from the interstate highway and minimizing traffic on local roads.

The maximum amount of temporary Program-related traffic and resulting emissions would occur at tunnel launching shaft sites when there is a shift change, conservatively modeled to take place during the evening peak hour (construction worker trips are not expected to occur during the evening peak hour as shift change is usually at approximately 3:00 PM). Program launching shaft locations (i.e., Tandem Trailer, Bifurcation, and Highland Avenue sites) are adjacent to highway ramps and are therefore not expected to cause a significant traffic impact to nearby local roadways. As shown on **SDEIR Chapter 3, Figure 3-5**, **Figure 3-6**, **Figure 3-10**, and **Figure 3-11**, none of the Program launching shaft sites considered in either of the SDEIR Alternatives are in EJ block groups. Furthermore, given their proximity to highway ramps, no construction vehicle routes between these launching shaft sites and the highway travel through EJ block groups.

Since no significant Program-related air quality or GHG emissions impacts are anticipated, there would be no impacts to baseline environmental or health conditions of EJ or non-EJ populations. See **SDEIR Chapter 3, Outreach and Environmental Justice**, for more information on baseline environmental and health conditions for EJ populations.

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9 Transportation

9.1 Introduction

This chapter summarizes updates to the Traffic Impact Assessment (TIA), which was prepared in accordance with the Commonwealth of Massachusetts, Executive Office of Energy and Environmental Affairs (EEA) and Massachusetts Department of Transportation (MassDOT) *Transportation Impact Assessment (TIA) Guidelines*,[1] to assess the Program's potential traffic impacts in each of the three Supplemental Draft Environmental Impact Report (SDEIR) Alternatives (SDEIR Alternatives 3A, 4A, and 10A). The updated TIA incorporates the supplemental assessment of potential traffic impacts associated with Program-related construction activities at the two new alternative sites considered for the terminus of the North Tunnel, Segment 1. The University of Massachusetts (UMass) Property large connection shaft site is considered in SDEIR Alternatives 3A and 4A, and the Lower Fernald Property receiving shaft site is considered in SDEIR Alternative 10A. The two new alternative sites are considered in place of the Fernald Property receiving shaft site that was previously evaluated in the Draft Environmental Impact Report (DEIR). All other sites associated with the SDEIR Alternatives remain unchanged from the DEIR. The updated analysis incorporating the UMass Property site and the Lower Fernald Property site is provided in **SDEIR Appendix F, Transportation Supporting Documentation**. **SDEIR Appendix F.1,** provides the updated TIA and **SDEIR Appendix F.2** provides the updated intersection operational analysis results. Information for all other Program sites remains the same as previously provided in **DEIR Chapter 4, Section 4.10, Transportation**, and **DEIR Appendix F, Transportation Supporting Documentation**.

The Secretary's Certificate on the DEIR, issued on December 16, 2022, identified a Scope for the SDEIR, which included specific requests related to transportation. **SDEIR Section 9.3** includes the comments from the Certificate specific to transportation and provides supplemental analysis and/or clarifying information in response per the Scope in the DEIR Certificate. Certificate comments related to how Program-related traffic may affect environmental justice (EJ) populations are discussed in **SDEIR Chapter 3, Outreach and Environmental Justice**. See **SDEIR Chapter 15, Responses to Comments**, for the full list of delineated comments received on the DEIR in the Certificate and the associated comment letters.

9.1.1 Summary of Findings

Key findings of the Program as they relate to transportation are listed below and are summarized in **Table 9-1**.

Key findings associated with the two new alternative sites considered in the SDEIR for the terminus of the North Tunnel, Segment 1, in place of the DEIR Fernald Property site include:

1 Massachusetts Department of Transportation, *Transportation Impact Assessment (TIA) Guidelines*, updated September 21, 2017, https://www.mass.gov/doc/transportation-impact-assessment-guidelines (accessed May 2, 2023).

- During temporary construction activities at the UMass Property site, the maximum estimated overall number of daily diesel truck trips would be up to 18 trips per day for a maximum duration of three quarters of a year. Due to the conservative assumptions regarding schedule, actual durations are anticipated to be shorter; up to three diesel truck trips per hour were estimated to arrive at and depart from the site.
- At the UMass Property site, up to 40 construction worker trips were conservatively estimated to arrive in the morning peak hour and depart in the evening peak hour for a maximum duration of one quarter a year. The analysis represents a conservative estimate since construction worker trips are not expected to occur during the evening peak hour as shift change is approximately 3:00 PM and the evening peak hour generally occurs between 4:00 PM and 6:00 PM.
- During temporary construction activities at the Lower Fernald Property site, the maximum estimated overall number of daily diesel truck trips would be up to 27 trips per day for a maximum duration of one quarter of a year; up to four diesel truck trips per hour were estimated to arrive at and depart from the site.
- At the Lower Fernald Property site, up to 64 construction worker trips were conservatively estimated to arrive in the morning peak hour and depart in the evening peak hour for a maximum duration of one quarter a year. Construction worker trips are not expected to occur during the evening peak hour as shift change is usually at approximately 3:00 PM.

Key findings associated with the three SDEIR Alternatives, which are consistent with the findings of the three DEIR Alternatives, include:

- For the SDEIR Alternatives, most traffic expected to be generated by construction activities at Program sites would be due to construction workers driving to and from the sites at the beginning and end of their workday shifts.
- The maximum amount of temporary Program-related traffic would occur at launching shaft sites where there is a shift change conservatively modeled to take place during the evening peak hour. Launching shaft sites (i.e., Tandem Trailer, Bifurcation, and Highland Avenue sites) are adjacent to highway ramps and are therefore not expected to cause a significant traffic impact to nearby local roadways.
- Construction of near-surface piping at some shaft site locations would require temporary traffic management measures, including temporary lane closures, sidewalk closures, and detours. Near-surface piping construction may temporarily impact traffic at the proposed UMass Property site in Waltham (SDEIR Alternatives 3A and 4A), the Lower Fernald Property site in Waltham (SDEIR Alternative 10A), the School Street site in Waltham (common to all SDEIR Alternatives), the Highland Avenue sites in Needham (due to the discharge pipeline which is common to all Alternatives), and the American Legion site in Boston (common to all SDEIR Alternatives).
- At locations where near-surface piping construction would be expected to temporarily increase traffic, construction activities would be limited to certain time periods depending on the characteristics of the roadways and surrounding land uses. As a potential mitigation measure, construction work could be performed during off-peak hours, as necessary and where appropriate.

- At locations where the additional traffic due to temporary Program-related construction may increase intersection delays, potential mitigation measures, if required, may consist of adjusting traffic signal timings. Adjusting traffic signal timings, if necessary and where appropriate, would be expected to result in either minimal increases or reductions in intersection delay when compared to existing conditions.

Table 9-1 Transportation Summary of Findings

Description of Potential Impact	Alternative 3A	Alternative 4A	Alternative 10A
Temporary increase in daily traffic volumes on Study Area roadways for the modeled peak day	• Non-highway: 0.1% to 2.0% temporary increase in daily volumes • Highway: 0.2% to 0.7% temporary increase in daily volumes	• Non-highway: 0.1% to 1.8% temporary increase in daily volumes • Highway: 0.2% to 0.7% temporary increase in daily volumes	• Non-highway: 0.1% to 1.9% temporary increase in daily volumes • Highway: 0.1% to 0.7% temporary increase in daily volumes
Maximum average daily trips (ADT) of diesel vehicles of one quarter of a year (all sites)	389 (Year 3, Quarter 4)	393 (Year 3, Quarter 4)	312 (Year 3, Quarter 2 to Year 4, Quarter 2)
Sites potentially subject to more than 150 ADT of diesel trucks during temporary construction activities if shift change were to take place in the peak hour (quantity and duration) [1]	• Tandem Trailer (156 truck trips per day for 5 quarters) • Highland Avenue Northeast/Southeast (156 truck trips per day for 7 quarters) • Bifurcation (152 truck trips per day for 3 quarters)	• Tandem Trailer (156 truck trips per day for 5 quarters) • Highland Avenue Northwest/Southwest (156 truck trips per day for 3 quarters) • Highland Avenue Northeast/Southeast (156 truck tips per day for 7 quarters)	• Highland Avenue Northwest/Southwest (156 truck trips per day for 9 quarters) • Highland Avenue Northeast/Southeast (156 truck trips per day for 7 quarters)
Installation of near-surface piping would require traffic management measures including lane closure, sidewalk closures, and/or detours	• UMass Property site • Highland Avenue sites • American Legion site • School Street site	• UMass Property site • Highland Avenue sites • American Legion site • School Street site	• Lower Fernald Property site • Highland Avenue sites • American Legion site • School Street site

1 The assessment of ADT of diesel trucks was based on a conservative, worst-case scenario where approximately 70 feet of excavation per day is assumed, and that construction would only occur on business days. The average rate for excavation is likely to be less than 60 feet per day, translating to fewer than 150 additional ADT by diesel trucks. The annual ADT generated by the Program would be around 111 average daily trips per year. The sequence of constructing each element within a construction package will be at the discretion of the selected contractor(s).

9.2 Updated Transportation Impact Assessment

The TIA was updated to incorporate traffic assumptions associated with the two new alternative sites considered in place of the DEIR Fernald Property site. The updated TIA, which is provided in **SDEIR Appendix F.1**, identified roadways near the two new alternative sites and associated existing conditions. Updated traffic counts were collected along the anticipated construction vehicle routes to and from the two new alternative sites: the UMass Property site in SDEIR Alternatives 3A and 4A, and the Lower Fernald Property site in SDEIR Alternative 10A. The updated assumptions were incorporated into the Program's overall traffic analysis for the three SDEIR Alternatives. Consistent with the methodology and analysis in the DEIR, the TIA includes a description of existing conditions; evaluates the traffic operations for roadways and key intersections on anticipated construction vehicle routes between the highway and shaft sites under existing and future construction conditions; and identifies mitigation that could be considered to offset potential impacts.

9.2.1 Transportation Existing Conditions

9.2.1.1 Study Area Roadways Existing Conditions

As described in **DEIR Section 4.10.2.1, Study Area (pg. 4.10-17)**, the Study Area encompasses the anticipated truck or haul routes between the access point(s) to each site and the nearest major highway. Truck routes are assumed to be used by contractors supplying equipment and materials and for hauling away excavated material from tunnel excavation. Consistent with the DEIR analysis, anticipated construction vehicle routes for the two new alternative sites were established by identifying the most direct route along main state and local roadways to and from the nearest highway to minimize traffic and emissions. The construction vehicle routes anticipated to be used during proposed construction activities at the UMass Property site considered in SDEIR Alternatives 3A and 4A are shown in **Figure 9-2**. The construction vehicle routes anticipated to be used during proposed construction activities at the Lower Fernald Property site considered in SDEIR Alternative 10A are shown in **Figure 9-3**.

Additional traffic data was collected in March 2023 for the two new alternative sites using automatic traffic recorders (ATR) along anticipated construction vehicle routes and peak hour turning movement counts (TMC) at the Study Area intersections. **Figure 9-1** shows the data collection locations. **Table 9-2** lists the roadways along the anticipated construction vehicle routes shown in **Figure 9-2** and **Figure 9-3**. Existing 24-hour traffic volumes collected via ATRs along the study roadways are also provided.

LINCOLN
LEXINGTON
ARLINGTON
WALTHAM
BELMONT
WESTON
WATERTOWN
NEWTON
SMITH ST
TRAPELO RD
WALTHAM ST
LEXINGTON ST
TOTTEN POND RD
FOREST ST
CHAPEL ROAD
BEAVER ST
WAVERLEY OAKS RD
SCHOOL ST
EXCHANGE ST
BACON ST
LINDEN ST
MAIN ST
PALMER ST
BANKS ST
WESTON ST
SOUTH ST
CHURCH ST
ELM ST
COMMON ST
MOODY ST
ELLISON PK
44
44B
44A
43B
43A
41
95
117
2
60
20
LOWER FERNALD PROPERTY SITE
UMASS PROPERTY SITE
0 1250 2500 5000
1" = 2500 FEET

Legend

- Approximate Temporary Construction Boundary of Shaft Site
- Automatic Traffic Recorder Location
- Signalized Study Intersection Turning Movement Counts (TMCs)
- Unsignalized Study Intersection TMCs

Metropolitan Water Tunnel Program

MWRA Contract No. 7159
Supplemental Draft Environmental Impact Report

in association with CDM Smith, vhb, Jacobs, GREEN INTERNATIONAL AFFILIATES, INC.

UMass Property Site and Lower Fernald Property Site Study Area Intersections

Figure 9-1

Waltham, MA

MassGIS 2019

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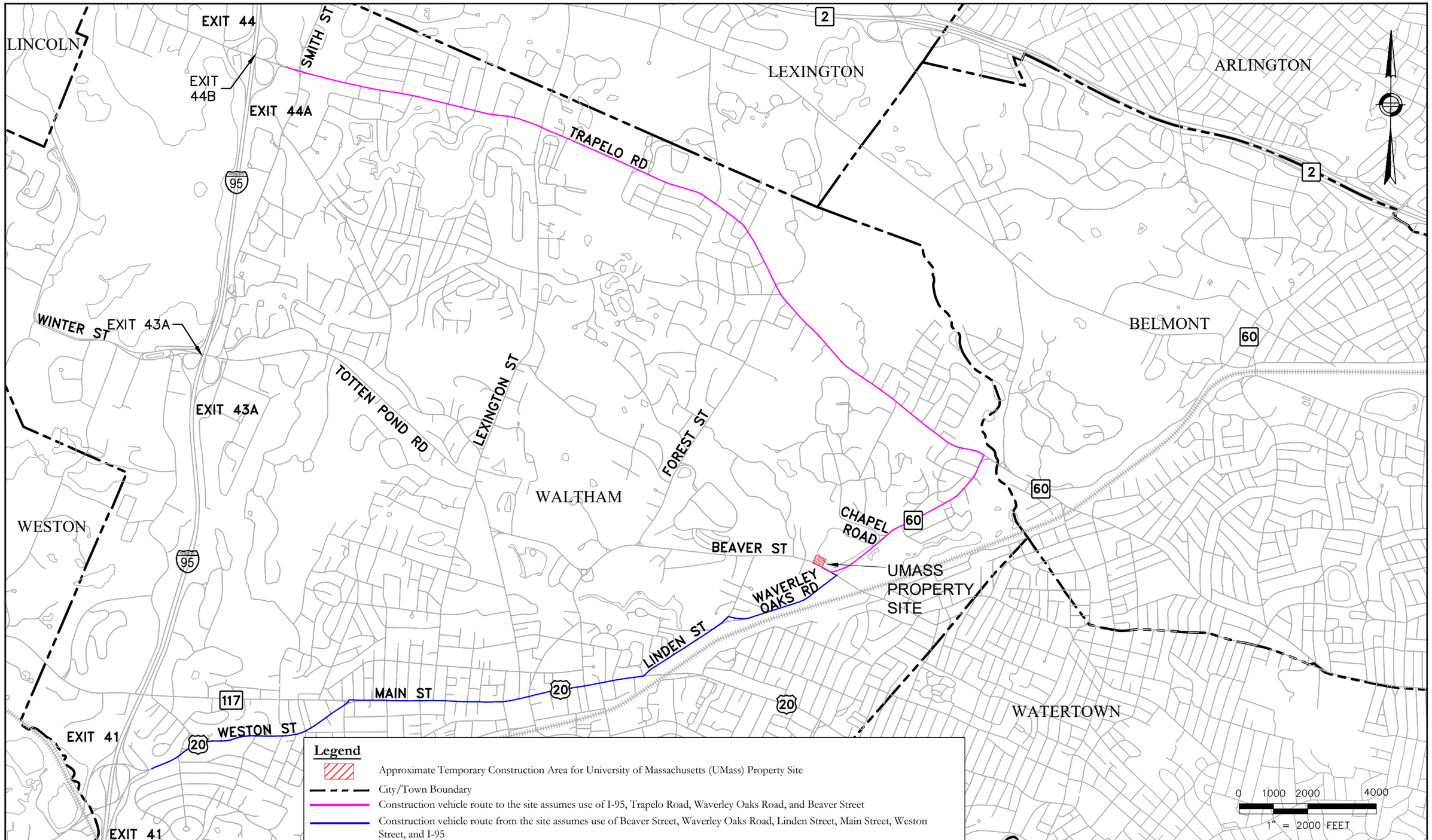
Table 9-2 Study Area Roadways – Existing Conditions

Shaft Site (Alternative)	Roadway	From	To	City/ Town	Existing Average 24-Hour Traffic Volume
UMass Property Large Connection (3A, 4A)	Trapelo Road	I-95	Waverley Oaks Road	Waltham	20,489
	Waverley Oaks Road	Trapelo Road	Linden Street	Waltham	13,665
	Linden Street	Waverley Oaks Road	Main Street	Waltham	9,398
	Main Street	Linden Street	Weston Street (Route 20)	Waltham	12,342
	Weston Street (Route 20)	Main Street	I-95	Waltham	13,208
Lower Fernald Property Receiving (10A)	Trapelo Road	I-95	Waverley Oaks Road	Waltham	20,489
	Waverley Oaks Road	Trapelo Road	Linden Street	Waltham	13,665
	Linden Street	Waverley Oaks Road	Main Street	Waltham	9,398
	Main Street	Linden Street	Weston Street (Route 20)	Waltham	12,342
	Weston Street (Route 20)	Main Street	I-95	Waltham	13,208
School Street Connection (All)	*Weston Street (Route 20)*	*I-95*	*Main Street*	*Waltham*	*13,208*
	Main Street	*Weston Street (Route 20)*	*Bacon Street*	*Waltham*	*12,342*
	Bacon Street	*Main Street*	*School Street*	*Waltham*	*8,612*
	School Street	*Bacon Street*	*Macks Court*	*Waltham*	*6,942*
Cedarwood Pumping Station Connection (All)	*Weston Street (Route 20)*	*I-95*	*South Street*	*Waltham*	*13,208*
	South Street	*Weston Street (Route 20)*	*Shakespeare Road*	*Waltham*	*11,755*
Bifurcation Launching (3A)	*I-90 to I-95 Ramp*	-	-	*Weston*	*162,000*
Tandem Trailer Launching (3A, 4A)	*South Avenue (Route 30)*	*Site Exit*	*I-95*	*Weston*	*22,587*
	I-95 to I-90 West Ramp	*I-95*	*Site Entrance*	*Weston*	*134,000*
Park Road East Large Connection (3A, 4A)	*South Avenue (Route 30)*	*I-95*	*Park Road*	*Weston*	*22,587*
	Park Road	*South Avenue (Route 30)*	*Site Entrance*	*Weston*	*9,050*
Park Road West Receiving (4A)/Large Connection (10A)	*South Avenue (Route 30)*	*I-95*	*Park Road*	*Weston*	*22,587*

Table 9-2 Study Area Roadways – Existing Conditions

Shaft Site (Alternative)	Roadway	From	To	City/ Town	Existing Average 24-Hour Traffic Volume
Hegarty Pumping Station Connection (All)	*Worcester Street (Route 9)*	*I-95*	*Cedar Street*	*Wellesley*	*47,052*
	Cedar Street	*Worcester Street (Route 9)*	*Barton Road*	*Wellesley*	*13,463*
St. Mary Street Pumping Station Connection (All)	*Worcester Street (Route 9)*	*I-95*	*Cedar Street*	*Wellesley*	*47,052*
	Cedar Street	*Worcester Street (Route 9)*	*Central Avenue*	*Wellesley/ Needham*	*15,552*
	Central Avenue	*Cedar Street*	*St. Mary Street*	*Needham*	*10,817*
Highland Avenue Northeast/ Southeast Launching (All)	*I-95 Northbound On-Ramp*	*Highland Avenue*	*I-95*	*Needham*	*162,000*
	I-95 Northbound Off-Ramp	*I-95*	*Highland Avenue*	*Needham*	*149,000*
Highland Avenue Northwest Receiving (3A)/ Northwest/ Southwest Launching (4A, 10A)	*I-95 Southbound On-Ramp*	*Highland Avenue*	*I-95*	*Needham*	*162,000*
	I-95 Southbound Off-Ramp	*I-95*	*Highland Avenue*	*Needham*	*149,000*
Newton Street Pumping Station Connection (All)	*Boylston Street (Route 9)*	*I-95*	*Lee Street*	*Newton/ Brookline*	*57,001*
	Lee Street	*Boylston Street (Route 9)*	*Clyde Street*	*Brookline*	*15,458*
	Clyde Street	*Lee Street*	*Newton Street*	*Brookline*	*16,716*
	Newton Street	*Clyde Street*	*Site Entrance*	*Brookline*	*12,833*
Southern Spine Mains Connection (All)	*Gallivan Blvd. (Route 203)*	*I-93*	*Morton Street (Route 203)*	*Boston*	*48,894*
	Morton Street (Route 203)	*Gallivan Blvd. (Route 203)*	*Arborway (Route 203)*	*Boston*	*35,658*
	Arborway (Route 203)	*Morton Street (Route 203)*	*Centre Street*	*Boston*	*32,778*
	South Street	*Arborway (Route 203)*	*Asticou Road*	*Boston*	*11,755*
American Legion Receiving (All)	*Gallivan Blvd. (Route 203)*	*I-93*	*Morton Street (Route 203)*	*Boston*	*48,894*
	Morton Street (Route 203)	*Gallivan Blvd. (Route 203)*	*Arborway (Route 203)*	*Boston*	*35,778*
	Arborway (Route 203)	*Morton Street (Route 203)*	*Centre Street*	*Boston*	*32,778*

Italicized text within the table indicates no change from the DEIR.



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Anticipated Construction Vehicle Routes
UMass Property Site (Alternatives 3A and 4A)
Figure 9-2

Waltham, MA

MassGIS 2019

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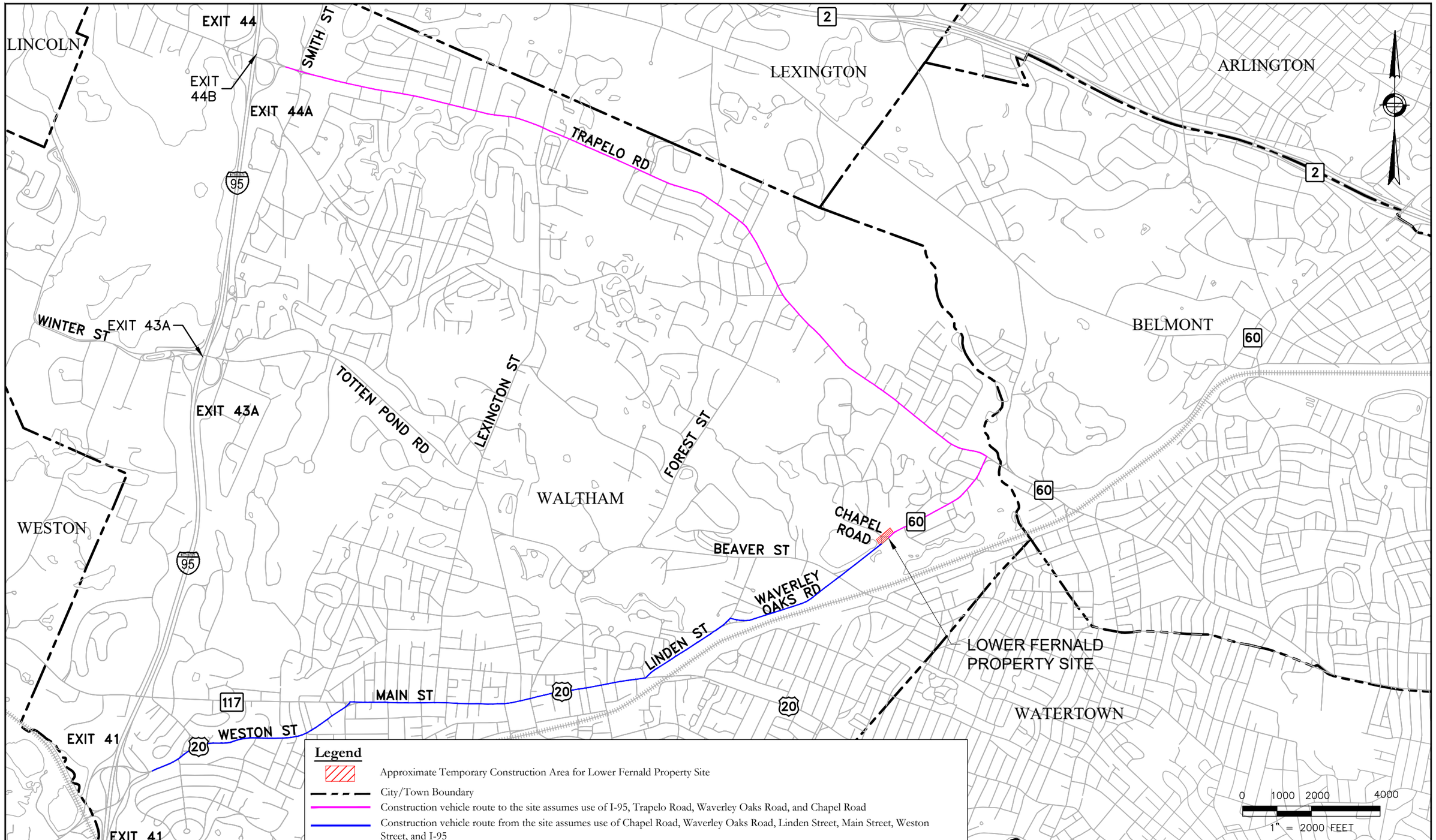

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Anticipated Construction Vehicle Routes
Lower Fernald Property Site (Alternative 10A)
Figure 9-3

Waltham, MA

MassGIS 2019

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9.2.1.2 Study Area Intersections Existing Conditions

The updated TIA (refer to **SDEIR Appendix F.1**) studied the key intersections associated with the two new alternative sites considered for the northern terminus of the North Tunnel, Segment 1, in place of the DEIR Fernald Property site. The intersections were selected based on estimates of vehicle traffic and pedestrian and bicyclist traffic that may result at these intersections from construction of the Program. **Table 9-3** lists the Study Area intersections and the associated Program sites by municipality. Study Area intersections associated with the two new alternative sites are shown in **Figure 9-1**. All other Study Area intersections remain the same as evaluated in the DEIR. See **DEIR Figures 4.10-1** through **4.10-6** for the Study Area intersections evaluated as part of the DEIR. Descriptions of the Study Area intersections evaluated in the DEIR are provided in **DEIR Appendix F.2**.

Table 9-3 Study Area Intersections by Municipality

City/Town	Intersection	Associated Shaft Site(s)
Waltham	Trapelo Rd. at Lexington St.	UMass Property, Lower Fernald Property
	Waverley Oaks Rd. at Trapelo Rd.	UMass Property, Lower Fernald Property
	Beaver St. at Waverley Oaks Rd.	UMass Property, Lower Fernald Property
	Main St. at Linden St./Ellison Park	UMass Property, Lower Fernald Property
	Elm St. at Main St.	UMass Property, Lower Fernald Property
	Moody St. at Main St.	UMass Property, Lower Fernald Property
	Bacon St. at Main St.	UMass Property, Lower Fernald Property, *School Street*
	Weston St. at Main St.	UMass Property, Lower Fernald Property, *School Street*
	South St. at Weston St.	UMass Property, Lower Fernald Property, *School Street, Cedarwood Pumping Station*
	Shakespeare Rd. at South St.	*Cedarwood Pumping Station*
Weston	*River Rd. at South Ave.*	*Tandem Trailer, Park Road East, Park Road West*
	I-95 N off-ramp at South Ave.	*Tandem Trailer, Park Road East, Park Road West*
	Park Rd. at South Ave.	*Park Road West*
Needham	*Central Ave. at Cedar St.*	*Hegarty Pumping Station, St. Mary Street Pumping Station*
Wellesley	*Worcester St. at Cedar St.*	*Hegarty Pumping Station, St. Mary Street Pumping Station*
Newton	*Woodward St./Elliot St. at Rt 9*	*Newton Street Pumping Station*
Brookline	*Grove St. at Newton St.*	*Newton Street Pumping Station*
	Newton St. at Clyde St.	*Newton Street Pumping Station*
	Dudley St. at Lee St.	*Newton Street Pumping Station*
	Lee St. at Rt 9	*Newton Street Pumping Station*
	Chestnut Hill Ave. at Rt 9	*Newton Street Pumping Station*
	Hammond St. at Rt 9	*Newton Street Pumping Station*
Boston	*Canterbury Ln. at Morton St.*	*American Legion, Southern Spine Mains*
	Morton St. at Harvard St.	*American Legion, Southern Spine Mains*
	Morton St. at Blue Hill Ave.	*American Legion, Southern Spine Mains*

Table 9-3 Study Area Intersections by Municipality

City/Town	Intersection	Associated Shaft Site(s)
Boston	*Morton St. at Norfolk St.*	*American Legion, Southern Spine Mains*
	Morton St. at Corbet St.	*American Legion, Southern Spine Mains*
	Morton St. at Gallivan Blvd.	*American Legion, Southern Spine Mains*
	Gallivan Blvd. at Washington St.	*American Legion, Southern Spine Mains*
	Gallivan Blvd. at Dorchester Ave.	*American Legion, Southern Spine Mains*
	Gallivan Blvd. at Granite Ave./Adams St.	*American Legion, Southern Spine Mains*
	Gallivan Blvd. at Hallet St.	*American Legion, Southern Spine Mains*
	Gallivan Blvd. at Neponset Ave.	*American Legion, Southern Spine Mains*
	Neponset Ave. at Morrissey Blvd.	*American Legion, Southern Spine Mains*
	South St. at Washington St.	*Southern Spine Mains*
	South St. at Arborway	*Southern Spine Mains*
	Washington St. at Arborway	*Southern Spine Mains*
	Arborway at Circuit Dr.	*Southern Spine Mains*

Italicized text within the table indicates no change from the DEIR.

There are no updates to bus routes associated with the two new alternative sites considered for the terminus of the North Tunnel, Segment 1.

9.2.1.3 Safety Existing Conditions

The MassDOT Top Crash Locations map[2] was reviewed to determine which Study Area intersections were designated as Top-200 Crash Clusters or Highway Safety Improvement (HSIP) Clusters. HSIP clusters are defined as locations that rank within the top five percent of each Regional Planning Agency, based on frequency and severity of crashes. Locations identified as HSIP clusters require Road Safety Audits to identify existing safety deficiencies and potential mitigating actions. Top-200 Crash Clusters are locations that rank within the top 200 crash locations in the state.

Collision data are summarized in **Table 9-4** for the Study Area intersections that were identified on the MassDOT Top Crash Locations map.

Table 9-4 Collision Data Summary and Proposed Safety Improvements of Study Area Intersections Identified on the Top Crash Location Map

Shaft Site	Intersection	Collision Data Summary
UMass Property, Lower Fernald Property	Trapelo Rd. at Lexington St., Waltham	On the list of 2018-2020 HSIP Cluster. 1 fatal/serious intersection crash, 4 non-serious/possible injury crashes and 21 non-injury crashes during 2018-2020.
UMass Property, Lower Fernald Property	Main St. at Linden St./Ellison Pk., Waltham	On the list of 2018-2020 HSIP Cluster. 2 fatal/serious injury crash, 4 non-serious/possible injury crashes, and 14 non-injury crashes during 2018-2020.
UMass Property, Lower Fernald Property	Main St. at Elm St./Church St.	Located within a 2011-2020 HSIP Bicycle Cluster. 2 fatal/serious intersection crashes, 10 non-serious/possible injury crashes, and 4 non-injury crashes during 2018-2020.
UMass Property, Lower Fernald Property	Main St. at Common St./Moody St.	Located within a 2011-2020 HSIP Bicycle Cluster. 2 fatal/serious intersection crashes, 10 non-serious/possible injury crashes, and 4 non-injury crashes during 2018-2020.
UMass Property, Lower Fernald Property, School Street	Main St. at Bacon St.	Located within a 2011-2020 HSIP Bicycle and Pedestrian Cluster. 9 fatal/serious intersection crashes, 37 non-serious/possible injury crashes, and 12 non-injury crashes during 2018-2020.
UMass Property, Lower Fernald Property, School Street, Cedarwood Pumping Station	Main St. at Weston St., South St. at Weston St.	Located within a 2011-2020 HSIP Bicycle and Pedestrian Cluster. 8 fatal/serious intersection crashes, 30 non-serious/possible injury crashes, and eight non-injury crashes during 2018-2020. Safety issues[1] on roadway/intersection geometry; lane markings and signage; traffic signal deficiencies; pedestrian, bicycle, and transit operations; visibility/sight line obstruction.

2 Massachusetts Department of Transportation, Top Crash Locations, https://gis.massdot.state.ma.us/topcrashlocations/ (accessed June 2023).

Table 9-4 Collision Data Summary and Proposed Safety Improvements of Study Area Intersections Identified on the Top Crash Location Map

Shaft Site	Intersection	Collision Data Summary
Newton Street Pumping Station	Boylston St. (Rt 9) at Woodward St/Elliot St., Newton	On the list of 2018-2020 HSIP Cluster. 1 fatal/serious intersection crash, 7 non-serious/possible injury crashes, and 5 non-injury crashes during 2018-2020. Inadequate pedestrian accommodation and pedestrian unfriendly; deficiency in signal and intersection operation; inadequate or outdated signage and pavement markings; access management issues; inadequate bus stop accommodation.[3]
American Legion, Southern Spine Mains	Morton St. at Harvard St., Boston	On the list of 2018-2020 HSIP Cluster. 1 fatal/serious intersection crash, 7 non-serious/possible injury crashes, and 8 non-injury crashes during 2018-2020. Inadequate intersection capacity; intersection geometry deficiency; inappropriate bus stop location; malfunction of signal equipment.[4]
American Legion, Southern Spine Mains	Morton St. at Norfolk St., Boston	On the list of 2018-2020 HSIP Cluster. 1 fatal/serious intersection crash, 7 non-serious/possible injury crashes and 8 non-injury crashes during 2018-2020.
American Legion, Southern Spine Mains	Gallivan Blvd. at Washington St., Boston	On the list of 2018-2020 HSIP Cluster. 6 non-serious/possible injury crashes and 12 non-injury crashes during 2018-2020.
American Legion, Southern Spine Mains	Washington St. at Arborway, Boston Blvd. at Dorchester Ave., Boston	On the list of 2018-2020 HSIP Cluster. 1 fatal/serious crash, 14 non-serious/possible injury crashes, and 32 non-injury crashes during 2018-2020.
American Legion, Southern Spine Mains	Washington St. at Arborway, Boston Gallivan Blvd. at Granite Ave./ Adams St., Boston	On the list of 2018-2020 HSIP Cluster. 1 fatal/serious crash, 7 non-serious/possible injury crashes and 8 non-injury crashes during 2018-2020.
American Legion, Southern Spine Mains	Washington St. at Arborway, Boston	On the list of 2018-2020 HSIP Cluster. 1 fatal/serious crash, 7 non-serious/possible injury crashes and 8 non-injury crashes during 2018-2020.

1 *Road Safety Audit: Weston Street (Route 20) at I-95 Ramps/Weston Street (Route 20) at Main Street (Route 117)/Totten Pond Road/Winter Street at 3rd Avenue Winter Street at 2nd Avenue. McMahon Associates, Inc., August 2017.*

2 *Road Safety Audit: Route 30 at River Road/I-95 Southbound Ramps. VHB, August 2019.*

3 *Road Safety Audit: Route 9 (Boylston Street) at Elliot Street, Woodward Street, Glenmore Terrace, and Ramsdell Street. Beta Group, Inc., May 7, 2021.*

4 *Road Safety Audit: Morton Street at Blue Hill Avenue, Morton Street at Courtland Road/Havelock Street, Morton Street at Harvard Street. Beta Group, Inc., January 20, 2012.*

Source: Massachusetts Department of Transportation, Top High Crash Intersection Locations, https://gis.massdot.state.ma.us/topcrashlocations/.

9.2.1.4 Intersection Operations Existing Conditions

An updated existing conditions intersection operational analysis is presented in **SDEIR Appendix F.2** to reflect the updated turning movement counts at intersections along construction vehicle routes associated with the UMass Property site and Lower Fernald Property site. Existing conditions were found to be largely the same as presented in the DEIR for the previously considered DEIR Fernald Property site.

9.2.1.5 Regional Highway Volumes Existing Conditions

Anticipated construction vehicle routes were established for each shaft site location by identifying the most direct route along main state and local roadways to and from the nearest highway. Construction vehicle routes are assumed to be used by contractors supplying equipment and materials and for hauling away excavated material from tunnel excavation. Traffic data collected includes ATR and TMC data along the nearest highways. **Table 9-5** shows the existing volumes at the four designated highway access points.

Table 9-5 Regional Highway Existing Volumes

Program Site	Highway	Location	MassDOT Loc. ID	AM Peak Hour Trips (one-way)	PM Peak Hour Trips (one-way)	Average 24-Hour Traffic Volumes
UMass Property, Lower Fernald Property, School Street, Cedarwood Pumping Station, Bifurcation, Tandem Trailer, Park Road East, Park Road West	I-95	North of I-90	32	10,200	10,900	162,000
Bifurcation, Tandem Trailer, Park Road East, Park Road West	I-90	West of I-95	AET10	8,350	9,000	134,000
Hegarty Pumping Station, St Mary Street Pumping Station, Highland Ave NE, Highland Ave NW, Newton Street Pumping Station	I-95	South of I-90	4165	9,800	10,200	149,000
Southern Spine Mains, American Legion	I-93	South of Route 203	8932	8,700	10,100	169,000

9.2.2 Transportation Construction Period Impacts

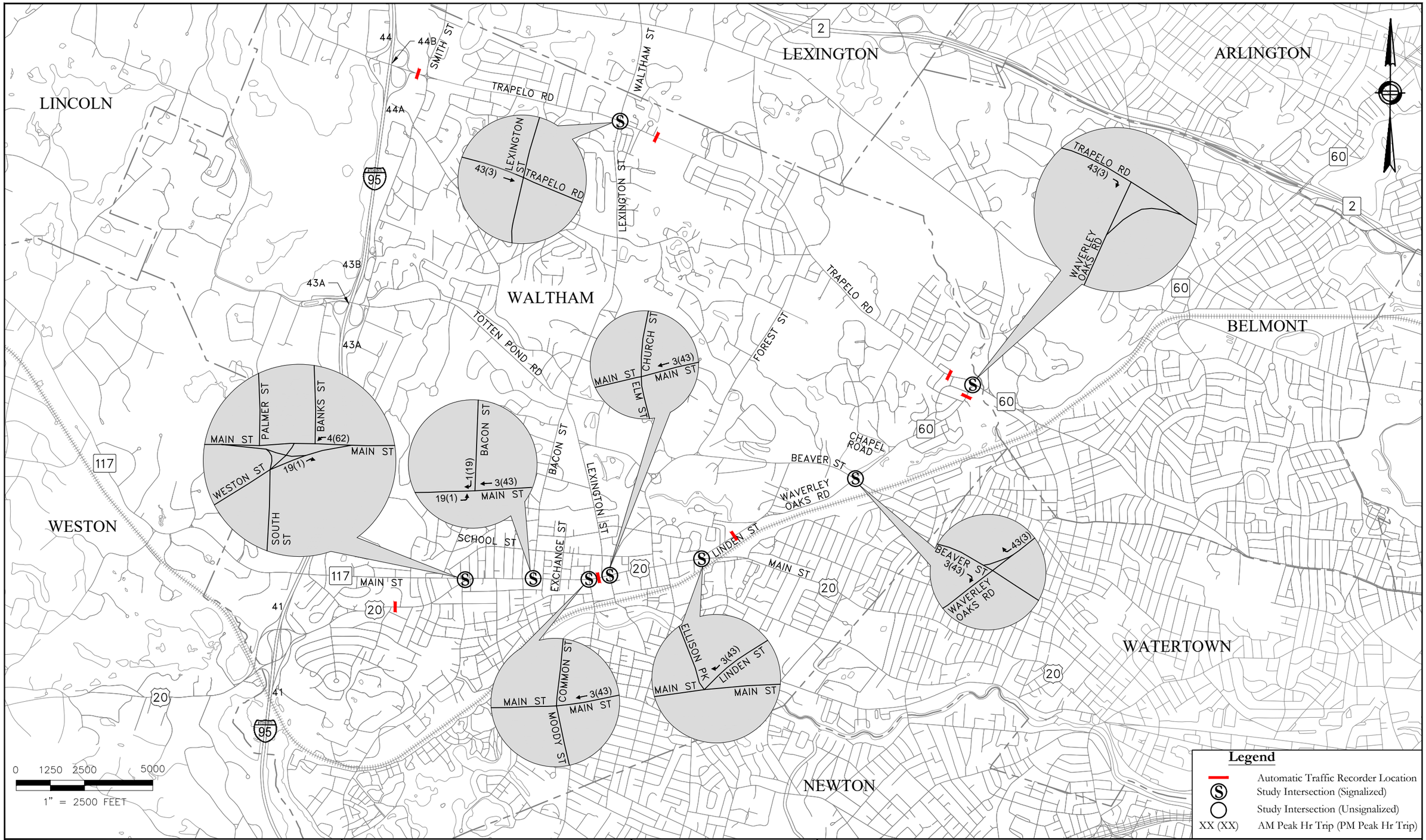
For the updated SDEIR Alternatives, most traffic expected to be generated by construction activities at the proposed Program sites would be due to construction workers driving to and from the sites at the beginning and ends of their workday shifts. Average daily vehicle trips (one-way trips) were calculated for each alternative and are summarized below. Additional details are provided in the updated TIA in **SDEIR Appendix F.1**. Program-generated vehicle trips calculated for the UMass Property site in SDEIR Alternatives 3A and 4A are shown in **Figure 9-4**. Program-generated vehicle trips calculated for the Lower Fernald Property site in SDEIR Alternative 10A are shown in **Figure 9-5**.

9.2.2.1 Alternative 3A/Alternative 4A Traffic Volumes Construction Period Impacts

UMass Property

The updated TIA identified the following (refer to **SDEIR Appendix F.1**):

- Up to three diesel truck trips per hour were estimated to arrive at and depart from the UMass Property site during temporary construction activities.
- The maximum estimated overall number of daily net new diesel truck trips would be up to 18 trips per day for a maximum duration of three quarters of a year during the construction period. Due to the conservative assumptions regarding schedule, actual durations are anticipated to be shorter.
- Up to 40 construction worker trips were estimated to arrive at the UMass Property site in the morning peak hour and depart in the evening peak hour for a maximum duration of one quarter a year. Construction worker trips are not expected to occur during the evening peak hour as shift change is usually at approximately 3:00 PM and the evening peak hour generally occurs between 4:00 PM and 6:00 PM.
- The intersections of Trapelo Road at Waverley Oaks Road and Main Street at Ellison Park/Linden Street in Waltham were estimated they would experience an increase in delay of up to 44 seconds in the morning peak hour. Traffic signal re-timing during construction activities could be implemented to minimize the increase in delay at these intersections.
- The intersection of Main Street at Ellison Park/Linden Street in Waltham was conservatively estimated it would experience an increase in delay of up to 74 seconds in the evening peak hour if construction worker shift change happened during the peak hour. As stated previously, worker shift change is expected to occur earlier than the evening peak hour. However, if all construction worker trips were to occur during the evening peak hour, mitigation such as signal re-timing would be considered to minimize the increase in delay at this intersection.



Metropolitan Water Tunnel Program

MWRA Contract No. 7159
Supplemental Draft Environmental Impact Report

CDM Smith in association with vhb
Jacobs GREEN INTERNATIONAL AFFILIATES, INC.

Program-Generated Construction Vehicle Trips
UMass Property Site (Alternatives 3A and 4A)
Figure 9-4

Waltham, MA

MassGIS 2019

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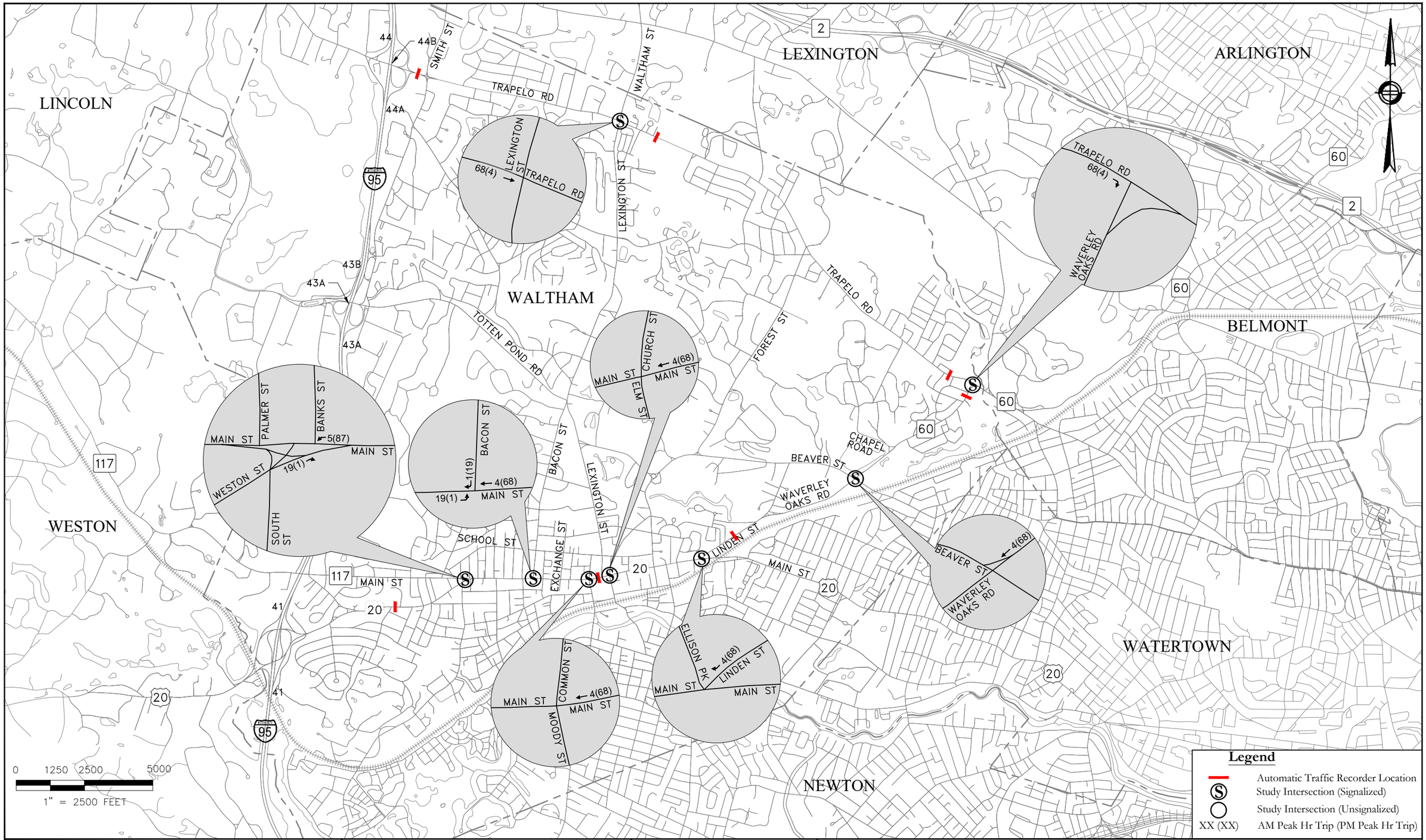

Metropolitan Water Tunnel Program

MWRA Contract No. 7159
Supplemental Draft Environmental Impact Report

in association with CDM Smith, vhb, Jacobs, GREEN INTERNATIONAL AFFILIATES, INC.

Program-Generated Construction Vehicle Trips
Lower Fernald Property Site (Alternative 10A)
Figure 9-5

Waltham, MA

MassGIS 2019

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9.2.2.2 Alternative 10A Traffic Volumes Construction Period Impacts

Lower Fernald Property

- Up to four diesel truck trips per hour were estimated to arrive at and depart from the Lower Fernald Property site during temporary construction period activities.
- The maximum estimated overall number of daily diesel truck trips would be up to 27 trips per day for a maximum duration of one quarter of a year. Actual durations are anticipated to be shorter.
- Up to 64 construction worker trips were conservatively estimated to arrive at the Lower Fernald Property site in the morning peak hour and depart in the evening peak hour for a maximum duration of one quarter a year. Construction worker trips are not expected to occur during the evening peak hour as shift change is usually at approximately 3:00 PM and the evening peak hour generally occurs between 4:00 PM and 6:00 PM.
- The intersections of Trapelo Road at Waverley Oaks Road and Main Street at Ellison Park/Linden Street in Waltham were conservatively estimated to experience an increase in delay of up to 47 seconds in the morning peak hour. Traffic signal re-timing during construction activities could be implemented to minimize the increase in delay at these intersections.
- The intersection of Main Street at Ellison Park/Linden Street in Waltham were conservatively estimated to experience an increase in delay of up to 118 seconds in the evening peak hour if construction worker shift change happened during the peak hour. As stated previously, shift change is expected to occur earlier (approximately 3:00 PM) than the evening peak hour. However, if all construction worker trips were to occur during the evening peak hour, mitigation would be considered to minimize the increase in delay at this intersection.

9.2.2.3 Study Area Roadways Traffic Volume Construction Period Impacts

The vehicle trips estimated at each shaft site were distributed onto the surrounding roadway network based on the anticipated construction vehicle routes. This section describes the maximum net new vehicle trips conservatively estimated to travel through each Study Area intersection in Waltham during the morning and evening peak hours in comparison to the existing volumes. Vehicle trips combine both construction worker trips and diesel truck trips. As shown in **Table 9-6**, Program-related vehicle traffic is estimated to temporarily increase peak 24-hour traffic volumes by approximately 0.1 percent to 2.0 percent on local roadways compared to existing conditions.

Table 9-6 Non-Highway Study Area Roadway Traffic Volumes

Shaft Site	Roadway	From	To	City/Town	AM Peak Hour Trips				PM Peak Hour Trips [1]				24-Hour Volume			
					Existing	Alt 3A	Alt 4A	Alt 10A	Existing	Alt 3A	Alt 4A	Alt 10A	Existing	Alt 3A	Alt 4A	Alt 10A
UMass Property/Lower Fernald Property entering	Trapelo Road	West of	Smith Street	Waltham	1,850	43 (2.4%)	43 (2.4%)	68 (3.8%)	1,650	3 (0.2%)	3 (0.2%)	4 (0.3%)	20,500	51 (0.3%)	51 (0.3%)	82 (0.5%)
UMass Property/Lower Fernald Property entering	Trapelo Road	Old Lexington Road	Bow Street	Waltham	1,200	43 (3.7%)	43 (3.7%)	68 (5.8%)	1,350	3 (0.3%)	3 (0.3%)	4 (0.4%)	14,600	51 (0.4%)	51 (0.4%)	82 (0.6%)
UMass Property/Lower Fernald Property entering	Trapelo Road	Manning Road	Upton Road	Waltham	850	43 (5.2%)	43 (5.2%)	68 (8.2%)	1,050	3 (0.3%)	3 (0.3%)	4 (0.4%)	10,650	51 (0.5%)	51 (0.5%)	82 (0.8%)
UMass Property/Lower Fernald Property entering	Waverly Oaks Road	Shirley Road	Brookfield Road	Waltham	1,000	43 (4.4%)	43 (4.4%)	68 (6.9%)	1,350	3 (0.3%)	3 (0.3%)	4 (0.4%)	13,700	51 (0.4%)	51 (0.4%)	82 (0.7%)
UMass Property/Lower Fernald Property exiting	Linden Street	North of	Middlesex Road	Waltham	650	3 (0.5%)	3 (0.5%)	4 (0.7%)	800	43 (5.5%)	43 (5.5%)	68 (8.7%)	9,400	51 (0.6%)	51 (0.6%)	82 (0.9%)
UMass Property/Lower Fernald Property exiting	Main Street	Linden Street	Weston Street	Waltham	*650*	*3 (0.5%)*	*3 (0.5%)*	*4 (0.7%)*	*800*	*43 (5.5%)*	*43 (5.5%)*	*68 (8.7%)*	*9,400*	*51 (0.6%)*	*51 (0.6%)*	*82 (0.9%)*
School Street	*School Street*	*Exchange Street*	*Spring Street*	*Waltham*	*450*	*20 (4.7%)*	*20 (4.7%)*	*20 (4.7%)*	*650*	*20 (3.2%)*	*20 (3.2%)*	*20 (3.2%)*	*6,950*	*44 (0.7%)*	*44 (0.7%)*	*44 (0.7%)*
School Street	*Bacon Street*	*South of*	*School Street*	*Waltham*	*600*	*20 (3.6%)*	*20 (3.6%)*	*20 (3.6%)*	*700*	*20 (3.0%)*	*20 (3.0%)*	*20 (3.0%)*	*8,650*	*44 (0.6%)*	*44 (0.6%)*	*44 (0.6%)*
UMass Property, Lower Fernald Property, School Street, Cedarwood Pumping Station exiting	*Weston Street*	*South Street*	*Elm Street*	*Waltham*	*900*	*43 (4.9%)*	*43 (4.9%)*	*44 (5.0%)*	*1,050*	*83 (8.3%)*	*83 (8.3%)*	*108 (10.7%)*	*13,250*	*141 (1.1%)*	*141 (1.1%)*	*170 (1.3%)*
Cedarwood Pumping Station	*South Street*	*Morris Street*	*Drew Street*	*Waltham*	*1,050*	*20 (2.0%)*	*20 (2.0%)*	*20 (2.0%)*	*1,000*	*20 (2.1%)*	*20 (2.1%)*	*20 (2.1%)*	*11,800*	*44 (0.4%)*	*44 (0.4%)*	*44 (0.4%)*
Bifurcation, Park Road West	*South Avenue (Route 30)*	*I-95 NB Ramp*	*I-95 SB Ramp*	*Weston*	*2,250*	*83 (3.8%)*	*52 (2.4%)*	*33 (1.5%)*	*1,950*	*146 (7.7%)*	*52 (2.8%)*	*34 (1.8%)*	*22,600*	*406 (1.8%)*	*128 (0.6%)*	*113 (0.6%)*
St. Mary Street Pumping Station	*Central Avenue*	*East of*	*Cedar Street*	*Needham*	*1,050*	*20 (2.0%)*	*20 (2.0%)*	*20 (2.0%)*	*1,050*	*20 (2.0%)*	*20 (2.0%)*	*20 (2.0%)*	*10,850*	*46 (0.5%)*	*46 (0.5%)*	*46 (0.5%)*
Hegarty Pumping Station	*Cedar Street*	*South of*	*Redwing Road*	*Wellesley*	*1,300*	*20 (1.6%)*	*20 (1.6%)*	*20 (1.6%)*	*1,250*	*20 (1.7%)*	*20 (1.7%)*	*20 (1.7%)*	*13,500*	*46 (0.4%)*	*46 (0.4%)*	*46 (0.4%)*
St. Mary Street	*Cedar Street*	*South of*	*Worcester Street*	*Wellesley*	*1,550*	*20 (1.4%)*	*20 (1.4%)*	*20 (1.4%)*	*1,450*	*20 (1.5%)*	*20 (1.5%)*	*20 (1.5%)*	*15,600*	*46 (0.3%)*	*46 (0.3%)*	*46 (0.3%)*
Hegarty Pumping Station, St. Mary Street Pumping Station	*Newton Street*	*North of*	*Grove Street*	*Brookline*	*850*	*40 (4.9%)*	*40 (4.9%)*	*40 (4.9%)*	*1,350*	*40 (3.1%)*	*40 (3.1%)*	*40 (3.1%)*	*12,850*	*92 (0.8%)*	*92 (0.8%)*	*92 (0.8%)*
Newton Street Pumping Station	*Clyde Street*	*Whitney Street*	*Larkin Street*	*Brookline*	*1,600*	*20 (1.3%)*	*20 (1.3%)*	*20 (1.3%)*	*1,750*	*20 (1.2%)*	*20 (1.2%)*	*20 (1.2%)*	*16,750*	*46 (0.3%)*	*46 (0.3%)*	*46 (0.3%)*
Newton Street Pumping Station	*Lee Street*	*South of*	*Boylston Street*	*Brookline*	*1,400*	*20 (1.5%)*	*20 (1.5%)*	*20 (1.5%)*	*1,350*	*20 (1.5%)*	*20 (1.5%)*	*20 (1.5%)*	*15,500*	*46 (0.3%)*	*46 (0.3%)*	*46 (0.3%)*
Newton Street Pumping Station	*Worcester Street (Route 9)*	*Harris Avenue*	*Minuteman Lane*	*Wellesley*	*3,750*	*20 (0.6%)*	*20 (0.6%)*	*20 (0.6%)*	*3,650*	*20 (0.6%)*	*20 (0.6%)*	*20 (0.6%)*	*47,100*	*46 (0.1%)*	*46 (0.1%)*	*46 (0.1%)*
Newton Street Pumping Station	*Boylston Street (Route 9)*	*East of*	*Hickory Cliff Road*	*Newton*	*3,950*	*20 (0.6%)*	*20 (0.6%)*	*20 (0.6%)*	*3,900*	*20 (0.6%)*	*20 (0.6%)*	*20 (0.6%)*	*56,500*	*46 (0.1%)*	*46 (0.1%)*	*46 (0.1%)*
Newton Street Pumping Station	*Boylston Street (Route 9)*	*West of*	*Langley Road*	*Newton*	*4,400*	*20 (0.5%)*	*20 (0.5%)*	*20 (0.5%)*	*3,800*	*20 (0.6%)*	*20 (0.6%)*	*20 (0.6%)*	*57,050*	*46 (0.1%)*	*46 (0.1%)*	*46 (0.1%)*

Table 9-6 Non-Highway Study Area Roadway Traffic Volumes

Shaft Site	Roadway	From	To	City/Town	AM Peak Hour Trips				PM Peak Hour Trips [1]				24-Hour Volume			
					Existing	Alt 3A	Alt 4A	Alt 10A	Existing	Alt 3A	Alt 4A	Alt 10A	Existing	Alt 3A	Alt 4A	Alt 10A
Newton Street Pumping Station	*Boylston Street (Route 9)*	*West of*	*Norfolk Road*	*Newton*	*2,900*	*20 (0.7%)*	*20 (0.7%)*	*20 (0.7%)*	*2,750*	*20 (0.8%)*	*20 (0.8%)*	*20 (0.8%)*	*40,000*	*46 (0.2%)*	*46 (0.2%)*	*46 (0.2%)*
Southern Spine Mains	*Arborway*	*South of*	*Centre Street*	*Boston*	*2,400*	*20 (0.9%)*	*20 (0.9%)*	*20 (0.9%)*	*2,500*	*20 (0.9%)*	*20 (0.9%)*	*20 (0.9%)*	*32,800*	*46 (0.2%)*	*46 (0.2%)*	*46 (0.2%)*
Southern Spine Mains	*Arborway*	*West of*	*Forest Hills Street*	*Boston*	*2,600*	*20 (0.8%)*	*20 (0.8%)*	*20 (0.8%)*	*2,700*	*20 (0.8%)*	*20 (0.8%)*	*20 (0.8%)*	*36,000*	*46 (0.2%)*	*46 (0.2%)*	*46 (0.2%)*
Southern Spine Mains	*Morton Street*	*West of*	*Canterbury Street*	*Boston*	*2,900*	*20 (0.7%)*	*20 (0.7%)*	*20 (0.7%)*	*2,750*	*20 (0.8%)*	*20 (0.8%)*	*20 (0.8%)*	*35,700*	*46 (0.2%)*	*46 (0.2%)*	*46 (0.2%)*
American Legion, Southern Spine Mains	*Morton Street*	*West of*	*West Main Street*	*Boston*	*2,650*	*72 (2.8%)*	*70 (2.7%)*	*72 (2.8%)*	*2,400*	*120 (5.1%)*	*106 (4.5%)*	*108 (4.6%)*	*32,700*	*334 (1.1%)*	*304 (1.0%)*	*318 (1.0%)*
American Legion, Southern Spine Mains	*Morton Street*	*East of*	*Norfolk Street*	*Boston*	*1,800*	*72 (4.1%)*	*70 (4.0%)*	*72 (4.1%)*	*2,000*	*120 (6.1%)*	*106 (5.4%)*	*108 (5.5%)*	*27,150*	*334 (1.3%)*	*304 (1.2%)*	*318 (1.2%)*
American Legion, Southern Spine Mains	*Gallivan Boulevard*	*Vera Street*	*Milton Street*	*Boston*	*1,150*	*72 (6.5%)*	*70 (6.3%)*	*72 (6.5%)*	*1,250*	*120 (9.8%)*	*106 (8.6%)*	*108 (8.8%)*	*17,050*	*334 (2.0%)*	*304 (1.8%)*	*318 (1.9%)*
American Legion, Southern Spine Mains	*Gallivan Boulevard*	*Rangeley Street*	*Carruth Street*	*Boston*	*1,550*	*72 (4.8%)*	*70 (4.6%)*	*72 (4.8%)*	*1,600*	*120 (7.6%)*	*106 (6.8%)*	*108 (6.9%)*	*23,800*	*334 (1.5%)*	*304 (1.3%)*	*318 (1.4%)*
American Legion, Southern Spine Mains	*Gallivan Boulevard*	*East of*	*Clover Street*	*Boston*	*2,850*	*72 (2.6%)*	*70 (2.5%)*	*72 (2.6%)*	*3,450*	*120 (3.5%)*	*106 (3.1%)*	*108 (3.2%)*	*48,900*	*334 (0.7%)*	*304 (0.6%)*	*318 (0.7%)*

Existing traffic volumes are rounded up to the nearest 50 trips.

1 Evening peak hour trips are a conservative estimate since construction worker trips are not anticipated to occur in the evening peak hour as shift change is usually at approximately 3:00 PM and the evening peak hour generally occurs between 4:00 PM and 6:00 PM.

Italicized text within the table indicates no change from the DEIR.

9.2.2.4 Study Area Intersections Construction Period Impacts

The vehicle trips estimated at each Program site were distributed onto the surrounding roadway network based on the anticipated construction vehicle routes. Vehicle trips combine both construction worker trips and diesel truck trips. The TIA provided in **SDEIR Appendix F.1** describes the net new vehicle trips conservatively estimated to travel through each Study Area intersection in each municipality during the morning and evening peak hours. These updated Program-generated vehicle trips are summarized in **Figure 9-4** and **Figure 9-5.**

The Study Area intersections were examined with regard to flow rates, capacity, and delay characteristics to determine the Level of Service (LOS) using the methodology defined in the Highway Capacity Manual[3] for the existing and future (No-Build and Build) traffic conditions. The LOS is an indicator of operating conditions that occur on a given roadway feature while accommodating varying levels of traffic volumes. It is a qualitative measure that accounts for a number of operational factors, including roadway geometry, speed, traffic composition, peak hour factors, travel delay, freedom to maneuver, and driver expectation. When all of these measures are assessed, and an LOS is assigned to a roadway or intersection, it is equivalent to presenting an "index" to the operational qualities of the section under study. The LOS is classified into six levels that are designated 'A' through 'F' based on the control delay ranges they fall under. Additionally, a movement with a volume-to-capacity (v/c) ratio of more than 1.00 also has a LOS of 'F', regardless of delay. These are presented in **Table 9-7** for signalized and unsignalized intersections.

Table 9-7 Level of Service Criteria at Unsignalized and Signalized Intersections

Level of Service (LOS)	Unsignalized Intersection Control Delay (Seconds) per Vehicle	Signalized Intersection Control Delay (Seconds) per Vehicle
A	≤10	≤10
B	>10 and ≤15	>10 and ≤20
C	>15 and ≤25	>20 and ≤35
D	>25 and ≤35	>35 and ≤55
E	>35 and ≤50	>55 and ≤80
F	>50 or v/c ≥1.00	>80 or v/c ≥1.00

v/c = Volume-to-Capacity Ratio

Source: Transportation Research Board, National Academies of Sciences, Engineering, and Medicine, Highway Capacity Manual 7th Edition, Washington, D.C., 2022.

Table 9-8 and **Table 9-9** summarize the Study Area intersection operational analyses for Existing, No-Build, and Temporary Construction conditions during the morning and evening peak hours at the intersections near the two new alternative sites considered for the northern terminus of the North Tunnel, Segment 1, in place of the DEIR Fernald Property site. Detailed analysis results (including delay times and volume-to-capacity ratios) for the intersections surrounding the two new alternative sites are provided in

3 Transportation Research Board, National Academies of Sciences, Engineering, and Medicine, *Highway Capacity Manual 7th Edition*, Washington, D.C., 2022.

SDEIR Appendix F.2. The intersection operational analysis results for all other Program sites remain the same as previously provided in **DEIR Appendix F.3**.

The No-Build condition projects traffic volumes into the future construction year using a background growth rate but assumes the Program will not take place and no additional trips are added. Build (i.e., final) conditions assume that construction will take place. This methodology conforms with the MassDOT TIA Guidelines.[4]

Table 9-8 Study Area Intersection Operational Analysis: Morning Peak Hour

Study Area Intersection	Existing LOS	No-Build LOS	Alternative 3A/4A LOS	Alternative 10A LOS
Trapelo Road at Lexington Street (Waltham)				
Trapelo Rd. EB L	D	D	D	D
Trapelo Rd. EB T	C	C	C	C
Lexington St. WB L	D	D	D	D
Lexington St. WB T	D	D	D	D
Trapelo Rd. WB R	C	C	C	C
Trapelo Rd. NB L	D	D	D	D
Trapelo Rd. NB T	D	D	D	D
Lexington St. SB L	D	D	D	D
Lexington St. SB T	C	C	C	C
Overall Intersection	**D**	**D**	**D**	**D**
Trapelo Road at Waverley Oaks Road (Waltham)				
Trapelo Rd. EB T	C	C	D	E
Trapelo Rd. WB L	F	F	F	F
Trapelo Rd. WB T	A	A	A	A
Waverley Oaks Rd. NB L	C	C	C	C
Overall Intersection	**F**	**F**	**F**	**F**

4 Massachusetts Department of Transportation, *Transportation Impact Assessment (TIA) Guidelines*, updated September 21, 2017, https://www.mass.gov/doc/transportation-impact-assessment-guidelines (accessed May 2, 2023).

Table 9-8 Study Area Intersection Operational Analysis: Morning Peak Hour

Study Area Intersection	Existing LOS	No-Build LOS	Alternative 3A/4A LOS	Alternative 10A LOS
Beaver Street at Waverley Oaks Road (Waltham)				
Beaver St. EB L	E	E	E	E
Beaver St. EB T	C	C	C	C
Beaver St. WB L	D	D	D	D
Beaver St. WB T	C	C	C	C
Waverley Oaks Rd. NB L	D	D	D	D
Waverley Oaks Rd. NB T	C	C	C	C
Waverley Oaks Rd. NB R	C	C	C	C
Waverley Oaks Rd. SB L	D	D	D	D
Waverley Oaks Rd. SB T	C	C	C	C
Waverley Oaks Rd. SB R	B	B	B	B
Overall Intersection	**C**	**C**	**C**	**C**
Main Street at Ellison Park/Linden Street (Waltham)				
Main St. EB L	F	F	F	F
Main St. EB T	E	E	E	E
Main St. WB T	D	E	E	E
Linden St. NB T	C	C	C	C
Main St. SB L	B	B	B	B
Main St. SB T	B	B	B	B
Main St. SB L	D	D	D	D
Main St. SB R	F	F	F	F
Overall Intersection	**F**	**F**	**F**	**F**
Main Street at Elm Street (Waltham)				
Main St. EB L	A	A	A	A
Main St. EB T	B	B	B	B
Main St. EB R	F	F	F	F
Main St. WB L	A	A	A	A
Main St. WB T	B	B	B	B
Elm St. NB T	D	D	D	D
Overall Intersection	**C**	**D**	**D**	**D**

Table 9-8 Study Area Intersection Operational Analysis: Morning Peak Hour

Study Area Intersection	Existing LOS	No-Build LOS	Alternative 3A/4A LOS	Alternative 10A LOS
Main Street at Moody Street (Waltham)				
Main St. EB T	B	B	B	B
Main St. EB R	B	B	B	B
Main St. WB L	F	F	F	F
Main St. WB TR	B	B	B	B
Moody St. NB L	B	B	B	B
Moody St. NB T	B	B	B	B
Moody St. NB R	C	C	C	C
Overall Intersection	**E**	**E**	**E**	**E**
Main Street at Bacon Street (Waltham)				
Main St. EB L	C	C	C	C
Main St. EB T	F	F	F	F
Main St. WB T	C	C	C	C
Main St. NB T	F	F	F	F
Bacon St. SB L	D	D	D	D
Bacon St. SB T	F	F	F	F
Bacon St. SB R	F	F	F	F
Overall Intersection	**F**	**F**	**F**	**F**
Main Street at Weston Street/ South Street (Waltham)				
Main St. EB T	B	B	B	B
Weston St. WB L	B	B	B	B
Weston St. WB T	C	C	C	C
Main St. NE L	A	A	A	A
Main St. NE R	A	A	A	A
Overall Intersection	**B**	**B**	**B**	**B**
Shakespeare Road at South Street (Waltham) [Unsignalized Intersection]				
South St. NEB LTR	*A*	*A*	*A*	*A*
Pump Station Driveway NB LTR	*D*	*D*	*D*	*D*
South St. SWB LTR	*A*	*A*	*A*	*A*
Shakespeare Rd. SB LTR	*D*	*E*	*E*	*E*

Table 9-8 Study Area Intersection Operational Analysis: Morning Peak Hour

Study Area Intersection	Existing LOS	No-Build LOS	Alternative 3A/4A LOS	Alternative 10A LOS
River Road at South Avenue (Weston)				
South Ave. NEB L	*F*	*F*	*F*	*F*
South Ave. NEB T	*B*	*B*	*B*	*B*
I-95 S Exit 39A off-ramp LT	*D*	*D*	*F*	*D*
I-95 S Exit 39A off-ramp R	*B*	*B*	*B*	*B*
South Ave. WB L	*F*	*F*	*F*	*F*
South Ave. WB T	*B*	*B*	*F*	*B*
River Rd. SB L	*C*	*C*	*C*	*C*
River Rd. SB T	*C*	*C*	*C*	*C*
River Rd. SB R	*A*	*A*	*A*	*A*
Overall Intersection	***D***	***D***	***E***	***D***
I-95 N Off Ramp at South Avenue/Commonwealth Ave (Weston)				
South Ave. EB T	*B*	*A*	*B*	*B*
I-95 N off-ramp L	*C*	*B*	*E*	*D*
I-95 N off-ramp R	*B*	*B*	*B*	*B*
Commonwealth Ave. WB T	*B*	*C*	*B*	*C*
Commonwealth Ave. WB TR	*C*	*C*	*C*	*C*
Overall Intersection	***A***	***B***	***C***	***B***
Park Road at South Avenue (Weston)				
South Ave. EB T	*D*	*D*	*D*	*D*
South Ave. EB R	*A*	*A*	*A*	*A*
Park Rd. NB L	*D*	*D*	*D*	*D*
Park Rd. NB LR	*D*	*D*	*D*	*D*
South Ave. WB L	*E*	*E*	*E*	*E*
South Ave. WB T	*C*	*C*	*C*	*C*
Overall Intersection	***C***	***C***	***C***	***C***
Central Avenue at Cedar Street (Needham) [Unsignalized Intersection]				
Central Ave. EB L	*A*	*A*	*A*	*A*
Central Ave. WB L	*A*	*A*	*A*	*A*
Cedar St. SB LTR	*F*	*F*	*F*	*F*

Table 9-8 Study Area Intersection Operational Analysis: Morning Peak Hour

Study Area Intersection	Existing LOS	No-Build LOS	Alternative 3A/4A LOS	Alternative 10A LOS
Worcester Street at Cedar Street (Wellesley)				
Worcester St. EB L	*D*	*D*	*D*	*D*
Worcester St. EB T	*D*	*D*	*D*	*D*
Cedar St. NB L	*A*	*A*	*A*	*A*
Cedar St. NB T	*C*	*C*	*C*	*C*
Worcester St. WB LTR	*C*	*C*	*C*	*C*
Cedar St. SB L	*A*	*A*	*A*	*A*
Cedar St. SB T	*A*	*A*	*A*	*A*
Overall Intersection	***C***	***C***	***C***	***C***
Route 9 at Woodward Street/Elliot Street (Newton)				
Route 9 EB L	*F*	*F*	*F*	*F*
Route 9 EB T	*F*	*F*	*F*	*F*
Elliot St. NB L	*C*	*C*	*C*	*C*
Elliot St. NB T	*D*	*D*	*D*	*D*
Route 9 WB L	*F*	*F*	*F*	*F*
Route 9 WB T	*F*	*F*	*F*	*F*
Woodward St. SB L	*F*	*F*	*F*	*F*
Overall Intersection	***F***	***F***	***F***	***F***
Grove Street at Newton Street (Brookline)				
Newton St. EB L	*D*	*D*	*D*	*D*
Newton St. EB R	*B*	*B*	*B*	*B*
Grove St. NB T	*B*	*C*	*C*	*C*
Newton St. SB T	*A*	*B*	*B*	*B*
Newton St SB R	*A*	*A*	*A*	*A*
Overall Intersection	***B***	***B***	***B***	***B***
Newton Street at Clyde Street (Brookline)				
Newton St. EB L	*F*	*F*	*F*	*F*
Newton St. EB T	*F*	*F*	*F*	*F*
Newton St. WB T	*E*	*E*	*E*	*E*
Clyde St. SB L	*D*	*D*	*D*	*D*
Clyde St. SB R	*A*	*A*	*A*	*A*
Overall Intersection	***E***	***F***	***F***	***F***

Table 9-8 Study Area Intersection Operational Analysis: Morning Peak Hour

Study Area Intersection	Existing LOS	No-Build LOS	Alternative 3A/4A LOS	Alternative 10A LOS
Warren Street at Lee Street (Brookline)				
Lee St. NEB L	*A*	*A*	*A*	*A*
Lee St. NEB R	*A*	*A*	*A*	*A*
Warren St. WB LR	*F*	*F*	*F*	*F*
Lee St. SB L	*A*	*A*	*A*	*A*
Lee St. SB R	*A*	*A*	*A*	*A*
Overall Intersection	***D***	***D***	***D***	***D***
Lee Street at Route 9 (Brookline)				
Route 9 EB T	*C*	*D*	*D*	*D*
Route 9 EB R	*A*	*A*	*A*	*A*
Lee St. NB L	*D*	*D*	*D*	*D*
Route 9 WB L	*F*	*F*	*F*	*F*
Route 9 WB T	*D*	*E*	*E*	*E*
Overall Intersection	***D***	***D***	***D***	***D***
Chestnut Hill Avenue at Route 9 (Brookline)				
Route 9 EB L	*F*	*F*	*F*	*F*
Route 9 EB T	*C*	*C*	*C*	*C*
Route 9 WB L	*D*	*D*	*D*	*D*
Route 9 WB T	*E*	*E*	*E*	*E*
Route 9 WB R	*A*	*A*	*A*	*A*
Chestnut Hill Ave. SB L	*F*	*F*	*F*	*F*
Chestnut Hill Ave. SB R	*A*	*A*	*A*	*A*
Overall Intersection	***D***	***D***	***D***	***D***
Hammond Street at Route 9 (Brookline)				
Route 9 EB L	*F*	*F*	*F*	*F*
Route 9 EB T	*E*	*E*	*E*	*E*
Hammond St. NB T	*F*	*F*	*F*	*F*
Route 9 WB L	*F*	*F*	*F*	*F*
Route 9 WB T	*F*	*F*	*F*	*F*
Route 9 WB R	*A*	*A*	*A*	*A*
Hammond St. SB L	*F*	*F*	*F*	*F*
Hammond St. SB T	*D*	*D*	*D*	*D*
Overall Intersection	***F***	***F***	***F***	***F***

Table 9-8 Study Area Intersection Operational Analysis: Morning Peak Hour

Study Area Intersection	Existing LOS	No-Build LOS	Alternative 3A/4A LOS	Alternative 10A LOS
Canterbury Lane at Morton Street (Boston)				
Canterbury Ln. EB LR	*C*	*C*	*C*	*C*
Morton St. NB L	*A*	*A*	*A*	*A*
Morton St. NB T	*B*	*B*	*B*	*B*
Morton St. SB T	*A*	*A*	*A*	*A*
Overall Intersection	***A***	***A***	***A***	***A***
Morton Street at Harvard Street (Boston)				
Harvard St. EB L	*F*	*F*	*F*	*F*
Harvard St. EB T	*C*	*C*	*C*	*C*
Morton St. NB L	*E*	*E*	*E*	*E*
Morton St. NB T	*E*	*E*	*E*	*E*
Harvard St. WB L	*D*	*D*	*D*	*D*
Harvard St. WB T	*F*	*F*	*F*	*F*
Morton St. SB L	*F*	*F*	*F*	*F*
Morton St. SB T	*C*	*C*	*C*	*C*
Overall Intersection	***F***	***F***	***F***	***F***
Morton Street at Blue Hill Avenue (Boston)				
Morton St. EB T	*C*	*C*	*C*	*C*
Morton St. EB R	*A*	*A*	*A*	*A*
Blue Hill Ave. NB L	*E*	*E*	*E*	*E*
Blue Hill Ave. NB T	*D*	*D*	*D*	*D*
Morton St. WB T	*D*	*D*	*D*	*D*
Blue Hill Ave. SB L	*F*	*F*	*F*	*F*
Blue Hill Ave. SB T	*D*	*D*	*D*	*D*
Overall Intersection	***E***	***E***	***E***	***E***
Morton Street at Norfolk Street (Boston)				
Morton St. EB L	*D*	*D*	*D*	*D*
Morton St. EB T	*D*	*E*	*E*	*E*
Norfolk St. NB T	*C*	*C*	*C*	*C*
Norfolk St. NB R	*A*	*A*	*A*	*A*
Morton St. WB L	*D*	*D*	*D*	*D*
Morton St. WB T	*D*	*F*	*F*	*F*
Norfolk St. SB LTR	*C*	*C*	*C*	*C*
Overall Intersection	***D***	***D***	***E***	***E***

Table 9-8 Study Area Intersection Operational Analysis: Morning Peak Hour

Study Area Intersection	Existing LOS	No-Build LOS	Alternative 3A/4A LOS	Alternative 10A LOS
Morton Street at Corbet Street (Boston)				
Morton St. EB L	*C*	*C*	*C*	*C*
Morton St. EB T	*C*	*C*	*C*	*C*
W. Selden St. NB LTR	*C*	*C*	*C*	*C*
Morton St. WB L	*D*	*C*	*D*	*C*
Morton St. WB T	*C*	*D*	*C*	*D*
Corbet St. SB LTR	*C*	*C*	*C*	*C*
Overall Intersection	***C***	***C***	***C***	***C***
Morton Street at Woodmere Street/Gallivan Boulevard (Boston)				
Morton St. SEB L	*C*	*B*	*B*	*B*
Morton St. SEB T	*C*	*C*	*C*	*C*
Woodmere St. NEB LTR	*A*	*A*	*A*	*A*
Morton St. NWB LT	*B*	*B*	*B*	*B*
Gallivan Blvd. WB T	*A*	*A*	*A*	*A*
Overall Intersection	***B***	***B***	***B***	***B***
Gallivan Boulevard at Washington Street (Boston)				
Gallivan Blvd. EB LT	*B*	*B*	*B*	*B*
Gallivan Blvd. EB R	*A*	*A*	*A*	*A*
Washington St. NB LTR	*B*	*B*	*B*	*B*
Gallivan Blvd. WB LTR	*B*	*B*	*B*	*B*
Washington St. SB LTR	*C*	*C*	*C*	*C*
Overall Intersection	***B***	***B***	***B***	***B***
Gallivan Boulevard at Dorchester Avenue (Boston)				
Gallivan Blvd. EB T	*B*	*B*	*B*	*B*
Dorchester Ave. NB LTR	*C*	*C*	*C*	*C*
Gallivan Blvd. WB T	*B*	*B*	*B*	*B*
Dorchester Ave. SB LTR	*C*	*C*	*C*	*C*
Overall Intersection	***B***	***B***	***B***	***B***

Table 9-8 Study Area Intersection Operational Analysis: Morning Peak Hour

Study Area Intersection	Existing LOS	No-Build LOS	Alternative 3A/4A LOS	Alternative 10A LOS
Gallivan Boulevard at Granite Avenue/Adams Street (Boston)				
Gallivan Blvd. EB L	*C*	*C*	*C*	*C*
Gallivan Blvd. EB T	*D*	*D*	*D*	*D*
Granite Ave. NB L	*C*	*C*	*C*	*C*
Granite Ave. NB TR	*D*	*D*	*D*	*D*
Gallivan Blvd. WB L	*F*	*F*	*F*	*F*
Gallivan Blvd. WB T	*C*	*D*	*D*	*D*
Adams St. SB L	*C*	*B*	*C*	*C*
Adams St. SB T	*D*	*D*	*D*	*D*
Adams St. SB R	*A*	*A*	*A*	*A*
Overall Intersection	***C***	***D***	***D***	***D***
Gallivan Boulevard at Hallet Street (Boston)				
Gallivan Blvd. EB T	*C*	*C*	*C*	*C*
Hallet St. NB L	*D*	*D*	*D*	*D*
Hallet St. NB R	*D*	*D*	*D*	*D*
Gallivan Blvd. WB T	*B*	*B*	*B*	*B*
Hallet St. SB L	*C*	*C*	*C*	*C*
Hallet St. SB T	*B*	*B*	*B*	*B*
Overall Intersection	***C***	***C***	***C***	***C***
Gallivan Boulevard at Neponset Avenue (Boston)				
Neponset Ave. EB L	*B*	*B*	*B*	*B*
Neponset Ave. EB T	*B*	*B*	*B*	*B*
Gallivan Blvd. NB T	*A*	*A*	*A*	*A*
Gallivan Blvd. NB R	*A*	*A*	*A*	*A*
Overall Intersection	***B***	***B***	***B***	***B***
Neponset Avenue at Morrissey Boulevard (Boston)				
Neponset Ave. EB T	*A*	*A*	*A*	*A*
Morrissey Blvd. SB L	*A*	*A*	*B*	*B*
Morrissey Blvd. SB T	*A*	*A*	*A*	*A*
Morrissey Blvd. SB R	*A*	*A*	*A*	*A*
Overall Intersection	***A***	***A***	***A***	***A***

Table 9-8 Study Area Intersection Operational Analysis: Morning Peak Hour

Study Area Intersection	Existing LOS	No-Build LOS	Alternative 3A/4A LOS	Alternative 10A LOS
South Street at Washington Street (Boston)				
South St. EB L	*E*	*E*	*E*	*E*
Washington St. NB T	*B*	*B*	*B*	*B*
South St. SB T	*B*	*B*	*B*	*B*
Overall Intersection	***C***	***C***	***C***	***C***
South Street at Arborway/New Washington Street (Boston)				
Arborway EB T	*B*	*B*	*B*	*B*
Arborway EB R	*A*	*A*	*A*	*A*
South St. NB L	*D*	*E*	*E*	*E*
South St. NB T	*D*	*D*	*D*	*D*
New Washington St. WB T	*C*	*C*	*C*	*C*
South St. SB L	*F*	*F*	*F*	*F*
South St. SB T	*D*	*D*	*D*	*D*
Overall Intersection	***C***	***C***	***C***	***C***
Washington Street at Arborway (Boston)				
New Washington St. EB T	*D*	*D*	*D*	*D*
Washington St. NB L	*D*	*D*	*D*	*D*
Washington St. NB TR	*D*	*D*	*D*	*D*
Arborway WB L	*F*	*F*	*F*	*F*
Arborway WB T	*B*	*B*	*B*	*B*
Washington St. SB L	*D*	*E*	*E*	*E*
Washington St. SB TR	*D*	*D*	*D*	*D*
Overall Intersection	***D***	***D***	***D***	***D***
Arborway at Morton Street/Circuit Drive (Boston)				
Arborway EB L	*E*	*E*	*E*	*E*
Arborway EB T	*B*	*B*	*B*	*B*
Morton St. NB T	*D*	*D*	*D*	*D*
Morton St. WB L	*E*	*E*	*E*	*E*
Morton St. WB T	*C*	*C*	*C*	*C*
Circuit Dr. SB T	*D*	*D*	*D*	*D*
Overall Intersection	***D***	***D***	***D***	***D***

Abbreviations:
EB = Eastbound *NB = Northbound* *L = Left* *R = Right*
WB = Westbound *SB = Southbound* *T = Through* *LOS = Level of Service*
Italicized text within the table indicates no change from the DEIR.

Table 9-9 Study Area Intersection Operational Analysis Results: Evening Peak Hour

Study Area Intersection	Existing LOS	No-Build LOS	Alternative 3A/4A LOS	Alternative 10A LOS
Trapelo Road at Lexington Street (Waltham)				
Trapelo Rd. EB L	D	D	D	D
Trapelo Rd. EB T	C	C	C	C
Lexington St. WB L	E	E	E	E
Lexington St. WB T	D	D	D	D
Trapelo Rd. WB R	C	C	C	C
Trapelo Rd. NB L	D	E	E	E
Trapelo Rd. NB T	D	D	D	D
Lexington St. SB L	D	D	D	D
Lexington St. SB T	D	D	D	D
Overall Intersection	**D**	**D**	**D**	**D**
Trapelo Road at Waverley Oaks Road (Waltham)				
Trapelo Rd. EB T	C	C	C	C
Trapelo Rd. WB L	F	F	F	F
Trapelo Rd. WB T	A	A	A	A
Waverley Oaks Rd. NB L	F	F	F	F
Overall Intersection	**F**	**F**	**F**	**F**
Beaver Street at Waverley Oaks Road (Waltham)				
Beaver St. EB L	E	F	F	F
Beaver St. EB T	C	C	C	C
Beaver St. WB L	D	D	D	D
Beaver St. WB T	C	C	C	C
Waverley Oaks Rd. NB L	D	D	D	D
Waverley Oaks Rd. NB T	D	D	D	D
Waverley Oaks Rd. NB R	C	C	C	C
Waverley Oaks Rd. SB L	D	D	D	D
Waverley Oaks Rd. SB T	C	C	C	C
Waverley Oaks Rd. SB R	C	C	C	C
Overall Intersection	**C**	**C**	**C**	**C**

Table 9-9 Study Area Intersection Operational Analysis Results: Evening Peak Hour

Study Area Intersection	Existing LOS	No-Build LOS	Alternative 3A/4A LOS	Alternative 10A LOS
Main Street at Ellison Park/Linden Street (Waltham)				
Main St. EB L	F	F	F	F
Main St. EB T	D	D	D	D
Main St. WB T	D	D	D	D
Linden St. NB T	C	C	C	C
Main St. SB L	C	C	C	C
Main St. SB T	C	C	C	C
Main St. SB L	C	C	C	C
Main St. SB R	F	F	F	F
Overall Intersection	**F**	**F**	**F**	**F**
Main Street at Elm Street (Waltham)				
Main St. EB L	A	A	A	A
Main St. EB T	B	B	B	B
Main St. EB R	D	D	D	D
Main St. WB L	A	A	A	A
Main St. WB T	B	B	B	B
Elm St. NB T	D	D	D	D
Overall Intersection	**C**	**C**	**C**	**C**
Main Street at Moody Street (Waltham)				
Main St. EB T	B	B	B	B
Main St. EB R	B	B	B	B
Main St. WB L	F	F	F	F
Main St. WB TR	B	B	B	C
Moody St. NB L	B	B	B	B
Moody St. NB T	B	B	B	B
Moody St. NB R	C	C	C	C
Overall Intersection	**F**	**F**	**F**	**F**
Main Street at Bacon Street (Waltham)				
Main St. EB L	A	A	A	A
Main St. EB T	C	C	C	C
Main St. WB T	A	A	B	B
Main St. NB T	A	A	A	A
Bacon St. SB L	C	C	C	C
Bacon St. SB T	F	F	F	F
Bacon St. SB R	B	B	B	B
Overall Intersection	**F**	**F**	**F**	**F**

Table 9-9 Study Area Intersection Operational Analysis Results: Evening Peak Hour

Study Area Intersection	Existing LOS	No-Build LOS	Alternative 3A/4A LOS	Alternative 10A LOS
Main Street at Weston Street/South Street (Waltham)				
Main St. EB T	D	D	D	D
Weston St. WB L	A	A	A	A
Weston St. WB T	E	E	E	E
Main St. NE L	A	A	A	A
Main St. NE R	A	A	A	A
Overall Intersection	**C**	**C**	**C**	**C**
Shakespeare Road at South Street (Waltham) [Unsignalized Intersection]				
South St. NEB LTR	*A*	*A*	*A*	*A*
Pump Station Driveway NB LTR	*C*	*C*	*C*	*C*
South St. SWB LTR	*A*	*A*	*A*	*A*
Shakespeare Rd. SB LTR	*D*	*D*	*E*	*E*
River Road at South Avenue (Weston)				
South Ave. NEB L	D	D	D	D
South Ave. NEB T	B	B	B	B
I-95 S Exit 39A off-ramp LT	F	F	F	F
I-95 S Exit 39A off-ramp R	A	A	A	A
South Ave. WB L	F	F	F	F
South Ave. WB T	A	A	A	A
River Rd. SB L	F	F	F	F
River Rd. SB T	F	F	F	F
River Rd. SB R	A	A	A	A
Overall Intersection	***D***	***D***	***E***	***D***
I-95 N Off Ramp at South Avenue/Commonwealth Ave (Weston)				
South Ave. EB T	*C*	*A*	*C*	*B*
I-95 N off-ramp L	*B*	*B*	*B*	*B*
I-95 N off-ramp R	*A*	*B*	*A*	*B*
Commonwealth Ave. WB T	*C*	*C*	*C*	*C*
Overall Intersection	***B***	***B***	***C***	***B***
Park Road at South Avenue (Weston)				
South Ave. EB T	*C*	*C*	*C*	*C*
South Ave. EB R	*A*	*A*	*A*	*A*
Park Rd. NB L	*C*	*C*	*C*	*C*
Park Rd. NB LR	*B*	*B*	*B*	*B*
South Ave. WB L	*C*	*C*	*D*	*C*
South Ave. WB T	*F*	*F*	*F*	*F*
Overall Intersection	***D***	***D***	***D***	***D***

Table 9-9 Study Area Intersection Operational Analysis Results: Evening Peak Hour

Study Area Intersection	Existing LOS	No-Build LOS	Alternative 3A/4A LOS	Alternative 10A LOS
Central Avenue at Cedar Street (Needham) [Unsignalized Intersection]				
Central Ave. EB L	*A*	*A*	*A*	*A*
Central Ave. WB L	*A*	*A*	*A*	*A*
Cedar St. SB LTR	*F*	*F*	*F*	*F*
Worcester Street at Cedar Street (Wellesley)				
Worcester St. EB L	*C*	*C*	*C*	*C*
Worcester St. EB T	*C*	*C*	*C*	*C*
Cedar St. NB L	*B*	*B*	*B*	*B*
Cedar St. NB T	*C*	*C*	*C*	*C*
Worcester St. WB LTR	*C*	*C*	*C*	*C*
Cedar St. SB L	*A*	*A*	*A*	*A*
Cedar St. SB T	*B*	*B*	*B*	*B*
Overall Intersection	***C***	***C***	***C***	***C***
Route 9 at Woodward Street/Elliot Street (Newton)				
Route 9 EB L	*F*	*F*	*F*	*F*
Route 9 EB T	*E*	*E*	*E*	*E*
Elliot St. NB L	*D*	*D*	*D*	*D*
Elliot St. NB T	*D*	*D*	*D*	*D*
Route 9 WB L	*F*	*F*	*F*	*F*
Route 9 WB T	*E*	*E*	*E*	*E*
Woodward St. SB L	*F*	*F*	*F*	*F*
Overall Intersection	***E***	***E***	***E***	***E***
Grove Street at Newton Street (Brookline)				
Newton St. EB L	*D*	*D*	*D*	*D*
Newton St. EB R	*A*	*A*	*A*	*A*
Grove St. NB T	*C*	*D*	*D*	*D*
Newton St. SB T	*F*	*F*	*F*	*F*
Newton St. SB R	*A*	*A*	*A*	*A*
Overall Intersection	***F***	***F***	***F***	***F***
Newton Street at Clyde Street (Brookline)				
Newton St. EB L	*F*	*F*	*F*	*F*
Newton St. EB T	*F*	*F*	*F*	*F*
Newton St. WB T	*D*	*D*	*D*	*D*
Clyde St. SB L	*C*	*C*	*C*	*C*
Clyde St. SB R	*B*	*B*	*B*	*B*
Overall Intersection	***F***	***F***	***F***	***F***

Table 9-9 Study Area Intersection Operational Analysis Results: Evening Peak Hour

Study Area Intersection	Existing LOS	No-Build LOS	Alternative 3A/4A LOS	Alternative 10A LOS
Warren Street at Lee Street (Brookline)				
Lee St. NEB L	*A*	*A*	*A*	*A*
Lee St. NEB R	*A*	*A*	*A*	*A*
Warren St. WB LR	*F*	*F*	*F*	*F*
Lee St. SB L	*A*	*A*	*A*	*A*
Lee St. SB R	*A*	*A*	*A*	*A*
Overall Intersection	***C***	***C***	***D***	***D***
Lee Street at Route 9 (Brookline)				
Route 9 EB T	*B*	*B*	*B*	*B*
Route 9 EB R	*A*	*A*	*A*	*A*
Lee St. NB L	*D*	*D*	*D*	*D*
Route 9 WB L	*F*	*F*	*F*	*F*
Route 9 WB T	*B*	*B*	*B*	*B*
Overall Intersection	***C***	***C***	***C***	***C***
Chestnut Hill Avenue at Route 9 (Brookline)				
Route 9 EB L	*F*	*F*	*F*	*F*
Route 9 EB T	*C*	*C*	*C*	*C*
Route 9 WB L	*F*	*F*	*F*	*F*
Route 9 WB T	*D*	*D*	*D*	*D*
Route 9 WB R	*A*	*A*	*A*	*A*
Chestnut Hill Ave. SB L	*F*	*F*	*F*	*F*
Chestnut Hill Ave. SB R	*B*	*B*	*B*	*B*
Overall Intersection	***E***	***F***	***F***	***F***
Hammond Street at Route 9 (Brookline)				
Route 9 EB L	*F*	*F*	*F*	*F*
Route 9 EB T	*F*	*F*	*F*	*F*
Hammond St. NB T	*F*	*F*	*F*	*F*
Route 9 WB L	*E*	*E*	*E*	*E*
Route 9 WB T	*E*	*E*	*E*	*E*
Route 9 WB R	*A*	*A*	*A*	*A*
Hammond St. SB L	*F*	*F*	*F*	*F*
Hammond St. SB T	*E*	*E*	*E*	*E*
Overall Intersection	***F***	***F***	***F***	***F***

Table 9-9 Study Area Intersection Operational Analysis Results: Evening Peak Hour

Study Area Intersection	Existing LOS	No-Build LOS	Alternative 3A/4A LOS	Alternative 10A LOS
Canterbury Lane at Morton Street (Boston)				
Canterbury Ln. EB LR	*C*	*C*	*C*	*C*
Morton St. NB L	*B*	*B*	*D*	*B*
Morton St. NB T	*A*	*A*	*A*	*A*
Morton St. SB T	*A*	*A*	*B*	*A*
Overall Intersection	***A***	***A***	***B***	***B***
Morton Street at Harvard Street (Boston)				
Harvard St. EB L	*E*	*E*	*E*	*E*
Harvard St. EB T	*C*	*C*	*C*	*C*
Morton St. NB L	*E*	*E*	*E*	*E*
Morton St. NB T	*C*	*D*	*D*	*D*
Harvard St. WB L	*D*	*D*	*D*	*D*
Harvard St. WB T	*E*	*E*	*E*	*E*
Morton St. SB L	*E*	*E*	*E*	*E*
Morton St. SB T	*C*	*D*	*D*	*D*
Overall Intersection	***D***	***D***	***D***	***D***
Morton Street at Blue Hill Avenue (Boston)				
Morton St. EB T	*C*	*C*	*C*	*C*
Morton St. EB R	*A*	*A*	*A*	*A*
Blue Hill Ave. NB L	*E*	*E*	*E*	*E*
Blue Hill Ave. NB T	*D*	*D*	*D*	*D*
Morton St WB T	*C*	*C*	*C*	*C*
Blue Hill Ave. SB L	*F*	*F*	*F*	*F*
Blue Hill Ave. SB T	*D*	*D*	*D*	*D*
Overall Intersection	***D***	***D***	***D***	***D***
Morton Street at Norfolk Street (Boston)				
Morton St. EB L	*E*	*E*	*E*	*E*
Morton St. EB T	*E*	*F*	*F*	*F*
Norfolk St. NB T	*C*	*C*	*C*	*C*
Norfolk St. NB R	*A*	*A*	*A*	*A*
Morton St. WB L	*D*	*D*	*D*	*D*
Morton St. WB T	*C*	*C*	*C*	*C*
Norfolk St. SB LTR	*C*	*C*	*C*	*C*
Overall Intersection	***D***	***D***	***E***	***E***

Table 9-9 Study Area Intersection Operational Analysis Results: Evening Peak Hour

Study Area Intersection	Existing LOS	No-Build LOS	Alternative 3A/4A LOS	Alternative 10A LOS
Morton Street at Corbet Street (Boston)				
Morton St. EB L	*E*	*E*	*E*	*E*
Morton St. EB T	*C*	*C*	*C*	*C*
W Selden St. NB LTR	*C*	*C*	*C*	*C*
Morton St. WB L	*E*	*F*	*F*	*F*
Morton St. WB T	*D*	*D*	*D*	*D*
Corbet St. SB LTR	*C*	*C*	*C*	*C*
Overall Intersection	***C***	***C***	***C***	***C***
Morton Street at Woodmere Street/Gallivan Boulevard (Boston)				
Morton St. SEB L	*C*	*C*	*D*	*C*
Morton St. SEB T	*D*	*D*	*D*	*D*
Woodmere St. NEB LTR	*B*	*B*	*B*	*B*
Morton St. NWB LT	*C*	*C*	*C*	*C*
Gallivan Blvd. WB T	*A*	*A*	*A*	*A*
Overall Intersection	***C***	***C***	***C***	***C***
Gallivan Boulevard at Washington Street (Boston)				
Gallivan Blvd. EB LT	*B*	*B*	*B*	*B*
Gallivan Blvd. EB R	*A*	*A*	*A*	*A*
Washington St. NB LTR	*B*	*B*	*B*	*B*
Gallivan Blvd. WB LTR	*B*	*C*	*B*	*C*
Washington St. SB LTR	*C*	*B*	*C*	*B*
Overall Intersection	***B***	***B***	***C***	***B***
Gallivan Boulevard at Dorchester Avenue (Boston)				
Gallivan Blvd. EB T	*B*	*B*	*B*	*B*
Dorchester Ave. NB LTR	*B*	*B*	*B*	*B*
Gallivan Blvd. WB T	*B*	*B*	*B*	*B*
Dorchester Ave. SB LTR	*C*	*C*	*C*	*C*
Overall Intersection	***B***	***B***	***B***	***B***

Table 9-9 Study Area Intersection Operational Analysis Results: Evening Peak Hour

Study Area Intersection	Existing LOS	No-Build LOS	Alternative 3A/4A LOS	Alternative 10A LOS
Gallivan Boulevard at Granite Avenue/Adams Street (Boston)				
Gallivan Blvd. EB L	*B*	*B*	*B*	*B*
Gallivan Blvd. EB T	*B*	*B*	*B*	*B*
Granite Ave. NB L	*D*	*E*	*E*	*E*
Granite Ave. NB TR	*D*	*D*	*D*	*D*
Gallivan Blvd. WB L	*D*	*D*	*E*	*E*
Gallivan Blvd. WB T	*C*	*C*	*C*	*C*
Adams St. SB L	*C*	*C*	*C*	*C*
Adams St. SB T	*D*	*D*	*D*	*D*
Adams St. SB R	*A*	*A*	*A*	*A*
Overall Intersection	***C***	***C***	***C***	***C***
Gallivan Boulevard at Hallet Street (Boston)				
Gallivan Blvd. EB T	*C*	*C*	*C*	*C*
Hallet St. NB L	*C*	*C*	*C*	*C*
Hallet St. NB R	*C*	*C*	*C*	*C*
Gallivan Blvd. WB T	*B*	*B*	*B*	*B*
Hallet St. SB L	*C*	*C*	*C*	*C*
Hallet St. SB T	*C*	*C*	*C*	*C*
Overall Intersection	***C***	***C***	***C***	***C***
Gallivan Boulevard at Neponset Avenue (Boston)				
Neponset Ave. EB L	*B*	*B*	*B*	*B*
Neponset Ave. EB T	*D*	*D*	*D*	*D*
Gallivan Blvd. NB T	*A*	*A*	*A*	*A*
Gallivan Blvd. NB R	*C*	*C*	*C*	*C*
Overall Intersection	***C***	***C***	***C***	***C***
Neponset Avenue at Morrissey Boulevard (Boston)				
Neponset Ave. EB T	*B*	*B*	*B*	*B*
Morrissey Blvd. SB L	*B*	*B*	*B*	*B*
Morrissey Blvd. SB T	*A*	*A*	*A*	*A*
Morrissey Blvd. SB R	*A*	*A*	*A*	*A*
Overall Intersection	***B***	***B***	***B***	***B***
South Street at Washington Street (Boston)				
South St. EB L	*E*	*F*	*F*	*F*
Washington St. NB T	*B*	*B*	*B*	*B*
South St. SB T	*B*	*B*	*B*	*B*
Overall Intersection	***C***	***C***	***C***	***C***

Table 9-9 Study Area Intersection Operational Analysis Results: Evening Peak Hour

Study Area Intersection	Existing LOS	No-Build LOS	Alternative 3A/4A LOS	Alternative 10A LOS
South Street at Arborway/New Washington Street (Boston)				
Arborway EB T	B	B	B	B
Arborway EB R	A	A	A	A
South St. NB L	E	E	E	E
South St. NB T	D	D	D	D
New Washington St. WB T	B	B	B	B
South St. SB L	C	C	C	C
South St. SB T	E	E	E	E
Overall Intersection	***C***	***C***	***C***	***C***
Washington Street at Arborway (Boston)				
New Washington St. EB T	*F*	*F*	*F*	*F*
Washington St. NB L	*D*	*D*	*D*	*D*
Washington St. NB TR	*C*	*C*	*C*	*C*
Arborway WB L	*F*	*F*	*F*	*F*
Arborway WB T	*B*	*B*	*B*	*B*
Washington St. SB L	*D*	*D*	*D*	*D*
Washington St. SB TR	*D*	*D*	*D*	*D*
Overall Intersection	***F***	***F***	***F***	***F***
Arborway at Morton Street/Circuit Drive (Boston)				
Arborway EB L	*C*	*C*	*C*	*C*
Arborway EB T	*C*	*C*	*C*	*C*
Morton St. NB T	*C*	*C*	*C*	*C*
Morton St. WB L	*E*	*E*	*E*	*E*
Morton St. WB T	*C*	*C*	*C*	*C*
Circuit Dr. SB T	*C*	*C*	*C*	*C*
Overall Intersection	***C***	***C***	***C***	***C***

Abbreviations:
EB = Eastbound *NB = Northbound* *L = Left* *R = Right*
WB = Westbound *SB = Southbound* *T = Through* *LOS = Level of Service*
Italicized text within the table indicates no change from the DEIR.

9.2.2.5 Alternative 3A/Alternative 4A Intersections Construction Period Impacts

Study Area intersections subject to potential temporary increases in traffic volumes during construction of the UMass Property site (SDEIR Alternatives 3A and 4A) are described below. The potential impacts listed below represent the worst-case scenario and are not expected to be experienced over the full duration of shaft site construction, but for one to two quarters of a year total at most.

Trapelo Road at Waverley Oaks Road (Waltham)

During the morning peak hour at the intersection of Trapelo Road at Waverley Oaks Road in Waltham, the Trapelo Road eastbound through movement was estimated to temporarily experience an increase in delay from approximately 29 seconds under No-Build conditions to approximately 43 seconds. Overall, the intersection was estimated to experience an increase in delay from approximately 95 seconds under No-Build conditions to approximately 97 seconds under Build conditions temporarily during construction at the UMass Property site in SDEIR Alternative 3A or 4A.

Main Street at Ellison Park/Linden Street (Waltham)

During the morning peak hour at the intersection of Main Street and Ellison Park/Linden Street in Waltham, the Main Street southbound left turn movement was estimated to temporarily experience an increase in delay from approximately 5 seconds under No-Build conditions to approximately 42 seconds during construction of SDEIR Alternatives 3A and 4A. The Main Street southbound right turn movement was estimated to experience an increase in delay from approximately 74 seconds under No-Build conditions to approximately 118 seconds. Overall, the intersection would be expected to have the same approximate delay time of approximately 109 seconds under the No-Build conditions and the Build conditions temporarily during construction at the UMass Property site in SDEIR Alternative 3A or 4A.

During the evening peak hour at the intersection of Main Street and Ellison Park/Linden Street in Waltham, the Main Street southbound right turn movement is conservatively estimated to experience a temporary increase in delay from approximately 238 seconds under No-Build conditions to approximately 312 seconds. Overall, the intersection is estimated to experience an increase in delay from approximately 277 seconds under the No-Build conditions to approximately 292 seconds under the Build conditions during temporary construction at the UMass Property site in SDEIR Alternative 3A or 4A.

9.2.2.6 Alternative 10A Intersections Construction Period Impacts

The Study Area intersections subject to potential temporary increases in traffic volumes during construction of the Lower Fernald Property site in SDEIR Alternative 10A are described below. The potential impacts listed below represent the worst-case scenario and are not expected to be experienced over the full duration of shaft site construction, but for one to two quarters of a year total at most.

Trapelo Road at Waverley Oaks Road (Waltham)

During the morning peak hour at the intersection of Trapelo Road at Waverley Oaks Road in Waltham, the Trapelo Road eastbound through movement is estimated to temporarily experience an increase in delay from approximately 29 seconds under No-Build conditions to approximately 56 seconds at the Lower Fernald Property site in SDEIR Alternative 10A. Overall, the intersection is expected to increase in delay from approximately 95 seconds under the No-Build condition to approximately 101 seconds under the Build condition temporarily during construction at the Lower Fernald Property site in SDEIR Alternative 10A.

Main Street at Ellison Park/Linden Street (Waltham)

During the morning peak hour at the intersection of Main Street and Ellison Park/Linden Street in Waltham, the Main Street southbound left turn movement is estimated to experience an increase in delay from approximately 5 seconds under No-Build conditions to approximately 42 seconds during temporary construction at the Lower Fernald Property site in SDEIR Alternative 10A. The Main Street southbound right turn movement is estimated to experience an increase in delay from 74 seconds under No-Build conditions to 121 seconds. Overall, the intersection is estimated to temporarily increase in delay from approximately 109 seconds under the No-Build condition to approximately 110 seconds during the Build condition temporarily during construction at the Lower Fernald Property site in SDEIR Alternative 10A.

During the evening peak hour at the intersection of Main Street and Ellison Park/Linden Street in Waltham, the Main Street southbound right turn movement is estimated to experience an increase in delay from approximately 238 seconds under No-Build conditions to approximately 356 seconds at the Lower Fernald Property site in SDEIR Alternative 10A. Overall, the intersection is expected to increase in delay from approximately 277 seconds under the No-Build condition to approximately 301 seconds under the Build condition temporarily during construction at the Lower Fernald Property site in SDEIR Alternative 10A.

9.2.2.7 Near-Surface Piping Construction Traffic Impacts

Near-surface piping for water distribution would be required at some Program sites. Construction of these pipes would require traffic management measures, including lane closures, sidewalk closures, and detours. Potential temporary traffic impacts associated with the installation of near-surface piping at the UMass Property site and the Lower Fernald Property site are described below.

Alternative 3A/Alternative 4A Near-Surface Piping Construction Period Traffic Impacts

A near-surface pipe is proposed between the proposed valve chamber at the UMass Property site and the existing MWRA pipeline along Waverley Oaks Road. This connection may require a short-term detour along Waverley Oaks Road, which is functionally classified as an urban principal arterial. It may also require a temporary lane closure along Beaver Street. Duration of the construction is anticipated to be approximately 40 weeks. If necessary and as appropriate, work would be performed during off-peak hours to minimize the potential disturbance to traffic operations.

Alternative 10A Near-Surface Piping Construction Period Traffic Impacts

A near-surface pipe is proposed between the proposed valve chamber at the Lower Fernald Property site and the existing MWRA pipeline along Waverley Oaks Road. This connection may require a short-term detour along Waverley Oaks Road, which is functionally classified as an urban principal arterial. If necessary and as appropriate, work would be performed during off-peak hours to minimize the potential disturbance to traffic operations.

9.2.2.8 Regional Highway Construction Period Traffic Impacts

The vehicle trips estimated at each shaft site were distributed onto the nearest highway access points. This section describes the maximum net new vehicle trips expected to travel through the highway access points during the morning, evening, and 24-hour volumes in comparison to existing volumes. Vehicle trips combine both construction worker trips and diesel truck trips. As shown in **Table 9-10**, the estimated Program-related vehicle trips at the highway access points are expected to temporarily have a less than 3.5 percent increase in peak hour traffic volumes and a less than 0.7 percent increase in peak 24-hour traffic volumes compared to existing conditions. Program-related vehicle traffic is anticipated to temporarily increase peak 24-hour traffic volumes along highways by approximately 0.2 percent to 0.7 percent for SDEIR Alternatives 3A/4A, and 0.1 percent to 0.7 percent for SDEIR Alternative 10A compared to existing conditions.

Table 9-10 Estimated Program-Related Vehicle Trips Compared to Existing Highway Volumes

Program Site	Roadway	Location	MassDOT Loc ID	AM Peak Hour Trips				PM Peak Hour Trips [1]				24-Hour Trips			
				Existing	Alt 3A	Alt 4A	Alt 10A	Existing	Alt 3A	Alt 4A	Alt 10A	Existing	Alt 3A	Alt 4A	Alt 10A
UMass Property, Lower Fernald Property, Tandem Trailer/Park Road East, Bifurcation, Park Road West, School Street, Cedarwood Pumping Station	I-95	North of I-90	32	10,200	274 (2.7%)	250 (2.5%)	145 (1.5%)	10,900	400 (3.7%)	313 (2.9%)	146 (1.4%)	162,000	1,058 (0.7%)	794 (0.5%)	365 (0.3%)
Tandem Trailer/Park Road East, Bifurcation, Park Road West	I-90	West of I-95	AET10	8,350	188 (2.3%)	164 (2.0%)	33 (0.4%)	9,000	314 (3.5%)	227 (2.6%)	34 (0.4%)	134,000	866 (0.7%)	602 (0.5%)	113 (0.1%)
Highland Ave NE, Highland Ave NW, Hegarty Pumping Station, St. Mary Street Pumping Station, Newton Street Pumping Station	I-95	South of I-90	4165	9,800	178 (1.9%)	226 (2.4%)	176 (1.8%)	10,200	197 (2.0%)	352 (3.5%)	352 (3.5%)	149,000	622 (0.5%)	954 (0.7%)	904 (0.7%)
American Legion, Southern Spine Mains	I-93	South of Route 203	8932	8,700	72 (0.9%)	70 (0.9%)	72 (0.9%)	10,100	120 (1.2%)	106 (1.1%)	108 (1.1%)	169,000	334 (0.2%)	304 (0.2%)	318 (0.2%)

Existing traffic volumes are rounded up to the nearest 50 trips.

1 Evening peak hour trips are conservative estimate since construction worker trips are not anticipated to occur in the evening peak hour as shift change is usually at approximately 3:00 PM and the evening peak hour generally occurs between 4:00 PM and 6:00 PM.

9.2.3 Transportation Final Conditions

Due to the nature of the Program, regular trip generation associated with the various sites is not anticipated to be significant once construction is complete. Post-construction (operational) activities are estimated to include an average of two vehicle trips per day at any given location (one trip entering the site and one trip exiting the site). The trips would support infrequent maintenance (e.g., snow clearing, mowing grassed areas, valve replacement) as needed. Therefore, operational analyses for the Final Condition were not evaluated as part of the TIA.

9.2.4 Transportation Avoidance, Minimization, and Mitigation Measures

Potential impacts to the transportation network may occur temporarily during the construction period, through an increase in truck trips to and from the construction sites, transportation of contractors, and physical construction of near-surface pipelines in public roadways at some sites. No significant Program-related permanent transportation impacts are anticipated.

The primary source of traffic expected to be generated temporarily by the Program would be construction worker trips to and from Program sites, as well as trucks hauling equipment and excavated material. The maximum amount of temporary Program-related traffic would occur at tunnel launching shaft sites where there is a shift change conservatively modeled to take place during the evening peak hour (construction worker trips are not expected to occur during the evening peak hour as shift change is usually at approximately 3:00 PM and the evening peak hour generally occurs between 4:00 PM and 6:00 PM). Launching shaft sites (i.e., Tandem Trailer, Bifurcation, and Highland Avenue sites) are adjacent to highway ramps and are therefore not expected to cause a significant traffic impact to nearby local roadways. Near-surface piping construction at some locations may require temporary traffic management measures, including lane closures, sidewalk closures, and detours.

If construction activities were to result in significant traffic congestion during the peak hour, work within the roadway may not be permitted during weekday peak hours, which normally occur from 7:00 AM to 9:00 AM and from 4:00 PM to 6:00 PM, in accordance with local ordinances. Coordination with the roadway owner is recommended if the proposed construction work needs to be completed during the weekday peak hours. On heavily traveled urban arterials, work within the roadway may primarily be permitted during off-peak, overnight hours. In some residential areas, work may be restricted to daytime hours to minimize potential disturbance to residents. In some areas, if necessary, time restrictions may also be used to avoid potential impacts to routine street sweeping or other activities.

If necessary and where appropriate, measures that would be considered to mitigate potential traffic impacts associated with temporary Program-related construction activities are summarized in **Table 9-11** and are described in the following sections. Most of the potential mitigation measures described in this section would require approval and/or permits from MassDOT, the Massachusetts Department of Conservation and Recreation (DCR), or applicable municipalities. Applicability of these measures would be discussed with the municipalities or agencies prior to submitting permit applications.

Table 9-11 Potential Construction Period Impacts and Mitigation

Potential Construction Period Impact		Mitigation
Temporary increase in traffic at local intersections		When possible and as necessary, conduct trucking during off-peak hours.
Town (Program Sites)	**Intersections**	
Waltham (UMass Property, Lower Fernald Property, School Street, and Cedarwood Pumping Station)	Trapelo Rd. at Lexington St. Waverley Oaks Rd. at Trapelo Rd. Beaver St. at Waverley Oaks Rd. Main St. at Linden St./Ellison Park Elm St. at Main St. Moody St. at Main St. Bacon St. at Main St. Weston St. at Main St. South St. at Weston St. Shakespeare Rd. at South St.	
Weston (Tandem Trailer, Park Road East, Bifurcation, Park Road West, Hultman Aqueduct Isolation Valve)	River Rd. at South Ave. I-95 N Off Ramp at South Ave. Park Rd. at South Ave.	
Wellesley (Hegarty Pumping Station)	Worcester St. at Cedar St.	
Needham (Highland Avenue Sites, St. Mary Street Pumping Station)	Cedar Avenue at Cedar St.	
Brookline (Newton Street Pumping Station)	Grove Street at Newton St. Newton St. at Clyde St. Dudley Street at Lee St. Lee St. at Route 9 Chestnut Hill Avenue at Route 9 Hammond Street at Route 9	
Boston (Southern Spine Mains, and American Legion)	Canterbury Ln. at Morton St. Morton St. at Harvard St. Morton St. at Blue Hill Ave. Morton St. at Norfolk St. Morton St. at Corbet St. Morton St. at Gallivan Blvd. Gallivan Blvd. at Washington St. Gallivan Blvd. at Dorchester Ave. Gallivan Blvd. at Granite Ave./Adams St. Gallivan Blvd. at Hallet St. Gallivan Blvd. at Neponset Ave. Neponset Ave. at Morrissey Blvd. South St. at Washington St. South St. at Arborway. Washington St. at Arborway Arborway at Circuit Dr.	

Table 9-11 Potential Construction Period Impacts and Mitigation

Potential Construction Period Impact		Mitigation
Temporary increase in traffic at intersections along construction vehicle routes:		When possible and as necessary, conduct trucking during off-peak hours.
Town (Program Sites)	**Intersections**	
Waltham (UMass Property, Lower Fernald Property, School Street, and Cedarwood Pumping Station)	Trapelo Road at Waverly Oaks Road Main St. at Ellison Park/Linden St.	
Weston (Tandem Trailer, Park Road East, Bifurcation, Park Road West, and Hultman Aqueduct Isolation Valve)	River Rd. at South Ave. Park Rd. at South Ave. (Alt. 4A and 10A) I-95 Northbound off-ramp at South Ave./Commonwealth	
Needham (Highland Avenue Sites, St. Mary Street Pumping Station)	Cedar Avenue at Cedar St.	
Newton (no sites, traffic from Newton Street Pumping Station)	Woodward St./Elliot St. at Route 9	
Brookline (Newton Street Pumping Station)	Newton St. at Clyde St.	
Boston (Southern Spine Mains, and American Legion)	Morton St. at Blue Hill Ave. Morton St. at Norfolk St. South St. at Washington St.	
Temporary impacts to bicycle and pedestrian pathways during installation of near-surface piping Southern Spine Mains: temporary bicycle and pedestrian detour along the Arborway		Accommodate bikes and pedestrians through on-street work zones. Maintain safe access at all times.
Installation of near-surface piping requiring traffic management and/or local detours		Install during off-peak and overnight hours, where possible and as necessary, to minimize potential disturbance to traffic, bicyclists, and pedestrians. Where possible and as appropriate, restripe crosswalks with high-visibility markings and construction of Americans with Disabilities Act (ADA)-compliant curb ramps with detectable warning panels on each corner where existing crosswalks or curb ramps are impacted. Maintain two-way traffic whenever possible and one-lane traffic at a minimum. Provide temporary local detours where necessary.
Proposed Site	**Location**	
UMass Property	Beaver Street and Waverley Oaks Road	
Lower Fernald Property	Waverley Oaks Road	
Highland Avenue Sites	Brook Road, Wexford Road, and Freemont Street	
American Legion	American Legion Highway and Morton Street	
School Street	School Street	

Table 9-11 Potential Construction Period Impacts and Mitigation

Potential Construction Period Impact	Mitigation
Temporary increase in truck traffic: Routes along Program sites	When possible and as necessary, conduct trucking during off-peak hours.

9.2.4.1 Intersection Operations

Based on the results of the capacity analysis, the Study Area intersections subject to potential temporary construction-related traffic impacts could be mitigated, if necessary and where appropriate, by adjusting the traffic signal timings. Depending on final design and coordination with local municipality and/or MassDOT, modifications could be made permanent.

9.2.4.2 Bicycles and Pedestrians

Bicycles and pedestrians would be accommodated through all on-street work zones. Specific details will be worked out through the final design process.

9.2.4.3 Near-Surface Piping Construction

Near-surface piping installed in public roadways would have potential temporary impacts on traffic and roadways. Details on roadways subject to potential impacts are provided in **Table 9-11**. Depending on the site, mitigation measures may include:

- Install near-surface piping during off-peak and/or overnight hours, where possible and as necessary, to minimize potential disturbance to traffic, bicyclists, and pedestrians.
- Where possible and as appropriate, restripe crosswalks with high-visibility markings and construct Americans with Disabilities Act (ADA)-compliant curb ramps with detectable warning panels on each corner where existing crosswalks and curb ramps are impacted.
- Maintain two-way traffic whenever possible. If not possible, maintain at least one-way traffic.
- Evaluate and implement trenchless technologies when feasible.

9.3 Technical Analysis to Respond to Certificate Comments

This section describes supplemental analysis that was performed in response to transportation-related comments received on the DEIR in the Secretary's Certificate. See **SDEIR Chapter 15, Responses to Comments**, for the full list of delineated comments received on the DEIR in the Certificate and the associated comment letters.

Certificate Comment C-13

The SDEIR should include a Construction Management Plan that identifies how the project will minimize traffic disruption during construction particularly in areas within or near EJ populations.

Response to C-13

As design progresses, the MWRA will develop requirements for traffic routes and work hour restrictions based on permit conditions and community coordination. These requirements will be documented in the contract documents and serve as the basis for a Construction Management Plan (CMP) to be prepared by the contractor. The CMP will further detail construction and contractor measures to avoid, minimize, and mitigate potential traffic disruptions, and potential air quality and noise impacts. The CMP will document requirements for the contractors to accept and follow prior to the start of construction activity.

The following requirements will be included in the CMP to limit potential impacts to EJ populations and will require contractor sign-off:

- The contractor would perform construction activities associated with near-surface piping within sidewalks or roadways during off-peak times to minimize disturbance to traffic.
- Near-surface piping work hours would be context-sensitive; there would be no night work conducted in residential areas.
- During construction, traffic signal timings may be adjusted, where necessary and as appropriate, to minimize potential intersection delay due to construction vehicles and trucks.
- Vehicles traveling to and from construction sites will take the most direct route along main roadways to/from highways to minimize traffic and emissions.
- Contractors would limit vehicle idling time in compliance with the Massachusetts idling regulation (310 Code of Massachusetts Regulations [CMR] 7.11). Idling restriction signs will be placed on the premises to remind drivers and construction personnel of the applicable regulations. Drivers and equipment operators would be trained accordingly.
- Contractors would use Ultra Low Sulfur Diesel fuel, and construction contracts would stipulate that all diesel-fuel construction equipment be fitted with after-engine emission controls. Any non-road diesel equipment would have to be rated 50 horsepower or greater to meet the U.S. Environmental Protection Agency's (USEPA's) Tier 4 emission standards or be retrofitted with appropriate emission-reduction equipment. Emission-reduction equipment could include USEPA-verified or California Air Resources Board (CARB)-verified diesel oxidation catalysts or diesel particulate filters.

- Contractors would be encouraged to use cleaner alternatively fueled equipment (natural gas or electric) rather than diesel-fueled equipment where available and feasible.
- Contractors would be required to implement measures to protect local residents, visitors, passengers, and passers-by from off-site exposure to dust and debris.

Appropriate methods of dust control would be determined according to the surfaces concerned (roadways or disturbed areas) and would include, as applicable, application of water during ground disturbing activities; stone surfacing of construction roads; seeding of areas of exposed or stockpiled soils; wheel washing; using covered trucks; and regular sweeping of paved roadways. Recycling construction waste and demolition materials may also reduce dust emissions.

Work within roadways would be coordinated with the local municipality, the DCR, and/or MassDOT and the owner of the utility, as appropriate. Upon completion of the valve chambers and piping, the disturbed areas will be restored and affected roadways would be repaved. The final pavement restoration details and any necessary detours would be coordinated with the local municipality, DCR and/or MassDOT as appropriate through their respective permitting processes.

As described in **SDEIR Chapter 3, Outreach and Environmental Justice, Section 3.5, Technical Analysis to Respond to Comments** (see Response to Comments C-5 and C-22), and as shown in **SDEIR Figures 3-3** to **Figure 3-19**, U.S. Census block groups containing EJ populations are adjacent to some Study Area intersections and along portions of truck routes that would be utilized during temporary Program-related construction activities. This includes routes along EJ block groups that have existing unfair or inequitable environmental burdens per the Massachusetts Department of Public Health (DPH) vulnerable health criteria data (low birth rate and elevated blood lead prevalence.

Construction vehicle routes were established for each Program site location by identifying the most direct route along main state and local roadways to/from the nearest highway. Using the most direct route seeks to minimize construction vehicle travel time and mileage, and the resulting Program-related traffic (and emissions). Any rerouting of construction vehicles would increase travel times and/or mileage, increasing traffic/trips in both EJ and non-EJ communities. Therefore, the least impactful routing to all populations is using the most direct routes to/from the interstate highway and minimizing traffic on local roads. Since no significant Program-related transportation impacts are anticipated, there would be no significant impacts to baseline environmental or health conditions of EJ or non-EJ populations. See **SDEIR Chapter 3, Outreach and Environmental Justice**, for more information on baseline environmental and health conditions for EJ populations.

The maximum amount of temporary Program-related traffic would occur at tunnel launching shaft sites where there is a shift change conservatively modeled to take place during the evening peak hour (construction worker trips are not expected to occur during the evening peak hour as shift change is usually at approximately 3:00 PM and the evening peak hour generally occurs between 4:00 PM and 6:00 PM). Program launching shaft sites (i.e., Tandem Trailer, Bifurcation, and Highland Avenue sites) are adjacent to highway ramps and are therefore not expected to cause a significant traffic impact to nearby local roadways. As shown on **SDEIR Figure 3-5, Figure 3-6, Figure 3-10**, and **Figure 3-11**, none of the Program launching shaft sites considered in either of the SDEIR Alternatives are in EJ block groups.

Furthermore, given their proximity to highway ramps, no construction vehicle routes between these launching shaft sites and the highway travel through EJ block groups.

Certificate Comment C-25

The SDEIR should confirm that the project will not generate more than 150 new ADT associated with diesel vehicle trips (Table 4.2-5 appears to indicate the project may produce up to 158 truck trips per day during the construction period).

Response to C-25

The analysis estimated the potential for up to 156 average daily trips (ADT) of diesel truck trips at Program launching sites based on a worst-case estimate. The worst-case estimate assumes approximately 70 feet excavation per day by a tunnel boring machine (TBM) and that construction would only occur on business days. The average rate for excavation is likely to be less than 60 feet per day, translating to fewer than 150 additional ADT by diesel trucks. Although the excavation on some days may reach or exceed 70 feet a day, the likelihood of exceeding 60 feet a day continuously for over four consecutive quarters (one year) is extremely low. Accordingly, the estimated number of trucks represents a conservative estimate considering the full duration of construction.

The annual ADT generated by the Program would be around 111 ADT per year. This conclusion is reached by taking the maximum number of daily truck trips (156) and multiplying that by the typical workdays in a year (260) and dividing that amount over a full 365 days to identify the number of annual ADT. Based on the Massachusetts Environmental Policy Act (MEPA) EJ guidance for an impact assessment, the annual ADT 111 is below the 150 ADT threshold and thus a one-mile radius for the EJ assessment is appropriate.

The transportation analysis assesses the work week ADT to confirm the roadways will be able to accommodate the anticipated temporary increase in annual traffic, while the air quality and greenhouse gas (GHG) emissions analysis considers trips as an annual average in the region.

As demonstrated in the DEIR and in this SDEIR, based on the conservative estimate of ADT, the roadways can accommodate the temporary increase in Program-related truck traffic with no need for mitigation.

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10 Rare Species and Wildlife Habitat

10.1 Introduction

This chapter describes the existing conditions related to rare species and wildlife habitat at the two alternative sites considered for the terminus of the proposed North Tunnel, Segment 1: the University of Massachusetts (UMass) Property large connection site considered in Supplemental Draft Environmental Impact Report (SDEIR) Alternatives 3A and 4A, and the Lower Fernald Property receiving shaft site considered in SDEIR Alternative 10A. The UMass Property site and the Lower Fernald Property site are considered in place of the Fernald Property site that was previously evaluated in the Draft Environmental Impact Report (DEIR). All other sites associated with the SDEIR alternatives remain unchanged from the DEIR. Included in this chapter is an evaluation of existing conditions, construction period impacts, and final conditions, as well as best practices to avoid and minimize potential impacts to rare species and wildlife habitat.

The Secretary's Certificate on the DEIR was issued on December 16, 2022. No comments related to rare species and wildlife habitat were received in the Certificate. One comment related to rare species and wildlife habitat was included in a comment letter and is addressed in **SDEIR Chapter 15, Responses to Comments**, along with the full list of delineated comments received on the DEIR.

10.1.1 Summary of Findings

Key findings associated with the two new alternative sites considered in the SDEIR for the terminus of the North Tunnel, Segment 1, in place of the DEIR Fernald Property site include:

- Neither the UMass Property site nor the Lower Fernald Property site include identified Massachusetts Natural Heritage Endangered Species Program (NHESP) Priority Habitats of Rare Species or Estimated Habitats for Rare Wetlands Wildlife.
- Neither the UMass Property site nor the Lower Fernald Property site are located within a 0.25-mile radius of known Northern Long-Eared Bat (Myotis septentrionalis; NLEB) hibernacula or include mapped known NLEB maternity roost trees.

Key findings associated with the three SDEIR Alternatives, which are consistent with the findings of the three DEIR Alternatives, include:

- One NHESP Priority Habitat/Estimated Habitat polygon was identified within 1,000 feet of the proposed tunnel alignment in Waltham in all three SDEIR Alternatives (as assumed in the DEIR). The polygon includes a portion of the Charles River however, because of proposed mitigation measures that would be implemented to minimize potential groundwater drawdown during construction (see **SDEIR Chapter 5, Wetlands and Waterways, Section 5.2.4, Wetlands and Waterways Avoidance, Minimization, and Mitigation Measures,** and **DEIR Section 4.6.5.3, Tunnel Alignments – All**

Alternatives [pg. 4.6-149]), no significant impacts to habitat within this mapped polygon would be anticipated.

- No Program sites are located within a 0.25-mile radius of known NLEB hibernacula or include mapped/known NLEB maternity roost trees.
- Construction in either of the three SDEIR Alternatives would result in temporary alterations of wildlife habitat, including potential NLEB habitat regulated under the federal Endangered Species Act (ESA) of 1973. There is the potential for an "incidental take" of NLEB habitat due to clearing vegetation within the limit of disturbance (LOD) during construction. Adherence to applicable time-of-year restrictions on tree clearing would avoid incidental take of NLEB.
- No species protected under the Massachusetts Endangered Species Act (MESA) are mapped in the vicinity of Program sites in any of the three SDEIR Alternatives, and Program-related impacts to wildlife habitats are not anticipated to adversely affect overall wildlife populations.
- No direct impacts to state or federal threatened or endangered species are anticipated in any of the SDEIR Alternatives.
- Tree clearing to accommodate construction would be required. SDEIR Alternative 3A is anticipated to require clearing of approximately 11.9 acres, and SDEIR Alternatives 4A and 10A would each require approximately 6.0 acres of tree clearing. The Program would seek to minimize tree clearing to the extent practicable and retain as many snags as possible.
- To minimize potential habitat impacts, areas temporarily disturbed during construction would be restored to pre-construction conditions where possible in accordance with the respective property owners.

10.2 Rare Species and Wildlife Habitat Impact Assessment

The following section describes the existing conditions of rare species and wildlife habitat identified at the two new alternative sites considered in the SDEIR in place of the DEIR Fernald Property site. Included is an analysis of potential construction-period impacts and permanent impacts to rare species habitats, along with consideration to potential impacts to trees. For this assessment, the term "rare species and wildlife habitat" refers to plant and animal species and their habitats, including rare, threatened, and endangered species and their critical habitat. Avoidance, minimization, and mitigation measures would be implemented in the construction and operational phases of the Program to protect potential and identified rare species and wildlife habitat, as described in **SDEIR Section 10.2.4**.

10.2.1 Rare Species and Wildlife Habitat Existing Conditions

The U.S. Fish and Wildlife Service (USFWS) Information for Planning and Conservation (IPaC) online system indicates that the entire Commonwealth of Massachusetts is considered potential habitat for the federally listed NLEB (*Myotis septentrionalis*), and that much of the Commonwealth is suitable habitat for the federally listed monarch butterfly (*Danaus plexippus*). At the time the DEIR was filed, the NLEB was listed as Threatened under the ESA. Effective as of March 31, 2023, the status of the NLEB was elevated to Endangered under the ESA. The monarch butterfly was and is still listed as a candidate species. Neither the NLEB nor the monarch butterfly have designated Critical Habitat in Massachusetts.

None of the proposed launching, receiving, large connection, connection, or isolation valve sites include any identified NHESP Priority Habitats of Rare Species or Estimated Habitats for Rare Wetlands Wildlife. Furthermore, no Program sites are located within a 0.25-mile radius of known NLEB hibernacula or include mapped/known NLEB maternity roost trees. One NHESP Priority Habitat/Estimated Habitat polygon located in Waltham was identified within approximately 1,000 feet of the proposed tunnel alignment in each of the three SDEIR Alternatives. As a result of proposed mitigation measures that would be implemented to minimize potential groundwater drawdown during construction, no impacts to these resources located within this mapped polygon are anticipated (see **SDEIR Section 5.2.4, Wetlands and Waterways Avoidance, Minimization, and Mitigation Measures,** and **DEIR Section 4.6.5.3, Tunnel Alignments – All Alternatives [pg. 4.6-149]**).

The following sections describe the existing rare species and wildlife habitat conditions at the UMass Property site and the Lower Fernald Property site. **Table 10-1** summarizes the presence or absence of key rare species and wildlife habitat at each Program site.

Table 10-1 Summary of Rare Species and Wildlife Habitats at Program Sites

Site (Alternative)	City/ Town	Potential NLEB [1] Habitat Present	Snags and/or NLEB-Suitable Trees Present	Within ¼ mile of Known Hibernacula or 150 ft. of Known Maternity Roost	Potential Monarch Butterfly Habitat Present	Fisheries Habitat Present
Launching, Receiving, and Large Connection Sites						
UMass Property (3A, 4A)	Waltham	Yes	Yes	No	Yes	None
Lower Fernald Property (10A)	Waltham	Yes	Yes	No	Yes	None
Bifurcation (3A)	*Weston*	*Yes*	*Yes*	*No*	*Yes*	*Coldwater*
Tandem Trailer/Park Road East (3A, 4A)	*Weston*	*Yes*	*Yes*	*No*	*Yes*	*Coldwater*
Park Road West (10A)	*Weston*	*Yes*	*No*	*No*	*Yes*	*None*
Highland Avenue Northwest/ Southwest (3A, 4A, 10A)	*Needham*	*Yes*	*No*	*No*	*Yes*	*Warmwater*
Highland Avenue Northeast/ Southeast (3A, 4A, 10A)	*Needham*	*Yes*	*No*	*No*	*Yes*	*Warmwater*
American Legion (3A, 4A, 10A)	*Boston*	*Yes* [2]	*Yes*	*No*	*Yes*	*Warmwater*

Table 10-1 Summary of Rare Species and Wildlife Habitats at Program Sites

Site (Alternative)	City/ Town	Potential NLEB [1] Habitat Present	Snags and/or NLEB-Suitable Trees Present	Within ¼ mile of Known Hibernacula or 150 ft. of Known Maternity Roost	Potential Monarch Butterfly Habitat Present	Fisheries Habitat Present
Connection Sites (Common to All Alternatives)						
School Street	*Waltham*	*Yes*	*No*	*No*	*Yes*	*None*
Cedarwood Pumping Station	*Waltham*	*Yes*	*Yes*	*No*	*Yes*	*Warmwater*
Hegarty Pumping Station	*Wellesley*	*Yes*	*Yes*	*No*	*Yes*	*Warmwater*
St. Mary Street Pumping Station	*Needham*	*Yes*	*No*	*No*	*Yes*	*None*
Newton Street Pumping Station	*Brookline*	*Yes*	*Yes*	*No*	*Yes*	*None*
Southern Spine Mains	*Boston*	*Yes*	*Yes*	*No*	*Yes*	*None*
Hultman Aqueduct Isolation Valve	*Weston*	*Yes*	*No*	*No*	*Yes*	*None*

1 NLEB: Northern Long-Eared Bat

2 Based on on-site observations

Italicized text within the table indicates no change from the DEIR.

10.2.1.1 Alternative 3A/Alternative 4A Existing Conditions

UMass Property

As shown on **Figure 10-1**, the LOD associated with the proposed UMass Property site is approximately 0.9 acres total. The LOD includes an approximately 0.5-acre area surrounding the proposed shaft site and approximately 0.4 acres to accommodate a near-surface pipeline traveling from the shaft site southeast for approximately 0.15-mile along Beaver Street to connect to Weston Aqueduct Supply Main Number Three (WASM3) at the intersection with Waverley Oaks Road. Land cover within the LOD for the shaft area consists of approximately 0.5 acres of mowed grass and lightly wooded upland.

The shaft site is adjacent to (west of) wetlands associated with Clematis Brook, which is located offsite. Trees on site include Norway maple (*Acer platanoides*), white oak (*Quercus alba*), and tree of heaven (*Ailanthus altissima*). Snags (i.e., dead trees) are also present on the site. Wetland areas associated with Clematis Brook are located east of the site as shown on **Figure 10-1**. Use of the site by wildlife was either observed directly during field observations or confirmed via signs of their presence. Species utilizing the site in the existing condition include small mammals common to suburban habitats such as grey squirrel, red squirrel, and chipmunk, as well as a variety of songbirds.

The Massachusetts Division of Fisheries and Wildlife (MassWildlife) NHESP does not identify any Endangered, Threatened, or Special Concern species present within the UMass Property. The USFWS IPaC online system indicates that suitable habitat for the NLEB and the monarch butterfly may be present within the property.

10.2.1.2 Alternative 10A Existing Conditions

Lower Fernald Property

As shown on **Figure 10-2**, land cover within the LOD associated with the proposed Lower Fernald Property site consists of approximately 2.3 acres of previously developed and lightly wooded upland located along Waverley Oaks Road. Wooded areas within the Lower Fernald Property site LOD include mixed deciduous forest, including species such as Norway maple, white oak, tree of heaven, and black cherry (*Prunus serotina*). Snags are also present on the site. Wetland areas associated with Clematis Brook are located southwest of the site as shown on **Figure 10-2**.

Use of the site by wildlife was either observed directly during field observations or confirmed via signs of their presence. Species utilizing the site in the existing condition include small mammals common to suburban habitats such as grey squirrel, red squirrel, and chipmunk, as well as a variety of songbirds.

The MassWildlife NHESP does not identify any Endangered, Threatened, or Special Concern species present within the Lower Fernald Property site. The USFWS IPaC online system indicates that suitable habitat for the NLEB and the monarch butterfly may be present within the Lower Fernald Property. The LOD for the Lower Fernald Property includes trees potentially suitable for NLEB summer roosting habitat.

10.2.2 Rare Species and Wildlife Habitat Construction Periods Impacts

The two new alternative sites for the proposed terminus of the North Tunnel, Segment 1: the UMass Property site and the Lower Fernald Property site were assessed for the presence of rare species and wildlife habitat within and adjacent to the proposed sites. All other sites making up the SDEIR alternatives remain unchanged from the DEIR.

No direct impacts to state or federal threatened or endangered species are anticipated due to construction of the any of the SDEIR Alternatives; however, there is the potential for an “incidental take” of NLEB habitat (regulated under the ESA) during periods of construction that include the clearing of vegetation within the LOD. For each SDEIR Alternative, potential tree clearing impacts are summarized in **Table 10-2**. No changes have been made to the anticipated areas of tree clearing for the other sites as described in the DEIR.

Table 10-2 Estimated Acres of Tree Clearing

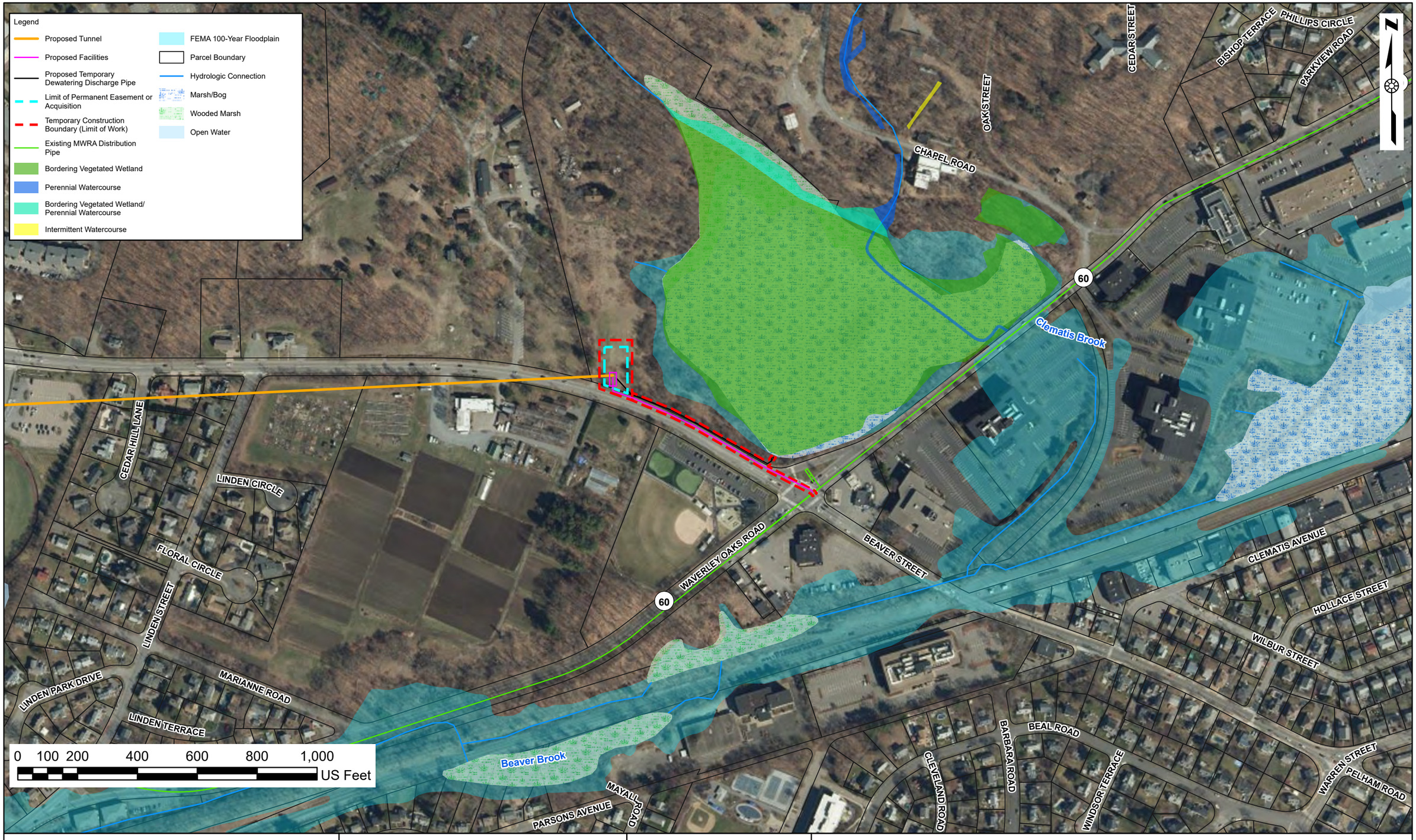
Site	Alternative 3A	Alternative 4A	Alternative 10A
Launching, Receiving, and Large Connection Sites			
UMass Property	0.2	0.2	N/A
Lower Fernald Property	N/A	N/A	1.1
Tandem Trailer (paired with Park Road East)	*0.8*	*0.8*	*N/A*
Park Road East	*0.1*	*0.1*	*N/A*
Bifurcation	*6.1*	*N/A*	*N/A*
Park Road West	*N/A*	*0.2*	*0.2*
Highland Avenue Northwest/Southwest	*2.5*	*2.5*	*2.5*
Highland Avenue Northeast/Southeast	-	-	-
American Legion	*1.5*	*1.5*	*1.5*
Connection and Isolation Valve Sites			
School Street Connection	-	-	-
Cedarwood Pumping Station Connection	*0.1*	*0.1*	*0.1*
Hegarty Pumping Station Connection	*0.2*	*0.2*	*0.2*
St. Mary Street Pumping Station Connection	-	-	-
Newton Street Pumping Station Connection	*0.1*	*0.1*	*0.1*
Southern Spine Mains Connection	*0.3*	*0.3*	*0.3*
Hultman Aqueduct Isolation Valve	-	-	-
Total Acres of Tree Clearing	**11.9**	**6.0**	**6.0**

N/A = Not Applicable, indicating that the site is not used in the alternative.
" - " = No tree clearing anticipated.
Italicized text within the table indicates no change from the DEIR.

10.2.2.1 Alternative 3A/Alternative 4A Construction Period Impacts

UMass Property

Construction period impacts to rare species and wildlife habitat include tree clearing within the LOD as shown in **Figure 10-1**. Most of the staging area is already cleared, but tree removal is anticipated in the southern half of the site. No trees were observed that are potentially suitable for NLEB summer roosting habitat. Snags are present in the southwest portion of the site and would be impacted by construction activities. See **Table 10-2**. Where needed and as appropriate, trees and vegetation removed during construction would be replaced with native trees and plantings.



Metropolitan Water Tunnel Program	MWRA Contract No. 7159 Supplemental Draft Environmental Impact Report 2023	CDM Smith in association with vhb Jacobs GREEN INTERNATIONAL AFFILIATES, INC.	**Rare Species and Wildlife Habitat** **UMass Property Large Connection Shaft Site (Alternatives 3A and 4A)** **Figure 10-1** Waltham, MA Source: MWRA, CDM Smith, VHB, Jacobs, MassGIS

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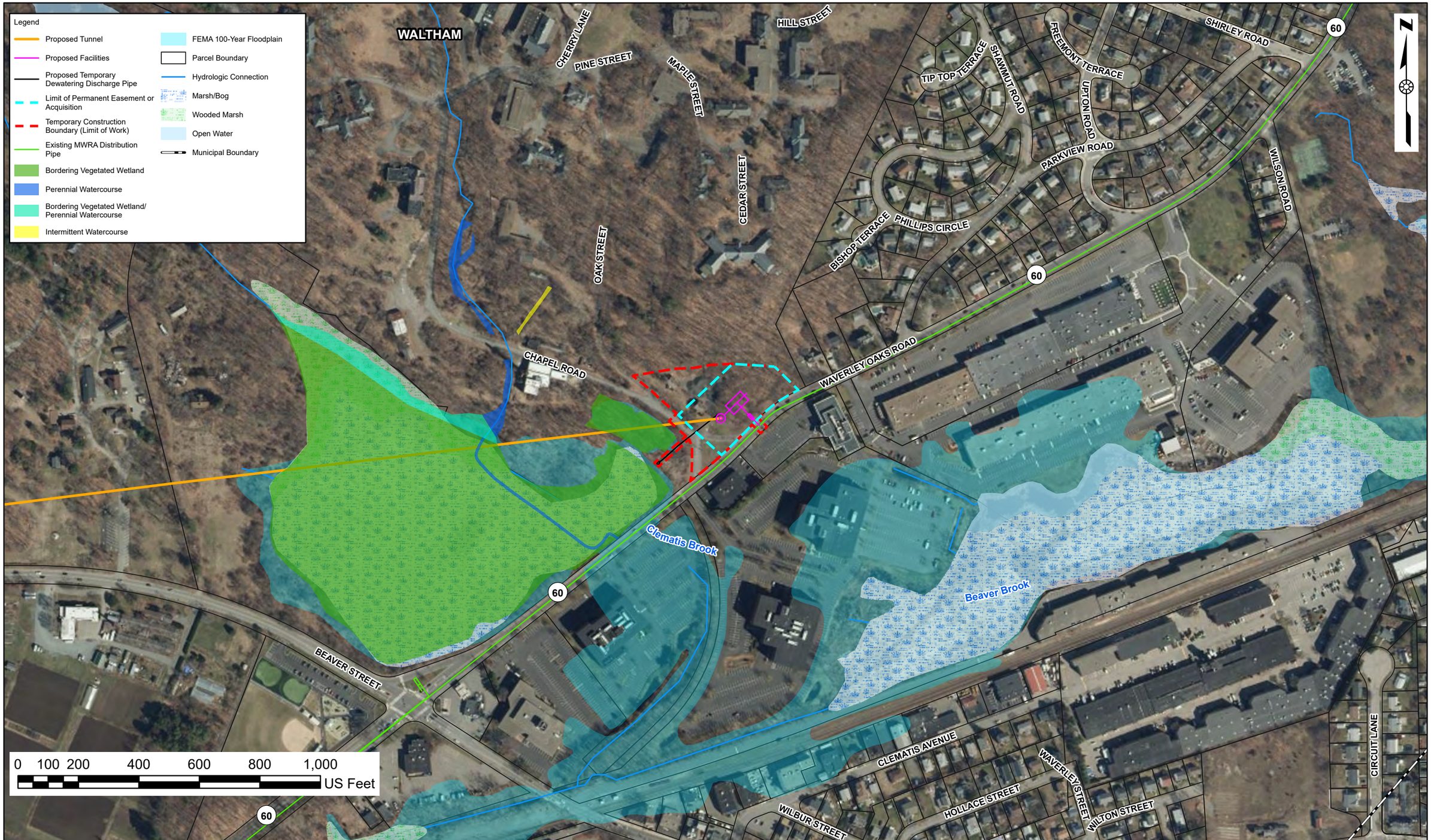

Metropolitan Water Tunnel Program	MWRA Contract No. 7159 Supplemental Draft Environmental Impact Report 2023	CDM Smith in association with vhb Jacobs GREEN INTERNATIONAL AFFILIATES, INC.	**Rare Species and Wildlife Habitat** **Lower Fernald Property Receiving Shaft Site (Alternative 10A)** **Figure 10-2** Waltham, MA Source: MWRA, CDM Smith, VHB, Jacobs, MassGIS

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10.2.2.2 Alternative 10A Construction Period Impacts

Lower Fernald Property

Construction period impacts to rare species and wildlife habitat include tree clearing within the LOD as shown in **Figure 10-2**. Most of the area within the LOD is already cleared, however tree removal would be anticipated in the eastern half of the site. Some trees within the LOD are potentially suitable for NLEB summer roosting habitat. Snags are also present in the eastern portion of the site and would be impacted by construction activities. Where needed and as appropriate, trees and vegetation removed during construction would be replaced with native trees and plantings.

10.2.3 Rare Species and Wildlife Habitat Final Conditions

In the final conditions, ongoing activities at Program sites would include periodic landscaping (e.g., mowing); inspection and maintenance of shafts, valve chambers, and associated utilities; maintenance of access roadways and parking areas (e.g., snow plowing); and maintenance of stormwater management areas. The valve chambers and parking areas would be fenced-in with gated access. Proposed final conditions are described below for the UMass Property site and the Lower Fernald Property site.

None of the maintenance activities during tunnel operation would be anticipated to adversely affect wildlife populations, since the species identified are common to urban and suburban areas and would be expected to be able to tolerate the anticipated minor levels of activity. None of the maintenance or inspection activities would be anticipated to adversely affect fisheries or water quality.

10.2.3.1 Alternative 3A/Alternative 4A Final Conditions

UMass Property

Final conditions for the UMass Property site would include a valve chamber and top-of-shaft structure in the central portion of the site, a stormwater basin, and a paved access drive connecting to Beaver Street. The final site would be fenced to secure the area around the top of shaft and valve chamber. Proposed construction at the UMass Property site includes an underground pipeline traveling southeast from the shaft site along Beaver Street to connect to the existing MWRA distribution line located at the intersection with Waverley Oaks Road. Where needed and as appropriate, trees and vegetation removed during construction would be replaced with native trees and plantings as the final step in the construction and close out process. Tree planting and landscaping will be coordinated with the City of Waltham and community stakeholders during final design.

10.2.3.2 Alternative 10A Final Conditions

Lower Fernald Property

Final conditions for the Lower Fernald Property site would include a valve chamber and top-of-shaft structure in the central portion of the site, a stormwater basin, and a paved access drive connecting to Chapel Road and Waverley Oaks Road. The final site will be fenced to secure the area around the top of shaft and valve chamber. The proposed site would include a buried pipe traveling southeast to connect to the existing MWRA distribution line under Waverley Oaks Road. Where needed and as appropriate, trees and vegetation removed during construction would be replaced with native trees and plantings as the final step in the construction and close out process, in coordination with the City of Waltham and community stakeholders during final design.

10.2.4 Rare Species and Wildlife Habitat Avoidance, Minimization, and Mitigation Measures

Consistent with the DEIR, this section describes the avoidance, minimization, and mitigation measures the Program would pursue to offset the impacts described in **SDEIR Section 10.2.2**, and **SDEIR Section 10.2.3**. The avoidance, minimization, and mitigation measures would be the same for each of the SDEIR Alternatives.

10.2.4.1 Construction Period Mitigation

Due to the statewide potential presence of NLEB habitat (regulated by the ESA), complete avoidance of potential endangered species habitat during the construction phase would not be feasible. The Program, however, incorporates efforts to minimize potential impacts to the species as detailed in the USFWS *Interim Voluntary Guidance for the Northern Long-Eared Bat: Forest Habitat Modification*, minimizing incidental take and promoting conservation of the NLEB.[1] No work is proposed within 0.25 miles of a NLEB hibernacula or within 150 feet of a known maternity roost tree. As outlined in the USFWS's interim guidance, tree clearing would be minimized to the extent practicable, and snags would be avoided and retained to the extent possible. The Program would comply with the USFWS recommended time of year restrictions on tree clearing. Where possible, special consideration would be given to avoid removal of trees with notable cracks, cavities, sloughing, or deeply fissured bark. In accordance with ESA, consultation with the USFWS would occur before construction during the Program's final design and permitting phase. As monarchs are a candidate species, the USFWS has not yet established any requirements for minimizing incidental take of monarchs.

1 U.S. Fish and Wildlife Service, *Interim Voluntary Guidance for the Northern Long-Eared Bat: Forest Habitat Modification*, March 6, 2023, https://www.fws.gov/sites/default/files/documents/Interim%20Guidance%20for%20Habitat%20Modification%20Projects_6Mar23.pdf (accessed May 2, 2023).

10.2.4.2 Final Conditions Mitigation

In the final conditions, ongoing inspection and maintenance activities at Program sites are not anticipated to impact listed species. Normal operations would not involve additional tree removal that could affect NLEB.

10.3 Technical Analysis to Respond to Certificate Comments

No comments were received in the Commonwealth of Massachusetts, Executive Office of Energy and Environmental Affairs Secretary's Certificate on the DEIR related to rare species and wildlife habitat. See **SDEIR Chapter 15, Responses to Comments**, for the full list of delineated comments received on the DEIR in the Certificate and the associated comment letters.

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