South Coast Rail

Draft Supplemental Environmental Impact Report

Massachusetts Bay Transportation Authority

Prepared for

Massachusetts Department of Transportation
Ten Park Plaza
Boston, Massachusetts

Prepared by

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Contract No. 99771

JANUARY 31, 2018

January 31, 2018

Secretary Matthew Beaton
Executive Office of Energy and Environmental Affairs
100 Cambridge Street
Boston MA 02110

Re: EEA No. 14346
Draft Supplemental Environmental Impact Report, South Coast Rail Project Phase 1

Dear Secretary Beaton:

The Massachusetts Department of Transportation (MassDOT) is pleased to submit the attached Draft Supplemental Environmental Impact Report (DSEIR) for Phase 1 of South Coast Rail Project. As you know, MassDOT is proposing to adopt a phased approach to provide service to the South Coast region beginning more than eight years earlier than would otherwise be possible with the Stoughton Straight Electric Alternative (the "Full Build Project") alone. As described in the attached DSEIR, the Phase 1 service will provide a one-seat ride from Fall River and New Bedford to Boston using the Middleborough Secondary to connect South Coast passengers with service on the existing Middleborough Lakeville commuter rail line.

MassDOT believes that the attached document not only fully complies with the Certificate on the Notice of Project Change (NPC) issued on May 26, 2017, but also demonstrates both the feasibility and value of the phased approach. The proposed Phase 1 can achieve passenger service by the end of 2022, provides over 40% of the ridership benefits of the Full Build Project, constructs 56% of the rail miles needed for the Full Build and presents far fewer environmental impacts and permitting challenges. For example, NO wetland variances are required for Phase 1.

This DSEIR analyzes new project elements associated with Phase 1 Service that were not previously studied, including improvements to track infrastructure on the Middleborough Secondary, an active freight line; a new station at Pilgrim Junction in Middleborough; a new station in East Taunton, south of Cotley Junction; and modifications to previously studied stations at Freetown and Fall River. Due to the depth of the analysis in the DSEIR and the high degree of public interest in this project, MassDOT requests that the MEPA office extend the public comment period to 45 days to ensure that stakeholders have ample time to ensure that the DSEIR fully addresses their questions and concerns about Phase 1 service.

Given the extensive planning, analysis and MEPA review that has already occurred on South Coast Rail during the past two decades, and the thorough documentation provided in the DSEIR, MassDOT respectfully requests that you find the DSEIR adequate and proceed to "roll over" the DSEIR into a final EIR, pursuant to 301 CMR 11.08(b)(2)(b). Use of this process, specifically recognized in the May 2017 Certificate on the Notice of Project Change, will help ensure that MassDOT can provide the South Coast with the long-awaited, long-promised rail service that the region needs and deserves by the target date of November 2022.

The DSEIR has been circulated to agencies, elected officials, municipalities, and commenters as required by MEPA regulations. Copies of the document are available at public libraries throughout the study area, and a limited number are available on request. The DSEIR is also available in electronic format on MassDOT's SCR website (www.mass.gov/southcoastrail).

Please publish notice of availability of the DSEIR for public review in the February 7, 2018 edition of *The Environmental Monitor*. We look forward to continuing to work with EEA to implement this important public transportation and economic development project.

Respectfully,

Stephanie Pollack
Secretary of Transportation and CEO
MassDOT

Cc: See Distribution List

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Acronyms and Abbreviations

ACEC	Area of Critical Environmental Concern
ADA	Americans with Disabilities Act
AHCW	Automatic Highway Crossing Warning
APE	Area of Potential Effect
APR	Agricultural Preservation Restriction
ASTM	American Society for Testing and Materials
ATR	Automatic Traffic Recorder
AUL	Activity and use limitation
BCR	Bird Conservation Region
BFE	Base flood elevation
BLSF	Bordering Lands Subject to Flooding
BM	BioMap
BMP	Best Management Practice
BOL	Bill of Lading
BVW	Bordering Vegetated Wetlands
BWSC	Boston Water and Sewer Commission
CAA	Clean Air Act
CAAA	Clean Air Act Amendments
CAPS	Conservation Assessment and Prioritization System
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation and Liability Information System
CFR	Coldwater Fish Resource
Chapter 91	Massachusetts General Law Chapter 91
CIR	Color-Infrared
CMP	Conservation and Management Plan

CO	Carbon Monoxide
CO2	Carbon Dioxide
Corps	U.S. Army Corps of Engineers (also USACE)
CPI	Consumer Price Index
CRMP	Cultural Resource Monitoring Program
CROCC	Commuter Rail Operations Control Center
CSO	Combined Sewer Overflow
CSX	CSX Transportation, Inc.
CTEC	Centralized Electric and Traffic Control
CTPS	Central Transportation Planning Staff
CVP	Certified Vernal Pool
CWA	Clean Water Act
CWCS	Comprehensive Wildlife Conservation Strategy
CWR	Continuous Welded Rail
CZM	Coastal Zone Management
CZMP	Coastal Zone Management Plan
DA	Department of the Army
dB	Decibels
DCAM	Division of Capital Asset Management
DCR	Department of Conservation and Recreation (Massachusetts)
DEIR	Draft Environmental Impact Report
DEIS	Draft Environmental Impact Statement
DEP	Massachusetts Department of Environmental Protection (also MassDEP)
DER	Massachusetts Division of Ecological Restoration
DFA	Massachusetts Department of Food and Agriculture
DFW	Massachusetts Division of Fisheries and Wildlife
DIF	District Improvement Financing
DO	Dissolved Oxygen
DOC	Diesel oxidation catalysts

USDOT	U.S. Department of Transportation
DPA	Designated Port Area
DPF	Diesel particulate filters
DPS	Downgradient Property Status
DSEIR	Draft Supplemental Environmental Impact Report
EEA	Massachusetts Executive Office of Energy and Environmental Affairs
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EJ	Environmental Justice
ENF	Environmental Notification Form
EO	Executive Order
EOEA	Executive Office of Environmental Affairs
EOHED	Executive Office of Housing and Urban Development (Massachusetts)
EOT	Massachusetts Executive Office of Transportation and Public Works (now MassDOT)
EPA	U.S. Environmental Protection Agency (also USEPA)
EPH	Extractable Petroleum Hydrocarbon
ERNS	Emergency Response Notification System
ESA	Environmental Site Assessment
ESA	Endangered Species Act (Federal)
FEIR	Final Environmental Impact Report
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FPPA	Farmland Protection Policy Act
FRA	Federal Railroad Administration
FRRA	Fall River Redevelopment Authority
FSEIR	Final Supplemental Environmental Impact Report
FTA	Federal Transit Administration
GATRA	Greater Attleboro Taunton Regional Transit Authority

GHG	Greenhouse Gases
GIS	Geographic Information Systems
GWSA	Global Warming Solution Act
HCM	*Highway Capacity Manual*
HOV	High Occupancy Vehicle
HSG	Hydric Soil Group
HSIPR	High Speed Intercity Passenger Rail
HSR	High-speed Rail
Hz	Hertz
IBA	Important Bird Area
ICG	Interagency Coordinating Group
IEI	Index of Ecological Integrity
ILF	In-Lieu Fee
ILSF	Isolated Land Subject to Flooding
in/s	Inches per second
ISD	Intersection Sight Distance
ISO	Independent System Operator
IPAC	Information for Planning and Consultation (USFWS)
ips	Inches per Second
IWH	Important Wildlife Habitat
IWPA	Interim Wellhead Protection Area
JTW	Journey-to-Work
KNR	Kiss & Ride
kV	Kilovolt
Ldn	Day-Night Averaged Sound Level
LED	Light-Emitting Diode
Leq	Energy-Averaged Equivalent Sound Level
lf	Linear feet
LID	Low Impact Development

LOS	Level of Service
LNG	Liquid Natural Gas
LRTP	Long Range Transportation Plan
LSF	Land Subject to Flooding
LSP	Licensed Site Professional
LUHPPL	Land Use with Higher Potential Pollutant Loads
LUST	Leaking underground storage tank
LUW	Land Under Waterbodies and Waterways
MAPC	Metropolitan Area Planning Council
MAS	Maximum Authorized Speed
MassDEP	Massachusetts Department of Environmental Protection (also DEP)
MassDOT	Massachusetts Department of Transportation
MassGIS	Massachusetts Office of Geographic Information
MBTA	Massachusetts Bay Transportation Authority
MCP	Massachusetts Contingency Plan
MCRR	Massachusetts Coastal Railroad
MCZMP	Massachusetts Coastal Zone Management Program
MEP	Mechanical, Electrical and Plumbing Professional
MEPA	Massachusetts Environmental Policy Act
MESA	Massachusetts Endangered Species Act
MGL	Massachusetts General Law
MHC	Massachusetts Historical Commission
MIPAG	Massachusetts Invasive Plant Advisory Group
mips	Micro Inch per Second
MMTCO2e	Million Metric Tons of Carbon Dioxide Equivalent
MOA	Memorandum of Agreement
MOVES	Motor Vehicle Emissions Simulator
mph	Miles per hour
MPO	Metropolitan Planning Organization

MRA	Multiple Resource Area
MS4	Municipal Separate Storm Sewer Systems
MSAT	Mobile Source Air Toxic
MUTCD	Manual of Uniform Traffic Control Devices
NAAQS	National Ambient Air Quality Standards
NAICS	North American Industry Classification System
National Register	National Register of Historic Places
NCHRP	National Cooperative Highway Research Program
NEC	Northeast Corridor
NEPA	National Environmental Policy Act
NHESP	Natural Heritage and Endangered Species Program
NHL	National Historic Landmark
NHPA	National Historic Preservation Act
NLEV	National Low Emission Vehicle
NMFS	National Marine Fisheries Service
NOx	Nitrogen Oxides
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NPS	National Park Service
NRCS	Natural Resources Conservation Service
O&M	Operations and Maintenance
OCC	Operational Control Center
OCPC	Old Colony Planning Council
OCS	Overhead Catenary System
OCS	Overhead Contact System
OHM	Oil or Hazardous Materials

ORAD	Order of Resource Area Delineation
ORW	Outstanding Resource Water
OSHA	Occupational Safety and Health Administration
OSRD	Open Space Residential Development
OTAQ	EPA's Office of Transportation and Air Quality
PA	Programmatic Agreement
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PDA	Priority Development Area
PE	Preliminary Engineering
PEM	Palustrine Emergent Marsh
PFO	Palustrine Forested Wetland
PM	Particulate Matter
PNR	Park & Ride
POW	Palustrine Open Water
PPA	Priority Preservation Area
ppm	Parts Per Million
PSS	Palustrine Shrub Scrub
PTC	Positive Train Control
PVP	Potential Vernal Pool
RA	Riverfront Area
RAO	Response Action Outcome
RCRA	Resource Conservation and Recovery Act
REC	Recognized Environmental Condition
RFG	Reformulated Gasoline
RMS	Root Mean Square
ROS	Remedy Operation Status
ROSP	Regional Open Space Plan
ROW	Right-of-Way

RPA	Regional Planning Agency
RSA	Road Safety Audit
RTA	Regional Transit Authority
RTDM	Regional Travel Demand Model
RTN	Release Tracking Number
RTP	Regional Transportation Plan
SCADA	Supervisory Control and Data Acquisition
SHPO	State Historic Preservation Office
SIP	State Implementation Plan (for air quality)
SMS	Stormwater Management Standards
SGR	State of Good Repair
SPD	Special Project Designation
SRPEDD	Southeastern Regional Planning and Economic Development District
SRTA	Southeastern Regional Transit Authority
SSA	Sole Source Aquifer
SSD	Stopping Sight Distance
STIP	State Transportation Improvement Program
SWL	Solid Waste Landfill
SWMP	Stormwater Management Plan
SWPPP	Stormwater Pollution Prevention Plan
TAZ	Traffic Analysis Zone
TCP	Traditional Cultural Property
TDR	Transfer of Development Rights
THPO	Tribal Historic Preservation Officer
TIF	Tax Increment Financing
TIGER	Transportation Investment Generating Economic Recovery
TIP	Transportation Improvement Program
TMC	Turning Movement Count
TMDL	Total Maximum Daily Load

TNM	Traffic Noise Model
TOD	Transit-oriented Development
TOY	Time of Year Restriction
TREDIS	Transportation Economic Development Impact System Model
TSD	Storage and Disposal
TSS	Total Suspended Solids
UMass	University of Massachusetts
USACE	U.S. Army Corps of Engineers (also Corps)
USDA	U.S. Department of Agriculture
USDOI	U.S. Department of the Interior
USEPA	U.S. Department of Environmental Protection
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
USPS	United States Postal Service
UST	Underground Storage Tank
v/c	Volume–to–Capacity (ratio)
VdB	Vibration Velocity Levels in Decibels
VMP	Vegetated Management Plan
VMT	Vehicle Miles Travelled
VOC	Volatile Organic Compound
VPH	Volatile Petroleum Hydrocarbon
WLA	Waste Load Allocation
WMA	Wildlife Management Area
WPA	Massachusetts Wetlands Protection Act
WQC	Water Quality Criteria
WQS	Water Quality Standards
WSC	Wooded Swamp Coniferous
WSD	Wooded Swamp Deciduous
WSM	Wooded Swamp Mixed

YOP	Yearly Operating Plan
µPa	Micropascals

1. Introduction and Project Purpose

1.1 Introduction

The Commonwealth of Massachusetts is committed to moving forward with the South Coast Rail (SCR) Project and to do so in a manner that provides long-awaited commuter rail service for the South Coast region, expeditiously. For this reason, the Massachusetts Department of Transportation (MassDOT) is proceeding with design and permitting of the Stoughton Straight Electric Alternative (also referred to as the "Full Build Project") previously reviewed under the Massachusetts Environmental Policy Act (MEPA), while also proposing a phased approach that will provide service to the region years before the Full Build Project can be completed. Phase 1 will provide commuter rail service from New Bedford, Fall River, and Taunton to Boston by using existing active freight rail corridors.

1.1.1 Purpose of Phasing

Since the 2013 Final Environmental Impact Statement(FEIS)/Final Environmental Impact Report(FEIR) for the SCR Project, MassDOT has advanced the conceptual design of the Stoughton Straight Electric Alternative. Based on the advanced design, MassDOT has determined that the timeline for implementing service was significantly longer than originally anticipated. MassDOT also determined that with the delay, the cost of the Project will continue to increase with inflation. The time required to complete the SCR Project includes not only time to complete the design and construction of the project, but also time required to complete final design and obtain environmental permits, which is substantially longer for the Stoughton to Taunton segment than for the Southern Triangle. The Program Management/Construction Management (PM/CM) team has estimated a projected schedule of 16 years to complete the Full Build, which was based on funding available in the 2017-2021 Capital Investment Plan. These estimates were reviewed and verified based on standard construction practices, as well as an independent cost estimator. The estimated permitting time of four or more years is based on experience with local, state, and federal agencies, and the fact that there are areas of environmental sensitivity that require variances from MassDEP and the development and implementation of detailed and costly mitigation measures.

MassDOT believes that service to the South Coast communities is critical, and delaying service until the Full Build Project can be constructed (anticipated to be no sooner than 2030) is not ideal. Therefore, MassDOT has adopted a phased approach to the Project. The Phased implementation of SCR service does not change the overall purpose of the Project, which is to more fully meet the existing and future demand for public transportation between Fall River/New Bedford and Boston, and to enhance regional mobility while supporting smart growth planning and development strategies in the affected communities. The start of Phase 1 operations in 2022 will advance the Project's purpose and need on an accelerated schedule.

1.1.2 Benefits of Phasing

MassDOT has developed the South Coast Rail phasing plan to expedite delivering commuter rail service to the South Coast, avoid and minimize wetlands impacts, and to reduce overall project costs by starting construction sooner. This will allow benefits to be realized earlier (beginning in 2022) than they would if Phase 1 service were not provided, in which case benefits would not begin to be realized until 2030, at the earliest. Phase 1 is projected to result in approximately 1,600 new daily inbound boardings at new stations (East Taunton, Freetown, Fall River Depot, King's Highway, and Whale's Tooth). On an annual basis, this equates to over 800,000 (inbound + outbound) trips per year for passengers using those stations. The Full Build will further increase this ridership by constructing five additional stations, increasing frequency, and reducing travel times. The benefits of the project extend beyond ridership alone, and include, for example, reduced vehicle miles traveled (VMT), reduced, predictable travel time between the South Coast and the Boston area, minimize air quality impacts, and economic development at an earlier date.

1.1.3 Phase 1 Description

The majority of Phase 1 will use infrastructure within the Southern Triangle, which has already been reviewed in the FEIS/FEIR and will be part of the SCR Full Build facility. The Southern Triangle extends from Cotley Junction in Taunton to Fall River using the Fall River Secondary Line, and to New Bedford using the New Bedford Main Line. The Project will improve the existing track infrastructure and add stations and overnight layover facilities for commuter-rail service. The new infrastructure elements to be included in Phase 1 are the use of the existing Middleborough Secondary freight line to connect the Southern Triangle to the Middleborough Main Line and the construction of a new station in Middleborough (see Figure 1-1). Phase 1 will build on improvements to the Middleborough Secondary and Southern Triangle rail corridors, made as part of MassDOT's State of Good Repair (SGR) program.

This Draft Supplemental Environmental Impact Report (DSEIR) analyzes the new elements being proposed as part of Phase 1, which include:

- Improvements to track infrastructure on the Middleborough Secondary;
- A new station at Pilgrim Junction in Middleborough;
- A new station in East Taunton south of Cotley Junction;
- Modifications to previously studied stations at Freetown and Fall River Depot; and
- Use of diesel locomotives for Phase 1 Service, with Tier 4 locomotives phased in to the fleet.

This DSEIR supplements the 2013 FEIS/FEIR and reviews new elements associated with the Phase 1 Service that were not previously studied and reviewed. The Middleborough Alternative was previously evaluated in the MEPA and the National Environmental Protection Act (NEPA) review processes, but was ultimately not pursued because it did not meet ridership criteria as fully as the Stoughton Straight Alternative, and therefore did not fully advance the Project purpose. This DSEIR analyzes the Phase 1 route as well as various service options and station locations/configurations and reports on the impacts of the new elements. The document also provides an update on the total impacts of Phase 1, and the cumulative impacts of Phase 1 and the SGR projects. This DSEIR does not re-analyze those elements of the Project included in the FEIS/FEIR analysis that remain unchanged.

1.1.4 Supporting Activities

MassDOT is currently initiating SGR projects within the limits of Phase 1 South Coast Rail primarily to maintain the existing freight service infrastructure. Though the SGR improvements support the existing freight operations, they will also help set the stage for the future South Coast Rail service and accelerate the construction schedule. SGR construction is currently underway along the Middleborough Secondary, including replacement of wood ties and two railroad bridges. Future SGR projects anticipated within the Phase 1 limits include replacing culverts, bridges and grade-crossing upgrades.

The SGR projects are defined as track right-of-way infrastructure upgrades that replace existing infrastructure in its existing footprint, in accordance with the “footprint bridge exemption” provisions of the 2014 Massachusetts Transportation Bond Bill (c. 79 of the Acts of 2014), These are exempt from the Massachusetts Wetlands Protection Act and Public Waterfront Act, but require state Water Quality Certification. SGR projects do not include new projects or expansion of existing infrastructure to accommodate South Coast Rail passenger service, such as double track. New portions of Phase 1 that do not qualify for the SGR exemptions will be designed and permitted as outlined in this document.

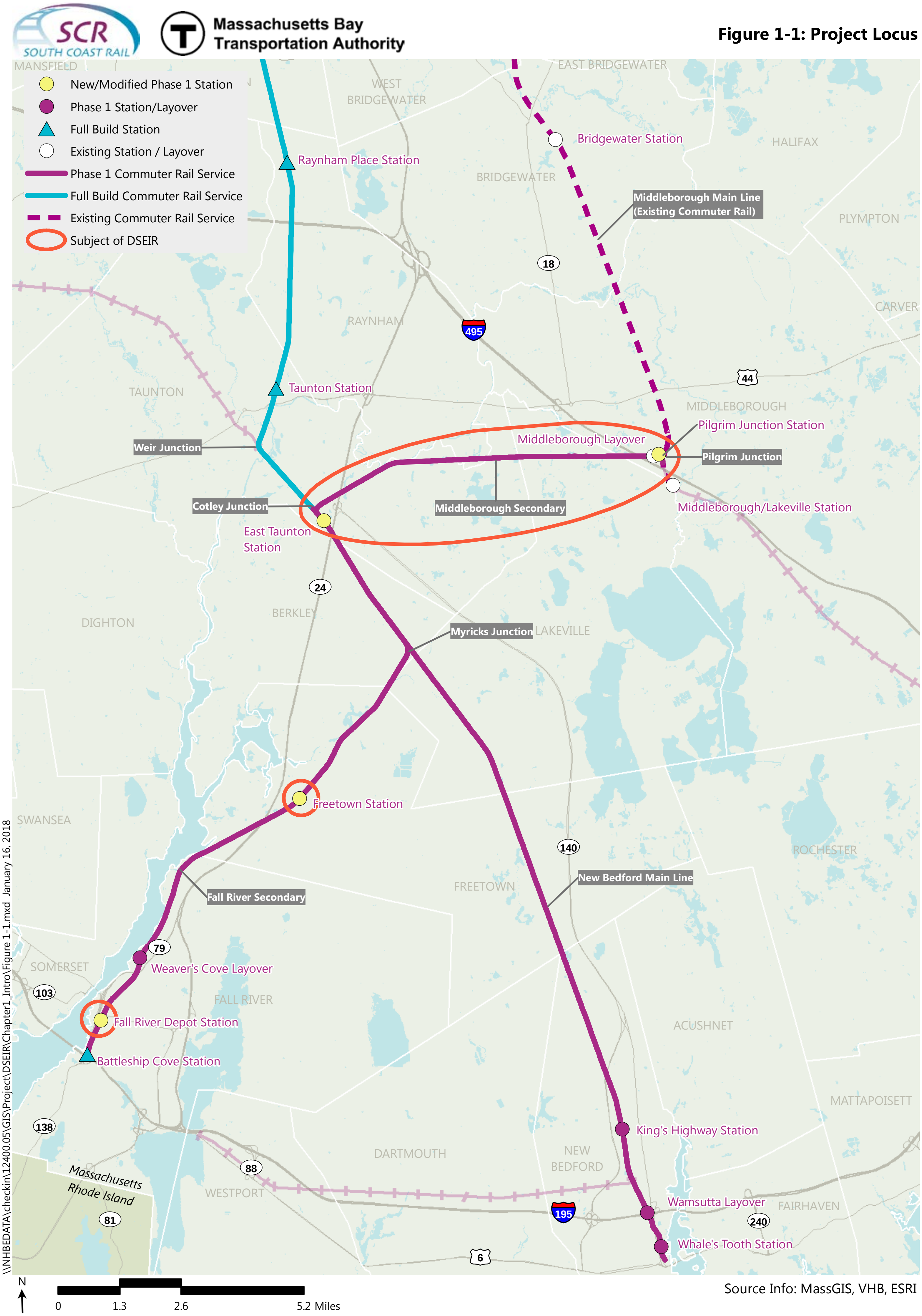

Figure 1-1: Project Locus

Source Info: MassGIS, VHB, ESRI

\\NHBEDATA\checkin\12400.05\GIS\Project\DSEIR\Chapter1_Intro\Figure 1-1.mxd January 16, 2018

1.2 Purpose and Need

The SCR Project is an initiative of MassDOT, implemented through the Massachusetts Bay Transportation Authority (MBTA). MassDOT's stated purpose is to more fully meet the existing and future demand for public transportation between Fall River/New Bedford and Boston and to enhance regional mobility while supporting smart growth planning and development strategies in the South Coast communities. At its completion, the SCR Project will extend the existing Stoughton Line commuter rail service south to Fall River and New Bedford using the out-of-service Stoughton Line from Stoughton to Taunton, the New Bedford Main Line from Taunton to New Bedford, and the Fall River Secondary from Myricks Junction (Berkley) to Fall River. The addition of phased service does not change the overall purpose or need of the Project as stated in the FEIS/FEIR. The Phase 1 Project will still help address transportation deficiencies in the South Coast Region of Massachusetts, and help to more fully meet the existing and future demand for public transportation between Fall River and New Bedford, and enhance regional mobility.

Phasing allows many of the overall Project goals to be met sooner than will be realized by the Full Build scenario alone. The commencement of Phase 1 operations will advance the Project's purpose and need on an accelerated schedule. The Full Build design is proceeding and is anticipated to be complete no sooner than 2030. Additional information describing how Phase 1 will advance the Project's Purpose and Need is provided in Section 2.7.1.

1.3 Project History and Regulatory Context

The SCR Project has been extensively studied in different configurations for more than 25 years. In 2002, an FEIS/FEIR prepared by the MBTA concluded that the Stoughton Straight Alternative was the most practicable and feasible of the alternatives, and identified it as the preferred route. On August 30, 2002, the Secretary of Energy and Environmental Affairs (the Secretary) issued a Final Certificate (Executive Office of Environmental Affairs [EEA] File # 10509) stating that the FEIR adequately and properly complied with MEPA and its implementing regulations. The Certificate authorized MassDOT to proceed with planning for the South Coast Rail Project as an extension of the existing Stoughton Line. However, further planning was delayed until April 2007, when the Commonwealth of Massachusetts released *South Coast Rail: A Plan for Action*, and the Project became a priority transportation initiative for the Commonwealth under the Patrick Administration.

For the Project to proceed to construction it will be necessary for MassDOT to obtain a permit from the U.S. Army Corps of Engineers (USACE) for the discharge of dredged or fill material in waters of the United States under Section 404 of the Clean Water Act. This required the USACE to conduct a federal environmental review in accordance with NEPA. The USACE and MEPA agreed to coordinate the environmental review for the Project. As the lead federal agency for the environmental review pursuant to NEPA, the USACE prepared a federal Environmental Impact Statement (EIS), which MassDOT reviewed and adopted as its state-required Environmental Impact Report (EIR).

The coordinated environmental review process began with a joint federal/state scoping process. Key milestones included:

- MassDOT, as the lead state agency, submitted an Environmental Notification Form (ENF) to EEA on November 15, 2008 for public review under MEPA, concurrent with the USACE's public scoping process under NEPA.
- The Secretary of EEA reviewed the Project (EEA No. 14346) and issued a Certificate on the ENF, with a Scope for the Draft EIR (DEIR), on April 3, 2009.
- A combined DEIS/DEIR was filed with the MEPA Office on March 15, 2011 and the Secretary issued a Certificate on the DEIR, with a Scope for the Final EIS/R (FEIS/FEIR), on June 29, 2011.
- The FEIS/FEIR was released in September 2013. The Secretary issued a Final Certificate in November 2013, stating that the FEIR adequately and properly complied with MEPA and its implementing regulations and that the Project could proceed to permitting, thus completing the MEPA process.

To date, the USACE has not issued the Record of Decision that will complete the NEPA process.

Since the 2013 FEIS/FEIR, MassDOT has advanced the design of the Project and determined that the timeline for implementing service was significantly longer than originally anticipated. MassDOT believes that service to the South Coast communities is critical, and such a delay is not in the best interests of the Commonwealth. Therefore, MassDOT has adopted a phased approach to the Project.

In accordance with 310 CMR 11.00, MassDOT filed a Notice of Project Change (NPC), which was published in the Environmental Monitor on March 22, 2017, describing the phased approach to Project implementation. A certificate was issued on May 26, 2017, with a scope for a DSEIR limited to an analysis of the proposed changes associated with Phase 1 of the Project. The Certificate indicated that upon review of the DSEIR, if no substantive issues remain to be addressed, the document could be reviewed as a Final Supplemental Environmental Impact Report (FSEIR) in accordance with 301 CMR 11.08(8)(b)(2). MassDOT has respectfully requested that the Secretary make such a determination.

1.4 Changes Since the NPC

The NPC for the SCR Project described the proposed changes that will result from implementing Phase 1 service. It provided an overview of proposed changes to what was reported in the 2013 FEIS/FEIR, and discussed aspects of the Project that are further analyzed in this DSEIR.

Since the filing of the NPC, the following changes have been made to the Project:

- The location of a new station in Middleborough has been identified (Pilgrim Junction);

- The option to provide train shuttle service from the existing Middleborough/Lakeville Station to a modified existing station on the Middleborough Main Line has been eliminated;
- MassDOT has confirmed that construction of the Freetown Station will be completed as part of Phase 1, and that construction of the Battleship Cove Station will be undertaken as part of the Full Build;
- The location of the East Taunton Station has been confirmed;
- A modified track profile that significantly reduces wetland impacts has been developed;
- The service implementation date has been moved up from 2024 to 2022.

1.5 Preferred Alternative

The Phase 1 Preferred Alternative consists of the following actions:

- Reconstruct track and make infrastructure improvements on the Southern Triangle (common to both Phase 1 and Full Build), as described in the FEIS/FEIR;
- Reconstruct existing track from Pilgrim Junction to Cotley Junction along the Middleborough Secondary, building on improvements begun under the State of Good Repair Program;
- Construct a maintenance-of-way siding along the Middleborough Secondary in Taunton;
- Upgrade five railroad at-grade roadway crossings along the Middleborough Secondary;
- Build six new stations, including:
    - Two stations as proposed in the FEIS/FEIR (King's Highway and Whale's Tooth in New Bedford);
    - Two stations with design modifications from the FEIS/FEIR (Fall River Depot and Freetown);
    - One station relocated from the FEIS/FEIR (East Taunton); and
    - One newly proposed station (Pilgrim Junction, in Middleborough).
- Extend the existing Middleborough Main Line service to New Bedford and Fall River:
    - Add two new trips per day to the existing Middleborough Main Line service to support Phase 1 (from 24 to 26 weekday trips); and
    - Operate six round-trip trains per weekday from Fall River Depot and seven round-trips per weekday from New Bedford for a total of 13 daily round-trips to the South Coast (26 weekday trips in total).

Chapter 2, *Alternatives Analysis*, provides additional details pertaining to operations and required infrastructure.

1.6 Project Benefits

Phased implementation of the Project will not negatively impact the benefits of the Project described in the FEIS/FEIR documents. In fact, many benefits to the South Coast region will be realized much earlier with the implementation of Phase 1 interim service than they would if Phase 1 were not advanced.

The Project will result in improvements to the transportation system, benefits to environmental justice populations, reductions in greenhouse gas emissions, and opportunities for smart growth, as described below and throughout this DSEIR.

Compared to current travel between the South Coast region and Boston, providing commuter rail service will improve peak period travel times by an average of 19 to 36 minutes (making train travel 18 to 34 percent faster) compared to bus or auto trips. This comparison is provided only to current auto travel times; it is expected that future auto travel times will increase due to further congestion increasing the travel time savings offered by MBTA commuter rail service.

Public Transportation

The Project will provide new public transportation service between the South Coast region and Boston with 1,600 new daily boardings originating from the South Coast communities such as Fall River and New Bedford. By implementing phased service, the Project will begin serving South Coast communities in 2022. According to research from the American Public Transportation Association, public transportation has a multitude of benefits. Research shows that public transportation:

- Improves mobility, particularly access for isolated residents in small urban areas;
- Lowers accident rates: Public transit has 0.03 fatal accidents per 100 million miles—about 1/25th the rate for automobiles. Injuries as well as fatalities are reduced;
- Boosts real estate values;
- Fosters more livable communities and encourages neighborhood interaction; and
- Provides access for all ages by creating connections to educational facilities and offering seniors independence.

Regional Transportation Connectivity

Currently, residents of the South Coast communities have few alternatives outside of driving to work. Phase 1 Service will provide increased mobility and regional opportunity. Similar to Full Build, Phase 1 service will provide direct service, known as a “one-seat ride,” from South Coast communities to Boston South Station.

Environmental Justice Benefits

One of the goals of the SCR Project is to improve transit services including benefits to environmental justice populations by improving mobility and regional access. Beneficial impacts include improved access to transit services, making it easier to reach employment and educational opportunities, general mobility, and improved air quality. Environmental justice (EJ) populations are present in the Project Area in Taunton, Fall River, and New Bedford.

Increased access will reduce peak period travel times to Boston and other employment centers. Average train travel times from Fall River and New Bedford are projected to be 91 to 95 minutes. Train travel times are more consistent and therefore more predictable than driving and represent 18 to 34 percent improvement over driving during the peak travel times. EJ populations generally have less access to automobiles than the statewide average. Improved access to transit and jobs resulting from earlier implementation of transit oriented development (TOD) around the proposed stations will benefit these populations. While the Full Build will provide the greatest improvement in access to jobs for both Fall River and New Bedford EJ populations, Phase 1 will begin to bring benefits to these populations much earlier than will be possible under the Full Build.

1.7 Permits and Approvals

The FEIS/FEIR provided a detailed discussion of permits required to construct the Full Build Project. Due to the addition of new Phase 1 elements, some additional permits will be required. Table 1-1 below lists the state and federal agency environmental permits and approvals initially required for Phase 1, as well as the remaining permits required to complete the Full Build Project.

Table 1-1 State and Federal Permits and Clearances

Permit	Phase 1	Full Build (Post Phase 1)
Wetland Protection Act Orders of Conditions	Middleborough	Canton
	Lakeville	Stoughton
	Raynham	Easton
	Taunton	Raynham
	Berkley	Taunton
	Freetown	Berkley
	Fall River	Lakeville
	New Bedford	Freetown
		Fall River
		New Bedford

Table 1-1 State and Federal Permits and Clearances (Continued)

Permit	Phase 1	Full Build (Post Phase 1)
Section 401 Water Quality Certification	Individual WQC required for State of Good Repair Project Individual WQC for Phase 1 Infrastructure	Required
Section 404 Clean Water Act	Required	Required
Chapter 91 Licenses	Required (Weaver's Cove Layover only)	Required
Massachusetts Coastal Zone Management Consistency Determination	No additional consistency determination	No additional consistency determination
Conservation and Management Permit	Required	Required
MEPA Clearance	Required for new Phase 1 elements (Middleborough Secondary, new stations)	Issued in 2013
NEPA Clearance	Required for USACE Section 404 Permit	Required for USACE Section 404 Permit

Source: VHB

1.8 Public and Agency Outreach

In the fall of 2016, MassDOT conducted a series of public meetings in the communities along the Project route to solicit public comment on MassDOT's Phased Project approach to South Coast Rail. Meetings were held in New Bedford, Fall River, Taunton, Canton, Easton, and Middleborough. The six public meetings drew strong attendance in every community, including elected officials, with more than 400 people signed in. More than 200 comment letters were submitted following the meetings. MassDOT and the MBTA posted the public meeting presentations on the Project website (www.massdot.state.ma.us/southcoastrail/Home.aspx). Summaries of meeting attendance and the key issues raised in each meeting are available as well.

The NPC and a Project Update for Spring 2017 were posted to the website, posted in the Environmental Monitor, and circulated to the Project contact database (including all persons and agencies that commented on the SCR EIR). After the March 2017 NPC filing, MassDOT hosted two NPC public meetings in Spring 2017 in Dartmouth and Taunton during the comment period. Public comments on the NPC are addressed in this DSEIR (Appendix G, *NPC Certificate and Responses to Comments*).

MassDOT will continue to present its plans for the Phased Project approach to a wide range of stakeholders, and will engage in ongoing inter-agency planning sessions and workshops. MassDOT will provide regular updates about the Project to public agencies, community representatives, advocacy groups, and other interested parties. Periodic updates to the website, fact sheets, and email blasts will also be sent to the project's extensive email list.

MassDOT is also undertaking a comprehensive interagency coordination effort and has re-engaged the South Coast Rail Interagency Coordinating Group (ICG) to facilitate the preparation and review of this document. The interagency group includes USACE, U.S. Environmental Protection Agency (EPA), National Park Service, EEA, Massachusetts Department of Environmental Protection (MassDEP), Massachusetts Department of Fish and Game, Natural Heritage and Endangered Species Program (NHESP), Massachusetts Office of Coastal Zone Management (CZM), Massachusetts Historical Commission (MHC), Massachusetts Division of Ecological Restoration, Massachusetts Department of Conservation and Recreation and Mashpee and Aquinnah Wampanoag Tribal Historic Preservation Offices.

The Project team has met with federal, state and local agencies and other government officials, as well as members of the public, throughout 2016 and 2017. As part of this outreach, MassDOT has met with municipalities to review the project, at-grade crossings, stations, and wetland impacts, and has made presentations at public meetings including meetings of town Selectmen and Conservation Commissions. Agency coordination has included meeting with individual agencies (MassDEP, NHESP, USACE, Mass Division of Marine Fisheries) as well as the ICG.

1.9 Anticipated Schedule

As of the publication of this DSEIR, project development for South Coast Rail Phase 1 is anticipated to follow the schedule in Table 1-2. During this time, design for elements of the Full Build project will also be advanced.

Table 1-2 Phase 1 Schedule

Activity	Start Date	End Date
Preliminary Engineering	July 2014	January 2018
Secure Permits	August 2017	September 2018
Final Design	February 2018	April 2019
Construction	By June 2019	June 2022
System Test and Commissioning	June 2022	November 2022
Start of Revenue Service	November, 2022	

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2. Alternatives Analysis

2.1 Introduction

The Massachusetts Environmental Policy Act (MEPA) requires a project proponent to consider a reasonable range of alternatives that could meet the Project purpose and need and provide an explanation of why alternatives were eliminated from the detailed study (301 CMR 11.00(f)). During the initial MEPA review of the South Coast Rail (SCR) Project from 2008-2013, the alternatives analysis process began with an analysis of 65 potential alternatives, with subsequent screening and detailed analyses. These were summarized in the September 2013 Final Environmental Impact Statement (FEIS)/Final Environmental Impact Report (FEIR). Throughout this process, public, agency, and stakeholder input was considered in the development and evaluation of alternatives through the state and federal environmental review processes and public involvement efforts. The previous analysis evaluated five main routes.[1]

Based on the results of the alternatives evaluation and input received during interagency coordination, the Massachusetts Department of Transportation (MassDOT) selected the Stoughton Straight Electric Alternative as the preferred alternative, as documented in the 2013 FEIS/FEIR. Since the 2013 FEIS/FEIR, MassDOT has advanced the design of the Project and determined that the timeline for implementing service along the Stoughton Straight route will be significantly longer than originally anticipated due to the length of time required for permitting and construction, and that the cost of the Project will be substantially greater than previously estimated.

To advance this critical service to the underserved Fall River, New Bedford, and Taunton communities in the short term, MassDOT has adopted a phased approach to the Project, as described in the Notice of Project Change (NPC) filed in March 2017. MassDOT is advancing the Middleborough service option as the first phase of the Project (as discussed in Section 2-3 below) while the Stoughton Straight Electric Alternative advances through design and permitting.[2] As shown in Figure 2-1, Phase 1 will extend existing Middleborough/Lakeville service to New Bedford and Fall River using the Middleborough Secondary, New Bedford Main Line, and Fall River Secondary freight lines (common to both Phase 1 and the Full Build).

MassDOT is filing this Draft Supplemental Environmental Impact Report (DSEIR) with MEPA to provide information about the potential environmental effects from the first phase of the Project that were not previously evaluated. Since the Middleborough service option was dismissed as a permanent-service option in the FEIR, the environmental effects of a portion of this route, and appropriate mitigation

[1] See FEIS/FEIR, Chapter 3 – Alternatives, for more details.
[2] The "Full Build" refers to the completion of the Stoughton Straight Electric Alternative.

measures, were not evaluated in detail. The remaining portion of the route, the Middleborough Main Line, does not require evaluation because it is an existing line, and Phase 1 will not include significant changes to service or infrastructure.

The majority of the Phase 1 route, known as the Southern Triangle, was previously reviewed as part of the 2013 FEIS/FEIR. The Southern Triangle is an existing active freight rail corridor extending from Cotley Junction in Taunton to Fall River (the Fall River Secondary Line), and from Cotley Junction to New Bedford (the New Bedford Main Line). The Phase 1 Project will improve the track infrastructure along this route, as well as add new stations and overnight layover facilities for commuter rail service. Phase 1 also includes new Project elements, which will connect the Southern Triangle to the Middleborough Main Line at Pilgrim Junction in Middleborough and upgrade Cotley Junction in Taunton (Figure 2-1). These new elements will improve the track infrastructure along the Middleborough Secondary (Figure 2-1), currently an active freight rail line, to make it suitable for passenger service. This chapter discusses the proposed Phase 1 service options analyzed as part of this process and considers modified station locations and/or layouts at Taunton, Freetown, and Fall River as part of the Phase 1 service.

MassDOT views Phase 1 service as an interim service until the Full Build service along the Stoughton route can be provided. The Phase 1 service provides utility in the short term by contributing to many of the Project goals to deliver service to New Bedford and Fall River in a more timely manner than the Full Build.

In the long term, the Phase 1 route will provide independent utility since the capital construction elements will improve existing freight track infrastructure along a critical freight corridor and will add new commuter rail capacity. A connection from the South Coast region to Boston via the Middleborough Main Line will also provide a level of redundancy and resiliency that will be an asset within this corridor upon completion of the Full Build Program. Resiliency is an important element, as the distance from these terminal cities to Boston will be the longest in the MBTA system in Massachusetts and the chance of having impacts and barriers to service increases over distance. The likelihood of barriers to service in the Full Build is even greater since the Stoughton Line joins the Northeast Corridor (NEC), a high frequency line with various complicated service conditions. By providing a permanent alternative to bypass these potential service obstacles from stations in the Southern Triangle, the MBTA service from New Bedford and Fall River could recover from a service interruption far more quickly than it could without the improvements associated with the phased service. In addition, because the Phase 1 route passes through fewer flood-prone areas than the Full Build route, it will provide resiliency in the event of extreme weather events. By having a permanent alternative route to use in those situations, MassDOT increases the level of resiliency in the corridor to a level that is warranted and appropriate.

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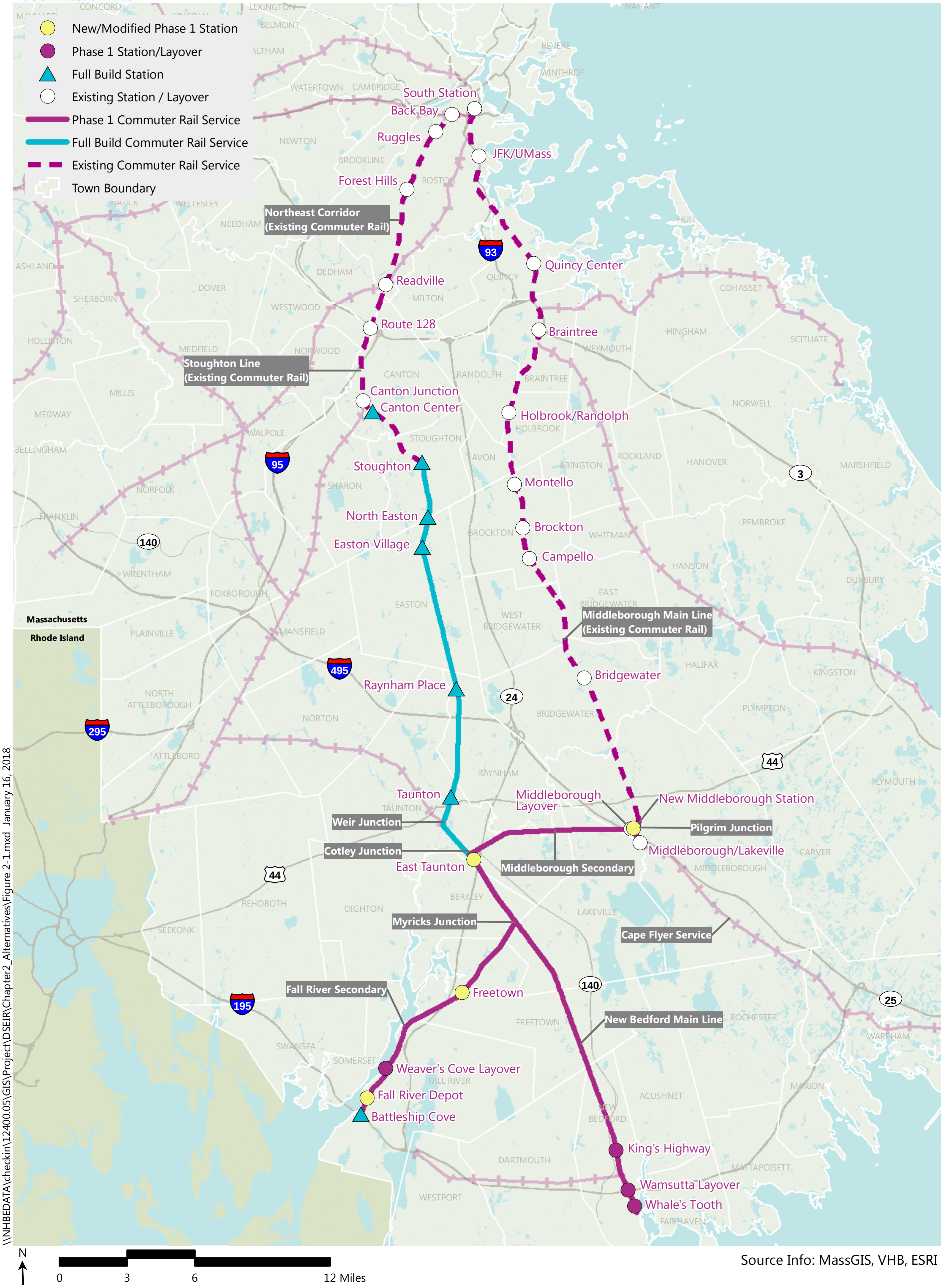
Figure 2-1: Phased Service



\\NHBEDATA\checkin\12400.05\GIS\Project\DSEIR\Chapter2_Alternatives\Figure 2-1.mxd January 16, 2018

Source Info: MassGIS, VHB, ESRI

The Phase 1 service will be practicable based on the Section 404 Permit definition: "capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purpose." Similarly, it will meet the overall Project purpose "to more fully meet the existing and future demand for public transportation between Fall River/New Bedford and Boston, Massachusetts, to enhance regional mobility." Sections 2.4 and 2.5 describe the reasons that Phase 1 service is practicable and meets the Project purpose.

If MassDOT does not implement phased service to the region (referred to in this document as the "No-Action" scenario), then the SCR Full Build, as described in the FEIS/FEIR, will proceed, though service will be provided later than the anticipated start of operations described in the FEIS/FEIR. In the No-Action scenario, communities will not realize the benefits of the SCR service until the start of Full Build operations no sooner than 2030, rather than in 2022 with Phase 1.

This chapter describes Phase 1 in more detail. It responds to the NPC Certificate requirement to "analyze operational and service options and station locations within Phase 1" by including:

- A description of the operational and service options to support Phase 1, including identification of a preferred service option;
- A description of station requirements to support Phase 1, including an analysis of station siting for new stations and a detailed review of design changes at existing stations;
- A full description of the proposed Phase 1 service, including operations, infrastructure requirements, and supporting information; and
- An analysis of ridership for Phase 1, as well as an updated analysis of ridership for the Full Build preferred alternative (the Stoughton Straight Electric Alternative).

2.1.1 Requirements of Certificate

The Secretary's Certificate requires the DSEIR to address the following:

- The alternatives considered for phasing and the criteria used to evaluate them, including the relative importance of the criteria;
- An analysis of operational and service options and station locations within Phase 1, including:
  - o A "one-seat ride" from Fall River/New Bedford with a cross platform connection north of Middleborough/Lakeville Station;
  - o A "one-seat ride" from Fall River/New Bedford including a relocated Middleborough/Lakeville Station to a point north or west of Pilgrim Junction;
  - o Station locations for East Taunton and a relocated Middleborough/Lakeville Station; and
  - o Construction of Freetown and Battleship Cove stations in Phase 1 or Full Build;

- A comparative analysis of the environmental impacts of the alternatives and impacts on service, constructability, schedule, and cost;
- Rationale for the selection of the Phase 1 Preferred Alternative and elimination of other alternatives from consideration; and
- An analysis of ridership, including:
  - Identification of any changes to the model since it was used to evaluate the Full Build, considering comments regarding its inputs;
  - Incorporation of Phase 1 station locations and/or grade crossings into the ridership modeling;
  - Information on fares, parking fees, and other aspects of financing;
  - Discussion of how future developments that may affect ridership are accounted for;
  - Consideration of uncertainty factors and model sensitivity;
  - Confirmation and justification of forecast year;
  - Transit statistics, including boardings by station, linked trips, and mode shifts;
  - An estimate of the cost per rider; and
  - Explanation of how the air quality assessment accounts for mode shifts.

This information is provided in the sections below and in Appendix A, *CTPS Memorandum*.

2.2 Methodology

This chapter includes a three-level analysis of the proposed phased service described in the following sections:

1) Section 2.3 describes the high-level routing alternatives considered, and selects a preferred route for the Phase 1 service. This analysis only considered routes that would use existing rail infrastructure to meet the interim service goals of providing a one-seat ride[3] between Fall River/New Bedford and Boston by 2022.
2) With the preferred route selected, Section 2.4 describes the analysis of different service options along the Phase 1 route. Evaluation criteria for each service option are defined in Section 2.4.1.
3) The preferred service option may require new or modified stations in comparison to those proposed in the FEIS/FEIR. Section 2.5 provides an analysis of station siting for the preferred service option. Evaluation criteria for station siting are defined in Section 2.5.1.

[3] A one-seat ride occurs when passengers board the train and remain aboard for the entire duration of the trip without transferring to another train or bus. A two-seat ride would require a transfer.

2.3 Potential Routing Options for Phase 1 Service

MassDOT only considered routes of existing rail infrastructure in order to meet the interim service goals of providing a one-seat ride between Fall River and New Bedford and Boston by 2022. The analysis identified two routing options that would use existing rail infrastructure (Figure 2-2):

1) via the Attleboro Secondary to the Northeast Corridor (NEC); and
2) via the Middleborough Secondary to the Middleborough Main Line.

Section 2.3.1 defines the criteria used to evaluate the Phase 1 routing options. Sections 2.3.2 and 2.3.3 discuss the evaluation of the Phase 1 routing options via Attleboro and via Middleborough.

2.3.1 Evaluation Criteria

MassDOT used the following criteria to evaluate the feasibility and practicability of each of the routing options:

- *Achieves goals for Phase 1 service*. Evaluated how well each alternative achieves the goals for Phase 1 service, identified below:
    - *Provide a one-seat ride between Fall River/New Bedford and Boston.* This analysis did not consider routes that would require a transfer for passengers from Fall River/New Bedford. A cross-platform transfer would increase the travel time and would decrease the attractiveness of the Phase 1 service, which would result in lower ridership. In addition, public engagement in 2016 and 2017 included negative feedback regarding potential two-seat options, reinforcing the impact that a transfer would have on ridership.
    - *Begin operating service by 2022.* Meeting this schedule for construction and implementation is partially dependent on permitting complexity, as options requiring new infrastructure with lengthier permitting timelines are less likely to meet the schedule goal for Phase 1 service. Routes that would require extensive infrastructure upgrades or have significant environmental impacts would delay service beyond the goal of 2022 and were not considered further.
- *Provide adequate capacity for MBTA Operations.* Considered the capacity of each routing option to provide peak and off-peak service to Fall River/New Bedford without reducing the frequency or routing of existing passenger or freight trips.

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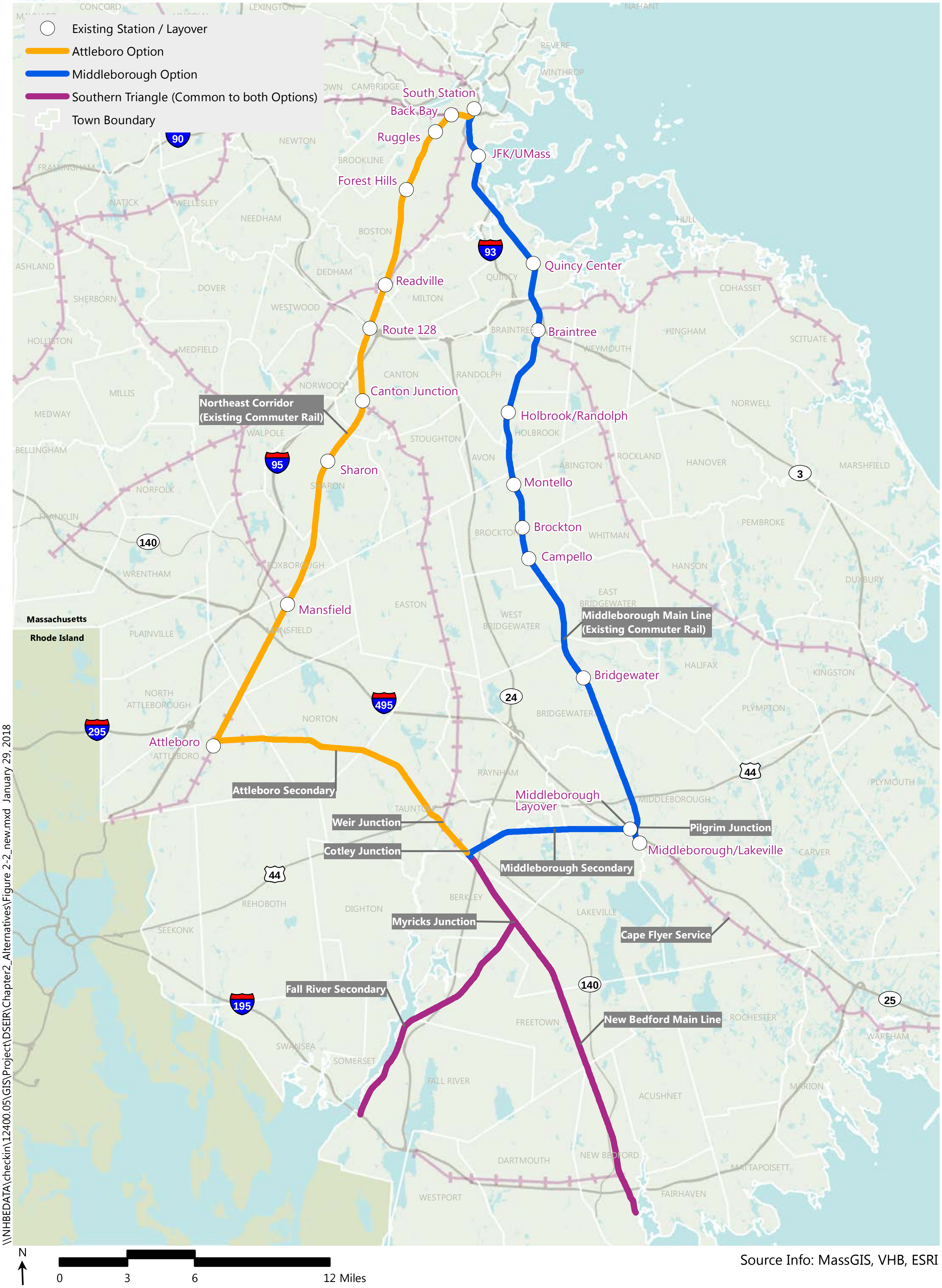
Figure 2-2: Potential Phase 1 Routes Using Existing Rail Infrastructure



\\NHBEDATA\checkin\12400.05\GIS\Project\DSEIR\Chapter2_Alternatives\Figure 2-2_new.mxd January 29, 2018

Source Info: MassGIS, VHB, ESRI

2.3.2 Attleboro Routing Option

The Attleboro Secondary is a routing option that was considered for Phase 1 service. This option would use the Attleboro Secondary and NEC to travel to/from Boston South Station. The NEC currently serves the MBTA's Needham, Franklin, and Providence/Stoughton Line trains, as well as Amtrak intercity high-speed and regional rail services. To provide Phase 1 service, the MBTA would either need to divert trips from these existing services to New Bedford and Fall River or add trips to the NEC beyond the number that operate today. Since diverting trips would reduce the frequency of existing operations , this section considers the feasibility of providing Phase 1 service by adding new trips to the NEC and MBTA system.

The NEC is a highly utilized line that currently operates with limited available capacity. The Attleboro Secondary ties into the Northeast Corridor tracks just north of the existing Attleboro Station and this connection only allows for southbound train movements. Using this route for Phase 1 Service from New Bedford and Fall River would require the train to back into Attleboro Station and reverse move north to Boston. This reverse move would require at least 15 minutes of additional time to accommodate operational and safety requirements. This reverse move is not practicable along the NEC given its limited capacity, and would result in severe operational impacts to existing Amtrak and MBTA services.

To avoid this operational impact, the DEIS/DEIR and FEIS/FEIR[4] evaluated the construction of a new Attleboro Secondary connection to the NEC to allow for a connection north, bypassing the Attleboro Station. This bypass would roughly follow a National Grid right-of-way from the Northeast Corridor at 2.6 miles north of Attleboro Station to the Attleboro Secondary near Chartley Pond. The construction of this new bypass would have environmental and community impacts, and could not be constructed by 2022 so it is not considered for Phase 1 service

In addition, providing a reasonable service to Fall River and New Bedford by increasing the number of trips along the NEC with the existing infrastructure would impact existing MBTA and Amtrak services. As discussed in the DEIS/DEIR, to support an increased number of trips along the NEC, the Attleboro Alternative would require construction of a third track along the heavily congested NEC between the proposed Attleboro Bypass and the Readville Interlocking in Boston (a distance of approximately 18 miles), constructing a fourth track along the NEC between Forest Hills Station and Back Bay Station, as well as major reconstruction of three existing commuter rail stations (Canton Junction, Sharon, and Mansfield). Prior operational analyses indicated that, without constructing a fourth track, the Attleboro Alternative would be operationally infeasible and contribute to a cascading negative impact on the on-time performance on four lines of the southerly commuter rail system. In addition to the

[4] South Coast Rail *Draft Environmental Impact Statement/Draft Environmental Impact Report*. Chapter 3 – Alternatives, February 2011.
South Coast Rail *Final Environmental Impact Statement/Final Environmental Impact Report*. Chapter 3 – Alternatives, August 2013.

infrastructure improvements required to support operations along the NEC, the limited capacity at South Station during peak periods would pose operational issues due to the additional train sets required for this option.

The analysis presented in the DEIS/DEIR detailed how the potential impacts, construction costs and schedule implications of these extensive infrastructure improvements, as well as key property and other impacts associated with construction of a fourth track, are not practicable. Selecting the Attleboro Alternative for the Phase 1 service would not achieve the goal of Phase 1 to deliver commuter rail service to New Bedford and Fall River in a more timely manner than the Full Build because it would require significant infrastructure improvements. Therefore, this option was dismissed from further consideration.

2.3.3 Middleborough Routing Option

The Middleborough Secondary provides a second routing option for Phase 1 service. MassDOT previously identified the Middleborough service option as an alternative to the Stoughton Straight Electric Alternative. This option was dismissed as a permanent-service option because it did not fully meet Full Build ridership or quality of service (frequency) criteria and therefore only partially met the Project purpose and need. Although the Middleborough route did not meet the Full Build ridership and quality of service criteria, it does provide an option for earlier passenger service because it takes advantage of existing active freight rail lines with operational capacity (the Middleborough Secondary, New Bedford Main Line, and Fall River Secondary) and is an extension of existing service on the Middleborough Main Line. Because this routing option can extend existing service, rather than introduce new service onto an existing line, it limits the number of new trips within the commuter rail system.

The Middleborough Alternative will extend existing Middleborough Main Line trains by upgrading existing infrastructure. Service along the Middleborough Secondary will travel within an exclusive right-of-way not shared with other passenger services. The Middleborough Alternative does not have significant environmental implications, could be constructed without substantial impacts to the existing transportation system and within a reasonable time frame, and provides both short-term and long-term benefits to MBTA operations.

The preferred routing using the Middleborough Secondary includes two junctions that influence the service provided: Pilgrim Junction and Cotley Junction (Figure 2-3). Pilgrim Junction is the point at which the Middleborough Secondary track alignment connects to the Middleborough/Lakeville Main Line in Middleborough. Cotley Junction in Taunton is the point at which the Southern Triangle connects to the Middleborough Secondary.

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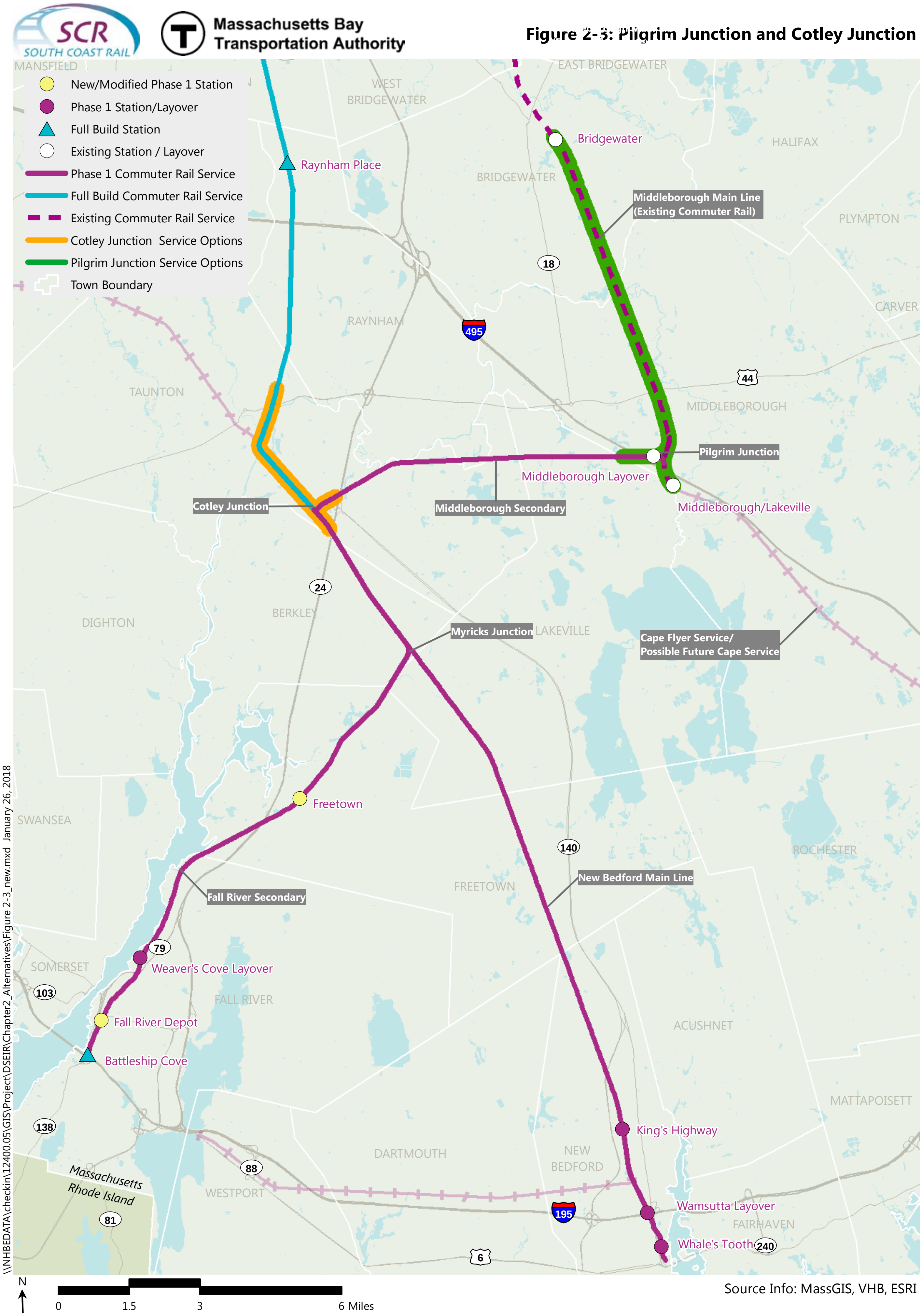
Figure 2-3: Pilgrim Junction and Cotley Junction



Source Info: MassGIS, VHB, ESRI

The existing Middleborough/Lakeville station is south of Pilgrim Junction, and would not be in the direct path of a trip between Fall River/New Bedford and Boston via Middleborough. Similarly, the Taunton stations proposed in the FEIS/FEIR would be located north of Cotley Junction, and would not be in the direct path of a trip between Fall River/New Bedford and Boston. Section 2.4 considers service options focused at these two junctions, and identifies:

1) A preferred service through Pilgrim Junction, serving at least one station in Middleborough or Lakeville; and
2) A preferred service through Cotley Junction, serving at least one station in Taunton.

Section 2.4 considers service options through Pilgrim Junction and Cotley Junction independently, since any of the Pilgrim Junction service options could be combined with any of the Cotley Junction service options. Together, the preferred Pilgrim Junction service option and the preferred Cotley Junction option combine to form the preferred Phase 1 service option.

2.4 Potential Phase 1 Service Options

The DSEIR alternatives analysis considered potential commuter rail service options to deliver Phase 1 service between Boston and Fall River/New Bedford, both through Pilgrim Junction and through Cotley Junction. Each option would provide a one-seat ride between Boston and Fall River/New Bedford. The operational, environmental, and schedule impacts of each option are discussed in the following sections.

Options considered through Pilgrim Junction, serving at least one station in Middleborough or Lakeville, are:

1) *Pilgrim Junction Service Option 1* would provide a one-seat ride between Fall River/New Bedford and Boston via a reverse move at the existing Middleborough/Lakeville Station in Lakeville. No new station would be constructed.
2) *Pilgrim Junction Service Option 2* would provide a one-seat ride between Fall River/New Bedford and Boston, the existing Middleborough/Lakeville Station would remain in service, and Middleborough/Lakeville passengers would take a shuttle train to a modified Bridgewater Station and transfer across the platform to the Boston-bound train. No new station would be constructed.
3) *Pilgrim Junction Service Option 3* would provide a one-seat ride between Fall River/New Bedford and Boston via a new Middleborough Station to a point north or west of Pilgrim Junction, and would include a bus or van shuttle between the existing Middleborough/Lakeville Station and the new Middleborough Station to provide a transfer to the Boston-bound train.

Service Options through Cotley Junction, serving at least one station in Taunton, include:

1) *Cotley Junction Service Option 1* would provide a one-seat ride between Fall River/New Bedford and Boston via a reverse move at Taunton Station proposed in the FEIS/FEIR). The Stoughton Straight Electric Alternative included two stations north of Cotley Junction – a station at Taunton Depot, off Route 140 in Taunton at the rear of a shopping plaza that contains Target, Home Depot,

and other stores; and a station in downtown Taunton, located along Arlington Street near Dean Street (Route 44), adjacent to the historic Old Colony Railroad Station. Cotley Junction Service Option 1 would serve both stations.

2) *Cotley Junction Service Option 2* would provide a one-seat ride between Fall River/New Bedford and Boston via a reverse move at the Taunton Depot Station proposed in the FEIS/FEIR. Under this option the downtown Taunton Station would be built as part of the Full Build.

3) *Cotley Junction Service Option 3* would provide a one-seat ride between Fall River/New Bedford and Boston via a new station south of Cotley Junction. Under this option the downtown Taunton Station would be built as part of the Full Build.

4) *Cotley Junction Service Option 4* would provide a one-seat ride between Fall River/New Bedford and Boston via a new station south of Cotley Junction, as in Cotley Junction Service Option 3, but would also provide a one-seat ride between the downtown Taunton Station proposed in the FEIS/FEIR and Boston by providing less frequent service to each of the three termini than in Cotley Junction Service Options 1-3.

Section 2.4.1 defines the criteria used to evaluate the Phase 1 service options. Sections 2.4.2 and 2.4.3 discuss the evaluation of the Phase 1 service options for Pilgrim and Cotley Junctions.

2.4.1 Evaluation Criteria

MassDOT used the following criteria to evaluate the feasibility and practicability of each of the service options:

- *Achieves goals for Phase 1 service*. Each service option should provide a one-seat ride between Fall River/New Bedford and Boston with service beginning in 2022. Meeting this schedule for construction and implementation is partially dependent on permitting complexity, as options requiring new infrastructure with lengthier permitting timelines are less likely to meet the schedule goal for Phase 1 service.

- *Impacts to existing and future MBTA Operations.* Considered the operations of each service option. This included several sub criteria, such as:

    - *Operational flexibility and reliability.* Measured by the infrastructure provided and the service operations. Minimizing the number of operational conflicts (where trains meet and pass each other) can also increase the operational reliability. Meanwhile, flexible service options would not preclude future increased Cape service (specific to Pilgrim Junction service options, since potential future Cape service would integrate with Phase 1 in Middleborough or Lakeville).

    - *Effect on existing MBTA Service.* Measured by changes in travel time or changes to station availability/access for existing MBTA riders.

    - *Travel time.* Measured by time to travel between Boston South Station and the New Bedford/Fall River terminal stations for each service option. Shorter travel times can improve customer satisfaction and make rail more attractive compared to other modes, resulting in increased ridership.

- *Infrastructure*. Considered how new and upgraded infrastructure required for the service option would affect the Project cost, permitting, and ability to begin operating service by 2022.
- *Environmental impacts*. Considered minimization of environmental impacts, and how permitting requirements could delay the Project schedule.

2.4.2 Pilgrim Junction Service Options

Pilgrim Junction Service Option 1 – One-Seat Ride via Reverse Move through Existing Middleborough/Lakeville Station

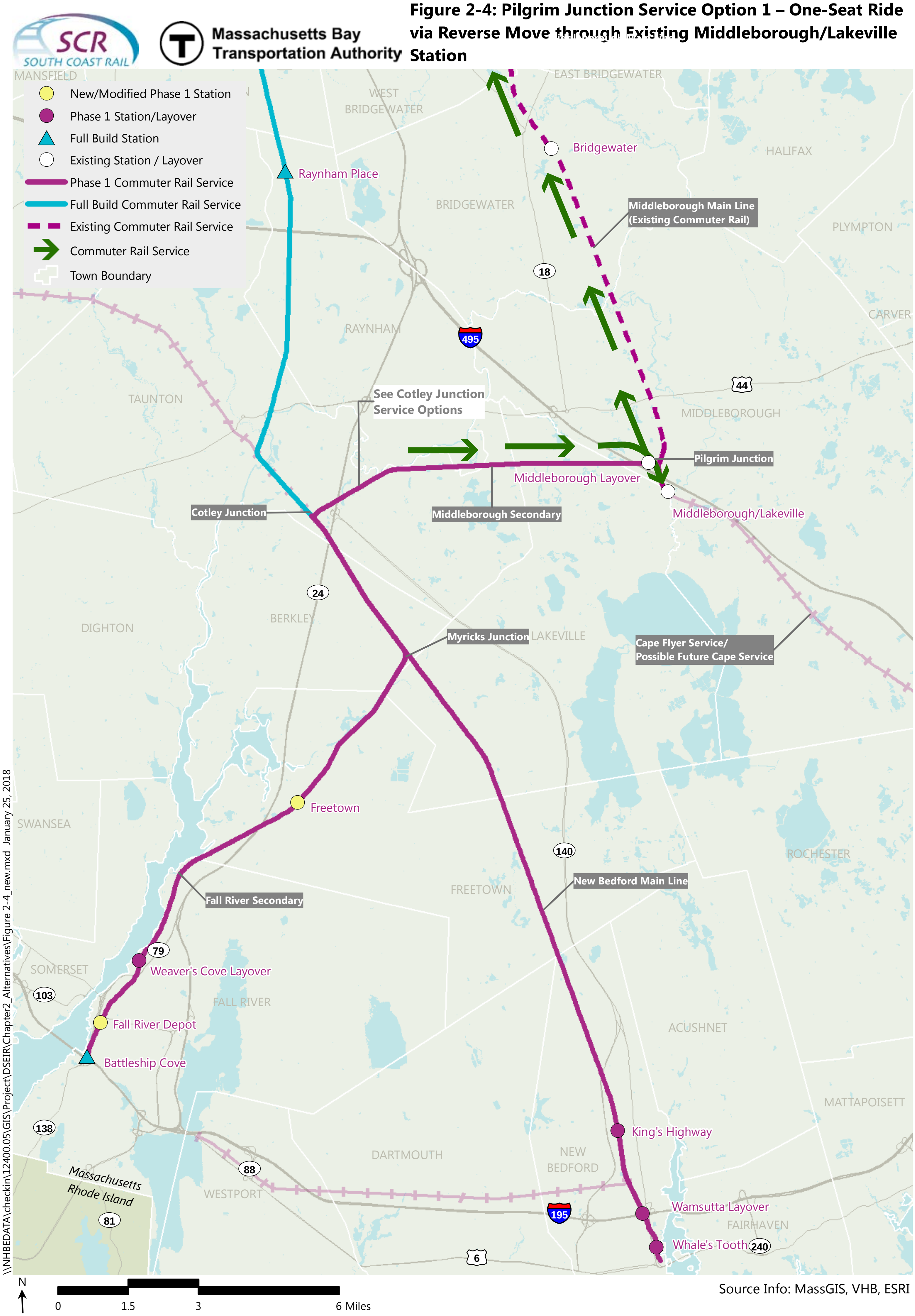
This option would extend existing Middleborough/Lakeville trains to New Bedford and Fall River, with a stop at the existing Middleborough/Lakeville Station (Figure 2-4). Since the existing station is south of Pilgrim Junction, traveling between Boston and New Bedford/Fall River via the Middleborough/Lakeville Station would require trains to make a reverse move at the existing station (Figure 2-4). This change in direction would require at least 15 minutes of additional time to accommodate required operational and safety requirements.

This reverse move would impact all passengers using the service from the South Coast Study Area (while maintaining the existing travel time for existing Middleborough/Lakeville riders, although increasing the risk of delay). This would impact the customer experience for new riders, and would result in lower ridership for the Phase 1 service. This option creates the longest travel time for New Bedford/Fall River riders (105+ minutes) of the Pilgrim Junction service options considered.

Although this service option would not preclude future Cape service, improvements for future Cape service would require additional infrastructure improvements, including adding a second track and reconstructing the station to include either a center island platform or a second side platform (which would then require vertical circulation to allow for transfers and pedestrian access). Constructing a center island platform in this location would require reconstructing a bridge and impacts to wetlands. The station reconstruction would produce additional land and right-of-way impacts, including the parcel north of the tracks across from Middleborough/Lakeville Station (182 South Main Street). This parcel contains or intersects many valuable resources (including Prime Farmland Soils, NHESP Priority Habitats of Rare Species, NHESP Estimated Habitats of Rare Wildlife, Middleborough Water Resource Protection district, and Federal Emergency Management Agency (FEMA) Flood Areas).

This option was dismissed from further consideration due to the operational impacts associated with occupying Middleborough/Lakeville Station for at least 15 minutes while reversing the train and the lower quality of Phase 1 service for potential riders from the South Coast Study Area due to the added trip time.

Figure 2-4: Pilgrim Junction Service Option 1 – One-Seat Ride via Reverse Move through Existing Middleborough/Lakeville Station



Source Info: MassGIS, VHB, ESRI

Pilgrim Junction Service Option 2 – One-Seat Ride via Shuttle to Bridgewater Station from Existing Middleborough/Lakeville Station

This option would extend the existing Middleborough Main Line trains between Bridgewater and New Bedford/Fall River, and would not provide a stop in Middleborough or Lakeville on the route between Boston and New Bedford/Fall River. Instead, a rail shuttle service would connect the existing Middleborough/Lakeville Station to the existing Bridgewater Station so that passengers could transfer to the Boston service (Figure 2-5), which would result in 26 additional trips daily along the 7-mile single track portion of the Middleborough Main Line between the Middleborough/Lakeville and Bridgewater Stations. This would require substantial infrastructure improvements, including double track to support the increased operations along the line.

Along with Option 3, this alternative would provide one of the shortest New Bedford/Fall River travel time at approximately 91 minutes. Option 2 adds travel time for existing Middleborough Main Line riders by requiring the transfer at Bridgewater Station. This option would allow the existing Middleborough/Lakeville Station to remain open to service the existing Cape Flyer. It also could support a future Cape service connection by extending the rail shuttle from the existing Middleborough/Lakeville Station.

The existing single-track infrastructure between Bridgewater Station and Middleborough/Lakeville Station could impact the operational reliability of the Phase 1 service, resulting in additional risk of delay by having two train service s on a single track between Pilgrim Junction and Bridgewater. It also would require existing passengers at the Middleborough/Lakeville Station to use a shuttle to/from Bridgewater Station, a transfer that would add approximately five minutes to their travel time to Boston. Providing a cross-platform transfer for shuttle passengers (two-seat ride) requires the reconstruction of Bridgewater Station, resulting in additional complexity and cost.

To be a viable service option, this option would require substantial infrastructure improvements. Avoiding meet/pass conflicts and maintaining reliability would require double-tracking the Middleborough Main Line from Pilgrim Junction to Bridgewater Station, a distance of over 7 miles. These infrastructure improvements would have additional land/right-of-way requirements, increased environmental impacts, and would necessitate a wetland variance, which could extend the time required to initiate construction by two years. The double-track construction would be on active commuter rail right-of-way and would likely result in significant additional costs to accommodate the additional track, which could result in potential disruptions to operations during nights and weekends.

Due to construction-period schedule and permitting complexity, it is unlikely that this option could be implemented within the preferred 5-year Phase 1 service schedule. Because of the environmental impacts, effects on existing Middleborough Main Line riders in implementing a two-seat ride, and the construction schedule required to avoid operational impacts, this option was dismissed from further consideration.

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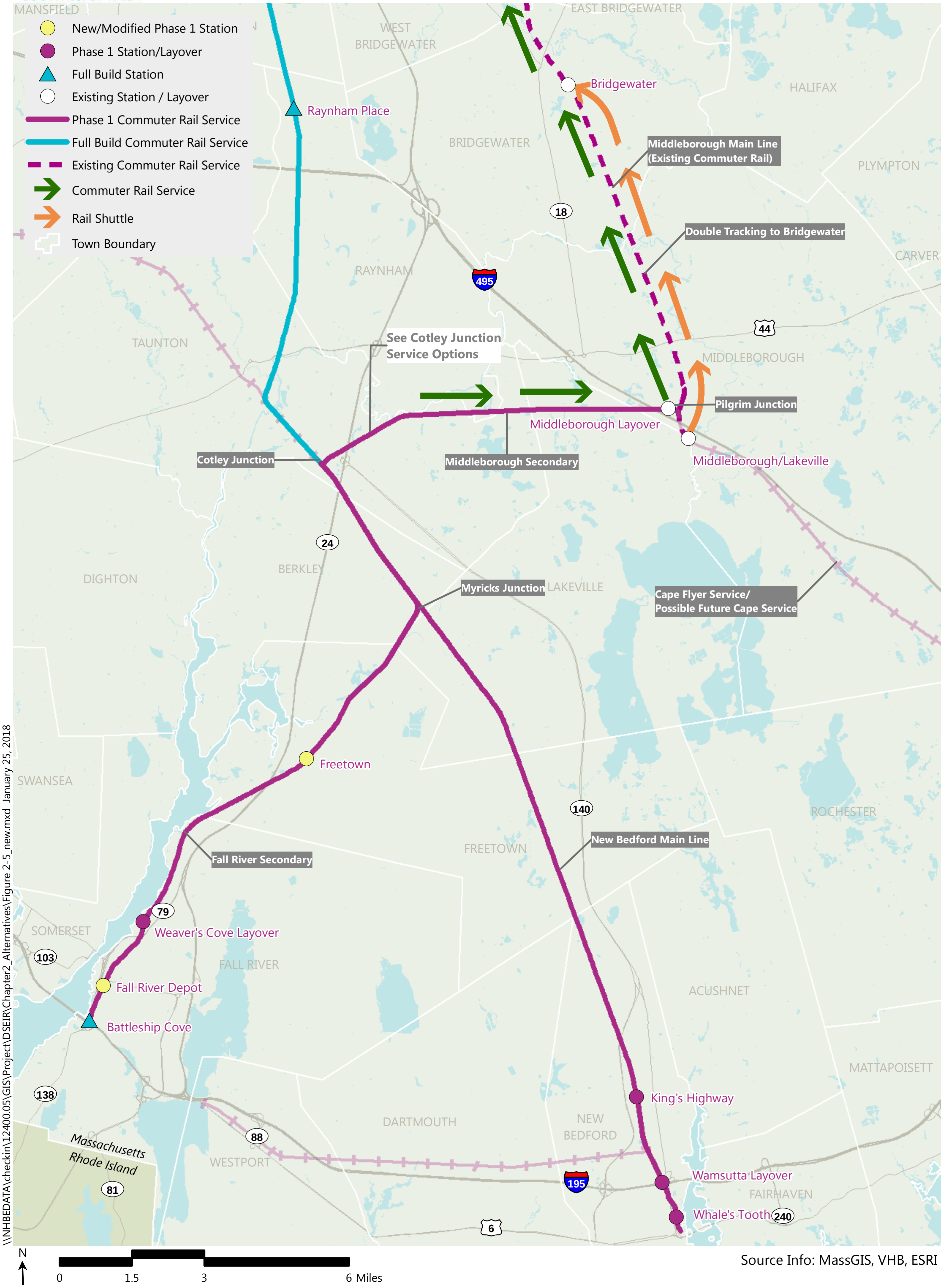
Figure 2-5: Pilgrim Junction Service Option 2 – One-Seat Ride via Shuttle to Bridgewater Station from Existing Middleborough/Lakeville Station



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Source Info: MassGIS, VHB, ESRI

Pilgrim Junction Service Option 3 – One-Seat Ride via New Middleborough Station

This option would extend the existing Middleborough Main Line trains to New Bedford and Fall River with a stop at a new Middleborough station to be constructed near Pilgrim Junction (Figure 2-6). This option would optimize railroad operations as it would maintain the existing number of trips on the Middleborough Main Line and would not require a reverse move at the Middleborough/Lakeville Station. Trains traveling between Fall River/New Bedford and Boston would stop at the new Middleborough station north or west of Pilgrim Junction instead of the existing Middleborough/Lakeville Station. Passengers from the transit-oriented development (TOD) in Lakeville could be connected to this new station using a bus or van shuttle service for the less than one-mile trip between stations, but would require additional transfer time between the shuttle service and Phase 1 commuter rail service.

Along with Option 2, this option would provide one of the shortest New Bedford/Fall River travel times at approximately 91 minutes. The station would need to provide adequate parking to accommodate park & ride users of the existing station with similar convenience. This would provide the opportunity to offer a shuttle between the existing Middleborough/Lakeville Station and the new station to accommodate existing walk-up users from Middleborough and the existing TOD around the station.[5] This would increase the travel time for existing TOD riders by requiring a transfer at the new station.

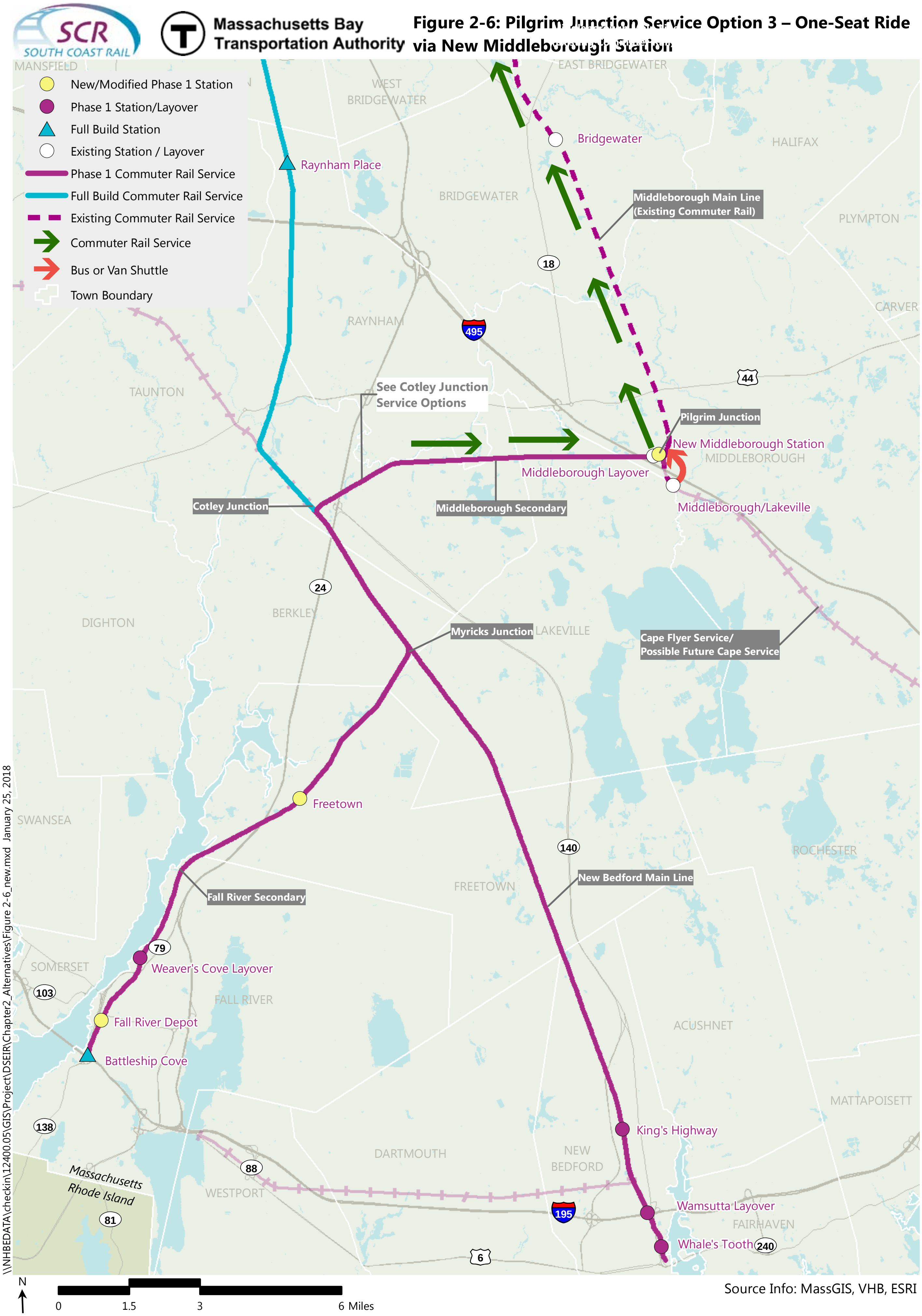
This option could also allow the existing Middleborough/Lakeville Station to remain open to service the Cape Flyer. This option was selected to advance for further evaluation as a preferred alternative because of its limited environmental impacts, operational flexibility and minimal impact to existing operations or existing users.

Summary of Phase 1 Service Options through Pilgrim Junction

Table 2-1 summarizes the differences between Pilgrim Junction Service Options 1, 2, and 3. Based on these differences, Option 3 - New Middleborough Station, is the preferred option to advance for Phase 1 service. Option 3 is equal to or more favorable than Options 1 and 2 for nearly all criteria.

[5] Field observations showed approximately 15-20 passengers per weekday accessing the station by bicycle or walking during the morning commuting period.

Figure 2-6: Pilgrim Junction Service Option 3 – One-Seat Ride via New Middleborough Station



Source Info: MassGIS, VHB, ESRI

Table 2-1 Summary of Pilgrim Junction Service Options

Criterion	Option 1: Reverse Move	Option 2: Bridgewater Shuttle	Option 3: New Middleborough Station (preferred)
One-Seat Ride between Fall River/New Bedford – Boston	Yes	Yes	Yes
Travel Time from Fall River/New Bedford - Boston[6]	105+ minutes	91 minutes	91 minutes
Impact to Existing Middleborough/ Lakeville Line Riders	None	High (parkers and TOD riders must use shuttle, for a two-seat ride)	Low (Potential for only TOD riders to use shuttle, for a two-seat ride)
Operational Flexibility	Low (high reverse move time at Middleborough/ Lakeville); Does not preclude future Cape service	Low (long shuttle distance to Bridgewater); Does not preclude future Cape service	High (maintains existing flexibility on Middleborough Main Line); Does not preclude future Cape service
Infrastructure Required	Middleborough/ Lakeville Station reconstruction for future Cape service	Middleborough Main Line double track, Bridgewater Station reconstruction	New Middleborough Station
Wetland Variances	Not required	Likely (double track)	Not required
Service by 2022	Yes	Potential delay due to wetland variance	Yes
RECOMMENDATION	**DISMISSED**	**DISMISSED**	**ADVANCED FOR EVALUATION**

All three options would provide a one-seat ride between Fall River/New Bedford and Boston and would not preclude future Cape service. Options 2 and 3 would avoid time-consuming reverse moves. Option 3 would require passengers who access the existing Middleborough/Lakeville Station by foot, including those who live within the TOD near the station, to take a bus shuttle to a new Middleborough station (currently affecting no more than 20 TOD riders), and Option 2 would require existing Middleborough/Lakeville Station users to shuttle to Bridgewater, while Option 1 would not require a shuttle. Option 3 has the greatest operational flexibility of the three alternatives by reducing the number of meet/pass conflicts on the Middleborough Main Line. Option 3 also minimizes environmental impacts from new infrastructure. Option 2 would require additional double track along the Middleborough Main Line and, therefore, would have substantially greater wetland impacts than

6 Options 2 and 3 would increase travel time from the existing Middleborough/Lakeville Station by providing a shuttle to the new Middleborough station, which would require an additional transfer time of approximately five minutes for a small number of existing riders. It is assumed that passengers who drive to the existing station would instead use the new station.

Options 1 and 3. Option 2 would also require construction on an active commuter rail line, which would lengthen the construction period and negatively impact existing riders. With construction occurring mainly outside the existing commuter rail service, Options 1 and 3 could provide service by 2022 in accordance with Phase 1 goals. Option 3 is the preferred Pilgrim Junction Service Option because it minimizes environmental impacts, minimizes trip times, and maintains operational flexibility by minimizing operational conflicts on the Middleborough Main Line and by not precluding a future Cape service.

2.4.3 Cotley Junction Service Options

Cotley Junction Service Option 1 – One-Seat Ride via Reverse Move through Downtown Taunton Station Proposed in FEIS/FEIR

Cotley Junction Service Option 1 would extend existing Middleborough/Lakeville trains to New Bedford and Fall River, with stops at the Taunton and Taunton Depot Stations proposed in the FEIS/FEIR. This option would provide a one-seat ride not only to New Bedford and Fall River, but also to downtown Taunton. However, since the proposed stations would be built north of Cotley Junction, traveling between Boston and New Bedford/Fall River via these stations would require trains to make a reverse move at the downtown Taunton Station, and return south to Cotley Junction (Figure 2-7).

Round-trip travel between Cotley Junction and Taunton Station via Taunton Depot Station would add approximately 15 minutes of travel time; in addition, the reverse move at a new downtown Taunton Depot Station would require at least 15 minutes.[7] In total, the travel time and reverse move would add approximately 30 minutes to trips to/from New Bedford and Fall River. This would impact the customer experience for new riders, and would result in lower ridership for the Phase 1 service. This option would create the longest travel time for New Bedford/Fall River riders (120+ minutes) of the Cotley Junction Service Options considered.

This option would also require a number of infrastructure upgrades, which the Full Build would continue to utilize. It would include two new stations. In addition to Southern Triangle and Middleborough Secondary improvements, it would require track upgrades along the New Bedford Main Line and Stoughton Branch between Cotley Junction and Taunton Station, and double track between Cotley Junction and Weir Junction as proposed for the Full Build. This option would also require three major bridge replacements over the Taunton River. These infrastructure improvements would likely necessitate a wetland variance, potentially delaying the initiation of construction by two years beyond 2022. This option would also require potential land takings and major infrastructure modifications to the High Street and Summer Street bridges to accommodate vertical clearance requirements for the Phase 1 diesel service and future electrification.

7 Reversing the train requires additional times for signal system route establishment (time-outs) and a member of the train crew to position themselves at the opposite end of the train from the engineer to look out for obstructions, pedestrians and general safety conditions. Fifteen minutes has been scheduled to support this operation.

SCR SOUTH COAST RAIL

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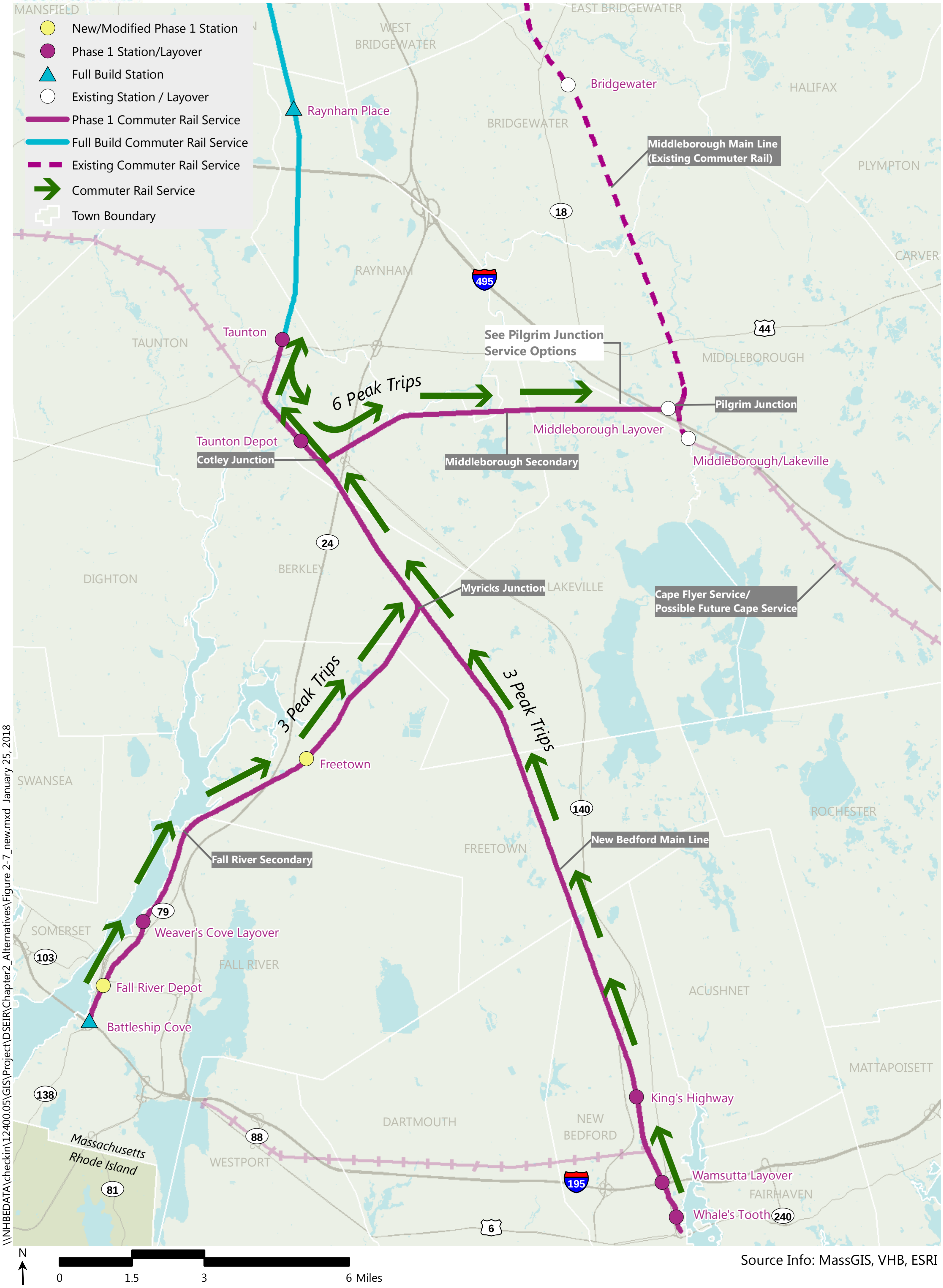
Figure 2-7: Cotley Junction Service Option 1 – One-Seat Ride via Reverse Move through Taunton Station Proposed in FEIS/FEIR



Source Info: MassGIS, VHB, ESRI

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This option was dismissed from further consideration due to the lower quality of Phase 1 service for potential riders from New Bedford and Fall River due to the added trip time, the level of environmental impacts, and delays to the schedule.

Cotley Junction Service Option 2 – One-Seat Ride via Reverse Move through Taunton Depot Station Proposed in FEIS/FEIR

Cotley Junction Service Option 2 would extend existing Middleborough/Lakeville trains to New Bedford and Fall River, with stops at the Taunton Depot Station proposed in the FEIS/FEIR. It would not include a new East Taunton Station or a new downtown Taunton Station. Since the proposed Taunton Depot Station would be north of Cotley Junction, traveling between Boston and New Bedford/Fall River via Taunton Depot would require trains to travel north from Cotley Junction, make a reverse move, and travel south back to Cotley Junction (Figure 2-8). This would be a similar move to the move proposed in Option 1, but would not serve Taunton Station

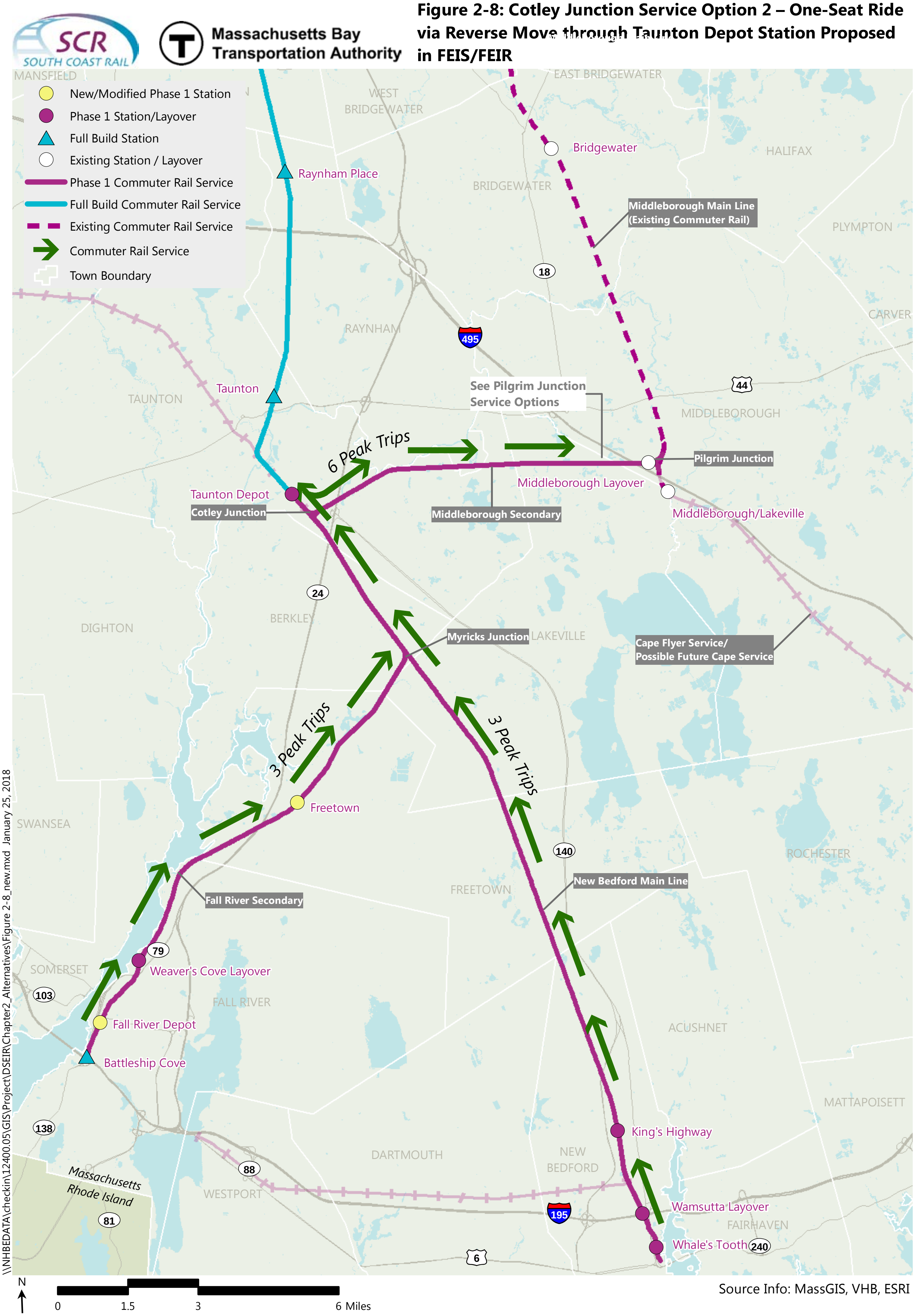
The change in direction at Taunton Depot Station would require at least 15 minutes.[8] This would impact the customer experience for new riders, and would result in lower ridership for the Phase 1 service. This option would create the second longest travel time for New Bedford/Fall River riders (105+ minutes) of the Cotley Junction service options considered.

This option would require infrastructure upgrades, which the Full Build would continue to utilize. In addition to Southern Triangle and Middleborough Secondary improvements, it would include a new station at Taunton Depot, and track upgrades along the New Bedford Main Line between Cotley Junction and Taunton Depot Station. These infrastructure improvements would require additional wetland impacts, particularly for the Taunton Depot Station, and would require a wetland variance, potentially delaying the initiation of construction by two years.

This option was dismissed from further consideration due to the lower quality of Phase 1 service for potential riders from New Bedford and Fall River due to the added trip time, and the increased wetland impacts.

8 Reversing the train requires additional times for signal system route establishment (time-outs) and a member of the train crew to position themselves at the opposite end of the train from the engineer to look out for obstructions, pedestrians and general safety conditions. Fifteen minutes has been scheduled to support this operation.

Figure 2-8: Cotley Junction Service Option 2 – One-Seat Ride via Reverse Move through Taunton Depot Station Proposed in FEIS/FEIR



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Source Info: MassGIS, VHB, ESRI

Cotley Junction Service Option 3 – One-Seat Ride via New East Taunton Station

This option would introduce a new Taunton Station south or east of Cotley Junction in lieu of the Taunton Depot Station proposed in the FEIS/FEIR, so that trains would not need to make a reverse move (Figure 2-9). The downtown Taunton Station would be deferred and built as part of the Full Build. Because Cotley Junction Service Option 3 would not require a reverse move, this option provides the best operations of the Phase 1 Cotley Junction Service Options considered. Although it would not provide rail service to downtown Taunton, passengers from downtown Taunton could be connected to this new station using a feeder bus service, which could be coordinated with the Phase 1 schedules as noted in Section 2.6.1.

Along with Option 4, this option would provide the shortest New Bedford/Fall River travel time at approximately 91 minutes. The station would need to provide adequate parking to accommodate Taunton riders and would be utilized in both Phase 1 and the Full Build Service. In addition to Southern Triangle and Middleborough Secondary improvement, this option would require infrastructure upgrades associated with the new East Taunton Station. It would not require a wetland variance.

This option was selected to advance for further evaluation because of its operational flexibility, highest quality of service for Fall River and New Bedford riders of the Cotley Junction Service Options and limited environmental impacts, on the shortest timeline to implementation.

Cotley Junction Service Option 4 – One-Seat Ride via New East Taunton Station with Service to Taunton Station Proposed in FEIS/FEIR

This would enable the Phase 1 service to provide direct service to Taunton, New Bedford, and Fall River by extending existing Middleborough/Lakeville trains to each of these terminal locations. This option would introduce a new Taunton Station south of Cotley Junction so that trains could use the new station and not require a reverse move (Figure 2-10). However, it would also provide service to the downtown Taunton Station proposed in the FEIS/FEIR. The Taunton Station proposed in the FEIS/FEIR would serve as a terminus for this route, along with New Bedford and Fall River. Instead of providing three peak trips between each New Bedford/Fall River and Boston (six total), this service would provide two peak trips each running service between Taunton/New Bedford/Fall River and Boston (still providing six total peak trips). However, it would reduce the service frequency to Fall River and New Bedford to two peak trips each instead of three.

Along with Option 3, this option would provide the shortest New Bedford/Fall River travel time at approximately 91 minutes. It would also require a number of infrastructure upgrades, which the Full Build would continue to utilize. It would include two Taunton stations (Taunton and East Taunton). In addition to Southern Triangle and Middleborough Secondary improvements, this option would require track upgrades along the New Bedford Main Line and Stoughton Branch between Cotley Junction and the downtown Taunton Station, and double track between Cotley Junction and Weir Junction as proposed for the Full Build.

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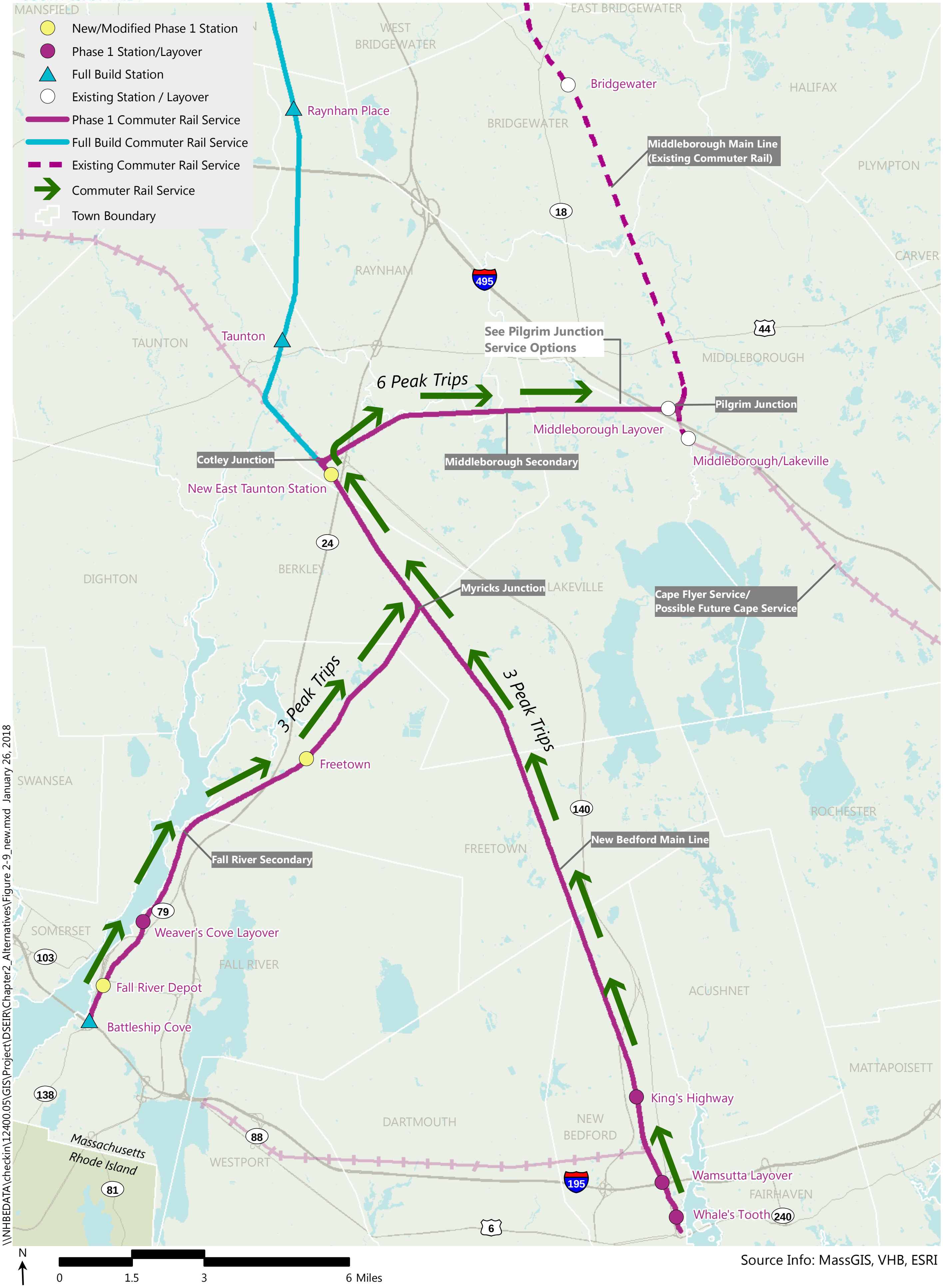
Figure 2-9: Cotley Junction Service Option 3 – One-Seat Ride via New East Taunton Station



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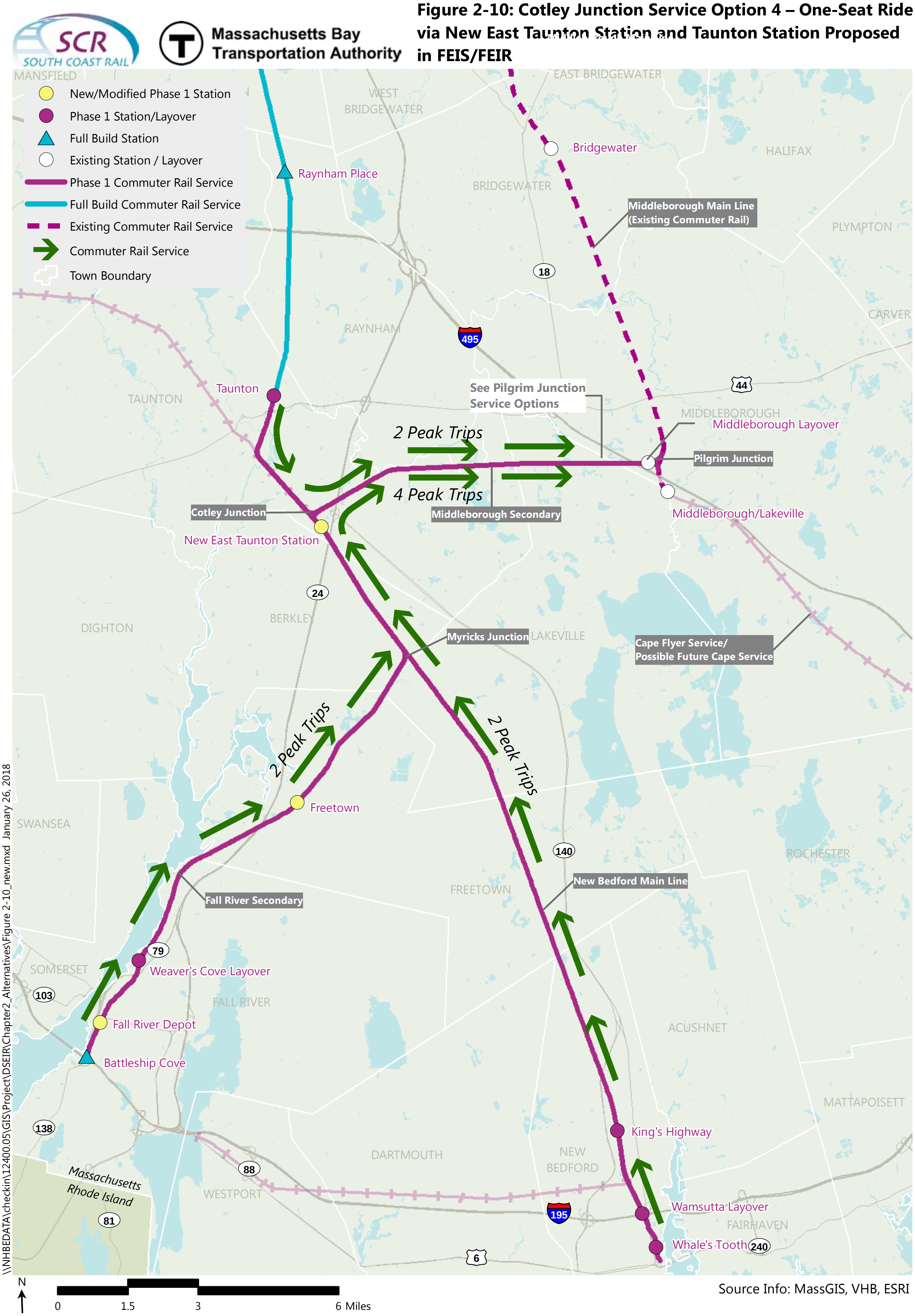
Source Info: MassGIS, VHB, ESRI

Figure 2-10: Cotley Junction Service Option 4 – One-Seat Ride via New East Taunton Station and Taunton Station Proposed in FEIS/FEIR



Source Info: MassGIS, VHB, ESRI

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This option would also require three major bridge replacements over the Taunton River. These infrastructure improvements would likely necessitate a wetland variance, potentially delaying the initiation of construction by two years beyond 2022. This option would also require potential land takings and major infrastructure modifications to the High Street and Summer Street bridges to accommodate vertical clearance requirements for the Phase 1 diesel service and future electrification.

In addition to the likely wetland variances required by the infrastructure improvements, this option was dismissed from further consideration due to the reduced frequency and lower quality of Phase 1 service for potential riders from New Bedford and Fall River.

Summary of Phase 1 Service Options through Cotley Junction

Table 2-2 summarizes the differences between Cotley Junction Service Options 1, 2, 3, and 4. Based on these differences, Option 3, New Taunton Station, is the preferred alternative to advance for Phase 1 service. Option 3 is equal to or more favorable than Options 1, 2, and 4 for nearly all criteria.

Table 2-2 Summary of Service Options through Cotley Junction

Criterion	Option 1: Taunton Reverse Move	Option 2: Taunton Depot Reverse Move	Option 3: New Taunton Station (preferred)	Option 4: New Taunton Terminus
One-Seat Ride between Fall River/New Bedford – Boston	Yes	Yes	Yes	Yes
Travel Time from Fall River/New Bedford - Boston	120+ minutes	105+ minutes	91 minutes	91 minutes
Impact to Existing MBTA Riders	None	None	None	None
Operational Flexibility	Low (high reverse move time at Taunton)	Low (high reverse move time at Taunton Depot)	High (maintains flexibility on New Bedford Main Line)	High (maintains flexibility on New Bedford Main Line)

Table 2-2 Summary of Service Options through Cotley Junction (Continued)

Criterion	Option 1: Taunton Reverse Move	Option 2: Taunton Depot Reverse Move	Option 3: New Taunton Station (preferred)	Option 4: New Taunton Terminus
Infrastructure Required[9]	New Taunton and Taunton Depot Stations; New Bedford Main Line and Stoughton Branch track upgrades; Double track from Cotley Junction to Weir Junction; Bridge replacements	New Taunton Depot Station; Track upgrades on New Bedford Main Line north of Cotley Junction	New East Taunton Station	New Taunton and East Taunton Stations; New Bedford Main Line and Stoughton Branch track upgrades; Bridge replacements
Wetlands Variances	Likely	Likely	Not required	Likely
Service by 2022	No	No	Yes	No
RECOMMENDATION	**DISMISSED**	**DISMISSED**	**ADVANCED FOR EVALUATION**	**DISMISSED**

All four options would provide a one-seat ride between Fall River/New Bedford and Boston. Options 3 and 4 would avoid any time-consuming reverse moves, and provide the lowest travel times from Fall River/New Bedford. In combination with Pilgrim Junction Service Option 3, Cotley Junction Options 3 and 4 would provide the shortest New Bedford/Fall River travel time at approximately 91 minutes. Options 1 and 4 would provide a one-seat ride from downtown Taunton, while Options 2 and 3 would provide feeder bus service for these potential passengers. Options 1, 2, and 3 would provide three peak period trips to/from Fall River/New Bedford and six peak period trips to/from Taunton, while Option 4 would only provide two peak period trips. to/from Fall River/New Bedford and six peak period trips to/from Taunton. Options 3 and 4 have the greatest operational flexibility of the three alternatives by eliminating the reverse turn in Taunton.

Option 3 also minimizes environmental impacts and permitting delay, as it would not require track upgrades or bridge reconstruction north of Cotley Junction, although infrastructure improvements across all alternatives would be utilized in the Full Build. Because Option 3 limits the infrastructure improvements required, it is the only option that requires the least wetland impact. None of the service options would impact existing MBTA riders (outside of potential schedule adjustments), and with construction occurring outside of existing commuter rail service, only Option 3 could provide service by 2022 in accordance with Phase 1 goals.

[9] Infrastructure requirements in table do not include require improvements to Southern Triangle.

Option 3 is the preferred Cotley Junction Service Option because it minimizes Fall River/New Bedford trip times while providing three peak period trips, maintains operational flexibility, and does not require a wetland variance as it minimizes the amount of new or upgraded infrastructure required in sensitive areas. This option was selected to advance for further evaluation as a preferred alternative because of its limited environmental impacts, operational flexibility and minimal impact to existing users.

2.5 Station Siting for Preferred Phase 1 Service

The preferred Phase 1 service option, the combination of Pilgrim Junction Service Option 3 (Figure 2-6) and Cotley Junction Service Option 3 (Figure 2-9), can accommodate the stations proposed in the FEIS/FEIR south of Cotley Junction. Except for Battleship Cove (in Fall River), the Phase 1 service will include all Southern Triangle stations previously evaluated in the FEIS/FEIR, with some modifications and a relocation of one station. Phase 1 will not preclude future construction of Battleship Cove, which will be included in the Full Build. Similarly, all stations north of Cotley Junction will be included in the Full Build, except for Taunton Depot Station, because Phase 1 will relocate this station to the south of Cotley Junction and include it in Phase 1, renamed as East Taunton Station. Phase 1 will also include a new, relocated or reconstructed station in Middleborough.

Phase 1 service via Middleborough will include the following stations, as further described below:

- All existing stations on the Middleborough Main Line between South Station and Bridgewater (without modifications);
- Middleborough/Lakeville (retain for Cape Flyer service or close station, with shuttle bus to new station);
- Middleborough **(new Middleborough Station location; not evaluated in FEIS/FEIR)**;
- East Taunton **(new station location; relocated from Taunton Depot that was evaluated in FEIS/FEIR)**;
- Freetown **(modified station configuration due to recent private development; on same parcel as site identified in FEIS/FEIR)**;
- Fall River Depot **(modified station layout due to recent private development)**;
- King’s Highway (unchanged since FEIS/FEIR); and
- Whale’s Tooth (unchanged since FEIS/FEIR).

Phase 1 service will continue to stop at the existing stations on the Middleborough Main Line between South Station and Bridgewater. These stations include: South Station, JFK/UMass, Quincy Center, Braintree, Holbrook/Randolph, Montello, Brockton, Campello, and Bridgewater. The Phase 1 service will not require modifications to these stations.

The Phase 1 service could retain the existing Middleborough/Lakeville Station by providing a bus or van shuttle between the existing station and a new Middleborough Station. The existing Middleborough/Lakeville Station could continue to accommodate existing Cape Flyer service. Alternatively, the station could be closed, allowing the land to be made available for other uses.

Phase 1 will include a new Middleborough station, as defined in Service Option 3, and relocation of the new Taunton Station to the south of Cotley Junction. Because these project elements were not considered in the FEIS/FEIR, and to address specific requirements in the MEPA Certificate on the NPC, this DSEIR contains evaluations of them in Sections 2.3.2 and 2.3.3, respectively.

This DSEIR also evaluates modified station configurations at Freetown and Fall River Depot, required because of third-party development activity at the station sites proposed in the FEIS/FEIR. Freetown Station will be constructed with a different configuration within the same parcel proposed in the FEIS/FEIR. The updated conceptual design for the Fall River Depot Station will maintain the FEIS/FEIR proposed location but will include a smaller parking area for Phase 1. Sections 2.3.4 and 2.3.5 further discuss these station siting adjustments.

2.5.1 Site Selection Criteria

This DSEIR considers the impacts associated with each of the station sites with new or modified station locations or configurations since the FEIS/FEIR: Middleborough, East Taunton, Freetown, and Fall River Depot. A range of sites and concepts were considered for each of these stations, as described in the following sections.

The following criteria guided the site selection at each station:

- *Achieves goals for Phase 1 service.* Each station site should accommodate a one-seat ride between Fall River/New Bedford and Boston with service beginning in 2022. Meeting this schedule for construction and implementation is partially dependent on permitting complexity, as stations with lengthy permitting timelines are less likely to meet the Phase 1 service schedule goal.
- *Accommodates freight and commuter rail operations.* The station siting affects the existing and future service and operations. The station siting considered the following operational subcriteria:
    - *Minimizes impact on existing MBTA riders.* Station siting minimizes the impact on existing MBTA riders, considering similar station access, frequency, and travel times.
    - *Accommodates freight operations.* Infrastructure adjustments, such as reconfigured track and access, should accommodate freight operations during and after construction.
- *Addresses other siting and environmental criteria.* The station siting considers a variety of additional criteria, including the following:
    - Provides sufficient parking to accommodate ridership demand;

- Minimizes the required property takings;
- Minimizes wetland impacts;
- Does not require design exceptions;
- Minimizes traffic impacts; and
- Provides potential for smart growth.

- *Considers long-term benefits and order-of-magnitude capital cost estimate.* As a phased service, it is critical that the infrastructure developed as part of Phase 1 provides future use and long-term benefits, as well as independent utility even when the Full Build is realized. This can include the ability to accommodate and provide direct connections to future service expansions (for example, Cape Service).

2.5.2 Middleborough: New Station Siting

With the recommendation to advance Service Option 3, this alternatives analysis evaluates potential sites for a new Middleborough Station. As noted in Section 2.4.2, to allow South Coast Rail trips to stop at the station without a reverse move, the relocated Middleborough station will need to be north or west of Pilgrim Junction. MassDOT and the MBTA identified and evaluated two options for the new Middleborough station (Figure 2-11):

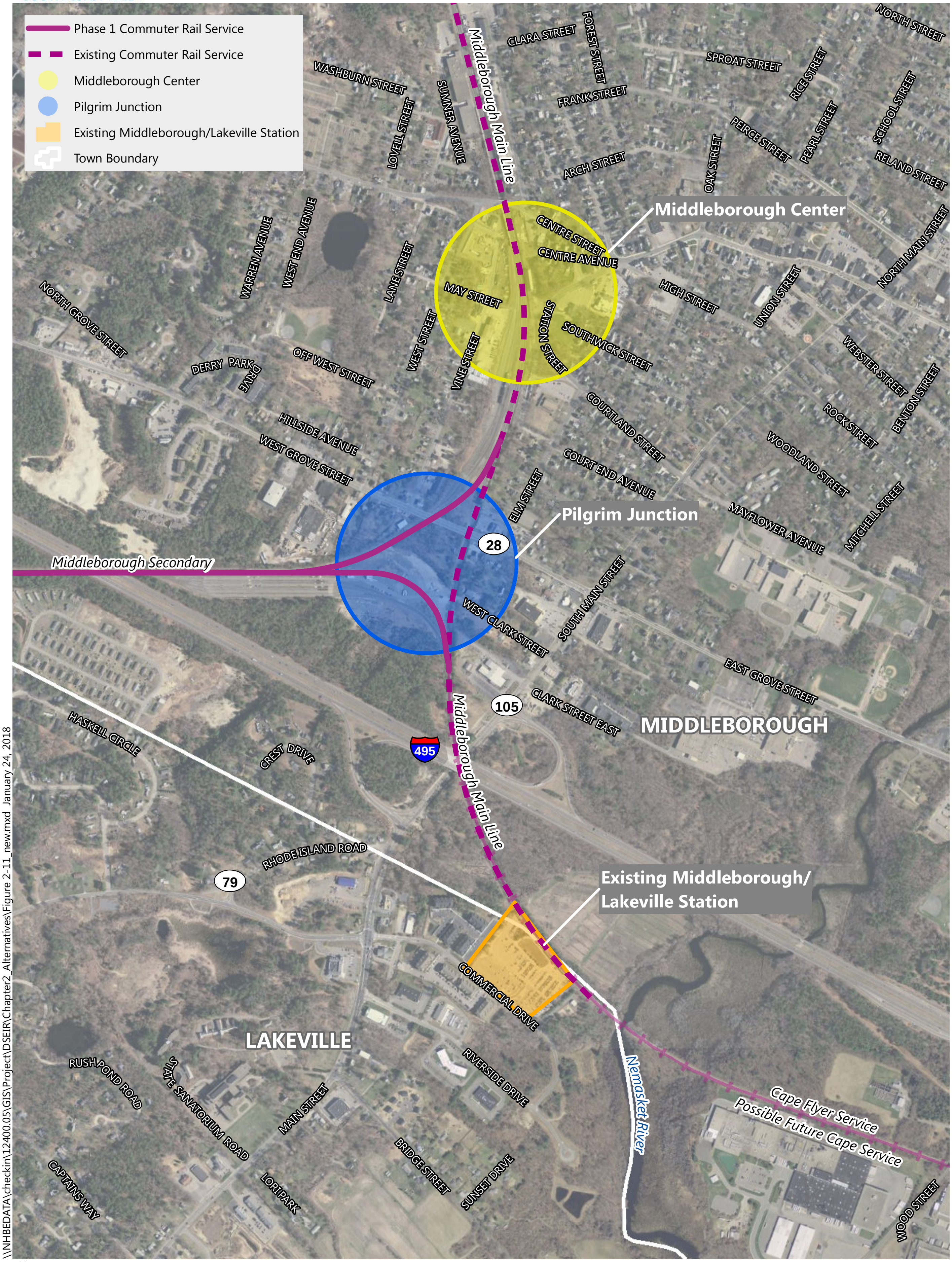
- Station Options 1a and 1b: Middleborough Center (on the Middleborough Main Line, north of Pilgrim Junction); and
- Station Option 2: Pilgrim Junction (west of the Middleborough Main Line)

Each of these station options has the potential to include a second platform to accommodate potential future Cape service. Each station can be connected to the existing Middleborough/Lakeville Station via a bus or van shuttle. The following subsections describe each station option, and then describe the options for including an additional platform for future Cape service at the preferred location.

Station Options 1a and 1b – New Middleborough Station at Middleborough Center

Station Options 1a and 1b would include a new station in Middleborough located in Middleborough Center (Figures 2-12 and 2-13). Option 1a would consist of a station sized to accommodate approximately 500 park & ride passengers. Option 1b would provide limited parking, requiring parking accommodations to remain at the existing Middleborough/Lakeville Station. This station would be located adjacent to the existing CSX freight yard, and could be accessed from Station Street. This location would be in the most densely populated section of Middleborough and close to the commercial district. While convenient for walk-ups, more prevalent localized traffic impacts are likely with a station located in Middleborough Center since, based on available data, much of the existing Middleborough/Lakeville Station traffic does not currently appear to traverse the downtown.

Figure 2-11: New Middleborough Station Siting Options



Source Info: MassGIS, VHB, ESRI

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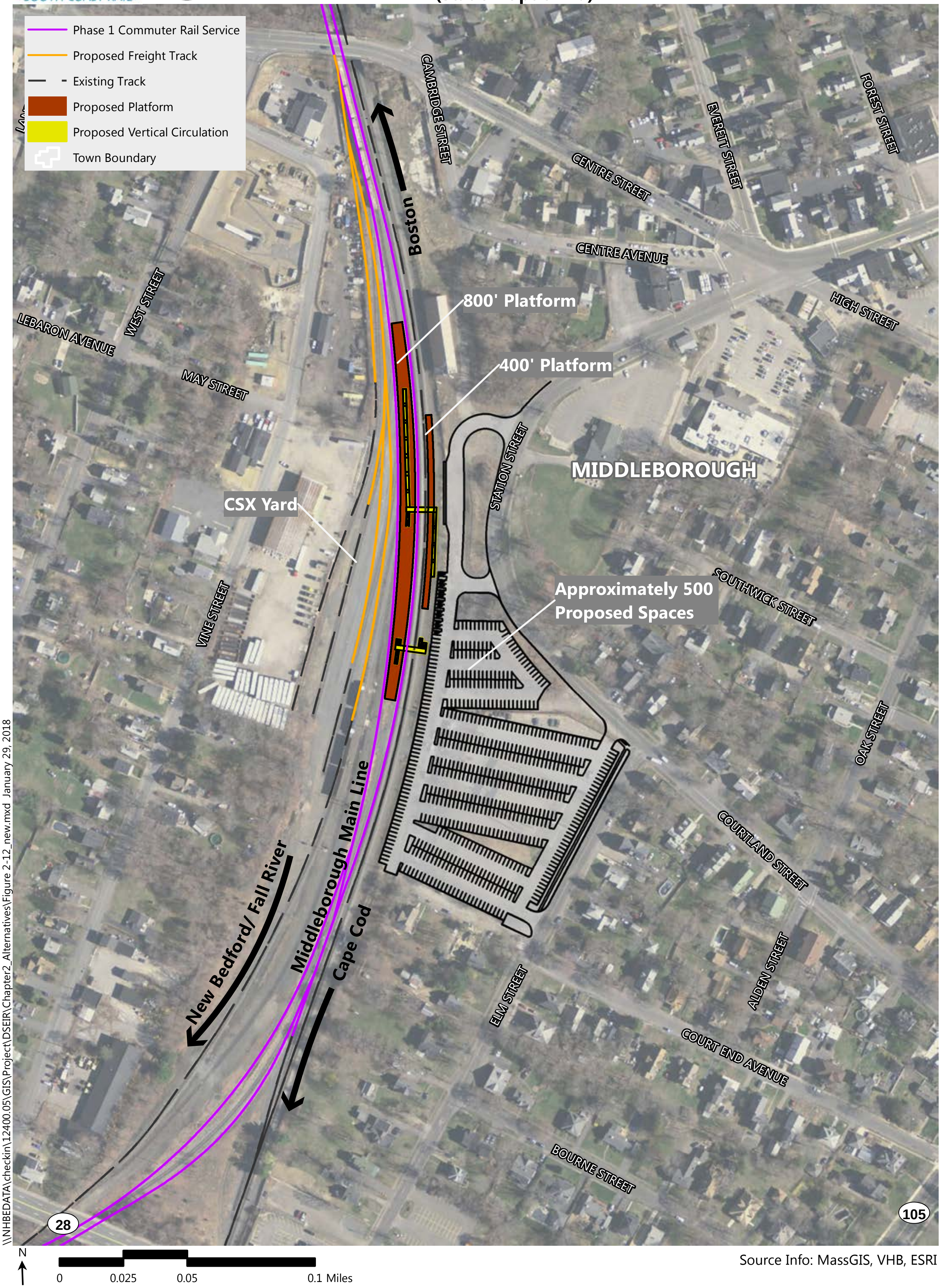
Figure 2-12: Conceptual Design of Potential Middleborough Station at Middleborough Center with Large Parking Lot (Station Option 1a)



Source Info: MassGIS, VHB, ESRI

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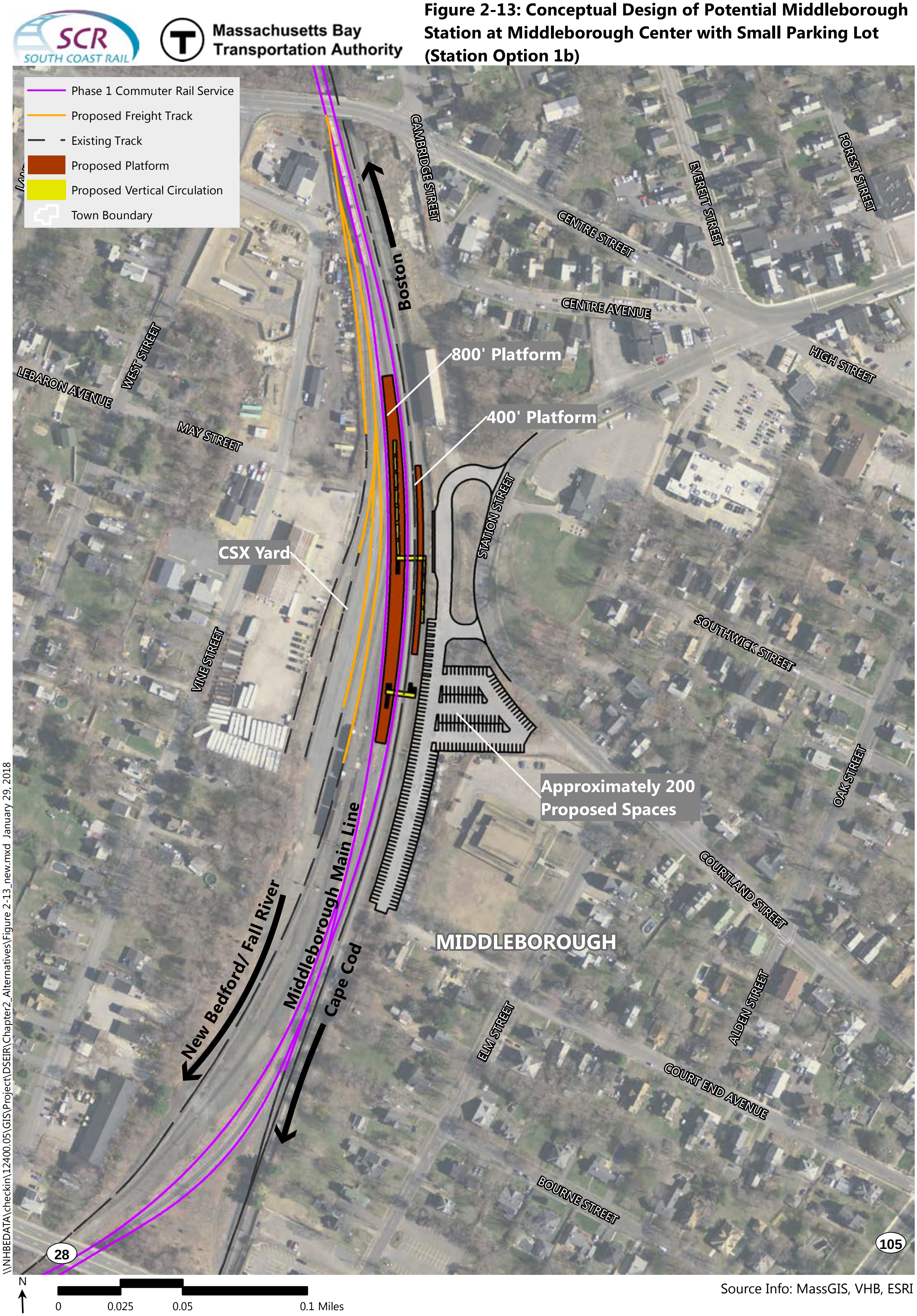
Figure 2-13: Conceptual Design of Potential Middleborough Station at Middleborough Center with Small Parking Lot (Station Option 1b)



Source Info: MassGIS, VHB, ESRI

Intersections located within the downtown are generally unsignalized and have existing operational deficiencies, with many approaches operating at an unacceptable Level of Service (LOS) E or LOS F. Two intersections, North/South Main Street at Center Street and Courtland Street at South Main Street are identified by MassDOT as high crash locations.[10]

Vehicle trips associated with the relocated Middleborough/Lakeville Station are expected to be roughly equal to the number of vehicle trips using the existing station today, roughly 200 during the morning peak hour and 275 during the evening peak hour. During the morning peak hour, trips to/from the commuter rail station coincide with the peak hour of traffic along Route 105. During the evening peak hour, the station and roadway have different peak hours, lengthening the amount of time potential traffic deficiencies might exist. Given the exiting traffic volumes recorded in the vicinity of the proposed station, it was determined that more localized traffic impacts would are likely.

The Middleborough Center Station would include an 800-foot center-island platform and could also include a separate 400-foot side platform to accommodate future Cape service. The center-island platform would accommodate double track for the service to/from Fall River and New Bedford. It would require vertical circulation (elevator, ramp, and stairs) to/from the parking lot for access. The potential side platform would have direct access from the parking lot and would not require vertical circulation. Transfers between the service to/from Boston and the future Cape service would require vertical circulation, as the side platform and center-island platform would be separated by two tracks.

Station Option 1 would have moderate impacts to main line operations during construction. It would require property takings northwest of the station and CSX yard modifications to accommodate the track design. To accommodate the ridership demand, Station Option 1a would include a parking lot of approximately 500 spaces (Figure 2-12), which would require taking two properties totaling 3.3 acres, including the Massachusetts Army National Guard Armory, which is potentially eligible for listing in the State and National Registers of Historic Places. Avoiding this property impact would result in a smaller parking lot (constrained parking capacity) as shown in Figure 2-13 as Station Option 1b, and would require retention of the existing Middleborough/Lakeville Station and a bus shuttle from the existing station to allow riders to park at the existing station and shuttle to the new station. This shuttle would increase operational costs and would increase the total travel time for trips between Boston and the existing Middleborough/Lakeville Station by approximately 10 minutes (including travel time for the shuttle between stations and the buffer time to allow for timed transfers between the New Bedford/Fall River service and the shuttle). Approximately half of the projected Middleborough Station riders would need to park at the existing Middleborough/Lakeville Station and use this shuttle with the constrained parking option.

[10] In June 2017 traffic data were collected at 13 locations surrounding a potential Pilgrim Junction or Middleborough Center Station (see Appendix B). The intent of this data collection effort was to be able to qualify potential traffic-related impacts associated with relocating the Middleborough/Lakeville Station from its existing location to either Pilgrim Junction or Middleborough Center.

The proposed Middleborough Center Station, with the side platform to accommodate future Cape service and smaller parking lot to avoid the Armory property impacts, would cost approximately $37.0 million, with key cost drivers including a new interlocking, signal and trackwork, and vertical circulation (particularly elevator, bridge, and ramp elements).[11]

Station Option 2 – New Middleborough Station at Pilgrim Junction

Station Option 2 would include a new Middleborough Station at Pilgrim Junction (Figure 2-14), located west of the Middleborough Main Line and north of the MBTA layover yard. Users would access the station from South Main Street (Route 105). The access point from Route 105 would provide convenient access to I-495 with a location across from the northbound exit for Route 105, and approximately 0.2 miles from the southbound exit for Route 105. This direct access to I-495 would minimize traffic impacts for the community. The new access would provide a direct route to the parking facilities for MBTA riders, and would provide a gated entrance to the existing MBTA layover yard for layover personnel. This would in turn close the residential West Clark Street to through traffic because it would no longer need to provide access to the layover facility. Existing Middleborough Main Line riders could park at Pilgrim Junction Station and have access comparable to that available at the existing station in Lakeville.

Traffic along Route 105 is operating at acceptable levels of service in the vicinity of the existing Middleborough/Lakeville Station and the I-495 ramps. Minor operational issues and a noted high crash location are limited to the intersection of Route 105/Route 28.[12] As noted in Station Option 1, vehicle trips associated with the relocated Middleborough/Lakeville Station are expected to be roughly equal to the number of vehicle trips using the existing station today, roughly 200 during the morning peak hour and 275 during the evening peak hour. During the morning peak hour, trips to/from the commuter rail station coincide with the peak hour of traffic along Route 105. During the evening peak hour, the station and roadway have different peak hours, lengthening the amount of time potential traffic deficiencies might exist. Given the exiting traffic volumes recorded in the vicinity of each of the proposed stations, it was determined that a proposed Pilgrim Junction Station would have the least impact on existing traffic operations and safety in Middleborough. A station at Pilgrim Junction would not increase the traffic volume through already congested intersections in the downtown. As discussed further in Chapter 5, rerouted traffic can be accommodated by existing capacity along Route 105 and no additional traffic is routed through the constrained intersection of Route 105/Route 28 (although mitigation is proposed at this location).

[11] This conceptual level, order-of-magnitude capital cost estimate uses 2017 base year dollars and assumes a construction period of 2020-2021. The estimate includes station work (for example, platform, canopy, lighting, communication, vertical circulation, site and civil, trackwork, signals block/interlocking, and land acquisition), a 20 percent design contingency, 10 percent construction contingency, and 3.5 percent annual escalation over 2.5 years.

[12] In June 2017 traffic data were collected at 13 locations surrounding a potential Pilgrim Junction or Middleborough Center Station (see Appendix B). The intent of this data collection effort was to be able to qualify potential traffic-related impacts associated with relocating the Middleborough/Lakeville Station from its existing location to either Pilgrim Junction or Middleborough Center.

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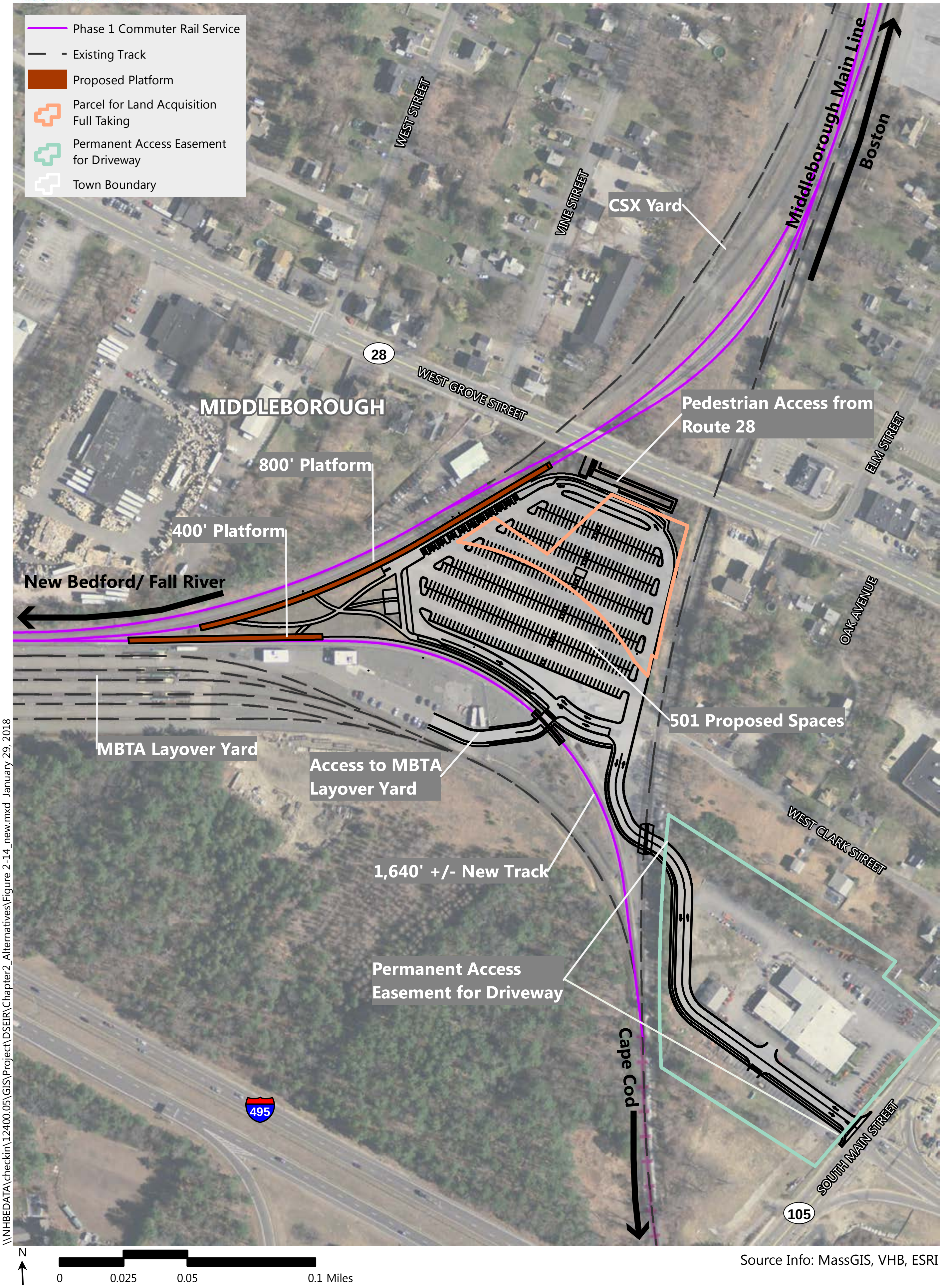
Figure 2-14: Conceptual Design of Potential Middleborough Station at Pilgrim Junction (Station Option 2)



Source Info: MassGIS, VHB, ESRI

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The Pilgrim Junction Station would include an 800-foot side platform and could also include a separate 400-foot side platform to accommodate future Cape service. Both platforms could provide at-grade access from the parking lot. In addition, passengers transferring between the service to/from Boston and the future Cape service could do so at-grade with a walking distance of less than 150 feet.

Future Cape service operations would be entirely separate from the New Bedford/Fall River service, as the future Cape service would travel on the Middleborough Main Line south of Pilgrim Junction while the New Bedford/Fall River trains would travel on the Middleborough Main Line to the north of Pilgrim Junction. The two trains would have separate platform tracks, and the tracks for the New Bedford/Fall River service and the future Cape service would not cross (Figure 2-14). Adding the second platform would also require additional trackwork, including track realignment and signal modification along the wye. The estimated order-of-magnitude capital cost for this option would be $24.9 million.[13] Alternatively, Phase 1 would not need to include the second platform until a future Cape service is implemented but would not preclude future expansion as part of a future phase. This option would present the lowest cost alternative with an estimated order-of-magnitude capital cost of $17.4 million.[14]

The Pilgrim Junction Station would be located approximately 4,600 feet from the existing Middleborough/Lakeville Station, and could provide a bus or van shuttle using existing roads for riders from the TOD around the existing station (Figure 2-15). Based on field observations, there are currently a limited number of pedestrians or cyclists accessing the existing Middleborough/Lakeville Station.[15] A bus or van shuttle would adequately serve the limited number of passengers accessing the station by pedestrian or bicycle access (with the potential for a timed transfer of approximately five minutes, increasing total travel time for shuttle users by approximately 10 minutes because of the transfer and additional travel time). With a bus or van shuttle, the existing Middleborough/Lakeville Station could remain open to serve the Cape Flyer. Cape Flyer trains would not be able to stop at the new Pilgrim Junction Station.

The parking lot in Station Option 2 would have 501 spaces. This would maximize the parking capacity to accommodate the anticipated high volume of park and ride users, given the station's proximity to I-495.

13 This conceptual level, order-of-magnitude capital cost estimate uses 2017 base year dollars and assumes a construction period of 2020-2021. The estimate includes station work (for example, platform, canopy, lighting, communication, vertical circulation, site and civil, trackwork, signals block/interlocking, and land acquisition), a 20 percent design contingency, 10 percent construction contingency, and 3.5 percent annual escalation over 2.5 years.

14 This conceptual level, order-of-magnitude capital cost estimate uses 2017 base year dollars and assumes a construction period of 2020-2021. The estimate includes station work (for example, platform, canopy, lighting, communication, vertical circulation, site and civil, trackwork, signals block/interlocking, and land acquisition), a 20 percent design contingency, 10 percent construction contingency, and 3.5 percent annual escalation over 2.5 years.

15 Field observations showed approximately 15-20 passengers per weekday accessing the station by bicycle or walking during the morning commuting period.

SCR SOUTH COAST RAIL

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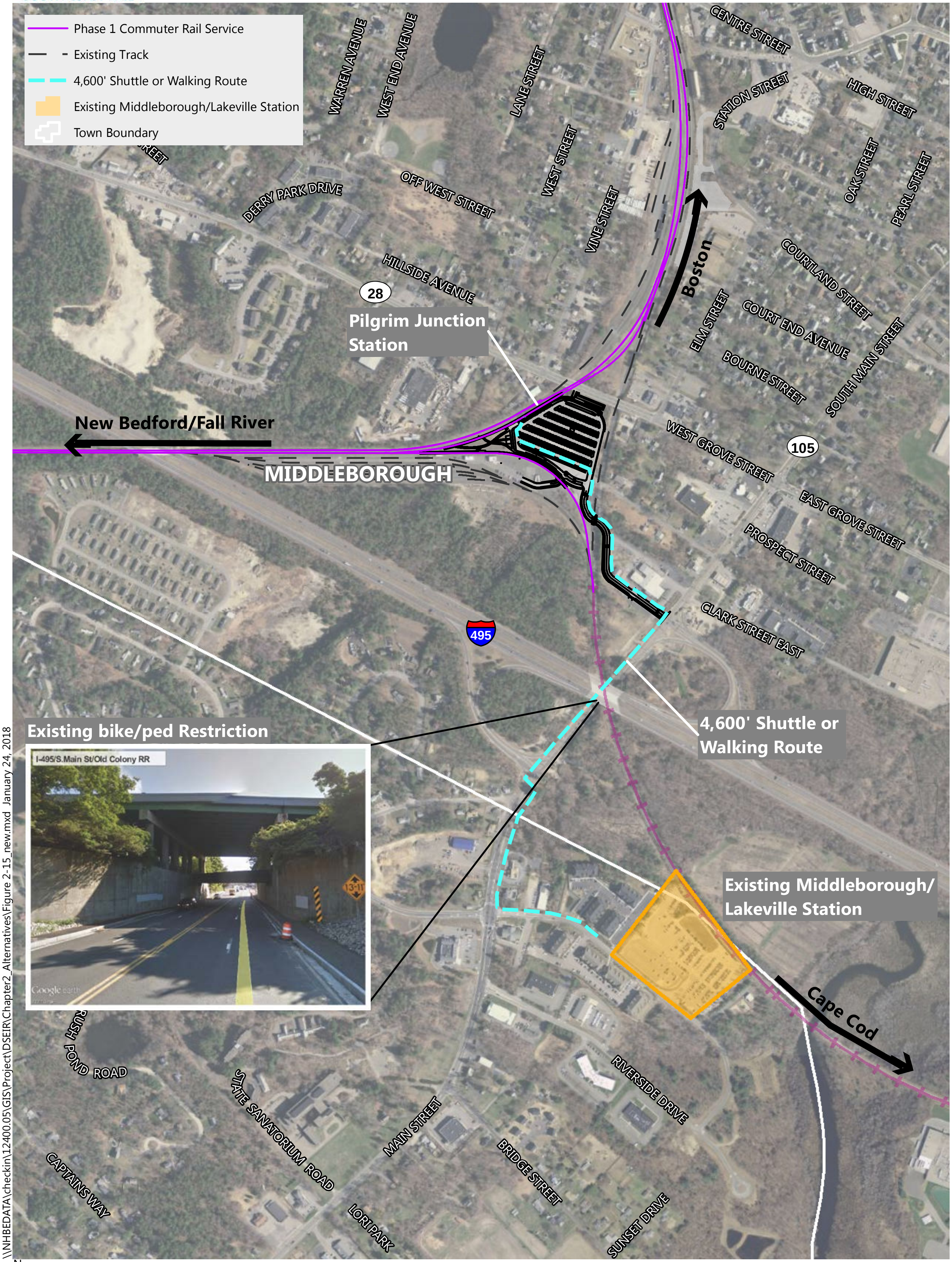
Figure 2-15: Existing Transit Oriented Development Riders to Pilgrim Junction Station



N

0 0.075 0.15 0.3 Miles

Source Info: MassGIS, VHB, ESRI, Google (2017)

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The property requirements for Station Option 2 would be related to the access road (permanent access easement on parts of two parcels) to/from Route 105, and the parking lot (full property acquisition of 1.7 acres for one parcel). Station Option 2 would not impact environmental resources. Additional details on these properties are included in Section 2.6.8.

This option would not impact freight operations. It would maintain a separate runaround track providing freight access to/from the CSX Yard. It would also result in minor construction impacts and disruptions to commuter rail service although much of the construction would occur outside of the Middleborough Main Line. Minor construction near Pilgrim Junction to accommodate grade crossing work would affect service to the existing Middleborough/Lakeville Station. Track and interlocking work to the north of Pilgrim Junction would likely impact both commuter rail service to Middleborough Main Line and freight service, but could be staged for minor impacts.

Station Option 2 would optimize operations because it would avoid reverse moves and would separate future Cape service operations from operations along the Middleborough Main Line and Middleborough Secondary.

Based on this analysis, the Station Option 2 location at Pilgrim Junction is the preferred station site for the new Middleborough Station because it results in the fewest impacts and lowest costs of the Middleborough Station siting options while providing long-term use (with the potential to add a second platform for future Cape service). It is also a favorable location for railroad operations for many reasons, including its location adjacent to the existing MBTA Yard, favorable property ownership, access and parking opportunity, minimal freight impacts or property needs, and potential to support the long-term Cape service.

2.5.3 Taunton: Relocated Station Siting

In the FEIS/FEIR, the Stoughton Straight Electric Alternative included a station at Taunton Depot, off Route 140 in Taunton at the rear of a shopping plaza that contains Target, Home Depot, and other stores. This proposed station, however, is north of Cotley Junction and cannot be served by the preferred Phase 1 service without a reverse move, as noted in Section 2.4.3. To avoid this increase in travel time but continue to accommodate riders from Taunton, the preferred service option identified in Section 2.4.3 includes a new station in East Taunton, south or east of Cotley Junction. This new East Taunton Station will replace the Taunton Depot Station proposed in the FEIS/FEIR, both during Phase 1 and for the Full Build condition.

Station siting analysis conducted during previous environmental review identified 13 potential station sites in Taunton, including 10 sites for potential rail alternatives (including the FEIS/FEIR proposed Taunton Depot Station at Target Plaza). Of these station sites, three are located along the proposed Phase 1 route (Figure 2-16):

- the "Mini Golf Site" located on the New Bedford Main Line just south of Cotley Junction;
- the "Galleria Site (Mall)" located on the New Bedford Main Line near the Silver City Galleria; and
- the "Old Colony Ave." site located on the Middleborough Secondary (which would not be located on the Full Build route).

Of these three sites, the "Mini Golf Site" was the only one advanced for further analysis in the previous state and federal environmental review process because of its topography, geometry, and siting conditions. The Mini Golf Site is available for acquisition and would be practicable to construct, as it has sufficient size and flat topography to construct a station, is accessible using existing road infrastructure, is within reasonable distance of a highway (Route 24 and Route 140), and is close enough to the proposed Taunton Depot Station site to attract riders who would have used that station. It is favorable from an environmental perspective, and supports some smart growth principles. This site would also have significantly lower wetland impacts than the Taunton Depot Station proposed in the FEIS/FEIR. Due to the location, the East Taunton Station could serve both the Phase 1 and Full Build routes. Its proximity to the Taunton Depot Station proposed in the FEIS/FEIR (the proposed access from Route 140 would be approximately 0.5 miles from the Route 140 access proposed in the FEIS/FEIR) would provide access to a similar population, allowing the East Taunton Station to replace the proposed Taunton Depot Station instead of constructing two separate stations.

The Mini Golf Site is located between Cotley Junction, Route 24, and Route 140 (Figure 2-17). The station would be accessible from Industrial Drive, off Route 140. Along with this ease of access, the station would provide 363 parking spaces to accommodate the projected park & ride demand, while maximizing the developable land remaining for other development, including TOD. The station would include one 800-foot center-island platform accessible from the parking lot via overhead walkways. The station would include double tracking for commuter rail and a single freight bypass track.

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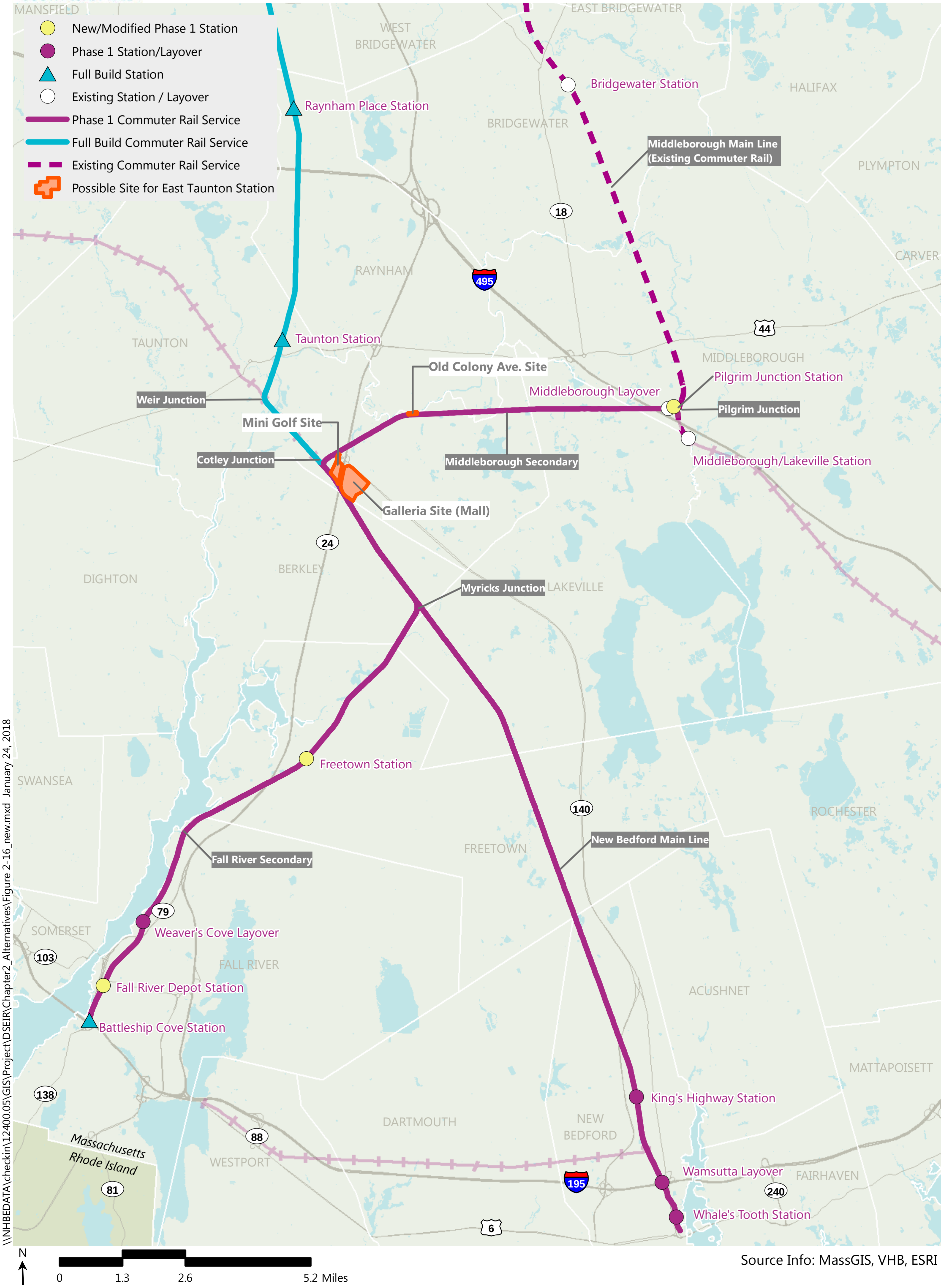
Figure 2-16: East Taunton Station Siting Options



Source Info: MassGIS, VHB, ESRI

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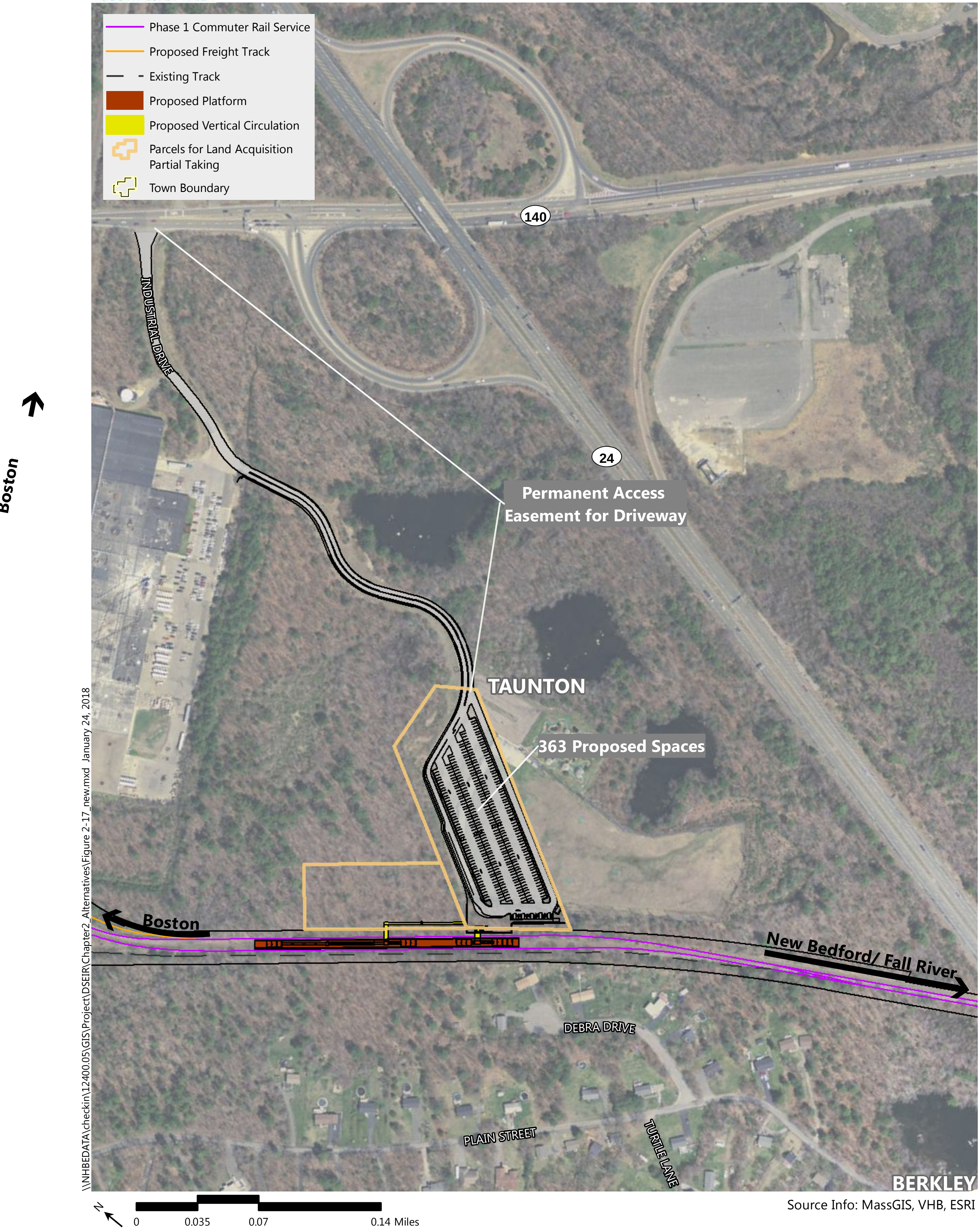
Figure 2-17: Conceptual Design of East Taunton Station



Source Info: MassGIS, VHB, ESRI

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2.5.4 Freetown: Modified Station Siting

In the FEIS/FEIR, a station was proposed in Freetown on South Main Street, at a site occupied by a self-storage business near the Fall River Executive Park and the proposed Riverfront Business Park. Since the FEIS/FEIR, the portion of the parcel where the station was proposed has been developed into a container storage facility. However, the property can still accommodate the station in a different configuration. To account for this development, MassDOT proposes to move the station and parking lot approximately 1,000 feet north on the same property (Figure 2-18), which would reduce wetland impacts from the design proposed in the FEIS/FEIR. In addition, the design of this station site will include developable land remaining for other development.

The station would include 107 parking spaces. The access driveway would still connect to South Main Street, shifting approximately 370 feet northeast from that previously evaluated in the FEIS/FEIR. This DSEIR evaluates the impacts associated with this design modification.

2.5.5 Fall River Depot: Modified Station Configuration

A Fall River Depot Station is proposed in Fall River one mile north of downtown Fall River at Route 79 and Davol Street, at the site of the former train station (Figure 2-19). The Fall River Depot site proposed in the FEIS/FEIR remains the preferred location for the Fall River Depot Station. However, since the FEIS/FEIR, a portion of the proposed Fall River Depot site has been developed (a new medical office building) in approximately the same location as the station parking facility included in the FEIS/FEIR station concepts. This resulted in reduced parking capacity available at the site, and in turn, required a design modification to provide a parking area large enough to accommodate the projected ridership.

The Davol Street lot would include 220 parking spaces and a centrally located kiss & ride accommodations close to the vertical circulation providing access to the platform. It would not include space for buses, which would stop on Davol Street, just outside of the station parking lot. Bus passengers would walk approximately 400 feet from the bus to the station platform.

To accommodate future Full Build ridership, MassDOT worked with the City of Fall River and the Fall River Redevelopment Authority (FRRA) to find an additional adjacent parcel that could provide adequate parking. The City of Fall River and the FRRA identified a parcel on North Main Street that could provide supplemental parking. This parcel is currently occupied by retail stores including a Rite Aid, Auto Zone, Family Dollar, and convenience store. A second parking lot on the east side of the tracks is a potential future expansion for the Full Build, with access from North Main Street, between Pearce Street and Baylies Street. This second parking lot would allow users to access the platform via Dyer Street and Pearce Street. Accessible ramp and stairs would provide access from the sidewalk on Pearce Street to the platform. Passengers using the North Main Street parking lot would have a walking distance of approximately 400 feet from the edge of the parking lot to the edge of the platform. This potential future expansion is not considered as part of the Phase 1 Project described in this DSEIR.

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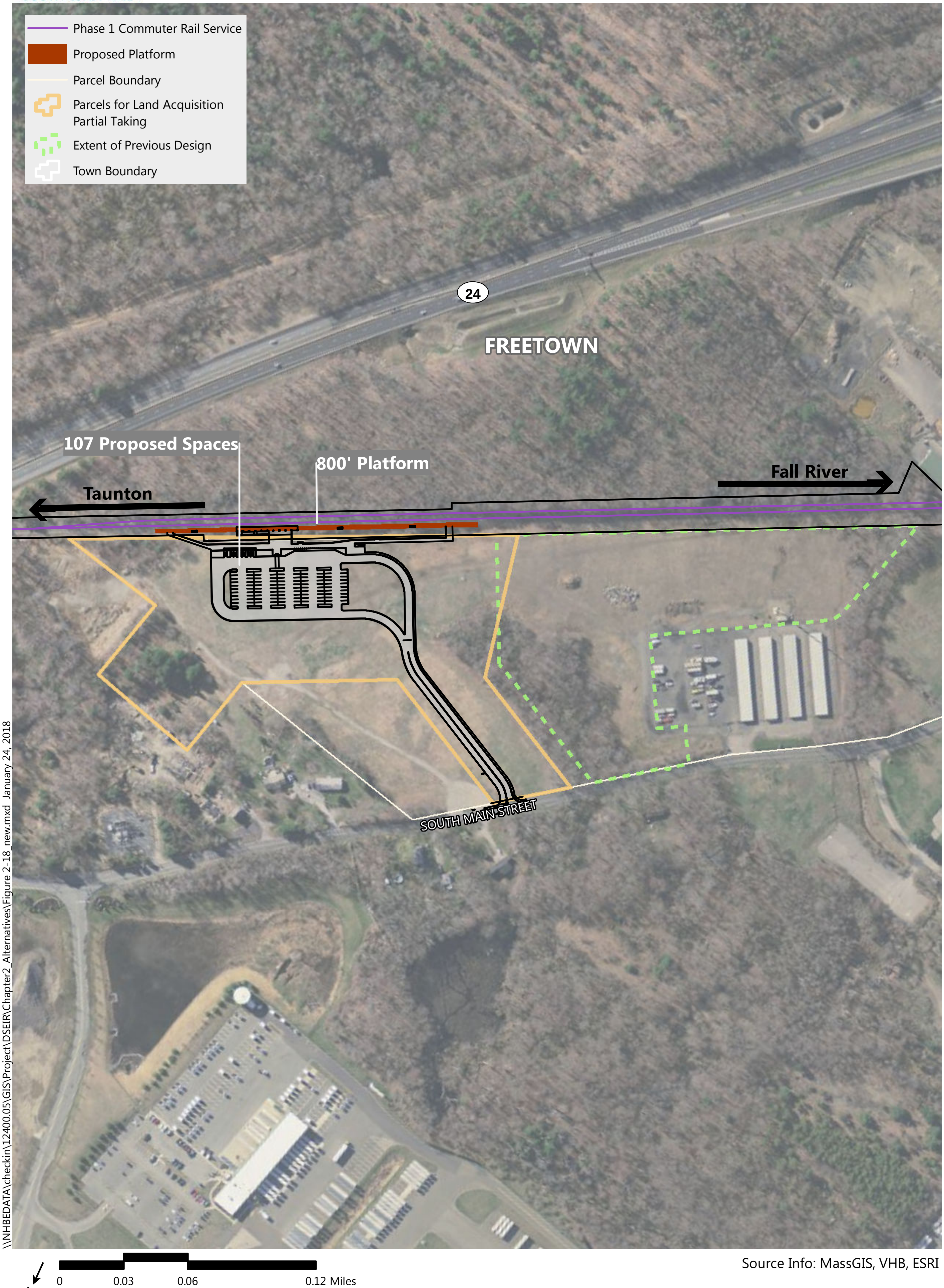
Figure 2-18: Conceptual Design of Freetown Station



Source Info: MassGIS, VHB, ESRI

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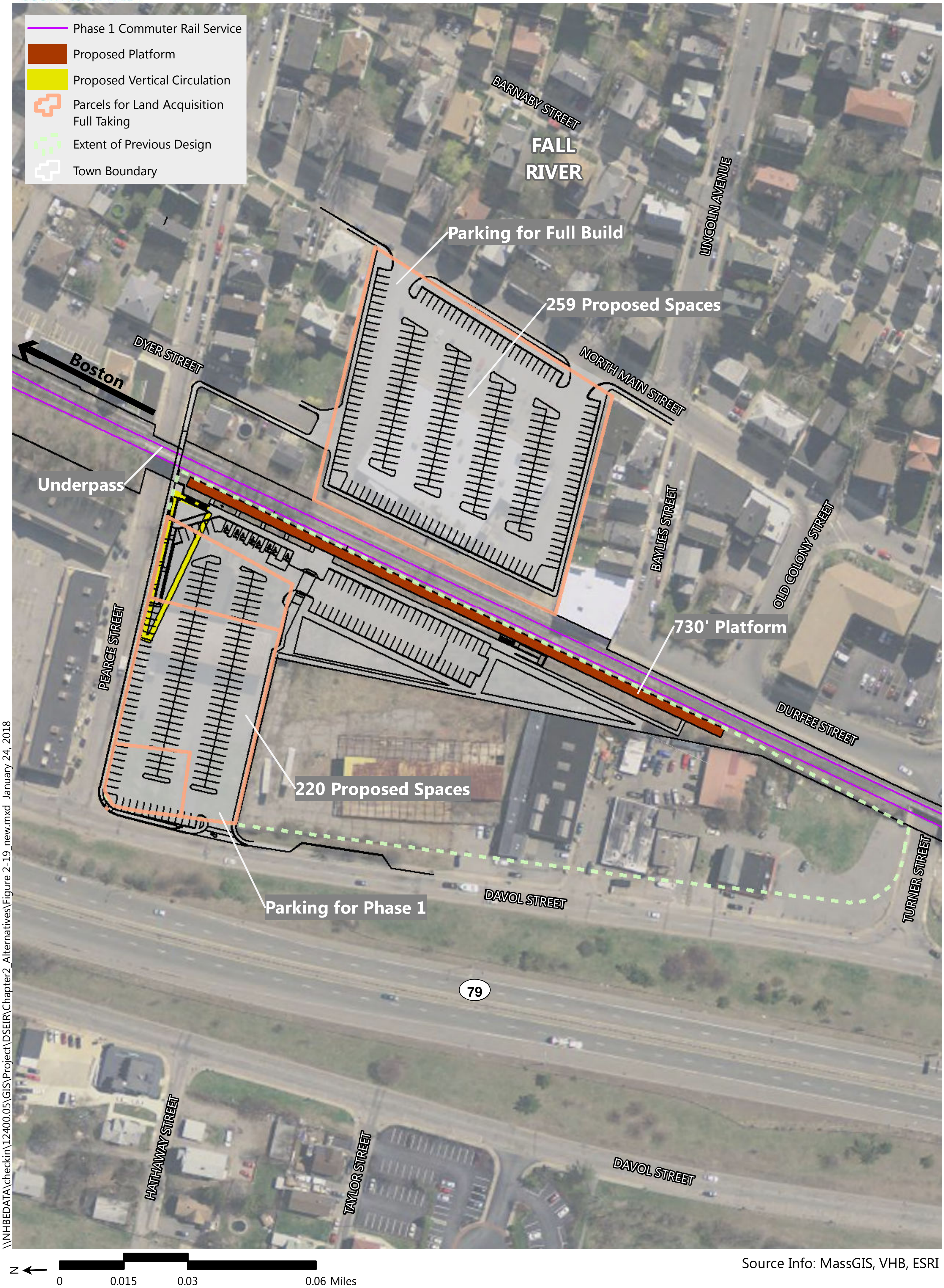
Figure 2-19: Conceptual Design of Fall River Depot Station



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Source Info: MassGIS, VHB, ESRI

2.6 Description of Phase 1 Elements and Operations

The following subsections detail the Phase 1 service, including its operations and required infrastructure. Phase 1 will:

- Operate three weekday peak period diesel-powered trains to each of the terminal stations of New Bedford and Fall River, with four additional off-peak trains to/from New Bedford and three additional off-peak trains to/from Fall River (a total of seven round trips to/from New Bedford and six round trips to/from Fall River each weekday);
- Utilize diesel engines for service to avoid the extensive cost and disruptive service shutdowns that will be required along the Old Colony lines to electrify service to Boston;
- Utilize approximately 34.8 miles of existing Middleborough Main Line track infrastructure between Boston and Pilgrim Junction;
- Reconstruct existing tracks at Pilgrim Junction to accommodate a station inside the wye;
- Upgrade existing track structures from Pilgrim Junction to Cotley Junction along the Middleborough Secondary, consisting of sections of single track and double track, a distance of approximately 7.1 miles;
- Reconstruct 17.3 miles of the New Bedford Main Line from Taunton to New Bedford and 11.7 miles of the Fall River Secondary between Berkley and Fall River, and make infrastructure improvements on the Southern Triangle (common to both Phase 1 and Full Build);
- Reconstruct five public at-grade railroad crossings along the Middleborough Secondary;
- Install new signals and positive train control (PTC) system;
- Build six new stations, including two as proposed in the FEIS/FEIR (King's Highway and Whale's Tooth), two with design modifications from the design shown in the FEIS/FEIR (Freetown and Fall River Depot), one relocated from the FEIS/FEIR location (East Taunton, common to both Phase 1 and Full Build), and one newly proposed station (Pilgrim Junction); and
- Build two new layover facilities (Wamsutta Layover Facility in New Bedford and Weaver's Cove Layover Facility in Fall River) as proposed in the FEIS/FEIR (common to both Phase 1 and Full Build).

2.6.1 Operations of the Phase 1 Service

Existing Operations

Segments of the proposed Phase 1 alignment currently provide passenger and freight service as described below:

- The *Middleborough Main Line* currently serves the MBTA Middleborough Main Line between Middleborough and Boston, and the MBTA Kingston/Plymouth and Greenbush Lines between

Braintree and Boston. In addition, one existing daily freight roundtrip operates in a window of availability.

- The *Middleborough Secondary* does not currently provide passenger service. Two daily freight roundtrips typically operate on the Middleborough Secondary.
- The *New Bedford Main Line* and *Fall River Secondary* do not currently provide passenger service. Freight operations on these rail lines were described in the FEIS/FEIR and are anticipated to continue on the track segments where freight is currently provided.

Although future freight demand was not modeled as part of the DSEIR, future operating windows and restrictions for freight trains were assumed to be similar to those described in the FEIS/FEIR.

Proposed Commuter Rail Operations

Phase 1 will provide service using the existing Middleborough Main Line, Middleborough Secondary, New Bedford Main Line, and Fall River Secondary. Between Boston and the termini stations in Fall River and New Bedford, this service will take the following route:

- All trains will travel along the *Middleborough Main Line* between Boston and Pilgrim Junction and will stop at the new Pilgrim Junction Station – trains will also stop at all stops between Pilgrim Junction and Holbrook/Randolph, and will have varying stopping patterns between Holbrook/Randolph and South Station (similar to the existing Middleborough Main Line service);
- All trains will travel along the *Middleborough Secondary* between Pilgrim Junction and Cotley Junction;
- All trains will travel along the *New Bedford Main Line* between Cotley Junction and Myricks Junction, and will stop at the new East Taunton Station just south of Cotley Junction;
- New Bedford trains will travel along the *New Bedford Main Line* between Myricks Junction and Whale's Tooth, and will stop at the new King's Highway and Whale's Tooth Stations;
- Fall River trains will travel along the *Fall River Secondary* between Myricks Junction and Fall River Depot, and will stop at the new Freetown and Fall River Depot Stations.

The proposed operations feature three peak period trains to each of the terminal stations of New Bedford and Fall River.[16] This translates to approximately 70-minute headways[17] on both the Fall River Secondary and the New Bedford Main Line, and 35-minute headways on the portion of the route north of Myricks Junction. During off-peak periods, three additional trains will operate on a 3- to 3.5-hour frequency from the terminal stations and with approximately 90-minute frequency on the trunk portion. This operational model provides six round-trip trains per weekday from Fall River and seven

16 The peak period is defined according to the MBTA Middleborough Main Line schedule, effective May 22, 2017, and is approximately three hours in each direction (inbound in the morning, outbound in the afternoon/evening).

17 A "headway" is the frequency between trains.

round-trip trains per weekday from New Bedford (a total of 13 round-trip trains per weekday between East Taunton and Boston). Table 2-3 summarizes the proposed Phase 1 weekday service. Two additional trainsets on the Middleborough Main Line are required to support Phase 1 service, with the addition of bi-level coaches to provide additional passenger capacity as described in more detail in Section 2.4.6.

Table 2-3 Number of Proposed Phase 1 Weekday Trips by Location

	Inbound	Outbound	Total	Peak Period
New Bedford	7	7	14	3 Morning Peak Trips 3 Evening Peak Trips
Fall River	6	6	12	3 Morning Peak Trips 3 Evening Peak Trips
Taunton	13	13	26	6 Morning Peak Trips 6 Evening Peak Trips
Middleborough	13	13	26 (24 Existing)	6 Morning Peak Trips 6 Evening Peak Trips

The MBTA has established a Service Delivery Policy[18] to ensure that its transit services meet the needs of the riding public. The MBTA identifies minimum frequency of service guidelines; for Commuter Rail, the minimum frequency guidelines specify a minimum of three trips in a peak direction during the morning (AM) peak period and four trips in a peak direction during the evening (PM) peak period.

Phase 1 service is constrained by limited capacity on the Middleborough Main Line and at South Station. The proposed Phase 1 service provides as much service as is possible without additional infrastructure improvements to the Middleborough Main Line and South Station. Therefore, Phase 1 service will meet the MBTA Service Delivery Policy to the maximum extent practicable. Phase 1 service will meet the minimum service delivery policy standard in the AM peak period but will not meet the policy in the PM Peak period as it would provide three trips (rather than four) to each terminal station in the peak direction during each peak period. Since trains serving both New Bedford and Fall River will stop at East Taunton and Pilgrim Junction Stations, frequency at these stations will meet the Service Delivery Policy guidelines in both the AM and PM peak periods. As a phased Project, SCR will be able to improve frequencies and fully meet the Service Delivery Policy in the Full Build.

Table 2-4 highlights the interregional links provided by the Phase 1 service. An interregional link is a link that provides a one-seat ride from one municipality to another. The Phase 1 service will provide 64 interregional links, consistent with the goal of the Project to improve regional mobility.

18 Massachusetts Bay Transportation Authority, Service Delivery Policy, MBTA Fiscal and Management Control Board approved January 23, 2017.

Table 2-4 Interregional Links – Phase 1 Service

	Boston	Quincy	Braintree	Holbrook	Randolph	Brockton	Bridgewater	Middleborough	Taunton	Freetown	Fall River	New Bedford
Boston		x	x	x	x	x	x	x	x	x	x	x
Quincy	x		x	x	x	x	x	x	x	x	x	x
Braintree	x	x		x	x	x	x	x	x	x	x	x
Holbrook	x	x	x		x	x	x	x	x	x	x	x
Randolph	x	x	x	x		x	x	x	x	x	x	x
Brockton	x	x	x	x	x		x	x	x	x	x	x
Bridgewater	x	x	x	x	x	x		x	x	x	x	x
Middleborough	x	x	x	x	x	x	x		x	x	x	x
Taunton	x	x	x	x	x	x	x	x		x	x	x
Freetown	x	x	x	x	x	x	x	x	x		x	
Fall River	x	x	x	x	x	x	x	x	x	x		
New Bedford	x	x	x	x	x	x	x	x	x			

1 Intra-municipal connections not included.

Travel time for Phase 1 service is based on operational analyses, which identified the segments of the rail corridors that will operate at top speed as well as segments where speed is constrained due to speed restrictions, geometry, vehicles, power mode, dwell times and number of stations and civil restrictions. Table 2-5 summarizes the total trip time from each terminal station (New Bedford and Fall River) to South Station based on the proposed operations. Average trip times range from 91 to 95 minutes between Fall River/New Bedford and South Station. The average trip times in Table 2-5 are based on simulation of the Phase 1 service. The operations for the Phase 1 service will continue to be refined, with expected travel times between Boston and each of the termini stations of under 90 minutes when Phase 1 operations begin.

Table 2-5 Average Trip Times, Phase 1 (min)[1, 2]

	New Bedford Trains		Fall River Trains	
Operation	**Northbound**	**Southbound**	**Northbound**	**Southbound**
Peak Period Service	91	91	91	93
Non-Peak Period Service	94	95	93	92

1 Overall travel times were developed using Berkeley's Rail Traffic Controller® simulation software.
2 Assumptions were made based on track and signal layout.

Proposed Feeder Bus Services

Three regional transit authorities currently provide local bus service within the region: Brockton Area Transit Authority (BAT), Southeastern Regional Transit Authority (SRTA), and Greater Attleboro Taunton Regional Transit Authority (GATRA). The SRTA and GATRA operators use a fleet of buses that accommodate bicycles, which will encourage multi-modal integration for the South Coast Rail Project. Current bus operators will provide enhanced Feeder Bus service to the proposed stations for Phase 1 service.

As defined in the FEIS/FEIR, the Feeder Bus plan for the South Coast Rail Project is envisioned to connect the urbanized communities in the study area to the commuter rail stations. A Feeder Bus network would provide an alternative to driving to stations and would support TOD and other smart growth initiatives in the study area by connecting surrounding areas to Phase 1 train stations. The Feeder Bus network would provide frequent, convenient service connections with trains. The Feeder Bus plan would apply to the Phase 1 service for stations included in the Phase 1 service. In addition, a shuttle would operate between the existing Middleborough/Lakeville Station and the new station at Pilgrim Junction. Table 2-6 summarizes the proposed Phase 1 Feeder Bus connections.

Table 2-6 Proposed Feeder Bus Operations

Station Name	Operator	Route #	Extension Length (miles)	Existing Headway (minutes)
Pilgrim Junction	GATRA	*Shuttle from Middleborough/Lakeville*		
Pilgrim Junction	GATRA	Wareham/Middle-borough/Lakeville	0.7	55
Pilgrim Junction	GATRA	Middleborough Downtown	0.7	240
East Taunton	GATRA	8	0.9	60
Freetown	SRTA	2	1.4	30
Fall River Depot	SRTA	2	0	20
King's Highway	SRTA	8	0	40
Whale's Tooth	SRTA	1	0.7	20
Whale's Tooth	SRTA	2	0	20

1 Proposed peak frequencies are the same as existing service. Potential frequency adjustments could be considered prior to implementation.

Further details on the decisions made in selecting the feeder bus routes and service changes are provided in the *Feeder Bus Service Analysis Report*, Appendix 3.2-A of the FEIS/FEIR. The proposed feeder bus routes would remain the same as those proposed in the FEIS/FEIR for Freetown, Fall River Depot, King's Highway, and Whale's Tooth.

2.6.2 Track Infrastructure

Phase 1 will use existing active rail alignments along its entire route. The service will be provided by using the Middleborough Main Line, Middleborough Secondary, New Bedford Main Line, and Fall River Secondary to provide service to Taunton, New Bedford, and Fall River. The Middleborough Main Line is an active freight and commuter rail line and part of the MBTA commuter rail system operated and maintained by Keolis. The Middleborough Secondary is an active single-track freight line owned by MassDOT, maintained by Mass Coastal Railroad, and with operating rights for CSX Corporation. The New Bedford Main Line and Fall River Secondary are active freight lines owned by MassDOT, and operated and maintained by Mass Coastal Railroad.

Track improvements to the Middleborough Main Line are not required for Phase 1 except at Pilgrim Junction. The track from Cotley Junction south to New Bedford and Fall River will be mostly reconstructed as previously evaluated in the FEIS/FEIR, with changes around Cotley Junction and the relocated East Taunton Station, and a modified track section. The Southern Triangle will also be reconstructed as described in the FEIS/FEIR, with some reduction in double track areas.

The following improvements are proposed along the Middleborough Secondary to accommodate Phase 1 commuter rail service:

- Rehabilitate existing single track from Pilgrim Junction to Cotley Junction to upgrade the track classification to Class 4, including a track lift of six inches to refurbish ballast, completing ongoing tie replacement, replacing culverts, and constructing retaining walls to minimize wetland impacts, as well as any noise or vibration mitigation measures that are deemed cost-effective. The tie replacement and culvert work will be coordinated with the MassDOT State of Good Repair program presently underway along this alignment;
- Install new track siding approximately 1,500 feet in length east of Middleborough Avenue to accommodate maintenance-of-way equipment and disabled trains;
- Upgrade five grade crossings;
- Install new signal and communications systems; and
- Install PTC communications equipment within the right-of-way along the commuter rail system to improve safety and communications as mandated by Congress in 2008 under the Rail Safety Improvement Act.

The list below describes the proposed commuter rail track infrastructure for the Phase 1 service by segment, totaling 36.1 miles of track:

- Pilgrim Junction to Cotley Junction (Middleborough Secondary): 7.1 miles, mostly single track with a new 1,800-foot siding;
- Cotley Junction to Myricks Junction (New Bedford Main Line): 4.3 miles of double track;

- Myricks Junction to Whale's Tooth (New Bedford Main Line): 13.0 miles of single and double track;
- Myricks Junction to Fall River Depot (Fall River Secondary): 11.7 miles of single and double track.

Except in certain locations, the track will be designed for a maximum authorized speed of 79 miles per hour (MPH), per MBTA Signal Design Speed standards. Locations designed for less than 79 MPH will be at certain sidings (which would be too short to achieve 79 MPH), and south of the King's Highway Station, where it would be precluded by existing site conditions.

2.6.3 Grade Crossings

There are five public at-grade railroad crossings on the Middleborough Secondary:

- Route 140, Taunton;
- Middleboro Avenue, Taunton;
- Old Colony Avenue, Taunton;
- North Precinct Street, Lakeville; and
- Leonard Street, Lakeville.

Chapter 5 – Traffic and Transportation provides information on the existing conditions and improvements proposed for each grade crossing. All existing public grade crossings on the Phase 1 railroad rights-of-way have flashing lights installed. It is recommended that each location will be upgraded to include a combination of new, state-of-the-art, Automatic Highway Crossing Warning (AHCW) systems, pavement markings and signage, and minor geometric modifications such as driveway reconfiguration, driveway closures, vegetation clearing, and utility pole relocations.

2.6.4 Bridges and Culverts

The FEIS/FEIR reviewed many bridges and culverts as part of the Full Build service. In addition to the bridges and culverts already reviewed, the Phase 1 service along the Middleborough Secondary crosses two waterways on bridges: Cotley River and Richmond Brook. MassDOT Rail and Transit Division is already undertaking repairs to these bridges as part of its State of Good Repair program, and Phase 1 will not require additional improvements. There are also 23 culverts that pass under the Middleborough Secondary, of which 13 will be maintained, and 10 will be replaced as part of MassDOT's State of Good Repair program. Because the culvert work has independent utility, and is exempt from Wetlands Protection Act and Massachusetts General Laws Chapter 91, MassDOT has elected to permit and construct these elements in advance of Phase 1 to expedite construction, using SCR funds. Section 8.3.2 provides more detail about these culverts, which are in Table 8.3.2-3.

2.6.5 Signals and Communications

Phase 1 will require a new signal system to be designed and installed within the proposed Phase 1 Project limits, which will be similar to the signal system described in the FEIS/FEIR. The communications system will include a new fiber optic conduit and radio antennas. This will allow the signal system and grade crossings to be connected to the Commuter Rail Operations Control Center (CROCC). The communications system will also connect the CROCC to systems at station stops, including passenger warning, public information and address, security, fire alarm, and police call back systems. Provisions will be made for future expansion of systems, such as for fare collection.

In addition, the new signal systems will now be required to include PTC as mandated by Congress in the Rail Safety Act of 2008; the new signal system will enforce speed and stop the train ("positive stop") if the engineer fails to operate the vehicle as directed by the signal system. Phase 1 will require a new PTC signal system for the New Bedford Main Line, Fall River Secondary, and Middleborough Secondary. Installation of the PTC signal system is underway on the Middleborough Main Line.

2.6.6 Rolling Stock

Phase 1 will require two additional trainsets, beyond what is currently used to provide MBTA service on the Old Colony Lines (Middleborough/Lakeville, Kingston/Plymouth, and Greenbush Lines). The planned locomotive fleet could accommodate this service increase. Phase 1 will also require that some of the existing single level coaches on the Old Colony Lines be replaced with bi-level coaches to accommodate the new riders, and some trainsets will be expanded to six cars as needed to accommodate the ridership. In total 16 new coaches will be required for Phase 1 service and will be usable under the Full Build Project as well. Figure 2-20 demonstrates how additional coaches could be used during peak periods in Phase 1 to accommodate ridership.

Figure 2-20: Proposed Peak Period Trainsets

*The schedule shows the times that proposed trips would stop at Pilgrim Junction. Existing trips stop at Middleborough/Lakeville within one minute of the times shown at Pilgrim Junction, with the exception of the new trip.

Sources

MBTA Middleborough Line Schedule, effective May 22, 2017.
DRAFT Weekday Schedule—Phase 1, August 2017.
South Side Equipment Cycle, effective May 22, 2017 (revised June 3, 2017).
DRAFT Proposed Old Colony Weekday Equipment Cycle—Phase 1, August 2017.

2.6.7 Stations

Phase 1 will have six new commuter rail stations, four of which were included in the FEIS/FEIR as part of the SCR preferred alternative. The Phase 1 stations are Pilgrim Junction, East Taunton, King's Highway, Whale's Tooth, Freetown, and Fall River Depot. Battleship Cove will be included in the Full Build. King's Highway and Whale's Tooth will remain unmodified from the stations proposed in the FEIS/FEIR, while slight design modifications to Freetown and Fall River are proposed to accommodate recent private development on these parcels. East Taunton will have a new station location that differs from that proposed in the FEIS/FEIR, and Pilgrim Junction is a new station not previously identified in the FEIS/FEIR. Trains will stop at existing Middleborough Main Line Stations in the same stopping pattern as existing trips, with the exception of the Middleborough/Lakeville Station. Bus or van shuttle service will be provided from the existing TOD at the existing Middleborough/Lakeville Station to the new Pilgrim Junction Station.

Phase 1 station stops will include:

- **South Station:** Modifications not required, existing stop on Middleborough Main Line
- **JFK/UMass:** Modifications not required, existing stop on Middleborough Main Line
- **Quincy Center:** Modifications not required, existing stop on Middleborough Main Line
- **Braintree:** Modifications not required, existing stop on Middleborough Main Line
- **Holbrook/Randolph:** Modifications not required, existing stop on Middleborough Main Line
- **Montello:** Modifications not required, existing stop on Middleborough Main Line
- **Brockton:** Modifications not required, existing stop on Middleborough Main Line
- **Campello:** Modifications not required, existing stop on Middleborough Main Line
- **Bridgewater:** Modifications not required, existing stop on Middleborough Main Line
- **Pilgrim Junction: New station in Middleborough not previously identified as part of South Coast Rail Project**
    - Parking Spaces – 501 total spaces, including 18 accessible spaces
    - Parking Lot Type – paved surface parking
    - Station Access Drive – driveway access from South Main Street (Route 105)
    - Bus/Kiss & Ride Accommodations – 200-foot bus loop that will accommodate 3 to 4 40-foot buses, one 120-foot kiss & ride parking area, and one 240-foot kiss & ride parking area.
    - Platform Type – one side platform for service to/from Boston, and potential for one side platform to support future Cape service
    - Platform Dimension – 800-foot high-level platform, 12-feet wide, and potential for 400-foot high-level platform, 12-feet wide
    - Track Configuration – single track for service to/from Boston and separate single track to support possible future Cape service

- Pedestrian Accommodations – a sidewalk will be installed connecting the parking lot with an existing sidewalk on West Grove Street (Route 28)
- Feeder Bus – a potential bus or van shuttle will provide service to/from the existing Middleborough/Lakeville Station
- Stormwater Management – onsite surface best management practices (BMPs)

- **East Taunton: New station location that differs from location presented in FEIS/FEIR**
  - Parking Spaces – 363 total spaces, including 10 accessible spaces
  - Parking Lot Type – paved surface parking
  - Station Access Drive – driveway access from Industrial Drive
  - Bus/Kiss & Ride Accommodations – 100-foot bus turnout that will accommodate 1 to 2 40-foot buses and a 240-foot kiss & ride parking area.
  - Platform Type – center island platform with two pedestrian bridges over the tracks (one with stairs, one with ramps)
  - Platform Dimension – 800-foot high-level center-island platform, 26.5-feet wide
  - Track Configuration – triple track (double track for commuter rail and single track for freight siding)
  - Pedestrian Accommodations – a sidewalk will be installed connecting the parking lot with an existing sidewalk to County Street (Route 140)
  - Feeder Bus – The existing GATRA Route 8 will be extended approximately 0.9 miles to provide a stop at the station
  - Stormwater Management – three onsite surface BMPs and one swale

- **King's Highway:** As described in FEIS/FEIR, without additional modifications

- **Whale's Tooth:** As described in FEIS/FEIR, without additional modifications

- **Freetown: Design Modification from design that was presented in FEIS/FEIR**
  - Parking Spaces – 107 total spaces, including 7 accessible spaces
  - Parking Lot Type – paved surface parking
  - Station Access Drive – driveway access from South Main Street
  - Bus/Kiss & Ride Accommodations – 120-foot pick-up/drop-off area that will accommodate 1 to 2 40-foot buses and accommodate kiss & ride users.
  - Platform Type – one side platform
  - Platform Dimension – 800-foot high-level platform, 12-feet wide
  - Track Configuration – double track
  - Pedestrian Accommodations – a sidewalk will be installed connecting the parking lot with South Main Street (Route 79)
  - Feeder Bus – The existing SRTA Route 2 will be extended approximately 1.4 miles to provide a stop at the station.
  - Stormwater Management – one onsite surface BMP

- **Fall River Depot: Design Modification from what was presented in FEIS/FEIR**
    - Parking Spaces – 220 total spaces in Davol Street lot (Phase 1), including approximately 8 accessible spaces
    - Parking Lot Type – paved surface parking
    - Station Access Drive – driveway access from Davol Street
    - Bus/Kiss & Ride Accommodations – 160-foot kiss & ride parking area. Buses will stop on Davol Street outside of the station parking area at a 125-foot bus stop.
    - Platform Type – one side platform
    - Platform Dimension – 730-foot high-level platform, 12-feet wide
    - Track Configuration – double track
    - Pedestrian Accommodations – A sidewalk will be installed connecting the parking lot with Davol Street (Route 138).
    - Feeder Bus – pedestrian access will be improved to connect to SRTA Route 2.
    - Stormwater Management – pretreatment with a water quality unit with the possibility of underground detention/retention units

2.6.8 Property Acquisition

For purposes of this discussion, "property acquisition" is defined as obtaining greater than a 500-square-foot portion, or a sliver of land more than 10 feet wide, of any parcel outside of the existing rights-of-way to accommodate permanent construction impacts, based upon conceptual engineering plans. Narrow slivers of parcels are not considered in the evaluation of property acquisition, given the scale and accuracy of the conceptual design. Temporary construction impacts beyond the limits of the existing rights-of-way will not require land acquisition (utilizing temporary construction easements instead) and are therefore not considered in this evaluation. Permanent easements are considered in this evaluation. Aerial photographs and public Massachusetts Geographic Information Systems (GIS) information were examined in reference to preliminary engineering plans to identify encroachments onto adjacent parcels. Final engineering plans may show a change in the actual area of acquisition required.

When evaluating each property acquisition, conceptual design plans (in CAD format) were compared with public GIS information. Where proposed construction required full-parcel acquisition, property size for each of these parcels was gathered from existing information contained at Assessors' offices in each municipality. The design endeavored to limit property impact to partial acquisitions wherever possible, unless partial-parcel acquisitions resulted in the remaining parcel being unusable to the existing owner. In these instances, the analysis accounts for full-parcel acquisitions. Where partial-parcel acquisition was required, property acquisition was calculated utilizing the public GIS information contrasting to proposed limits of work. Parcel acquisition needs will be re-evaluated during final design using more detailed property boundary data and refined right-of-way requirements mapping.

Where property acquisition is required, the goal for MassDOT will be to reach agreements with existing owners for purchase of properties required by the Project. However, the Eminent Domain process may be required. Once property has been acquired for the Project, it is expected that the Commonwealth (or one of its assignees) will retain ownership of each parcel.

Table 2-7 summarizes property acquisition along the Middleborough Secondary and required for Pilgrim Junction, East Taunton, Freetown, Stations. Values in Table 2-7 reflect both full and partial takings required for Phase 1 that were not disclosed in the FEIS/FEIR, and provides comparisons to acquisitions presented in the FEIS/FEIR. There is also the potential that sliver takings near grade crossings will be required along the Middleborough Secondary.

Table 2-7 Summary of Proposed Property Acquisitions on Middleborough Secondary and at Modified Stations Not Disclosed in FEIS/FEIR

Location	Property	Area (Acres)[1]	Type	Comparison to Acquisitions Presented in FEIS/FEIR
Pilgrim Junction	52 West Grove Street	1.7	Full	N/A
	18 West Clark Street	0.25	Permanent Easement	
	161 South Main Street	2.0	Permanent Easement	
East Taunton	1133 County Street	4.7	Partial and Permanent Easement	Replaces 11.53 acres (2 parcels) disclosed in FEIS/FEIR
	1141 County Street	4.8	Partial and Permanent Easement	
Freetown	165 South Main Street	9.8	Partial	Replaces 4.18 acres (1 parcel) disclosed in FEIS/FEIR

1 Area is listed for the full property and does not define the portion required for partial property acquisition or permanent easements.

2.6.9 Cost

Capital costs include new infrastructure such as the construction of track, stations, new layovers, signals and positive train control; procurement of new coaches; land acquisition; and professional services. The first step in understanding the financial impact of Phase 1 is to convert the capital and operating cost estimates from base year (2017) dollars to the projected year-of-expenditure dollars.

The capital cost estimates for both infrastructure and equipment use the midpoint of construction based on the FTA standard cost category inflation factor of 3.5%. The total program cost, with escalation, is approximately $935 million based on a cost estimate as of December 5, 2017, and summarized in Table 2-8.[19] The capital cost estimates will be refined as design develops.

The incremental operations and maintenance (O&M) cost, net of fare revenues, was calculated for Phase 1, assuming revenue service commences November 2022. The total amount in 2017 dollars is anticipated to be approximately $10.80 million per year, based on an incremental gross O&M cost of $18.07 million per year and projected fare revenues of $7.27 million per year. The Phase 1 service would have a fare recovery ratio of 40.2% (compared to a systemwide commuter rail average of 49.1%).[20]

Table 2-8 Phase 1 Capital Cost Summary

Item	Capital Cost
Total Infrastructure Cost[1]	$ 466,787,000
Real Estate Cost	$ 21,490,000
Professional Services Cost[2]	$ 127,825,000
Contingency and Escalation[3, 4]	$ 205,573,000
Coach Costs[5]	$ 71,605,000
Force Account and Agency	$ 41,472,000
Total	**$ 934,752,000**

Notes:
1 Total Infrastructure costs were estimated in 2016 dollars.
2 Professional services include Design, Permitting, Construction Phase Services, Program Management, Construction Management and Land Acquisition (deed research, appraisals, etc.).
3 Contingencies include escalation and design & construction contingencies
4 Escalation was calculated at 3.5 percent per year per FTA Standard Cost Category Criteria.
5 Based on ridership projections, procurement of sixteen (16) new bi-level coaches will be incorporated into the existing MBTA fleet. Two (2) locomotives for the additional trainsets, necessary to meet the service schedule, will come from the existing MBTA locomotive fleet.

19 Order-of-magnitude capital cost estimates include total infrastructure cost, real estate cost, professional services cost, contingency and escalation, vehicle costs, force account, and agency costs. See Table 2-7 for more details.

20 Order-of-magnitude O&M cost estimates (November 27, 2017) represent the incremental cost of Phase 1 service compared to existing service on the Middleborough Main Line. Costs are estimated based on proposed schedule, net new distance, net new travel time, and unit costs developed from the MBTA FY 2016 submission to the National Transit Database (escalated to FY 2017 using the FY 2016 and FY 2017 budgets). Revenues are estimated based on CTPS projections for Phase 1 service. The fare recovery ratio is calculated as fare revenues/gross O&M costs, with the systemwide commuter rail average based on the MBTA's FY 2016 submission to the National Transit Database.

Costs and Benefits

The cost of providing Phase 1 service can be measured against the benefits of providing Phase 1 service. These benefits include, but are not limited to, the following:

- Connecting the Fall River, New Bedford, and Taunton communities with Boston at an earlier date will result in new system boardings and new transportation options for the South Coast region;
- Reduced vehicle miles traveled (VMT) will result in reduced emissions, congestion, vehicle crashes, pavement damage, operating expenses, oil imports, and fuel consumption;
- Phasing service will generate net new jobs and additional economic activity, and will increase property values in Taunton, Freetown, New Bedford, and Fall River; and
- By phasing service, the SCR Program will construct elements of the Full Build in the Southern Triangle at an earlier date than in a non-phased program, which will result in escalation savings of approximately $152.90 million[21] – in comparison, the elements of Phase 1 that are not included in the Full Build service (but will result in freight improvements and resiliency in the event of service disruptions) will cost approximately $124.84 million.[22]

2.6.10 Construction Schedule

The time required for construction affects the length of short-term impacts and startup date for new transit services. Phase 1 will be constructed within a reasonable timeframe to achieve the Project purpose and provide service to the South Coast Region earlier than the Full Build. A design and construction schedule has been developed to open passenger service to the South Coast Region in November 2022. By phasing the Project and constructing Phase 1 to provide an earlier in-service date for communities within the Southern Triangle, construction and escalation costs are reduced for this portion of the permanent infrastructure. Construction costs, which typically escalate over time, will increase significantly for the permanent improvements within the Southern Triangle under a Full Build approach, since construction will not begin until much later under the Full Build approach. Phase 1 will be constructed and open for revenue service in November 2022.

21 Escalation savings calculated using projected capital cost cash flows current as of December 5, 2018and assume a midpoint of construction of June 2021 for Phase 1 and June 2026 for the Full Build (without phasing). Escalation savings include construction cost, land acquisition cost, professional services cost, vehicle costs, force account, and agency costs.

22 Order-of-magnitude capital cost estimate for Middleborough Secondary and Pilgrim Junction is current as of December 5, 2018 and includes total infrastructure cost, real estate cost, professional services cost, contingency and escalation, force account, and agency costs. Estimate does not include vehicle costs.

2.7 Phase 1 Ridership Analysis

2.7.1 Model Basis

Consistent with the approach taken in the FEIS/FEIR, ridership was modeled for the Phase 1 service using a travel demand model developed by the Central Transportation Planning Staff (CTPS) of the Boston Region Metropolitan Planning Organization (MPO). The CTPS model uses a process consistent with that of other major transportation projects in eastern Massachusetts. This travel demand model was refined specifically for the South Coast Study Area, using the current Boston Region MPO travel model and the statewide model for the South Coast Study Area. The model set that CTPS uses for forecasting travel demand is based on procedures and data that have evolved over many years and incorporates assumptions based on accepted practice, professional judgment and policy decisions relating to items such as model method, service plans and demographic assumptions. The CTPS regional model and its underlying assumptions are subject to review and approval by the Federal Highway Administration and FTA because the model is used to develop the regional emissions estimates used for transportation conformity determinations on the Long-Range Transportation Plan (LRTP) and Transportation Improvement Program (TIP).

The basis for the CTPS model is summarized below, with supporting technical information provided in Appendix A. Appendix A discusses updates to the CTPS ridership model incorporated for the DSEIR analyses.

Existing Transit Modes

Connectivity to other transit modes provides a larger coverage area for the Project while it increases mobility and regional opportunity. The model includes all major transit modes, such as commuter rail lines, the subway system (including both light and heavy rail lines), ferry service, and bus routes in regional communities. The model allows for transfers between all modes. Access to the transit system is allowed via walk/bike, transit, park & ride, and kiss & ride modes.

Regional Plan

The demographic forecasts were created by the local Regional Planning Agencies (RPAs) in the model area including the Southeastern Regional Planning and Economic Development District (SRPEDD), Old Colony Planning Council (OCPC), and Metropolitan Area Planning Council (MAPC). The transportation improvements included in this study are those transportation improvement projects most likely to be built by 2030 (for Phase 1 projections) and 2040 (for Full Build projections) and are included in the Boston Region Long-Range Transportation Plan, *Charting Progress to 2040*.

CTPS developed ridership forecasts for Phase 1 for the 2030 forecast year. To provide consistency in ridership projections to account for model inputs that have changed since the FEIS/FEIR and that result in lower projected ridership,[23] CTPS also developed ridership forecasts for the Full Build for the 2040 forecast year. The Full Build ridership estimates reflect changes that have occurred since the analysis conducted for the FEIS/FEIR. More detail on the Full Build ridership estimates is provided in Appendix A, *CTPS Memorandum*.

The ridership model assumed that the transportation network will be updated to reflect the Project improvements. The outputs of the model runs were compared to the No-Action scenario to see what changes in travel patterns would occur to the transportation system due to the South Coast Rail Project for Phase 1.

Population and Employment Densities

To establish where people are coming from and going to, the travel demand/ridership model considers the population and employment densities of the region. This is the basis for an origin/destination summary that ultimately translates into the number of people who would use the service. The model also accounts for the proximity of population densities to establish how the riders access the stations. Knowing whether riders walk, bike, drive or take the bus, for instance, is also relevant to ensuring that the stations are properly designed with adequate sidewalks, bike storage capacity, parking capacity, and good connections to other transit modes.

2.7.2 Model Inputs

The travel demand model relies on the following elements and assumptions to estimate future ridership projections:

- Operating plan;
- Station locations;
- Station parking, availability and cost; and
- Fares.

Operating Plan

The Operating Plan for the travel demand model was developed based on the proposed operations described in Section 2.4.1. Rail travel times for the Phase 1 service were calculated for operation in the forecast year and reflect the Phase 1 improvements and service modifications. The anticipated travel time reduction below 90 minutes noted in Section 2.4.1 would positively affect the ridership results provided in Section 2.5.3, as the lower travel time would make rail trips more attractive to users.

[23] For example, the base year was updated from 2010 to 2016. The forecast year was changed from 2035 in the FEIS/FEIR to 2040 for the Full Build in the DSEIR. Land use projections have changed. In addition, the FEIS/FEIR modeling effort used data from the MBTA Blue Book, which utilized conductor counts. Since then, CTPS has conducted a separate set of counts and determined that the conductor counts were inflated above the observed data, which in turn results in lower demand projections.

The Phase 1 Operating Plan includes approximately 70-minute peak period peak direction headways along the Fall River Secondary and New Bedford Main Line. Peak period peak direction headways will be approximately 35 minutes on the portion of the alignment north of Myricks Junction.

Station Location

How well a transit alternative appeals to potential riders is directly related to how easily patrons can get to a station. The travel demand model, therefore, considers the surrounding transportation infrastructure and any barriers that make access to the station difficult, which could potentially add to the in-vehicle travel time to the stations.

Station Parking, Availability and Cost

To plan for and design station parking that accommodates future demand, most of the proposed stations, including all the Phase 1 stations evaluated in the DSEIR, were modeled as if there were no constraints on the amount of available parking.[24] Running the model unconstrained at the proposed stations ensures that the true attractiveness of a station will be reflected in the total number of riders who would be expected to use the new service. This applies to the riders who will arrive to the station by car. All other modes (such as drop-offs or patrons arriving to the station by walking, riding a bicycle, or using transit) would be unaffected by the parking supply. Stations that do not offer parking were modeled without parking, and existing stations were modeled to reflect the number of existing spaces. Stations where TOD is projected will limit the parking supply at the new station to the benefit of greater development intensity in the immediate vicinity of the station to encourage future transit riders to live and work within walking distance of the station.

Fares

The model also considers the economics of using the proposed transit system. This allows the model to weigh the economic attractiveness of riding the proposed system compared to the economics of continuing to drive or using the existing commuter bus service. Fares for the proposed Phase 1 service were based on the current MBTA commuter rail monthly fare structure.[25]

2.7.3 Modeling Results

To portray the ways in which the South Coast Rail Project shifts and adds new ridership, the results summarize new station boardings and other transit metrics. The summary of new station boardings pertains to the new South Coast Rail stations only and gauges the overall benefit to the region provided by Phase 1. The transit metrics include:

24 For the Full Build, Battleship Cove, Taunton, and Easton Village were modeled with parking constraints associated with the physical constraints at each location.

25 The ridership model included Pilgrim Junction in Zone 8. Phase 1 service will include Pilgrim Junction in Zone 7, which would make the ride more affordable than the modeling assumptions.

- The total number of linked trips represents the shift in mode choice due to the alternative. For instance, for mode of access, residents of the South Coast communities currently have few alternatives outside of driving to work. With the Phase 1 service, people will have regional transit opportunity by 2030, which was previously not available and would not be available in the 2030 No Action, giving South Coast residents an additional mode to get to work. The additional transit choice presented by the Project will increase the number of people who choose to take transit to work. This number is represented in the increase in linked trips;
- New system-wide boardings represent the overall draw to the commuter rail transit system due to Phase 1. This total is also used to calculate overall cost-effectiveness of the Project; and
- The VMT reduction measure quantifies how many miles of automobile travel will be removed from the region due to the Project. As people switch from driving to using the new transit project, the reduction in VMT correlates to air quality benefits due to the Project.

Ridership

Table 2-9 presents the ridership estimates for the 2030 No Action[26] and Phase 1 service. Comparing the No Action to the Phase 1 projected ridership provides an estimate of the impact of Phase 1 service on ridership.

In the No-Action scenario, the Middleborough Main Line will continue to serve the existing Middleborough/Lakeville Station. In Phase 1, while many of these riders will board at Pilgrim Junction, others may choose to board elsewhere based on the inputs specified in Section 2.5.2. Similarly, riders at other stations along the route may choose to board at the new stations, resulting in diversions from existing stations. Of the Phase 1 ridership, 1,610 total daily inbound boardings will occur at the new stations of East Taunton, Freetown, Fall River Depot, King's Highway, and Whale's Tooth.[27]

[26] The No Action condition evaluated in the Ridership Analysis assumes that only the existing commuter rail lines are in operation (Providence, Stoughton, and Middleborough). This is a different condition that used elsewhere in this DSEIR, which compares the impacts of Phase 1 to the Full Build South Coast Rail Project (the No Action condition for impact analysis assumes that the Full Build is operational).

[27] Pilgrim Junction is excluded from this sum of new station boardings because much of the ridership using Pilgrim Junction currently uses the existing Middleborough/Lakeville Station.

Table 2-9 Ridership of Service Scenarios in 2030 on Middleborough Route (Inbound Boardings)

Station	No Action	Phase 1
JFK/UMass	50	60
Quincy Center	60	80
Braintree	20	20
Holbrook/Randolph	340	320
Montello	310	290
Brockton	350	330
Campello	310	300
Bridgewater	700	720
Middleborough/Lakeville	760	-
Pilgrim Junction	-	670[1]
East Taunton	-	420
Freetown	-	60
Fall River Depot	-	390
King's Highway	-	260
Whale's Tooth	-	480
Total Ridership	2,900	4,400

Source: CTPS Ridership Projections for SCR Phase 1, 2017.

Notes:

1 The number of inbound boardings at Pilgrim Junction includes riders accessing the station through a shuttle from the existing Middleborough/Lakeville Station. CTPS projected that as many as 120 riders may use this shuttle. Since the CTPS model is a regional model, the analysis included in this DSEIR accounts for likely route choices at the localized level and assumes that the projected ratio of park & ride to kiss & ride/drop-off riders would be similar at Pilgrim Junction and Middleborough/Lakeville. To account for this, the adjustment shifts kiss & ride passengers from Middleborough/Lakeville to Pilgrim Junction. This reduces the number of kiss & ride passengers from 100 to 10 at Middleborough/Lakeville and reduces the total projected shuttle ridership to 30 passengers. This adjusted value is used in the DSEIR analysis.

Transit Metrics

The four key transit metrics presented in Table 2-10 consist of daily linked transit trips, daily unlinked trips, boardings on the commuter rail system, and boardings on the private buses serving the Study Area compared to the No-Action scenario. Detailed breakdowns of the system-wide transit results are included in Appendix A. CTPS Memorandum.

Table 2-10 2030 Regional Transit Modeling Results (Daily)

Year Scenario	2016 Existing Conditions	2030 No Action	2030 Phase 1	Difference between No Action and Phase 1
Unlinked Transit Trips	1,197,900	1,380,000	1,382,200	2,200
Linked Transit Trips	905,000	1,041,300	1,042,900	1,600
Commuter Rail (1)	104,000	114,300	116,900	2,600
Study Area Private Buses (2)	2,000	2,200	1,400	-800

Source: CTPS Ridership Projections for SCR Phase 1, 2017.
Notes:
1 Commuter rail trips calibrated to CTPS 2012 passenger counts.
2 Study Area means the SCR Project Study Area.

The transit system is projected to grow from 1.20 million unlinked transit trips in 2016 to 1.38 million in 2030 in the No-Action scenario. The growth in unlinked transit trips is primarily due to demographics, but some transit improvements (e.g., the Green Line Extension) are adding to the increase in transit trips in the future. The Middleborough Phase 1 service is projected to add 2,200 unlinked transit trips and 1,600 linked transit trips compared to the No-Action scenario for 2030.

Even with limited service and fewer stations than provided in the Full Build, Phase 1 is expected to capture a substantial portion of the projected ridership for SCR in the South Coast region. The increase in linked trips in Phase 1 represents 41 percent of the increase in linked trips in the Full Build at approximately one-third the cost. Some of the passengers using other stations in the Full Build will likely choose to use one of the stations included in the Phase 1 service – for example, a subset of the 710 passengers using the downtown Taunton Station in the Full Build will likely use East Taunton during Phase 1 instead of commuting by automobile.

There are five reasons why the Phase 1 service builds towards the demand for the Full Build service:

- The Phase 1 frequency will increase in the Full Build, which will decrease the waiting time and generate additional ridership;
- The Full Build service will add a stop (and transfer) at Back Bay Station, which includes a sizable employment base and access to the Orange Line. This will increase the markets being served;
- Phase 1 includes six new stations. The Full Build will increase the markets served by adding five stations: North Easton, Easton, Raynham, Taunton (Dean Street), and Battleship Cove. Pilgrim Junction is included in Phase 1 but is not included in the Full Build alternative;
- Phase 1 provides travel times between Fall River/New Bedford and Boston of 91-95 minutes. The Full Build alignment will reduce these travel times (to under 80 minutes); and

- While much of the projected growth between existing conditions and 2040 occurs before 2030, modest regional growth is projected between 2030 (Phase 1) and 2040 (Full Build).[28]

Summarized in Table 2-11, private bus service boardings under Phase 1 will decline substantially to a projected 1,400 boardings (compared to 2,200 in the 2030 No Action) due to the diversion of passengers to the new rail options. Considering the rail ridership and remaining bus ridership together, Phase 1 will meet 10 percent of the demand for the approximately 30,000 work trips from the South Coast region to Boston.

Table 2-11 Daily Ridership Demand (2030)

Name	New Rail Station Boardings	Bus Boardings at Existing Commuter Bus Services	Total Service to South Coast Region	Percentage of Met Ridership Demand[1]
No Action	N/A	2,200	2,200	7%
Phase 1	1,600	1,400	3,000	10%

Source: CTPS Ridership and Land Use Projections for SCR Phase 1, 2017.
Notes:
1 Total Service to South Coast region divided by the number of daily work trips from the South Coast region to Boston (approximately 30,000)

Vehicle Miles Traveled

VMT is an important gauge for an alternative's transportation system benefits. VMT measures the extent of motor vehicle operation or the total number of vehicle miles traveled within the study area on given day. This measure quantifies how many miles of travel will be removed from the regional roadway network by commuters who elect to travel by train or bus rather than drive. This reduction in driving has several environmental benefits, notably, cleaner air and a reduction in greenhouse gas emissions. Fewer cars on the road also eases congestion along highway corridors and reduces highway wear and tear, which requires repairs and adds to congestion.

Based on the CTPS projections for 2030 (Appendix A), Phase 1 service will achieve a reduction of approximately 66,400 VMT per day from automobiles, and will result in an increase of approximately 714 VMT from transit (based on the extension of existing trips and proposed new trips to Fall River and New Bedford).[29, 30]

[28] For example, estimates from OCPC and SRPEDD project a 2.2% total growth in population across OCPC and SRPEDD communities from 2030 to 2040, as detailed in Appendix A.
[29] CTPS Air Quality Projections for SCR Phase 1, 2017.
[30] The change in Transit VMT reflects the change in the VMT of trains and does not include potential bus service changes.

Summary of Ridership Modeling Results

The results of this analysis show that Phase 1 will result in approximately 1,600 more daily linked trips than the No-Action scenario in 2030 and 1,600 passengers diverting from automobiles. This translates into an estimated reduction of 66,400 VMT from automobiles compared to the No Action, resulting in emissions benefits that are discussed in Chapter 6, *Air Quality & Greenhouse Gas*.

3. Land Alteration

3.1 Introduction

This chapter describes the type, amount and location of land alteration associated with Phase 1 that was not previously evaluated in the South Coast Rail (SCR) Final Environmental Impact Statement (FEIS)/Final Environmental Impact Report (FEIR). It also describes the proposed design for each new or relocated station, as well as how each station will be designed to minimize impervious area and alteration of any previously undisturbed land. Measures to minimize, mitigate, and compensate for impacts are also discussed.

3.1.1 Requirements of Certificate

The Secretary's Certificate requires the Draft Supplemental Environmental Impact Report (DSEIR) to:

- Include cumulative totals for land alteration and impervious area;
- Include a breakdown of land alteration impacts for specific elements of the Project, such as stations and layover facilities;
- Identify the different types and amounts of land altered, including forest; woodland; wetland resource areas; wetland buffer; priority habitat; previously disturbed area (specifying land type/use); and
- Describe proposed parking plans for each new or relocated station and how the design will minimize impervious area and land alteration.

This information is provided in the sections below. As confirmed in the Secretary's Certificate on the Notice of Project Change (NPC), Phase 1 elements are not located within an Area of Critical Environmental Concern, do not result in new impacts to open space, and do not require the disposition of Article 97 lands.

3.1.2 Regulatory Context

There are no state or federal regulations applicable to the evaluation of land alteration. The SCR Project was subject to a mandatory EIR because the Full Build will exceed the review threshold for land alteration described in 310 CMR 11.03(1)(a) and (b), as the SCR Project will cause the direct alteration of 50 or more acres of land, and creates ten or more acres of impervious area. Land alteration related to wetland resource areas is regulated under the Wetlands Protection Act (WPA 310 CMR 10.00 et. seq.), which is described in detail in Chapter 8, *Wetlands, Water Quality, and Waterways*. The new project elements associated with Phase 1 operations will not by themselves exceed these thresholds, however. However, the following analysis is provided as a supplement to the analysis in the FEIS/FEIR.

3.2 Existing Conditions

This section includes a qualitative description of existing conditions as they relate to ground cover at each new or redesigned station in Phase 1, along with the Middleborough Secondary rail corridor. Additional information pertaining to soils, topography and drainage can be found in Chapter 8, Section 8.4.3, *Existing Conditions*. Additional information about habitat and biodiversity can be found in Chapter 9, Section 9.2.5, *Phase 1 Station Locations*.

3.2.1 Pilgrim Junction Station

The proposed Pilgrim Junction Station will be located in Middleborough north of I-495 near the intersection of Routes 28 and 105 (Figure 3-1). Situated within the wye formed by the Massachusetts Bay Transportation Administration (MBTA) Middleborough Main Line and the Middleborough Secondary, the station will be within the triangle bordered on the north by the West Grove Street overpass, a four-lane highway, and accessed on the east by West Clark Street, a local residential road. Much of this 8.7-acre parcel is disturbed or previously developed, with wooded areas bordering the site along West Grove Street. Zoning at the site is General Use with a Water Resource Protection District (WPRD Z2) overlay.

3.2.2 East Taunton Station

The proposed location of the new East Taunton Station is an approximately 44.9-acre site at 1141 County Street (Route 140), near the exit 12 interchange on Route 24. It contains a former miniature golf course and a driving range with associated parking. The western side of the parcel is wooded and contains open water wetlands (Figure 3-2). Zoning at the site is Industrial with an Adult Entertainment District overlay.

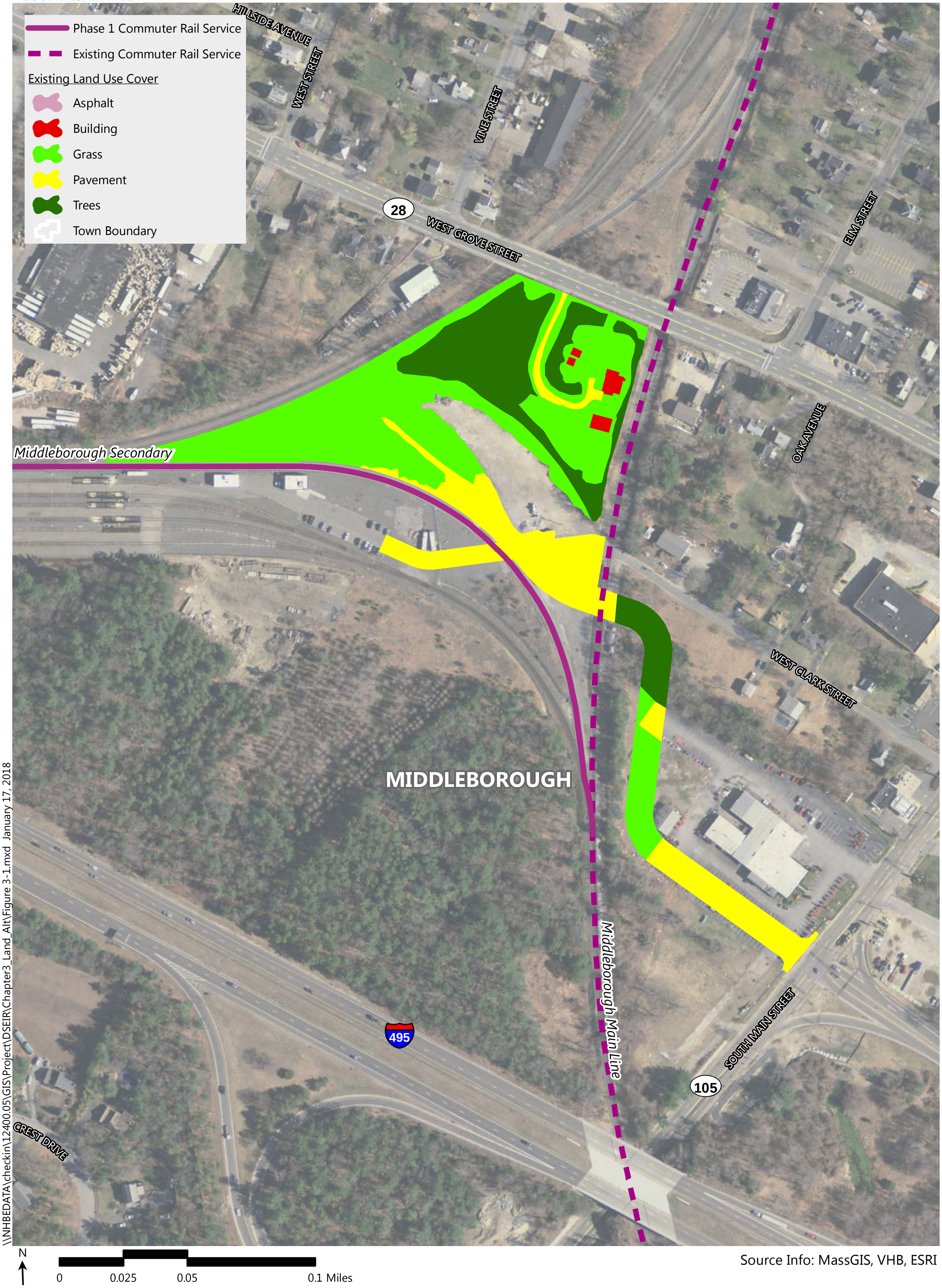
3.2.3 Freetown Station

The proposed Freetown Station is located on the same parcel identified in the FEIS/FEIR. However, the configuration of the station within that site has been revised due to the construction of a new development on a portion of the site since the filing of the FEIS/FEIR. The station will be located on 5.4 acres of the 28.6-acre site at 165 South Main Street, along the Fall River Secondary. The proposed station and parking lot have been relocated 1,000 feet north, on the same property evaluated in the FEIS/FEIR (Figure 3-3).

The site currently includes a commercial land use (container storage), as well as open land and forested wetlands. The property is bounded on the north by low-density residential uses, on the east by the existing rail line, on the south by forested land, and on the west by South Main Street. The former Algonquin Gas facility, which is proposed to be redeveloped as a mixed-use project called Riverfront Business Park, with residential, office, retail, hotel, and industrial uses, is west of South Main Street. Zoning at the Freetown Station site is General Use with a Planned Mixed Use District overlay and a South Main Street Corridor overlay.

Figure 3-1: Existing Conditions - Pilgrim Junction Station

Massachusetts Bay Transportation Authority



Source Info: MassGIS, VHB, ESRI

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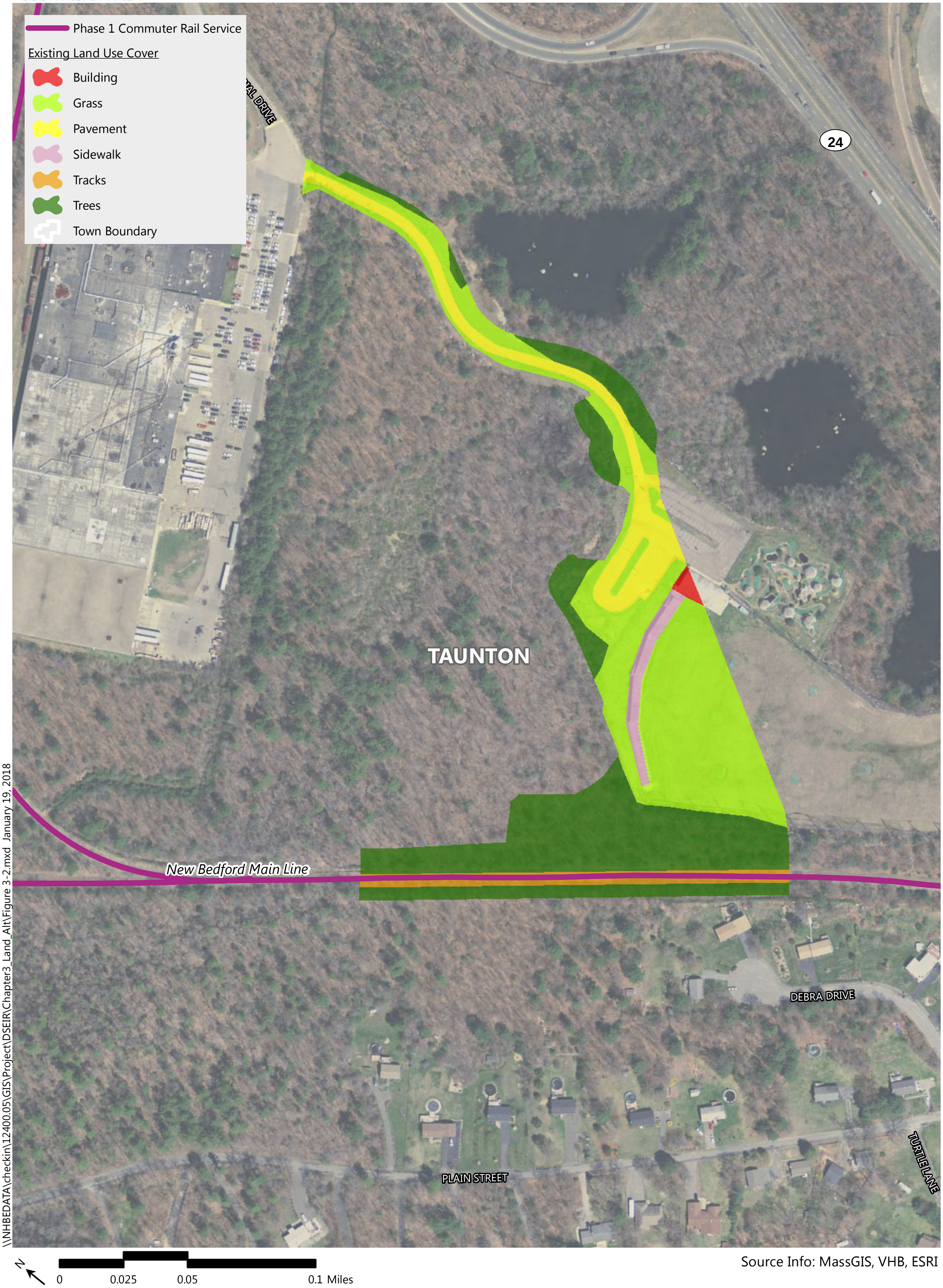
Figure 3-2: Existing Conditions - East Taunton Station

SCR SOUTH COAST RAIL
Massachusetts Bay Transportation Authority



Source Info: MassGIS, VHB, ESRI

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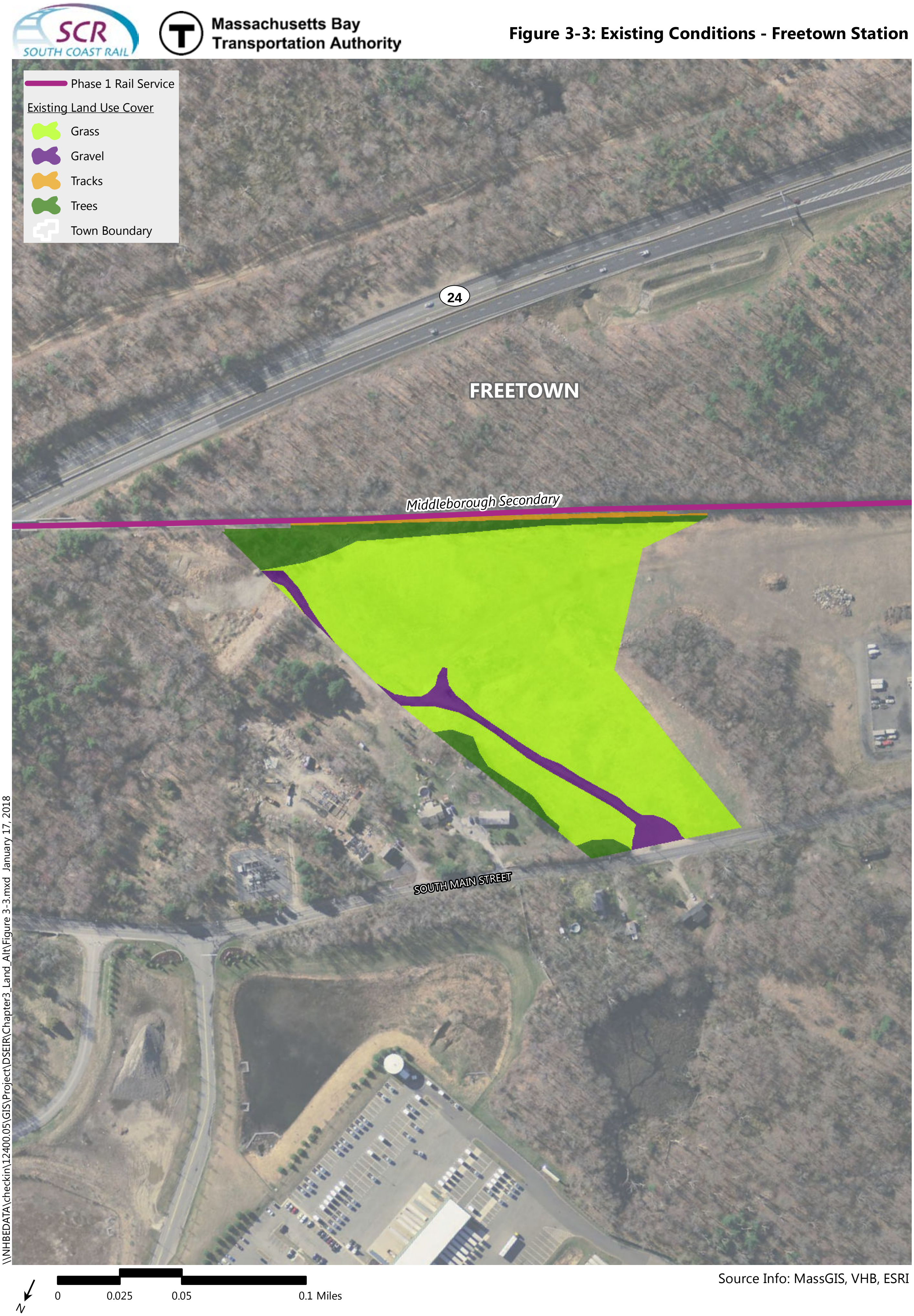
Massachusetts Bay Transportation Authority

Figure 3-3: Existing Conditions - Freetown Station



Source Info: MassGIS, VHB, ESRI

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3.2.4 Fall River Depot Station

The proposed location of the Fall River Depot Station has not changed since the FEIS/FEIR. The station will be located at 825 North Davol Street, which is one mile north of downtown Fall River along the Fall River Secondary near Route 79 (Figure 3-4). However, the configuration of the station has been revised since the filing of the FEIS/FEIR. A portion of the proposed station site was sold and has been developed into a medical office building. In response, the proposed parking has been reconfigured. Additional parking may be added on the north side of the track at 870 North Main Street as part of the Full Build. The location of the proposed station platform remains the same.

The site is bounded by Pearce Street to the north, the existing railroad line to the east, Old Colony Street to the south, and Davol Street to the west. A portion of the site was last in industrial use but is now vacant, while other portions include commercial uses. A historic train station, now demolished, previously occupied the site. The potential Full Build the site is located in the middle of the block bounded by Pearce Street to the north, the existing railroad line to the west, Baylies Street to the south, and North Main Street to the east. The site is currently occupied by a retail building and associated surface parking. Zoning at the Fall River Depot Station site is industrial (IND) and local business (B-L).

3.2.5 Middleborough Secondary

The Middleborough Secondary is an existing active freight rail line that extends approximately 7.1 miles from Cotley Junction in Taunton to Pilgrim Junction in Middleborough. The right-of-way (ROW) consists of a single track on ballast, with an average cleared width of 20 feet.

3.3 Impact Analysis

This section presents an analysis of direct impacts by comparing existing conditions to proposed conditions. Existing and proposed conditions are categorized as either impervious (pavement, building, dirt, gravel, asphalt, and/or sidewalk) or pervious (grass, trees, landscape, and/or pond) as appropriate for each site. As described in detail in Chapter 9, Section 9.2, *Existing Conditions*, none of the proposed station sites analyzed in this chapter contain important habitat or wetlands. Due to their short duration, temporary construction-period impacts are not included in this analysis.

Parking at each station will be designed to avoid altering previously undisturbed land, to reduce the amount of impervious coverage to the extent practicable, and to provide the appropriate number of spaces to support projected Full Build ridership. Indirect effects and cumulative impacts to land cover are also assessed.

Figure 3-4: Existing Conditions - Fall River Station

Source Info: MassGIS, VHB, ESRI

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3.3.1 No-Action Alternative

In the absence of the Phase 1 Project, the land alteration impacts described at Freetown and Fall River Stations would occur at a later date as part of the Full Build Project, and are similar to the land alterations previously described in the SCR FEIS/FEIR. Impacts to the land at East Taunton Station would not occur; instead, impacts would occur at the Taunton Depot Station as described in the FEIS/FEIR. The impacts projected at Pilgrim Junction would not occur in the absence of station construction. The impacts along the Middleborough Secondary associated with reconstructing the track and five at-grade railroad crossings would not occur.

3.3.2 Pilgrim Junction Station

Construction of the Pilgrim Junction Station involves redeveloping 8.5 acres of an approximately 11.0-acre site within the existing Pilgrim Junction wye in Middleborough (Figure 3-5). The station will consist of a paved parking area with 500 parking spaces, drop-off areas and pedestrian accommodations. A new access driveway off of South Main Street will be constructed to create a controlled intersection at the I-495 Exit 4 interchange. The amount of impervious coverage will increase in the proposed condition, from 23 percent to 71 percent, representing an increase of 4.06 acres. A breakdown of the proposed alteration is provided in Table 3-1 below.

Table 3-1 Proposed Land Alteration at Pilgrim Junction Station

	Existing Conditions		Proposed Conditions	
Ground Cover	**AC**	**%**	**AC**	**%**
Impervious	**1.95**	**23%**	**6.01**	**71%**
Pavement	1.87	22%	*6.01*	*71%*
Roof	0.08	1%	*0.00*	*0%*
Pervious	**6.55**	**77%**	**2.49**	**29%**
Dirt	0.96	11%	*0.00*	*0%*
Grass	3.83	45%	*2.49*	*29%*
Trees	1.76	*21%*	*0.00*	*0%*
Total	**8.50**	***100%***	**8.50**	**100%**

Source: VHB, 2017.

3.3.3 East Taunton Station

Constructing the East Taunton Station involves redeveloping 10.3 acres of an approximately 44.9-acre site (Figure 3-6). It will contain 363 parking spaces and drop-off accommodations. The amount of impervious coverage will increase from 13 percent to 50 percent under proposed conditions, an increase of 3.8 acres. A breakdown of the proposed alteration is provided in Table 3-2 below.

SCR SOUTH COAST RAIL

Massachusetts Bay Transportation Authority

Figure 3-5: Proposed Conditions - Pilgrim Junction Station

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Source Info: MassGIS, VHB, ESRI

Massachusetts Bay Transportation Authority

Figure 3-6: Proposed Conditions - East Taunton Station

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Source Info: MassGIS, VHB, ESRI

Table 3-2 Proposed Land Alteration at East Taunton Station

	Existing Conditions		Proposed Conditions	
Ground Cover	**AC**	**%**	**AC**	**%**
Impervious	**1.37**	**13%**	**5.17**	**50%**
Pavement	1.04	10%	3.99	*39%*
Building	0.07	1%	0.00	*0%*
Asphalt & Sidewalk	0.26	2%	0.99	*10%*
Gravel	0.00	0%	0.19	*2%*
Pervious	**8.95**	**87%**	**5.16**	**50%**
Grass	3.68	36%	4.82	*47%*
Trees	4.68	45%	0.00	*0%*
Ballast	0.59	6%	0.34	*3%*
Total	**10.32**	**100%**	**10.32**	**100%**

Source: VHB, 2017.

3.3.4 Freetown Station

Constructing the Freetown Station involves developing 9.5 acres of an approximately 28.5-acre site. An access drive will be located at a point approximately 40 feet south of the existing site entrance on South Main Street. The station site will consist of a paved lot with 100 parking spaces (73 fewer spaces than previously proposed in the FEIS/FEIR in an effort to minimize impervious surfaces while still maintaining adequate supply), a landscaped area, and an access driveway. A central marked pedestrian way will provide direct access to the concrete platform walkway and ramps (Figure 3-7).

Proposed alterations will increase impervious coverage from 6 percent to 26 percent in the proposed condition, an increase of approximately 1.9 acres. This is a reduction over the increase in impervious area of 2.4 acres proposed in the FEIS/FEIR. A breakdown of the proposed alteration is provided in Table 3-3 below.

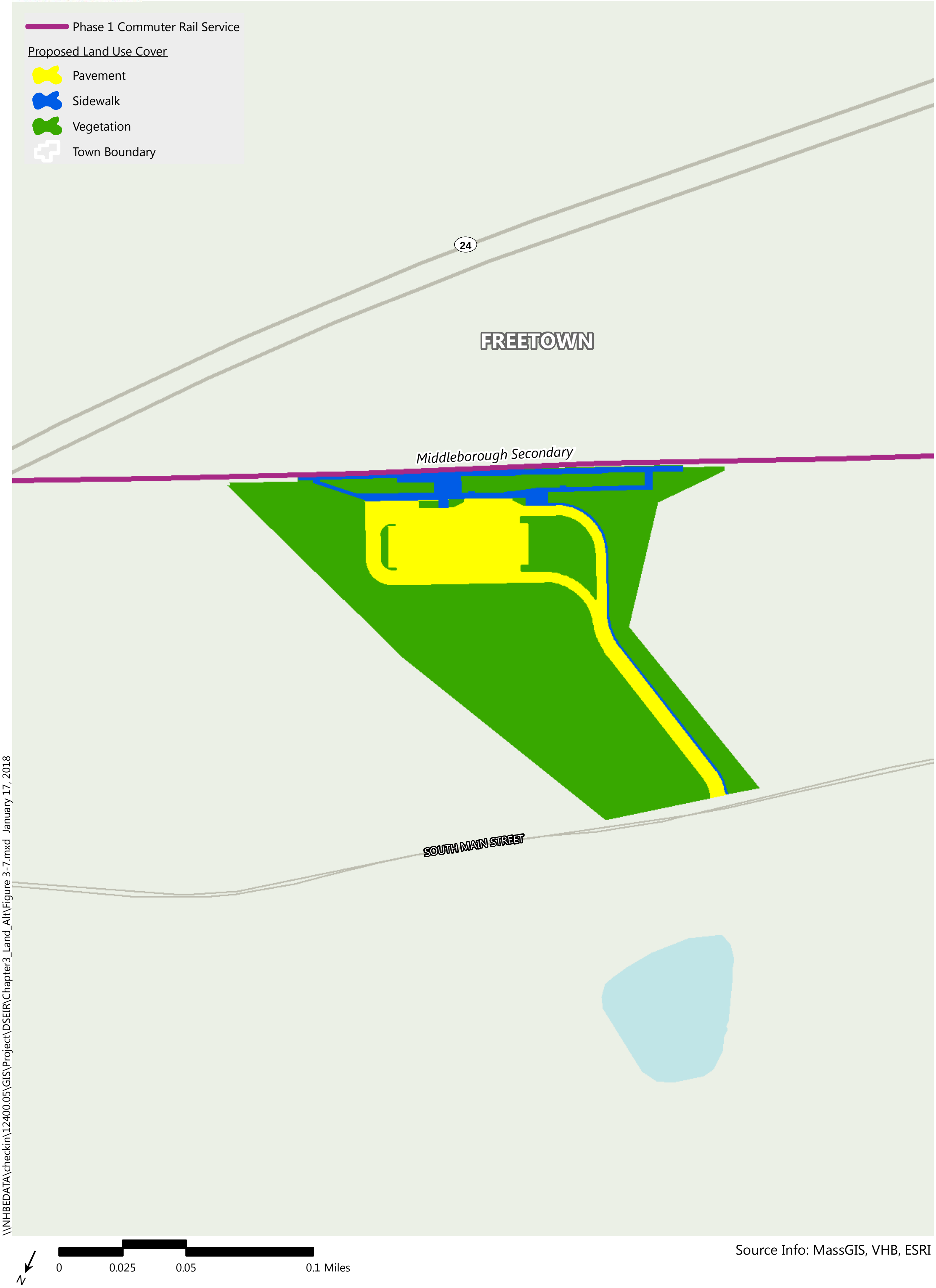
Table 3-3 Proposed Land Alteration at Freetown Station

	Existing Conditions		Proposed Conditions	
Ground Cover	**AC**	**%**	**AC**	**%**
Impervious	**0.53**	**6%**	**2.44**	**26%**
Pavement	0.00	0%	1.83	19%
Dirt & Gravel	0.53	6%	0.00	0%
Asphalt & Sidewalk	0.00	0%	0.61	6%
Pervious	**9.00**	**94%**	**7.09**	**74%**
Grass	8.81	92%	7.09	74%
Ballast	0.19	2%	0.00	0%
Total	**9.53**	**100%**	**9.53**	**100%**

Source: VHB, 2017.

Massachusetts Bay Transportation Authority

Figure 3-7: Proposed Conditions - Freetown Station



Source Info: MassGIS, VHB, ESRI

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3.3.5 Fall River Depot Station

Fall River Depot Station will be located at 825 North Davol Street, as presented in the FEIS/FEIR, on an approximately 3.0-acre parcel (Figure 3-8). Due to development on a portion of the 7.0-acre site previously considered in the FEIS/FEIR, the parking lot has been redesigned to utilize a smaller area. The proposed layout will use one new and one existing curb cut to provide access to a parking lot containing 220 parking spaces for Phase 1 Operations. Handicapped parking and a drop-off area will be located adjacent to the platform walkway (Figure 3-8).

Proposed alterations will increase impervious coverage from 44 percent to 83 percent in the proposed condition, an increase of approximately 1.2 acres. This is a reduction over the amount of impervious surface proposed at this station in the FEIS/FEIR, which was approximately 7.0 acres. A breakdown of the proposed alteration is provided in Table 3-4.

Table 3-4 Proposed Land Alteration at Fall River Depot Station

	Existing Conditions		Proposed Conditions	
Ground Cover	**AC**	**%**	**AC**	**%**
Impervious	**1.35**	**44%**	**2.52**	**83%**
Pavement	0.43	14%	1.88	62%
Building	0.41	13%	0.0	0%
Asphalt & Sidewalk	0.51	17%	0.64	21%
Pervious	**1.7**	**56%**	**0.53**	**17%**
Landscape	1.7	*56%*	0.53	*17%*
Total	**3.05**	**100%**	**3.05**	**100%**

Source: VHB, 2017.

Massachusetts Bay Transportation Authority

Figure 3-8: Proposed Conditions - Fall River Station

Source Info: MassGIS, VHB, ESRI

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3.3.6 Middleborough Secondary

The proposed upgrade of the railbed, track and signals, and use of the Middleborough Secondary for commuter rail service will not result in any significant alterations to the land within the Middleborough Secondary ROW. Minor temporary and permanent impacts may occur within narrow strips immediately adjacent to the existing ballasted track, as necessary for track reconstruction and minor re-alignment of track segments in certain areas. No significant land acquisition is needed for the proposed Phase 1 construction along this ROW.

3.3.7 Indirect Effects

As described in Section 13.1 of this DSEIR, the Project is expected to induce growth in the vicinity of the new stations, and Phase 1 may lead to the conversion of undeveloped lands to developed land near the two new proposed stations. To guide this anticipated future development, the South Coast Rail Economic Development and Land Use Corridor Plan created “a blueprint for clustering jobs and homes around stations, maximizing the economic benefits of rail investment, minimizing sprawl development, and preserving the farms, fields, and forests of the South Coast." To promote smart growth, it identified Community Priority Areas of Regional Significance, including Priority Development Areas (PDAs) and Priority Protection Areas (PPAs). According to the Corridor Plan, PDAs are areas “with the greatest capacity or potential to accommodate new development,” while PPAs “include land or environmental resources that are not permanently protected but are worthy of increased levels of protection through planning, regulation, conservation or acquisition.” This approach to smart growth provides communities with the opportunity to organize new growth (and associated land alteration) and direct it away from sensitive areas with significant natural and cultural resources. This same approach is anticipated to be applied to the new Phase 1 stations (East Taunton and Pilgrim Junction). Taunton and Middleborough were included in the Corridor Plan and have designated PDAs and PPAs.

3.3.8 Cumulative Impacts

As described in Section 3.2, *Existing Conditions*, all the sites that will be used or impacted by the Phase 1 Project elements have been previously developed to some degree. The Middleborough Secondary is an active single-track freight line that has been in existence since the mid-1850s. The wye at Pilgrim Junction has been the site of active rail-related activities since the construction of the Middleborough Secondary and Middleborough Main Line. The site of the proposed East Taunton Station was a golf facility from the mid-1990s through 2013. The site of the proposed Freetown Station contains land that was previously undeveloped, as well as land that was used for industrial purposes. A historic train station, now demolished, occupied a portion of the proposed Fall River Depot Station site, as well as a foundry and a steel company.

Section 3.3.2 through 3.3.6 described the direct impact of the Project, while indirect effects were assessed in Section 3.3.7. Section 13.4, *Cumulative Impacts* discusses the cumulative impacts of changes in land use from converting land from a natural state to developed land. These changes are very likely to result in an increase in impervious coverage in the vicinity of the stations. As part of each municipality's land development process, appropriate stormwater management practices will need to be implemented to avoid or mitigate potential impacts. The cumulative impacts of the Phase 1 elements, in addition to the Full Build, will not additively result in a significant environmental impact. The Phase 1 elements that were not considered in the Stoughton Straight Alternative consist of active rail lines and an additional station in Middleborough. Although a new Taunton Station is included in Phase 1 in a new location, it effectively replaces the station in Taunton already considered under the Full Build and already documented in the FEIS/FEIR cumulative impact assessment.

3.4 Mitigation

Under proposed conditions, overall impervious coverage will increase at all stations. If not mitigated, the potential environmental impacts of such proposed land alteration could include deforestation, sedimentation and erosion, water quality degradation, stream degradation, wetland loss, and habitat loss. The Project has been designed to eliminate, minimize and/or mitigate potential impacts of land alteration to the extent practicable by selection of locations for new project elements that focus on previously developed lands and lands that are adjacent or proximate to the existing freight line. The stations have been designed to comply with the Massachusetts Stormwater Standards as described in Section 8.4.5, *Regulatory Compliance*. During construction, the Project will include contract controls to require the implementation of erosion and sedimentation controls.

4. Environmental Justice

4.1 Introduction

This chapter identifies environmental justice populations within and adjacent to Phase 1 of the South Coast Rail (SCR) Project and evaluates potential impacts to these populations that may result from the Project. Phase 1 will extend service from the existing Middleborough Main Line to New Bedford and Fall River using the Middleborough Secondary freight line. The majority of the Phase 1 corridor, known as the Southern Triangle, has already been reviewed as part of the 2013 South Coast Rail Final Environmental Impact Statement (FEIS)/Final Environmental Impact Report (FEIR). The Southern Triangle is an existing active freight rail corridor that extends from Cotley Junction in Taunton to Fall River (the Fall River Secondary Line) and to New Bedford (the New Bedford Main Line). The 2013 FEIS/FEIR addresses disproportionate adverse impacts in environmental justice neighborhoods resulting from the Full South Coast Rail Project. The FEIS/FEIR found the highest concentration of environmental justice populations present near the southern portion of the Southern Triangle in urban areas of Fall River and New Bedford. Environmental justice populations identified in New Bedford and Fall River were more widespread and diverse (met more criteria for environmental justice) than the populations in other towns in the South Coast region. The other towns in the South Coast area, such as Canton, Stoughton, or Taunton, have moderate to high concentrations of environmental justice populations meeting one or two criteria for designation.

This chapter discusses existing environmental justice populations within the environmental justice study area and assesses the potential for disproportionate impacts resulting from Phase 1 of the SCR Project. The environmental justice study area consists of a 0.5-mile radius around the railroad alignment and new station sites. This area includes the new station sites associated with Phase 1, Pilgrim Junction Station and the relocated East Taunton Station. This Draft Supplemental Environmental Impact Report (DSEIR) analyzes new elements being proposed as part of Phase 1, which include:

- Improvements to track infrastructure on the Middleborough Secondary, an active freight line;
- A new station at Pilgrim Junction in Middleborough;
- A new station in East Taunton south of Cotley Junction; and
- Modifications to previously studied stations at Freetown and Fall River.

Although relocations of Freetown and Fall River Stations will take place as part of Phase 1, they will occur within the same previously-identified and evaluated parcels discussed in the FEIS/FEIR and are, therefore, not evaluated in this DSEIR. Part of the Town of Berkley is located within the environmental justice study area for Phase 1. Impacts to this area were evaluated in the FEIS/FEIR and are not changed as a result of Phase 1; therefore, they are not evaluated further in this DSEIR.

4.1.1 Resource Definition

Environmental justice is an important element of policy-making in transportation planning. Environmental justice policies focus on improving the natural environment in traditionally underserved communities, addressing disproportionate adverse environmental impacts that exist in those communities, and providing enhanced opportunities for participation in the decision-making process for those actions that may result in beneficial and/or adverse impacts. One of the SCR Project's goals is to improve transit services that will also likely provide benefits to environmental justice populations in terms of improved mobility and regional access.

The *Environmental Justice Policy* of the Massachusetts Executive Office of Energy and Environmental Affairs (EEA) characterizes environmental justice populations as neighborhoods, comprised of block groups defined by the U.S. Census Bureau, which meet one or more of the following criteria:

- 25 percent of households within the census block group have a median annual household income at or below 65 percent of the statewide median income for Massachusetts (median income in 2010 inflation adjusted dollars was $62,133[1] and 65 percent of this value is $40,673); or
- 25 percent or more of the residents are minority; or
- 25 percent or more of the residents have English Isolation.

EEA's *Environmental Justice Policy* was updated in January 2017 to include changes to the environmental justice criteria. The policy no longer includes foreign born as a criterion for environmental justice populations. This group was previously evaluated in the 2013 FEIS/FEIR in accordance with the 2002 Massachusetts Environmental Justice Policy. EEA's 2017 *Environmental Justice Policy* also updated the low-income criterion to include 25 percent of households within the census block group that have a median annual household income at or below 65 percent of the statewide median income.[2]

4.1.2 Regulatory Context

Environmental justice is based on the principle that all people have the right to be protected from environmental pollution and to live in and enjoy a clean and healthful environment. EEA's *Environmental Justice Policy* makes environmental justice an integral consideration in the implementation of all state environmental programs including, but not limited to: granting financial resources; implementing and enforcing laws, regulations and policies; and providing access to both active and passive open space. The Policy focuses attention on minority and low-income neighborhoods in Massachusetts where residents have traditionally been unaware of or unable to participate in environmental decision-making or to gain access to state environmental resources. This chapter addresses the requirements of the statues, regulations, and guidance documents listed below.

1 https://docs.digital.mass.gov/dataset/massgis-data-2010-us-census-environmental-justice-populations.

2 The Massachusetts Environmental Justice Policy, published in 2002, recognizes low-income households to be the median annual household income at or below 65 percent of the statewide median income for Massachusetts.

- Executive Order (EO) 12898 states that "each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies and activities on minority and low-income populations."
- The U.S. Army Corps of Engineers (USACE), in complying with EO 12898, utilizes the guidance provided by the U.S. Environmental Protection Agency (EPA). EPA defines environmental justice as "The fair treatment and meaningful involvement of all people, regardless of race, color, national origin or income with respect to the development, implementation, and enforcement of environmental laws, regulations and policies. Fair treatment means that no group of people, including racial, ethnic, or socio-economic groups, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal and commercial operations or the execution of federal, state, local and tribal programs and policies." EPA has responsibility for the consideration of environmental justice in Clean Air Act reviews.
- The Federal Transit Administration (FTA), Federal Railroad Administration (FRA) and Federal Highway Administration (FHWA) are U.S. Department of Transportation (DOT) agencies that are Cooperating Agencies for the National Environmental Policy Act (NEPA) review process for South Coast Rail. DOT Order 5610.2, Environmental Justice in Minority and Low-Income Populations, requires all DOT agencies to determine whether activities will have an adverse impact on minority and low-income populations. DOT agencies must determine if adverse effects are predominantly borne by a low-income or minority population, and if adverse effects are appreciably more severe than the adverse effect that will be suffered by the non-minority or non-low-income population.

4.1.3 Requirements of Certificate

The Secretary's Certificate on the Notice of Project Change (NPC) for the SCR Project, issued on May 26, 2017, required further analysis or discussion of certain impacts to environmental justice populations in the DSEIR. The Certificate stated:

- The DSEIR should include maps that identify the location of EJ populations in the Phase 1 area.
- The DSEIR should address how changes proposed in Phase 1 may affect Environmental Justice populations (EJ) and discuss relevant state and federal policies including the EEA Environmental Justice Policy (EJ Policy).
- The DSEIR should identify any potential for disproportionate impacts on EJ communities that may result from the proposed project, and any proposed mitigation.
- The DSEIR should evaluate impacts related, but not limited to noise, vibration, air quality, increased property values; and tax revenue, residence, business, or job losses associated with property acquisition.
- The DSEIR should describe specifically how the Project will provide tangible benefits to the EJ communities.

- The DSEIR should discuss strategies to enhance public participation in the environmental review process and describe outreach efforts to EJ communities.

4.1.4 Methodology

This section summarizes the methodology used to evaluate the potential direct (occurring at the same time and place as the action) and indirect effects (removed in time and space from the action, but reasonably foreseeable) of Phase 1 of the SCR Project on environmental justice populations.

Evaluation of Direct Effects

Potential direct effects to environmental justice populations have been evaluated for residence or job losses due to neighborhood fragmentation, increases in noise levels, impacts to air quality and impacts to other resources. If any impacts to these resources in environmental justice neighborhoods were found to be substantive, then a comparison of impacts to non-environmental justice neighborhoods was made to determine if the adverse impact will be predominantly borne by environmental justice populations, or whether it is appreciably more severe or greater in magnitude than the adverse impact that will be suffered by the non-environmental justice population in the same community.

Property acquisition requirements in environmental justice neighborhoods were identified by reviewing areas where new construction is required for the Project with respect to those neighborhoods to determine where the rail corridor or stations would pass through or be located within them. For the purposes of this evaluation, "construction" is defined as upgrading existing rail lines, replacing existing railroad bridges and culverts, constructing new permanent or temporary railroad bridges, reconfiguring at-grade road/railroad crossings, and constructing new stations. Environmental justice neighborhoods were outlined by Census Block Group according to the criteria cited above, and plotted on aerial photographs with the preliminary plans of the Phase 1 Project elements for the evaluation.

"Property Acquisition" is defined as taking a greater than 500-square-foot portion, or a sliver greater than 10 feet wide, of any parcel outside of the existing right-of-way (ROW) to accommodate permanent impacts, and is based upon preliminary engineering plans. Temporary construction impacts outside of the existing ROW will not require property acquisition and are not considered in this evaluation. Slivers less than 10 feet wide or temporary construction easements were not considered in the evaluation of property acquisition because given the scale and accuracy of the preliminary engineering plans, these are likely to be eliminated in final design. Maps and aerial photographs were examined in reference to preliminary engineering plans to identify encroachments into environmental justice neighborhoods. Adverse impacts to environmental justice populations were determined if the property acquisition would result in loss of residences or jobs. Such impacts will be further characterized as substantive if they represent a large portion of total residences or jobs in a community and are located in a neighborhood with a high concentration of low-income and/or minority residents.

Neighborhood fragmentation was evaluated by examining aerial photographs and observing environmental justice neighborhoods to qualitatively determine if neighborhood continuity will be disrupted by Phase 1 service.

Disproportionate impacts to environmental justice communities are predicated on the potential for significant impacts in other environmental categories; only the environmental impact categories with significant impacts under Phase 1 were studied in detail in this analysis. The specific topics included in the environmental justice assessment are: property acquisition, socioeconomics, noise, vibration, air quality, public safety, and access and travel time impacts. For each of these topics, substantive adverse impacts in environmental justice neighborhoods were compared with impacts in non-environmental justice neighborhoods to determine if environmental justice populations will be disproportionately impacted. Issues related to traditional cultural properties are addressed in Chapter 11, *Cultural Resources*.

Temporary impacts were not evaluated in detail because they will be mitigated through construction best management practices, and any impacts after mitigation will not have a lasting effect on adjacent communities.

Evaluation of Indirect Effects

Potential indirect effects to environmental justice populations were also evaluated based on the review of stations and other rail infrastructure associated with Phase 1. This analysis also included a review of indirect impacts to environmental justice populations in nearby communities likely served by the stations. Potential benefits to environmental justice communities are an indirect effect of Phase 1. A study conducted by the Central Transportation Planning Staff (CTPS) of the Metropolitan Area Planning Agency (MAPC) examined how Phase 1 will affect travel accessibility and mobility for environmental justice populations. Results of that study are incorporated in this chapter; the study is provided in Appendix A.

Potential indirect socioeconomic impacts due to changes in property values were evaluated qualitatively through reference to the *South Coast Rail Economic Development and Land Use Corridor Plan* and the applicable literature.

4.2 Existing Conditions

This section discusses the presence of minority, low-income, and English Isolation populations within the environmental justice study area for Phase 1 of the South Coast Rail Project.

4.2.1 Regional Overview of Environmental Justice Populations

Communities that could be impacted by new Phase elements I include:

- Middleborough

- Lakeville
- Raynham
- Taunton

The Middleborough Secondary passes through or near these four communities, and new/relocated station sites are within or near each, including Pilgrim Junction Station and the relocated East Taunton Station. Portions of Taunton and Middleborough include environmental justice neighborhoods that may be directly affected and/or benefit from services provided by Phase 1. Lakeville and Raynham do not contain environmental justice neighborhoods.

Table 4-1 provides an overview of environmental justice communities identified using state-listed criteria as a percent of total municipal acreage. Such a designation comes from the regulatory framework for conducting environmental justice analysis in Massachusetts. Table 4-2 identifies the presence of environmental justice populations (minority, low-income, and English Isolation) within these two communities.

Table 4-1 Environmental Justice Areas within or near South Coast Rail Phase 1

			Percent Designated as Environmental Justice Area			
				Defined by Specific Criteria		
Municipality	Total Municipal Acreage	Acreage within Designated Environmental Justice area	Designated Environmental Justice Area[1]	Low-Income	Minority	English Isolation
Taunton	30,983	2,582	8.3	4.0	3.4	2.8
Middleborough	46,180	321	0.7	0.7	0	0

Source: U.S. Census data (2010), MassGIS

1 Environmental justice areas can be designated based on multiple independent criteria. The table presents the cumulative environmental justice areas for all criteria as well as the total area designated by the specific criteria indicated. This may differ from the sum of the individual criteria because some environmental justice areas qualify for more than one criterion.

Table 4-2 Environmental Justice Areas within or near South Coast Rail Phase 1

	Percent of Population Living in Environmental Justice Areas[1]			
		Defined by Specific Criteria		
Municipality	Defined by any criteria	Low-Income	Minority	English Isolation
Taunton	23.6	18.3	13.6	2.4
Middleborough	9.5	9.5	-	-

Source: U.S. Census data (2010), MassGIS

1 Environmental justice areas can be designated based on multiple independent criteria. The table presents the cumulative environmental justice areas for all criteria, as well as the total area designated by the specific criteria indicated. This may differ from the sum of the individual criteria because some environmental justice areas qualify for more than one criterion.

Approximately 2.3 percent of the land area of the four South Coast communities identified in the study area has an environmental justice neighborhood designation. These environmental justice neighborhoods in Taunton and Middleborough contain approximately 1.4 percent of the population of the four communities. Approximately 85.8 percent of the total environmental justice population is located in Taunton and the remaining 14.2 percent is in Middleborough. As noted above, no environmental justice populations were identified in Lakeville and Raynham.

The four municipalities are primarily comprised of those who identify themselves as White, with varying shares of those who identify themselves as Black or African American, Asian, American Indian or Alaska Native, Native Hawaiian or Other Pacific Islander, multiracial, and Hispanic or Latino residents, based on definitions from the U.S. Office of Management and Budget[3] and data from the U.S. Census.[4] Overall, minority populations represent less than 7.0 percent of the total population in each of the four municipalities, with the exception of Taunton where approximately 12.8 percent of the population identifies itself as a minority. Each of the communities has a smaller percentage of minority populations than the statewide average of 19.6 percent (Table 4-3).

Table 4-3 Racial and Ethnic Composition of Phase 1 South Coast Communities

		Percent of Population by Race							
Municipality	**Total Population**	**White**	**Black or African American**	**American Indian or Alaskan**	**Asian**	**Native Hawaiian or Other Pacific Islander**	**Other**	**Multiracial**	**Hispanic[1] or Latino**
Middleborough	23,116	95.2	1.6	0.2	0.7	0.0	0.6	1.6	1.6
Raynham	13,383	93.2	2.6	0.2	1.6	0.0	0.8	1.6	1.8
Lakeville	10,602	96.8	0.8	0.1	0.8	0.0	0.4	1.1	0.9
Taunton	55,874	87.2	5.0	0.3	1.0	0.0	3.1	3.4	5.5
Statewide Avg.		80.4	6.6	0.3	5.3	0.0	4.7	2.6	9.6

Source: U.S. Census data (2010), MassGIS
1 Hispanic populations are generally included as subsets within other racial categories but are listed separately as well as for clarity. Therefore, the percentages for each city will add up to more than 100 percent.

People who are physically, economically, or socially disadvantaged often have less access to an automobile and may face barriers to mobility. The correlation between automobile access and environmental justice populations was evaluated for the Phase 1 environmental justice study area. Registered motor vehicle data were reviewed for each of the South Coast communities in the environmental justice study area (Table 4-4) Decennial Census data from 2010 reveals a negative correlation between environmental justice populations in the study area and the percentage of households reporting registered motor vehicles. Middleborough and Taunton have a percentage of their populations in environmental justice populations and reported the highest percentage of households without motor vehicles, at approximately 4.3 percent and 7.2 percent, respectively.

3 http://www.whitehouse.gov/omb/fedreg_1997standards.
4 "Overview of Race and Hispanic Origin" March 2001. http://www.census.gov/prod/2001pubs/c2kbr01-1.pdf.

All other study area communities were below the statewide average of 12.2 percent of zero-car households. Raynham and Lakeville both reported motor vehicle ownership at greater than 97.0 percent of all households.

Table 4-4 Percentage of Households with No Registered Motor Vehicles, 2010

Municipality	Percent of Households
Middleborough	4.3
Raynham	2.3
Taunton	7.2
Lakeville	1.9
Regional Average of Communities Listed	5.5
Statewide Average	12.2

Source: U.S. Census data (2010), MassGIS

4.2.2 Environmental Justice Populations within a 0.5 mile of Phase 1 of the South Coast Rail Project

Environmental justice populations within 0.5 mile of the Middleborough Secondary are summarized and described in this section. The accompanying figure shows communities meeting environmental justice criteria based on minority and low income along the Middleborough Secondary and near East Taunton and Pilgrim Junction Stations. Along the Middleborough Secondary, the percentage of the total population living within a designated environmental justice area defined by any criterion is 5.8 percent with the primary criterion being low income.[5] No other environmental justice criterion applies to the communities within 0.5 miles of Phase 1.

There are no environmental justice communities within 0.5 miles of the East Taunton or Pilgrim Junction station sites. East Taunton Station is a relocated station that will be constructed south of Cotley Junction (modified from its original location in the FEIS/FEIR) to accommodate riders from Taunton as part of the Phase 1 service. Pilgrim Junction Station is a new station to be constructed to connect the Southern Triangle to the Middleborough Main Line at Pilgrim Junction in Middleborough.

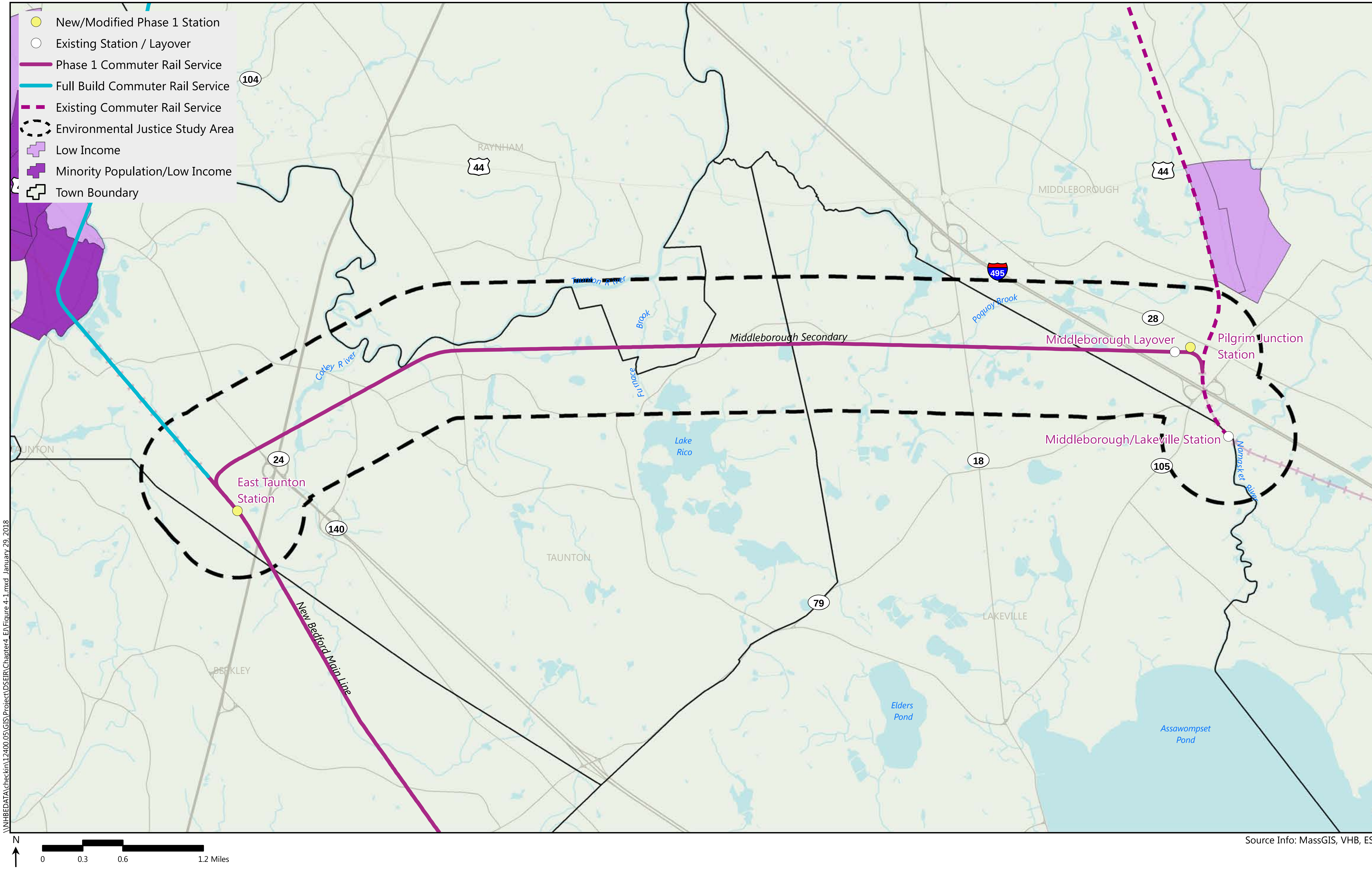
The Middleborough Secondary is an active single-track freight line owned by MassDOT that will be used to extend the existing Middleborough Main Line to Taunton, New Bedford and Fall River. In 2010, the total population near the Middleborough Secondary, as derived from Census Block Groups within 0.5 miles of the rail line, was 37,592. As Figure 4-1 illustrates, environmental justice populations are concentrated along the eastern portion of the route in Middleborough. Environmental justice populations were identified within 0.5 miles of the Middleborough Secondary under the low income (5.8 percent) criterion (Figure 4-1).

5 US Census data (2010), MassGIS.

SCR SOUTH COAST RAIL

Massachusetts Bay Transportation Authority

Figure 4-1: Middleborough Secondary Rail Alignment



Source Info: MassGIS, VHB, ESRI

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4.3 Impact Analysis

This section analyzes and identifies any disproportionate adverse impacts to environmental justice populations as part of Phase 1 of the SCR Project. Specifically, the evaluation considered property acquisition, socioeconomics, noise, vibration, air quality, public safety, and access to travel time impacts. If adverse impacts were identified, they were further evaluated to determine if environmental justice communities will experience a disproportionately high and adverse share of these impacts. The evaluation also considered beneficial effects that will be recognized as a result of Phase 1. Beneficial impacts will include improved access to transit services, making it easier to reach employment and educational opportunities, and general mobility. Detailed information regarding potential impacts is provided in pertinent resource chapters in the DSEIR, including but not limited to Land Use, Socioeconomics, Traffic and Transportation, Open Space, Air Quality, Noise, Vibration, Indirect Effects, and Cumulative Impacts.

4.3.1 No Action

If MassDOT does not implement phased service to the region, then the Full SCR Project, as the 2013 FEIS/FEIR describes, will proceed, in delayed fashion. Environmental justice populations in the Southern Triangle will not see these benefits sooner than 2030.

4.3.2 Property Acquisitions

This section describes property acquisition impacts resulting from Phase 1 Project elements related to environmental justice areas. Chapter 3, *Land Alteration* describes the type, amount and location of land alteration associated with infrastructure for Phase 1 that was not previously evaluated in the SCR FEIS/FEIR. No impacts are anticipated from Phase 1 because there will be no property acquisitions required in environmental justice neighborhoods within the environmental justice study area for Phase 1.

4.3.3 Socioeconomics

This section addresses neighborhood fragmentation and indirect socioeconomic effects related to transit-oriented development in the vicinity of stations.

Neighborhood Fragmentation

The Middleborough Secondary is an existing active freight railroad and does not pass through any environmental justice neighborhoods. The existing rail alignment will remain unchanged resulting in no changes in fragmentation of environmental justice communities, or any other neighborhoods.
Fragmentation of environmental justice communities, or any other neighborhoods, along this segment will not result from adding commuter rail service to the Middleborough Secondary. The proposed locations of Pilgrim Junction Station and East Taunton Station are not in or near environmental justice neighborhoods, resulting in no disproportionate impacts.

Indirect Effects of Transit Oriented Development

There are no environmental justice communities located within 0.5 miles of East Taunton Station or Pilgrim Junction Station. There are two environmental justice communities in Middleborough located outside the 0.5-mile environmental justice study area. Because they are located outside the environmental justice study area, there are no anticipated impacts to these communities as a result of this Project. As described in the *South Coast Rail Economic Development and Land Use Corridor Plan,*[6] transit-oriented development (TOD) in the vicinity of train stations will provide benefits to environmental justice populations. TOD emphasizes "compact, generally mixed-use development at or near transit stops whose design encourages walking and transit use." Environmental justice populations generally have less access to automobiles than the statewide average. Improved access to transit and jobs resulting from TOD will benefit these populations.

Environmental justice populations may also benefit from increased property values in the vicinity of station sites, and TOD could further amplify that effect. Conversely, property values may decrease along the alignments, due to impacts of increased noise from train operations.

Near station sites there may also be a "gentrification" effect, a process whereby neighborhood revitalization or investment is accompanied by the influx of higher-income populations that displace lower-income residents in a community. Environmental justice populations (specifically, those defined as low income) are displaced from homes or apartments if property becomes unaffordable. The effects of gentrification may vary among property owners and renters. While owners may benefit from increased property values, renters may experience unaffordable rental increases. As described in the Corridor Plan, TOD may offset this effect if affordable housing is a required component.[7] Overall, impacts to environmental justice populations due to property value changes are possible, but are too uncertain to precisely predict. Numerous factors other than transit contribute to changes in housing prices, such as the state of the national and regional economy, changes in income, inflation, tax policy and many other factors.

Section 4.3.7, *Access and Travel Time Impacts* describes anticipated improvements in access to jobs – for both designated and non-designated environmental justice neighborhoods – across the SCR corridor. It is anticipated that increased access to these services will help offset or mitigate minor and localized adverse impacts that may result from the Project.

East Taunton Station

The East Taunton Station site is not within an environmental justice neighborhood, and there are no environmental justice neighborhoods present nearby the station.

6 EOT. 2009. South Coast Rail Economic Development and Land Use Corridor Plan. Commonwealth of Massachusetts, Executive Office of Transportation and Public Works, and Executive Office of Housing and Economic Development. Prepared by Goody Clancy, Inc.: Boston.

7 EOT. 2009. South Coast Rail Economic Development and Land Use Corridor Plan. Commonwealth of Massachusetts, Executive Office of Transportation and Public Works, and Executive Office of Housing and Economic Development. Prepared by Goody Clancy, Inc.: Boston.

Pilgrim Junction Station

The Pilgrim Junction Station is not within an environmental justice neighborhood, and there are no environmental justice neighborhoods located within the 0.5-mile environmental justice neighborhood study area. Outside of the 0.5-mile environmental justice area, there is an environmental justice neighborhood designated as low income. Pilgrim Junction Station will be located in Middleborough near the existing Middleborough Station. It is anticipated that because the area is already served by transit, Pilgrim Junction Station will not create new or induced development pressures that disproportionately and adversely affect environmental justice populations.

4.3.4 Noise

The noise impact assessment considers the potential for the Project to affect areas within the Project study area. Phase 1 operations will change noise conditions due to the increase in frequency and speed of trains utilizing this line. There are no environmental justice neighborhoods located along the Middleborough Secondary within the environmental justice study area, including the Pilgrim Junction and East Taunton Stations. No noise impacts to environmental justice neighborhoods are anticipated as a result of Phase 1. See Chapter 10, *Noise and Vibration,* for more information.

4.3.5 Vibration

The vibration impact assessment considers the potential for the Project to affect areas within the Project study area. Phase 1 operations will change vibration conditions due to the increase in frequency and speed of trains utilizing this line. There are no environmental justice neighborhoods located along the Middleborough Secondary or within the 0.5-mile environmental justice study area, including the proposed Pilgrim Junction and East Taunton Stations. There are no vibration impacts anticipated from Phase 1 to environmental justice neighborhoods. See Chapter 10, *Noise and Vibration,* for more information.

4.3.6 Air Quality

The air quality impact assessment considers the potential for the Project to affect areas within the Project study area. The Phase 1 Project will reduce emissions of carbon monoxide (CO), volatile organic compounds (VOC), and carbon monoxide (CO_2). For $PM_{2.5}$ and PM_{10}, the train emissions generally offset the motor vehicle emissions. The additional rail service will result in increased regional NO_X emissions as the NO_X emissions of the locomotives are substantially larger than the NO_X reductions of the diverted motor vehicles. The results of the mesoscale analysis show that Phase 1 Service will be below *de minimus* levels of General Conformity, as well as the National Ambient Air Quality Standards (NAAQS). An analysis of the impacts of the diesel commuter rail trains on the closest residential areas adjacent to the train stations demonstrates that all the pollutant concentrations will be below the NAAQS. Air quality impacts resulting from Phase 1 will not have a disproportionate adverse impact to environmental justice neighborhoods. See Chapter 6, *Air Quality,* for more information.

4.3.7 Public Safety

This section describes public safety impacts as a result of the Project. There are no environmental justice neighborhoods located along the Middleborough Secondary or within the 0.5-mile environmental justice study area including proposed Pilgrim Junction and East Taunton Stations. There are no public safety impacts resulting from Phase 1 to environmental justice neighborhoods. See Chapter 5, *Traffic and Transportation,* for more information.

4.3.8 Access and Travel Time Impacts

This section describes the impacts to access and travel time that will be realized by environmental justice populations as a result of the SCR Project. This includes an evaluation of the improvements in access to employment centers, colleges and hospitals, as well as improvements in travel time to Boston from Taunton and Middleborough for both environmental justice and non-environmental justice communities (Appendix A).

Each travel scenario is compared to the No Action on a percent change basis, and results are provided for both environmental justice and non-environmental justice communities.

Potential Effects on Job Access

The SCR Project will improve access to jobs for both environmental justice and non-environmental justice populations. The CTPS report identifies the relative improvements for Phase 1, as compared to the No Action scenario in transit access to employment opportunities from environmental justice and non-environmental justice neighborhoods in Taunton, Fall River, New Bedford, and Middleborough to jobs within 90 minutes' travel time (Appendix A).

Phase 1 will result in benefits that will be recognized by all populations regardless of designation. Increased access will reduce travel times to Boston and other employment centers. If MassDOT does not implement phased service to the region, then the Full South Coast Rail Project, as the SCR FEIS/FEIR describes, will proceed in delayed fashion from the originally anticipated commencement of operations. Environmental justice communities in the Southern Triangle will not see these benefits until sometime after 2030.

Potential Effects on In-Vehicle Travel Time to Boston

The SCR Project will also result in improved travel times to Boston from four South Coast communities for environmental justice and non-environmental justice populations. Phase 1 will provide the same benefits as the Full Build condition with respect to the reduced in in-vehicle travel times from the three communities to South Station in Boston for both environmental justice and non-environmental justice populations, and this benefit will be achieved sooner with Phase 1.

4.4 Summary

Based on Massachusetts' criteria for determining such populations, Phase 1 of the South Coast rail Project has no disproportionate adverse impact on the environmental justice populations. There are no designated environmental justice populations living within the environmental justice study area of the Middleborough Secondary and East Taunton and Pilgrim Junction Stations. As a result, there are no property acquisition, socioeconomic, noise, vibration, air quality, public safety, or access and travel time impacts to environmental justice neighborhoods. There are also benefits associated with Phase 1 that will be recognized by all populations regardless of designation. Increased access will reduce travel times to Boston and other employment centers. If MassDOT does not implement phased service to the region, then the Full South Coast Rail Project, as the SCR FEIS/FEIR describes, will proceed in delayed fashion from the originally anticipated commencement of operations. Environmental justice communities in the Southern Triangle will not see these benefits until sometime after 2030.

There are two environmental justice communities in Middleborough located outside the 0.5-mile environmental justice study area. There are no anticipated direct impacts to these communities as a result of this Project. The primary criterion for environmental justice-designation in Middleborough for these identified environmental justice neighborhoods is low income.

4.5 Benefits and Mitigation

No project mitigation for environmental justice communities is required as part of Phase 1 because there are no disproportionate adverse impacts to environmental justice communities. Phased service will benefit all environmental justice communities previously identified and evaluated in the FEIS/FEIR as it provides passenger rail service to the South Coast earlier than the Full South Coast Rail Project. If MassDOT does not implement phased service to the region, then the Full South Coast Rail Project, as the SCR FEIS/FEIR describes, will proceed in delayed fashion from the originally anticipated commencement of operations. Environmental justice communities in the Southern Triangle will not see these benefits until sometime after 2030.

4.6 Public Outreach

Since the March 2017 NPC filing, MassDOT conducted public meetings to brief stakeholders on Project updates in the following environmental justice communities: New Bedford, Taunton, Fall River, and Middleborough. MassDOT hosted two NPC public meetings in Spring 2017 in Dartmouth and Taunton during the comment period. Public comments are addressed in the DSEIR. MassDOT will continue to update and engage environmental justice communities and other South Coast communities throughout the entirety of the Project, including Phase 1 through final construction. MassDOT continues to make South Coast Rail Project environmental documentation accessible by providing the Executive Summary in Spanish and Portuguese and complying with Section 508 of the Americans with Disabilities Act.

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5. Traffic and Transportation

5.1 Introduction

This chapter describes the potential transportation and roadway safety impacts for Phase 1 that were not previously evaluated in the South Coast Rail (SCR) Final Environmental Impact Statement (FEIS) / Final Environmental Impact Report (FEIR). There is a potential for transportation impacts at four locations due to Phase 1 service:

- Middleborough – relocated station at Pilgrim Junction;
- Taunton – relocated station at Taunton Depot;
- Freetown – modification to proposed station driveway location; and
- Fall River – modification to proposed parking at Fall River Depot.

Intersections within the communities were selected for safety and traffic operation analyses based on the proposed locations of the new, relocated, or modified commuter rail stations.

Existing grade crossing locations along the Middleborough Secondary were also identified, inventoried, and evaluated for project impacts under Phase 1 operations. The potential effects of the proposed Phase 1 operations are evaluated with respect to intersection and roadway traffic operations, pedestrian and bicycle accommodations, and parking at each planned station.

5.1.1 Regulatory Context

The Project is subject to Massachusetts Department of Transportation's (MassDOT) Transportation Impact Assessment Guidelines, which define the planning and preliminary level of engineering analysis to ensure consistency, adequacy, and comprehensiveness in the basic information to be included in the transportation analysis sections of environmental documents submitted to Commonwealth agencies for review.

5.1.2 Requirements of Certificate

The Secretary's Certificate requires the Draft Supplemental Environmental Impact Report (DSEIR) to include a revised transportation analysis, including reductions in traffic congestion by improving public transit and the impacts associated with construction and induced growth. The DSEIR is also required to include data on current and projected traffic congestion, and current and future demographic and economic data to support evaluation of Phase 1 and its anticipated benefits, as well as an assessment of anticipated reductions in vehicle miles traveled (VMT) associated exclusively with construction of Phase 1.

5.2 Methodology

5.2.1 Existing Conditions

The criteria and procedures used to analyze and summarize existing transportation conditions include:

- Existing roadway and intersection inventory
- Grade crossing inventory
- Traffic volume data collection
- Vehicle crash analysis summary
- Traffic operations analysis

Existing Roadway and Intersection Inventory

A comprehensive field inventory of major roadways and key intersections was completed for each commuter rail station study area. Field reconnaissance included an inventory of roadway geometry, observed vehicle speeds, signalization (where applicable), other traffic control, and nearby land uses.

Grade Crossing Inventory

An inventory of highway-railroad at-grade crossings was performed in June 2017 to identify and document existing active (freight) grade crossings along the Middleborough Secondary. Each crossing was evaluated to determine the crossing geometry, sight distances and roadway traffic patterns. Each rail and roadway approach was photographed, and sketches were prepared to illustrate the warning systems in place and other physical features that should be considered during the layout and design of the proposed grade crossing.

Available historical data, such as roadway traffic volumes, roadway posted speed limits, and railroad records, were reviewed to provide a historic perspective and help understand any safety issues associated with each location. Roadway traffic volumes were obtained in June 2017 using Automatic Traffic Recorder (ATR) counts. Crash/Incident reports were obtained from MassDOT's online database. Table 5-1 provides the list of intersections where grade crossings were evaluated.

Table 5-1 At-grade Crossing Locations along the Middleborough Secondary

Municipality	Location	Traffic Control
Lakeville	Leonard Street, south of Taunton Street	flashing lights
	North Precinct Street, south of Taunton Street	flashing lights
Taunton	Old Colony Avenue, south of Taunton River	flashing lights[1]
	Middleboro Avenue, east of Leisure Lane	flashing lights
	Route 140, northwest of Industrial Drive	flashing lights[1]

1 Overhead and post mounted flashing lights provided. No gates are provided at the existing crossings.

Traffic Volume Data Collection

Traffic volume data were collected in June 2017 for roadways and critical intersections serving each of the proposed stations that have been relocated, are new, or have been reconfigured since the FEIS/FEIR. Revised transportation analyses were performed at four locations identified above.
Table 5-2 provides the list of intersections that were analyzed for Phase 1. As discussed below, no new traffic data were collected in Freetown, since the only change since the FEIS/FEIR consists of moving the driveway about 370 feet.

Table 5-2 Turning Movement Count Locations

Municipality	Station	Location	Traffic Control
Middleborough	Pilgrim Junction	Main Street (Route 105) at West Grove Street (Route 28)	Signalized
	Pilgrim Junction	Main Street (Route 105) at I-495 Northbound	Signalized
	Pilgrim Junction	Main Street (Route 105) at I-495 Southbound	Signalized
	Pilgrim Junction	Main Street (Route 105) at Route 79/Commercial Drive	Signalized
	Pilgrim Junction	Commercial Drive at Middleborough/Lakeville Station Driveway	Unsignalized
Taunton	East Taunton	Route 140 at Route 24 Northbound	Signalized
	East Taunton	Route 140 at Route 24 Southbound	Signalized
	East Taunton	Route 140 at Mozzone Boulevard	Signalized
	East Taunton	Route 140 at Industrial Drive	Unsignalized
	East Taunton	Route 140 at Mobile Station Driveway	Unsignalized
Fall River	Fall River Depot	North Main Street at President Avenue	Signalized
	Fall River Depot	North Davol Street at President Avenue	Signalized
	Fall River Depot	South Davol Street at President Avenue	Signalized
	Fall River Depot	North Davol Street at Pearce Street	Unsignalized
	Fall River Depot	North Main Street at Pearce Street	Unsignalized
	Fall River Depot	North Main Street at Lincoln Avenue	Unsignalized

Source: VHB, 2017.

Traffic volume data collected includes ATR counts and manual turning movement counts (TMCs). Forty-eight-hour ATR data were collected along major roadways to provide an understanding of daily and peak-hour traffic flows near each proposed commuter rail station. TMCs were conducted at key intersections during the weekday morning (6:30 to 8:30 AM) and evening (2:30 to 6:30 PM) commuter peak periods. Vehicles, bicycles, and pedestrians were counted. All TMCs were conducted midweek

(Tuesday through Thursday) to capture traffic count data that depict typical weekday peak conditions. The TMCs were balanced (if appropriate), and rounded to form the traffic volume networks used to evaluate existing traffic operations. To determine whether it was necessary to seasonally adjust the recorded traffic volumes, MassDOT seasonality factors were consulted based on roadway type. The MassDOT data indicate June traffic volumes are typically 10 percent higher than the yearly average. Consequently, the actual traffic counts were not adjusted to reflect any seasonal difference in traffic.

Vehicle Crash Analysis Summary

In order to identify crash trends, historical crash data were obtained from MassDOT for the most recent three-year period available for Middleborough, Taunton, Freetown, and Fall River. For each proposed station site, vehicle crashes were compiled by roadway and key intersection. Specific crash characteristics include year of crash, crash type, severity, weather, and time of day.

Crash rates are calculated based on the number of crashes at an intersection and the volume of traffic traveling through the intersection on an annual daily basis. Rates that exceed the MassDOT district or statewide average could indicate safety or geometric issues at an intersection. The District 5 crash rate for unsignalized intersections is 0.58 crashes per million entering miles and the rate for signalized intersections is 0.76 crashes per million entering miles. The statewide crash rate is 0.58 for unsignalized intersections and 0.77 for signalized intersections.

Locations identified as high crash locations by the state will be further evaluated to determine whether Roadway Safety Audits (RSAs)[1] are required as part of the Project. RSAs are a formal safety examination of existing roadways or intersections to identify potential safety issues and possible opportunities for safety improvements. They are required by MassDOT for certain high crash locations, particularly when located on a state highway.

Traffic Operations Analysis

Understanding the relationship between the supply and demand on a roadway is a fundamental consideration in evaluating how well a transportation facility fulfills its objective to safely and efficiently accommodate the traveling public. The assessment of traffic operations provides a technical evaluation of the operational qualities of the key intersections and roadway sections using the procedures documented in the 2010 *Highway Capacity Manual*.[2]

Capacity at a signalized intersection is defined for lane groups rather than for approaches or the intersection as a whole. A lane group may be a single movement, a group of movements, or an entire approach, and is defined by the geometry of the intersection and the distribution of movements over the various lanes. Capacity of a lane group is calculated as the maximum rate of flow that may pass through the intersection under prevailing traffic, roadway, and signalization conditions. The rate of

1 http://www.massdot.state.ma.us/Portals/8/docs/traffic/SafetyAudit/RSAGuidelines.pdf
2 2010 Highway Capacity Manual, Transportation Research Board, National Research Council, Washington D.C., 2010.

flow is generally measured or projected for a 15-minute period and capacity is stated in vehicles per hour. Capacity analysis of signalized intersections involves computing volume–to–capacity (v/c) ratios for each lane group, from which an overall intersection v/c ratio may be derived.

Generally, when two opposing flows are moving during the same signal phase, one of the lane groups will require more green time than the other to process its volume. This lane group is defined as the "critical" lane group for the subject signal phase. The concept of a critical v/c ratio is used to evaluate the intersection as a whole, considering only the critical lane groups or those with the greatest demand for green time. Thus, if the green time has not been appropriately allocated to the various approaches, it is possible to have an overall intersection v/c of less than 1.00 (under capacity) but still have individual movements saturated within the signal cycle.

The other major concept in signalized intersection analysis is level of service (LOS), which is an index used to grade intersection operations under various traffic volume loads. Level of service is defined in terms of delay and ranges from LOS A (free flow conditions) to LOS F (long delays). Delay represents a measure of driver discomfort, frustration, fuel consumption, and lost time. Specifically, level of service delay criteria is stated in terms of control delay per vehicle during a peak 15–minute period. These criteria are listed in Table 5-3.

Table 5-3 Level-of-Service Indices for Signalized Intersections

LOS	Average Control Delay[1] (seconds per vehicle)
A	<10.0
B	10.1 – 20.0
C	20.1 – 35.0
D	35.1 – 55.0
E	55.1 – 80.0
F	>80.0

Source: 2010 Highway Capacity Manual
1 Average control delay (in seconds) per vehicle for a peak 15-minute period.

Level of service for unsignalized intersections assumes that major street traffic is not affected by minor street movements (for example; minor street traffic must wait for a gap in major street traffic). The capacity of the intersection to accommodate minor street movements is based on the amount of traffic on the major street and the configuration of the intersection. Level of service is based on the average control delay, which is the total elapsed time from the time a vehicle stops at the end of the queue to the time the vehicle departs from the stop line. The average control delay for any particular minor movement is a function of the service rate or capacity of the approach and the degree of saturation. The overall LOS designation is for the most critical (worst) minor movement, which is often the left–turn movement from the side street. Table 5-4 presents these criteria.

Table 5-4 Level-of-Service Indices for Unsignalized Intersections

LOS	Average Control Delay[1] (seconds per vehicle)
A	<10.0
B	10.1 – 15.0
C	15.1 – 25.0
D	25.1 – 35.0
E	35.1 – 50.0
F	>50.0

Source: 2010 Highway Capacity Manual
1 Average control delay (in seconds) per vehicle for a peak 15-minute period.

5.2.2 Future Conditions

The future transportation analyses contained in this chapter are directly related to the projected ridership of the SCR alternatives.

Vehicular Transportation

Methods used for this study followed standard transportation planning industry practice for the evaluation of transportation systems and infrastructure. Much of the evaluation was based on a 2030 traffic forecast with and without the proposed project provided by the Central Transportation Planning Staff (CTPS). CTPS is the staff for the metropolitan planning organization for the Boston region and works with the communities within the region to address issues such as transportation, land use, and economic development. The CTPS regional travel-demand model was used to provide the traffic forecasts for the entire Study Area. This model is run using TransCAD software.

Traffic Growth Forecasts and 2030 No-Action Conditions

CTPS's method of travel-demand forecasting follows the traditional four steps — trip generation, trip distribution, modal split, and travel assignment. The model uses changes in population, number of households, employed residents, number of automobiles, and total employment to forecast changes in traffic over time.

CTPS developed, calibrated, and used its Regional Travel-demand Model (RTDM) to examine alternatives specific to Phase 1. These efforts informed the traffic analysis, transit demand forecasts, air quality work, environmental justice examination, and helped refine the service plans as well as the station layout. This information spanned land use assumptions, transportation service assumptions, and modeling methods. The RTDM and the subsequent analysis were developed from a coordinated and collaborative planning process using information from various federal, state, regional, and local entities.

Future No-Action Condition (2030) model runs were prepared based on forecasted changes in population, households, employed residents, number of automobiles, and employment throughout the model area. The model was also updated to reflect anticipated changes to the transportation infrastructure including highway and transit projects on the Transportation Improvement Program (TIP) and in long-range regional plans.

Using the future No-Action Condition model output, weekday morning and evening peak-hour turning movement volume networks were created. For each municipality, a background growth rate was established based on model outputs. Table 5-5 shows the background growth rate used in each community. These growth rates were applied to the existing traffic volumes to develop No-Action Condition volumes. Traffic increases from specific development projects not included in the model, listed in Section 5.4.1, were also added to the network to develop the final No-Action networks for local intersections.

Table 5-5 Background Growth Rate (by Community)

Community	Growth Rate[1]
Middleborough	8%
Taunton	4%
Fall River	1.5%

Source: CTPS Travel-demand Model.
1 Total (aggregate) growth rate used to convert 2017 conditions to 2030 conditions.
Note: Freetown was not included in this assessment because no additional traffic operations analysis was required.

The resulting 2030 peak-hour volumes were analyzed to evaluate how well the future infrastructure will accommodate the demands placed on it during the morning and evening peak-hours. The analysis produces a level of service (LOS) rating for each facility using the methodology described under existing conditions (above).

Station Area Phase 1 Operations

Traffic demands estimated for the South Coast Rail alternatives are based on ridership forecasts developed by CTPS. CTPS developed these forecasts based on several variables, including observed commuter rail ridership in similar areas, magnitude of service to be provided, and future estimates of population and employment within the South Coast region and greater Boston area. These data were analyzed using the regional travel-demand model, which ultimately provided a future ridership estimate for the proposed service.

CTPS conducted 2030 Phase 1 model runs by including rail service as a travel option. Trip generation for each station was based on projected park & ride (i.e., driving & parking at the station) and kiss & ride (i.e., pick-up/drop-off) ridership. The analyses of impacts on traffic operations are based on the peak-hour park & ride and kiss & ride ridership projections for each station. The park and ride ridership was divided by a vehicle occupancy rate (VOR) of 1.05 to calculate the number of park & ride vehicles entering and exiting the stations. Two vehicle trips were assumed for each kiss & ride rider; one entering and one exiting the proposed station.

Using these model outputs, peak-hour turning movement volume networks were developed for Phase 1 operations. The rail-related trips were distributed as new traffic and assigned to the roadway network based on the distribution of trips from the travel-demand model. To present a conservative analysis condition, no adjustments were made to the traffic volumes to account for diverted trips within the local street network. The peak-hour volumes were then used to conduct level of service assessments for the Project. When compared to the No-Action Condition, the level of service assessment for Phase 1 will show the effect of the proposed action on transportation conditions.

Where impacts could not be avoided or minimized, mitigation was proposed and evaluated for effectiveness. Mitigation was proposed for intersections where LOS E/F conditions result because of Phase 1 operations, and where LOS E/F conditions under the No-Action Condition are notably worsened with Phase 1 operations (generally an increase in control delay of more than 10 seconds).

Traffic Signal Warrant Analysis

Peak-hour signal warrant analyses were conducted at study area intersections in conformance with the Manual of Uniform Traffic Control Devices (MUTCD) standards. For the purposes of this analysis, peak-hour traffic signal warrants were evaluated for locations that exhibit poor traffic operations and will decline further as a result of the Proposed Project. If an intersection does not meet the peak-hour traffic signal warrant based on projected 2030 traffic volumes, no additional analysis is necessary. All proposed station driveway locations were also evaluated for traffic signal installation.

Locations meeting traffic signal warrants under the peak condition will be evaluated for four and eight-hour traffic signal warrants as part of the preliminary design process. Meeting a traffic signal warrant indicates that a traffic signal could be placed at a particular location; however, satisfaction of a traffic signal warrant does not in itself require a traffic signal be installed. The Mitigation Measures section of this chapter discusses locations where traffic signal installation is considered an appropriate mitigation measure.

Pedestrians and Bicycles

The travel-demand model was also used to project total pedestrian and bicycle volume at each planned station. For each transportation analysis zone (TAZ) within the regional model, CTPS provided the number of pedestrians and bicycles using transit and the specific station they would access. The pathways of travel between zones and each station were mapped and pedestrians and bicycles were assigned to routes accordingly. Bicycle accommodations were evaluated qualitatively with respect to their ability to serve projected users and any projected impacts from project-related traffic and planned or proposed roadway improvements.

Parking

The parking assessment for each station compares the planned number of parking spaces to the projected peak parking demand and identifies any existing parking supply that may be affected by the proposed project. Peak parking demand at each station was projected based on daily passenger boardings determined by the CTPS travel-demand model. For the purposes of this analysis, peak parking demand is equal to the number of passengers who will drive and park at the station prior to boarding the train. No reduction in parking demand was taken to account for carpooling. Locations where projected demand for parking exceeded the planned parking supply were identified.

Grade Crossings

The following sections provide a summary of the methodologies employed to understand the traffic impacts at grade crossings created by Phase 1 operations.

Gate Closure

The impact of the grade crossings on traffic operations requires the calculation of the amount of time the roadway will be blocked. In accordance with standard practice, it is assumed that the gate system will close 30 seconds prior to the train's arrival at the grade crossing, remain closed as the train crosses the roadway and for 15 seconds after the train clears the crossing. The time required for the train to cross the roadway is estimated by dividing the approximate length of the train by the approximate speed of the slowest train expected at that crossing. In most cases where the rail crossing is perpendicular to the roadway, the sum of these components yields the total time (60 seconds) that the roadway is blocked. A longer delay time will be used for unusually wide or skewed crossings.
For the Phase 1 analysis, there is no proposed crossing located within 500 feet of a station platform. Therefore, this analysis does not assume the additional safety measure of gate activation as a train pulls into a station prior to reaching the crossing.

Determination of Vehicle Volumes

As discussed above, traffic data were collected at all grade crossing locations in June 2017. The 2030 morning and evening peak-hour traffic volumes were developed for each grade crossing by applying the annual growth rates obtained from the CTPS regional transportation demand model.

Queue and Delay Calculation

The peak-direction traffic volumes were converted to an average arrival rate by dividing the hourly volume by the number of seconds in an hour (3,600). By applying the arrival rate to the total time that the roadway was blocked, an average queue estimate was developed. The average delay per stopped vehicle was estimated based on gate closure time plus the startup time for the vehicles in the queue. An average startup time of two seconds was used, representing a four second start up time for vehicles in the beginning of the queue and zero seconds toward the back of the queue. The average delay is therefore equal to one-half of the time that the roadway is blocked plus two seconds per vehicle for one-half of the average queue.

Determination of Impact

After the average queue was calculated, impacts of the queue on nearby intersections were determined. A value of 20 to 25 feet per vehicle is generally used to estimate the length of queues. This length includes the length of the vehicle and the spacing between queued vehicles. For this analysis, the total number of vehicles was multiplied by 25 feet per vehicle to determine the total average length (in feet) of the queue.

5.3 Existing Conditions

This section presents the results of the existing conditions, safety, and traffic analysis for Phase 1 operations. The analysis includes:

- Grade crossing data for the Middleborough Secondary rail corridor, and
- Safety and capacity analysis of the study area intersections near each proposed station.

5.3.1 Grade Crossing Inventory

There are five existing grade crossings on the Middleborough Secondary. Specific data for each crossing are provided in Table 5-6. Based on United States Department of Transportation crossing inventory forms, the existing train frequency at these crossings varies from four to 22 freight trains per week. Typical day data suggest one roundtrip per day from Sunday through Thursday and one roundtrip per day from Monday through Friday. Based on these data, it is assumed typical activity is one roundtrip per day on Sunday and Friday and two roundtrips per day from Monday through Thursday. Traffic volumes vary widely along the secondary. With current average daily traffic volumes in excess of 27,000 vehicles per day, Route 140 has the largest potential to be affected by commuter rail service along the secondary.

Table 5-6 Middleborough Secondary At-grade Crossing Summary

Municipality	Crossing	Mile Post	Type	Existing Track Use	Posted Speed (MPH)	Traffic Volume (ADT)[2]
Lakeville	Leonard Street	19.15	Public	Freight	30	1,200
	North Precinct Street	18.43	Public	Freight	30	300
Taunton	Old Colony Avenue	15.72	Public	Freight	30	10,580
	Middleboro Avenue	15.03	Public	Freight	30 20 SB	9,370 NB
	Route 140	14.07	Public	Freight	35	27,100

1 Mileposts for Middleborough Secondary measure from Cotley Junction to Pilgrim Junction.
2 ADT= Average Daily Traffic. All ADT from 2017 traffic data collected by VHB.

5.3.2 Stations

Revised transportation analyses were performed at four locations where Phase 1 proposed conditions are different than those evaluated in the FEIS/FEIR. These include one new station (Middleborough), one relocated station (Taunton), and two with site modifications (Freetown and Fall River). This section provides roadway and intersection inventories, traffic volume data, safety data, and traffic operations under existing conditions for each station study area.

Middleborough/Pilgrim Junction

As discussed in more detail in Chapter 2, the preferred location for the new Middleborough Station is Pilgrim Junction, which is located approximately one mile south of Middleborough Center, south of West Grove Street (Route 28) and just north of I-495. A new parking lot will be constructed northeast of the existing Middleborough main line south of W. Grove Street (Route 28). Access will be provided off South Main Street (Route 105) using a new leg of the intersection at the Interstate 495 NB off-ramp (Exit 4). Figure 5-1 shows the location of the Middleborough Station and selected study area intersections.

Inventory of Roadways and Intersections

A comprehensive field inventory of traffic conditions on the study area roadways and at study area intersections was conducted as part of the study. The field inventory consisted of data on existing roadway geometry, traffic volumes, and operating characteristics.

North/South Main Street (Route 105) is a four-lane arterial south of West Grove Street (Route 28) and a two-lane arterial north of Route 28. It extends north to south from Halifax to Marion. South Main Street provides direct access to Route 44 as well as Interstate 495 at Exit 4. Land uses along Route 105 are predominantly residential, with some commercial. Route 105 will provide access to the new Pilgrim Junction Station. The roadway is under the jurisdiction of MassDOT.

Interstate 495 (I-495) is part of the federal interstate highway system that falls under MassDOT jurisdiction. I-495 is a six lane, divided circumferential highway traversing eastern Massachusetts from Salisbury to Wareham. Access to the proposed site from I-495 is provided by an interchange with Route 105 (Exit 4) just east of the proposed station.

East/West Grove Street (Route 28) is a minor arterial roadway traversing Middleborough, also under the jurisdiction of MassDOT. Regionally it runs north to south from New Hampshire to Eastham. Through the study area it runs east-west extending from Route 44 to Wareham. Its intersection with Route 105 lies just north of Pilgrim Junction. Land uses along this road are primarily residential.

Route 79 is a minor arterial running east-west connecting Route 105 to Route 140 and Route 24 south of the proposed station. Under local jurisdiction within the study area, Route 79 provides access to the existing Middleborough/Lakeville Station. Land uses along the roadway are a mix of residential and commercial.

North/South Main Street (Route 105) and East/West Grove Street (Route 28) form a four-legged signalized intersection. The southbound and westbound approaches on Route 105 and Route 28 accommodate an exclusive left-turn lane and a shared through/right-turn lane. The northbound and eastbound approaches of Route 105 and Route 28 consist of dedicated left, through and right-turn lanes. The traffic signal operates on five phases. The first phase allows for protected left turns on the northbound and southbound approaches, or a lead phase for either the northbound or southbound approach. The second phase permits both northbound and southbound through/right movements. The third phase is an exclusive pedestrian phase. The fourth phase is protected eastbound and westbound left-turn movements, or a lead phase for either the eastbound or westbound movements and the final phase permits eastbound and westbound through movements. Right turns on red are not permitted on any approach. Sidewalks and crosswalks are present on all approaches of the intersection. Land uses at this intersection consist of residential and commercial uses.

South Main Street (Route 105) and I-495 NB Ramp form a three-legged signalized intersection. The northbound Route 105 approach consists of two through lanes and a channelized right-turn lane. The southbound Route 105 approach consists of a dedicated left-turn lane in addition to two through lanes. The westbound I-495 NB ramp consists of dedicated left and right-turn lanes. The traffic signal operates on three phases; the first phase is a lead phase for all southbound movements. The westbound right-turn overlap is also, permitted during the first phase. The second phase permits all northbound and southbound movements with a concurrent pedestrian phase across the eastern leg. Crosswalks are provided only across the I-495 ramps. The final phase permits all westbound movements. Land uses at this intersection are primarily commercial.

South Main Street (Route 105) and I-495 SB Ramp form a three-legged signalized intersection. The southbound Route 105 approach consists of two through lanes and a channelized right-turn lane. The northbound Route 105 approach consists of two through lanes and a dedicated left-turn lane. The eastbound I-495 SB ramp consists of a dedicated left-turn lane and a channelized right-turn lane. This intersection is controlled by a three-phase signal. The first phase permits all northbound and southbound movements, with a concurrent pedestrian phase across the western leg. The second phase is a lag phase that protects the northbound left-turn movement and permits the through movements. The third phase permits all eastbound approach movements. Crosswalks are provided across the I-495 ramps and the northbound approach of South Main Street. Land uses at this intersection are primarily vacant with some residential and commercial to the south.

South Main Street (Route 105) and Route 79/Commercial Drive form a four-legged, signalized intersection. The northbound and southbound approaches consist of a shared through/right-turn lane, a through lane and a dedicated left-turn lane. The eastbound and westbound approaches each consist of a dedicated right-turn lane and a through/left-turn lane. This intersection operates on five phases; the first phase protects northbound and southbound left turns and allows right turn overlaps on the eastbound and westbound approaches. If the signal detects left-turning traffic on only one of these approaches, it instead provides a lead phase for all movements on that approach. The second phase permits northbound and southbound through and right-turn movements. The third phase is an exclusive pedestrian phase. The fourth phase is an eastbound lead for all movements, while the final phase permits all eastbound and westbound movements. There are crosswalks on all approaches with sidewalks on each leg of the intersection. Land uses in the area are primarily commercial. The existing Middleborough/Lakeville Station is east of the intersection.

SCR SOUTH COAST RAIL

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Figure 5-1: Study Area Map - Middleborough

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Source Info: MassGIS, VHB, ESRI

Existing Traffic Volumes

Traffic volume data to support an analysis of the Middleborough study area were collected in June 2017 and included ATR counts and manual TMCs. ATR data were collected to support the grade crossing analysis presented in Table 5-5.

The TMCs were collected during the weekday morning (6:30 to 8:30 AM) and weekday evening (2:30 to 6:30 PM) peak periods at each of the study area intersections. These volumes were reviewed and balanced to develop the traffic volume networks used to evaluate existing traffic operations. The morning network peak-hour generally occurred from 7:15 to 8:15 AM and the evening network peak-hour generally occurred from 5:00 to 6:00 PM. Peak-hour traffic flow networks for an existing weekday morning and evening peak-hour can be found in Appendix B.

Crash Analysis

As shown in Table 5-7, 196 crashes occurred over the five-year period from 2010 to 2014, with the majority (71 percent) occurring at the intersection of South Main Street (Route 105) at W. Grove Street (Route 28). The crash data show that:

- Most of the crashes that occurred in the study are either angle type (46 percent) and rear-end type (29 percent) collisions;
- The majority of crashes involved only property damage (80 percent);
- Most crashes occurred outside of peak-hours (65 percent);
- There was one fatality — at the intersection of Route 105 at I-495 NB ramps; and
- None of the crashes were reported to involve a bicyclist or pedestrian.

The crash rate at one Middleborough intersection exceeds the statewide average:

- South Main Street (Route 105) at W. Grove Street (Route 28) (2.80 vs. 0.76)

The intersection of South Main Street (Route 105) at W. Grove Street (Route 28) ranks as number 121 of the Top 200 intersection crash locations in the Commonwealth. A separate, more comprehensive crash analysis was completed for these locations in accordance with MassDOT's RSA guidelines. It was determined that an RSA is required in Middleborough and will be undertaken by MassDOT. Mitigation identified from the RSA will be incorporated into this Project.

Table 5-7 Middleborough Vehicular Crash Summary

	Route 105 at W. Grove St (Route 28)	Route 105 at I-495 NB Ramps	Route 105 at I-495 SB Ramps	Route 105 at Commercial Drive (Route 79)
Year				
2010	31	7	2	2
2011	30	8	3	2
2012	23	3	1	3
2013	24	0	4	10
2014	31	6	2	4
Total	139	24	12	21
Collision Type				
Angle	70	11	4	6
Head-on	3	1	0	1
Rear-end	42	6	4	4
Rear-to-Rear	1	0	0	2
Sideswipe	17	2	3	5
Single-vehicle crash	5	4	1	3
Unknown	1	0	0	0
Total	139	24	12	21
Severity				
Fatal	0	1	0	0
Injury	22	3	2	4
Property-related	109	20	10	17
Unknown	8	0	0	0
Total	139	24	12	21
Time of day				
Weekday, 7:00 AM - 9:00 AM	8	2	1	2
Weekday, 4:00 PM - 6:00 PM	32	9	4	5
Saturday, 11:00 AM - 2:00 PM	6	0	0	0
Weekday, other time	70	11	7	11
Weekend, other time	23	2	0	3
Total	139	24	12	21
Pavement Conditions				
Dry	109	16	10	14
Wet	26	7	2	6
Snow	1	0	0	0
Ice/Slush	2	0	0	0
Sand	0	1	0	0
Unknown	1	0	0	1
Total	139	24	12	21
Calculated Crash Rates	2.80	0.65	0.34	0.70
MassDOT District 5 Crash Rates	0.76	0.76	0.76	0.76

Source: MassDOT, 2017.

Traffic Operations

An analysis of the existing traffic operations at study area intersections was performed to assess the ability of intersections to process traffic. The results of the analyses for these intersections for 2017 Existing Conditions are presented in Table 5-8.

Under existing conditions, the Middleborough study area intersections include four signalized intersections. During the morning peak-hour, all study intersections operate at acceptable levels of service (LOS C or better), however during the afternoon peak-hour, two of the four study area intersections operate at a deficient level of service. The intersection of South Main Street (Route 105) at West Grove Street (Route 28) currently operates at LOS E during the evening peak hour.

Table 5-8 Middleborough Intersection Capacity Analysis – Existing Conditions

	Weekday Morning Peak-hour			Weekday Evening Peak-hour		
	V/C [1]	**Delay [2]**	**LOS [3]**	**V/C**	**Delay**	**LOS**
South Main Street (Route 105) at Route 28	0.73	29	C	0.81	79	E
South Main Street (Route 105) at I-495 NB Ramps	0.71	12	B	0.51	11	B
South Main Street (Route 105) at I-495 SB Ramps	0.37	11	B	0.59	19	B
South Main Street (Route 105) at Route 79/ Commercial Drive	0.52	22	C	0.62	44	D

Source: Synchro 9.0 Software
1 volume-to-capacity ratio
2 average control delay for all vehicles, rounded to the nearest whole second, for signalized intersections
3 level of service

Taunton/East Taunton Station

The proposed East Taunton Station, previously referred to as Taunton Depot in the FEIS/FEIR, will be relocated from the rear of Target Plaza to a site on Industrial Drive. Access will be provided from Route 140. The station will serve pedestrian, bicycle, park and ride and those picked-up/ dropped-off. It was noted in the FEIS/FEIR that redevelopment will need to occur in the area for the Project to attract a large pedestrian and bicycle population.

Inventory of Roadways and Intersections

Route 140 (County Street) is a state numbered route under the jurisdiction of MassDOT within the Project limits and to the south. Route 140 extends in a northwest-southeast direction through Taunton Center. It leads to Norton in the northwest and to Freetown and New Bedford in the southeast. South of Route 24, the roadway is a limited access, four-lane divided highway. Route 140 connects with Route 24 approximately 450 feet south of the proposed station driveway.

Route 140 and Route 24 northbound ramps form a three-legged, signalized intersection. The Route 140 northbound approach consists of two through lanes and a channelized right-turn lane. The southbound Route 140 approach consists of an exclusive left-turn lane and two through lanes. The northbound and southbound Route 140 traffic is separated by a concrete median. The Route 24 northbound off ramp to Route 140 northbound accommodates a channelized right-turn lane and is under a YIELD control. This intersection is controlled by a two-phase signal. The first phase is a lead phase for southbound traffic. The second phase permits northbound and southbound Route 140 movements. There are no sidewalks or crosswalks at this intersection. Land use at this intersection consists primarily of undeveloped areas.

Route 140 and Route 24 southbound ramps form a three-legged, signalized intersection. The Route 140 southbound approach consists of two through lanes and a channelized right-turn lane. The northbound Route 140 approach consists of an exclusive left-turn lane and two through lanes. The northbound and southbound Route 140 traffic is separated by a concrete median. The Route 24 northbound off ramp accommodates an exclusive left-turn lane and two channelized right-turn lanes. This intersection is controlled by a three-phase signal. The first phase permits Route 140 northbound and southbound movements. The second phase is a lagging phase for the northbound Route 140 movements. The third phase permits Route 24 southbound off-ramp left and right turns. Right turns on red are not permitted for the Route 24 off-ramp traffic. There are no sidewalks or crosswalks at this intersection. Land use at this intersection consists primarily of thickly wooded areas.

Route 140 and Mozzone Boulevard form a three-legged, signalized intersection. The northbound approach consists of a shared through/left-turn lane and an exclusive through lane. The southbound approach consists of an exclusive through lane and a shared through/right-turn lane. The westbound approach consists of an exclusive right-turn and an exclusive left-turn lane. This intersection is controlled by a four-phase signal. The first phase permits all northbound Route 140 movements, along with right-turns from Mozzone Boulevard. The second phase permits Route 140 through traffic in both directions. The third phase provides an exclusive pedestrian phase and the fourth phase allows all movements from Mozzone Boulevard. Sidewalks are present on the west side of Route 140 in the vicinity of the intersection.

Route 140 and Industrial Drive form a three-legged, unsignalized intersection. All approaches consist of a single general-purpose lane. The intersection is located about 230 feet south of the existing at-grade railroad crossing (freight).

The Route 140 corridor was under construction during the existing conditions evaluation (August 2017). The final roadway condition was included in the future No-Action analysis conditions discussed in subsequent sections.

Existing Traffic Volumes

Traffic volume data for the East Taunton Station study area were collected in June 2017 and, similar to Middleborough, included ATR and TMC data. The locations of the traffic counts are shown in Figure 5-2. ATR data were collected to support the grade crossing analysis and are presented in Table 5-5.

The TMCs were collected during the weekday morning (6:30 to 8:30 AM) and weekday evening (2:30 to 6:30 PM) peak periods at each of the study area intersections. These volumes were reviewed and balanced to develop the traffic volume networks used to evaluate existing traffic operations. The morning network peak-hour generally occurred from 7:15 to 8:15 AM and the evening network peak-hour generally occurred from 5:00 to 6:00 PM. Peak-hour traffic flow networks for an existing weekday morning and evening peak-hour can be found in Appendix B.

Crash Analysis

As shown in Table 5-9, 130 crashes occurred in the Taunton study area over the five-year period from 2010 to 2014. The crash rate at the intersection of Route 140 at Mozzone Boulevard was higher than the District 5 and statewide averages (0.91 versus 0.76).

The crash data show that 62 percent of all crashes involved only property damage, while 35 percent involved a non-fatal injury. There were several crashes where the severity was unknown and one fatality noted at the intersection of Route 140 and Route 24 southbound ramps. None of the crashes were reported to involve a bicyclist or pedestrian.

The intersections of Route 140 with the Route 24 ramps (both northbound and southbound) are listed as high crash locations, eligible for HSIP funding. A separate, more comprehensive crash analysis was completed for these locations in accordance with MassDOT’s RSA guidelines. This analysis is provided as separate memorandum in Appendix B. An RSA was determined not to be required at this location, as the analysis confirms there have been no change in crash trends since a previously completed RSA at this location.

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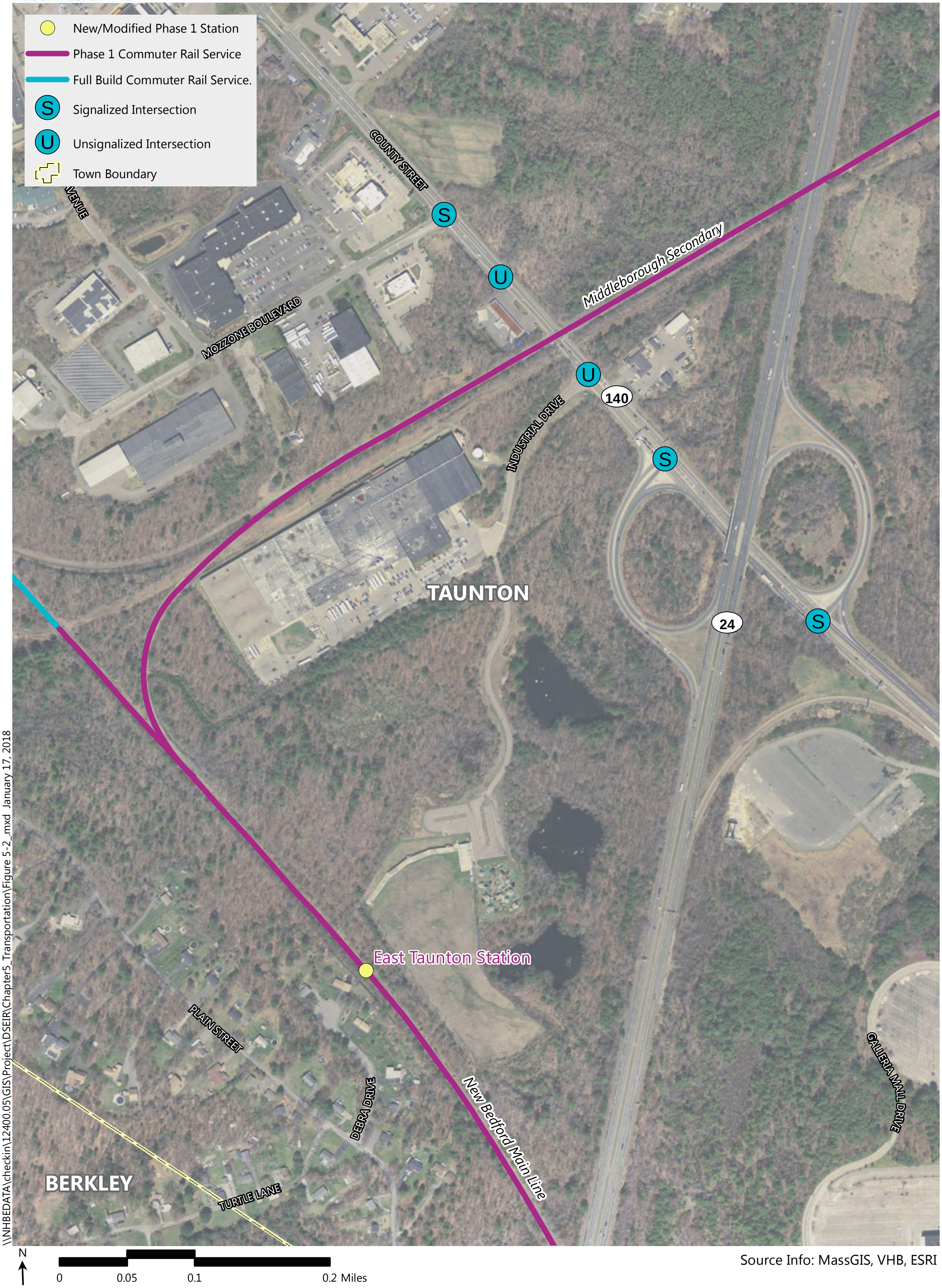
Figure 5-2: East Taunton Station Traffic Count Locations



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Source Info: MassGIS, VHB, ESRI

Table 5-9 Taunton Vehicular Crash Summary

	County Street (Route 140) at Mozzone Blvd	County Street (Route 140) at Mobil Gas Station	County Street (Route 140) at Industrial Dr	County Street (Route 140) at Route 24 SB Ramps	County Street (Route 140) at Route 24 NB Ramps
Year					
2010	12	1	4	8	13
2011	7	2	0	5	5
2012	8	5	1	4	8
2013	7	1	0	3	7
2014	4	2	4	8	11
Total	38	11	9	28	44
Collision Type					
Angle	13	5	2	4	2
Head-on	3	0	0	3	1
Rear-end	14	3	3	14	26
Sideswipe	4	1	3	5	6
Single-vehicle crash	3	2	0	2	7
Unknown	1	0	1	0	2
Total	38	11	9	28	44
Severity					
Fatal Injury	0	0	0	1	0
Non-fatal Injury	15	6	0	9	15
Property damage only	22	5	8	17	28
Unknown	1	0	1	1	1
Total	38	11	9	28	44
Time of day					
Weekday, 7:00AM to 9:00AM	2	1	1	4	5
Weekday, 4:00PM to 6:00PM	5	2	2	2	5
Saturday, 11:00AM to 2:00PM	0	0	0	0	1
Weekday, other time	27	5	4	16	26
Weekend, other time	4	3	2	6	7
Total	38	11	9	28	44
Pavement Conditions					
Dry	30	8	8	23	30
Wet	7	2	1	4	12
Ice	0	0	0	0	0
Snow	0	1	0	1	1
Unknown	1	0	0	0	1
Total	38	11	9	28	44
Calculated Crash Rates	0.91	0.28	0.23	0.51	0.75
MassDOT District 5 Crash Rates	0.76	0.58	0.58	0.76	0.76

Source: MassDOT, 2017.

Traffic Operations

An analysis of the existing traffic operations at study area intersections was performed to assess the ability of intersections to process traffic. The results of the analyses for these intersections for 2017 Existing Conditions are presented in Table 5-10.

Under existing conditions, the study area includes three signalized intersections and two unsignalized intersections. There have been modifications to traffic signal timing and phasing along the Route 140 Corridor since the previous FEIS/FEIR. These changes have substantially improved traffic operations in the vicinity of Route 24. Traffic signal operations and coordination along the corridor is evaluated as part of the Phase 1 operations analysis.

Table 5-10 Taunton Intersection Capacity Analysis – Existing Conditions

	Weekday Morning Peak-hour			Weekday Evening Peak-hour		
Signalized Intersections	**V/C** [1]	**Delay** [2]	**LOS** [3]	**V/C**	**Delay**	**LOS**
Route 140 at Route 24 Southbound	0.44	16	B	0.62	24	C
Route 140 at Route 24 Northbound	0.61	4	A	0.54	3	A
Route 140 at Mozzone Boulevard	0.32	18	B	0.54	26	C
Unsignalized Intersections	**Critical Movement**	**Delay**[4]	**LOS**	**Critical Movement**	**Delay**	**LOS**
Route 140 at Mobile Station	Driveway	12	B	Driveway	13	B
Route 140 at Industrial Drive	Industrial Drive Exit	14	B	Industrial Drive Exit	18	C

Source: Synchro 9.0 Software
1 volume-to-capacity ratio
2 average control delay for all vehicles, rounded to the nearest whole second, for signalized intersections
3 level of service
4 average control delay for the critical movement, rounded to the nearest whole second, for unsignalized intersections

Freetown/Freetown Station

The proposed Freetown Station is located on South Main Street south of the Route 24/Route 79 interchange (Exit 9). The station is proposed to serve pedestrian, bicycle, park and ride, and pick-up/drop-off customers as well as those shuttled between the station and the nearby industrial parks. There are no operational changes proposed at Freetown Station to support Phase 1 service, therefore no new traffic data were collected. However, a shift in the alignment of the proposed station driveway necessitated a review of sight distance at the proposed driveway. This is discussed fully in Section 5.5.3 below.

Based on recent traffic data collected for private development projects in the vicinity of the proposed station location, average daily traffic along South Main Street, south of Bryant Neck Road (Stop and Shop Distribution Center driveway) is roughly 4,000 vehicles per day, with 225 vehicles per hour observed during the morning and 310 vehicles per hour observed during the evening peak-hours. The magnitude of this volume will be taken into account in the sight distance evaluation.

Fall River/Fall River Depot

The proposed location of the Fall River Depot Station remains the same as previously proposed in the FEIS/FEIR. However, due to existing development on the site that has occurred since 2012, the location of parking facilities has been modified.

Inventory of Roadways and Intersections

President Avenue (Route 6) is a four-lane arterial roadway extending from South Davol Street and continuing east through Fall River providing direct access to Route 24 at Exit 5. President Avenue runs east-west just north of the proposed station. Its intersection with South Davol Street provides access to the proposed station via a U-turn under Route 79. Land uses along President Avenue consist of commercial uses.

Davol Street traverses the study area in a north-south direction from Brightman Street to Broadway. Davol Street serves as a frontage route to Routes 138 and 79, which connects Route 24 with I-195. North Davol Street provides access to the proposed Fall River Depot Station, south of President Avenue.

North Main Street is a minor arterial roadway traversing downtown Fall River. It runs north-south extending from the Fall River Country Club in the north to Central Street in the south. Its intersection with President Avenue is located just to the north of the proposed Fall River Depot Station. Additional parking for the station will be provided off North Main Street just east of the site and therefore North Main Street will provide access to the station. Land uses along this road are a mix of commercial and residential.

Turner Street is a two-lane local street that runs east-west connecting North Davol Street to North Main Street. Its intersection with North Davol Street lies just to the south of the proposed Fall River Depot Station, providing easy access to Routes 138 and 79 to the west and direct access to the center of town to the east. Land uses along this street are a mix of residential and commercial.

Pearce Street runs east-west through the study area. It operates as one-way westbound from Davol Street to North Main Street and then two-way from North Main Street to its terminus at Ward Street. Its intersections with North Main Street and Davol Street lie just north of the proposed Fall River Depot Station.

North Main Street and President Avenue form a four-legged signalized intersection. The eastbound and westbound approaches on President Avenue accommodate an exclusive left lane and a shared through/right-turn lane. Right turns on red are not permitted for the westbound approach on President Avenue. The northbound and southbound approaches on North Main Street consist of one general purpose lane. The traffic signal operates on three phases. The first phase permits the northbound and southbound traffic concurrently, the second phase is an exclusive pedestrian phase, and the third phase permits the eastbound and westbound traffic concurrently. Bus stops are located on both sides of North Main Street south of the intersection. Sidewalks and crosswalks are present on all approaches of the intersection. Land uses at this intersection consist of residential and commercial uses.

North Davol Street and President Avenue form a four-legged signalized intersection. The northbound Davol Street approach is one-way and consists of a shared left-turn/through lane, a through lane and an exclusive right-turn lane. The eastbound approach on President Avenue consists of two general-purpose lanes. The westbound President Avenue approach consists of a shared left-turn/through lane, a through lane, and a channelized right-turn lane. This intersection is controlled by a four-phase signal, including an exclusive pedestrian phase. The first phase permits the northbound approach movements. The second phase is a lead phase for the eastbound left-turn traffic. The third phase accommodates the eastbound and westbound traffic concurrently, and finally, the fourth phase is the exclusive pedestrian phase. Crosswalks are present across all approaches of the intersection. Land uses at this intersection are retail and commercial.

South Davol Street and President Avenue form a four-legged signalized intersection. The southbound Davol Street approach is one-way and accommodates two general purpose lanes, with a wide shoulder. The eastbound approach on President Avenue consists of a general-purpose lane. The westbound President Avenue approach consists of two general purpose lanes. This intersection is controlled by a three-phase signal. The first phase permits all southbound movements. The second phase is a concurrent phase that permits the eastbound and westbound traffic with a permitted westbound left-turn. The third phase is an exclusive pedestrian phase. Sidewalks and crosswalks are present on all approaches of the intersection. Land uses at this intersection consist of a public park to the north and a power sub-station to the south.

North Davol Street and Turner Street form a three-legged, unsignalized intersection. Davol Street is one-way and consists of two general purpose lanes. The Turner Street westbound approach consists of one general purpose lane and is under STOP control. A crosswalk is present across Turner Street. Land in the vicinity of this intersection consist primarily of commercial uses and undeveloped areas.

Pearce Street and Davol Street form a three-legged, unsignalized intersection. Davol Street is one-way northbound and consists of two general purpose lanes. Pearce Street is one-way westbound and consists of one general purpose lane and is under STOP-control. Parking is permitted on both sides of Pearce Street. A crosswalk is present across Pearce Street. Land uses in the vicinity of this intersection consist primarily of commercial and retail uses.

North Main Street at Lincoln Avenue form a three legged unsignalized intersection. The eastern leg (Lincoln Avenue) is STOP controlled while the north-south movement (North Main Street) operates freely.

North Main Street at Pearce Street form a four-legged unsignalized intersection. The western leg of Pearce Street operates as one-way westbound while the eastern leg operates as two with a single approach lane for all movements that is STOP controlled. North Main Street, both northbound and southbound, have one general purpose lane and operate freely.

Existing Traffic Volumes

Traffic volume data at select locations within the study area surrounding the proposed Fall River Depot Station were collected by VHB in June 2017 to supplement previous data collection efforts. These data were collected at intersections related to the potential new parking lot location. The locations of the traffic counts are shown in Figure 5-3.

The TMCs were collected during the weekday morning (6:30 to 8:30 AM) and weekday evening (2:30 to 6:30 PM) peak periods at each of the study area intersections. These volumes were reviewed and balanced to develop the traffic volume networks used to evaluate existing traffic operations. The morning network peak-hour generally occurred from 7:15 to 8:15 AM and the evening network peak-hour generally occurred from 4:15 to 5:15 PM. Peak-hour traffic flow networks for an existing weekday morning and evening peak-hour can be found in Appendix B.

Crash Analysis

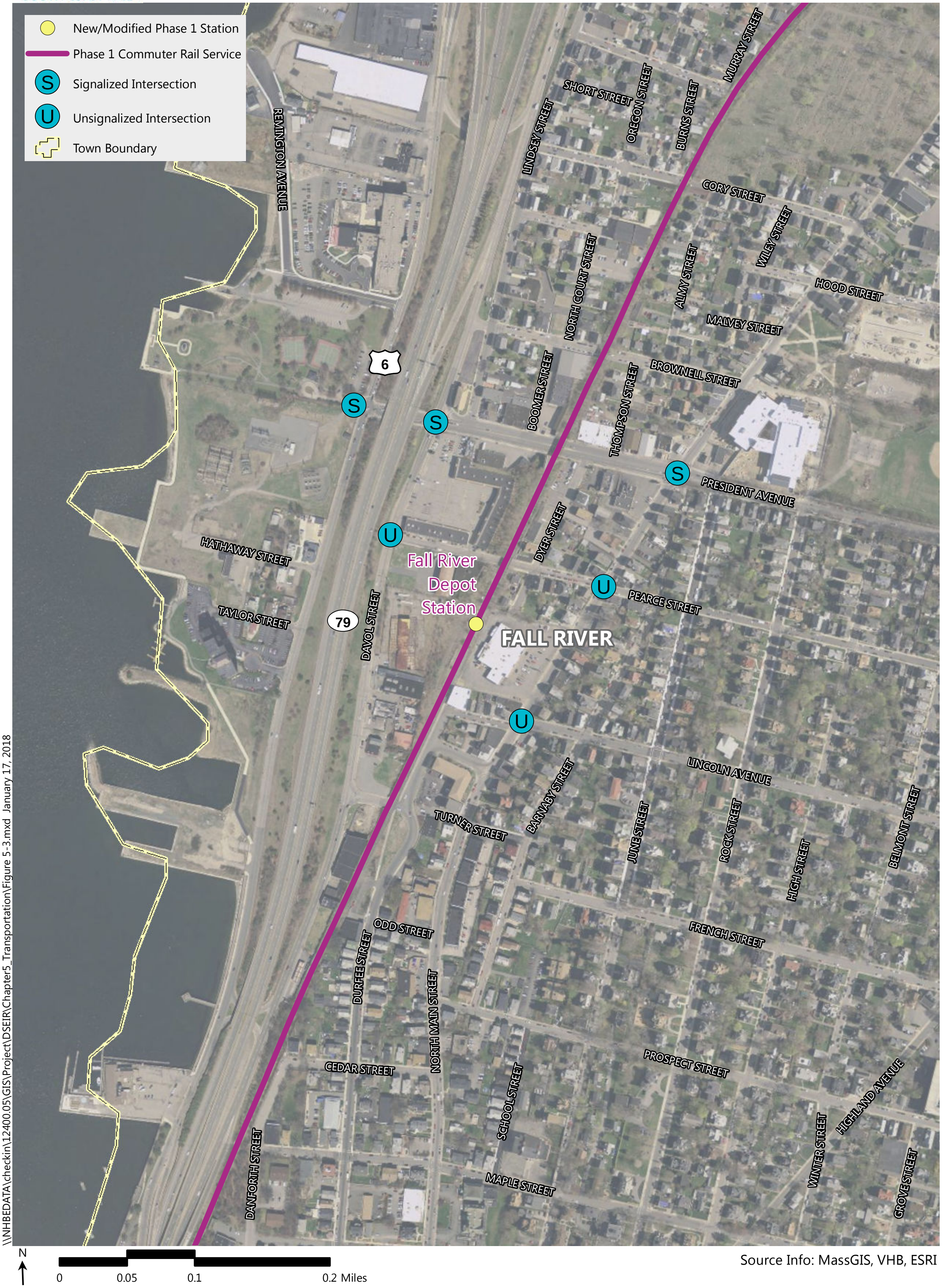
As shown in Table 5-11, 215 crashes occurred over the five-year period from 2010 to 2014, with the majority occurring at the intersections of North Main Street at President Avenue (35 percent) and North Davol Street at President Avenue (31 percent). A brief summary of the crash data shows that angle type crashes involving only property damage are most frequent. No fatalities were reported between 2010 and 2014. The crash rate at four Fall River intersections exceeds the statewide average:

- North Main Street at President Avenue (2.12 vs. 0.76)
- North Main Street at Lincoln Avenue (2.35 vs. 0.58)
- North Main Street at Pearce Street (1.97 vs. 0.58)
- North Davol Street at President Avenue (1.62 vs. 0.76)

The President Avenue corridor, between North Davol Street and Thompson Street is listed as a high crash location eligible for HSIP funding. The President Avenue corridor between Dyer Street and June Street is listed as a bicycle crash cluster eligible for HSIP funding. A separate, more comprehensive crash analysis was completed for these locations in accordance with MassDOT's RSA guidelines. This analysis is provided in Appendix B. It was determined that an RSA is required in Fall River and will be undertaken by MassDOT. Mitigation identified from the RSA will be incorporated into this Project.

Massachusetts Bay Transportation Authority

Figure 5-3: Fall River Traffic Count Locations



\\NHBEDATA\checkin\12400.05\GIS\Project\DSEIR\Chapter5_Transportation\Figure 5-3.mxd January 17, 2018

Source Info: MassGIS, VHB, ESRI

Table 5-11 Fall River Vehicular Crash Summary

	N. Main Street at President Avenue	N. Main Street at Lincoln Avenue	N. Main Street at Pearce Street	S. Davol Street at President Avenue	N. Davol Street at President Avenue	N. Davol Street at Pearce Street
Year						
2010	17	4	8	0	19	0
2011	16	6	7	1	11	0
2012	16	11	2	0	14	0
2013	16	8	9	1	9	0
2014	11	8	7	0	14	0
Total	76	37	33	2	67	0
Collision Type						
Angle	34	12	16	1	34	0
Head-on	2	0	2	0	2	0
Rear-end	29	8	5	1	22	0
Rear-to-rear	0	4	0	0	0	0
Sideswipe	6	10	8	0	6	0
Single-vehicle crash	4	2	2	0	2	0
Unknown	1	1	0	0	1	0
Total	76	37	33	2	67	0
Severity						
Fatal Injury	0	0	0	0	0	0
Non-fatal Injury	21	10	5	1	10	0
Property damage only	55	24	27	1	57	0
Unknown	0	3	1	0	0	0
Total	76	37	33	2	67	0
Time of day						
Weekday, 7:00AM to 9:00AM	4	1	2	0	7	0
Weekday, 4:00PM to 6:00PM	4	3	2	0	16	0
Saturday, 11:00AM to 2:00PM	0	0	2	0	1	0
Weekday, other time	49	28	22	1	16	0
Weekend, other time	19	5	5	1	27	0
Total	76	37	33	2	67	0
Pavement Conditions						
Dry	63	30	25	1	57	0
Wet	12	6	6	0	9	0
Snow	0	1	0	0	1	0
Ice/Slush	1	0	2	0	0	0
Sand, mud, dirt, oil, gravel	0	0	0	1	0	0
Total	76	37	33	2	67	0
Non-Motorist	6	2	2	0	1	0
Calculated Crash Rates	2.12	2.35	1.97	0.07	1.62	0.00
MassDOT District 5 Crash Rates	0.76	0.58	0.58	0.76	0.76	0.58

Traffic Operations

An analysis of the existing conditions in the vicinity of the Fall River Depot Station was performed to assess the ability of intersections to process traffic. The results of the analyses for these intersections for 2017 Existing Conditions are presented in Table 5-12.

Under existing conditions, the Fall River Depot Station study area consists of three signalized and four unsignalized intersections. All of the signalized and unsignalized intersections provide a good level of service (LOS C or better) during both the morning and evening peak-hours.

Table 5-12 Fall River Intersection Capacity Analysis – Existing Conditions

	Weekday Morning Peak-hour			Weekday Evening Peak-hour		
Signalized Intersections	**V/C [1]**	**Delay [2]**	**LOS [3]**	**V/C**	**Delay**	**LOS**
N. Main Street at President Avenue	0.58	35	D	0.67	53	D
South Davol Street at President Avenue	0.60	24	C	0.62	16	B
North Davol Street at President Avenue	0.46	17	B	0.60	19	B
Unsignalized Intersections	**Critical Movement**	**Delay[4]**	**LOS**	**Critical Movement**	**Delay**	**LOS**
North Main Street at Lincoln Avenue	Lincoln	13	B	Lincoln	13	B
North Main Street at Pearce Street	Pearce	15	B	Pearce	19	C
North Davol Street at Turner Street	Turner	13	B	Turner	14	B
North Davol Street at Pearce Street	Pearce	12	B	Pearce	14	B

Source: Synchro 9.0 Software
1 volume-to-capacity ratio
2 average control delay for all vehicles, rounded to the nearest whole second, for signalized intersections
3 level of service
4 average control delay for the critical movement, rounded to the nearest whole second, for unsignalized intersections

5.4 2030 No-Action Conditions

This section describes the No-Action Conditions within the Project Area. The purpose of the No-Action analysis is to provide a base against which the results of the analysis of Phase 1 can be compared to determine the impacts of the Project.

5.4.1 Background Developments/Infrastructure Improvements

While the CTPS travel-demand model accounts for the majority of future development areas within its demographic forecasts, a few large development projects were not specifically included in the model's future land use assumptions. Identification of these projects were coordinated with the Massachusetts Environmental Policy Act (MEPA) office, MassDOT, and the relevant municipalities. The No-Action

Condition transportation analysis includes travel-demands from these specific planned developments in the Study Area and roadway improvements planned or programmed to be completed by or before 2030. These development projects and transportation improvements are described in the following sections by community. The existing traffic volume networks were projected to future conditions by applying annual traffic growth factors (see Table 5-5) combined with project-specific traffic volumes to the existing traffic volumes to create the 2030 No-Action Condition traffic volume networks, which are provided in Appendix B.

Middleborough

A review of projects currently under review at MEPA and discussions with staff for the Town of Middleborough yielded no specific development or transportation infrastructure projects that should be included as part of the 2030 No-Action Condition. A 200,000-square foot (sf) freezer distribution center, with 50 loading dock spaces, is proposed at the existing Ocean Spray facility in Middleborough. However, it is expected that additional truck activity will largely occur outside of the peak commuting periods and that additional traffic related to the facility was included in the growth percentage provided by CTPS.

The commuter rail ridership data provided by CTPS for the No-Action Condition indicates that passenger growth at the existing Middleborough/Lakeville Station is expected. Vehicle trips associated with this growth are included in the No-Action analysis.

Taunton

A review of projects currently under review at MEPA and discussions with staff for the City of Taunton yielded two specific developments that were included as part of the 2030 No-Action Condition.

- **Project First Light** – Construction of a 324,000-sf casino with 900 hotel rooms and a 25,000-sf indoor water park located in the northeast quadrant of the Route 24/Route 140 interchange.
- **Hart Four Corners** – Construction of a 35,000-sf retail plaza to include a convenience store with small restaurant and five gasoline pumps, a bank or drive-thru fast food restaurant, and an additional retail building located at the intersection of Route 140 and Hart Street.

Discussions with MassDOT District 5 have indicated that the state is planning to reconstruct the Route 24/Route 140 interchange by 2030. The preferred alternative for the new interchange was included in the No-Action analysis for Taunton.

Fall River

A review of projects currently under review at MEPA and discussions with staff for the City of Fall River yielded no specific development or transportation infrastructure projects that should be included as part of the 2030 No-Action Condition beyond what was considered in the original FEIS/FEIR.

5.4.2 2030 No-Action Intersection Level of Service Analysis

Middleborough

Based on the growth rates identified above, the existing Middleborough traffic volume networks were projected to create the 2030 No-Action traffic volume networks, which are provided in Appendix B. A comparison of existing and No-Action Condition capacity analysis results for the Middleborough Station study area is shown in Table 5-13. One study area intersection is projected to experience a change in level of service between Existing and No-Action Conditions.

Table 5-13 Middleborough Intersection Capacity Analysis – No-Action Conditions

	Weekday Morning Peak-hour				Weekday Evening Peak-hour			
	Existing	No-Action			Existing	No-Action		
	LOS[1]	V/C [2]	Delay [3]	LOS	LOS	V/C	Delay	LOS
South Main Street (Route 105) at Route 28	C	0.81	37	D	E	0.93	106	F
South Main Street (Route 105) at I-495 NB Ramps	B	0.78	14	B	B	0.57	12	B
South Main Street (Route 105) at I-495 SB Ramps	B	0.42	11	B	B	0.66	22	C
South Main Street (Route 105) at Route 79/Commercial Drive	C	0.55	22	C	D	0.63	43	D

Source: Synchro 9.0 Software
1 level of service
2 volume-to-capacity ratio
3 average control delay for all vehicles, rounded to the nearest whole second, for signalized intersections
Shaded rows reflect worst level of service intersections (LOS = F).

Taunton

Based on the growth rates identified above, and traffic studies related to the background development projects identified, the existing Taunton traffic volume networks were projected to create the 2030 No-Action traffic volume networks, which are depicted in Figures 5-13 and 5-14. A comparison of existing and No-Action capacity analysis results for the Taunton Station Study Area is shown in Table 5-14. One unsignalized intersection, Route 140 at Industrial Drive, is expected to see a reduction in level of service. This reduction is attributed to increased traffic along Route 140 and the signal phasing and timing changes proposed at the Route 24 southbound ramps as part of the proposed interchange project.

Table 5-14 Taunton Intersection Capacity Analysis – No-Action Conditions

	Weekday Morning Peak-hour				Weekday Evening Peak-hour			
	Existing	No-Action			Existing	No-Action		
Signalized Intersections	**LOS[1]**	**V/C [2]**	**Delay [3]**	**LOS**	**LOS**	**V/C**	**Delay**	**LOS**
Route 140 at Route 24 Southbound	B	0.62	11	B	C	0.87	21	C
Route 140 at Route 24 Northbound	A	0.86	4	A	A	0.89	5	A
Route 140 at Mozzone Boulevard	B	0.39	19	B	C	0.67	28	C
Unsignalized Intersections		**Critical Movement**	**Delay[4]**	**LOS**		**Critical Movement**	**Delay**	**LOS**
Route 140 at Mobile Station	B	Driveway	14	B	B	Driveway	14	B
Route 140 at Industrial Drive	B	Industrial Drive Exit	21	C	C	Industrial Drive Exit	41	E

Source: Synchro 9.0 Software
1 level of service
2 volume-to-capacity ratio
3 average control delay for all vehicles, rounded to the nearest whole second, for signalized intersections
4 average control delay for the critical movement, rounded to the nearest whole second, for unsignalized intersections

Fall River

Based on the growth rates identified above, the existing Fall River traffic volume networks were projected to create the 2030 No-Action traffic volume networks, which are provided in Appendix B. A comparison of existing and No-Action capacity analysis results for the Fall River Station Study Area is shown in Table 5-15. The intersection of North Main Street and President Avenue is expected to see a reduction in level of service from LOS D to LOS E by 2030. On average, vehicles can be expected to realize a two-second increase in delay at this location.

Table 5-15 Fall River Intersection Capacity Analysis – No-Action Conditions

	Weekday Morning Peak-hour				Weekday Evening Peak-hour			
	Existing	No-Action			Existing	No-Action		
Signalized Intersections	LOS[1]	V/C [2]	Delay [3]	LOS	LOS	V/C	Delay	LOS
N. Main Street at President Avenue	D	0.58	36	D	D	0.71	63	E
South Davol Street at President Avenue	C	0.58	22	C	B	0.61	15	B
North Davol Street at President Avenue	B	0.44	18	B	B	0.58	18	B
Unsignalized Intersections		**Critical Movement**	**Delay[4]**	**LOS**		**Critical Movement**	**Delay**	**LOS**
North Main Street at Lincoln Avenue	B	Lincoln	12	B	B	Lincoln	13	B
North Main Street at Pearce Street	B	Pearce	15	B	C	Pearce	20	C
North Davol Street at Turner Street	B	Turner	12	B	B	Turner	13	B
North Davol Street at Pearce Street	B	Pearce	12	B	B	Pearce	13	B

Source: Synchro 9.0 Software
1 level of service
2 volume-to-capacity ratio
3 average control delay for all vehicles, rounded to the nearest whole second, for signalized intersections

5.5 Phase 1 Operations

Transportation analyses were conducted for each of the new or redesigned Phase 1 stations. If the proposed station layout has not been modified since the FEIS/FEIR no additional analysis was required as part of this assessment. The analysis of transportation impacts was based on projected ridership at each station. As with the No-Action analysis, the Phase 1 Operations analysis results are presented by community. For Middleborough and Taunton, vehicle trip generation was estimated based on the 2030 ridership forecasts. For Fall River, changes to the station layout only effect service as part of the Full Build. As such, 2040 ridership forecasts for the Stoughton Local Electric Alternative were considered at the Fall River Depot Station only. Detailed information about trip generation and trip distribution characteristics are provided in the appropriate sections below.

The results of the Phase 1 Operations analyses are presented for signalized and unsignalized intersections by community. The results include No-Action Conditions level of service and highlight locations that operate at unacceptable levels of service during at least one peak-hour.

5.5.1 Middleborough

Pilgrim Junction Station will be located immediately adjacent to South Main Street (Route 105) between I-495 and West Grove Street (Route 28) in Middleborough. Access to the station will be from the existing signalized intersection of Route 105 and I-495 Northbound. A new fourth leg to the intersection will be constructed at the existing traffic signal. Passenger parking, kiss & ride, and employee parking access will be from the primary driveway. Pedestrians and bicycles will access the station via the driveway or a ramp/staircase directly from West Grove Street. The existing employee parking access on West Clark Street will be closed and West Clark Street will become a dead-end roadway. Shuttle service will be provided from the currently existing Middleborough/Lakeville Station to serve TOD residents and employees.

Traffic

Assuming Phase 1 Operations, design year (2030) traffic volumes for the study area roadways were determined by estimating site-generated traffic volumes and distributing these volumes through the study area intersections within Middleborough. These site-generated volumes were added to the No-Action traffic volumes to create the 2030 Phase 1 Operation traffic volume networks, which are provided in Appendix B.

When compared to the No-Action condition, ridership data provided by CTPS show a decline in anticipated 2030 passenger levels under Phase 1 Operations. This decline is reflective of an anticipated future shift of some riders from Middleborough/Lakeville to Taunton, which will provide more direct station access from neighborhoods to the southwest. Overall, anticipated 2030 ridership at Pilgrim Junction is expected to mirror ridership levels seen at the existing Middleborough/Lakeville Station in 2017. Therefore, no net new park & ride (PNR) or kiss & ride (KNR) trips were generated for Pilgrim Junction Station. The existing station parking lot will remain open and shuttle service from the existing to the new station will be provided.

To account for these factors in the traffic analysis of Phase 1 Operations, the following adjustments were made to the No-Action traffic volumes:

- Vehicle trips to/from the existing station were relocated to Pilgrim Junction Station. The magnitude of these trips is equal to the 2017 volume observed at the existing parking lot and trips were relocated based on existing travel patterns.
- Additional station-related traffic projected under No-Action Conditions was redistributed to East Taunton Station based on the information provided by CTPS and the geographical distribution of these trips.

The intersection levels of service based on the redistribution of rail-related traffic are shown in Table 5-16. Four signalized intersections, including the station driveway, were analyzed for the

Middleborough Station under Phase 1 Operations. The analysis indicates that all intersections will operate at acceptable levels of service except the intersection of South Main Street (Route 105) at Route 28 which is anticipated to continue to operate at LOS F during the evening peak-hour. Since under Phase 1 Operations, vehicle trips are primarily rerouted between the existing and proposed station locations, there is no net change in vehicle trips anticipated through the intersection of South Main Street at Route 28.

Table 5-16 Middleborough Intersection Capacity Analysis – Phase 1 Operations

	Weekday Morning Peak-hour				Weekday Evening Peak-hour			
	No-Action	Phase 1 Operations			No-Action	Phase 1 Operations		
	LOS[1]	V/C [2]	Delay [3]	LOS	LOS	V/C	Delay	LOS
South Main Street (Route 105) at Route 28	D	0.81	37	D	F	0.93	106	F
South Main Street (Route 105) at I-495 NB Ramps	B	0.90	19	B	B	0.67	18	B
South Main Street (Route 105) at I-495 SB Ramps	B	0.41	11	B	C	0.67	23	C
South Main Street (Route 105) at Route 79/ Commercial Drive	C	0.48	19	B	D	0.65	44	D

Source: Synchro 9.0 Software
1 level of service
2 volume-to-capacity ratio
3 average control delay for all vehicles, rounded to the nearest whole second, for signalized intersections
Shaded rows reflect worst level of service intersections (LOS = F).

Along with data provided by CTPS, the Project team reviewed regional access to the proposed new Pilgrim Junction Station as it relates to the existing station at Middleborough/Lakeville. Due to the proximity of the two station locations, there is no anticipated shift in regional traffic – either from or to the highway system, when compared to existing travel patterns. Trips originating from the southwest of I-495 will increase traffic along Route 105 between Route 79 and the new station driveway. However, this increase is offset by trips originating from the northwest, which will no longer travel along Route 105 south of the proposed station entrance. Station-related trips through key intersections in Middleborough Center, the Middleborough Rotary, and in the vicinity of the schools located along Route 28 will be unchanged.

Bicycles and Pedestrians

The travel-demand and ridership estimates completed by CTPS indicate that about 10 non-motorized person trips (bicycles and pedestrians) will access Pilgrim Junction Station daily. While these demand estimates are low, roadway mitigation that enhances access for bicycles and pedestrians is proposed.

Pilgrim Junction Station will be located closer to more densely populated Middleborough Center and the proximity of the station to the neighborhood provides enhanced opportunity to draw passengers on foot and by bicycle.

The proposed station location will not physically alter existing designated bicycle facilities nor disrupt future plans for either on-road or off-road facilities in the study area. To accommodate demand, bicycle parking and storage locations will be maximized using available space.

Parking

Pilgrim Junction is proposed to have 501 parking spaces (of which, eight will be handicapped accessible and two will be handicapped van accessible). A designated area will be reserved for kiss & ride activity. The Proposed Project will not physically alter the existing public parking supply or impact parking availability within Middleborough. Based on the projected daily PNR ridership, the parking supply will be sufficient to meet the peak parking demand under Phase 1 and Full Build operations, which are 453 and 483 daily parkers, respectively.

Mitigation

As discussed above, there are no anticipated adverse impacts caused by the Proposed Project in Middleborough. However, intersection improvements are being suggested to either mitigate existing deficiencies or enhance bicycle and pedestrian access to Pilgrim Junction. These measures are as follows:

- Complete a RSA at the intersections of Route 105/Route 28. Implement recommended improvements, as appropriate.
- Modify traffic signal timing and phasing at the intersection of Route 105 and Route 28 to provide protected/permissive left turns for all approaches.
- Extend the exclusive pedestrian phase at the intersection of Route 105 and Route 28 from 21 to 26 seconds to provide adequate crossing time.
- Modify traffic signal timing and phasing at the intersection of Route 105 and I-495 Northbound to incorporate the new station driveway and a pedestrian crossing of Route 105 on the northeastern leg of the intersection.
- Install high visibility materials, advanced signage, and flashing beacon warning devices at the existing unsignalized crosswalks across Route 28 at West Street and at Elm Street.
- Modify the traffic signal timing at the intersection of Route 79 and Commercial Street to reflect reduced traffic demand at the station driveway.

Table 5-17 presents the Phase 1 Operations with and without mitigation to illustrate the benefits of the proposed changes, where applicable.

Table 5-17 Middleborough Intersection Capacity Analysis – Phase 1 Operations with Mitigation

	Weekday Morning Peak-hour				Weekday Evening Peak-hour			
	Phase 1	Phase 1 with Mitigation			Phase 1	Phase 1 with Mitigation		
	LOS[1]	V/C [2]	Delay [3]	LOS	LOS	V/C	Delay	LOS
South Main Street (Route 105) at Route 28	D	0.76	34	C	F	0.84	45	D
South Main Street (Route 105) at I-495 NB Ramps	B	0.92	22	C	B	0.71	21	C

Source: Synchro 9.0 Software
1 level of service
2 volume-to-capacity ratio
3 average control delay for all vehicles, rounded to the nearest whole second, for signalized intersections

5.5.2 Taunton

East Taunton Station will be located immediately adjacent to Route 140, just north of Route 24. Access to station will be via Industrial Drive (an existing unsignalized intersection) for all transportation modes.

Traffic

Assuming Phase 1 Operations, design year (2030) traffic volumes for the study area roadways were determined by estimating site-generated traffic volumes and distributing these volumes through the study area intersections within Taunton. These site-generated volumes were added to the No-Action traffic volumes to create the 2030 Phase 1 Operation traffic volume networks, which are provided in Appendix B.

The projected number of vehicle trips in and out of East Taunton in the morning and evening peak-hours are shown in Table 5-18. The trip generation for East Taunton Station is based on the projected ridership and mode split information provided by CTPS.

Table 5-18 Park & Ride and Kiss & Ride Vehicle Trips for East Taunton Station

		Morning Peak-hour		Evening Peak-hour	
	Type of Trip	In	Out	In	Out
East Taunton	Park & Ride	164	17	9	127
	Kiss & Ride	25	25	19	19

Source: VHB, 2017. CTPS Travel Demand Model.

The directional distribution of station-generated traffic is a function of population distribution, vehicle-owning households, existing travel patterns on area roadways, and traffic conditions. The trip distribution for the PNR trips associated with East Taunton Station is based on ridership data provided by CTPS, which consider these factors. Table 5-19 provides the geographic distribution of these trips.

Table 5-19 East Taunton Station Trip Distribution

To/From	Distribution
North (Route 140)	36%
North (Route 24)	6%
South (Route 140)	36%
South (Route 24)	22%

Source: VHB, 2017.

The PNR traffic was distributed to the study area roadways based on these percentages. KNR traffic was added separately and is based on existing travel patterns on area roadways near the proposed station.

The intersection levels of service based on the addition of rail-related traffic are shown in Table 5-20. Three signalized intersections were evaluated for the East Taunton Station under Phase 1 Operations. The analysis indicates that all three intersections will operate at acceptable levels of service, with no change to levels of service expected. Two unsignalized intersections were evaluated. The analysis indicates one location will continue to operate at acceptable levels of service. As expected, with the inclusion of station-related traffic along Industrial Drive, operations degrade to LOS F under both conditions. Queuing at the Route 140 grade crossing, immediately adjacent to Industrial Drive, exacerbates this condition.

Traffic Signal Warrants

The intersection of Route 140 and Industrial Drive was evaluated to determine whether a traffic signal could be considered for traffic mitigation. From a traffic volume and crash history perspective, the intersection does not meet the criteria for traffic signal installation. However, based on the intersection's proximity to the at-grade railroad crossing of Route 140 and to adjacent traffic signals at Route 140/Mozzone Boulevard and Route 140/Route 24, the location meets traffic signal warrants for railroad crossings and traffic signal systems. The evaluation of a traffic signal as project mitigation is discussed below.

Bicycles and Pedestrians

The travel-demand and ridership estimates completed by CTPS indicate that about 40 non-motorized person trips (bicycles and pedestrians) will access East Taunton Station daily. The proposed station location will not physically alter existing designated bicycle facilities nor disrupt future plans for either on-road or off-road facilities in the study area. To accommodate demand, bicycle parking and storage locations will be maximized using available space.

Table 5-20 Taunton Intersection Capacity Analysis – Phase 1 Operations

	Weekday Morning Peak-hour					Weekday Evening Peak-hour				
	No-Action	Phase 1 Operations				No-Action	Phase 1 Operations			
Signalized Intersections	**LOS[1]**		**V/C [2]**	**Delay[3]**	**LOS**	**LOS**		**V/C**	**Delay**	**LOS**
Route 140 at Route 24 Southbound	B		0.63	12	B	C		0.90	22	C
Route 140 at Route 24 Northbound	A		0.86	4	A	A		0.89	5	A
Route 140 at Mozzone Boulevard	B		0.42	20	B	C		0.71	29	C
Unsignalized Intersections		**Critical Movement**		**Delay[4]**	**LOS**		**Critical Movement**		**Delay**	**LOS**
Route 140 at Mobil Station	B	Driveway		14	B	B	Driveway		14	B
Route 140 at Industrial Drive	C	Industrial Drive Exit		103	F	C	Industrial Drive Exit		>120	F

Source: Synchro 9.0 Software
1 level of service
2 volume-to-capacity ratio
3 average control delay for all vehicles, rounded to the nearest whole second, for signalized intersections
4 average control delay for the critical movement, rounded to the nearest whole second, for unsignalized intersections
Shaded rows reflect worst level of service intersections (LOS = F).

Parking

East Taunton is proposed to have 363 parking spaces (of which, seven will be handicapped accessible and one will be handicapped van accessible). A designated area will be reserved for kiss & ride activity. The Proposed Project will not physically alter the existing public parking supply or impact parking availability within Taunton. Based on the projected daily PNR ridership, the parking supply will be sufficient to meet the peak parking demand under Phase 1 and Full Build operations, which are 298 and 322 daily parkers, respectively.

Mitigation

As discussed above, the potential for adverse impacts caused by the Proposed Project in Taunton is related to the influence of the new at-grade railroad crossing on traffic operations along the Route 140 corridor. Specific station-related traffic impacts are not anticipated. MassDOT proposes intersection improvements to facilitate grade crossing safety while maintaining traffic operations to the extent possible during grade crossing closures on Route 140. These measures include:

- Install a new traffic signal at the intersection of Route 140 and Industrial Drive. In conjunction with this new traffic signal, install pre-signals at the Route 140 grade crossing. These traffic signals will provide traffic signal preemption during a crossing event to allow vehicles queues along Route 140 to clear prior to the crossing gates being lowered.
- Restripe Route 140 southbound between Industrial Drive and Route 24 southbound to provide two through lanes and a dedicated right-turn lane onto Route 24 southbound. Minor widening may be required to facilitate this change.
- Modify traffic signal timing and phasing at the Route 140 intersections with Mozzone Boulevard and Route 24 southbound ramps to provide preemption phasing during gate closure.

Table 5-21 presents the Phase 1 Operations with and without the proposed mitigation to illustrate the benefits of the proposed changes, where applicable.

Table 5-21 Taunton Intersection Capacity Analysis – Phase 1 Operations with Mitigation

	Weekday Morning Peak-hour				Weekday Evening Peak-hour			
	Phase 1	Phase 1 with Mitigation			Phase 1	Phase 1 with Mitigation		
Signalized Intersections	LOS[1]	V/C [2]	Delay [3]	LOS	LOS	V/C	Delay	LOS
Route 140 at Industrial Drive	F	0.44	11	B	F	0.52	10	B

Source: Synchro 9.0 Software
1 level of service
2 volume-to-capacity ratio
3 average control delay for all vehicles, rounded to the nearest whole second, for signalized intersections
4 average control delay for the critical movement, rounded to the nearest whole second, for unsignalized intersections
Shaded rows reflect worst level of service intersections (LOS = F).

5.5.3 Freetown

A shift in the alignment of the driveway entrance to Freetown Station necessitated a new review of whether adequate sight distance is provided from the new intersection. Sight distance considerations are divided into two categories: Stopping Sight Distance (SSD) and Intersection Sight Distance (ISD). SSD is the distance required for a vehicle approaching an intersection from either direction to perceive, react and come to a complete stop to avoid colliding with an object in the road. In this respect, SSD can be considered as the minimum visibility criterion for the safe operation of an unsignalized intersection. ISD is based on the time required for perception, reaction and completion of the desired critical exiting maneuver (typically, a left turn) once the driver on a minor street approach or in a driveway decides to execute the maneuver. Calculations for ISD include the time to (1) turn left and clear the near half of the intersection without conflicting with the vehicles approaching from the left; and (2) upon turning left, to accelerate to the operating speed on the roadway without causing approaching vehicles on the main road to unduly reduce their speed. In this context, ISD can be considered as a desirable visibility criterion for the safe operation of an unsignalized intersection.

Table 5-22 presents a summary of the desirable ISD and required SSD for the proposed Freetown Station driveways, based on the posted speed limit of 35 mph traveling eastbound and westbound along South Main Street. Sight distance worksheets are included in Appendix B.

Table 5-22 Freetown Station Sight Distance Evaluation

	Stopping Sight Distance (feet)			Intersection Sight Distance (feet)		
Location	**Traveling**	**Required[1]**	**Provided**	**Looking**	**Desirable[1]**	**Provided**
Freetown Station at South Main Street	Eastbound	250	300+	Left (west)	390	400
	Westbound	260	330+	Right (east)	390	215

1 Based on guidelines established in *A Policy on the Geometric Design of Highways and Streets, 6th Edition*, American Association of State Highway and Transportation Officials (AASHTO), 2011. Speeds are based on the posted speed limit of 35 mph along South Main Street.

As shown in the table, the required stopping sight distance along South Main Street is exceeded at the proposed site driveway. However, the desirable intersection sight distance from the station driveway will not be met when looking right due to the vertical and horizontal curvature in the roadway. This means that drivers along South Main Street may be required to slow when vehicles are exiting the station driveway, but should have adequate distance to do so. The proposed driveway can be relocated west to improve ISD from 215 to 315 feet. Wetlands near the station prohibit any further improvement to ISD, which remains short of desirable by about 75 feet. Advanced warning signage along South Main Street and at the station driveway should be installed to alert drivers to activity at the station driveway. A dynamic message sign that indicates a warning to passing motorists when a train is at the station should also be considered.

5.5.4 Fall River

The proposed Fall River Depot Station will be located one mile north of downtown Fall River on North Davol Street between Pearce Street and Turner Street. Access to the station will be via an unsignalized entrance and exit driveways located on North Davol Street. An additional parking lot may be provided east of the train tracks with access provided off North Main Street under the Full Build condition. A pedestrian walkway would be constructed to link this North Main Street parking lot with the station platform. Pearce Street, Turner Street and North Main Street provide pedestrian and bicycle connections to the station from the neighborhood east of the railroad tracks.

Since the FEIS/FEIR, a medical office has been constructed on the south side of the Fall River Depot train station site, which reduces the land available to construct parking. For Phase 1, the reduced parking area is expected to be adequate to serve demand. There are no substantive changes in transportation access for Phase 1 when compared to the FEIS/FEIR, therefore a fully updated analysis was not necessary.

Mitigation

Project mitigation suggested in the FEIS/FEIR is still adequate to address existing deficiencies at critical locations and adverse impacts caused by the traffic at Fall River Depot. This mitigation includes:

- North Main Street and President Avenue:
  - Update signal timing to provide a longer exclusive pedestrian interval to accommodate the increased intersection cross-section and Project-related pedestrians.
- President Avenue at North Davol Street:
  - Increase the pedestrian crossing interval to accommodate Project-related pedestrians and provide adequate crossing time.

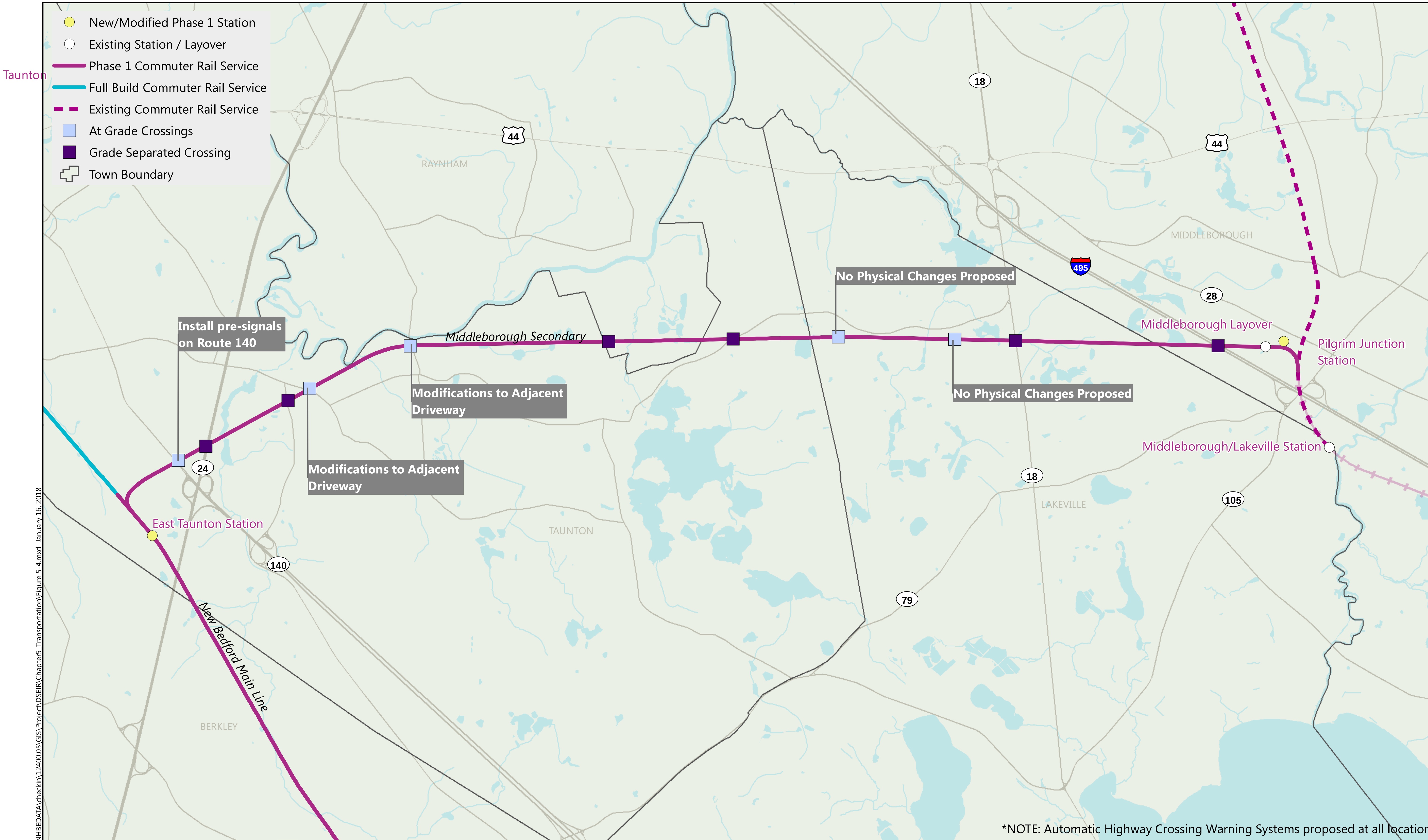
5.5.5 Grade Crossings

This section provides an evaluation of the traffic impacts associated with the public grade crossings that will be in service along the Middleborough Secondary. Figure 5-4 presents all the crossing locations evaluated, along with any recommended treatment (grade separation, closure or at-grade crossing). The Middleborough Secondary includes five grade crossings in Taunton and Lakeville. During the morning and evening peak-hours, the grade crossings are projected to be closed three times (two trains traveling in the peak-direction and one train traveling in the off-peak-direction), or approximately five percent of the peak-hour. Twelve round trips per day are expected.

The assessment of potential traffic and safety impacts at the proposed public grade crossings indicates that each location will be suitable for public use equipped with a combination of new, state of the art, Automatic Highway Crossing Warning (AHCW) systems and minor geometric modifications such as driveway reconfiguration, driveway closures, vegetation clearing and utility pole relocations. The delay and queue technical analysis for all locations can be found in Appendix B.

Massachusetts Bay Transportation Authority

Figure 5-4: Grade Crossings



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0 0.25 0.5 1 Miles

Source Info: MassGIS, VHB, ESRI

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Middleborough

There are no new proposed grade crossings in Middleborough. All existing grade crossings are currently part of the Middleborough Main Line and are grade separated.

Lakeville

Two public grade crossings on the Middleborough Secondary are in Lakeville. Both crossings are currently active with freight activity. As in Taunton, it is assumed that all future freight will run outside of the peak commuting hours to facilitate commuter rail along the single track. Table 5-27 shows the traffic volumes, maximum queue, and average delay at these grade crossings.

Table 5-27 Lakeville Grade Crossings – Traffic Volumes[1] and Average Delay

Crossing	Traffic Volume (ADT)	AM Peak Volume	PM Peak Volume	Queue Length (feet)	Average Delay (Seconds)
Leonard Street	1,265	135	205	50	31
North Precinct Street	325	35	55	25	30

Source: VHB, 2017.
1 Projected 2030 traffic conditions.

There are no anticipated impacts to any driveways or adjacent intersections in the vicinity of these crossings and no mitigation (other than installation of the AHCW) is proposed.

Raynham

There are no new proposed grade crossings in Raynham. All existing grade crossings within Raynham along the Middleborough Secondary are grade separated.

Taunton

Three public grade crossings on the Middleborough Secondary corridor are located in Taunton. Each Taunton crossing is currently active with freight activity. In the future, it is assumed that all freight will run outside of the peak commuting hours to facilitate commuter rail along the single track. Table 5-28 shows the traffic volumes, maximum queue and average delay at these grade crossings.

Table 5-28 Taunton Grade Crossings – Traffic Volumes[1] and Average Delay

Crossing	Traffic Volume (ADT)	AM Peak Volume	PM Peak Volume	Queue Length (feet)	Average Delay (Seconds)
Old Colony Avenue	10,960	1,060	985	350	39
Middleboro Avenue	9,715	860	495	225	38
Route 140	28,065	1,920	2,310	475	48

Source: VHB, 2017.
1 Projected 2030 traffic conditions.

Projected queue lengths and average delays at all three crossings will affect driveways immediately adjacent to the crossing at all three of these locations. However, there are no anticipated impacts to any adjacent intersections due to queued vehicles at the crossing.

Mitigation

In addition to installation of AHCW, minor modifications to driveways adjacent to the grade crossings are proposed along Old Colony Avenue and Middleboro Avenue. These modifications are provided in Appendix B. More extensive changes are proposed along Route 140. These changes are discussed above in Section 5.5.2.

5.6 Summary of Mitigation

Table 5-29 presents a summary of mitigation discussed in the previous sections.

Table 5-29 Mitigation Summary

	Recommended Improvement
Middleborough	• Complete an RSA at the intersection of Route 105/Route 28 and implement recommended improvements. • Modify traffic signal timing/phasing at Route 105/Route 28, including providing adequate pedestrian crossing times. • Modify traffic signal timing/phasing at Route 105/I-495 northbound. Provide new crosswalk across Route 105. • Install high visibility materials, advanced signage, and flashing beacon warning devices at the existing unsignalized crosswalks across Route 28 at West Street and at Elm Street. • Modify the traffic signal timing at Route 105/Route 79/Commercial Street
Taunton	• Install new traffic signal at Route 140/Industrial Drive. • Install pre-signals at the Route 140 grade crossing. • Restripe Route 140 southbound between Industrial Drive and Route 24 southbound • Modify traffic signal timings/phasing at Route 140 with Mozzone Boulevard and with Route 24 southbound ramps to provide preemption phasing during gate closure.
Freetown	• Install advanced warning signage along South Main Street and at Freetown Station driveway. • Install dynamic messages signing along approach where sight distance is deficient.
Fall River	• Widen North Main Street on both approaches to President Avenue. • Update traffic signal timing/phasing at North Main Street/President Avenue and increase pedestrian crossing time. • Increase the pedestrian crossing time at North Davol Street/President Avenue.

5.7 Construction Impacts

Each municipality is expected to have limited traffic impacts associated with construction of stations and parking. Temporary construction impacts include construction related traffic and potentially minor traffic disruptions for the construction or upgrading of station driveways. These impacts are expected to terminate when construction is complete. The Project will work with the agency or municipality that has jurisdiction over the roadway (as well as public safety officials from each municipality) during the development of temporary traffic control plans. Construction is proposed to take place during off peak traffic periods, as much as practicable, to minimize impacts to the traveling public. With respect to grade crossing improvements, at this stage of design no detours are anticipated given the proposed improvements. If detours are found necessary as design progresses, the Project will coordinate with appropriate state and local officials.

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6. Air Quality & Greenhouse Gas

6.1 Introduction

This chapter assesses the effects of South Coast Rail's (SCR) Phase 1 operations on future air quality conditions at the regional (mesoscale) and local (microscale) levels. Section 6.1 defines the resource area, presents the regulatory context of the chapter and summarizes the requirements of the Secretary's Certificate on the Notice of Project Change (NPC). Section 6.2 presents the existing conditions in the Phase 1 Study Area. Section 6.3 describes the methodology used to conduct the air quality analysis. Section 6.4 presents the results of the analyses and demonstrates the Project's compliance with applicable regulatory standards. Finally, Section 6.5 reviews the potential temporary construction impacts and related mitigation.

6.1.1 Resource Definition

Air quality refers to the ambient concentration of air pollutants in the atmosphere. Ambient air is generally defined to mean the portion of the atmosphere, external to buildings, to which the public has access. Air pollutants are substances (naturally occurring or human-generated) that can have adverse effects on human health and/or natural resources. Of special concern are the respiratory effects of pollutants, as described in Section 6.2.1 below.

6.1.2 Regulatory Context

The U.S. Environmental Protection Agency (EPA) is responsible for establishing the National Ambient Air Quality Standards (NAAQS), enforcing the Clean Air Act (CAA), and regulating transportation-related emission sources, such as aircraft, ships, and certain types of locomotives. The EPA also establishes vehicular emission standards applicable to on-road vehicles and certain kinds of non-road vehicles and equipment.

Clean Air Act and General Conformity Rule

The CAA defines nonattainment areas as geographic regions designated as not meeting one or more of the NAAQS. It requires that a state implementation plan (SIP) be prepared for each nonattainment area, and a maintenance plan be prepared for each former nonattainment area that has subsequently demonstrated compliance with the standards (Bristol and Plymouth Counties are former nonattainment areas). A SIP is a compilation of a state's air quality control plans and rules, approved by EPA. Section 176(c) of the CAA provides that federal agencies cannot engage, support, or provide financial assistance for licensing, permitting, or approving any project unless the Project conforms to the applicable SIP. The state and EPA's goals are to eliminate or reduce the severity and number of violations of the NAAQS and to achieve expeditious attainment of these standards.

Pursuant to CAA Section 176(c) requirements, EPA promulgated Title 40 of the Code of Federal Regulations Part 51 (40 CFR 51) Subpart W and 40 CFR Part 93, Subpart B, Determining Conformity of General Federal Actions to State or Federal Implementation Plans[1]. These regulations, commonly referred to as the General Conformity Rule, apply to all federal actions except for those federal actions which are excluded from review (e.g. project's not of air quality concern) or related to transportation plans, programs, and projects under Title 23 U.S. Code or the Federal Transit Act, which are subject to Transportation Conformity. The General Conformity Rule typically applies to all federal actions not addressed by the Transportation Conformity Rule. The primary federal approvals required for the Project are the National Environmental Policy Act (NEPA) Record of Decision and permits from the U.S. Army Corps of Engineers (USACE). Therefore, Transportation Conformity does not apply and the applicable conformity regulation is the General Conformity Rule.

The General Conformity Rule is used to determine if federal actions meet the requirements of the CAA and the applicable SIP by ensuring that air emissions related to the action do not:

- Cause or contribute to new violations of a NAAQS.
- Increase the frequency or severity of any existing violation of a NAAQS.
- Delay timely attainment of a NAAQS or interim emission reduction.

A conformity determination under the General Conformity Rule is required if the federal agency determines: the action will occur in a nonattainment or maintenance area; that one or more specific exemptions do not apply to the action; the action is not included in the federal agency's "presumed to conform" list; the emissions from the proposed action are not within the approved emissions budget for an applicable facility; and the total direct and indirect emissions of a pollutant (or its precursors), are at or above the *de minimis* levels established in the General Conformity regulations (75 FR 17255).

The General Conformity Rule defines direct emissions as "caused or initiated by the Federal action and originate in a nonattainment or maintenance area and occur at the same time and place as the action and are reasonably foreseeable." Indirect emissions are defined as emissions of a criteria pollutant or its precursors:

- That are caused or initiated by the Federal action and originate in the same nonattainment or maintenance area but occur at a different time or place as the action;
- That are reasonably foreseeable;

1 58 Federal Register [FR] 63214, [November 30, 1993], as amended, 75 FR 17253 [April 5, 2010]

- That the agency can practically control; and
- For which the agency has continuing program responsibility.

For the purposes of this definition of indirect emissions, even if a federal licensing, rulemaking or other approving action is a required initial step for a subsequent activity that causes emissions, such initial steps do not mean that a federal agency can practically control any resulting emissions (40 CFR 93.152). For the SCR Project, the USACE Section 404 permit decision may cause temporary construction emissions that will need to be considered under General Conformity. However, the long-term locomotive emissions will not be subject to General Conformity requirements because USACE will have no way of controlling the emissions nor any continuing program responsibility over commuter rail operations.

Global Warming Solutions Act of 2008 (GWSA)

The Commonwealth of Massachusetts and MassDOT are committed to reducing greenhouse gas (GHG) emissions, which contribute to global climate change. The Commonwealth's Global Warming Solutions Act, signed into law in 2008, set enforceable goals of reducing GHG emissions by 25 percent below 1990 levels by 2020, and 80 percent below 1990 levels by 2050. In January 2015, the Massachusetts Department of Environmental Protection (MassDEP) promulgated 310 CMR 60.05: Global Warming Solutions Act Requirements for the Transportation Sector and the Massachusetts Department of Transportation (the "GreenDOT Regulation"). This regulation places a range of obligations on MassDOT and Metropolitan Planning Organizations (MPO) to further the achievement of the Commonwealth's climate change goals through the programming of transportation funds. The SCR Project is helping to meet the GWSA goals by providing a transit option that reduces the overall greenhouse gas emissions related to mobile sources (motor vehicles) in the region. (details provided in Section 6.4.3).

Executive Order 569

Executive Order 569: Establishing an Integrated Climate Change Strategy for the Commonwealth (EO 569) lays out a comprehensive approach to further reduce greenhouse gas emissions, safeguard residents, municipalities and businesses from the impacts of climate change, and build a more resilient Commonwealth. EO 569 represents the collaboration between the Office of the Governor, the Executive Office of Energy and Environmental Affairs, the Executive Office of Public Safety and Security, and key state, local and environmental stakeholders.

EO 569 ensures that Massachusetts will continue to lead by example and collaborate across state government to reduce greenhouse gas emissions and improve resiliency within government operations. EO 569 also directs the Executive Offices of Energy and Environmental Affairs and Public Safety and Security to lead the development and implementation of a statewide comprehensive climate adaptation plan that will provide a blueprint for protecting the built and natural environment of the Commonwealth, based on the best available data on existing and projected climate change impacts. Additionally, each Executive Office within the Administration is required to designate a Climate Change Coordinator who will work to complete a vulnerability assessment for each office, and assist with implementation and coordination of adaptation and mitigation efforts across state government.

GreenDOT Policy

GreenDOT is MassDOT's sustainability initiative, announced through a Policy Directive in June 2010. The GreenDOT Implementation Plan serves as the framework for embedding the sustainability principles of GreenDOT into MassDOT's core business practices. GreenDOT is intended to fulfill the requirements of several state laws, regulations, Executive Orders, and MassDOT policies, including the Global Warming Solutions Act, the Green Communities Act, the Healthy Transportation Compact, and Leading by Example Executive Order.

Through the GreenDOT Policy, MassDOT promotes sustainable economic development; protects the natural environment; and enhances the quality of life of the Commonwealth's residents and visitors. The GreenDOT initiative has three primary objectives:

- Reduce greenhouse gas emissions.
- Promote healthy transportation options including walking, bicycling, and public transit.
- Support smart growth development.

The SCR Project will help reduce greenhouse gas emissions by:

- Providing new transit options that will result in reduced vehicle miles traveled (VMT), which will in turn result in decreased GHG emissions;
- Incorporating anti-idling technology for commuter rail trains;
- Installing electric vehicle charging stations at commuter rail stations; and
- Specifying energy efficient light-emitting diode (LED) lighting at commuter rail stations.

For more information on greenhouse gas reduction measures, see Section 6.4.3.

Healthy Transportation

On September 9, 2013, MassDOT released its Healthy Transportation Policy Directive, which formalized its commitment to the implementation and maintenance of transportation networks that serve all mode choices for its customers. To further MassDOT's GreenDOT Implementation Plan, the Commonwealth's Healthy Transportation Compact, and the statewide Mode Shift Goal, the Healthy Transportation Policy Directive was issued to ensure all MassDOT projects are designed and implemented in a way that all customers have access to safe, comfortable, and healthy transportation options at all MassDOT facilities and in all the services it provides. Healthy Transportation modes as defined by GreenDOT are walking, bicycling and taking transit. The SCR Project complies with the directive by providing a new accessible transit service to the South Coast region of Massachusetts, which is also being designed to improve bicycle and pedestrian access.

6.1.3 Requirements of Certificate

The Certificate on the NPC issued by the Secretary of the EEA on May 26, 2017[2] identified the following to be addressed in the evaluation of air quality impacts:

- A mesoscale analysis of VOC, NO_X, CO_2, CO, $PM_{2.5}$, and PM_{10} associated with Phase 1;
- Evaluation of air quality and GHG effects of rail transit on freight service – possible shift from freight lines to roadways resulting in increased truck traffic;
- Describe compliance with CAA and NAAQS;
- A microscale analysis of CO, PM_{10}, and $PM_{2.5}$ for hotspot locations that includes vehicles and locomotives around stations and layover facilities where idling emissions will occur;
- Describe how Phase 1 will meet federal locomotive standards;
- Provide air quality mitigation measures for construction and operations;
- Analyze Greenhouse Gas (CO_2) emissions in accordance with MEPA’s policy; and
- Discuss the Project within the context of the GWSA, Executive Order 569: Establishing an Integrated Climate Change Strategy for the Commonwealth (EO 569) and the MassDOT GreenDOT Policy.

2 Massachusetts Executive Office of Energy and Environmental Affairs. Certificate of the Secretary of Energy and Environmental Affairs on the Notice of Project Change. EEA Number 14346. May 26 ,2017.

6.2 Affected Environment

6.2.1 Pollutants of Concern and Attainment Status

Carbon Monoxide

Carbon monoxide (CO) is a colorless and odorless gas that is a product of incomplete combustion. Carbon monoxide is absorbed by the lungs and reacts with hemoglobin to reduce the oxygen carrying capacity of the blood. At low concentrations, CO has been shown to aggravate the symptoms of cardiovascular disease. It can cause headaches and nausea and, at sustained high concentration levels, can lead to coma and death.

Proposed projects that are in CO non-attainment or maintenance areas are required to evaluate their impact on CO concentrations and the NAAQS. The proposed Phase 1 operations are in Bristol and Plymouth Counties. These counties are in attainment of the air quality standards for CO. As such, a microscale CO analysis is not required under General Conformity, but was conducted for NEPA purposes to better understand the potential effects of the Project on air quality.

Particulate Matter

Particulate matter (PM) is made up of small solid particles and liquid droplets. PM_{10} refers to particulate matter with a nominal aerodynamic diameter of 10 micrometers or less, and $PM_{2.5}$ refers to particulate matter with an aerodynamic diameter of 2.5 micrometers or less. Particulates can enter the body through the respiratory system. Particulates over 10 micrometers in size are generally captured in the nose and throat and are readily expelled from the body. Particles smaller than 10 micrometers, and especially particles smaller than 2.5 micrometers, can reach the air ducts (bronchi) and the air sacs (alveoli) in the lungs. Particulates are associated with increased incidence of respiratory diseases, cardiopulmonary disease, and cancer.

Bristol and Plymouth counties are in attainment of the PM standards. A microscale PM analysis is not required under General Conformity because the Project is not in a nonattainment or maintenance area, but was conducted for NEPA purposes to better understand the potential effects of the Project on air quality.

Ozone

Ozone is a strong oxidizer and an irritant that affects the lung tissues and respiratory functions. Exposure to ozone can impair the ability to perform physical exercise, can result in tightness in the chest, coughing, and wheezing, and can ultimately result in asthma, bronchitis, and emphysema.

The Commonwealth has been divided into two attainment/nonattainment areas, Eastern and Western Massachusetts. On June 15, 2005, the EPA revoked the 1-hour ozone standard for most areas in the country and the 8-hour ozone (1997) was revoked in 2008. The SCR Phase 1 operations are in the

Bristol and Plymouth Counties which are in maintenance areas for the 1-hour and 8-hour revoked standards and in attainment for the 8-hour (2008) standard. In 2015, EPA promulgated a stricter 8-hour standard of 0.070 ppm. Massachusetts has recommended that all counties in the commonwealth be classified as attainment areas for the standard, however the official designation from EPA is still forthcoming. Therefore, the air quality analysis calculated emission inventories of the two pollutants that contribute to the violation of the Ozone NAAQS from mobile sources-VOC and NO_X.

Volatile Organic Compounds

Volatile organic compounds (VOC) are a general class of compounds containing hydrogen and carbon and are a precursor to the formation of the pollutant ozone. While concentrations of VOC in the atmosphere are not generally measured, ground-level ozone is measured and used to assess potential health effects. Emissions of VOC and nitrogen oxides (NO_X) react in the presence of heat and sunlight to form ozone in the atmosphere. Accordingly, ozone is regulated as a regional pollutant and not assessed as part of microscale air quality analysis. VOC emissions inventories are regulated by emission budgets in the SIP. A project can show that its VOC emissions are minor by comparing these emissions to the General Conformity *de minimis* limits.

Nitrogen Oxides

When combustion temperatures are extremely high, as in automobile engines, atmospheric nitrogen gas may combine with oxygen gas to form various oxides of nitrogen. Of these, nitric oxide (NO) and nitrogen dioxide (NO_2) are the most significant air pollutants. This group of pollutants is generally referred to as nitrogen oxides or NO_X. Nitric oxide is relatively harmless to humans but quickly converts to NO_2. Nitrogen dioxide has been found to be a lung irritant and can lead to respiratory illnesses. Nitrogen oxides, along with VOC, are also precursors to ozone formation. NO_X emissions inventories are regulated by emission budgets in the SIP. A project can show that its NO_X emissions are minor by comparing these emissions to the General Conformity *de minimis* limits.

Carbon Dioxide

GHGs are essential to maintaining the temperature of the Earth; without them the planet would be so cold as to be uninhabitable. The earth's climate is predicted to change over time, in part because human activities are altering the chemical composition of the atmosphere through the buildup of GHGs. Climate change is having and will continue to have wide ranging impacts on water, energy, transportation, agriculture, ecosystems, and health. While there are other GHGs, carbon dioxide (CO_2) is the predominant contributor to climate change, and emissions can be calculated for CO_2 with readily accessible data.

EEA issued a policy and protocol for evaluating GHG emissions from proposed projects with emphasis on CO_2 emissions. This policy requires that projects requiring an EIR quantify greenhouse gas emissions generated by the Project and identify measures to reduce or minimize these impacts.

To date, no national standards or thresholds for greenhouse gas emissions applicable to transit projects have been established. EPA has identified certain greenhouse gases as pollutants under the

Clean Air Act and regulatory actions to date have included emissions standards for motor vehicles, fuel standards, and carbon pollution standards for new power plants, among other actions.

On August 1, 2016, the Council on Environmental Quality issued "Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews." The Final Guidance addresses when and how to evaluate both the greenhouse gas emissions from proposed actions and the potential impacts of climate change on proposed actions. However, this guidance has been rescinded as of March 28, 2017 per Presidential Executive Order 13783.[3]

6.2.2 Air Quality Standards

The EPA has set the primary NAAQS to protect public health. Secondary standards set limits to protect public welfare, including protection against visibility impairment, damage to animals, crops, vegetation, and buildings. Table 6-1 outlines the primary and secondary NAAQS for all the criteria pollutants. The predominant source of pollution anticipated from the alternatives under consideration is emissions from project-related motor vehicle traffic. CO and PM are directly emitted by motor vehicles. CO and PM concentrations can be estimated by computer modeling, which can then be compared to the NAAQS.

Table 6-1 National Ambient Air Quality Standards

Pollutant		Primary/Secondary	Averaging Time	Level	Form
Carbon Monoxide		Primary	8 hours 1 hour	9 ppm 35 ppm	Not to be exceeded more than once per year
Lead		Primary and Secondary	Rolling 3-month avg.	0.15 μg/m³	Not to be exceeded
Nitrogen Dioxide		Primary	1 hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		Primary and Secondary	1 year	53 ppb	Annual mean
Ozone		Primary and Secondary	8 hours	0.070 ppm	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particulate Matter	$PM_{2.5}$	Primary	1 year	12.0 μg/m³	Annual mean, averaged over 3 years
		Secondary	1 year	15.0 μg/m³	Annual mean, averaged over 3 years
		Primary and Secondary	24 hours	35 μg/m³	98th percentile, averaged over 3 years
	PM_{10}	Primary and Secondary	24 hours	150 μg/m³	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide		Primary	1 hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		Secondary	3 hours	0.5 ppm	Not to exceeded more than once per year

Source: https://www.epa.gov/criteria-air-pollutants/naaqs-table. Accessed: July 11, 2017.

3 Executive Order 13783, Promoting Energy Independence and Economic Growth, March 28, 2017.

6.2.3 Background Concentrations

The total concentrations that receptor locations will experience include background concentrations from other surrounding emission sources. Background concentrations are ambient pollution levels from other stationary, mobile, and area sources. MassDEP maintains an air quality monitoring network and produces annual air quality reports that include monitoring data for CO, NO_x, PM_{10}, $PM_{2.5}$ and SO_2. The closest monitoring site with data available was used in this analysis located at 659 Globe Street in Fall River, MA. Where data was unavailable at 659 Globe Street, the closest monitoring station (Harrison Avenue in Boston) was used. The background concentration values of the pollutants modeled in this air quality analysis are shown in Table 6-2.

Table 6-2 Background Concentrations

Pollutant	Averaging Time	Monitoring Location	Background Concentration
Carbon Monoxide (CO)	1-Hour[1]	Harrison Avenue, Boston	1.9 ppm
	8-Hour[1]	Harrison Avenue, Boston	1.1 ppm
Nitrogen Dioxide (NO2)	Annual[2]	Harrison Avenue, Boston	17.4 ppb
	1-Hour[3]	Harrison Avenue, Boston	51.3 ppb
Particulate Matter (PM10)	24-Hour[1]	Harrison Avenue, Boston	61 µg/m³
Particulate Matter (PM2.5)	Annual[3]	659 Globe St,Fall River	5.8 µg/m³
	24-Hour[3]	659 Globe St, Fall River	15.6 µg/m³
Sulfur Dioxide (SO2)	1-Hour[3]	659 Globe St, Fall River	28.4 ppb

1 Using the highest second-high value recorded in the three most recent years available. (2013-2015).
2 Using the highest value recorded in the three most recent years (2013-2015).
3 Using the average of the three values recorded in the past three years (2013-2015).

6.3 Methodology

The EPA and MassDEP have established guidelines that define the modeling and review criteria for local and regional air quality analyses prepared pursuant to the MEPA process. These guidelines require that a proposed project determine the change in project-related mobile source emissions. If the VOC and emissions from the Build Alternatives are greater than the No Action Alternative, then a proposed project should include all reasonable and feasible emission reduction mitigation measures. Massachusetts has incorporated this criterion into its SIP.

The EPA and MassDEP guidelines require that the air quality study utilize traffic and emissions data for existing and future (No Action and Build) conditions. The traffic and emissions data are incorporated into the EPA air quality models and modeling procedures to generate emissions estimates that demonstrate if a proposed project will have air quality impacts.

The air quality study for the SCR Project evaluated several conditions, including the 2017 Existing Condition and 2030 No Action and 2030 Phase 1 Build Alternatives. The No Action Alternative included regional background traffic growth and planned roadway improvements[4]. The Build Alternative also included the anticipated future changes in travel demand associated with Phase 1 Service. The year 2030 was selected as the future year of analysis for the microscale and mesoscale air quality assessment to be consistent with the statewide model and for consistency with the regional long-range transportation plan, and is a later date than the Phase 1 start of service. Future alternative-related emission calculations are based upon changes in traffic and emission factor data.

Traffic (volumes and speeds) and emission factor data for the No Action and Build Alternatives were developed for the microscale and mesoscale analyses. These data were incorporated into air quality models to demonstrate that the proposed Phase 1 operations will meet the CAA, NAAQS and SIP criteria. The traffic data included traffic volumes, vehicle-miles-of-travel, roadway operations, and physical roadway improvements. The emission factor data include emission reduction programs, years of analysis, and roadway speeds.

The predominant sources of air pollution anticipated from Phase 1 include emissions of CO, PM, NO_x, VOC and CO_2 from locomotive engines and from motor vehicles traveling to and from the stations. Carbon monoxide emissions are emitted predominantly by motor vehicles. PM and carbon dioxide emissions are emitted by motor vehicles and diesel engines. Locomotives and vehicles do not directly emit ozone, which is formed through a complex chemical process that occurs when ozone precursor emissions (NO_x and VOCs) react in the presence of sunlight and heat. The ozone impacts due to the Proposed Project were evaluated by assessing changes in ozone precursor emissions in the mesoscale analysis and comparing the results to the CAAA and conformity criteria.

The mesoscale analysis evaluated the regional air quality impacts of the SCR Project by determining the change in total pollutant emissions (VOC, NOx, CO_2, CO, and PM) for the existing and future conditions within the study area. The microscale analysis calculated the CO and PM concentrations for the same conditions at intersections, grade crossings, and Phase 1 stations. The impacts of CO and PM are estimated in the microscale analysis by modeling CO and PM concentrations at congested locations, typically intersections, and comparing the results to the NAAQS. The NAAQS for CO, PM, ozone, and other criteria pollutants have been set by the EPA to protect the public health. The Commonwealth of Massachusetts has adopted the same standards as those set by the EPA.

6.3.1 Mesoscale Methodology

The predominant effect on regional pollution anticipated from the proposed Phase 1 Project is emissions reductions resulting from modal travel shifts from private automobiles to rail service. The

[4] The No-Action condition evaluated in the air quality analysis assumes that the Full Build South Coast Rail project has not been completed.

mesoscale analysis uses traffic and emissions data for existing and future (No Action and Build) conditions for the Phase 1 Service.

The general modeling process to determine whether the alternatives will have air quality impacts utilized link-by-link data from the Central Transportation Planning Staff (CTPS) state wide traffic model and emission factors derived using the EPA's Motor Vehicle Emission Simulator (MOVES2014a) model.[5] The link-by-link traffic data includes daily vehicle volumes as well as free flow and congested speeds over each link. The vehicle volumes are combined with the link lengths to determine the daily VMT over the link. The VMT is then multiplied by the appropriate speed-specific emission factors to arrive at the total daily emissions for each link. The roadways included in the mesoscale study area include the roadways coded in the CTPS state-wide model and generally includes southeastern Massachusetts. The mesoscale analysis estimated the existing and future regional VOC, NO_X, CO_2, CO, and PM emissions due to the changes in average daily traffic volume, roadway characteristics, and vehicle emissions. The mesoscale analysis traffic (volumes, delays, and speeds) and emission factor data were developed for the three study conditions (Existing, 2030 No Build and 2030 Phase 1 Build).

Currently, the MBTA commuter rail locomotive fleet consists of a mix of Tier 3 and Tier 0+ diesel engines. Of the ninety locomotives owned by the MBTA for systemwide commuter rail service, forty are certified Tier 3 locomotives (the HSP-46), which are the most energy efficient locomotives in the MBTA fleet. The MBTA is in the process of creating a future fleet plan that will include procurement and/or leasing of additional Tier 3 and Tier 4 compliant locomotives to improve upon locomotive emissions through-out the system by 2030. For the purposes of this air quality analysis, the air quality modeling inputs have assumed conservatively that Phase 1 Middleborough service will consist of train sets using Tier 3 locomotives by 2030.

The number of train miles is estimated from a breakdown of track mileage by train line and community. Train mileage is a function of the train frequency data using present and proposed commuter rail schedules. Multiplying the train miles per day by the vehicular emissions per train mile yields the estimated vehicular emissions per day in southeastern Massachusetts for the appropriate pollutant.

The Travel Demand Model

Vehicle emissions in the mesoscale analysis are estimated by combining emissions factors from the emissions model and VMT from a regional transportation model. For this analysis, the VMT estimates were gathered from the Regional Travel Demand Model (RTDM) maintained by CTPS. A RTDM is a computer model used to estimate future travel behavior and travel demand across a region. These estimations are based on a multitude of factors, such as number and sizes of households, land uses,

4 MOVES2014a (Motor Vehicles Emission Simulator), November 2016, US EPA, Office of Mobile Sources, Ann Arbor, MI.

and density of development in a region. The RTDM was used to determine the amount of people switching from driving a vehicle to using the Phase 1 Interim Service for this analysis.

The RTDM includes every major highway, arterial, and collector in the study area. The centroid connectors are a proxy for the local roads. These roadways are represented as links, segments of roadways that have motor vehicles assigned to them in each alternative. Each roadway link and centroid connector has a roadway type and distance associated with it. The highway assignment process calculates how many vehicles are on each link and centroid connector and what its congested speed would be by time of day. The VMT is a function of how many vehicles are on a link and the length of that link. This parameter was calculated for every link in the model area (the regional study area for the CTPS model can be found in Appendix C, *Air Quality*.)

The emission factor for the appropriate pollutant is identified for each link and centroid connector based on the roadway type and congested speed of the link. The emission factors were held constant across analysis conditions for 2030. The emissions produced on each link and centroid connector is the product of the emission rate and the VMT. The total emissions are the sum of the pollutant for all the links in the study area by period. The four time-periods (morning, midday, evening, and overnight) are summed to arrive at an emission inventory for an average weekday in the analysis year. Observed emission changes are due to mode shifts from auto to transit, resulting in lower VMT and possibly lower congested speeds on the roadway network. Therefore, reducing VMT by diverting commuters from auto to rail should result in improvements to air quality. Additionally, the RTDM is developed conservatively, such that VMT reductions could be larger than predicted in this analysis, resulting in more emission reductions.

Motor Vehicle Emissions

EPA's Office of Transportation and Air Quality (OTAQ) introduced the Motor Vehicle Emission Simulator (MOVES) in October 2014 and released the improved MOVES2014a model in November 2015. MOVES2014a is EPA's latest motor vehicle emissions model for state and local agencies to estimate VOC, NOx, and other emissions from cars, trucks, buses, and motorcycles.

All the vehicle emission factors used in the mesoscale analysis were obtained using EPA's MOVES2014a emissions model. MOVES2014a calculates emission factors from motor vehicles in mass per distance format (often grams per mile) for existing and future conditions and applies these factors to VMT data to obtain emissions inventories. The MOVES2014a input files utilized for the analysis were coordinated with MassDEP. The emissions calculated for this air quality assessment include Tier 3 emission standards, which is an EPA program that sets new vehicle emissions standards, including lowering the sulfur content of gasoline, heavy-duty engine, and vehicle greenhouse gas regulations (2014-2018), and the second phase of light-duty vehicle GHG regulations (2017-2025). It also includes Massachusetts-specific conditions, such as the state vehicle registration age distribution and the statewide Inspection and Maintenance (I/M) Program. These stringent emissions programs often result in smaller emissions inventories with the passage of time when comparing similar scenarios. The analysis used emission factors for CO during the winter season and for VOC and NO_x emissions for the ozone season (summer).

Train Emissions

Diesel train emissions were modeled using the most recently approved EPA train emission factors and based on travel distances obtained from the anticipated service schedule. SCR Phase 1 Air Quality modeling assumed predominantly Tier 3 diesel locomotive engines, as a conservative approach to modeling the future fleet mix, with MBTA's capital plan reflecting the purchase of new engines, leading to cleaner burning engines by the design year of 2030. The Phase 1 South Coast Rail train emissions for the regional mesoscale assessment are calculated by using the EPA passenger/commuter train emission factors and the total distance between South Station and the endpoints of the Southern Triangle for each condition. The rail emissions were based on the VMT difference between the Build and No-Action scenarios, meaning the emissions represent only new Phase 1 Service and exclude the existing Middleborough/Lakeville Line. Estimates of rail emissions in the Eastern Massachusetts region are based upon the factors received by CTPS in 2009 guidance from the EPA OTAQ[6].

6.3.2 Microscale Methodology

The local/microscale analysis included assessments of air quality impacts of the Phase 1 Service at three categories of locations: intersections in the vicinity of the new stations; grade crossings; and train stations. The analysis also considers the Layover Facilities analyzed in the FEIS/FEIR in context of the Phase 1 Service. The following outlines the methodologies for each of these assessments.

Intersection Analysis

The intersection analysis evaluated the CO, $PM_{2.5}$ and PM_{10} concentrations at congested intersections within the vicinity of the Phase 1 stations. The intersections selected for microscale air quality modeling were selected based upon the procedures outlined by the EPA. These procedures recommend that the intersections be ranked by their level-of-service (LOS) and their total traffic volumes. In addition to the two new stations proposed for the Phase 1 Project, intersections around Fall River Depot were considered, as the traffic patterns at this station have changed since the FEIS/FEIR filing. Intersections in the study area were ranked based on traffic volumes and level of service.

The following intersections were selected for analysis because they were the most congested intersections in the vicinity of each station:

- Pilgrim Junction Station, Middleborough: Main Street (Route 105) at West Grove Street (Route 28)

6 Emission Factors for Locomotives. United States Environmental Protection Agency, Office of Transportation and Air Quality, EPA-420-F-09-025 April 2009.

- East Taunton Station, Taunton: Route 140 at the Route 24 Southbound Ramps
- Fall River Depot Station, Fall River: North Main Street at President Avenue

The impacts of the Phase 1 Project on the nearest residences were assessed for CO and PM emissions to determine whether the emissions comply with the applicable NAAQS.

The microscale analysis calculated maximum 1-hour and 8-hour CO concentrations, the 24-hour and annual $PM_{2.5}$ concentrations, and the 24-hour PM_{10} concentrations. The EPA's computer model AERMOD[7] was used to predict CO and PM concentrations at receptor locations for each intersection. All modeling was conducted in compliance with the relevant EPA Guidance for hotspot analysis[8,9,10]. The receptor locations modeled were located at sidewalks, homes, and locations where the public may have access. Receptors were placed at the edge of the roadway, but not closer than 10 feet (3 meters) from the nearest travel lane, so that they were not within the roadway "mixing cell" (the area within the roadway corridor which is subject to mixing and turbulence caused by the passage of vehicles). The results calculated at these receptor locations represent the highest concentrations at each intersection. Receptor locations farther away from the intersections will have lower concentrations because of CO and PM dispersion characteristics. The receptor locations that are along the major roadways in the study area are also expected to have lower CO and PM concentrations than intersection receptors. The reason for this is that emission rates for vehicles traveling along these roadways are much lower than the emission rates for vehicles queuing/idling at intersections, with stop-and-go traffic.

Vehicular Emission Factors

The vehicle emission factors used in the microscale and mesoscale (discussed earlier in Section 6.3.1) analysis were obtained using the EPA's MOVES2014a model, which calculates emission factors from motor vehicles in grams per vehicle mile or grams per hour for existing and future conditions. The emission rates calculated in this air quality study are adjusted by the model to reflect Massachusetts-specific conditions such as the vehicle age distribution, the statewide Inspection and Maintenance (I/M) Program, and the Stage II Vapor Recovery System based on inputs provided by MassDEP. PM emission factors for the analysis were determined for the four seasons of the year (winter,

7 AERMOD, The American Meteorological Society/Environmental Protection Agency Regulatory Model. Version 16216r.

8 "Guideline for Modeling Carbon Monoxide from Roadway Intersections", US Environmental Protection Agency. EPA-454/R-92-005. November 1992.

9 "Using MOVES2014 in Project-Level Carbon Monoxide Analyses" US Environmental Protection Agency. EPA-420-B-15-028. March 2015.

10 "Transportation Conformity Guidance for Quantitative Hot-spot Analyses in PM2.5 and PM10 Nonattainment and Maintenance Areas." US Environmental Protection Agency. EPA-420-B-15-084. November 2015.

spring, summer, and fall) and for four times of day (morning, midday, evening, and overnight). The CO emission factors were determined by conservatively using winter season temperatures in the morning.

Grade-Crossing Analysis

Each of the five grade crossings proposed as part of the Phase 1 Service were assessed for possible air quality impacts in the build condition. The air quality impacts considered were the emissions from a passing train and the emissions from motor vehicles waiting at the grade crossing. The grade-crossing locations within the Phase 1 Study Area are:

- Leonard Street, south of Taunton Street
- North Precinct Street, south of Taunton Street
- Old Colony Avenue, south of Taunton River
- Middleboro Avenue, east of Leisure Lane
- County Road (Route 140), northwest of Industrial Drive

The methodology used to model pollutant concentrations during a passing train at a grade crossing largely mirrors the methodology used at roadway intersections. The primary differences are that all vehicles at the grade crossing are assumed to idle for the entire time the train is passing and the addition of emissions from the train. AERMOD modeling was used to assess the combined air quality impacts of the vehicles idling at the crossing with the locomotives passing the grade crossing. Traffic parameters such as vehicle volumes and queue lengths were obtained from the transportation analysis (see Chapter 5, *Traffic and Transportation*). Consistent with the transportation analysis, the modeling assumed that four trains pass through the grade crossings (two in each direction) and each passing occurs evenly spaced throughout the peak hour. Vehicular emission factors were obtained using the methodology outlined above in the Intersection Analysis. The results of the CO and PM emissions are compared to the NAAQS to ensure no standards are being exceeded.

<u>Train Emission Factors</u>

The diesel trains travelling through the grade crossings would result in additional CO and PM emissions. These diesel train emissions were accounted for by adding the train line-haul area sources in the AERMOD model along the rail. Diesel locomotive emission factors were based on EPA guidance.[11] As a result, the air quality modeling for the grade crossings for the Phase 1 Project represent the total air quality impacts (including motor vehicles and trains) expected at each grade crossing.

11 *Emission Factors for Locomotives United States Environmental Protection Agency*, Office of Transportation and Air Quality, EPA-420-F-09-025 April 2009.

Train Station Analysis

An air quality analysis of the diesel train operations within the vicinity of the Phase 1 stations was conducted to model trains idling within the stations. The pollutants that were assessed include CO, PM and NO_2. The analysis was based on the proposed operations schedule and station parameters used in the operations analysis. The emission factors for the trains stopping at the stations for each pollutant were based on the EPA's locomotive emission factors included in *EPA Locomotive Emissions*, as described further below.[12] EPA's atmospheric model AERMOD was used to model locomotive emissions at the stations. The model incorporated meteorological data, source emission data, stack geometry, and detailed surrounding land use and topography.

For the two Phase 1 stations (Middleborough and East Taunton), the analysis of each receptor was based on trains idling in the station. Other stations associated with SCR were analyzed in the FEIS/FEIR. The train emission source was analyzed by treating the locomotive idling at the station as a point source in the AERMOD model, located at the heads of the platforms. The emission factors used for the train idling were the "Switch" emissions factors which are the closest locomotive emission factors for "idling" available in the EPA guidelines. The number of trains using the stations in the peak hour was based on the estimated rail schedules and grade crossing analysis.

Currently, the MBTA commuter rail locomotive fleet consists of a mix of Tier 3 and Tier 0+ diesel engines. Of the ninety locomotives owned by the MBTA for systemwide commuter rail service, forty are certified Tier 3 locomotives (the HSP-46), which are the most energy efficient locomotives in the MBTA fleet. The MBTA is in the process of creating a future fleet plan that will include procurement and/or leasing of additional Tier 3 and Tier 4 compliant locomotives to improve upon locomotive emissions through- out the system by 2030. For the purposes of this air quality analysis, the air quality modeling inputs have assumed conservatively that Phase 1 Middleborough service will consist of train sets using Tier 3 locomotives by 2030. The fleet planning effort currently being conducted by the MBTA is part of the overall operational and capital planning exercise aimed at improving operational efficiencies and reducing air quality impacts system wide by implementing the most cost effective and timely improvements to the fleet.

Layover Facilities Analysis

Layover facilities are open-air storage areas for the trains when out of service. There are some electrical requirements for each layover facility but the emissions related to the minimal electrical requirements are considered negligible. During the Phase 1 Service, diesel locomotives will idle at the layover facilities and emit pollutants. Locomotive idling at Layover Facilities is limited by law to no more than 30 minutes[13]. Diesel train emissions at the Layover Facilities were analyzed in the FEIS/FEIR. The locations of these facilities have not changed since the FEIS/FEIR analysis. Therefore, the analysis of

12 Ibid.
13 310 CMR 7.11

the diesel emissions at Layover Facilities is valid for the Phase 1 Service and the use of these facilities during Phase 1 Service will comply with the NAAQS. The analysis of diesel locomotive emissions at the Layover Facilities was presented in Section 4.9.3.8 of the FEIS/FEIR.

6.3.3 Stationary Source Methodology

An air quality stationary source analysis was not conducted for the stations because there are no buildings proposed as part of the stations in Phase 1. The stations will only include a platform. East Taunton Station as proposed will include an emergency generator. However, direct emissions from fuel combustion are expected to be negligible at the stations apart from the idling trains that are considered in Section 6.3.2.

6.3.4 Greenhouse Gas Methodology

EEA has established a GHG emissions policy, which requires proponents of projects undergoing MEPA review quantify greenhouse gas emissions and identify measures to avoid, minimize, and mitigate those emissions. MEPA has developed procedures and guidelines for implementing this policy, which was originally released in 2007. The most recent version of the policy was released in 2010 with an effective date of May 5, 2010.

The MEPA Certificate for the SCR Project called for GHG modeling of direct and indirect sources. These sources include motor vehicles, buses, diesel trains and stations in Phase 1. The Smart Growth scenario analyzed in Chapter 13 is primarily anticipated to affect the GHG emissions caused by motor vehicles, which will be affected by implementing smart growth and transit-oriented development policies. Smart Growth programs include other "green" policies and goals in addition to transportation improvements, including building energy efficiency, travel behavior changes, etc. The development patterns associated with the Smart Growth programs, such as Transit Oriented Development near new or existing transit stations may result in different (higher) building densities, and other characteristics, thereby potentially resulting in different GHG reduction benefits, including those recognized by the State under the GWSA.

Modeling

Mesoscale mobile source emissions were calculated for all the major transportation modes in eastern Massachusetts for different years. The modes consist of on-road vehicles such as autos, trucks, and commuter rail. The methodology being used for the SCR Project is the same one that is used for the Federal Certification Activities conducted by the Metropolitan Boston Planning Organization (Boston Region MPO). This methodology has been used in the Regional Metropolitan Transportation Planning process, Air Quality Conformity Determination, and numerous other highway and transit projects.

The analysis methodology for modeling GHG emissions is similar to the mesoscale methodology outlined in Section 6.3.1. Mobile vehicle emissions were modeled using EPA's MOVES2014a emission factor model and CTPS's regional travel demand model. This was conducted for existing conditions and No Action and Build alternatives. Train emission factors for GHG were developed using EPA guidance for commuter/passenger trains. Using the CO_2 emission factor provided by the EPA, the total emissions for the alternative for the years 2017 and 2030 were calculated.

To have a net reduction in greenhouse gas emissions, a build alternative would have to divert automobile travel to transit to a degree that the reduction in motor vehicle emissions from automobiles would more than offset the increase resulting from the alternative's CO_2 emissions. The extent to which build alternatives would reduce greenhouse gas emissions associated with vehicular travel depends on the estimated diversion of the use of motor vehicles to transit. This "mode-shift" from motor vehicles to transit results in reductions of VMT, which reduces motor vehicle emissions. It also contributes to reduction in traffic congestion, which can also reduce vehicular emissions due to lower emission rates associated with improved traffic flow, rather than stop-and-go conditions.

6.4 Environmental Consequences

6.4.1 Mesoscale Analysis

The objective of the mesoscale analysis is to estimate the change in area-wide emissions of VOC, NO_X, CO, and PM emissions during a typical day and CO_2 emissions during the entire year resulting from implementing the proposed Phase 1 Service. The daily area-wide emissions are presented in kilograms per day to be consistent with conformity criteria and SIP budgets and in terms of tons per year to be consistent with Massachusetts GHG policy. The air quality study uses traffic data (volumes, delays, and speeds) developed for each condition analyzed. Vehicle speeds are developed based upon traffic volumes, observed traffic flow characteristics, and roadway capacity. Using EPA recommended air quality modeling techniques, total pollutant emissions are calculated for the No Action Alternative and the Build Alternative. The mesoscale analysis considers the 2030 mobile source emissions from the major roadways in the study area as well as train emissions.

The No Action Alternative VOC and NO_X emissions are typically lower than the Existing Conditions emissions due to the implementation of state and federal emission control programs and the Massachusetts Inspection and Maintenance program.

Table 6-3 and Table 6-4 present the mesoscale analysis results for the Phase 1 Service. Table 6-3 presents a summary of the Existing, 2030 No Action and 2030 Build mesoscale results. The 2030 Build includes the regional motor vehicles emissions projected under the 2030 No Action scenario plus the emissions from both motor vehicles and trains resulting from the Middleborough Phase 1 Project. A more detailed breakdown of train and motor vehicles emissions is presented in Table 6-4. The analysis assumes using predominantly Tier 3 locomotives in the design year (2030). For informational purposes, the results of a mesoscale analysis assuming a fleet of Tier 4 locomotives is also presented.

The Phase 1 Project will reduce emissions of CO, VOC, and CO_2. For $PM_{2.5}$ and PM_{10}, the train emissions generally offset the motor vehicle emissions. The additional rail service will result in increased regional NO_X emissions, as the NO_X emissions of the locomotives are substantially larger than the NO_X reductions of the diverted motor vehicles. Use of Tier 4 locomotives would result in additional emissions reductions, particularly in PM emissions. The Phase 1 Project is expected to reduce CO by 64 kg/day, VOC by 1-2 kg/day, $PM_{2.5}$ and PM_{10} by less than 1 kg/day, and CO_2 by 7,121 short tons per year. Phase 1 is expected to increase NO_X emissions by between 5 and 26 kg/day because the increased train emissions offset the reduction in motor vehicle emissions, but is still well under the *de minimis* General Conformity levels. Overall, the Project's impact on air quality throughout the region is relatively minor and could be eliminated completely should VMT be reduced beyond the traffic model predictions.

Table 6-3 Mesoscale Mobile Source Analysis Results

Scenario	**CO (kg/day)**	**VOC (kg/day)**	**NO_X (kg/day)**	**$PM_{2.5}$ (kg/day)**	**PM_{10} (kg/day)**	**CO_2 (short tons/year)[1]**
2017 Existing[2]	103,715	1,079	13,926	676	752	6,740,796
2030 No Action[2]	33,823	480	1,802	640	187	3,021,207
2030 Build (Tier 3 locomotives)[3]	33,759	479	1,828	640	187	3,014,086
2030 Build (Tier 4 locomotives) [3]	33,759	478	1,807	639	187	3,014,086
Phase 1 Effects (Tier 2/3 locomotives)[4]	**-64**	**-1**	**26**	**0 (-0.05)**	**0 (0.06)**	**-7,121**
Phase 1 Effects (Tier 4 locomotives)[4]	**-64**	**-2**	**5**	**-1 (-0.9)**	**0 (-0.2)**	**-7,121**

1 The CO_2 emissions were calculated assuming an annualization factor of 365 days/year.

2 The Existing and No Action emissions represent the regional motor vehicles emissions (The regional study area consists of the southeast Massachusetts area -Figure presented in Appendix C, *Air Quality*)

3 The 2030 Build includes the No Action plus Middleborough Phase 1 Project emissions including resulting emissions from both motor vehicles and trains. The breakdown of train and motor vehicles emissions is presented in Table 6-4. SCR Phase 1 Air Quality modeling assumed predominantly Tier 3 diesel locomotive engines, as a conservative approach to modeling the future fleet mix, with MBTA's capital plan reflecting the purchase of new engines, leading to cleaner burning engines by the design year of 2030. A mesoscale analysis with Tier 4 locomotives is presented for informational purposes.

4 Calculated by subtracting the No Action from the Build Scenario: (XX) = actual difference if not rounded)

Table 6-4 Mesoscale Mobile Source Analysis Results: Phase 1 Transit and Auto Emissions

Scenario	Vehicle Miles Travelled (VMT in mi/day)	CO (kg/day)	VOC (kg/day)	NO_X (kg/day)	$PM_{2.5}$ (kg/day)	PM_{10} (kg/day)	CO_2 (short tons/year)[1]
2030 Build (Tier 3)[2]							
Transit	714	12	0.9	31	1.0	0.3	2,290
Auto	42,296,600	33,747	478	1,797	639	187	3,011,797
Total	42,297,314	33,759	479	1,828	640	187	3,014,086
2030 Build (Tier 4) [2]							
Transit	714	12	0.4	9	0.1	0.03	2,290
Auto	42,296,600	33,747	478	1,798	639	187	3,011,797
Total	42,297,314	33,759	478	1,807	639	187	3,014,086

1 The CO_2 emissions were calculated assuming an annualization factor of 365 days/year.

2 The 2030 Build includes the No Action plus Middleborough Phase 1 Project emissions including resulting emissions from both motor vehicles and trains. The breakdown of train and motor vehicles emissions is presented in Table 6-4. SCR Phase 1 Air Quality modeling assumed predominantly Tier 3 diesel locomotive engines, as a conservative approach to modeling the future fleet mix, with MBTA's capital plan reflecting the purchase of new engines, leading to cleaner burning engines by the design year of 2030. A mesoscale analysis with Tier 4 locomotives is presented for informational purposes.

Mesoscale Analysis Results

The results of the mesoscale show that Phase 1 Service will comply with General Conformity and the SIP by reducing the emissions of CO and VOC. The increased train operations will slightly increase the emissions of NO_X in the region, but emissions are well below the *de minimis* criteria, indicating that this pollutant also complies with General Conformity. The *de minimis* criteria for this project (ozone maintenance area in an ozone transport region) are as follows:

- VOC- 50 tons/year
- NO_X- 100 tons/year

The increase in NO_X of 26 kg/day (or 11 tons/year) for the Phase 1 Project is associated with the Tier 3 locomotive analysis. Tier 4 emissions standards result in a 70 percent decrease in NO_X emissions over Tier 3 and a 5 kg/day (or 2 tons/year) increase.

6.4.2 Microscale Analysis

Intersection Analysis

This section evaluates the potential air quality impacts of motor vehicle emissions on receptor locations adjacent to the intersections affected by rail users driving to and from the train stations. The intersections chosen for analysis at the two Phase 1 stations (Middleborough and Taunton) and the revised Fall River Junction Station represent the worst-case scenarios for the respective traffic network. These intersections operate poorly, with large delays and high traffic volumes. It is expected that, if these worst-case intersections comply with the NAAQS criteria, all other intersections in the study areas will comply with the NAAQS.

As motor vehicles are primary source of air pollution at these intersections, the analysis estimated the concentrations of CO, PM_{10}, and $PM_{2.5}$. The intersections were modeled under the Existing, No Action, and Phase 1 Build Conditions. Pollutant concentrations in the No Action and Build Conditions are lower than the Existing Condition because vehicle emission factors are smaller due to stricter regulation with the passage of time. Receptors were placed in locations where the public may have access. The receptor grids were generally in 25-meter increments and placed about 2 meters off the ground, both as recommended by EPA hotspot guidance[14].

Table 6-5, Table 6-6 and Table 6-7 summarize the analysis results for the intersections studied at the three stations. These tables present the Existing, No Action, and Build results, respectively. Figure 6-1 shows the receptor quadrant labeling used at each intersection in the microscale air quality study area. With the Project in operation, the maximum 1-hour CO concentration is 2.3 ppm, while maximum 8-hour concentration is 1.3 ppm. The maximum 24-hour PM_{10} concentration is 69.6 $\mu g/m^3$. The maximum 24-hour $PM_{2.5}$ concentration is 17.0 $\mu g/m^3$ while the annual concentration is 6.4 $\mu g/m^3$. Pollutant concentrations in the No Action Condition are less than those in the Existing Condition as motor vehicle emission rates decrease with time due to increasingly stringent emission regulations. Under all conditions, the pollutant concentrations for the intersections are well below the NAAQS criteria (presented in Table 6-1). CO, PM_{10}, and $PM_{2.5}$ concentrations for the 2030 design year show no adverse effect from the Phase 1 Service and are a slight improvement over existing conditions.

[14] "Guideline for Modeling Carbon Monoxide from Roadway Intersections", US Environmental Protection Agency. EPA-454/R-92-005. November 1992.

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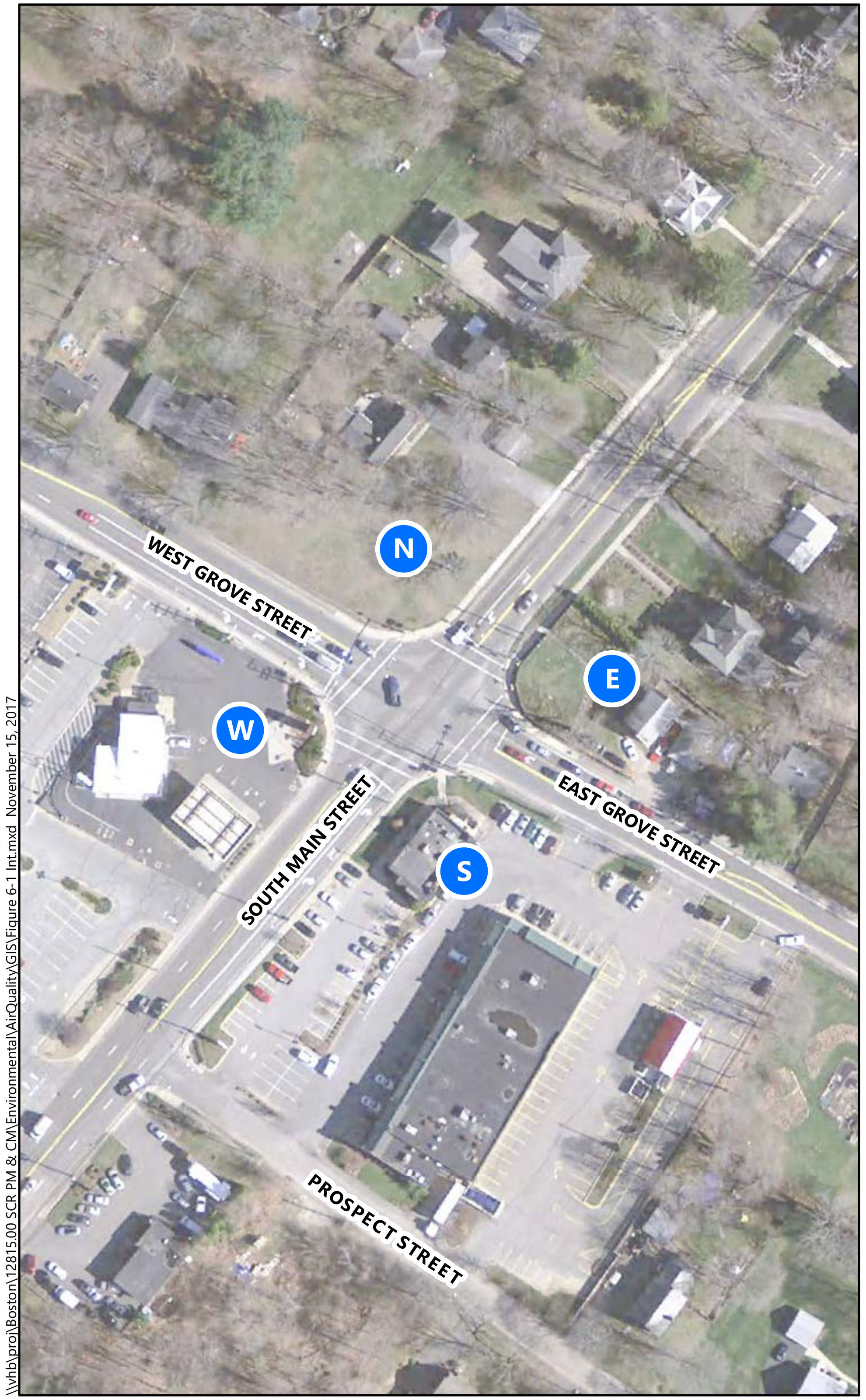
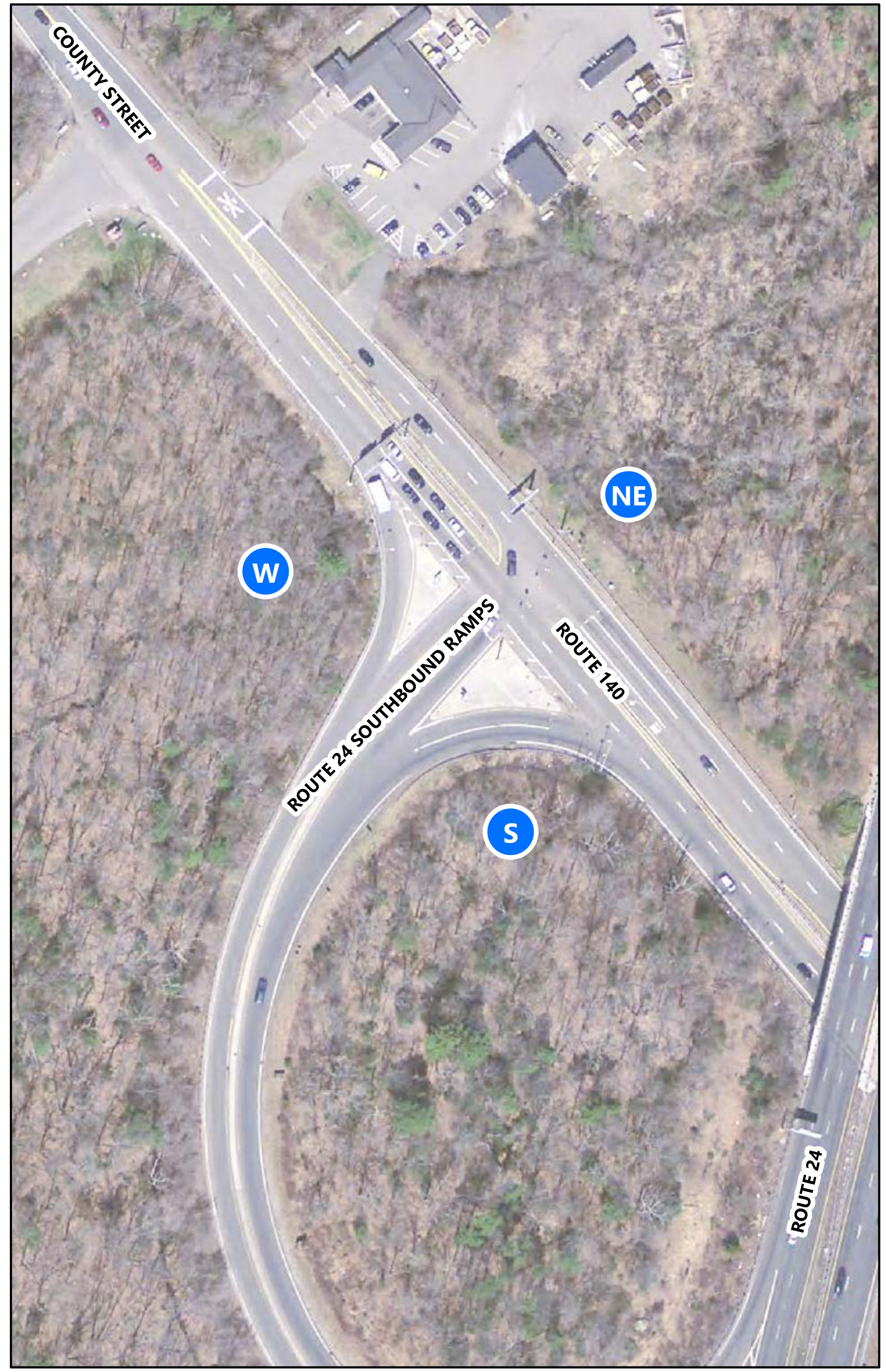
SOUTH COAST RAIL

Massachusetts Bay Transportation Authority

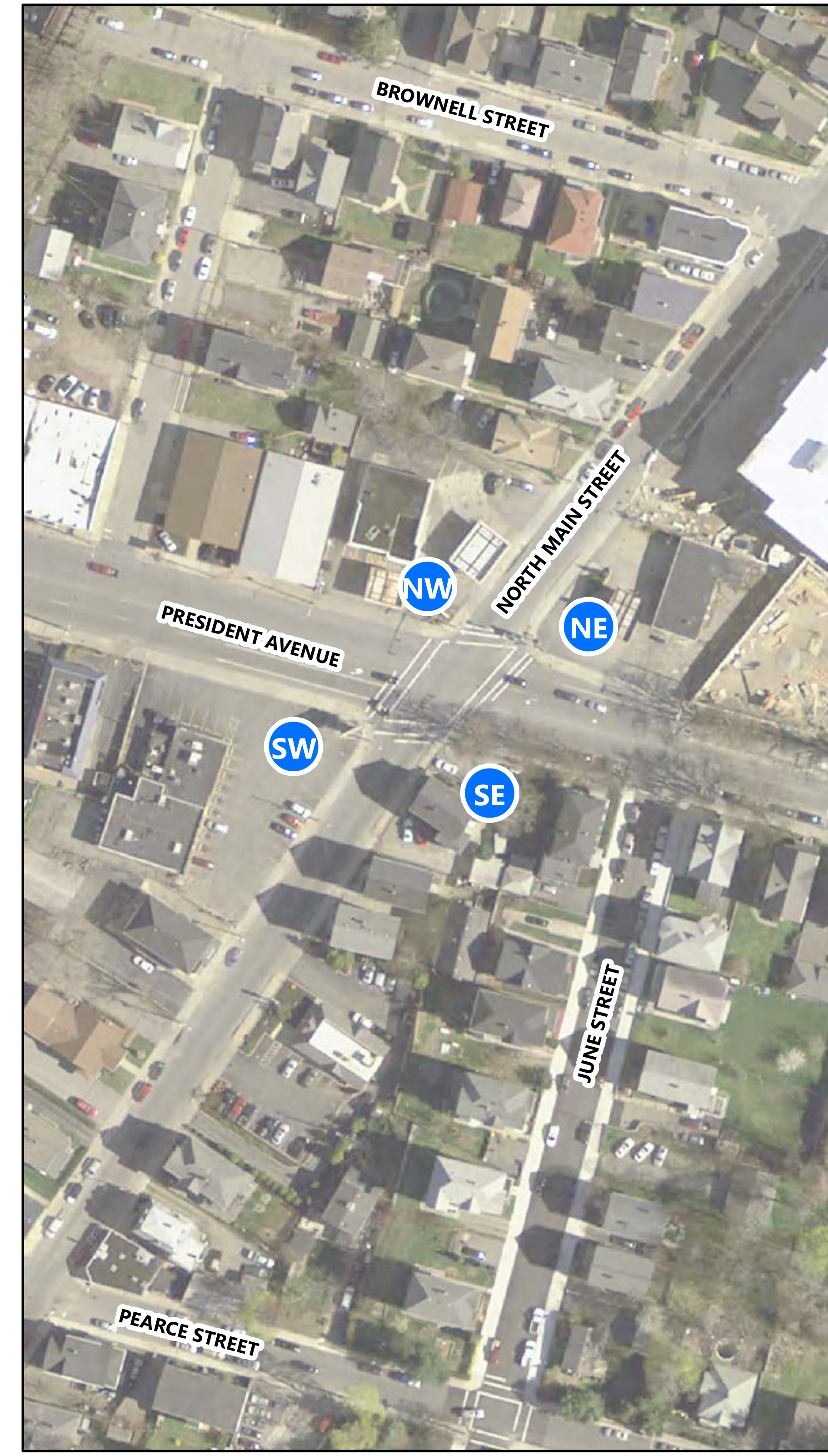
Figure 6-1: Air Quality Intersection Receptor Quadrants



Main Street (Route 105) at West Grove Street (Route 28)
Middleborough, Massachusetts



County Road (Route 140) at Route 24 Southbound Ramps
Taunton, Massachusetts



North Main Street at President Avenue
Fall River, Massachusetts

Receptor Quadrant

Source Info: MassGIS, VHB

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Table 6-5 Predicted Maximum Pollutant Concentrations at Intersections (Existing Conditions)

Town	Station	Intersection	Receptor Location at Intersection	CO (ppm) 1-Hour[1]	CO (ppm) 8-Hour[2]	$PM_{2.5}$ ($\mu g/m^3$) 24-Hour[3]	$PM_{2.5}$ ($\mu g/m^3$) Annual[4]	PM_{10} ($\mu g/m^3$) 24-Hour[5]
				Year 2017 (Existing)				
Middleborough	Pilgrim Junction	Main Street (Route 105) at West Grove Street (Route 28)	N	2.5	1.5	18.1	6.8	70.2
			E	2.5	1.5	18.2	7.0	70.5
			W	2.5	1.5	17.6	6.6	69.1
			S	2.5	1.5	17.9	6.9	69.7
Taunton	East Taunton	Route 140 at Route 24 Southbound	NE	2.5	1.5	17.9	6.8	69.2
			W	2.4	1.4	16.9	6.2	65.6
			S	2.3	1.4	17.1	6.4	66.7
Fall River	Fall River Depot	North Main Street at President Avenue	NW	2.4	1.5	17.9	6.8	69.5
			NE	2.4	1.5	18.0	6.9	69.6
			SW	2.5	1.4	17.6	6.7	69.0
			SE	2.4	1.5	18.0	6.8	70.3

1 The 1-hr CO concentration includes a 1.9 ppm background. The 1-hr CO NAAQS is 35 ppm.
2 The 8-hr CO concentration includes a 1.1 ppm background. The 8-hr CO NAAQS is 9 ppm.
3 The 24-hr $PM_{2.5}$ concentration includes a 15.6 $\mu g/m^3$ background. The 24-hr $PM_{2.5}$ NAAQS is 35 $\mu g/m^3$.
4 The Annual $PM_{2.5}$ concentration includes a 5.8 $\mu g/m^3$ background. The Annual $PM_{2.5}$ NAAQS is 12.0 $\mu g/m^3$.
5 The 24-hr PM_{10} concentration includes a 61 $\mu g/m^3$ background. The 24-hr PM_{10} NAAQS is 150 $\mu g/m^3$.

Table 6-6 Predicted Maximum Pollutant Concentrations at Intersections (No Action Conditions)[1]

Town	Station	Intersection	Receptor Location at Intersection	CO (ppm) 1-Hour[2]	CO (ppm) 8-Hour[3]	PM2.5 (μg/m3) 24-Hour[4]	PM2.5 (μg/m3) Annual[5]	PM10 ($\mu g/m^3$) 24-Hour[6]
				Year 2030 (No Action)				
Middleborough	Pilgrim Junction	Main Street (Route 105) at West Grove Street (Route 28)	N	2.3	1.3	17.1	6.4	69.5
			E	2.2	1.3	17.1	6.5	70.1
			W	2.2	1.3	16.7	6.3	68.6
			S	2.2	1.3	16.9	6.4	69.0
Taunton	East Taunton	Route 140 at Route 24 Southbound	NE	2.2	1.3	16.5	6.2	66.0
			W	2.2	1.3	16.3	6.0	65.1
			S	2.2	1.3	16.5	6.1	66.3
Fall River	Fall River Depot	North Main Street at President Avenue	NW	2.2	1.3	16.8	6.3	68.0
			NE	2.2	1.3	16.7	6.3	67.5
			SW	2.2	1.3	16.7	6.3	67.9
			SE	2.2	1.3	16.9	6.4	68.7

1 Pollutant concentrations in the No Action Condition are less than those in the Existing Condition as motor vehicle emission rates decrease with time due to the increase in emission regulations.
2 The 1-hr CO concentration includes a 1.9 ppm background. The 1-hr CO NAAQS is 35 ppm.
3 The 8-hr CO concentration includes a 1.1 ppm background. The 8-hr CO NAAQS is 9 ppm.
4 The 24-hr $PM_{2.5}$ concentration includes a 15.6 $\mu g/m^3$ background. The 24-hr $PM_{2.5}$ NAAQS is 35 $\mu g/m^3$.
5 The Annual $PM_{2.5}$ concentration includes a 5.8 $\mu g/m^3$ background. The Annual $PM_{2.5}$ NAAQS is 12.0 $\mu g/m^3$.
6 The 24-hr PM_{10} concentration includes a 61 $\mu g/m^3$ background. The 24-hr PM_{10} NAAQS is 150 $\mu g/m^3$.

Table 6-7 Predicted Maximum Pollutant Concentrations at Intersections (Build Conditions)

				Year 2030 (Build)				
				CO (ppm)		$PM_{2.5}$ ($\mu g/m^3$)		PM_{10} ($\mu g/m^3$)
Town	Station	Intersection	Receptor Location at Intersection	1-Hour[1]	8-Hour[2]	24-Hour[3]	Annual[4]	24-Hour[5]
Middleborough	Pilgrim Junction	Main Street (Route 105) at West Grove Street (Route 28)	N	2.3	1.3	17.0	6.4	69.3
			E	2.2	1.3	17.0	6.4	69.6
			W	2.2	1.3	16.6	6.2	67.8
			S	2.2	1.3	16.9	6.4	68.7
Taunton	East Taunton	Route 140 at Route 24 Southbound	NE	2.2	1.3	16.5	6.2	66.2
			W	2.2	1.3	16.3	6.0	65.2
			S	2.2	1.3	16.5	6.1	66.4
Fall River	Fall River Depot	North Main Street at President Avenue	NW	2.2	1.3	16.8	6.3	68.0
			NE	2.2	1.3	16.8	6.3	67.9
			SW	2.2	1.3	16.6	6.2	67.3
			SE	2.2	1.3	16.8	6.4	68.7

1 The 1-hr CO concentration includes a 1.9 ppm background. The 1-hr CO NAAQS is 35 ppm.
2 The 8-hr CO concentration includes a 1.1 ppm background. The 8-hr CO NAAQS is 9 ppm.
3 The 24-hr $PM_{2.5}$ concentration includes a 15.6 $\mu g/m^3$ background. The 24-hr $PM_{2.5}$ NAAQS is 35 $\mu g/m^3$.
4 The Annual $PM_{2.5}$ concentration includes a 5.8 $\mu g/m^3$ background. The Annual $PM_{2.5}$ NAAQS is 12.0 $\mu g/m^3$.
5 The 24-hr PM_{10} concentration includes a 61 $\mu g/m^3$ background. The 24-hr PM_{10} NAAQS is 150 $\mu g/m^3$.

Grade Crossing Analysis

This section evaluates the potential air quality impacts of motor vehicle and locomotive emissions on receptor locations adjacent to the grade crossings proposed under Phase 1 Interim Service. All five grade crossings (two located in Lakeville and three located in Taunton) were modeled to represent worst-case operating conditions in a peak rail hour. Vehicles on roadways intersecting the rail corridor were assumed to idle for the entire duration of the train passing, including some additional delay while the gates are down during train approach and departure. Other grade crossings associated with SCR were evaluated in the FEIS/FEIR.

Table 6-8 summarizes the microscale analysis results for the each of the five grade crossings in the Phase 1 study area. The modeling assumed that 4 passing trains will occur during the peak hour and used traffic data developed in the transportation analysis. Both the moving trains and roadway vehicles were considered in the grade crossing analysis. Receptors were placed in locations where people will be expected to be breathing ambient air and where the public may have access. The receptor grids were generally in 10-meter increments and placed 6 feet off the ground, per EPA guidance. The concentrations were developed for the 2030 Build Condition.

Figure 6-2 shows the grade crossing air quality study area and receptor quadrants. Including the background concentrations, the 1-hour CO concentrations ranged from 2.0 ppm to 4.2 ppm, while the 8-hour CO concentrations ranged from 1.1 ppm to 2.6 ppm (well below the NAAQS criteria of 35 ppm for 1-hour concentrations and 9 ppm for 8-hour concentrations). All CO concentrations are well below the NAAQS. With the background concentrations, the 24-hour $PM_{2.5}$ concentrations ranged from 16 μg/m^3 to 23 μg/m^3, while the annual $PM_{2.5}$ concentrations ranged from 5.9 μg/m^3 to 9.6 μg/m^3 (below the NAAQS criteria of 35 μg/m^3 for 24-hour concentrations and 12 μg/m^3 for annual concentrations). The 24-hour PM_{10} concentrations ranged from 61 μg/m^3 to 74 μg/m^3 (below the NAAQS criteria of 150 μg/m^3 for 24-hour concentrations). All PM concentrations are also well below the NAAQS. The assessment of the air quality impacts of the motor vehicles and Phase 1 trains at the grade crossings reveals that all project operations are projected to be well under the air quality standards (NAAQS).

Table 6-8 Predicted Maximum Pollutant Concentrations at Grade Crossings

			Year 2030 (Build Condition)				
		Receptor Quadrant at	CO (ppm)		$PM_{2.5}$ (μg/m^3)		PM_{10} (μg/m^3)
Town	Grade Crossing	Intersection	1-Hour[1]	8-Hour[2]	24-Hour[3]	Annual[4]	24-Hour[5]
Lakeville	Leonard St, south of Taunton St	NE	2.2	1.3	16	6.2	63
		NW	2.3	1.3	16	6.1	63
		SW	2.2	1.2	16	6.0	62
		SE	2.2	1.3	17	6.2	63
Lakeville	North Precinct St, south of Taunton St	NE	2.1	1.2	16	6.0	62
		NW	2.0	1.2	16	5.9	61
		SW	2.0	1.1	16	5.9	61
		SE	2.0	1.2	16	6.0	62
Taunton	Old Colony Ave, south of Taunton River	NE	2.9	1.6	18	7.1	68
		NW	2.8	1.5	17	6.5	66
		SW	3.4	2.1	20	7.4	70
		SE	4.2	2.6	23	9.6	74
Taunton	Middleboro Ave, east of Leisure Ln	N	2.5	1.5	17	6.7	66
		W	2.6	1.5	17	6.6	66
		S	2.5	1.5	17	6.5	66
		E	2.7	1.6	18	7.0	67
Taunton	Route 140, northwest of Industrial Drive	N	2.7	1.7	18	7.2	68
		W	2.9	1.8	18	6.9	68
		S	2.6	1.5	17	6.5	67
		E	2.9	1.8	19	7.5	69

1 The 1-hr CO concentration includes a 1.9 ppm background. The 1-hr CO NAAQS is 35 ppm.
2 The 8-hr CO concentration includes a 1.1 ppm background. The 8-hr CO NAAQS is 9 ppm.
3 The 24-hr $PM_{2.5}$ concentration includes a 15.6 μg/m^3 background. The 24-hr $PM_{2.5}$ NAAQS is 35 μg/m^3.
4 The Annual $PM_{2.5}$ concentration includes a 5.8 μg/m^3 background. The Annual $PM_{2.5}$ NAAQS is 12.0 μg/m^3.
5 The 24-hr PM_{10} concentration includes a 61 μg/m^3 background. The 24-hr PM_{10} NAAQS is 150 μg/m^3.

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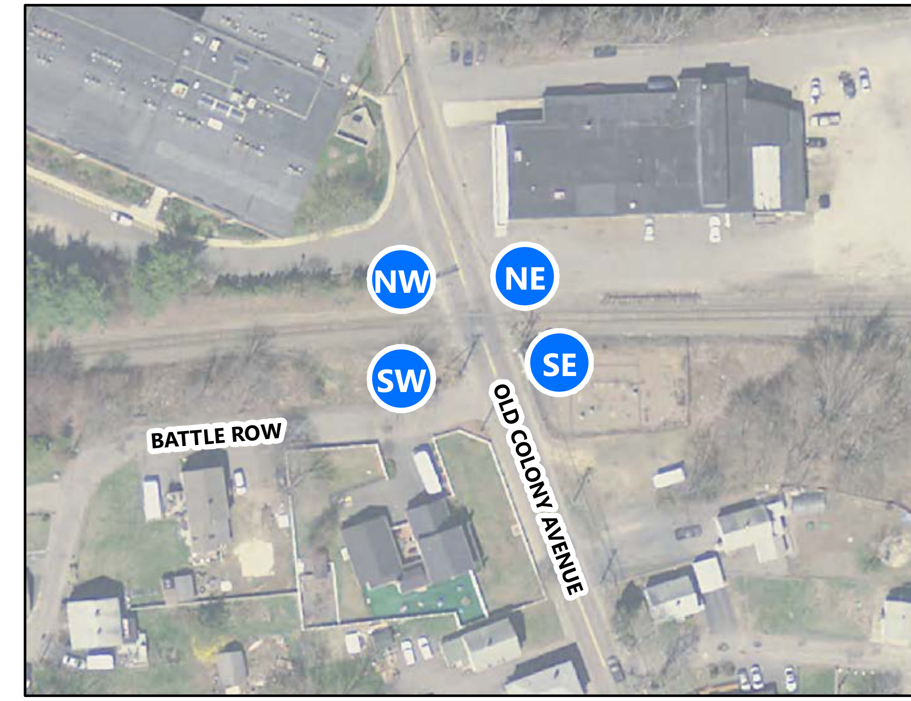
Massachusetts Bay Transportation Authority

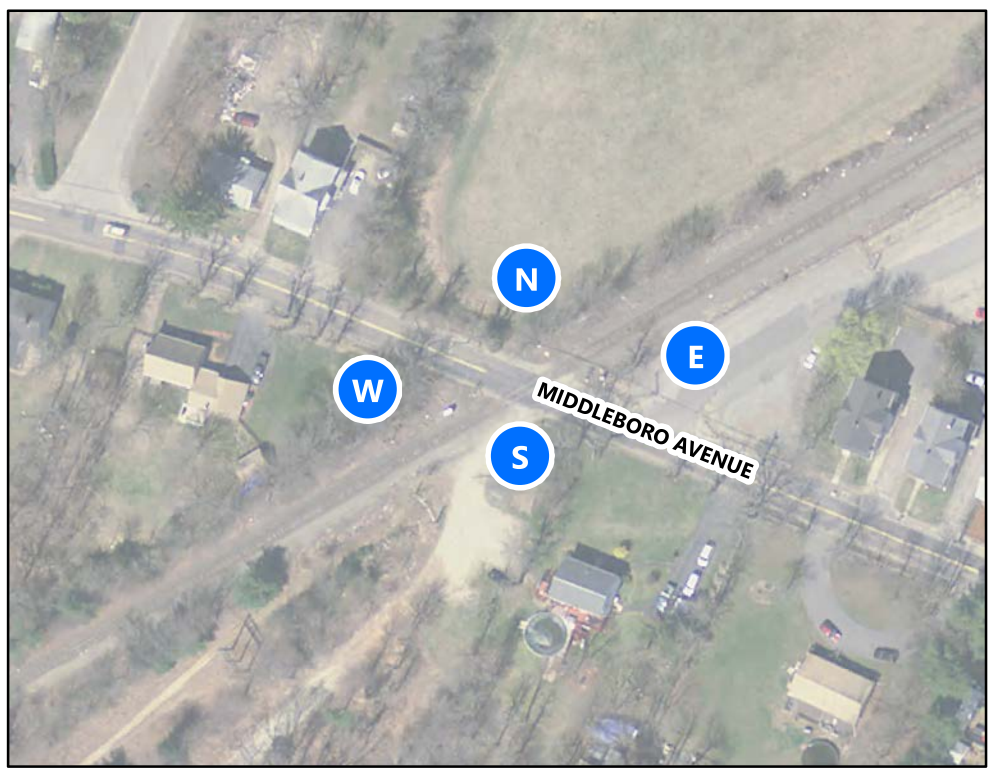
Figure 6-2: Air Quality Grade Crossing Receptor Quadrants

Leonard Street:
South of Taunton Street
Lakeville, Massachusetts

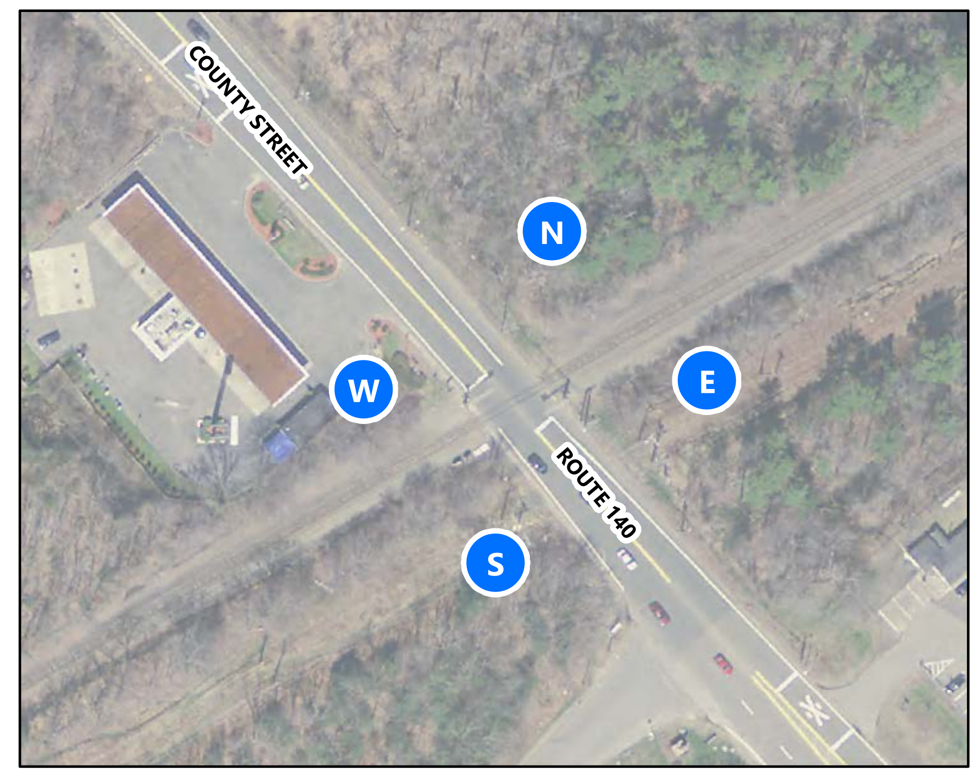
North Precinct Street:
South of Taunton Street
Lakeville, Massachusetts



Old Colony Avenue:
South of Taunton River
Taunton, Massachusetts



Middleboro Avenue:
East of Leisure Lane
Taunton, Massachusetts



County Street/Route 140:
Northwest of Industrial Drive
Taunton, Massachusetts

Receptor Quadrant

\\vhb\proj\Boston\12815.00 SCR PM & CM\Environmental\AirQuality\GIS\Figure 6-2 GC.mxd November 15, 2017

Source Info: MassGIS, VHB

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Train Station Analysis

This section evaluates the potential air quality impacts of train locomotive emissions on receptor locations adjacent to the two Phase 1 train stations. A stationary source analysis was not conducted because there are no anticipated stationary sources at the stations in the Phase 1 Project. The two stations analyzed were Pilgrim Junction in Middleborough and East Taunton in Taunton. The stations will only include a platform and will not be conditioned. There are some electrical requirements for each station but the emissions related to the minimal electrical consumption are considered negligible and as well as direct emissions from the emergency generator at the East Taunton Station.

The air quality analysis evaluated the potential for impact of idling train locomotives on receptor locations adjacent to the train stations by calculating the worst-case pollutant concentrations. Receptors were placed 6 feet above the ground in accordance with EPA guidance and extended approximately 1,600 feet from the platforms. This receptor grid provided sufficient coverage of the nearest residential neighborhoods. An analysis of the impacts of the diesel commuter rail trains on the closest residential areas adjacent to the train stations was conducted using EPA's AERMOD air dispersion model. The primary pollutants of concern from diesel trains are CO, NO_2, PM_{10}, and $PM_{2.5}$. AERMOD calculated the highest concentrations of each pollutant. These results represent a worst-case condition.

The results of the air quality analysis of the Phase 1 stations demonstrate that all the pollutant concentrations will be below the NAAQS. Receptor locations that are located further away from the train stations will experience lower pollutant concentrations due to additional dilution with greater distances. The worst-case concentrations of each pollutant at the two stations are presented in Table 6-9. The air quality analysis assumed predominantly Tier 3 diesel locomotive engines, as MassDOT and the MBTA are moving to phase out the older Tier 0+ engines by the modeled design year of 2030. The analysis shows that the pollutant increases from train locomotives are relatively small compared to the background concentrations. This is primarily because trains are expected to dwell at stations for a short time before continuing to the next station.

Table 6-9 Predicted Maximum Pollutant Concentrations at Stations

		Year 2030 (Build Condition)						
		CO (ppm)		$PM_{2.5}$ (µg/m³)		PM_{10} (µg/m³)	NO_2 (ppb)	
Town	Station	1-Hour[1]	8-Hour[2]	24-Hour[3]	Annual[4]	24-Hour[5]	1-Hour[6]	Annual[7]
Middleborough	Pilgrim Junction	1.9	1.1	15.8	5.8	61.4	70.5	18.1
Taunton	East Taunton	1.9	1.1	15.9	5.8	61.4	67.7	18.1

1 The 1-hr CO concentration includes a 1.9 ppm background. The 1-hr CO NAAQS is 35 ppm.
2 The 8-hr CO concentration includes a 1.1 ppm background. The 8-hr CO NAAQS is 9 ppm.
3 The 24-hr $PM_{2.5}$ concentration includes a 15.6 µg/m³ background. The 24-hr $PM_{2.5}$ NAAQS is 35 µg/m³.
4 The Annual $PM_{2.5}$ concentration includes a 5.8 µg/m³ background. The Annual $PM_{2.5}$ NAAQS is 12.0 µg/m³.
5 The 24-hr PM_{10} concentration includes a 61 µg/m³ background. The 24-hr PM_{10} NAAQS is 150 µg/m³.
6 The 1-hr NO_2 concentration includes a 51.3 ppb background. The 1-hr NO_2 NAAQS is 100 ppb.
7 The Annual NO_2 concentration includes a 17.4 ppb background. The Annual NO_2 NAAQS is 53 ppb.

Microscale Analysis Results

The microscale air quality analysis evaluated the potential for impact of motor vehicles and train locomotives on hotspot locations around the grade crossings and proposed stations in association with Phase 1. Hotspot locations are typically areas where local concentrations of air pollutants may approach or exceed the NAAQS. The microscale analysis first considered the intersections surrounding the stations to be used by rail passengers. The worst-case intersection in each station's traffic network was analyzed. Since these intersections comply with the NAAQS criteria, it is expected that all intersections in the traffic networks will comply. Each of the five grade crossings along the Phase 1 corridor were modeled during the peak transit hour when the most grade crossing events would occur. Additionally, ambient air quality near the stations was considered by assessing idling locomotives during the peak transit hour. The microscale analyses included motor vehicle and train emissions to calculate worst-case concentrations where appropriate.

The trains that will be used in Phase 1 will be diesel. The modeling assumed that most Phase 1 locomotives will comply with Tier 3 emission standards, as MassDOT and MBTA are moving to phase out the older Tier 0+ engines and purchase or lease Tier 3 and Tier 4 engines. The microscale analysis, which typically focuses on motor vehicle emissions, added the emissions of the moving diesel commuter rail trains to the grade crossing receptor locations to calculate the highest concentrations of CO, PM_{10}, and $PM_{2.5}$. The results represent a worst-case condition. All the pollutant concentrations comply with the NAAQS. The results for all microscale analyses show that Phase 1 will not substantially change any of the concentrations of CO, NO_X, PM_{10}, and $PM_{2.5}$.

The results demonstrate that Phase 1 will meet the NAAQS for CO, NO_X, PM_{10}, and $PM_{2.5}$. The worst-case modeling results are presented in the tables in Section 6.4.2. Phase 1 will not:

- Cause any new violation of the NAAQS;

- Increase the frequency or severity of any existing violations; or
- Delay attainment of any NAAQS.

Phase 1 operations will comply with federal and Massachusetts ambient air quality regulations.

6.4.3 Greenhouse Gas Analysis

The EEA has developed a policy that requires project proponents to identify and describe the feasible measures to minimize GHG emissions. The Policy requires that projects quantify the Project's direct and indirect GHG emissions and identify measures to avoid, minimize, or mitigate such emissions. Projects generate GHG emissions through the use of electricity and fossil fuels typically from building sources including boilers, heaters and internal combustion engines. MEPA's GHG policy requires that the analysis include a No Action, with Improvements conditions. The Build condition represents the mobile source emissions that would occur using equipment that meets all applicable regulations (e.g. the building code or regulations on vehicle and locomotive emission standards). The Build with Improvements condition should include various GHG reduction measures, and renewable resources, such as solar, wind, geothermal, green power, and energy star measures.

While the Phase 1 Service would help reduce regional GHG emissions, there will be no buildings associated with the stations that will be generating GHG emissions. The Phase 1 stations will all be open to the outside and will not need heating/air conditioning equipment. Therefore, the air quality analysis did not evaluate cumulative impacts by alternative, nor did it compare any building under the current state building codes to proposed building with mitigation measures. In absence of buildings associated with the Phase 1 Service, the air quality analysis did not include an evaluation of renewable energy sources and commitment to Leadership in Energy and Environmental Design (LEED) and Energy Star elements. However, as the Project progresses, the station platforms will be designed to be solar ready and will not preclude the consideration of future solar photovoltaic (PV) at the stations.

The air quality analysis did evaluate the motor vehicle and train locomotive GHG emissions in Section 6.4.1. The results of the mesoscale analysis show that the Phase 1 Service will reduce GHG emissions by 7,121 short tons per year, as shown in Table 6-3. Since the Project will not increase GHG emissions, further mitigation measures are not required by the MEPA GHG Policy. However, the Proponent is proposing other measures that would help address GHG emissions (as discussed further in Chapter 7, *Climate Change*) including LED lighting, reflective roofs on shelters, landscaping near shelters and pedestrian corridors.

As indicated in the FEIS/FEIR, each of the SCR alternatives represent new transit options that will result in reduced VMT and GHG emissions. The Phase 1 Service will also reduce VMT as a GHG mitigation measure. Although not within the scope of Phase 1, the FEIS/FEIR made a commitment to use train engine plug-ins and electric block heaters at layover facilities to reduce idling GHG emissions. As part of the Phase 1 Service, the Project will further reduce GHG emissions by installing electric vehicle charging equipment in commuter rail station parking lots. The Project will also use LED technology for lighting at the commuter rail stations. LED lighting is far more efficient than conventional lighting equipment and will further reduce the minimal electricity consumption at the stations.

6.5 Temporary Construction-Period Impacts

6.5.1 Construction Activities

Temporary air quality impacts could result from construction activities associated with utility relocation, grading, excavation, track work and installation of systems components. Such impacts may occur in residential areas and at other sensitive land uses located within several hundred feet of the alignment.

There are requirements established by Federal Conformity Rules regarding construction periods and impact evaluation procedures, which include quantitative analysis for both operational and construction emissions - except for short-term construction activities lasting less than two to five years. Based on the current construction sequencing, Phase 1 could be constructed and open for revenue service in November 2022. This would indicate that construction activity would occur for less than five years. Additionally, construction activity would vary geographically. Most locations in the study area would not experience activity for the complete duration of Phase 1 construction.

6.5.2 Construction Mitigation

To reduce criteria pollutants and GHG emissions from temporary construction activities, construction contractors will be contractually required to adhere to all applicable regulations regarding control of construction vehicles emissions. This will include, but not be limited to, maintenance of all motor vehicles, machinery, and equipment associated with construction activities and proper fitting of equipment with mufflers or other regulatory-required emissions control devices. Also, the prohibition of excessive idling of construction equipment engines will be implemented, as required by MassDEP regulations at 310 CMR 7.11. Typical methods of reducing idling include driver training, periodic inspections by site supervisors, and posting signage. In addition, to ensure compliance with this regulation once the Project is occupied, permanent signage will be posted limiting idling to five minutes or less.

Construction specifications will stipulate that all diesel construction equipment used on-site will be fitted with after-engine emission controls such as diesel oxidation catalysts (DOCs) or diesel particulate filters (DPFs), as already required by MBTA contract documents. Construction contractors will be required to utilize ultra-low sulfur diesel fuel for all off-road construction vehicles as an additional measure to reduce air emissions from construction activities. Idling restriction signs will be placed on the premises to remind drivers and construction personnel of the State’s idling regulation.

The contractors will be required to implement protective measures around the construction and demolition work to protect pedestrians and prevent dust and debris from leaving the site or entering the surrounding community. Dust generated from earthwork and other construction activities, such as stockpiled soils will be controlled by spraying with water to mitigate wind erosion on open soil areas. Other dust suppression methods such as wheel washing will be implemented to ensure minimization of the off-site transport of dust. Regular sweeping of the pavement of adjacent roadway surfaces will be required during the construction period to minimize the potential for vehicular traffic to create airborne dust and particulate matter.

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7. Climate Change

7.1 Introduction

This chapter presents climate change projections and includes the South Coast Rail (SCR) Project's strategies for increasing resilience and adapting to anticipated climate conditions.

7.1.1 Requirements of Certificate

The Secretary's Certificate on the Notice of Project Change (NPC) requires the Draft Supplemental Environmental Impact Report (DSEIR) to:

- Demonstrate how the design of Phase 1 Project elements will foster resiliency of Phase 1, and the Full Build project, to the effects of climate change, including measures to address potential impacts associated with more frequent and intense precipitation and flooding; and
- Evaluate measures to maintain the operational capability of energy and other systems including elevation of tracks and stations and over-sizing of compensatory flood storage areas and stormwater recharge and treatment areas to address increases in the frequency and level of precipitation (for example, design for peak stream flow).

7.1.2 Regulatory Context

To address climate change adaptation (as opposed to just mitigation), in late 2014, the Massachusetts Executive Office of Energy and Environmental Affairs (EEA) released the *Draft MEPA Climate Change Adaptation and Resiliency Policy*. It is intended to facilitate assessment of the risk and vulnerabilities of a project or action under reasonably foreseeable scenarios and conditions associated with climate change to inform the identification and evaluation of measures to mitigate these risks and vulnerabilities to the extent feasible and practicable. In compliance with this draft policy, this chapter provides an evaluation of how the SCR Project may be impacted by changes in precipitation and increases in temperature. The elements of Phase 1 analyzed in this DSEIR are not within coastal areas subject to the impacts of sea level rise, therefore this climate change impact is not reviewed here.

7.2 Adaptation & Resiliency Assessment

The Massachusetts Department of Transportation (MassDOT) recognizes the potential threat posed by climate change to the resiliency of the state's transportation infrastructure over the coming decades and beyond. Preparing transportation assets, including the SCR Project, to adapt to future climate-related hazards will help prevent infrastructure failure, improve reliability, reduce operations and maintenance costs, and improve safety. According to the U.S. Department of Transportation's (DOT) *2014 Climate Adaptation Plan*, "newly constructed infrastructure should be designed and built in recognition of the best current understanding of future environmental risks." In recent years, multiple governmental entities have begun to assess climate change impacts on infrastructure and to develop potential responses. Following this trend, MassDOT has undertaken a vulnerability assessment as part of its *Statewide Climate Change Adaptation Plan* (currently underway). Completed products resulting from this effort at the time of drafting this DSEIR include climate projection maps for the Commonwealth[1] and a report titled *Assessment of Extreme Temperature Impacts on MassDOT Assets* (the "Assessment"),[2] both of which serve as sources of information for this chapter.

7.2.1 Climate Projections

For projects with a long design life, such as transportation infrastructure, storm and flood-related impacts, including potentially catastrophic outcomes, may significantly affect the public and/or public interests. Therefore, consideration of a broad range of climate change scenarios over a longer timeframe is generally warranted. This chapter examines the impacts of climate change up to the year 2100, which encompasses the SCR Project's service life, and for which time period projections are readily available.

As part of MassDOT's Assessment, three sets of climate projection maps were created reflecting three greenhouse gas (GHG) concentration trajectories (Representative Concentration Pathways 4.5, 6.0, and 8.5[3]) for four future periods (2030, 2050, 2070, and 2100). They provide projections for precipitation depth and temperature change that can be used for planning purposes. Table 7-1 below includes baseline conditions as well as future projections specifically for the geographic area of Massachusetts in which Phase 1 infrastructure is situated. The range represents the middle 80% probability of occurrence.

Table 7-1 MassDOT Climate Projections

	Baseline (1986-2005)	RCP[1]	2030	2050	2070	2100
24-hour 100-year return interval precipitation depth (inches)	6-8	RCP 4.5	6-10	6-10	6-10	6-10
		RCP 6.0	6-10	6-10	6-10	6-10
		RCP 8.5	6-10	6-10	6-10	6-12
Annual maximum number of consecutive days > 95°F	0-5	RCP 4.5	5-10	5-10	5-10	5-10
		RCP 6.0	0-10	0-10	5-10	5-10
		RCP 8.5	5-10	5-10	5-10	5-20

Source: MassDOT Climate Projection Viewer http://gis.massdot.state.ma.us/cpws/, accessed 8/30/17
1 Representative Concentration Pathway

1 MassDOT. *Future Projections for a Changing Climate*. http://gis.massdot.state.ma.us/cpws/ accessed 11/9/17
2 MassDOT. March 17, 2017. *Assessment of Extreme Temperature Impacts on MassDOT Assets*. http://www.massdot.state.ma.us/Portals/17/docs/Sustainable/AssessmentExtremeTempImpacts_Final03172017.pdf
3 Representative Concentration Pathways (RCPs) are four greenhouse gas concentration trajectories adopted by the Intergovernmental Panel on Climate Change (IPCC) for its fifth Assessment Report (AR5) in 2014.The pathways are used for climate modeling and research, and describe four possible climate futures, all of which are considered possible depending on how greenhouse gas concentrations change in the years to come.

Additional projected rainfall data for the region (from Taunton to Newburyport) can be found in the Boston Water and Sewer Commission's (BWSC) 2015 *Wastewater and Storm Drainage System Facilities Plan*, which analyzed climate change scenarios related to increased precipitation, river flooding, sea level rise and storm surge. BWSC describes how recent trends in regional rainfall data indicate that average annual rainfall and daily maximum rainfalls are increasing in volume, and the report provides corresponding design standards. For example, the current 10-year, 24-hour design storm used by the BWSC is forecast to increase to as much as 6.65 inches with a peak hourly intensity of 2.11 inches per hour by the year 2100 with climate change, which is consistent with the projected precipitation data provided by MassDOT. The data and design standards described in BWSC's plan are being taken into consideration as design for the Project's on-site stormwater management systems moves forward, including the design of new culverts.

7.2.2 Impact Analysis

The draft Massachusetts Environmental Policy Act (MEPA) policy identifies precipitation impacts associated with impervious surfaces and temperature impacts on energy demand as the impacts that most projects should consider. These are addressed below.

Precipitation

As indicated in Chapter 8, *Wetlands, Water Quality, and Waterways*, 12 locations within the Phase 1 Study Area are within the 100-year floodplain (Figure 8.5), and could be impacted by projected increases in precipitation volume and intensity. They include inland floodplains primarily associated with the Taunton River adjacent to the Middleborough Secondary track in Middleborough, Lakeville, Raynham, and Taunton. While portions of Freetown Station are within 250 feet of a floodplain with a regulatory floodway associated with Rattlesnake Brook, the station is elevated approximately 20 feet above the base flood elevation (BFE) of the 1% annual chance flood, and not likely to be subject to flooding under the foreseeable scenarios. In addition, while Fall River Depot Station is near a coastal floodplain, it lies at an elevation that is 13 feet higher than the BFE, and is also not likely to be subject to flooding. Other low-lying areas, or areas with poor drainage, within the Project may also be prone to temporary flooding due to changes in precipitation.

Temperature

According to MassDOT's Assessment, the most serious threat for transportation systems comes from extended periods of extreme temperatures. Extreme heat has a wide range of potential impacts on the transportation system. Design-related impacts may include:

- Instability of materials exposed to high temperatures over longer periods of time (such as causing pavement or track buckling) can result in increased failures;
- Ground conditions and less water saturation (due to drought conditions) could alter the design factors for foundations and retaining walls; and

- Encased equipment such as signal control systems for rail service might fail due to higher temperatures inside the enclosures.

With respect to rail, the Massachusetts Bay Transportation Authority (MBTA) uses a rail neutral temperature of 95 degrees Fahrenheit. Rail neutral temperature does not actually measure the temperature of the rail, but rather refers to the temperature of the uninstalled rail before it is affixed to the railroad ties. Immediately after any rail is installed, it becomes susceptible to changes in temperature and reacts by attempting to expand and/or contract along its length. For this reason, prior to installation, rail is mechanically or thermally altered to achieve a measured length equivalent to a stress-free temperature of 95°F before it is clipped down, which ensures that at a temperature of 95°F there will be no thermal forces, either compressive or contractive, in the rail. This process of stressing rail greatly reduces the risk of fracturing or buckling at the temperature extremes.

Given expected high temperatures in the next several decades, the current MBTA approach to rail track should provide sufficient buffer to the effects of higher temperatures. MassDOT's Assessment found that although exposure to consecutive high temperature days could cause discomfort and inconvenience to users of the Commonwealth's transportation system (due to higher temperatures and delays due to increased maintenance), the projected levels do not constitute a serious challenge to infrastructure design and materials specification.[4]

7.3 Mitigation and Adaptation

MassDOT is committed to using Best Practices to help determine how climate change may impact the SCR Project, and how to construct the SCR Project to be more resilient to climate change impacts. The MBTA has already taken steps to consider climate change more systematically in project designs. For example, the MBTA's contract template for Design and Engineering Services has been modified to require climate change analysis at the 30% project design level (such as, assess vulnerability) and to identify potential adaptation measures. For Phase 1, project designers are analyzing all project components in terms of their vulnerability to the climate change impacts associated with heat and flooding based on the following procedure:

1. Refer to projected future climate conditions scenario;
2. Identify exposure to climate change impacts;
3. Identify sensitivity to changing climate conditions;
4. Consider the component's adaptive capacity based on the component's useful life; and
5. Choose appropriate design solution(s).

4 MassDOT. *Assessment of Extreme Temperature Impacts on MassDOT Assets*. March 17, 2017, p.13.

7.3.1 Mitigating and Adapting to Potential Flooding Impacts

Table 7-2 below identifies potential design solutions for various precipitation and flooding-related impacts to stations, tracks, and electrical systems that will be considered as design progresses.

Table 7-2 Potential Design Solutions to Mitigate Projected Increased Flooding

Flooding Impacts	Potential Design Solutions
Stations	
At stations, earthen support (soil, berms) for structures may erode due to gradual inundation or storm-related inundation, reducing the foundation's stability.	Prevent localized flooding by reducing runoff from parking lots, station structures, and other impervious surfaces. For parking lots, this can be accomplished with vegetated filter strips; vegetated or bioretention swales; and/or bioretention or infiltration basins. For structures, this can be accomplished through the use of vegetated green roofs and rain barrels or cisterns.
Temporary flooding and/or ponding may occur in parking lots that do not drain sufficiently.	Size drainage structures for future conditions.
Track	
Track in the 1% or 0.2% annual chance flood hazard area[5] and other flood-prone areas is at risk of damage due to washout.	Many washouts can be prevented by planting and/or maintaining vegetation whose roots hold the soil and/or slow the flow of surface and underground water. Consider designing space to allow for the erection of barriers or retaining walls that can protect lines that run parallel to rivers and or are near/within flood hazard areas that may become subject to flooding. Larger culvert openings at stream crossings may also prevent washout.
Immersion of wood ties (often standard, rather than concrete ties) in water due to local inundation softens/expands the wood, weakening its ability to support tracks.	Use materials that can withstand inundation, taking into consideration the water source (fresh or salt).
Erosion of supporting systems (such as ballast and other nearby ground) can threaten track stability.	Reinforce slopes where erosion is likely to occur.
Loss of embankment support due to gradual or sudden inundation-related erosion is a risk.	Monitor vulnerable locations and reinforce embankment support when necessary.
Bridges	
All rail infrastructure in the 0.2% annual chance flood hazard area and other flood-prone areas is at risk of damage due to washout. Underlying earthen support may erode, or manmade infrastructure may break down from forces beyond design specifications.	MassDOT has designed bridges to withstand the 0.2% annual chance flood event. Consider designing to reduce bridge scour by strengthening protections around piers.

5 The 1% and 0.2% annual chance flood hazard areas are colloquially known as the 100-year and 500-year flood hazard areas (or floodplains), respectively.

Table 7-2 Potential Design Solutions to Mitigate Projected Increased Flooding (Continued)

Heavy precipitation events can increase the flow velocity and flow depth of a stream or river, which affect local scour depth. During flood conditions, if the stream elevation reaches the low chord bridge elevation, the local scour depths could increase.	MassDOT has designed bridges to withstand the 0.2% annual chance flood event. Consider designing to reduce bridge scour by strengthening protections around piers.
Flooding can pile debris on bridge decks.	Set the elevation of the lower chord of the bridge to a minimum of 3 feet above normal freeboard for the 100-year flood for streams carrying a large amount of debris to reduce damage.
Electrical Systems	
Heavy precipitation or any flooding can ruin electrical equipment caused by shorting of circuitry. Inundation can cause rail sensor failure, as well as other electrical failures (switches, gates, signals).	Waterproof vulnerable housing for electrical components. Raise electrical components above future flood elevations.

7.3.2 Mitigating and Adapting to Potential Temperature Increases

Table 7-3 below identifies potential design solutions for various temperature-related impacts to stations, tracks, and electrical systems that will be considered as design progresses.

Table 7-3 Potential Design Solutions to Projected Temperature Increase

Temperature Impacts	Potential Design Solutions
Stations	
High heat can affect passengers waiting at station shelters or platforms.	Specify reflective roofs on shelters to reduce heat gain. Design pavements to absorb less heat by increasing albedo (greater reflectivity) and other material and structure choices. Design shelter facilities to provide shading for passenger comfort and safety. Include landscaping near shelters and along pedestrian corridors leading to them to create microclimates with temperatures that are cooler than surrounding areas.

Table 7-3 Potential Design Solutions to Projected Temperature Increase (Continued)

Temperature Impacts	Potential Design Solutions
Track[6]	
Extreme heat can cause track buckling, which occurs when the metal in the track expands beyond the capacity of the supporting infrastructure.	Prevent buckling from rail expansion at high temperatures by setting and maintaining high "rail-neutral temperatures" (95-110°F).
Buckling more often affects track with rock ballast than concrete slab track with a paved right-of-way, as the concrete slab provides stronger support.	Consider designing expansion joints to provide space for rail expansion to prevent buckling.
Continuous welded rail (CWR) is particularly susceptible to temperature-related buckling.	Consider the use of concrete slab in select locations rather than stone ballast under track areas, as concrete slabs provide more stability and are not generally prone to buckling.
Electrical Systems	
Electric utility blackouts and brownouts can affect signals, lighting and communication systems.	Reduce dependency on centralized power for lighting, signals and communication equipment by installing off-grid solar and wind power for back-up power generation.
Electrical equipment is susceptible to overheating and malfunction. Overheating may lead to melting electronics or temporary shutdown in cases where temperature thresholds result in an automatic shutdown. Possible malfunctions of track sensors and signal sensors are possible above threshold temperatures.	Design substations, signal rooms, and electrical boxes with improved ventilation or air conditioning systems for future climate conditions.
Temperature-driven expansion of metal can damage wiring and housing of electrical equipment.	This potential impact has not yet been widely studied. MBTA will continue to monitor this issue.

7.3.3 Resiliency through Redundancy

Another way to increase the rail system's flexibility and adaptive capacity is to establish redundant routes. For instance, the Full Build Project will cross the Taunton River in three locations, and is therefore vulnerable to flooding in extreme storms. If a particular rail segment becomes impassable, the availability of an alternate route would allow travel between destinations. When the Full Build is reached, the Middleborough Secondary will revert to freight usage. However, in emergencies such as flooding, power outages, or track damage, it can become available for commuter rail use to maintain the connection between the South Coast and Metro Boston, significantly improving resiliency of the SCR Project.

6 As noted in Section 7.2.2, given expected high temperatures in the next several decades, the current MBTA approach to rail track should provide sufficient buffer to the effects of higher temperatures. However, later in century when the number of consecutive days of 95 degrees becomes larger, the MBTA might need to re-examine temperature related specifications to its rail design.

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8. Wetlands, Water Quality, and Waterways

8.1 Introduction

The results of an initial analysis of wetland, water quality and waterways impacts along the Stoughton Straight Electric Project corridor were presented in the South Coast Rail (SCR) Final Environmental Impact Statement (FEIS)/ Final Environmental Impact Report (FEIR). The proposed Phase 1 Project requires analysis of wetland, water quality and waterways impacts associated with the new Phase 1 elements, including the Middleborough Secondary corridor, the new Pilgrim Junction Station, and the relocated East Taunton Station. The additional analyses completed for the Phase 1 Study Area regarding wetlands and floodplains (Section 8.2), surface and groundwater resources (Section 8.3), stormwater (Section 8.4), and waterways (Section 8.5) are discussed in the sections below. Each section includes an introduction that lists the requirements of the certificate, definitions of resources, and the regulatory context for each topic. It also describes the methodology used in the evaluation and existing conditions. This is followed by an analysis of potential permanent and temporary impacts, as well as a description of potential or proposed mitigation measures. Finally, an explanation of regulatory compliance is provided.

8.2 Wetlands and Floodplains

8.2.1 Introduction

This section explains the jurisdictional authority and regulatory procedures for wetlands and floodplains, and describes how the phased approach to project implementation, including early advancement of maintenance-related activities, is consistent with regulatory requirements. This section first summarizes the requirements of the Secretary's Certificate with respect to aquatic resources. The potentially affected resources within the Phase 1 Project Study Area are then described, as are the methods used to identify and delineate all wetland resource areas. This section also presents the methods used to quantify the direct impacts (both permanent and temporary) to all categories of wetland resource areas, and the methods used to assess secondary and/or indirect impacts to wetland functions and values. This methodology is consistent with that used in the FEIS/FEIR.

A comprehensive assessment of all impacts to jurisdictional resource areas is provided, including impacts by municipality for Wetlands Protection Act (WPA) regulated resource areas, as well as impacts by cover type, as required to determine federal mitigation requirements. Areas of the Southern Triangle that will be in use for the Phase 1 Project have been previously evaluated as part of the Massachusetts Environmental Policy Act (MEPA) and the National Environmental Policy Act (NEPA) processes. Since the publication of the FEIS/FEIR, the designs in these areas have been advanced and revised to meet the requirements of both the Phase 1 service, which has significantly reduced impacts to aquatic resources, and the Full Build Project. The results of this design refinement in the Southern Triangle with respect to wetlands, water quality and waterways are also summarized below. The applicable state and federal regulatory requirements for mitigation are defined and the proposed measures that have been identified to meet them are described. Finally, this section specifies the state and federal regulatory requirements for wetlands protection and indicates how the Project will meet each one.

8.2.1.1 Requirements of Certificate

The Secretary's Certificate required that the Draft Supplemental Environmental Impact Report (DSEIR) include the following information related to wetlands and floodplains:

- An update on the monitoring and collection of data, using the Conservation Assessment and Prioritization System (CAPS) analysis to evaluate the effectiveness of wetland replication/restoration sites and culvert design associated with Phase 1. MassDOT should use the CAPS model to evaluate the effects of specific mitigation measures and the restoration potential of identified mitigation sites.
- A detailed description of compensatory mitigation for alteration of all resource areas, potential wetland restoration, and the rationale for site selection.
- An explanation, in both quantitative and qualitative terms, of the extent to which the mitigation proposed will support biodiversity conservation and otherwise reduce or mitigate project-related impacts.
- Identification of impacts to Inland Bank, Land Under Water (LUW), Bordering Land Subject to Flooding (BLSF), and Riverfront Area.
- A description of wetland systems identified along all proposed work areas.
- Maps, plans, and other graphics to supplement the narrative and show the specific locations and extent of wetland impacts.
- Tables to summarize wetlands impacts for each alternative.
- A description of the consultation with the Interagency Coordinating Group regarding changes to the methodology used for the analysis of wetlands functions and values, compared to the FEIS/FEIR.
- Cumulative impacts for each wetland resource area and by municipality.
- Impacts to wetlands for each project component (tracks and stations).
- A description of how proposed work in wetland resource areas will meet applicable performance standards and a statement on whether or not a variance will be required for Phase 1.
- A description of alterations to floodplains (BLSF) and discussion of how floodway and floodplain crossings will comply with applicable regulatory standards.

- An evaluation of potential flood level increases during the 100-year flood, including supporting hydrological and hydraulic analyses.
- Flood compensation calculations based on most recently available flood profile data, as well as location(s) and amount of compensatory storage that will be provided for all loss of BLSF at or near the points of impact.
- A discussion of compliance of Phase 1 with the Wetlands Regulations and associated stormwater management standards (SMS) for work proposed in wetland resource areas and buffer zones.
- A description of how MassDOT will address project phasing within the context of requests for a variance from the WPA performance standards (310 CMR 10.05(10)).
- A description of best management practices (BMPs) for erosion and sedimentation controls and time-of-year (TOY) restrictions on construction activity to avoid and minimize impacts to fisheries resources.
- Identification and description of any discharges to Outstanding Resource Waters (ORWs).
- A demonstration that the Project will avoid, minimize or mitigate impacts to wetland resource areas and water quality to the maximum extent practicable.
- An outline of a comprehensive mitigation program designed to meet all applicable requirements and standards, including construction period measures, post-construction period monitoring and restoration/compensation, and measures to promote wildlife habitat and to remove/prevent the establishment of invasive species.

8.2.1.2 Resource Definition

The term "wetlands" means those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas[1]. These areas are characterized by hydric soils, hydrophytic vegetation, and standing water or saturated soils. Wetlands provide benefits including flood storage, storm protection, ground water recharge, water filtration, and wildlife habitat. Under Massachusetts General Law (MGL), Chapter 131, Section 40, “freshwater wetlands”, are wet meadows, marshes, swamps, bogs, areas where groundwater, flowing or standing surface water or ice provide a significant part of the supporting substrate for a plant community for at least 5 months of the year; emergent and submergent plant communities in inland waters; that portion of any bank which touches any inland waters.

1 Code of Federal Regulations (CFR) Title 33, Part 328.3(b), Definition of Waters of the United States.

Wetland Resource Areas as defined in the Massachusetts WPA and its implementing regulations[2] that occur within the Middleborough Secondary corridor include these inland resource areas:

- Bank;
- Bordering Vegetated Wetlands (BVW);
- Land Under Waterbodies and Waterways (LUW);
- Bordering Land Subject to Flooding (BLSF);
- Isolated Land Subject to Flooding (ILSF); and
- Riverfront Area (RA).

This section provides a brief description of the regulatory criteria defining each of these resources.

Bank

As defined in 310 CMR 10.54 (2)(a) & (c), a Bank is *"... the portion of the land surface that normally abuts and confines a waterbody."* This land surface *"... may be partially or totally vegetated, or it may be comprised of exposed soil, gravel, or stone." "The upper boundary of a Bank is delineated as the first observable break in the slope or the mean annual flood level, whichever is lower."* Bank is present between a perennial river, lake or pond and the adjacent BVW or upland and within intermittent streams.

The regulations define a stream as *"a body of running water which moves within, into or out of an Area subject to protection of the Act... Such a body of running water that does not flow throughout the year (i.e. intermittent) is a stream except for that portion upgradient of all bogs, swamps, wet meadows and marshes."* Accordingly, only those intermittent channels that convey water in response to a hydraulic gradient and those that are within or downgradient of BVW contain the resource area Bank.

Bordering Vegetated Wetlands (BVW)

As defined in 310 CMR 10.55(2)(a), *"Bordering Vegetated Wetlands are freshwater wetlands which border on creeks, rivers, streams, ponds and lakes."* Bordering Vegetated Wetland boundaries are defined in 310 CMR 10.55(2)(c) as *"...the line within which 50 percent or more of the vegetational community consists of wetland plants and saturated or inundated conditions exist."*

Land Under Waterbodies and Waterways (LUW)

Land under Waterbodies and Waterways *"is the land beneath any creek, river, stream, pond or lake. Said land may be composed of organic muck or peat, fine sediments, rocks or bedrock. The boundary of Land Under Waterbodies and Waterways is the mean annual low water level"* [310 CMR 10.56 (2)(a)&(c)].

2 310 CMR 10.00 et seq. http://www.lawlib.state.ma.us/source/mass/cmr/cmrtext/310CMR10.pdf, accessed June 1, 2012.

Bordering Land Subject to Flooding (BLSF)

"*Bordering Land Subject to Flooding is an area with low flat topography adjacent to and inundated by flood waters rising from creeks, rivers, streams, ponds, or lakes. It extends from the banks of these waterways and waterbodies; where a bordering vegetated wetland occurs, it extends from said wetland*" [310 CMR 10.57(2)(a)]. *"The boundary of Bordering Land Subject to Flooding is the estimated maximum lateral extent of flood water which will theoretically result from the statistical 100-year frequency storm… determined by reference to the most recently available flood profile data prepared for the community within which the work is proposed… under the Federal Emergency Mapping Agency…"* [310 CMR 10.57(2)(c)].

Isolated Land Subject to Flooding (ILSF)

"*Isolated Land Subject to Flooding is an isolated depression or closed basin without an inlet or outlet. It is an area which at least once a year confines standing water to a volume of one quarter acre-foot and an average depth of six inches*" [310 CMR 10.57(1)(b)].

Riverfront Area (RA)

Riverfront Area is "*the area of land between a [perennial] river's mean annual high-water line measured horizontally outward from the river and a parallel line located 200 feet away.*" [310 CMR 10.58 (2)(a)3]. Riverfront Area occurs at all locations where the right-of-way crosses a perennial watercourse, or is within 200 feet of a perennial watercourse. The regulatory presumptions regarding the intermittent or perennial nature state that *"A stream shown as intermittent or not shown on the current USGS map, or more recent map provided by the Department, that has a watershed size of less than one square mile is intermittent…"* [310 CMR 10.58(2)(1)(c)].

Wetland resources in Massachusetts are regulated under local, state, and federal programs. The following section describes the regulatory context of the Clean Water Act (CWA), Massachusetts Wetlands Protection Act (the Act) and the local Bylaws.

Vernal Pools

Vernal pools are not regulated under the WPA as a wetland resource area. Vernal pool habitats, as defined in 310 CMR 10.04, are "confined basin depressions, at least in most years, holding water for a minimum of two continuous months during the spring and/or summer," and must be within a regulated wetland resource area to be protected under the WPA. Vernal pool habitat includes the certified pool itself and all land within 100 feet of the pool that is also within a resource area. The presence of vernal pool habitat indicates that the wetland resource area provides important wildlife habitat. Vernal pools are described in Chapter 9, *Biodiversity, Wildlife and Vegetation*. Vernal pools discussed in this document are certified, potential, and field verified vernal pools located in wetlands within 100 feet of the right-of-way.

8.2.1.3 Regulatory Context

The Phase 1 Project requires regulatory review under state and federal wetlands regulatory programs, as described below.

Section 404 of the Clean Water Act

Section 404 of the CWA requires a Department of the Army permit for the discharge of dredged or fill material into waters of the United States,[3] including adjacent wetlands. Unlike the Full Build Project, the Phase 1 Project will not necessarily require the issuance of an Individual Section 404 Permit. Because permanent and temporary impacts to federally jurisdictional wetlands will not exceed one acre, the Phase 1 work may be eligible for United States Army Corps of Engineers (USACE) approval under the Massachusetts Programmatic General Permit[4]. Based on consultation meetings held with the USACE since the issuance of the FEIS/FEIR, MassDOT intends to file a new Application for Department of the Army (DA) permit for the Phase 1 Project. The USACE anticipates issuing an Individual Permit for the Phase 1 Project that is the subject of this DSEIR, and which has independent utility from the Full Build Project. MassDOT anticipates that certain elements of project construction, such as in-kind culvert and bridge replacements, may be permitted separately in accordance with the USACE Massachusetts General Permit for Repair, Replacement and Maintenance. As repairs to active freight lines, maintenance of these structures is necessary regardless of whether or not the Phase 1 Project is implemented, and is consistent with MassDOT Rail and Transit Division's overall State of Good Repair (SGR) program.

Section 401 of the Clean Water Act (Water Quality Certification)

Section 401 of the Clean Water Act (33 U.S.C. 1341) requires any applicant for a federal license or permit to conduct any activity that may result in a discharge of a pollutant into waters of the United States to obtain a certification from the State in which the discharge originates or would originate, that the discharge will comply with the applicable effluent limitations and water quality standards.[5] In addition, construction of projects that result in the discharge of fill to a wetland or waterbody requires Water Quality Certifications, pursuant to the Massachusetts Clean Waters Act (M.G.L. c. 21 §§ 26 – 53). The Phase 1 Project will require issuance of an individual Section 401 Water Quality Certification because it will result in the loss of more than 5,000 square feet of wetlands subject to federal jurisdiction. MassDOT anticipates that certain elements of project construction as part of the MassDOT SGR program, such as in-kind culvert and bridge replacements, may be permitted under a separate Individual 401 Water Quality Certificate and in accordance with the maintenance provisions of the regulations.

3 Code of Federal Regulations (CFR) Title 33, Part 328.3(a), Definition of Waters of the United States.

4 Department of the Army General Permits for Massachusetts, effective February 4, 2015. Available on line at: www.nae.usace.army.mil/Portals/74/docs/regulatory/StateGeneralPermits/MAGPs9March2015.pdf

5 Code of Federal Regulations (CFR) Title 33, Part 320.3(a), General Regulatory Policies.

Massachusetts Wetlands Protection Act

The WPA regulations establish performance standards for work proposed within each of the resource areas, and requires review of any work proposed within 100 feet of a wetland resource, or 200 feet of a perennial stream to determine if that work will result in the alteration of wetland resources. "Alter" is defined as including the changing of pre-existing drainage conditions, the lowering of the water level or water table, the destruction of vegetation, or the changing of the physical, biological, or chemical characteristics of the receiving water. Phase 1 will require the issuance of Orders of Conditions under the WPA in each of the four municipalities along the Middleborough Secondary as well as the Southern Triangle municipalities. The Project as proposed in the Notice of Intent filed with each local Conservation Commission will meet all the applicable performance standards for each regulated resource and will not require a variance under 310 CMR 10.05(10) (a).

In accordance with the Footprint Bridge Exemption provisions of the 2014 Transportation Bond Bill (c. 79 of the Acts of 2014) certain existing structures within the railroad right of way will be exempt from WPA review. As stated in the Bill:
"**SECTION 24**: *Notwithstanding any general or special law to the contrary, section 61 and sections 62A to 62I, inclusive, of chapter 30 of the General Laws, chapter 91 of the General Laws and section 40 of chapter 131 of the General Laws shall not apply to bridge projects of the Massachusetts Department of Transportation and the Massachusetts Bay Transportation Authority for the repair, reconstruction, replacement or demolition of existing state highway, authority and municipally-owned bridges…*"

The structures that are considered exempt will be identified in the Notice of Intents (NOIs) filed within each community. These elements will nevertheless be permitted under the Sections 401 and 404 of the Clean Water Act, with mitigation provided in accordance with state and federal requirements as part of MassDOT's SGR program.

Outstanding Resource Waters

Massachusetts regulations designate certain areas as ORWs "as determined by their outstanding socioeconomic, recreational, ecological and/or aesthetic values." ORWs in Massachusetts include public drinking water supplies, as well as tributaries to these supplies. Vernal pools are also designated as ORWs.

Local Wetland Bylaws and Ordinances

Several communities along the right-of-way corridors enforce local wetlands protection bylaws that may further regulate many of these resource areas. As a state agency, MassDOT is exempt from local bylaws and local bylaws are not addressed in this document.

8.2.2 Methodology

This section describes the methodology to document existing wetlands within the Phase 1 Project Study Area. The study area was assessed for the presence of wetland resources. Two sources of information were used to determine the approximate limits and cover type of existing wetlands and their connectivity to larger wetland systems. The sources of information included Geographic Information Systems (GIS) mapping using data available from MassGIS[6] and field verification.

8.2.2.1 Existing Information

Existing information for wetland resources within the Phase 1 Study Area was available from MassGIS. A GIS layer (described below) provided the starting point for the wetland information presented in the figures included in the DSEIR.

GIS Mapping

The MassGIS DEP Wetlands layer, last updated in April 2007, provided an underlying data set for defining wetland resources for each of the analytical approaches. This layer provided approximate location, general vegetation cover type, and size of wetland resources, including hydrologic connections and stream characteristics. Information contained in this layer was interpreted from 1:12,000 scale, stereo color-infrared (CIR) photography by staff at the University of Massachusetts (UMASS), Amherst.

The Phase 1 Study Area was evaluated for the presence of BLSF through GIS mapping. Federal Emergency Management Agency (FEMA) floodplain maps were used in conjunction with the DEP Wetland layers to determine where the 100-year floodplain extended past the boundary of Bank and BVW. BLSF was assumed to occur in such instances.

Riverfront Area was evaluated where the U.S. Geological Survey (USGS) 7.5 Minute map showed a perennial stream crossing the right-of-way. Bank could not be accurately delineated at this scale of resolution.

Due to the limitations of this methodology, no ILSF or non-state federal wetlands were identified using this approach. Wetlands within or adjacent to the right-of-way for the Phase 1 Study Area were delineated in accordance with the Corps of Engineers Wetlands Delineation Manual, as updated.

Mapped vernal pools consist of certified vernal pools and potential vernal pools as identified in the 2017 Natural Heritage and Endangered Species Program (NHESP) Natural Heritage Atlas as well as vernal pools that were field verified in the Phase 1 Project Study Area. Additional information on vernal pools can be found in Chapter 9, *Biodiversity, Wildlife and Vegetation*.

Field Verification

Field verification of wetland boundaries was conducted within the Phase 1 Study Area using the following methods.

6 MassGIS Data - DEP Wetlands (1:12,000).

8.2.2.2 Delineation Criteria for Vegetated Wetlands

To identify and delineate the jurisdictional wetland resource areas within the Phase 1 Study Area corridor, field surveys were conducted along the entire length of the right-of-way. This effort involved field work in all four municipalities along the length of the Phase 1 Project corridor.

Vegetated wetlands and waterways were identified and delineated using the methods and criteria established in the 1987 Corps Manual[7] and the 2012 Northcentral-Northeast Regional Supplement[8], as well as the 1995 State Manual[9]. Potential wetland resource areas were examined by field investigators using these criteria all along the Phase 1 Project corridor. To document conditions in each identified wetland resource area, a representative observation point was selected, and field data sheets were completed describing the upland and wetland characteristics of the observation point.

Wetland areas were delineated in the field between August 2016 and August 2017. Wherever wetland resource areas occurred, points to designate the boundaries were marked with colored flagging and surveyed. In some locations, points were located with a Trimble® GeoXT hand-held GPS device.

Hydrophytic Vegetation

Visual estimates of species abundance were made for the upland and wetland plant communities at each observation point, and the dominant species were determined and recorded by genus and species on field data sheets. Dominant species were determined separately for each vegetative stratum as trees, saplings/shrubs, herbs, and vines.

The wetland indicator status of each species was determined according to the 2016 *National List of Plant Species That Occur in Wetlands: Region 1, Northeast*[10], which is based on the national list[11] According to the Regional Supplement, three separate procedures exist to determine whether an area has hydrophytic vegetation: the rapid test for hydrophytic vegetation, the dominance test, and the prevalence index. These procedures are discussed in detail in the Regional Supplement[12]. All three methods were considered when evaluating site conditions.

7 Environmental Laboratory. (1987). "Corps of Engineers Wetlands Delineation Manual," Technical Report Y-87-1, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

8 Environmental Laboratory, (2012). "Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (Version 2.0). U.S. Army Engineer Research and Development Center, Environmental Laboratory, Vicksburg, MS.

9 Massachusetts Department of Environmental Protection. (1995). "Delineating Bordering Vegetated Wetlands Under the Massachusetts Wetlands Protection Act."

10 Reed, P. B., Jr. (1988). National list of plant species that occur in wetlands: Northeast (Region 1). Biological Report 88(26.1). Washington, DC: U.S. Fish and Wildlife Service.

11 Reed, P. B., Jr. (1988). National list of plant species that occur in wetlands: 1988 National Summary. Biological Report 88(24). Washington, DC: U.S. Fish and Wildlife Service.

12 USACE, (2012) Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (Version 2.0).

Soils

Baseline soils information was determined from review of existing data, including the U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) Soils Surveys of Bristol, Plymouth, and Norfolk/Suffolk counties of Massachusetts[13], county and state lists of hydric soils, and data collected from the previous wetland delineations.

During wetland investigation, soils were examined with a hand auger to determine if hydric soil characteristics were present. Auger holes were excavated to a depth that confirmed the presence of hydric soils in wetland areas, or that eliminated the possibility of hydric soils in uplands. Instances of auger refusal often occurred at a depth of only a few inches due to the subsurface conditions of the large disturbance area associated with existing railroad beds. The colors of the soil matrix and any redoximorphic features were described using Munsell® Soil Color Charts. Information describing the upland and wetland soil profiles was recorded on the field data sheets for each identified wetland.

Hydrology

Site hydrology was determined in the field based on properties such as soil saturation, inundation, oxidized root zones, manganese concretions, drainage patterns, and proximity to a perennial waterway. Hydrologic indicators were based on the 1987 Corps Manual, the 2012 Northcentral-Northeast Regional Supplement, and the 1995 State Manual.

8.2.2.3 Delineation Criteria for Other Resource Areas

The following sections describe the criteria used to determine the boundaries of other resource areas.

Bank

Bank was delineated according to Massachusetts regulations (310 CMR 10.54) as the lower of the first break in slope or mean annual flood level. Waterbodies were identified, including perennial and intermittent streams as well any ponds, and Bank flags were hung at the first observable break in the slope.

Land Under Waterbodies and Waterways (LUW)

LUW was based on the delineation of Bank. In areas that contain a perennial or intermittent stream or pond, LUW extends downgradient from Bank flags.

Bordering Land Subject to Flooding (BLSF)

BLSF (310 CMR 10.56) was not delineated in the field. The extent of this resource area is based on published FEMA flood elevations, which estimate the elevations to which water would flood during a 100-year storm event[14]; any area below this elevation to the Bank of a corresponding waterway or a BVW is BLSF.

13 US Department of Agriculture, Natural Resource Conservation Service. Web Soil Survey. Available online at: http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm, accessed June 1, 2012.

14 A "100-year storm event" has a 1 percent probability of occurring in any given year.

Isolated Land Subject to Flooding (ILSF)

ILSF, (310 CMR 10.57)) areas were identified along the Phase 1 Project corridor only when they were already known to be ILSF from previous plans, or when they were positively identified as ILSF by visual observation and estimation of their ability to hold one quarter-acre foot of water at an average depth of 6 inches.

Riverfront Area (RA)

RA (310 CMR 10.58) was not delineated in the field. Measurement of these resource areas is based on the determination of mean annual high water. In areas that contain a perennial stream, RA extends 200 feet upgradient from Bank flags.

8.2.2.4 Wetland Functions, Values and Significant Interests

Wetlands, watercourses, and water bodies may provide a variety of functions and values, such as wildlife habitat, fish habitat, visual/aesthetic quality, water-based recreation, flood storage and storm damage prevention, groundwater and surface water quality and quantity, pollutant attenuation through nutrient retention and sediment trapping, shoreline stabilization, and dissipation of erosive forces. Ecological functions and societal values vary with each wetland. Factors affecting wetland function include size, location in the watershed, number and interspersion of plant cover types, and the degree of disturbance.

The WPA regulations list eight functions and values, defined as significant interests, provided by wetland resource areas. These are:

- Protection of public and private water supply;
- Protection of ground water supply;
- Flood control;
- Storm damage prevention;
- Prevention of pollution;
- Protection of land containing shellfish;
- Protection of fisheries; and
- Protection of wildlife habitat.

The regulations presume that each wetland resource area is significant to some or all of these interests. These presumptions are rebuttable under the regulations in cases where the resource area has been altered by development or other human activities.

Table 8.2-1 summarizes the regulatory presumptions for each state-regulated inland wetland resource area.

Table 8.2-1 State Wetland Resource Area Presumptions of Significance

	LUW	Bank	BVW	BLSF[1]	ILSF[2]	Riverfront Area
Public and Private Water Supply	X	x	x	-	x[2]	x
Ground Water Supply	X	x	x	-	x[2]	x
Flood Control	X	x	x	x	x	x
Storm Damage Prevention	X	x	x	x	x	x
Prevention of Pollution	X	x	x	-	x	x
Fisheries	X	x	x	-	-	x
Land Containing Shellfish	-	-	-	-	-	x
Wildlife Habitat	X	x	x	x	x	x

1 Only those areas within the 10-year floodplain, or within 100 feet of bank or BVW (provided those areas are within the 100-year floodplain) and all vernal pool habitat within the 100-year floodplain, except for those portions which have been so extensively altered that their important wildlife habitat functions have been eliminated.

2 ILSF is presumed significant to Public and Private Water Supply and Ground Water Supply when underlain by pervious material. When it is underlain by organic material it is presumed significant to Prevention of Pollution. Vernal Pool habitat within ILSF is significant to Wildlife Habitat.

The Army Corps of Engineers New England District method for assessing wetland functions and values[15] was employed for the Phase 1 Project. There are eight wetland functions and five wetland values as listed below.

Wetland Functions:

- Floodflow Alteration;
- Fish and Shellfish Habitat (Aquatic Diversity/Abundance);
- Sediment/Toxicant Retention (Pollutant Attenuation);
- Nutrient Removal/ Retention/Transformation (Pollutant Attenuation);
- Production Export (Nutrient);
- Wildlife Habitat;
- Uniqueness/Heritage; and
- Recreation (Consumptive/Non-Consumptive).

Wetland Values:

15 USACE. 1999. *The Highway Methodology Workbook Supplement, Wetland Functions and Values - a Descriptive Approach*. New England District, U.S. Army Corps of Engineers, NAEEP-360-1-30a. Concord, MA.

- Groundwater Recharge/Discharge
- Sediment/Shoreline Stabilization
- Educational/Scientific Value
- Visual Quality/Aesthetics
- Threatened or Endangered Species Habitat

Floodflow Alteration (Storage/Desynchronization)

Wetlands can be important in the storage and desynchronization of floodwaters, protecting downstream resources from flood damage. Wetlands high in the watershed with constricted outlets or closed basins are generally important in capturing and detaining floodwaters. Other wetland characteristics that contribute to flood storage and desynchronization include broad floodplains and plant communities consisting of low, dense vegetation.

Study Area wetlands designated as having floodflow desynchronization functions are identified by considering the local topography (broad, relatively flat areas), size, presence of ponded water, contiguous/branched channels, well vegetated floodplains along rivers and larger streams, and position in the landscape. The location of culverted streams within the right-of-way provides a means for retaining floodwaters higher in the watershed.

Fish and Shellfish Habitat (Aquatic Diversity/Abundance)

Large wetlands contiguous to a large, perennial stream or waterbody capable of supporting large fish and/or shellfish populations are important in providing Aquatic Diversity/Abundance. Other wetland characteristics that contribute to Aquatic Diversity/Abundance include good water quality, an abundance of shoreline vegetation, objects or vegetation that provide cover, spawning areas such as beds of submerged aquatic vegetation or gravel beds, and the lack of barriers such as dams and waterfalls which prevent fish movement.

Sediment/Toxicant Retention (Pollutant Attenuation)

Wetland basins with permeable soils that detain storm and flood waters and promote percolation reduce runoff rates sufficiently to allow sediments and the adsorbed toxicants to settle from the water column. Diffuse channels, deep pools, and dense low vegetation are wetland characteristics that may also contribute to this process by slowing water velocities.

Nutrient Removal/Retention/Transformation (Pollutant Attenuation)

Wetlands can serve as a filter for the removal or detention of nutrients carried in surface water flows. Many wetland plants respond to high nutrient concentrations with accelerated rates. Some nutrients are assimilated in plant material while others are trapped in organic sediments in wetlands by chemical, physical, and biotic actions.

Study Area wetlands designated as having nutrient removal functions are identified by the presence of large areas of open or ponded water with dense emergent vegetation, meandering streams with slow water velocities (supporting aggradations), and contiguous/branched channels.

Production Export (Nutrient)

Production export is the production of organic material and its subsequent transport out of a wetland to downstream areas or to deeper waters within the basin. This organic material is then added to the food chain where it is eaten by fish and other aquatic organisms. Wetlands with dense vegetation dominated by non-persistent emergent vegetation are important in supplying downstream wetlands with organic material. Wetlands dominated by shallow marshes with a perennial stream flowing from them are most important in providing production export.

Wetlands designated as having production export functions are classified by the presence of high densities and diversity of hydrophytic vegetation, presence of abundant fish and wildlife and downstream/downgradient evidence of export.

Wildlife Habitat

Large, undisturbed wetlands greater than 1 acre are generally considered to provide important wildlife habitat functions. Other factors that contribute to the provision of important wildlife habitat include the presence of shallow, permanent open water of good quality; proximity to undisturbed upland wildlife habitat; a high degree of interspersion of vegetation classes; a high degree of species and structural diversity within the vegetational community; high vegetation density; and the presence of wildlife food plants. Wetlands that are contiguous to other wetland areas may serve as travel or migratory corridors for wetland wildlife. Presence of vernal pools (ephemeral bodies of water that lack fish populations) connote a high wildlife value because several wildlife species, in addition to the obligate vernal pool species such as wood frog (*Rana sylvatica*) and ambystomid salamanders (*Ambystoma* spp.), use vernal pools and the areas immediately adjacent for feeding, cover, courtship, and overwintering habitat.

Size, adjacent land use, water quality, and presence of vernal pools are used to classify wetlands as important wildlife habitat for waterfowl, reptiles and amphibians, terrestrial bird species, and mammals.

Uniqueness/Heritage

The Uniqueness/Heritage function includes considerations of science, the endangerment of the wetland, and the importance of the wetland in the context of its local and regional environment. The wetland may contain areas of archaeological, historical, or social significance, or it may represent the last fragment of its wetland type in an urbanized or agricultural environment. The presence of relatively scarce wetland habitats or wetland species contributes to the Uniqueness/Heritage function provided by the wetland. Areas containing Estimated Habitats of Rare Wildlife (Estimated Habitat) or Priority Habitats of Rare Species (Priority Habitat) mapped by the NHESP confer a higher value in this category.

Recreation (Consumptive/Non-Consumptive)

Wetlands designated as having Recreational value are classified based on the suitability of the wetland and associated watercourses to provide recreational opportunities such as hiking, canoeing, boating, fishing, hunting and other recreational activities. Consumptive opportunities, such as fishing and hunting, consume or diminish the plants, animals, or other resources that are intrinsic to the wetland. Non-consumptive opportunities do not diminish these resources of the wetland.

8.2.2.5 Impact Assessment Methodology

Quantification of Direct Impacts

As required by the NEPA Council on Environmental Quality (CEQ) regulations,[16] the analysis of the environmental consequences requires discussion of the direct and indirect effects of a proposed action, and their significance. Direct effects are defined as those "which are caused by the action and occur at the same time and place."[17] Indirect effects are defined as those "which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems."[18] These types of indirect effects are further discussed in Chapter 13, *Indirect Effects and Cumulative Impacts*.

MEPA requires "a detailed description and assessment of the negative and positive potential environmental impacts of the alternatives. The EIR shall assess (in quantitative terms, to the maximum extent practicable) the direct and indirect potential environmental impacts from the Project that are within the Scope. The assessment shall include both short-term and long-term impacts for all phases of the Project (for example, acquisition, development, and operation) and cumulative impacts of the Project, any other projects, and other work or activity in the immediate surroundings and region."[19] Cumulative impacts are discussed in Chapter 13, *Indirect Effects and Cumulative Impacts*.

Direct wetland impacts, both temporary and permanent, are anticipated along each of the proposed alternatives. Each alternative corridor was assessed for the presence of wetland resources within and adjacent to the right-of-way, and the impacts associated with them. Permanent impacts are the loss of a wetland resource area following construction. Permanent impacts may result from, but are not limited to, wetland fill, dredging, and watercourse relocation or alteration.

16 Code of Federal Regulations (CFR), Title 40: Protection of the Environment, Part 1502- Environmental Impact Statement, Section 1502.16 Environmental Consequences (40 CFR 1502.16).
17 40 CFR 1508.8(a).
18 40 CFR 1508.8(b).
19 301 Code of Massachusetts Regulations, Title 11.00: MEPA Regulations. Section 11.07- EIR Preparation and Filing, (6) Form and Content of EIR, (h) Assessment of Impacts. (11 CMR 11.07(6)(h)).

Temporary impacts that may occur along the right-of-way include work areas adjacent to the alignment, placing erosion control devices including hay bales and silt fences, vegetation removal, and any indirect impact that could result from the migration of exposed soils. Examples of temporary impacts include short-term disturbances to wetlands and waterways during construction that will cease once construction activities are complete. These may include, but are not limited to, installing erosion controls, establishing work areas, or installing temporary structures at stream crossings. The measures that will be implemented for the Phase 1 Project are the same as those discussed in greater detail in Section 4.16.9.4 – Temporary Construction-Period Impacts of the SCR FEIS/FEIR.

As described in the Existing Conditions section, each impacted wetland along the Phase 1 Project corridor was also evaluated for its functions and values as well as the ability of each wetland to protect the interests of the Act. The evaluation was based on eight functions and five values as described and outlined by the United States Army Corps of Engineers, New England District.[20] The wetlands were evaluated using GIS data layers, orthophotos, and visual inspections of critical areas. Functions and values of impacted wetlands are shown on the figures illustrating each rail and roadway segment. These graphics show the functions and values, cover type, and total area of permanent loss for each impacted wetland. This information is presented in the large (1.75 x 1.75-inch) boxes on the graphic. Where a large wetland will be impacted in several locations, smaller (1 x 1.25-inch) boxes are shown for each localized area of impact. These boxes show the cover type and amount of wetland loss in a specific sub-area of a larger wetland. Detailed information is provided about the total area of each wetland, the amount of impacted area, and the impacted cover types.

Once the wetland resource areas had been delineated and the preliminary track layout was determined, direct impacts to wetland resource areas were quantified. The quantification of direct impacts was performed using CAD analysis of the layout of the track and stations, all wetland resource areas, and the limit of disturbance of the Project. The limit of disturbance represents the limit of permanent alteration associated with the Phase 1 Project.

Direct impacts were calculated as being either permanent or temporary. Permanent impacts are any direct impact (fill) to wetland resource areas that are within the limit of disturbance. These impacts include fill, retaining walls, and other disturbance and structures that will remain in place and permanently impact the wetland resource area. Permanent impacts were determined by calculating the areas of any portion of a wetland resource area inside the limit of disturbance.

Permanent impacts were calculated for all wetland resource areas: BVW, LUW, Isolated Vegetated Wetlands (IVW), Bank, RA, BLSF, and ILSF. For BLSF and ILSF, only the area of impact has been estimated, rather than the total volume of impact to these resource areas. Since detailed design for work within BLSF does not yet exist, the volume of impact to these resource areas cannot be calculated

20 U.S. Army Corps of Engineers, New England District. 1999. *The Highway Methodology Workbook Supplement,* US Army Corps of Engineers, New England District Tech. Rept. NAEEP-360-1-30a, 32pp.

with accuracy. Additionally, where FEMA has not completed the detailed analysis to establish the limits of BLSF, a hydrologic assessment is required to determine the flood elevation. These hydrologic assessments and volume calculations for BLSF will be developed during final design and be included in permit application materials.

Impacts to RA were calculated as a those impacts to the area within 200 feet of a perennial waterway which would largely constitute redevelopment of previously developed land. The RA within the Phase 1 Project corridors has been previously altered in association with construction and maintenance of the embankment and track infrastructure for the existing active freight lines. Areas of impact to RA outside of the existing track bed are limited to impacts due to culvert and bridge repairs where the previously disturbed RA has reestablished natural vegetation over time. Temporary and permanent impacts to ORWs were determined by identifying BVWs that contained a vernal pool within 100 feet of the right-of-way. These determinations are conservative and included certified vernal pools (CVPs), potential vernal pools (PVPs), and vernal pools that have been field verified in support of the Phase 1 Project (SCR-VPs). Additional information on potential impacts to vernal pools can be found in Chapter 9, Biodiversity, Wildlife and Vegetation. Aside from Vernal Pools, no other ORWs have been designated within the Phase 1 Study Area.

Temporary impacts represent unavoidable disturbances to the wetland associated with constructing the Project which will not impact the wetland longer than the period of construction. These impacts mainly arise from the necessity of crew and machinery to work beyond the limit of permanent disturbance in order to construct slopes, retaining walls, and other portions of the Project.

Secondary and/or Indirect Impact Analysis Methodology

Secondary (indirect) effects are defined in EPA Regulations at 40 CFR Part 230.11.[21] The EPA regulations state that "Secondary effects are effects on an aquatic ecosystem that are associated with a discharge of dredged or fill materials, but do not result from the actual placement of the dredged or fill material." Additionally, although not specifically addressing impacts to aquatic resources, the NEPA CEQ regulations at 40 CFR Part 1508.8[22] define indirect effects as "effects, which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects many include related effects on air and water and other natural systems, including ecosystems".

Secondary and/or indirect impacts are therefore the consequences of an action's direct impacts. For example, while the direct impact of filling a wetland would be the loss of the filled wetland area and the functions and values provided by that specific area, the secondary and/or indirect impacts of that wetland fill would result from the associated changes to the overall size of the wetland, hydrology,

21 40 CFR §230.11, Factual Determinations. Available on line at: http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&tpl=/ecfrbrowse/Title40/40cfr230_main_02.tpl, accessed June 1, 2012.
22 40 CFR §1508.8, Effects http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&tpl=/ecfrbrowse/Title40/40cfr1508_main_02.tpl, accessed June 1, 2012.

cover type, species assemblage, or degree of habitat fragmentation. These types of impacts could adversely affect the ability of the wetland to provide functions and values, or could diminish the functions and values to a degree greater than would be attributed simply due to the loss of area. Isolated fragments of wetlands or waterways may have reduced habitat value, no longer provide viable fish or wildlife habitat or be so isolated that the wetland or waterway fragments are rendered inaccessible to many fish or other aquatic species.

Methodology and Criteria for Evaluation

MassDOT met with the South Coast Rail Interagency Coordinating Group (ICG) in 2012 to develop a methodology for evaluating secondary and/or indirect impacts to wetlands from the SCR Project. The methodology was presented in a memorandum prepared by MassDOT that incorporated ICG comments.

The assessment of secondary and/or indirect impacts from the Phase 1 Project utilized the same methodology and focuses on wetlands within 100 feet of the right-of-way along the Phase 1 Project corridor. The methodology developed by MassDOT to assess secondary and/or indirect impacts is a stepwise process that first evaluates any direct impacts to a given wetland, and then assesses the result of those impacts on the functions and values that the wetland provides, using a checklist of potential effects developed by MassDOT. The checklist is based on "considerations and qualifiers" for each wetland function and value, based on those outlined in a document prepared by the USACE New England Division.[23] These considerations and qualifiers are identified as the principal characteristics which contribute to the ability of each wetland to provide the indicated function or value. If the direct wetland impact of the proposed action alters these characteristics, it is presumed to alter the ability of the wetland to continue to provide the associated function or value.

For this analysis, secondary and/or indirect impacts to wetlands and other Waters of the United States include the following effects which could be caused by the placement of fill within jurisdictional wetlands, but occur at a different location or time:

- Changes in wetland functions; or
- Changes in wetland physical/biological characteristics as a result of the direct impacts (loss of wetland).

The types of direct impacts and the secondary and/or indirect impacts that may result include:

- Filling a portion of a wetland (loss of)–reduction in wetland size, introducing human activity (noise, disturbance);
- Dredging a wetland/pond–change in hydrology, vegetation, habitat;
- Installing a new culvert or changing existing culvert–alter water levels or flow patterns;

23 The Highway Methodology Workbook Supplement, Wetland Functions and Values - a Descriptive Approach. USACE NED, 1999.

- Removing canopy or other vegetation–change light regimes, water temperature, plan community structure; or
- A new discharge of stormwater–alter water levels or flow patterns, or introduce sediments or nutrients.

Assessment of Secondary and/or Indirect Impacts

Secondary and/or indirect impacts were assessed for each wetland within 100 feet of the right-of-way, based on the functions and values that the wetland provides and the type and extent of the direct wetland impact and/or work adjacent to the wetland that is the cause of the secondary and/or indirect impact. The steps of this process are:

- For each wetland, identify the type of direct impact:
- Loss of wetland area due to placement of fill
- New culvert
- Replacement of existing culvert
- Direct discharge of untreated stormwater from a pollutant source
- For each wetland, identify the type of work occurring within 100 feet of the wetland:
- Improvement of existing freight or commuter rail tracks and increased train service
- Replacement of track infrastructure on out-of-service rail and addition of train service, and
- Evaluate secondary and/or indirect impacts based on function-specific considerations using the MassDOT checklist of potential effects.

The list of potential effects on functions and values is based on the "considerations and qualifiers" for each wetland function and value, as presented in the Corps' "*Highway Methodology Workbook Supplement – Wetland Functions and Values, a Descriptive Approach*" (September 1999). These characteristics are identified in the Workbook Supplement as the principal characteristics which contribute to the ability of each wetland to provide the indicated function or value. If the direct wetland impact of the proposed action altered these characteristics, it is presumed to alter the ability of the wetland to continue to provide these functions.

8.2.3 Existing Conditions

8.2.3.1 Overview

Major Watershed

The Phase 1 Project Study Area passes through the Taunton River Regional Watershed. Watersheds have become an important measure of the overall health and the capacity of a region to handle both stormwater and pollutant loading. The Taunton River regional watershed is the second largest watershed in the state. The watershed consists of 562 square miles of land, with 94 square miles of wetlands.

Major Wetland Systems

Typical wetland resource areas within the Study Area consist of extensive red maple (*Acer rubrum*) swamps, river systems with surrounding red maple swamp and shrub swamps, and small isolated wetlands. The majority of the red maple swamps have a closed tree canopy dominated by red maple and an understory dominated by arrow-wood (*Viburnum dentatum*), silky dogwood (*Cornus amomum*), highbush blueberry (*Vaccinium corymbosum*), and sweet pepperbush (*Clethra alnifolia*). The Middleborough Secondary crosses several intermittent and perennial waterways including Furnace Brook, the Cotley River, Richmond Brook, Box Brook, Poquoy Brook, and several unnamed streams associated with adjacent cranberry bogs. A reach of the Taunton River flows roughly parallel to the rail line in Taunton but the river is not bridged within the Study Area. Except for the Cotley River, which is bridged near Barstow's pond, the other waterways are conveyed under the rail bed in culverts.

8.2.3.2 Existing Conditions by Municipality

This section presents the results of the field delineations of wetland resource areas along the Phase 1 Study Area. The following sections describe the wetland resource areas present in each municipality along the project corridor. Each section includes a table listing the wetland resource areas.

This Chapter only addresses those resource areas that are within the Phase 1 Study Area. Other wetlands within 100 feet of the right-of-way are shown in the figures that accompany Chapter 8, but they were not field delineated at this planning stage of the Project because they will not be directly impacted. Figure 8-1, sheets 1-7, show the existing wetlands and wetland systems identified within the Phase 1 Study Area.

Any wetlands that are designated as ORWs are shaded in the tables below. All wetlands that met the NHESP criteria for certification as vernal pools were designated as ORWs when determining impacts regardless of their certification status. Vernal pools are discussed in detail in Chapter 9 Biodiversity, Wildlife and Vegetation.

Federal jurisdictional wetlands include the state-regulated LUW, BVW, ILSF, as well as other small IVW that are not subject to state jurisdiction.

Middleborough

The Middleborough segment of the Phase 1 Study Area is approximately 0.7 miles long. Five wetlands are located along the right-of-way in Middleborough. Wetlands MMS-3, MMS-4, and MMS-5 are west of Pilgrim Junction. Wetlands along the right-of-way in Middleborough are part of a larger wetland system associated with the Nemasket River and part of the Taunton River regional watershed. Table 8.2-2 lists the wetlands delineated along the right-of-way and the resources associated with each wetland.

Massachusetts Bay Transportation Authority

Figure 8-1: Middleborough Secondary - Wetlands Page Key Sheet

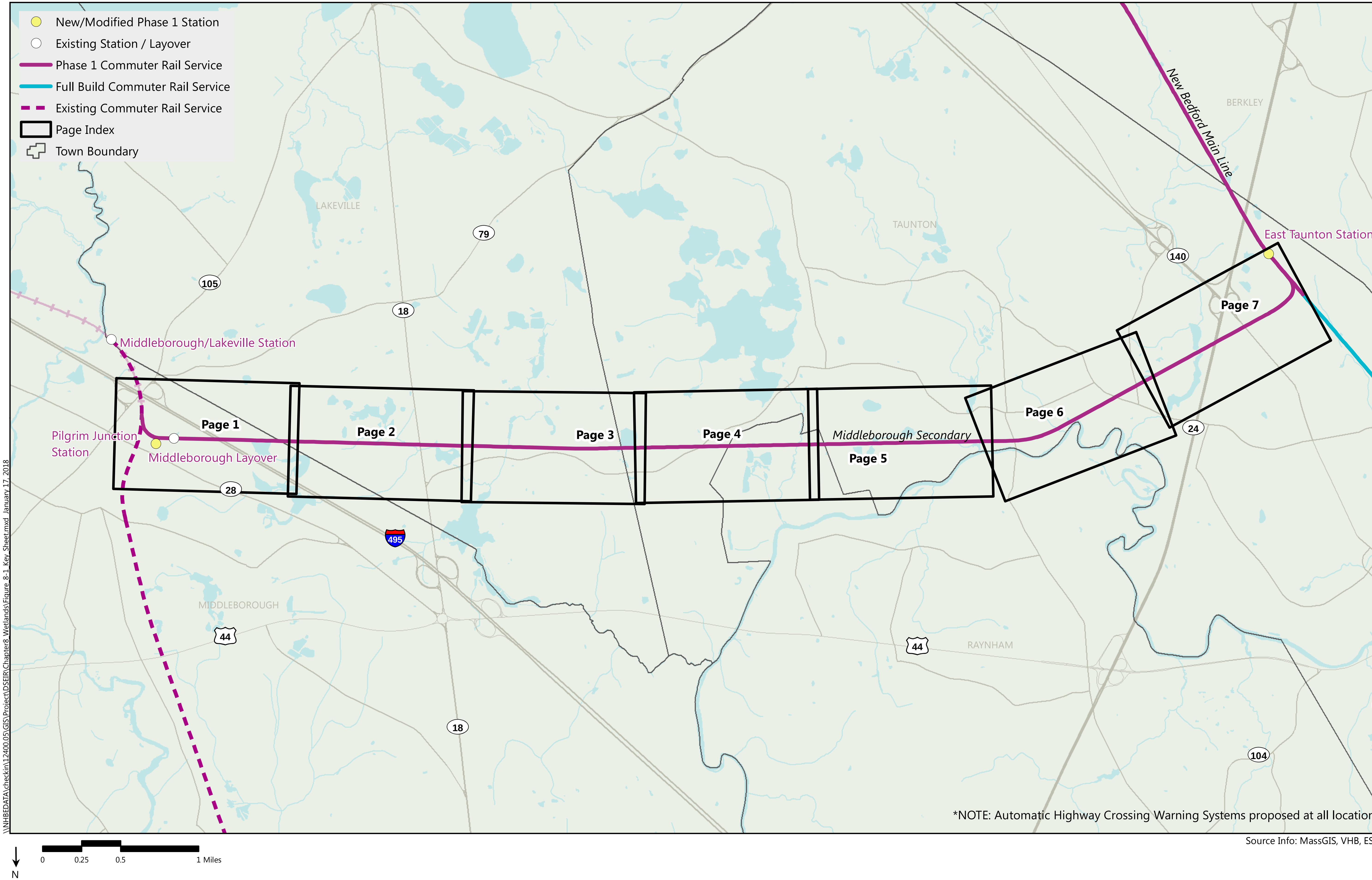

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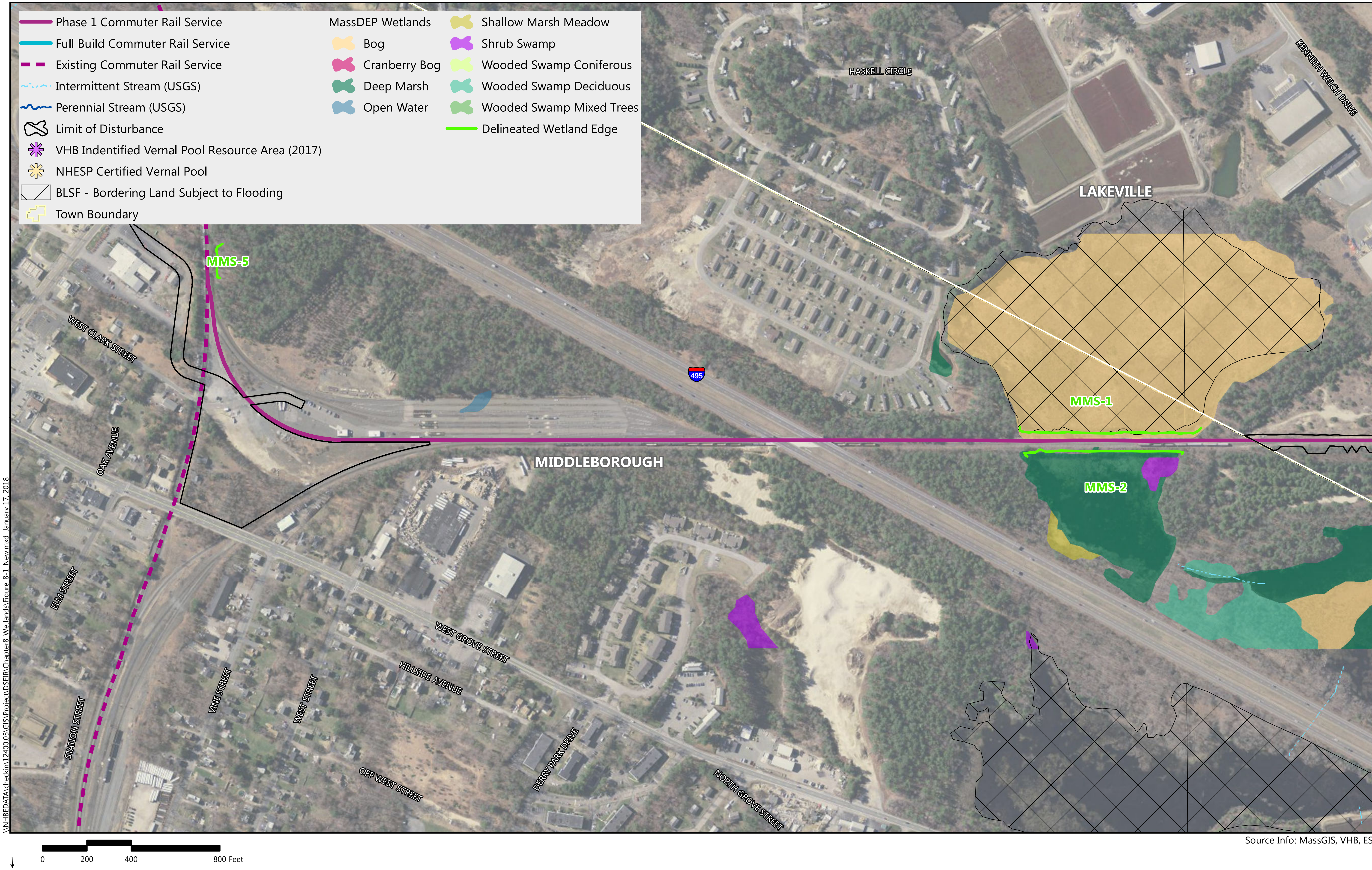
Figure 8-1: Middleborough Secondary - Wetlands



Source Info: MassGIS, VHB, ESRI

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Figure 8-1: Middleborough Secondary - Wetlands

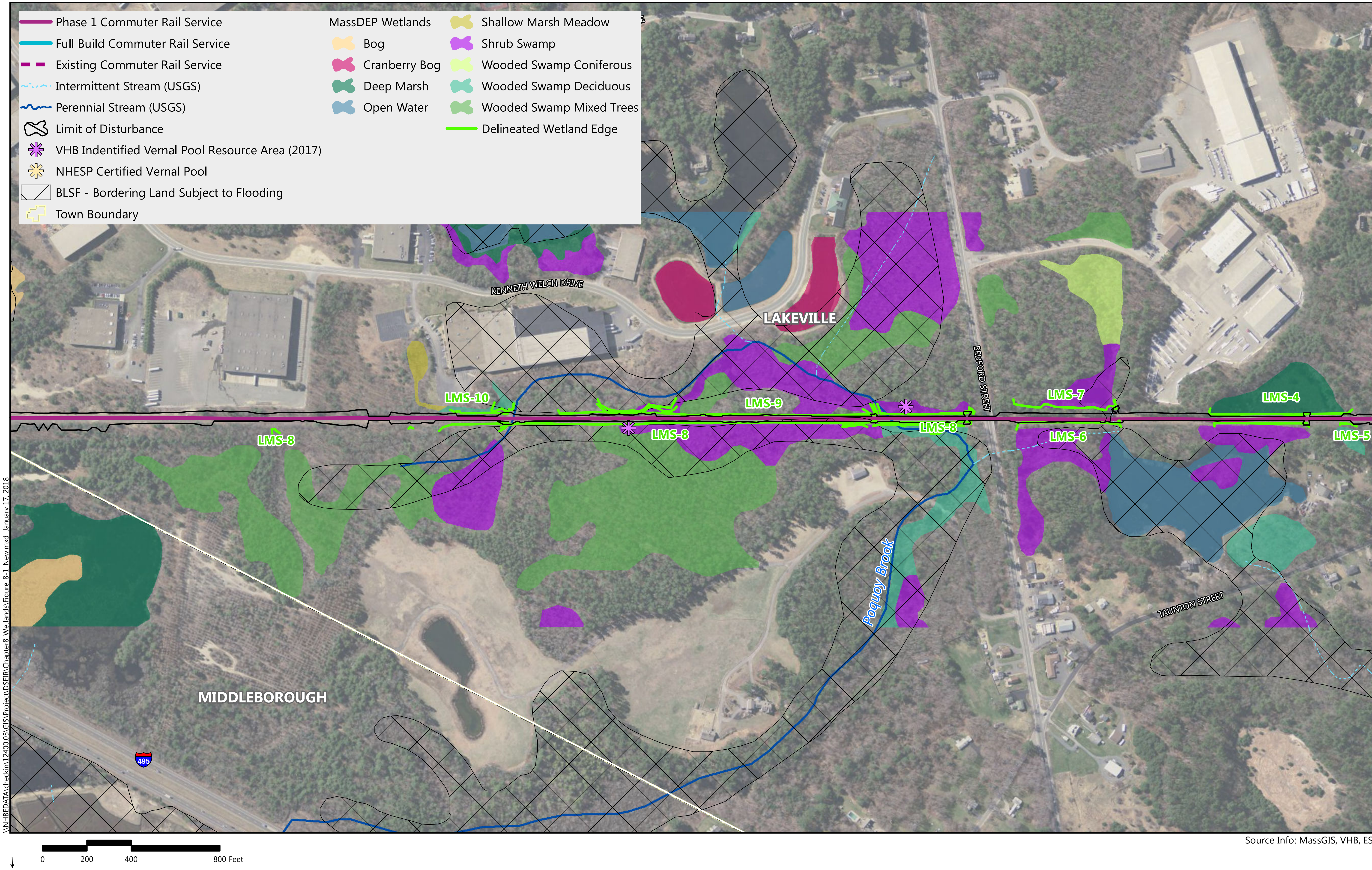

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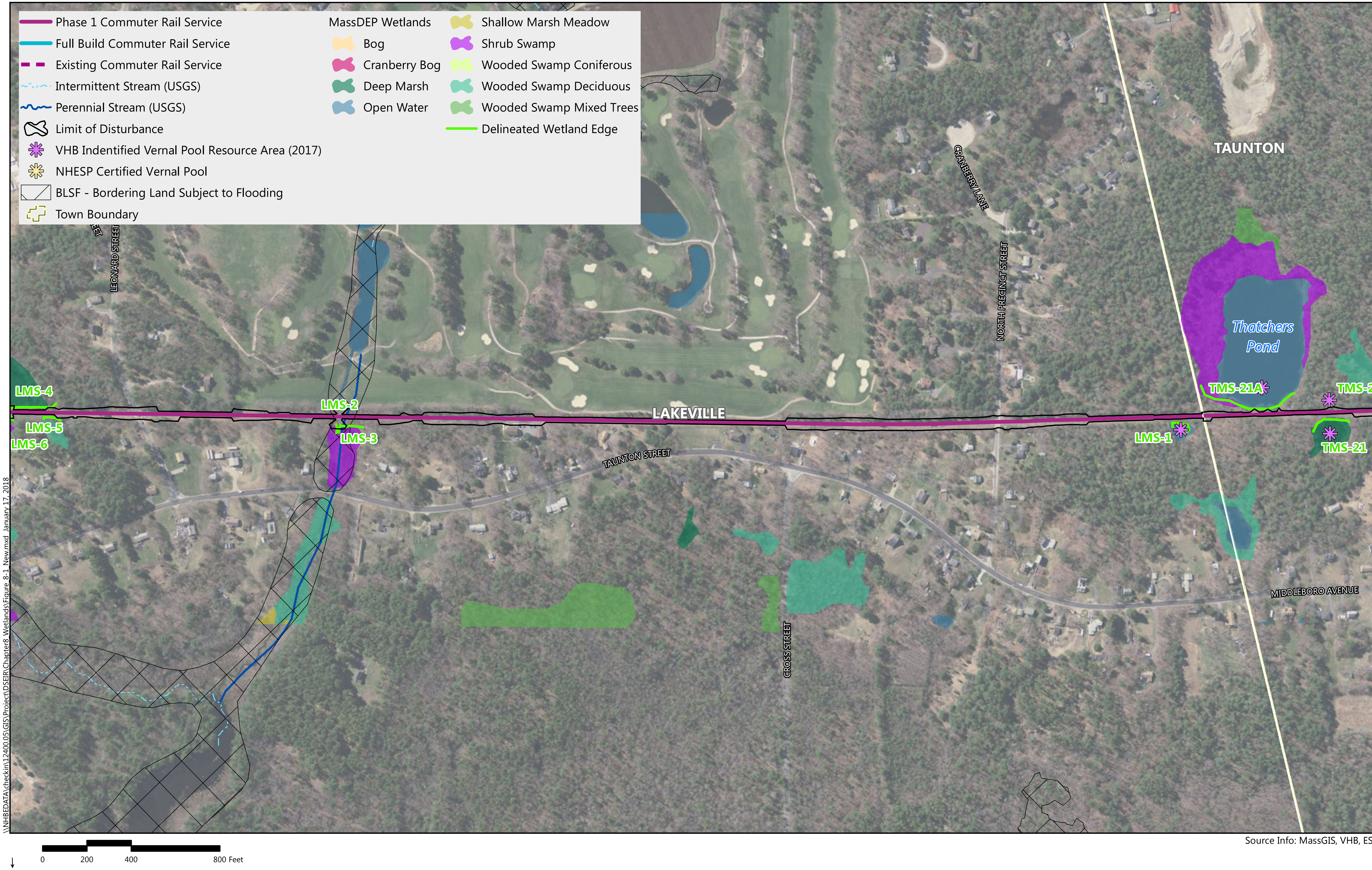
Figure 8-1: Middleborough Secondary - Wetlands



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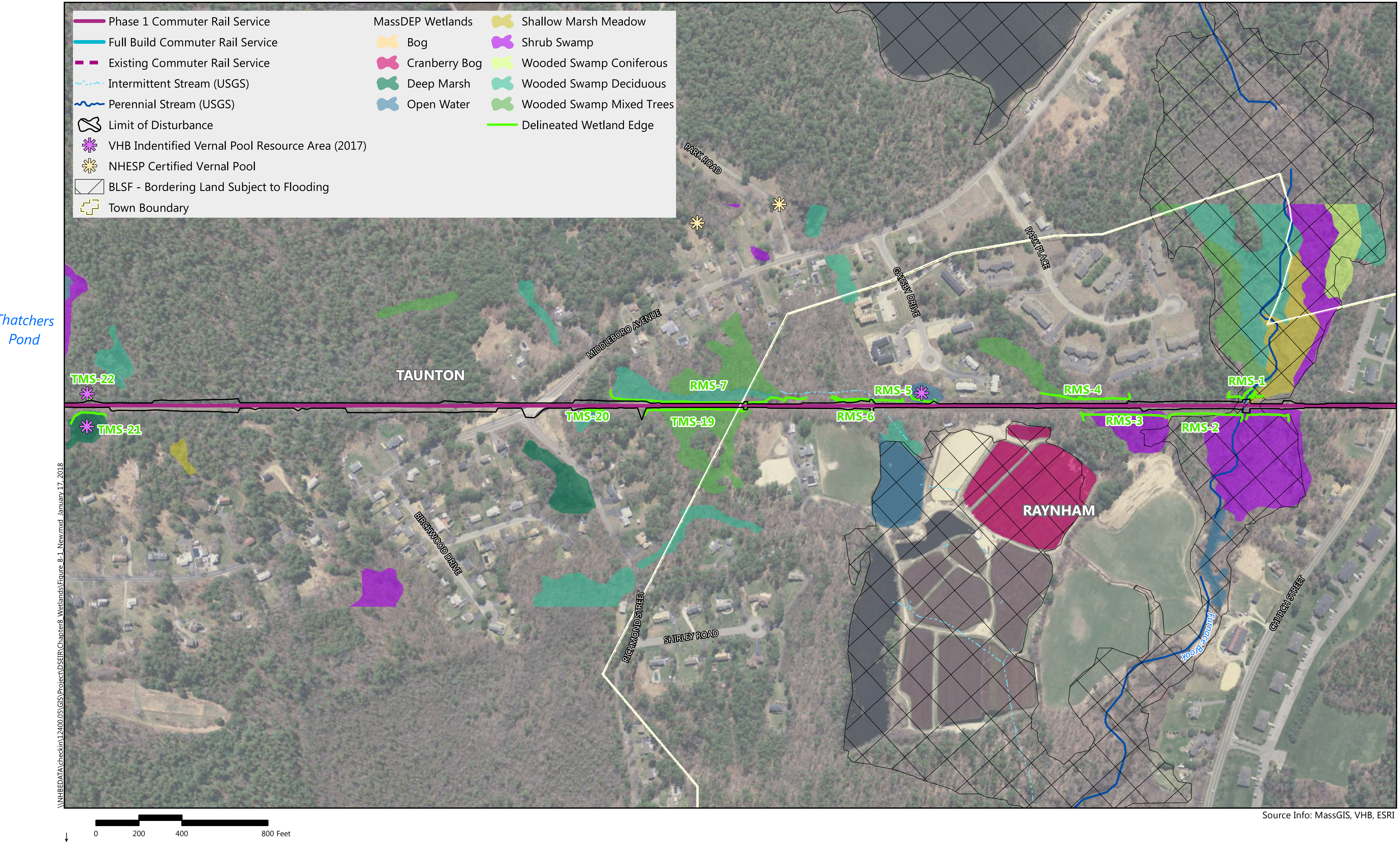

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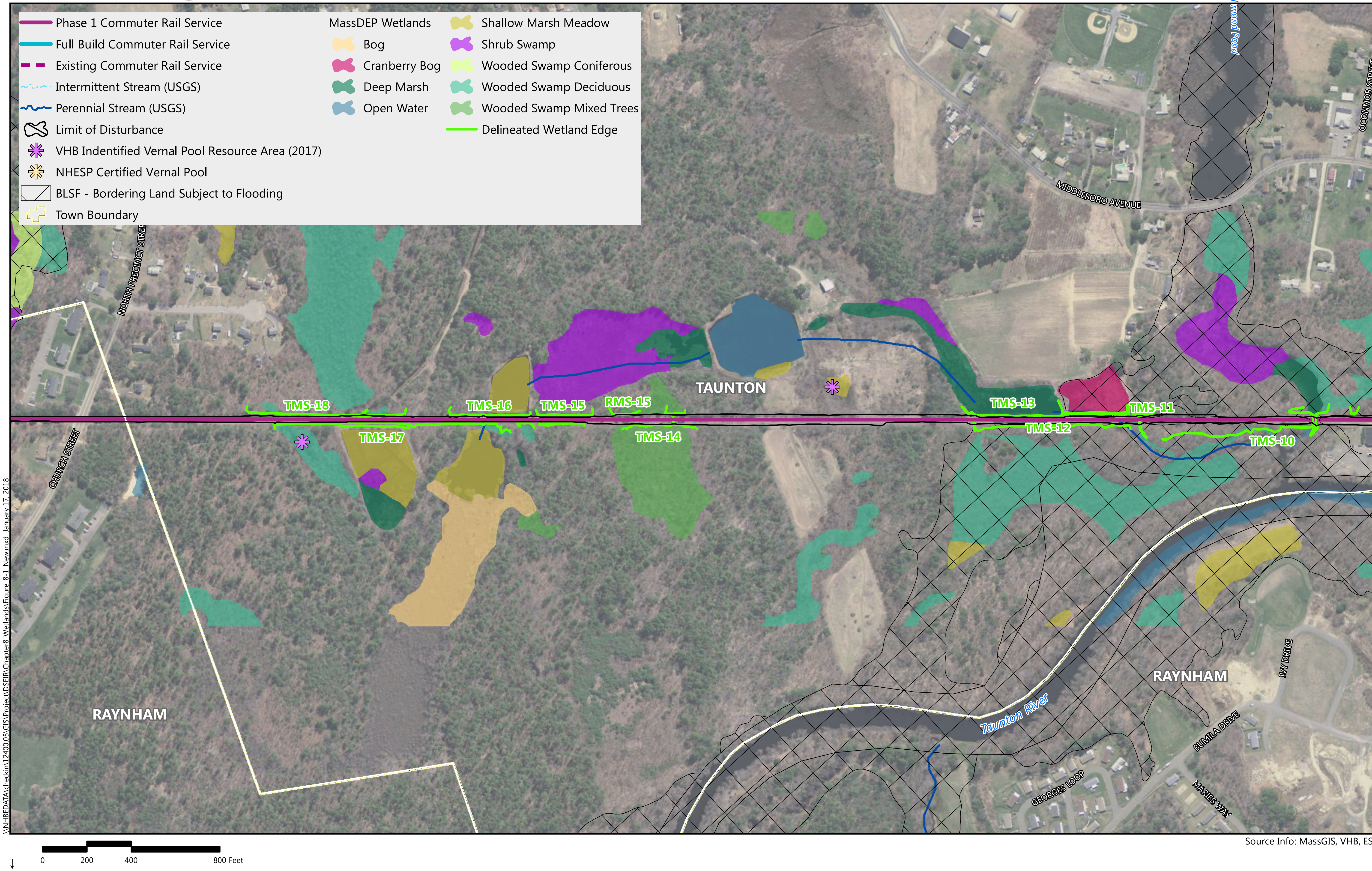
SCR SOUTH COAST RAIL

Massachusetts Bay Transportation Authority



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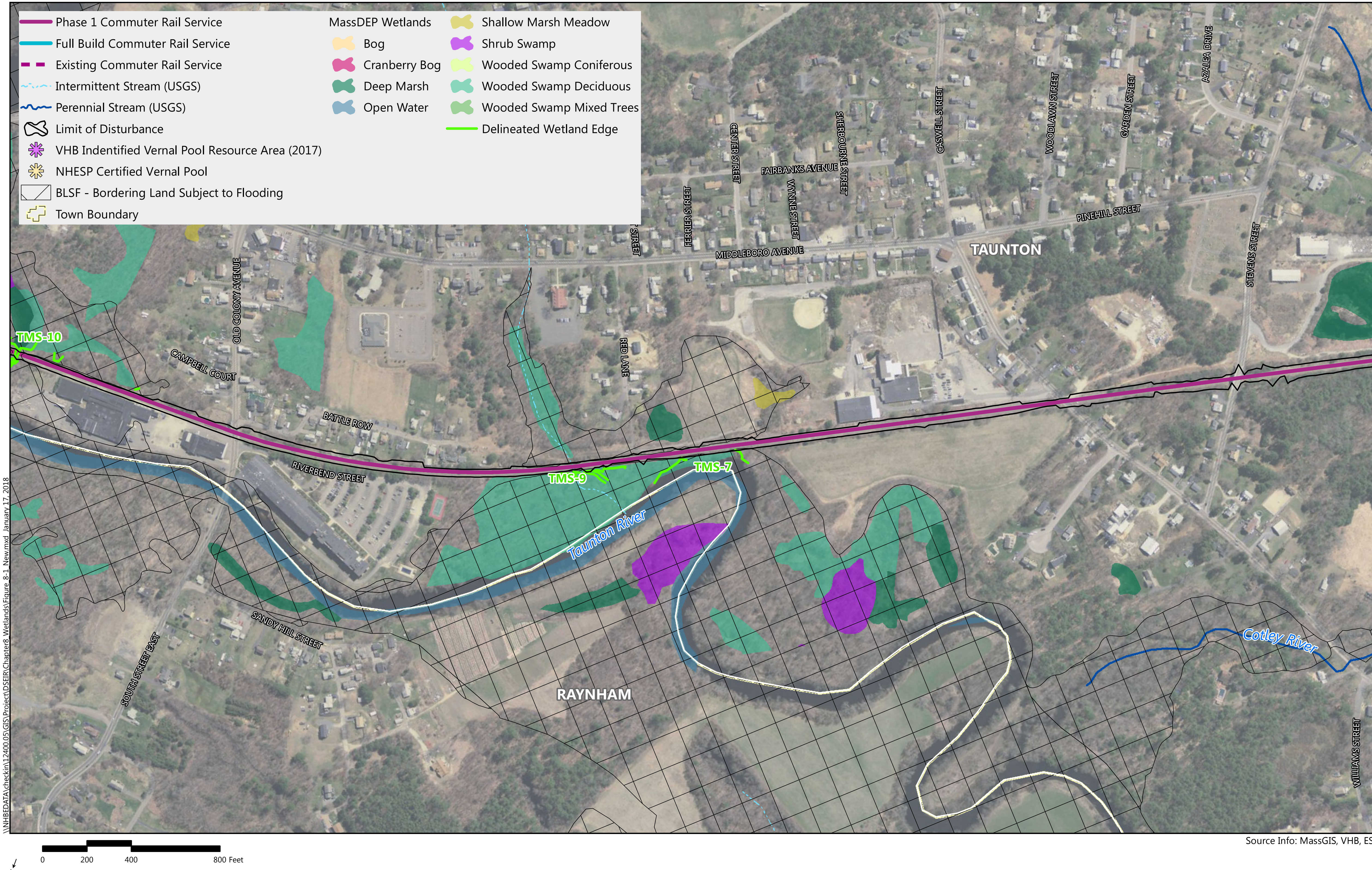

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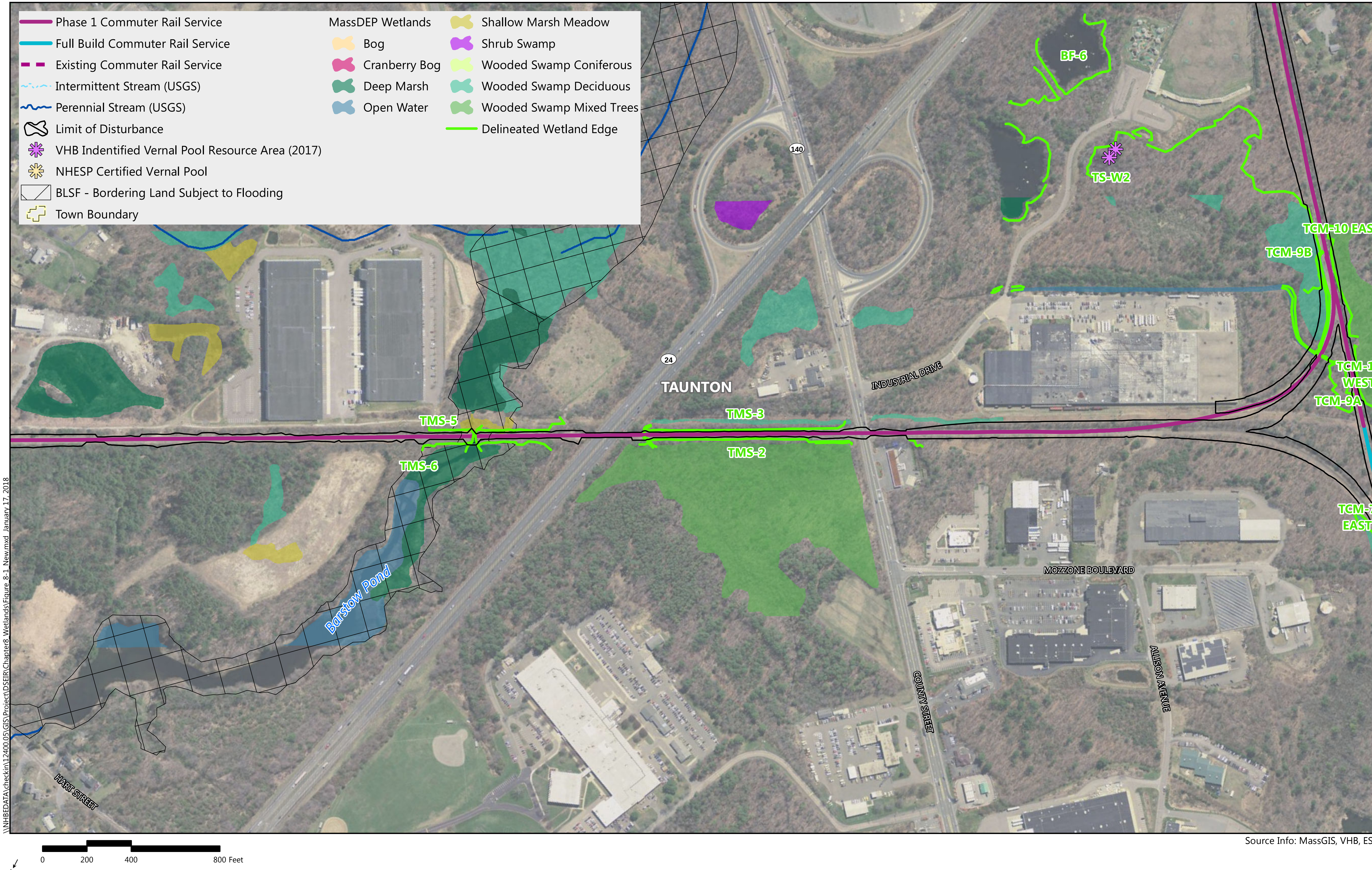

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Table 8.2-2 Wetland Resource Areas–Middleborough

Wetland #	Cowardin Type and Description[1]	Bank	LUW	BVW	IVW	RA	BLSF	ILSF
MMS-1	PEM Emergent wetland south of the ROW	-	-	✓	-	-	✓	-
MMS-2	PFO/PEM Forested wetland north of the ROW that transitions to an emergent wetland	-	-	✓	-	-	-	-
MMS-3	PFO/PVP Forested wetland east of the ROW, containing a PVP	-	-	✓	-	-	-	-
MMS-4	PEM/PSS Emergent wetland west of the ROW with a scrub-shrub fringe. Contains an intermittent stream connected to MMS-3 via culvert under the rail berm	✓	-	✓	-	-	-	-
MMS-5	PFO Forested wetland west of the ROW	-	-	✓	-	-	-	-

Source: Vanasse Hangen Brustlin Inc., 2016-2017

1 Cowardin Types: OW = Open Water, PEM = Palustrine Emergent, PFO = Palustrine Forested, PSS = Palustrine Scrub/Shrub. Wetland Classifications: LUW=Land Under Water, BVW = Bordering Vegetated Wetland, IVW = Isolated Vegetated Wetland (federal only), RA = Riverfront Area, BLSF = Bordering Land Subject to Flooding, ILSF = Isolated Land Subject to Flooding.

Lakeville

The Lakeville segment of the Phase 1 Study Area is approximately 2.2 miles long. Ten wetlands are located along the right-of-way in Lakeville including one isolated federal wetland (LMS-1). Poquoy Brook, a perennial stream, is associated with a large wetland system along this segment of right-of-way.

Table 8.2-3 lists the wetlands delineated along the right-of-way in Lakeville and the resources associated with each wetland.

Table 8.2-3 Wetland Resource Areas–Lakeville

Wetland #	Cowardin Type and Description[1]	Bank	LUW	BVW	IVW	RA	BLSF	ILSF
LMS-1	PEM/PFO/VP Isolated wet meadow with a forested fringe located north of the ROW	-	-	-	✓	-	-	-
LMS-2	Bank south of the ROW associated with an unnamed perennial stream that flows from the golf course north via culvert underneath the rail berm	✓	-	-	-	✓	-	-
LMS-3	PFO Forested wetland north of the ROW including the bank of an unnamed perennial stream that flows north from a culvert underneath the rail berm	✓	-	✓	-	✓	-	-
LMS-4	PFO Forested wetland south of the ROW	-	-	✓	-	-	-	-
LMS-5	PFO Forested wetland north of the ROW	-	-	✓	-	-	-	-
LMS-6 (100 and 200 series)	PFO/OW Forested wetland north of the ROW associated with the Crystal Waters Reservoir and including the bank of the reservoir and an intermittent stream that flows via culvert beneath the rail	✓	✓	✓	-	-	✓	-
LMS-7	PFO Forested wetland south of the ROW including an intermittent stream connected via culvert underneath the rail berm to the Crystal Waters Reservoir	✓	-	✓	-	-	-	-
LMS-8	PFO/VP Forested wetland east of Bedford Street and north of the ROW containing Box Brook (perennial) which flows via culvert beneath the rail. LMS-8 also contains an intermittent stream, which flows via culvert beneath the rail, and a vernal pool.	✓	-	✓	-	✓	✓	-
LMS-9	PFO/VP Forested wetland south of the ROW associated with Box Brook (perennial) which is culverted beneath the rail berm. LMS-9 also contains an intermittent stream, which flows via culvert beneath the rail, and a vernal pool.	✓	✓	✓	-	✓	✓	-
LMS-10	PFO Forested wetland south of the ROW associated with Box Brook (perennial) which is culverted beneath the rail berm.	✓	✓	✓	-	✓	✓	-

Source: Vanasse Hangen Brustlin Inc., 2016-2017
1 Cowardin Types: OW = Open Water, PEM = Palustrine Emergent, PFO = Palustrine Forested, PSS = Palustrine Scrub/Shrub. Wetland Classifications: LUW=Land Under Water, BVW = Bordering Vegetated Wetland, IVW = Isolated Vegetated Wetland (federal only), RA = Riverfront Area, BLSF = Bordering Land Subject to Flooding, ILSF = Isolated Land Subject to Flooding.

Raynham

The Raynham segment of the Phase 1 Study Area is approximately 0.6 miles long. Furnace Brook, a perennial stream, is the largest wetland system along this segment of right-of-way. Furnace Brook is part of a larger wetland system associated with the Taunton River. Table 8.2-4 lists the wetlands delineated along the right-of-way in Raynham and the resources associated with each wetland. There is one isolated wetland along this section of existing track (RMS-5). This wetland is a small depression that appears to contain water for limited periods and is vegetated by plant species known to occur in wetlands and subject to federal jurisdiction only.

Table 8.2-4 Wetland Resource Areas–Raynham

Wetland #	Cowardin Type and Description[1]	Bank	LUW	BVW	IVW	RA	BLSF	ILSF
RMS-1	PFO Forested wetland south of the ROW, containing the southwest and southeast banks of Furnace Brook (perennial). Connected to RMS-2 via culvert under the rail berm	✓	✓	✓	-	✓	✓	-
RMS-2	PFO/PSS Forested wetland north of the ROW that transitions to scrub-shrub at the northern banks of Furnace Brook	✓	✓	✓	-	✓	✓	-
RMS-3	PFO Forested wetland north of the ROW, containing an intermittent stream associated with Furnace Brook. Connects to RMS-4 via culvert under the rail berm	✓	-	✓	-	-	✓	-
RMS-4	PFO Forested wetland south of the ROW. Connects to RMS-3 via an intermittent stream culverted under the rail berm	✓	-	✓	-	-	-	-
RMS-5	PFO/PVP Isolated forested wetland south of the ROW (includes PVP 20481 - Certifiable Vernal Pool)	-	-	-	✓	-	-	-
RMS-6	PFO Forested wetland north of the ROW, containing an intermittent stream. Connects to RMS-7 via culvert under the rail berm	✓	-	✓	-	-	-	-
RMS-7	PFO Forested wetland south of the ROW, containing an intermittent stream. Connects to RMS-6 via culvert under the rail berm	✓	-	✓	-	-	-	-

Source: Vanasse Hangen Brustlin Inc., 2016-2017

1 Cowardin Types: OW = Open Water, PEM = Palustrine Emergent, PFO = Palustrine Forested, PSS = Palustrine Scrub/Shrub. Wetland Classifications: LUW=Land Under Water, BVW = Bordering Vegetated Wetland, IVW = Isolated Vegetated Wetland (federal only), RA = Riverfront Area, BLSF = Bordering Land Subject to Flooding, ILSF = Isolated Land Subject to Flooding.

Streams and wetlands along the right-of-way in Raynham are part of the Taunton River regional watershed. Furnace Brook, a perennial stream along the right-of-way, and its bordering wetlands discharge into this regional watershed.

Taunton

The Taunton segment of the Study Area is approximately 4.0 miles long. Twenty-nine wetlands are located along the right-of-way in Taunton. The Cotley River (TMS-5, TMS-6) and the Taunton River (TMS-7) are the large wetland systems along this segment of right-of-way. Table 8.2-5 lists the wetlands delineated along the right-of-way in Taunton and the resources associated with each wetland. There are six isolated wetlands along this section of existing track (TMS-1, TMS-8, TMS-20, TMS-22, and TMS-21A). Five are small depressions that appear to contain water for limited periods and are vegetated by plant species known to occur in wetlands. One (TMS-21A) is Thatcher's Pond, a large coastal plain pond, which is large enough to be considered ILSF. The others are too small to meet the definition of ILSF, but are considered IVW's subject to federal jurisdiction. Seven wetlands (TS-1 through TS-7) are not in the right-of-way but are adjacent to the proposed East Taunton Station site.

Table 8.2-5 Wetland Resource Areas–Taunton

Wetland #	Cowardin Type and Description[1]	Bank	LUW	BVW	IVW	RA	BLSF	ILSF
TMS-1	PEM Isolated depression north of the ROW that receives stormwater from the adjacent roadway	-	-	-	✓	-	-	-
TMS-2	PFO Forested wetland north of the ROW containing two intermittent streams	✓	-	✓	-	-	-	-
TMS-3	PFO Forested wetland south of the ROW containing an intermittent stream	✓	-	✓	-	-	-	-
TMS-5 (100 and 200 series)	PFO Forested wetland south of the ROW associated with the Cotley River (perennial)	✓	✓	✓	-	✓	✓	-
TMS-6 (100 and 200 series)	PFO/PEM Forested wetland north of the ROW associated with the Cotley River (perennial). Forest transitions to wet meadow adjacent to the river	✓	✓	✓	-	✓	✓	-

Source: Vanasse Hangen Brustlin Inc., 2016-2017
1 Cowardin Types: OW = Open Water, PEM = Palustrine Emergent, PFO = Palustrine Forested, PSS = Palustrine Scrub/Shrub. Wetland Classifications: LUW=Land Under Water, BVW = Bordering Vegetated Wetland, IVW = Isolated Vegetated Wetland (federal only), RA = Riverfront Area, BLSF = Bordering Land Subject to Flooding, ILSF = Isolated Land Subject to Flooding.

Table 8.2-5 Wetland Resource Areas–Taunton (Continued)

Wetland #	Cowardin Type and Description[1]	Bank	LUW	BVW	IVW	RA	BLSF	ILSF
TMS-7 (100, 200, 300, and 400 series)	PEM/PFO Associated with the Taunton River. Wetland is primarily a wet meadow with forested fringe (100, 200 and 400 series) adjacent to the bank of the river (300 series).	✓	✓	✓	-	✓	✓	-
TMS-8	PSS/PVP Isolated scrub-shrub wetland on south side of ROW	-	-	-	✓	-	-	-
TMS-9	PSS Scrub-shrub wetland on south side of ROW	-	-	✓	-	-	-	-
TMS-10	PEM/PSS Emergent wetland with scrub-shrub fringe on the north and south side of the ROW. Associated with Richmond Brook (perennial).	✓	✓	✓	-	✓	✓	-
TMS-11	PSS Scrub-shrub wetland (100 and 200 series) on the north and south sides of the ROW associated with a perennial stream channel culverted under rail. Connected to an intermittent channel adjacent to abandoned cranberry bog on south side of rail berm (300 and 400 series)	✓	✓	✓	-	✓	-	-
TMS-12	PFO/PSS Forested wetland with scrub-shrub fringe on the north side of the ROW. An intermittent stream connects TMS-12 to TMS-13 on the south side of the ROW	✓	-	✓	-	-	-	-
TMS-13	OW/PEM/PSS Pond with emergent and scrub-shrub wetland fringe on the south side of the ROW. An intermittent stream connects TMS-13 to TMS-12 on the north side of the ROW	✓	✓	✓	-	-	-	-
TMS-14	PFO Forested wetland north of the ROW. An intermittent stream connects TMS-14 to TMS-15 on the south side of the ROW	✓	-	✓	-	-	-	-

Source: Vanasse Hangen Brustlin Inc., 2016-2017
1 Cowardin Types: OW = Open Water, PEM = Palustrine Emergent, PFO = Palustrine Forested, PSS = Palustrine Scrub/Shrub. Wetland Classifications: LUW=Land Under Water, BVW = Bordering Vegetated Wetland, IVW = Isolated Vegetated Wetland (federal only), RA = Riverfront Area, BLSF = Bordering Land Subject to Flooding, ILSF = Isolated Land Subject to Flooding.

Table 8.2-5 Wetland Resource Areas–Taunton (Continued)

Wetland #	Cowardin Type and Description[1]	Bank	LUW	BVW	IVW	RA	BLSF	ILSF
TMS-15	PFO Forested wetland south of the ROW. An intermittent stream connects TMS-15 to TMS-14 on the north side of the ROW	✓	-	✓	-	-	-	-
TMS-16	PEM/PFO Emergent wetland south of the ROW encompassing a cranberry bog transitioning into forested wetland.	-	-	✓	-	-	-	-
TMS-17	PFO/VP Forested wetland north of the ROW associated with cranberry bogs. Connected to agricultural ditches and intermittent streams (Includes PVP 25438- Certifiable Vernal Pool)	✓	-	✓	-	-	-	-
TMS-18	PFO Forested wetland south of the ROW. Connected to an intermittent stream channel associated with irrigation ditches	✓	-	✓	-	-	-	-
TMS-19	PFO Forested wetland north of the ROW including an intermittent stream channel	✓	-	✓	-	-	-	-
TMS-20	PFO Isolated forested wetland on the north side of the ROW	-	-	-	✓	-	-	-
TMS-21	PSS/VP Isolated forested wetland on the north side of the ROW (includes PVP 25490 - Certifiable Vernal Pool)	-	-	-	✓	-	-	-
TMS-22	PFO/VP Isolated forested wetland on the south side of the ROW (includes VHB VP7 - Certifiable Vernal Pool)	-	-	-	✓	-	-	-
TMS-21A	OW/PSS/VP Coastal plain pond (Thatcher's Pond) south of the ROW with a scrub-shrub perimeter, (includes VHB VP6 - Certifiable Vernal Pool)	✓	✓	-	✓	-	-	✓
TCM-7East	PFO Forested wetland northeast of Cotley Junction	-	-	✓	-	-	-	-

Source: Vanasse Hangen Brustlin Inc., 2016-2017
1 Cowardin Types: OW = Open Water, PEM = Palustrine Emergent, PFO = Palustrine Forested, PSS = Palustrine Scrub/Shrub. Wetland Classifications: LUW=Land Under Water, BVW = Bordering Vegetated Wetland, IVW = Isolated Vegetated Wetland (federal only), RA = Riverfront Area, BLSF = Bordering Land Subject to Flooding, ILSF = Isolated Land Subject to Flooding.

Table 8.2-5 Wetland Resource Areas–Taunton (Continued)

Wetland #	Cowardin Type and Description[1]	Bank	LUW	BVW	IVW	RA	BLSF	ILSF
TCM-7West	PFO Forested wetland southwest of Cotley Junction	-	-	✓	-	-	-	-
TCM-9A	PFO Forested wetland west of New Bedford Main Line track siding at Cotley Junction. Connected to Wetland TCM-9B upgradient by culvert under track siding	✓	-	✓	-	-	-	-
TCM-9B	PFO Forested wetland with an intermittent stream in a manmade channel along the east side of the track siding off the New Bedford Main Line at Cotley Junction	✓	-	✓	-	-	-	-
TCM-10	PFO Forested wetland southeast of Quad Graphics Siding track and west of track siding at Cotley Junction	✓	✓	✓	-	-	-	-
TCM-11B	PFO Forested wetland east of the ROW, north of Stevens Street	✓	-	-	-	-	-	-
TCM-12	PFO/PEM Forested wetland east of the ROW, north of Route 24	✓	-	-	-	-	-	-
TS-1	Bank of intermittent stream at the proposed Taunton Station property. Man-made channel culverted beneath Industrial Drive	✓	-	-	-	-	-	-
TS-2	PFO Forested wetland west of Industrial Drive along the northern edge of the proposed Taunton Station property	-	-	✓	-	-	-	-
TS-3	OW Pond to the east of Industrial Drive on the proposed Taunton Station property	✓	✓	-	-	-	-	-
TS-4	PEM/PSS Isolated wetland in a former stormwater detention basin on the proposed Taunton Station property	-	-	-	✓	-	-	✓

Source: Vanasse Hangen Brustlin Inc., 2016-2017
1 Cowardin Types: OW = Open Water, PEM = Palustrine Emergent, PFO = Palustrine Forested, PSS = Palustrine Scrub/Shrub. Wetland Classifications: LUW=Land Under Water, BVW = Bordering Vegetated Wetland, IVW = Isolated Vegetated Wetland (federal only), RA = Riverfront Area, BLSF = Bordering Land Subject to Flooding, ILSF = Isolated Land Subject to Flooding.

Table 8.2-5 Wetland Resource Areas–Taunton (Continued)

Wetland #	Cowardin Type and Description[1]	Bank	LUW	BVW	IVW	RA	BLSF	ILSF
TS-5	PFO Forested wetland on the proposed Taunton Station property	-	-	✓	-	-	-	-
TS-6	OW Open water pond on the proposed Taunton Station property	✓	-	-	-	-	-	-
TS-7	PFO Forested wetland connecting the open water ponds of Wetland TS-3 and Wetland TS-6.	-	-	✓	-	-	-	-
TS-BF-1	Bank associated with an intermittent stream at the proposed East Taunton Station site	✓	-	-	-	-	-	-

Source: Vanasse Hangen Brustlin Inc., 2016-2017
1 Cowardin Types: OW = Open Water, PEM = Palustrine Emergent, PFO = Palustrine Forested, PSS = Palustrine Scrub/Shrub. Wetland Classifications: LUW=Land Under Water, BVW = Bordering Vegetated Wetland, IVW = Isolated Vegetated Wetland (federal only), RA = Riverfront Area, BLSF = Bordering Land Subject to Flooding, ILSF = Isolated Land Subject to Flooding.

Freetown

Since the filing of the FEIS/FEIR, the concept for the Freetown Station within the Southern Triangle portion of the Project has been revised to include an access road to South Main Street (Route 79). Due to the change, additional wetland delineation was required in Freetown. Table 8.2-6 lists the additional wetlands delineated near the proposed Freetown Station site and the resources associated with each wetland.

Table 8.2-6 Wetland Resource Areas–Freetown Station

Wetland #	Cowardin Type and Description[1]	Bank	LUW	BVW	IVW	RA	BLSF	ILSF
FS-WF1	PFO Red maple swamp on the western portion of the site associated with an intermittent stream flowing into a culvert under South Main Street	✓	-	✓	-	-	-	-

Source: Vanasse Hangen Brustlin Inc., 2017
1 Cowardin Types: OW = Open Water, PEM = Palustrine Emergent, PFO = Palustrine Forested, PSS = Palustrine Scrub/Shrub. Wetland Classifications: LUW=Land Under Water, BVW = Bordering Vegetated Wetland, IVW = Isolated Vegetated Wetland (federal only), RA = Riverfront Area, BLSF = Bordering Land Subject to Flooding, ILSF = Isolated Land Subject to Flooding.

8.2.3.3 Summary

The Phase 1 Study Area contains 46 BVWs, nine additional IVWs, and one area of ILSF within or directly adjacent to the right-of-way and including the proposed East Taunton Station site, and the redesigned Freetown Station site. No resources are present within the vicinity of the Pilgrim Junction Station or Fall River Depot site. These 55 vegetated wetlands are subject to jurisdiction under Sections 404 and 401 of the Federal Clean Water Act. In addition, the Phase 1 Study Area crosses (or is within Riverfront Area of) five perennial streams or rivers, and is within the 100-year floodplain in 12 locations. A total of 34 areas of Bank (which include banks of perennial as well as intermittent streams, ponds, and any other waterbody) are present along the Phase 1 Project corridor. Table 8.2-7 provides a summary of the number of different wetland resource types along the right-of-way, by municipality and in total.

Table 8.2-7 Summary of Existing Conditions (Phase 1 Study Area)

Municipality	Total Delineated Areas[1]	Bank	LUW	BVW	IVW	RA	BLSF	ILSF
Taunton	36	20	8	26	7	5	4	1
Raynham	7	6	2	6	1	1	3	0
Lakeville	10	7	3	8	1	2	4	0
Middleborough	5	1	0	5	0	0	1	0
Freetown	1	0	0	1	0	0	0	0
TOTAL	9	34	13	46	9	8	12	1

Source: Vanasse Hangen Brustlin, Inc., 2016-2017
1 Delineated areas may qualify as more than one type of wetland resource area.
Wetland Classifications: LUW=Land Under Water, BVW = Bordering Vegetated Wetland, IVW = Isolated Vegetated Wetland, RA = Riverfront Area, BLSF = Bordering Land Subject to Flooding, ILSF = Isolated Land Subject to Flooding.

8.2.4 Impact Analysis (Permanent and Temporary)

This section identifies the impacts to wetland resources within the Study Area that may result from Phase 1 construction (inclusive of railroad alignments, and new or redesigned train stations).

Wetland impacts are described quantitatively by specific wetland resources as well as qualitatively by functions and values. These direct and indirect impacts are discussed along with potential mitigation efforts and how they relate to the state and federal regulatory process. The direct and indirect assessment methodologies are discussed in Section 8.2.2.4.

8.2.4.1 Direct Impacts – Phase 1 Study Area

This section evaluates the potential impacts to wetlands within the Phase 1 Study Area associated with the new Phase 1 elements. These elements will include the rehabilitation of the existing Middleborough Secondary track bed, reconstruction of Cotley Junction, and construction of Pilgrim Junction, East Taunton, and Freetown Stations.

Note that State of Good Repair work undertaken as part of regular maintenance and repair of the active rail lines is not included in this section. MassDOT's ongoing SGR program will upgrade certain elements including culverts and bridges, to allow freight service to continue along the Middleborough Secondary, New Bedford Main Line, and Fall River Secondary.

The direct impacts discussed below are related to infrastructure improvements related to South Coast Rail Commuter Rail operations including additional tracks, culvert extensions, or new station construction.

The direct impacts to wetland resource areas along the right-of-way are discussed below. Direct impacts were calculated separately for federal vs. state jurisdictional resources, and area was tabulated by municipality. The impacts along the portions of the rail lines within the southern part of the Project study area (referred to as the Southern Triangle) were previously evaluated for the FEIS/FEIR. The reduction in wetland impacts within the Southern Triangle for Phase 1 is summarized separately in Section 8.2.4.2. Using the methods of analysis previously described, permanent and temporary direct impacts were calculated to state wetland/aquatic resource areas in each municipality along the Phase 1 (Middleborough Secondary) right-of-way and the new/relocated stations:

- Bank;
- BVW;
- LUW;
- BLSF;
- ILSF; and
- RA.

The direct (permanent and temporary) impacts to the wetlands are presented below including state and federal impact categories. Figure 8-2, show the locations of all direct wetland impacts, as well as the functions and values provided by each wetland.

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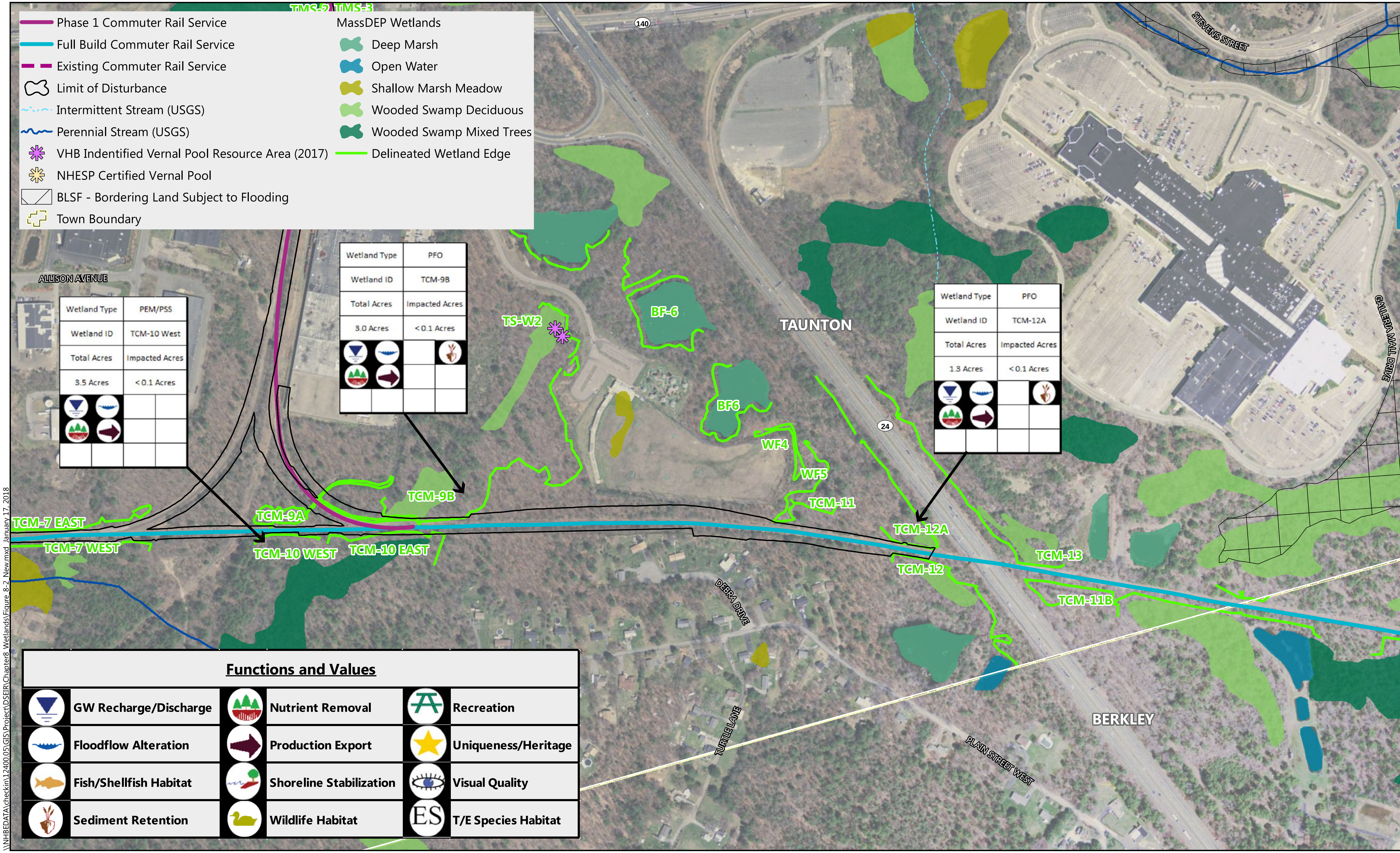
Figure 8-2: Middleborough Secondary - Wetland Impacts



Source Info: MassGIS, VHB, ESRI

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Middleborough

The Middleborough segment of the Phase 1 Study Area is approximately 7.1 miles long. Five wetlands, part of a larger wetland system associated with the Nemasket River, are located along the right-of-way in Middleborough. The Phase 1 Project in Middleborough will make improvements to the track infrastructure along the Middleborough Secondary and construct a new station at Pilgrim Junction. Reconstructing the existing active rail line in Middleborough and the new station will not result in any permanent or temporary impacts to any wetland resources, but track work will require construction in wetland buffer zones. There are no wetland resources within 100 feet of the Pilgrim Junction Station.

Lakeville

The Lakeville segment of the Phase 1 Study Area is approximately 2.2 miles long. Ten wetlands are located along the right-of-way in Lakeville including one isolated federal wetland (LMS-1). Poquoy Brook, a perennial stream, is associated with a large wetland system along this segment of right-of-way. The proposed construction within the Phase 1 Project Study Area in Lakeville will improve the Middleborough Secondary track bed and replace three culverts. All three culverts will be replaced as part of the MassDOT Rail and Transit Division SGR program and are exempt from WPA review. Improvements to the track bed will temporarily impact Bank in seven locations, with a total of 484 lf of impact. Redevelopment within RA will total of 78,990 sf (1.8 acres).

Table 8.2-8 lists the impacted wetlands in Lakeville and the size of each impacted area

Table 8.2-8 Direct Impacts to State and Federal Resource Areas – Lakeville

	MA DEP Resources										Federal Section 401/404 Resources			
	Bank Impacts (lf)		BVW (sf)		LUW (sf)		BLSF (sf)	ILSF (sf)	RA (sf)	Waterbody/way (sf)		Vegetated wetland (sf)	
Wetland ID	Temp.	Perm.	Temp.	Perm.	Temp.	Perm.	Perm.	Perm.	Perm.	Temp.	Perm.	Temp.	Perm.
LMS-2	44	-	-	-	-	-	-	-	7,979	-	-	-	-
LMS-3	55	-	-	-	-	-	-	-	In Above	-	-	-	-
LMS-6	31	-	-	-	-	-	-	-	-	-	-	-	-
LMS-7	22	-	-	-	-	-	-	-	-	-	-	-	-
LMS-8	283	-	-	-	-	-	-	-	71,011	-	-	-	-
LMS-9	33	-	-	-	-	-	-	-	In Above	-	-	-	-
LMS-10	16	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	484	-	-	0	-	-	-	-	78,990	-	-	-	-
TOTAL (ac)	-	-	-	-	-	-	-	-	1.8	-	-	-	-

Notes: Wetland Classifications: BVW = Bordering Vegetated Wetland, LUW=Land Under Water, BLSF = Bordering Land Subject to Flooding, ILSF = Isolated Land Subject to Flooding, RA = Riverfront Area.

Raynham

The Raynham segment of the Phase 1 Study Area is approximately 0.6 miles long. Seven wetlands are located along the right-of-way in Raynham. Furnace Brook is the largest wetland system along this segment of right-of-way. Reconstructing the existing active rail line in Raynham not will result in any permanent impact to BVW, Bank or LUW. Culvert maintenance at Furnace Brook will result in 17,823 sf (0.4 ac) of impact to previously altered RA due to removal of woody vegetation behind the existing headwall.

Table 8.2-9 lists the impacted wetlands in Raynham and the size of each impacted area.

Table 8.2-9 Direct Impacts to State and Federal Resource Areas – Raynham

Wetland ID	MA DEP Resources: Bank Impacts (lf) Temp.	Bank Impacts (lf) Perm.	BVW (sf) Temp.	BVW (sf) Perm.	LUW (sf) Temp.	LUW (sf) Perm.	BLSF (sf) Perm.	ILSF (sf) Perm.	RA (sf) Perm.	Federal Section 401/404 Resources: Waterbody/way (sf) Temp.	Waterbody/way (sf) Perm.	Vegetated wetland (sf) Temp.	Vegetated wetland (sf) Perm.
Furnace Brook	-	-	-	-	-	-	-	-	17,823	-	-	-	-
TOTAL	-	-	-	-	-	-	-	-	17,823	-	-	-	-
TOTAL (ac)	-	-	-	-	-	-	-	-	0.4	-	-	-	-

Notes: Wetland Classifications: BVW = Bordering Vegetated Wetland, LUW=Land Under Water, BLSF = Bordering Land Subject to Flooding, ILSF = Isolated Land Subject to Flooding, RA = Riverfront Area.

Taunton

The Taunton segment of the Study Area is approximately 4.0 miles long. Thirty-two wetlands are located along the right-of-way in Taunton including the proposed East Taunton Station location. The Cotley River (TMS-5, TMS-6) and the Taunton River (TMS-7) are the large wetland systems along this segment of right-of-way. Phase 1 will make improvements to the track infrastructure along the Middleborough Secondary, Cotley Junction, and south from Cotley Junction to the Berkley town line. The existing bridges on the Middleborough Secondary over the Cotley River and Richmond Brook are being replaced as part of the MassDOT Rail and Transit Division’s ongoing SGR program.

The proposed construction within the Phase 1 Project Study Area in Taunton will improve the Middleborough Secondary track bed and replace five culverts. Four of the five culverts will be replaced as part of the MassDOT Rail and Transit Division SGR program and are exempt from WPA review.

Reconstructing the existing active rail lines and constructing freight bypass track siding in the Phase 1 area in Taunton will result in permanent impact to BVW in three wetlands, with 4,230 sf (0.1 acres) of impact. Bank will be permanently impacted in four locations, with a total of 1,021 lf of impact, and temporarily impacted in eight locations, with a total of 66 lf of impact, for a total of 1,087 feet of alteration. This includes 12 lf of alteration at the East Taunton Station site. LUW will be permanently impacted in four wetlands, with a total of 5,219 sf (0.1 acre) of impact, and temporarily impacted in three wetlands, with a total of 178 sf (<0.1 acre) of impact, for a total of 5,397 sf (0.1 acre) of alteration. BLSF will be permanently impacted at the Taunton River, with a total of 1,354 sf of impact. RA will be permanently impacted in four locations, with a total of 78,036 sf (1.8 acres) of redevelopment of previously altered RA. The largest wetland impact in Taunton is due to relocating the freight siding at

Quad Graphics, the construction of the new connection from the New Bedford Main Line to the Middleborough Secondary, and a freight bypass track at East Taunton Station, all of which occur in the vicinity of Cotley Junction.

Table 8.2-10 lists the impacted wetlands in Taunton and the size of each impacted area.

Table 8.2-10 Direct Impacts to State and Federal Resource Areas – Taunton

	MA DEP Resources									Federal Section 401/404 Resources			
	Bank Impacts (lf)		BVW (sf)		LUW (sf)		BLSF (sf)	ILSF (sf)	RA (sf)	Waterbody/way (sf)		Vegetated wetland (sf)	
Wetland ID	Temp.	Perm.	Temp.	Perm.	Temp.	Perm.	Perm.	Perm.	Perm.	Temp.	Perm.	Temp.	Perm.
TMS-5	-	-	-	-	-	-	-	-	12,012	-	-	-	-
TMS-7	-	-	-	-	-	-	1,354	-	38,515	-	-	-	-
TMS-10	-	-	-	-	-	-	-	-	14,782	-	-	-	-
TMS-11	-	6	-	-	-	-	-	-	12,727	-	-	-	-
TCM-9A	14	58	-	-	25	199	-	-	-	25	199	-	-
TCM-9B	22	945	-	2,051	33	4,900	-	-	-	33	4,900	-	2,051
TCM-10	-	-	-	1,998	-	-	-	-	-	-	-		1,998
TCM-12A	-	-	-	181	-	-	-	-	-	-	-	-	181
TS-BF-1	-	12	-	-	120	120	-	-	-	120	120	-	-
TOTAL	36	1,021	-	4,230	178	5,219	1,354	-	78,036	178	5,219		4,230
TOTAL (ac)		-	-	<0.1	<0.1	0.1	<0.1	-	1.8	<0.1	0.1	-	0.1

Notes: Wetland Classifications: BVW = Bordering Vegetated Wetland, LUW=Land Under Water, BLSF = Bordering Land Subject to Flooding, ILSF = Isolated Land Subject to Flooding, RA = Riverfront Area.

Freetown

The Phase 1 Project Study Area in Freetown consists of the proposed station site. Since the filing of the FEIS/FEIR, the concept for the Freetown Station on the Fall River Secondary has been revised shift the proposed station to the north, on the same parcel as was evaluated in the FEIS/FEIR. The proposed Phase 1 concept for Freetown Station will not have any wetland impacts.

In Freetown, Phase 1 will also make improvements to the New Bedford Main Line and Fall River Secondary track infrastructure using modified limits of disturbance as compared to the FEIS/FEIR that will reduce the wetland impacts in Freetown as described below.

Summary of Direct Impacts to State and Federal Resource Areas – Phase 1

Reconstructing the existing active Middleborough Secondary rail line, reconstructing Cotley Junction, and constructing the passenger platform and siding at East Taunton Station will result in temporary and permanent impacts to wetland resources. The majority of impacts are to wetlands associated with the existing drainage system (track drainage ditches and culverts) that are proposed to be modified in association with the track infrastructure improvements at Cotley Junction in Taunton.

- BVW will be permanently impacted in three wetlands, with 4,230 sf of total impact.

- Bank will be impacted in 11 locations, with a total of 1,541 lf of impact.
- LUW will be impacted in three locations, with 5,227 sf of total impact.
- BLSF will be permanently impacted in one location, with a total of 1,354 sf of impact. The BLSF impacts will occur within previously altered areas on the track bed due to track infrastructure improvements.
- RA will be permanently impacted in seven locations, with a total of 4.01 acres of impact to previously altered RA within the footprint of the track bed in the existing right-of-way. The largest RA impact outside of the track bed will occur in Raynham due to vegetation removal at the headwall of the Furnace Brook culvert.
- Federal waterbodies and waterways will be impacted in three locations in Taunton, with a total of 5,227 sf of impact.
- Federal vegetated wetlands will be permanently impacted in three locations in Taunton, with a total of 4,230 sf of impact.

Table 8.2-11 provides a summary of the direct state and federal wetland resource impacts within the Phase 1 Study Area by cover type. The number of impacted wetlands and the total size of the impact for each resource type are given for each municipality. Totals for the entire length of the Phase 1 Project are also given.

Table 8.2-11 Summary of Direct Impacts to State and Federal Resource Areas – Phase 1 Project

	MA DEP Resources									Federal Section 401/404 Resources			
	Bank		BVW		LUW		BLSF	ILSF	RA	Waterbody/ Waterway		Vegetated Wetlands	
Municipality	Temp. (#/lf)	Perm. (#/lf)	Temp. (#/ac)	Perm. (#/ac)	Temp. (#/ac)	Perm. (#/ac)	Perm. (#/ac)	Perm. (#/ac)	Perm. (#/ac)	Temp. (#/ac)	Perm. (#/ac)	Temp. (#/ac)	Perm. (#/ac)
Lakeville	7/484	0/0	0/0	0/0	0/0	0/0	0/0	0/0	2/1.8	0/0	0/0	0/0	0/0
Taunton	2/36	4/1,021	0/0	3/<0.1	3/<0.1	3/0.1	1/<0.1	0/0	4/1.8	3/<0.1	3/0.1	0/0	3/<0.1
Raynham	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	1/0.4	0/0	0/0	0/0	0/0
TOTAL	9/520	4/1,021	0/0	3/<0.1	3/<0.1	3/0.1	1/<0.1	0/0	7/4.0	3/<0.1	3/0.1	0/0	3/<0.1

Notes: Wetland Classifications: BVW = Bordering Vegetated Wetland, LUW=Land Under Water, BLSF = Bordering Land Subject to Flooding, ILSF = Isolated Land Subject to Flooding, RA = Riverfront Area.

8.2.4.2 Direct Impacts – Southern Triangle

This Section describes changes to proposed wetland impacts within the Southern Triangle that have been identified since publication of the FEIS/FEIR. Wetland impacts within the Southern Triangle due to implementation of the Phase 1 Service will be substantially less than those previously described in the FEIS/FEIR for the Full Build Project. The reduction in impacts will be achieved by constructing an alternative typical railroad cross-section for Phase 1, that maximizes use of the existing freight rail infrastructure and minimizes regrading outside of the active railbed. Illustration 8.2-1 provides a comparison of the currently proposed typical cross section to the section that was used to calculate wetland impacts for the FEIS/FEIR. Of note is that the Phase 1 service also does not require wetland impacts due to the construction of catenary and associated pole foundations and power stations. The majority of Phase 1 wetland impacts within Southern Triangle communities are associated with reconstructing the existing active rail line, bridge replacements, and the addition of a second track where in-bound and out-bound trains will meet.

Illustration 8.2-1 Typical Track Section and Modified Track Section

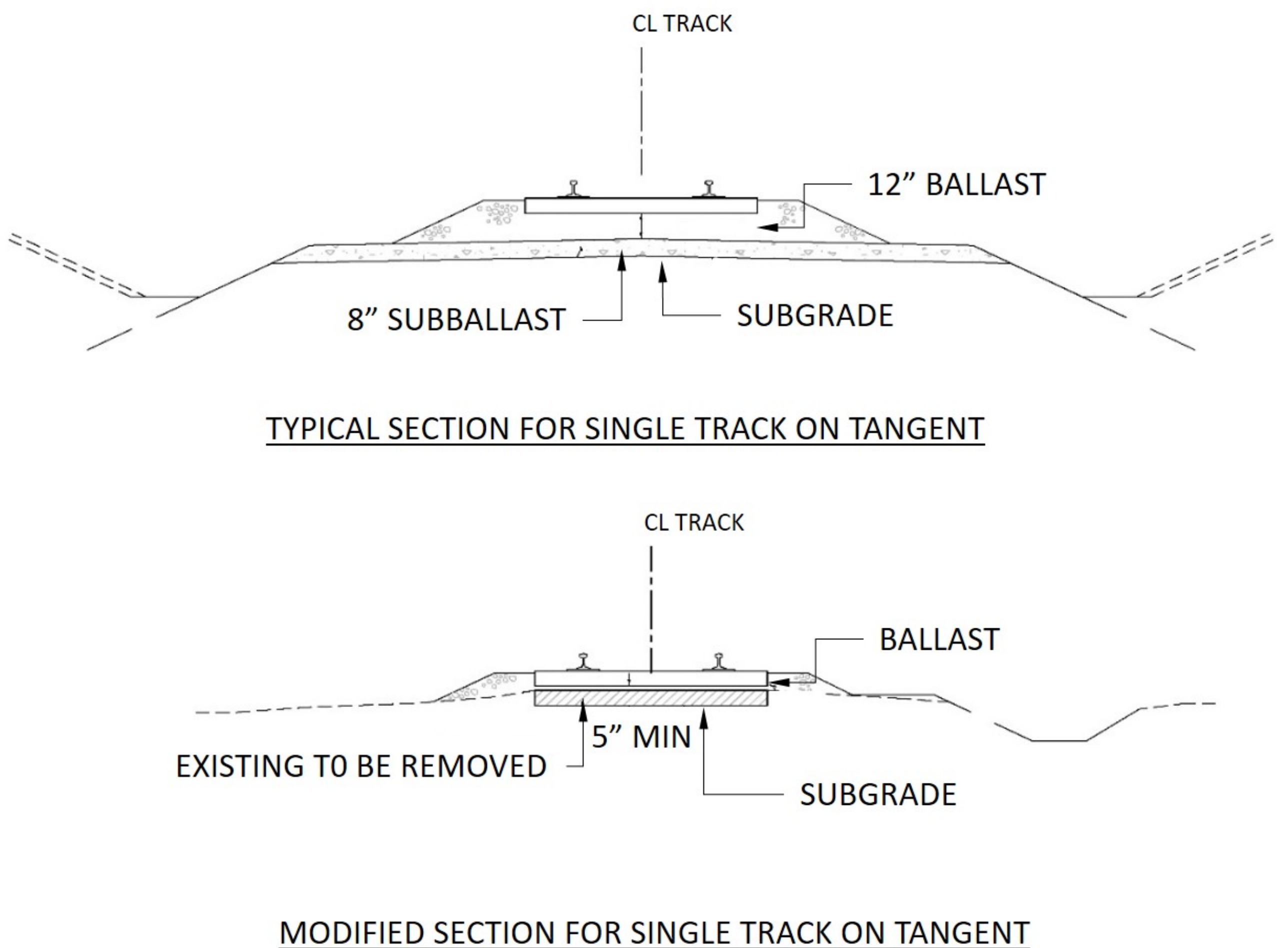

Table 8.2-12 provides a comparison of the change in wetland impacts in the Southern Triangle since publication of the FEIS/FEIR.

Table 8.2-12 Comparison of Direct Impacts to State and Federal Resource Areas – Southern Triangle

	MA DEP Resources										Federal Section 401/404 Resources			
	Bank		BVW		LUW		BLSF	ILSF	RA		Waterbody/ Waterway		Vegetated Wetlands	
Municipality	Temp. P/C (lf)	Perm. P/C (lf)	Temp. P/C (ac)	Perm. P/C (ac)	Temp. P/C (ac)	Perm. P/C (ac)	Perm. P/C (ac)	Perm. P/C (ac)	Perm. P/C (ac)		Temp. P/C (ac)	Perm. P/C (ac)	Temp. P/C (ac)	Perm. P/C (ac)
Berkley	0/0	233/14	1/0	1.4/<0.1	0/<0.1	0/<0.1	0.2/0.1	0/0	2.9/3.2		0/<0.1	0/<0.1	1/0.4	1.5/<0.1
Freetown	0/212	2,460/ 38	0.6/<0.1	1/0.1	0.1/<0.1	0.3/<0.1	0.3/<0.1	0/0	2.4/2.3		0.1/<0.1	0.3/<0.1	0.6/0.4	1.1/0.2
New Bedford	0/86	0/6,656	0.8/<0.1	1.2/<0.1	0/<0.1	0/0.5	<0.1/0.2	0/0	0/1.5		0/<0.1	0/0	0.8/<0.1	1.2/<0.1
Fall River	0/0	0/0	<0.1/<0.1	0/<0.1	0/<0.1	0/<0.1	0/0	0/0	0/<0.1		0/0	0/0	<0.1/<0.1	<0.1/<0.1

Notes: Wetland Classifications: BVW = Bordering Vegetated Wetland, LUW=Land Under Water, BLSF = Bordering Land Subject to Flooding, ILSF = Isolated Land Subject to Flooding, RA = Riverfront Area.
P = Previous Impact from FEIS/FEIR
C = Current Impact from Phase 1

State of Good Repair Project – Phase 1 Project Area

Certain elements of construction within the Phase 1 Project Area, such as in-kind culvert and bridge replacements, may be permitted in accordance with the USACE Massachusetts General Permit for Repair, Replacement and Maintenance. As repairs to active freight lines, maintenance of these structures is necessary regardless of whether or not the Phase 1 Project is implemented, and is consistent with MassDOT Rail and Transit Division’s overall SGR program. Replacing, repairing, and improving many of the culverts and bridges along the Middleborough Secondary and the Southern Triangle will fall under the “footprint bridge exemption” provisions of the Massachusetts Transportation Bond Bill of 2014. Under the provisions of the bill, these culverts and bridges do not require review under the WPA; however, they do require review under Sections 404 and 401 of the Federal CWA. MassDOT will file a Pre-Construction Notification Permit application for SGR work under the USACE’s Massachusetts General Permit to meet the requirements of Section 404. To meet the requirements of Section 401, SGR work will be permitted and mitigated under an Individual 401 Water Quality Certificate and in accordance with the maintenance provisions of the regulations. Table 8.2-13 provides a summary of wetland impacts that will be permitted under the SGR program.

Table 8.2-13 Summary of Direct Impacts to Federal Resource Areas Under State of Good Repair Program

	Impacts to Federal Wetland Resource Areas (sf)			
	Vegetated Wetland		Waterbody/way	
Municipality	Perm.	Temp.	Perm.	Temp.
Middleborough	0	0	0	0
Lakeville	1,184	996	1,423	5,047
Taunton	10	610	36	244
Raynham	0	107	5	60
Berkley	386	1,089	556	1,848
Freetown	257	3,080	531	4,015
Fall River	0	114	0	1,278
New Bedford	0	37	0	173
Totals:	1,837	6,033	2,551	12,665
Total Impacts:	7,870 sf		15,216 sf	

Source: Vanasse Hangen Brustlin Inc., 2017

8.2.4.3 Indirect Impacts

The Secondary and/or Indirect Impact Analysis evaluated the effects of the Phase 1 Project on wetland functions and values for all wetlands within 100 feet of the project limits. These impacts cannot be quantified, but are presented in a qualitative approach that identifies, for each wetland, the principal functions and values provided by that wetland, the magnitude of impact to those functions based on the physical extent of the impacts in comparison to the overall size of the wetland.

Secondary and/or indirect effects are changes in the ability of a wetland to provide each function, and do not affect a wetland uniformly (except for some small wetlands). These functional effects occur as gradients with the highest intensity occurring closest to the disturbance and decreasing with distance. Each resource affected may also experience the effects differently – for example, the effects of a canopy gap do not affect all wildlife species in the same way, or at the same distance. While some researchers have considered a secondary effect ("road effect") to alter the entire wetland, others have documented that the effects of highways are not uniformly distributed across a wetland. Effects on the ability of a wetland to support production export are different in type and location than on the ability of a wetland to provide sediment/toxicant retention or nutrient transformation. Eigenbrod et al.[24] have shown that the ability of a wetland to provide wildlife habitat functions is multivariate, and includes size, edge:

24 Eigenbrod, F., S.J. Hecnor, and L. Fahrig. 2009. Quantifying the road-effect zone: threshold effects of a motorway on anuran populations in Ontario, Canada. Ecology and Society 14:24. Available online at: http://www.ecologyandsociety.org/vol14/iss1/art24.

interior ratio, cover type, connectivity, microhabitat diversity, soil moisture, and other factors. Their work has shown that the most important variable is wetland size, and that changes in wetland size in small wetlands has a much greater effect on wildlife species richness than changes in size in larger wetlands.

For these reasons, the analysis of secondary and/or indirect effects has estimated the severity of the effect of the Phase 1 Project (reconstructing active rail infrastructure and constructing new stations) on each adjacent or nearby wetland by ranking the impact based on the relative extent of impact in comparison to the overall size of the wetland, for each key function or value provided by that wetland. Wetlands within 100 feet of the Phase 1 Project could experience secondary and/or temporary impacts to wetland functions as a result of the permanent loss of a portion of the wetland, temporary impacts resulting from construction, and/or proximity to the Project.

The Phase 1 Project proposes improvements to active rail segments that are characterized by a developed (ballasted) rail bed and tracks, which create a canopy gap and barrier to wildlife movement. Work proposed along these segments will improve wildlife passage by reconstructing bridges and culverts, and installing between-the-tie crossings to accommodate smaller fauna such as amphibians, but will not change the characteristics of the upland. The only effects of the proposed project will be to increase train passage and a minor increase in noise levels due to the increased number of trains.

The physical characteristics of those wetlands within 100 feet of the Project limit-of-work not directly affected by construction will not change. The increased train passage is not anticipated to adversely affect the wildlife habitat function of adjacent or nearby wetlands (see Chapter 9, Biodiversity, Wildlife, and Vegetation).

Secondary and/or indirect effects to physical and biochemical functions (groundwater recharge, sediment/toxicant retention, flood storage, nutrient retention/transformation, production export) are related to the loss of the wetland that provides these functions, and impacts will be proportionate to the size of the lost area relative to the total wetland size. Areas of temporary construction impact will be restored to the same elevation and re-vegetated, with no loss of wetland function for these physical and biochemical functions. In general, reductions in sediment/toxicant/pathogen removal and nutrient removal/transformation would result from a reduced opportunity for sediment trapping, reduced vegetation/water interspersion, and changes in the type and density of vegetation. The ability of a wetland to provide production export would be affected by reduction in wildlife food sources, reduced wildlife usage, and a potentially reduced diversity of wetland plants.

Secondary effects to wildlife habitat functions would result from a loss of wetland that provides wildlife habitat function, or from canopy removal in forested wetlands as the canopy edge effects would extend further into the wetland. The loss of a portion of a wetland would reduce the effective habitat size for all species, and more so for forest interior species. These effects would be exacerbated by the barrier and noise effects. Barrier effects (and creation of a canopy gap that reduces the size of forest interior habitat) would result in the reduction of effective contiguous habitat size for populations of some species (especially reptiles, amphibians, some small mammals, some forest interior birds) as documented in Chapter 9, Biodiversity, Wildlife, and Vegetation.

Areas of temporary impact will be restored, but create the potential for establishment of invasive species such as common reed or reed canary-grass (*Phalaris arundinacea*) that reduce wetland habitat quality in the impacted area and can spread throughout the wetland.

Impacts to fisheries habitat would occur only where fill will be placed in pond or other waterway/waterbody with fisheries value, or where removing vegetation from or near a riverbank could affect shading.

Other categories of secondary and/or indirect effects include effects caused by extending or relocating culverts that convey streams, and the potential effects of changes in stormwater discharge from the proposed commuter rail stations. Where culverts are required to be extended or relocated, the changes to the wetland outlet have the potential to result in secondary effects to the physical as well as biological characteristics of wetlands. Changes to the outlet of a wetland could alter the duration or depth of flood storage, change discharge rates (that would affect downstream wetlands), or result in channel modifications upstream or downstream of the culvert.

Culverts are proposed to be retained without modification in the majority of areas, or reconstructed to meet to meet engineering requirements for operation of the Phase 1 Project (per industry standards for railroad use) and, where appropriate (based on hydrology and ecological value), to meet the Massachusetts Stream Crossing Standards.[25] Where culverts are proposed to be reconstructed to meet these standards, the appropriate hydrological studies will be undertaken prior to final design so that the upstream and downstream hydrology is not altered.

Figure 8-2 provides an overview of the wetlands functions and values of the areas of unavoidable permanent wetland impact. These impacts are primarily small areas on the periphery of large wetland systems that will not be expected to significantly impact the ability of the resource area to provide the identified wetland functions and values. Compensatory mitigation will be provided within the watershed to offset any minor functions and values losses.

8.2.4.4 Cumulative Impacts

The Middleborough Secondary was constructed in 1856, and can be assumed to have fragmented wetland habitats along the alignment creating an elevated railroad berm and a gap in forest cover.

25 River and Stream Crossing Partnership. 2011. Massachusetts River and Stream Crossing Standards. The University of Massachusetts- Amherst (College of Natural Sciences), The Nature Conservancy, Massachusetts Division of Ecological Restoration-Riverways Program, American Rivers, and others. August 2004; revised March 1, 2006; revised March 1, 2011; corrected January 31, 2012.

The small culverts have restricted hydrologic connections among formerly contiguous wetland systems. In the subsequent years, additional wetland loss and hydrologic alteration occurred due to the development of cranberry bogs, commercial and industrial development, impoundment of waterways, and later development of residential areas along the roads crossing the ROW. Despite this history of development, substantial areas of contiguous wetland habitats remain both north and south of the ROW.

Loss of wetland habitat is anticipated to continue in the foreseeable future in the absence of the Phase 1 Project. Residential development is anticipated to continue, and planned developments such as the Taunton Casino will likely result in direct and indirect wetland alteration. The railroad will continue to influence the hydrology of adjacent wetland systems and reduce wildlife connectivity within the corridor.

With the proposed Phase 1 improvements, there will be a negligible loss of wetlands with the reconstruction of the tracks and culverts, with negligible effect on the existing fragmentation of important wetland complexes. Hydrologic interaction and wildlife habitat connectivity among project-area wetlands will be improved through the improved culverts which will have a larger openness ratio and will improve conveyance of surface water across the Middleborough Secondary.

8.2.5 Mitigation

This section provides a description of the wetland mitigation measures proposed to offset the permanent wetland impacts previously presented, based on the regulatory requirements. Compensatory mitigation for both state and federal wetland resource impacts that will result from the Phase 1 Project is addressed.

The goal of the wetland mitigation design is to compensate for the lost functions and values of the wetland resources that will be directly impacted by project construction. Mitigation area designs will be based on ensuring that an adequate area of the appropriate wetland types will be established to account for lost functions and values of all affected resources. The rationale for selection of proposed mitigation sites will be based on the probability of success in establishing a functional wetland system that replicates the targeted functions and values. In general, sites that include restoration of a former filled wetland are preferred over sites that create wetlands from areas that were historically uplands. As required by the WPA, mitigation is proposed to be provided at a ratio in excess of 1:1 on-site and in-kind in each community where unavoidable permanent wetland impacts will occur. Additional mitigation when required to meet federal guidelines will be provided out-of-kind or offsite, as discussed below.

The site-specific details of all proposed wetland mitigation actions will be provided in the WPA Notices of Intent, and the Section 404 DA permit and Section 401 (WQC) application materials for Phase 1. Additionally, the overall mitigation program will include implementation of construction-period measures to avoid and minimize unanticipated impacts, and post-construction monitoring to document achievement of success standards and address potential encroachment of non-native and/or invasive species.

8.2.5.1 Massachusetts Wetlands Protection Act

Mitigation for permanent impacts to wetland resources will be provided in each community where the impacts are proposed in accordance with WPA Regulations. Mitigation sites will be on site or adjacent to the impacted site where feasible, in the same watershed, with the same elevation, habitat types, hydrological regime, ecological functions, and other key characteristics. Mitigation will be provided at a minimum impact to mitigation ratio of 1:1 for all proposed permanent BVW impacts at one location within each municipality. The WPA NOI filed for the Phase 1 Project will include grading and planting plans that detail the layout, erosion control measures, topography, soil amenities, seed mixtures, and composition of installed plant materials for the proposed mitigation areas. Upon completion of construction, post-construction monitoring will be implemented to document establishment of least 75 percent of the surface of the replacement area with indigenous wetland plant species within two growing seasons. If monitoring suggests this success standard may not be met, appropriate adaptive management actions will be developed and implemented in consultation with the local conservation commission.

BLSF requires mitigation at a 1:1 ratio to provide compensatory flood storage volume for any flood storage volume lost due to fill required. This will be designed to provide sufficient flood storage volume incrementally equal to the theoretical volume of flood water at each elevation, up to and including the 100-year flood elevation, which will be displaced by the proposed fill. All BLSF mitigation will occur within the same floodplain as the impact.

Table 8.2-14 provides a summary of proposed WPA impacts and mitigation by community.

Table 8.2-14 Summary of WPA Mitigation for BVW – Phase 1*

Municipality	Bordering Vegetated Wetlands Permanent Impacts (sf)	Bordering Vegetated Wetlands Proposed Mitigation (sf)
Lakeville	0	0
Raynham	0	0
Taunton	4,230	5,200
Berkley	3,330	5,520
Freetown	4,841	5,410
New Bedford	2,191	2,600
Fall River	0	0
TOTAL	14,592	18,730

Source: VHB
* includes Southern Triangle impacts

8.2.5.2 Clean Water Act Sections 404 and 401

In setting mitigation requirements for Section 404 permits, the USACE considers watershed needs, mix of habitat types, and compatibility with adjacent land use. The USACE issued rules for compensatory wetland mitigation (33 CFR Parts 325 and 332) in April 2008. In 2016, the USACE New England District issued the Compensatory Mitigation Guidance Document[26] to provide further information on the requirements for mitigation within the District and to provide a standardized format for use in reviewing mitigation plans for their technical merit and ability to replace impacted functions.

This guidance emphasizes a watershed approach to selecting compensatory mitigation measures and locations. Five types of compensatory mitigation are recognized:

- Establishment (creation), defined as: "the manipulation of the physical, chemical, or biological characteristics present to develop an aquatic resource that did not previously exist at an upland site. Establishment results in a gain in aquatic resource area and functions."
- Re-establishment: "the manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former aquatic resource. Re-establishment results in rebuilding a former aquatic resource and results in a gain in aquatic resource area and functions." In the past, this was generally referred to as "restoration."
- Rehabilitation: "the manipulation of the physical, chemical, or biological characteristics of a site with the goal of repairing natural/historic functions to a degraded aquatic resource. Rehabilitation results in a gain in aquatic resource function, but does not result in a gain in aquatic resource area."
- Enhancement: "the manipulation of the physical, chemical, or biological characteristics of an aquatic resource to heighten, intensify, or improve a specific aquatic resource function(s). Enhancement results in the gain of selected aquatic resource function(s), but may also lead to a decline in other aquatic resource function(s). Enhancement does not result in a gain in aquatic resource area."
- Preservation: "the removal of a threat to, or preventing the decline of, aquatic resources by an action in or near those aquatic resources. This term includes activities commonly associated with the protection and maintenance of aquatic resources through the implementation of appropriate legal and physical mechanisms. Preservation does not result in a gain of aquatic resource area or functions."

The District guidance document establishes certain mitigation ratios for compensatory mitigation permanent impacts. For purposes of calculating federal mitigation goals, it is assumed that the wetland

26 USACE. 2016. New England District Compensatory Mitigation Guidance. New England District, U.S. Army Corps of Engineers, September 7, 2016. Available online at: www.nae.usace.army.mil/portals/74/docs/regulatory/Mitigation/2016_New_England_Compensatory_Mitigation_Guidance.pdf

restoration standard will be applied. Using this formula, and assuming that wetland restoration will be required for permanent impacts, a 1:1 minimum ratio is required for impacts to areas of open water, a 2:1 minimum ratio is required for permanent impacts to emergent wetlands, a 2:1 minimum ratio is required for impacts to scrub-shrub wetlands, and a 3:1 minimum ratio is required for impacts to forested wetlands. Temporary impacts are also addressed in the guidance document, with most impacts requiring the replacement of a given percentage of the impacted area.

MassDOT and USACE have agreed upon replacement ratios of 1:1 for permanent and temporary impacts to wetlands, consistent with the replacement undertaken for the WPA impacts. The proposed mitigation will be in-kind with respect to the cover type of the impacted wetlands, within the same watershed, and of sufficient area to offset the functions and vales of the impacted resources. Where compliance with USACE mitigation guidance ratios under CWA Section 404 will require additional mitigation over and above WPA required mitigation, an In-Lieu Fee (ILF) Agreement will be established to provide additional compensatory mitigation for impacts to emergent, scrub-shrub and forested wetlands to be replaced offsite in accordance with the minimum ratios.

Under the Section 401 procedures for the evaluation of applications for discharge of dredge or fill material the relevant standard for mitigation (314 CMR 9.06(2)) states:

- No discharge of dredged or fill material shall be permitted unless appropriate and practicable steps have been taken that will minimize potential adverse impacts to the bordering or isolated vegetated wetlands or land under water, including a minimum of 1:1 restoration or replication of isolated or bordering wetlands.

The Phase 1 Project will provide a minimum of 1:1 restoration or replication of isolated or bordering vegetated wetlands in association with WPA and Section 401 required mitigation.

8.2.6 Regulatory Compliance

Proposed work and its associated impacts will be subject to regulatory review with respect to state and federal wetlands regulatory programs, as described below.

8.2.6.1 Massachusetts Wetlands Protection Act (WPA)

The WPA regulations (310 CMR 10.00) establish specific mitigation requirements for the majority of wetland resource areas. Performance standards are outlined for work performed in each of the wetland resources regulated under the Massachusetts State Wetlands Regulations.

This section discusses the project’s compliance with the performance standards established for each resource area. The Phase 1 Project will fully comply with the performance standards of the WPA as described below and will not require a variance under 310 CMR 10.05(10) (a).

As noted above, in accordance with the Footprint Bridge Exemption provisions of the 2014 Transportation Bond Bill (c. 79 of the Acts of 2014) certain existing structures within the railroad right- of- way are exempt from WPA review. As repairs to active freight lines, maintenance of these structures is necessary regardless of whether or not the Phase 1 Project is implemented, and is consistent with MassDOT Rail and Transit Division's overall SGR program. The SGR structures that are considered exempt will be identified in the NOIs filed within each community.

Performance standards are outlined for work performed in each of the wetland resources regulated under the Massachusetts State Wetlands Regulations. The following sections list these performance standards by resource type.

Bank

The regulations for Bank (310 CMR 10.54(4)) do not specify mitigation requirements, but do list general performance standards that require that work on a Bank not impair any of the following:

- The physical stability of the Bank;
- The water carrying capacity of the existing channel within the Bank;
- Ground water and surface water quality;
- The capacity of the Bank to provide breeding habitat, escape and food cover for fisheries; and
- The capacity of the Bank to provide important wildlife habitat functions.

Where Bank is significant to important wildlife habitat functions, the regulations at 310 CMR 10.60(3) apply. These regulations require that alterations of wildlife habitat characteristics beyond permissible thresholds (for Bank, 50 linear feet) be restored onsite or replicated offsite.

The Phase 1 Project will meet all the general performance standards for Bank and will not adversely impact Bank significant to wildlife habitat within each municipality in excess of permissible thresholds. Proposed Bank impacts will result from culvert and bridge repairs. The repairs at all structures will be designed to restore and permanently stabilize the Banks, while maintaining the water carrying capacity of the channel.

Bordering Vegetated Wetlands (BVW)

For work proposed within BVW, the following performance standards apply:

- Any proposed work in a BVW shall not destroy or impair any portion of the said area;
- The issuing authority may issue an Order of Conditions permitting work, which results in the loss of up to 5,000 square feet of BVW when said area is replaced in accordance with the following general conditions and any additional, specific conditions the issuing authority deems necessary to ensure that the replacement area would function in a manner similar to the area that would be lost;
- No project may be permitted that would have any adverse effect on the specified habitat sites of rare vertebrate or invertebrate species; and
- Any proposed work shall not destroy or otherwise impair any portion of a BVW that is within an ACEC designated by the Secretary of Environmental Affairs.

The regulations at 310 CMR 10.55(4)(b) establish seven general performance standards for replacement of lost BVW.

- The issuing authority may issue an Order of Conditions permitting work, which results in the loss of up to 5,000 square feet of BVW when said area is replaced in accordance with the following general conditions and any additional, specific conditions the issuing authority deems necessary to ensure that the replacement area would function in a manner similar to the area that would be lost;
- The surface of the replacement area to be created shall be equal to that of the area that will be lost;
- The elevation of groundwater relative to the surface of the replacement area shall be approximately equal to that of the lost area;
- The overall horizontal configuration and location of the replacement area with respect to the bank shall be similar to that of the lost area;
- The replacement area shall have an unrestricted hydraulic connection to the same water body or waterway associated with the lost area;
- The replacement area shall be located within the same general area of the water body or reach of the waterway as the lost area;
- At least 75 percent of the surface of the replacement area shall be reestablished with indigenous wetland plant species within two growing seasons, and prior to said vegetative reestablishment any exposed soil in the replacement area shall be temporarily stabilized to prevent erosion in accordance with standard U.S. Soil Conservation Service methods; and
- The replacement area shall be provided in a manner that is consistent with all other General Performance Standards for each resource area in Part III of 310 CMR 10.00.

The Phase 1 Project will meet all the general performance standards for BVW and will not permanently impact greater than 5,000 square feet of BVW within a given municipality. Mitigation for proposed impacts to BVW will be provided within each municipality in accordance with the WPA performance standards.

Land Under Waterbodies and Waterways (LUWW)

The regulations for LUWW (310 CMR 10.56(4)) do not specify mitigation requirements, but do list general performance standards, which require that work within LUWW not impair any of the following:

a. The water carrying capacity within the defined channel, which is provided by said land in conjunction with the banks;
b. Ground and surface water quality;
c. The capacity of said land to provide breeding habitat, escape cover and food for fisheries; and
d. The capacity of said land to provide important wildlife habitat functions.
e. Where LUWW is significant to important wildlife habitat functions, the regulatory standards at 310 CMR 10.60(3) apply. These regulations require that alterations of wildlife habitat characteristics beyond permissible thresholds (for LUWW, 5,000 square feet) be restored onsite or replicated offsite in accordance with the general conditions listed above for Bank.

The Phase 1 Project will meet the general performance standards for LUWW and will not adversely impact greater than 5,000 square feet of LUWW significant to wildlife habitat within a given municipality.

Bordering Land Subject to Flooding (BLSF)

For work proposed in BLSF, the following performance standards apply:

- Compensatory flood storage shall be provided for all flood storage volume that would be lost as the result of a proposed project within BLSF. Such compensatory volume shall have an unrestricted hydraulic connection to the same waterway or waterbody. Further, with respect to waterways, such compensatory volume shall be provided within the same reach of the river, stream or creek;
- Work within BLSF, including that work required to provide the compensatory flood storage specified above, shall not restrict flows so as to cause an increase in flood stage or velocity; and
- Work in those portions of bordering land subject to flooding found to be significant to the protection of wildlife habitat shall not impair its capacity to provide important wildlife habitat functions. Where this resource is significant to important wildlife habitat functions, the regulatory standards at 310 CMR 10.60(3) apply. These regulations require that alterations of wildlife habitat characteristics beyond permissible thresholds (for BLSF, 10% or 5,000 square feet, whichever is less) be restored onsite or replicated offsite in accordance with the general conditions listed above for Bank.

The Phase 1 Project will meet the general performance standards for BLSF and will not adversely impact greater than 5,000 square feet of BLSF significant to wildlife habitat within a given municipality. All areas of BLSF that may be impacted by the proposed trackwork are located within the railroad right of way and on the existing track structure. As an active freight line, these areas of BLSF are not assumed top provide significant wildlife habitat function. Impacts to all regulatory floodways will be avoided. During final design, hydrologic assessments will be completed to determine the flood elevation for all potential BLSF areas where FEMA has not completed a detailed study. Volume calculations will be completed for any fill to be placed within BLSF due to project construction. Compensatory flood storage mitigation will be provided on-site in accordance with WPA requirements. At each location with unavoidable fill proposed within BLSF, a volume of excavation will be proposed within the same floodplain and at the appropriate elevations to provide compensatory flood storage volume incrementally equal to the volume lost.

Riverfront Area

The performance standards for Riverfront Area (310 CMR 10.58(4)) do not specify mitigation requirements. However, where this resource is significant to important wildlife habitat functions, the regulatory standards at 310 CMR 10.60(3) apply. These regulations require that alterations of wildlife habitat characteristics beyond permissible thresholds (for Riverfront Area, 5,000 square feet) be restored onsite or replicated offsite in accordance with the six general conditions listed above for Bank. The Phase 1 Project will meet the performance standards for work within previously altered Riverfront and will not adversely impact RFA that provides important wildlife habitat. All Riverfront Areas altered due to Phase 1 construction will be restored onsite and permanently stabilized.

8.2.6.2 Clean Water Act Section 401

The Phase 1 Project will require MassDOT to obtain an Individual Water Quality Certificate from MassDEP as impacts from Phase 1 will exceed 5,000 square feet project-wide.

The Project will meet the seven criteria for the evaluation of applications for discharge of dredge or fill material (314 CMR 9.06) as follows:

- No discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge that would have less adverse impact on the aquatic ecosystem;
- The alternatives analysis completed for the Phase 1 Project demonstrates that there are no practicable alternatives to the proposed fill that would have less adverse impacts on aquatic resources.
- No discharge of dredged or fill material shall be permitted unless appropriate and practicable steps have been taken that would minimize potential adverse impacts to the bordering or isolated vegetated wetlands or land under water, including a minimum of 1:1 restoration or replication of isolated or bordering wetlands;

- The proposed design for Phase 1 incorporates appropriate measures, such as retaining walls, to minimize impacts to aquatic resources, where practicable. Mitigation is proposed in excess of 1:1 for all unavoidable impacts.
- No discharge of dredged or fill material shall be permitted to ORWs, except for the activities specified in 314 CMR 9.06(3)(a) through (l), which remain subject to an alternatives analysis and other requirements of 314 CMR 9.06;
- The proposed infrastructure improvements within the Phase 1 study area will not involve any impacts to ORWs.
- Discharge of dredged or fill material to an ORW specifically identified in 314 CMR 4.06(1)(d) (e.g., vernal pool, within 400 feet of a water supply reservoir and any other area so designated) is prohibited as provided unless a variance is obtained under 314 CMR 9.08;
- The Phase 1 Project will not involve permanent or temporary impacts within any vernal pool ORWs or within 400 feet of a water supply reservoir.
- No discharge of dredged or fill material is permitted for the impoundment or detention of stormwater for the purposes of controlling sedimentation or other pollutant attenuation;
- The Phase 1 Project will not require any permanent impacts due to stormwater management or sedimentation controls.
- Stormwater discharges shall be provided with BMPs to attenuate pollutants and provide a set back from receiving water or wetland; and
- All proposed stormwater discharges associated with the Phase 1 Project will incorporate appropriate BMP's, with setbacks provided to the extent feasible.
- No discharge of dredged or fill material shall be permitted in the rare circumstances where the activity meets the criteria for evaluation but would result in substantial adverse impacts to the physical, chemical, or biological integrity of surface waters of the Commonwealth.
- The unavoidable impacts to aquatic resources proposed for the Phase 1 Project will not individually or cumulatively result in any substantial adverse impacts to the physical, chemical, or biological integrity of surface waters of the Commonwealth.
- As described above, all practicable avoidance and minimization measures will be incorporated into the Phase 1 Project design. Sufficient areas of wetland restoration and replication will be implemented to provide compensatory wetland mitigation at a minimum of 1:1 to offset the lost wetlands functions and values.

Due to unavoidable impacts to federally jurisdictional wetlands, the Phase 1 Project will be required to obtain a 401 Water Quality Certification for all proposed impacts project-wide. The project proposes to provide mitigation for wetland impacts within each community and watershed where impacts will occur, as well as additional mitigation offsite to meet ratios set by the Army Corps of Engineers under section 404 of the Clean Water Act. This suite of mitigation measures will meet the regulatory requirements set forth under the criteria for Water Quality Certification.

8.2.6.3 Clean Water Act Section 404

The Phase 1 Project will require a Section 404 permit for the placement of fill in freshwater wetlands. The wetland filling is evaluated, in part, using the US EPA Guidelines for Specification of Disposal Sites for Dredged or Fill Material promulgated pursuant to Section 404(b) (1) of the Clean Water Act (Section 404(b)(1) Guidelines) and its implementing regulations at 40 CFR 230 et seq. The Guidelines are intended to avoid unnecessary filling of waters and wetlands as follows:

- No discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge that would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences; and
- No discharge of dredged or fill material shall be permitted unless appropriate and practicable steps have been taken that will minimize adverse effects of the discharge on the aquatic ecosystem.

In setting mitigation requirements for Section 404 permits, the USACE considers watershed needs, mix of habitat types, and compatibility with adjacent land use. As described above, the Phase 1 Project will implement compensatory wetland mitigation in accordance with the USACE issued rules for compensatory wetland mitigation (33 CFR Parts 325 and 332) and the USACE New England District Compensatory Mitigation Guidance Document[27] .

Practicable Alternatives

Practicable means available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes[28]. In considering whether an alternative is practicable, due consideration must be given to cost, constructability, existing technology and also to logistical considerations such as traffic flow and safety in and around each particular alignment and station location. The practicability of the alternatives is considered in the Corps' determination of the LEDPA.

Water Quality/Threatened and Endangered Species

The Phase 1 Project includes proposed stormwater management systems intended to mitigate potential impacts to water quality by controlling runoff velocities and removing pollutants from the stormwater runoff discharging from station locations to downstream surface water resources. The proposed Project has been designed to comply with Massachusetts Stormwater Standards.[29]

27 USACE. 2016. New England District Compensatory Mitigation Guidance. New England District, U.S. Army Corps of Engineers, September 7, 2016. Available online at: www.nae.usace.army.mil/portals/74/docs/regulatory/Mitigation/2016_New_England_Compensatory_Mitigation_Guidance.pdf
28 40 CFR 230.3(q)
29 310 Code of Massachusetts Regulations (CMR) 10.05(6) (k).

The Phase 1 Project will seemingly not affect any federally-listed endangered species, because there are none within the immediate project area. Habitat for several state-listed species occurs within or immediately adjacent to the right-of-way. This is described in detail in Chapter 9, Biodiversity.

No Significant Degradation

The 404(b)(1) Guidelines stipulate that no discharge of dredged or fill material shall be permitted that will cause or contribute to significant degradation of the waters of the United States.[30] Measures to protect and avoid impacts to wetlands and water resources were incorporated into the design process of the Phase 1 Project and will be further refined for the LEDPA. Construction practices will be implemented in accordance with state and federal guidelines to prevent unnecessary impacts to wetland and water resources. Water resources are further described in Section 8.3, Surface and Ground Water Resources.

Reasonable Steps to Minimize Adverse Effects

The 404(b)(1) Guidelines further stipulate that no discharge of dredged or fill material shall be permitted unless appropriate and practicable steps have been taken that will minimize potential adverse impacts of the discharge on the aquatic ecosystem, to the extent practicable, adverse effects to wetland resources will be minimized through avoidance, minimization, and compensatory mitigation.

Avoidance

Avoidance of wetland impacts was considered when designing the track layout and station locations for the Phase 1 Project. When possible, the track was kept within the existing footprint of the active freight lines. Retaining walls were also included, to the maximum extent practicable in this design stage, in track and layout design to avoid additional impacts associated with large grading footprints. Complete avoidance of all wetland impacts would only be possible in the No-Action Alternative, which does not meet the project purpose.

Minimization

The Phase 1 Project evaluated in this report includes design features that were selected to minimize wetland impacts, such as the use of single track segments where possible to minimize widening of the right-of-way and locating railroad passing sidings in adjacent uplands rather than in wetlands. Wetland impacts will be further evaluated during final design. As part of that process, additional steps will be taken to minimize specific impacts along the corridor, such as tightening side slopes and using retaining walls to further reduce the overall footprint associated with the proposed work.

Minimization of impacts to wetland resource areas within the southern triangle has occurred since the publication of the SCR FEIS/FEIR which estimated a total of 7 acres of vegetated wetland impact within the southern triangle for the Preferred Alternative. The current estimate of the impacts to these

30 40 CFR 230.10(c)

resource areas, including new area along the Middleborough Secondary, from the Phase 1 Project is 0.4 acres. This minimization has been achieved by using a revised track cross section that greatly reduces work outside of the footprint of the existing freight rail infrastructure.

8.3 Surface and Groundwater Resources

8.3.1 Introduction

This section discusses the existing water resources within and adjacent to the Phase 1 Study Area. It describes potential impacts to water resources and water supply protection areas within the Study Area, and identifies potential mitigation measures.

8.3.1.1 Requirements of Certificate

The Secretary's Certificate required that the DSEIR include the following information related to surface and groundwater resources:

- Information on the number and location of stream crossings;
- Cross-sections for proposed culverts and bridges and provide detailed designs;
- An evaluation of which culverts appear to provide hydrologic control of an upstream wetland;
- An evaluation of opportunities for maximizing hydrologic connections between wetlands for enhancement and restoration as well as for flood capacity;
- Identification and description of any discharges to Outstanding Resource Waters;
- Identification of the location and impacts to Outstanding Resource Waters, such as certified vernal pools and tributaries to public water supplies; and
- An assessment of proposed bridge and culverts in non-tidal river and stream crossings located along the Phase 1 Middleborough/Lakeville alignment similar to the analysis provided in the FEIS/FEIR a similar assessment for those structures and water bodies.

8.3.1.2 Resource Definition

Surface Water and Groundwater

Surface and groundwater are important natural resources that have a variety of uses including public drinking water, irrigation, industrial, and wildlife habitat. Water quality is determined by the amount of dissolved or suspended material that the water may contain. The quality of surface water and groundwater is influenced by surficial geology, land use, and water quality of source waters. The use of water may be limited by its physical and chemical characteristics. Changes in temperature, pH, dissolved oxygen (DO) content, and pollutant concentrations may make surface waters or groundwater unsuitable for their existing uses.

Surface Water Quality

The surface water quality of a waterbody is largely determined by the terrain and condition of its contributing watershed. Pollutant sources can include point sources, such as municipal wastewater treatment plants and industrial discharges, with varying concentrations of particles and/or chemicals, as well as non-point sources, such as stormwater runoff, from farmland, containing sediment, fertilizer and pesticides.

Groundwater Quality

Groundwater quality may also be affected by aboveground pollutant sources. Precipitation that infiltrates through the soil to the water table may carry pollutants encountered on the surface or in the soil. However, aquifers are often buffered from surface influences by underground hydrogeologic features, such as different soil types. Layers of clay may impede infiltration, preventing water from reaching the aquifer, while layers of sand may filter out many contaminants as the water travels through the soil. Drinking water wells are often located in highly-permeable soils to maximize potential pumping rates. These same soils can allow accidental spills to reach the well quickly, especially if the spills are close to the well itself. Therefore, protection of groundwater supplies must consider potential pollutant sources, well locations, and soil conditions.

8.3.1.3 Regulatory Context

Surface and groundwater resources are protected under several state and federal regulatory programs, including the federal Clean Water Act (Sections 402 and 404) and the Massachusetts Clean Waters Act (MGL Chapter 21, §26-53). Other applicable regulations include the Massachusetts Section 401 Discharge regulations (314 CMR 9.00), Groundwater Quality Standards (314 CMR 6.00), and Surface Water Quality Standards (314 CMR 4.00). Some waterways are also regulated under MGL Chapter 91, which protects the public interest in tidelands, Great Ponds, and non-tidal rivers.

Clean Water Act of 1977

Water quality must be addressed for compliance with the Federal Water Pollution Control Act, also known as the CWA, which provides the authority to the United States Environmental Protection Agency (EPA) to establish water quality standards (or to states to establish standards equal to or more stringent than EPA standards), to control discharges into surface and subsurface waters, to develop waste treatment management plans and practices. It requires states to monitor and classify waterbodies, establish goals, and publish lists of monitoring and classification results. The CWA gives states the authority and responsibility to publish water quality standards.[31]

Section 303(d) of the CWA (TMDL and 303(d) Program)

As part of the Massachusetts's NPDES MS4 program, the EPA requires states to establish priority rankings for impaired waters and develop Total Maximum Daily Loads (TMDLs) for these waters under

31 U.S. Code. Title 33, Chapter 26 – *Water Pollution Prevention and Control*. (November 27, 2002).

section 303(d) of the Clean Water Act to address pollution from point and non-point source discharges. States are required to submit lists of impaired waters, meaning that the waterway does not meet state water quality standards (WQS), to the EPA for approval. These are waters that are too polluted or otherwise degraded to meet WQS. Once approved under the 303(d) program, the state then continues to study and test the waterway and if the quality degrades further, then eventually a TMDL is developed for a specific pollutant. TMDLs represent a pollution budget that establishes the maximum amount of a pollutant that can occur in a waterbody and still meet Massachusetts WQS. A TMDL serves as a planning tool and potential starting point for restoration or protection activities with the ultimate goal of attaining or maintaining WQS. If a project impacts a TMDL-listed waterbody, appropriate measures must be taken to control the discharge of the listed pollutant and meet the TMDL requirements. Some TMDLs may require additional measures (including stormwater treatment) in order to prevent an increase in pollutant loading to the receiving water.

Safe Drinking Water Act

The Safe Drinking Water Act authorizes the EPA to set national health-based standards for drinking water to protect against both naturally-occurring and man-made contaminants that may be found in drinking water.[32] If the project impacts a drinking water supply, appropriate mitigation measures must be provided to maintain compliance with the Safe Drinking Water Act.

National Wild and Scenic Rivers Act

The National Wild and Scenic Rivers Act (Public Law 90-542; 16 U.S.C. 1271 et seq.) was established to preserve the free-flowing conditions of rivers with outstanding natural, cultural, and recreational values. Designation of an entire river system, or segments of, is approved by Congress or the Secretary of the Interior. Rivers are then classified as Wild: free of impoundments, generally inaccessible (except by trail), with primitive watersheds/shorelines unpolluted waters; Scenic: free of impoundments, largely undeveloped watersheds/shorelines and accessible in places by roads; or Recreational: readily accessible by road or railroad with some development along their shorelines and some past impoundments or diversions. The administration of designated rivers is assigned to a federal or state agency.

The Taunton River was designated as a Wild and Scenic River on March 30, 2009; therefore, the Freetown and Fall River Stations are subject to the Wild and Scenic Rivers Act provisions. The administration of this designation occurs through a partnership between the National Park Service and the Taunton River Stewardship Council. The entire river system was included in this designation from its headwaters at the confluence of the Town and Matfield Rivers in Bridgewater downstream 40 miles to the confluence with the Quequechan River at the Interstate 195 Bridge in Fall River. Twenty-six miles of the Taunton River were classified as Scenic and 14 miles as Recreational.

The Act prohibits federal support for actions such as the construction of dams or other in stream activities that would harm the river's free-flowing condition, water quality, or Outstanding Resource

32 U.S. Code. Title 42, Chapter 6A, Subchapter XII – *Safety of Public Water Systems*. (January 6, 2003).

Values (scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values).[33] However, it does not prohibit development near designated rivers; rather it encourages regional river management practices to protect the use and enjoyment of these rivers. New development on federal lands must be guided by land use and resource management objectives that are compatible with the river's classification.

8.3.2 Existing Conditions

This section describes the existing conditions of surface waters, groundwater resources, and public water supplies that would be affected within the Phase 1 Project Study Area. Resources assessed include named surface waters, such as rivers and lakes, as well as public drinking water wells. This section also explains the regulatory classifications that apply to surface water and groundwater protection. Figure 8-3 shows the project area and major waterbodies.

8.3.2.1 Surface Water Resources and Classifications

In Massachusetts, certain surface waters with exceptional socioeconomic, recreational, ecological, or aesthetic values are designated ORWs, which require additional protection. ORWs can include drinking water supplies, as well as high-value wetlands areas (specified in 314 CMR 4.06[2]) such as Areas of Critical Environmental Concern (ACECs) and vernal pools. There are no state-designated ORWs or ACECs associated with the Middleborough Secondary or the stations, though vernal pool surveys of the area identified nine certifiable vernal pools. See Chapter 9 for more information on vernal pools.

Surface and groundwaters are classified according to the Massachusetts Water Quality Standards and Surface Water Supply Protection Zones.

Water Quality Standards

The Massachusetts Water Quality Standards (314 CMR 4.00) assign class designations to inland and coastal waters. These classes specify water quality standards based on the intended uses of the waterbodies. The standards for each class can address characteristics such as temperature, DO, pH, bacteria, solids, color and turbidity, oil and grease, and taste and odor. The classes for inland waters are:

- **Class A** are fresh waters designated as sources of public drinking water supply, as excellent fish and wildlife habitat, and for primary and secondary contact recreational activities. The standards for contact recreation must be met for Class A waters even if these activities are not permitted (e.g., in a reservoir). Class A waters also have excellent aesthetic value. This is the most stringent inland water classification and includes strict standards for bacteria, DO, and other characteristics to protect the designated uses of the water and human health.

33 National Wild and Scenic Rivers webpage: http://www.rivers.gov/.

- **Class B** are fresh waters designated for primary and secondary contact recreational activities and for fish and wildlife habitat. Class B waters are suitable for compatible industrial processes and cooling, irrigation, and other agricultural uses. Class B waters also have consistently good aesthetic value. Some Class B waters are designated as suitable for public water supply with appropriate treatment.

- **Class C** are fresh waters designated for secondary contact recreational activities and for fish and wildlife habitat. Class C waters are suitable for compatible industrial processes and cooling and for irrigation of crops that are intended for cooking before consumption. Class C waters also have good aesthetic value. This is the least stringent inland water classification.

- **Class SB** are coastal and marine waters designated for primary and secondary contact recreational activities and as fish and wildlife habitat. Class SB waters also have consistently good aesthetic value. Specific Class SB waters may be designated for shellfish harvesting with depuration in 314 CMR 4.00. Any desalination plant making withdrawals from a Class SB water must protect the existing and designated uses of the water.

Most major waterbodies in Massachusetts are classified in 314 CMR 4.00. Inland waters not specified in the regulations are assumed to be Class B. However, the regulations specify other ways that classifications can be determined. For example, tributaries to a drinking water supply (which would itself be designated Class A) would be designated as Class A waters in order to protect the intended uses downstream.

In addition to the water classifications in 314 CMR 4.00, MassDEP also maintains the *Massachusetts Integrated List of Waters*[34], which is updated every two years and provides more detail on individual waterbodies. This list identifies what designated uses are attained, what impairments have been reported, and whether or not a TMDL has been prepared, if required. Waterbodies with ongoing impairments may require a TMDL for a given contaminant. TMDLs identify the major contributors to a given impairment (e.g., sources within a watershed that may contribute to the contamination or impairment) and specifies both general and individual discharge limits that must be met in order to reduce contaminant loading and improve the health of the waterbody.

To summarize, the *Massachusetts Integrated List of Waters* divides waterbodies into various categories:

- **Category 1 Waters:** Waters attaining all designated uses.
- **Category 2 Waters:** Attaining some uses; other uses not assessed.
- **Category 3 Waters:** No uses assessed.
- **Category 4a Waters:** TMDL is completed.

34 Massachusetts Department of Environmental Protection, Division of Watershed Management. *Massachusetts Year 2014 Integrated List of Waters*. December 2015.

- **Category 4c Waters:** Impairment not caused by a pollutant.
- **Category 5 Waters:** Waters requiring a TMDL.

To evaluate existing surface waters potentially affected by the project, a screening for surface waters was performed to identify all waterbodies that will be crossed by or within 100 feet of the centerlines of the Middleborough Secondary and that will receive stormwater discharges from the stations. This process used geographic information systems (GIS) data developed by the U.S. Geological Survey (USGS) and provided by MassGIS to identify named and unnamed waterbodies. Named waterbodies are included in the *Massachusetts List of Integrated Waters* and have a waterbody ID assigned by MassDEP which denotes a specific segment of the waterbody.

The screening process identified six named rivers, streams, and ponds and numerous unnamed, minor waterbodies. The six named water bodies are identified in Table 8.3-1. Four of the waterbodies are on the *Massachusetts Integrated List of Waters* and have waterbody IDs and three waterbodies are not on the list.

Table 8.3-1 Named Surface Waters Within the Phase 1 Study Area

Phase 1 Area	Waterbody Name	Waterbody ID
Pilgrim Junction	Nemasket River	MA62-25
Middleborough Secondary	Box Brook	No ID
	Poquoy Brook	No ID
	Furnace Brook	No ID
	Taunton River	MA62-01
	Cotley River	MA62-41*
East Taunton	Cotley River	MA62-41*
Freetown	Taunton River	MA62-04**
Fall River	Taunton River	MA62-04**

* Cotley River receives stormwater discharges from the Middleborough Secondary and the East Taunton Station
** This Taunton River segment receives stormwater discharges from both the Freetown and Fall River Stations

The classes and categories identified by MassDEP in the *Massachusetts Integrated List of Waters* and the Massachusetts Water Quality Standards provide an effective summary of a waterbody's uses and overall health. Table 8.3-2 identifies the named waterbodies with a waterbody ID and their integrated list category and other relevant information. See Section 8.2 for more information on wetlands associated with Box Brook, Poquoy Brook, and Furnace Brook.

Table 8.3-2 Streams and Ponds Classified by MassDEP

Name	ID	Category	Class	ORW	Uses Attained	Impairments	TMDL
Nemasket River	MA62-25	2	B	No	Fish, other Aquatic Life and Wildlife	-	None

Name	ID	Category	Class	ORW	Uses Attained	Impairments	TMDL
Taunton River	MA62-01	5	B	No	-	Escherichia coli	None
Cotley River	MA62-41	3	B	No	N/A	N/A	N/A
Taunton River	MA62-04	5	SB	No	-	Enterococcus, Fecal Coliform, Fishes Bioassessments, Dissolved Oxygen	Pathogens*

* MA62-04 of the Taunton River is impacted by the discharge of CSOs

These waterbodies are all Class B and SB waters, indicating that they should be safe for recreational use and provide good fish and wildlife habitat but do not need to meet drinking water standards.

Cotley River

The Cotley River is a tributary of the Taunton River and runs through Barstows Pond to the Taunton River. The Middleborough Secondary crosses the Cotley River. The Cotley River is a Category 3 surface water, indicating that its intended uses have not been assessed by MassDEP.

Taunton River

The Taunton River begins in Bridgewater, MA at the confluence of Town and Matfield Rivers and flows south to discharge to Mount Hope Bay in Rhode Island. The Taunton River is adjacent to the Middleborough Secondary, and streams crossing the railroad are tributary to the Taunton River.

The upstream portion of the Taunton River (MA62-01) is a Class B surface water, indicating that it should have consistently good aesthetic and habitat values. It is intended for primary and secondary contact recreation and is not intended for drinking water supply without treatment beforehand.

The downstream portion of the Taunton River (MA62-04) is a Class SB surface water, which indicates that it is a marine and coastal water with similar characteristics as a Class B surface water. This segment of the Taunton River has combined sewer overflows (CSOs) and is classified for shellfishing with depuration. The downstream portion of the Taunton River has been placed in Category 5 surface water as not meeting water quality standards and in need of a TMDL. This section of the river is impaired for enterococcus, fecal coliform, fishes bioassessments, and dissolved oxygen. The *Final Pathogen TMDL for the Taunton River Watershed*[35] (the Pathogen TMDL) was approved by EPA in June 2011 and covers this segment of the Taunton River. The Pathogen TMDL indicates that the source for pathogens for segment MA62-04 of the Taunton River are municipal separate storm sewer systems (MS4s), CSOs, septic systems, and marina/boating releases. The TMDL document identifies segment MA62-04 as high priority, indicating the potential presence of raw sewage and the need for bacteria source tracking

35 MassDEP. June 2011. Final Pathogen for the Taunton River Watershed. http://www.mass.gov/eea/docs/dep/water/resources/n-thru-y/taunton1.pdf.

during dry weather (first priority) and wet weather (second priority). The City of Fall River has four combined sewer outfalls that discharge to segment MA62-04.

Nemasket River

The Nemasket River begins in Middleborough, MA as an offshoot from the Taunton River and flows south to discharge to Assawompset Pond in Taunton, MA. Waterways in the eastern part of the Middleborough Secondary are tributary to the Nemasket River, which is approximately 4,000 feet to the east of the ROW. The Nemasket River is a Category 2 surface water, and it has attained the uses of fish, other aquatic life and wildlife.

Surface Water Supply Protection Zones

Waterbodies used for drinking water supply were identified separately from the waterbody screening discussed above. Massachusetts Drinking Water Regulations (310 CMR 22.00) define three different Surface Water Supply Protection Zones that surround reservoirs and other surface drinking water sources as follows:

- **Zone A** represents:
    - the land area between the surface water source and the upper boundary of the bank;
    - the land area within 400 feet of the upper boundary of the bank of a Class A surface water source, defined in 314 CMR 4.05(3)(a); and
    - the land area within 200 feet of the upper boundary of the bank of a tributary or associated surface waterbody.
- **Zone B** represents the land area within one-half mile of the upper boundary of the bank of a Class A surface water source, or the edge of the watershed, whichever is less. Zone B always includes the land area within 400 feet of the upper boundary of the bank of a Class A surface water source.
- **Zone C** represents the land area not designated as Zone A or B within the watershed of a Class A surface water source.

The screening process showed that the Middleborough Secondary or stations do not intersect with any surface water supply protection areas (Zone A, B, or C). See Figure 8-3, sheets 1-3.

Ground Water Protection Areas are discussed below in Section 8.3.2.2.

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Figure 8-3: Middleborough Secondary - Water Resources Page Key Sheet

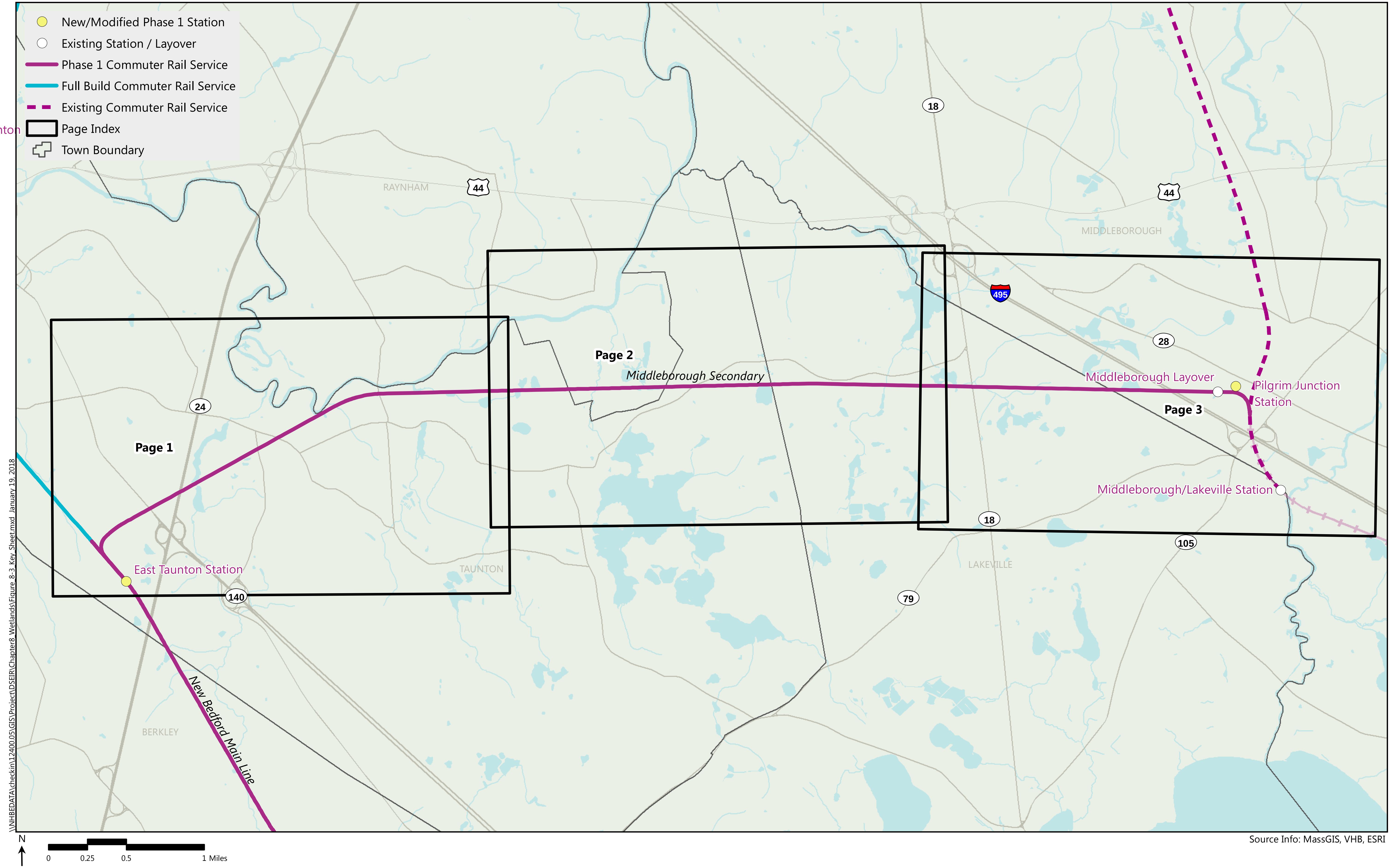

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Figure 8-3: Middleborough Secondary - Water Resources

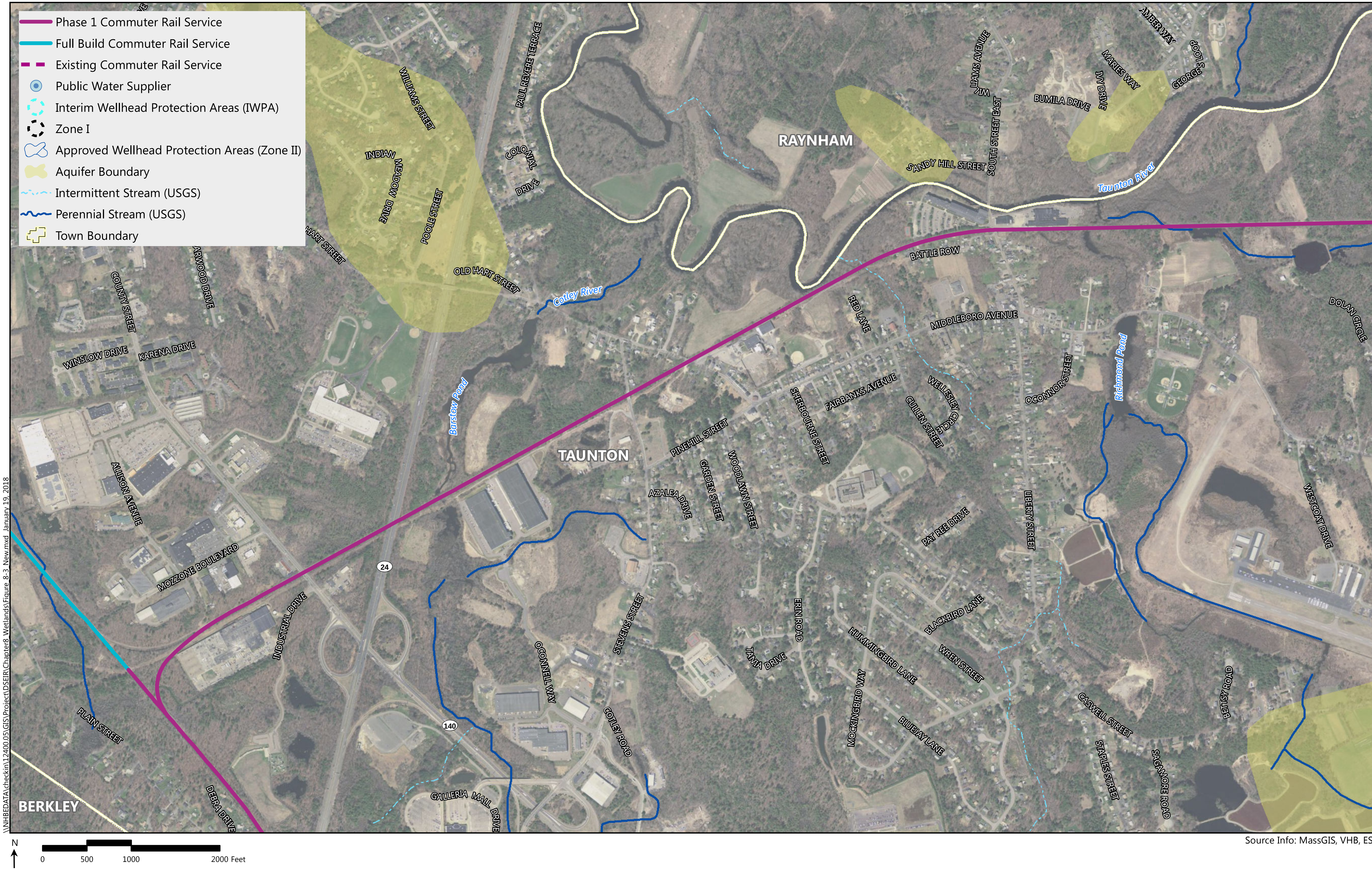

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Figure 8-3: Middleborough Secondary - Water Resources

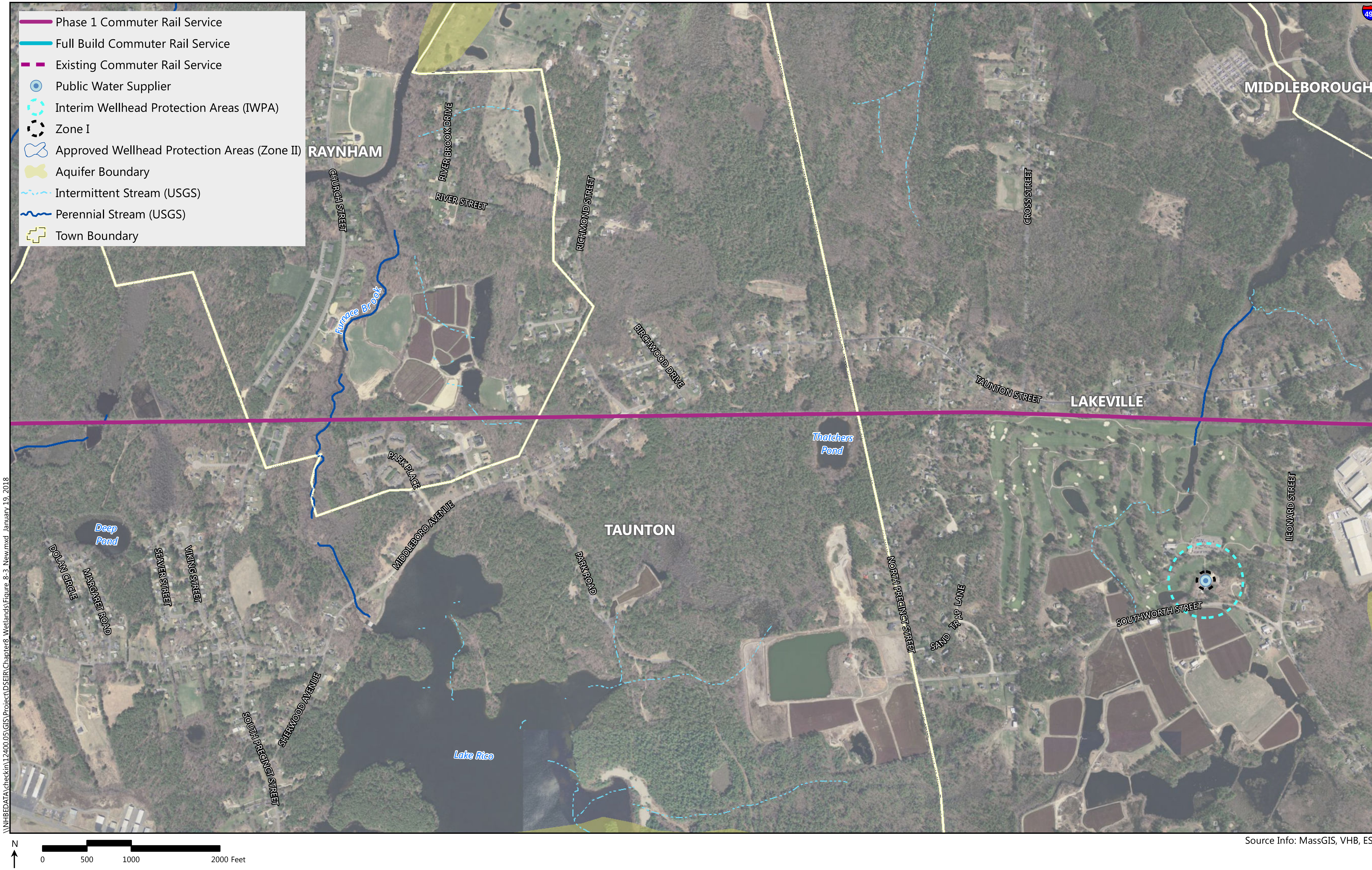

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Figure 8-3: Middleborough Secondary - Water Resources

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8.3.2.2 Groundwater Resources and Protection Areas

Groundwater resource areas are defined and regulated pursuant to the *Massachusetts Drinking Water Regulations*. Public drinking water supply wells[36] can include municipal supplies as well as any supplies that provide water to at least fifteen service connections. There are no municipal water supplies within 100 feet of the Middleborough Secondary or the new Phase 1 stations.

The groundwater supply protection areas (310 CMR 22.21) surrounding public water supply wells include:

- **Zone I:** The protective radius required around a public water supply well or well field. This radius varies in size from 100 to 400 feet based on the approved yield of the well.
- **Zone II:** The area of an aquifer that contributes water to a well under the most severe pumping and recharge conditions that can be realistically anticipated.
- **Zone III:** The land surface beyond Zone II from which surface water and groundwater drain into the Zone II based on topography.
- **Interim Wellhead Protection Area (IWPA):** The primary protected recharge area for public wells without a DEP-approved Zone II. The IWPA radius can range from a minimum of 400 feet to a maximum of 0.5 mile. The default radius is 0.5 mile.

The Groundwater Supply Protection regulations require that Zone I areas be "owned or controlled by the supplier of water" [310 CMR 22.21(1) (b)]. Zoning controls are required to restrict land use within Zone II and Zone III. Track, trains, roads, and parking areas are not prohibited uses in Zone II and Zone III areas. There are no Zone I or IWPAs adjacent to the Middleborough Secondary or the stations. However, Pilgrim Junction Station is within a Zone II to a municipal groundwater well located approximately 3,600 feet away and adjacent to the Nemasket River. Stormwater management systems that are located within Zone IIs need more pre-treatment of stormwater runoff before discharging off-site. See Section 8.4 for description on the proposed stormwater management system at Pilgrim Junction.

Aquifers may be designated as Sole Source Aquifers (SSAs) by the EPA if they provide at least 50 percent of a community's drinking water and there are no reasonable alternative drinking water sources available. Since the contamination of an SSA could leave residents without drinkable water, any projects proposed within an SSA that receive federal funding are subject to review by EPA to ensure they do not endanger the aquifer. The Phase 1 Study Area does not cross any SSAs.

36 The definition of public water supplies in 310 CMR 22.02 includes any systems that provide at least 15 service connections or regularly serve an average of at least 25 individuals daily at least 60 days of the year.

8.3.2.3 Bridges and Culverts

The Phase 1 Project Area crosses two waterways on bridges: Cotley River, and Richmond Brook. There are 26 culverts that pass under the Phase 1 Project Area. Of these, 19 convey intermittent or perennial streams; six are wetland equalizers (wetlands but no defined channel on either side), and one conveys upland drainage under the right-of-way. Table 8.3-3 lists the bridges and culverts and Figures 8-4 and 8-5 show their locations. Note that many of these culverts and the Cotley River bridges are being repaired under MassDOT's SGR Program and will be repaired or replaced ahead of the Phase 1 construction.

Table 8.3-3 Middleborough Secondary Bridges and Culverts

Structure Name	Municipality	Description
CV-MI-1	Middleborough	Wetland equalizer
CV-LK-8	Lakeville	Upland crossing
CV-LK-9	Lakeville	Perennial stream
CV-LK-10	Lakeville	Perennial stream
CV-LK-11	Lakeville	Intermittent stream
CV-LK-12	Lakeville	Intermittent stream
CV-LK-13	Lakeville	Wetland equalizer
CV-LK-14	Lakeville	Intermittent stream
CV-RA-1	Raynham	Intermittent stream
CV-RA-2	Raynham	Intermittent stream
CV-RA-3	Raynham	Wetland equalizer
Furnace Brook Culvert	Raynham	Perennial stream tributary to Taunton River
CV-TA-1	Taunton	Intermittent stream
Cotley River (Barstow Pond) Bridge	Taunton	Bridge
CV-TA-2	Taunton	Wetland equalizer
CV-TA-3	Taunton	Wetland equalizer
CV-TA-4	Taunton	Intermittent stream
Richmond Brook Bridge	Taunton	Tributary to Taunton River
CV-TA-5	Taunton	Perennial stream
CV-TA-6	Taunton	Intermittent stream
CV-TA-7	Taunton	Intermittent stream
CV-TA-8	Taunton	Potential perennial stream
CV-TA-9	Taunton	Intermittent stream
CV-TA-10	Taunton	Intermittent stream
CV-TA-11	Taunton	Wetland equalizer
CV-TA-12	Taunton	Intermittent stream
CV-TA-13	Taunton	Intermittent stream
East Taunton Station Culvert	Taunton	Intermittent stream

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Figure 8-4: Middleborough Secondary Bridge and Culvert Locations

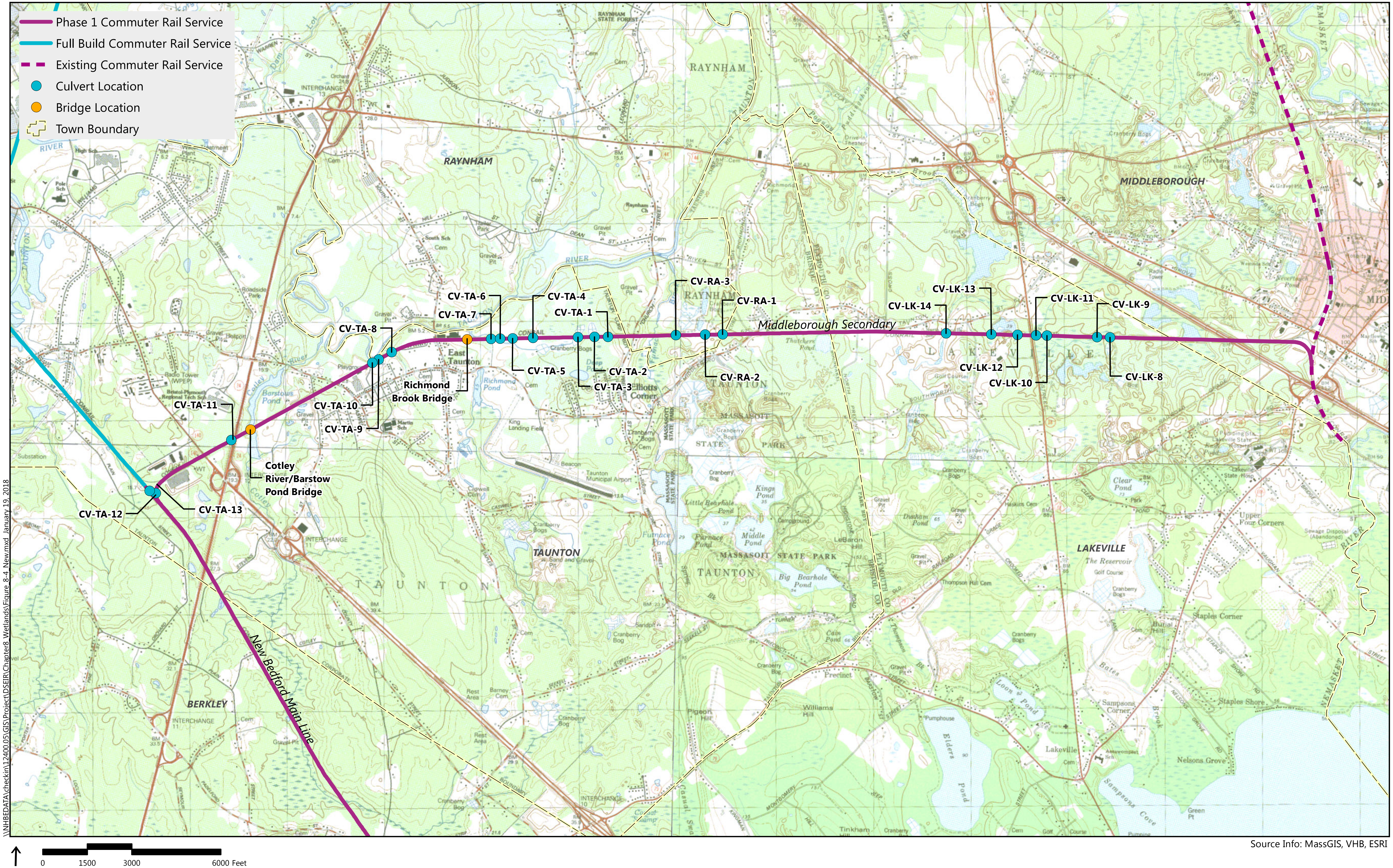

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Figure 8-5: Middleborough Secondary Bridge and Culvert Locations
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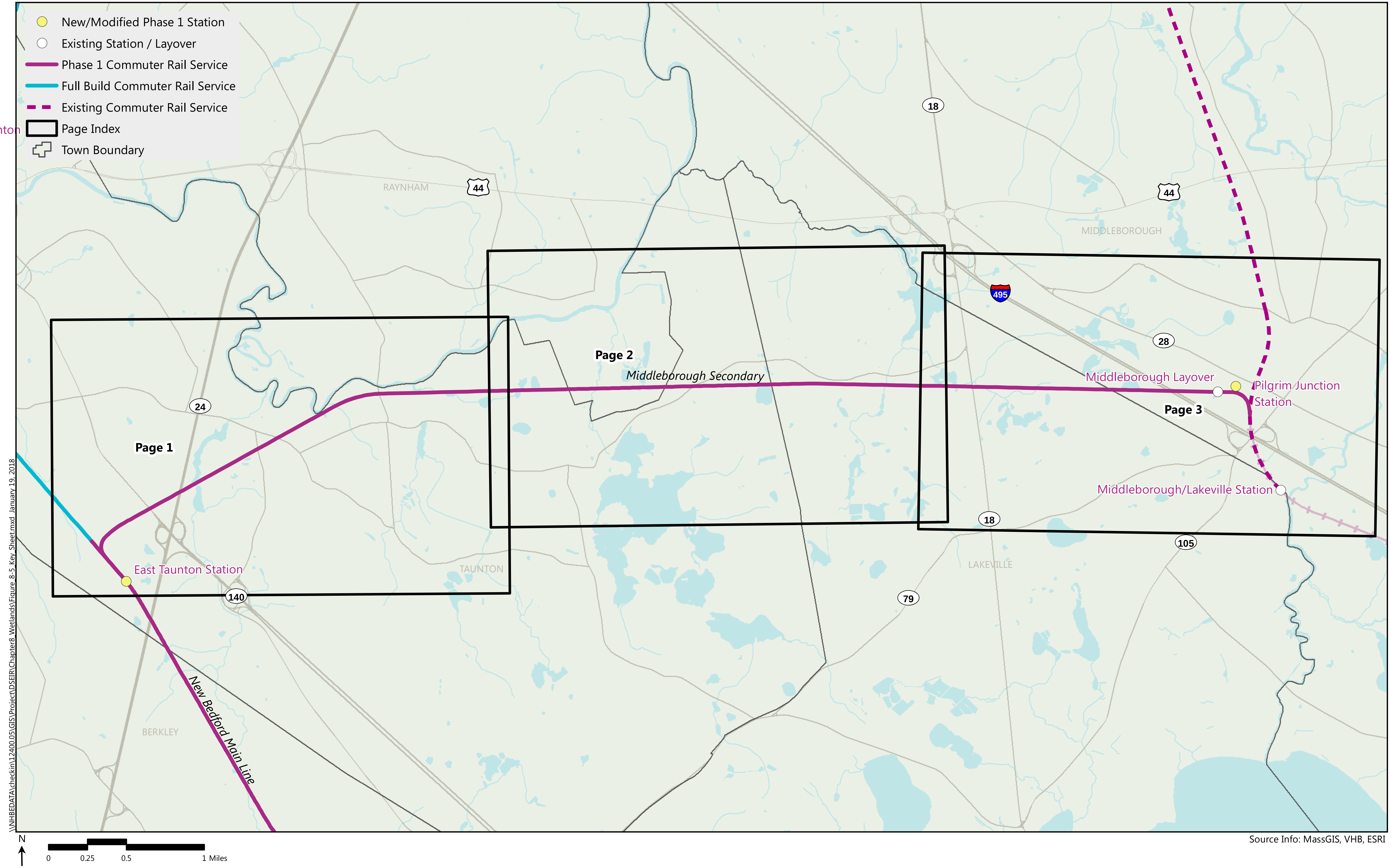

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Figure 8-5: Middleborough Secondary Bridge and Culvert Locations

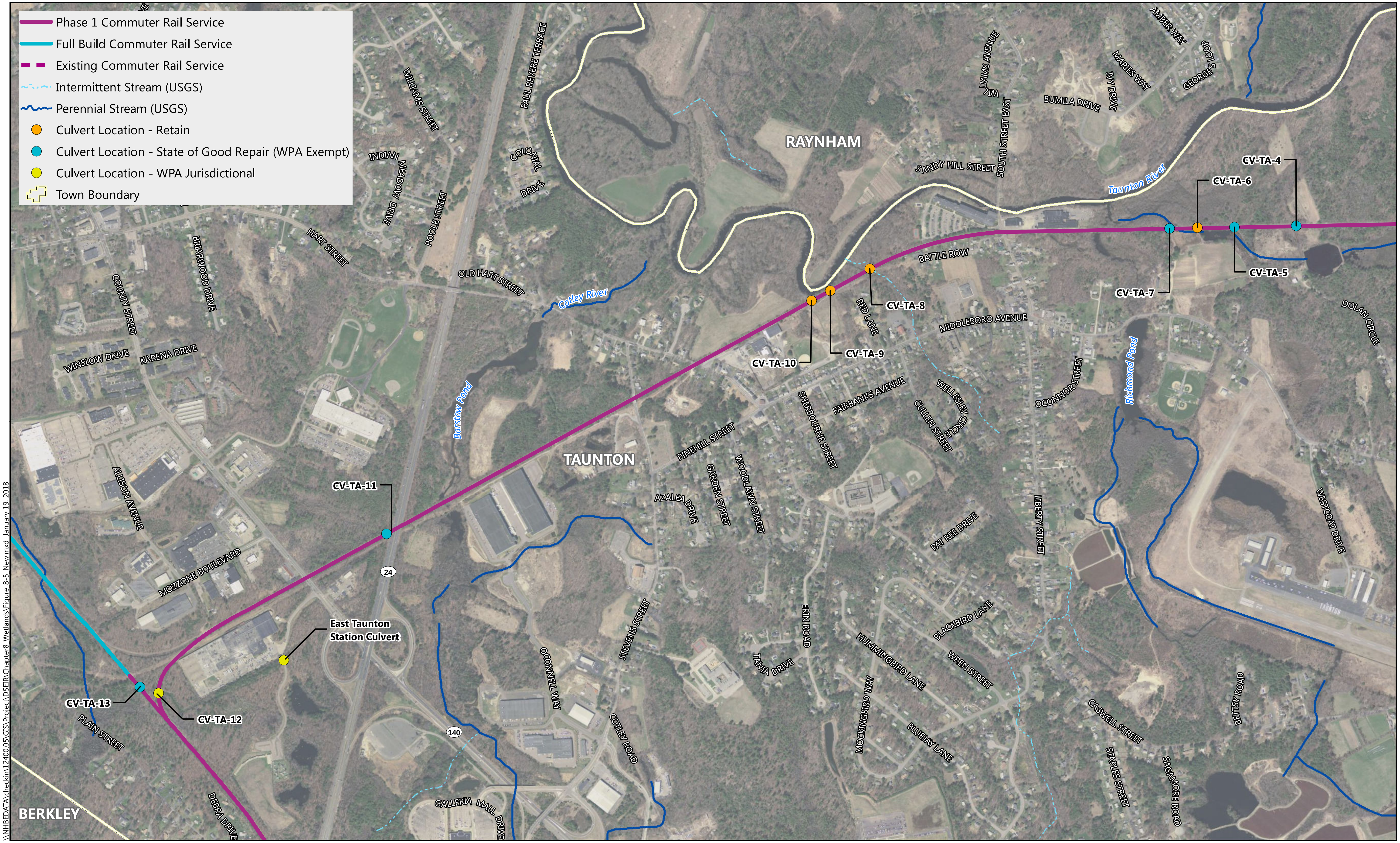

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Figure 8-5: Middleborough Secondary Bridge and Culvert Locations

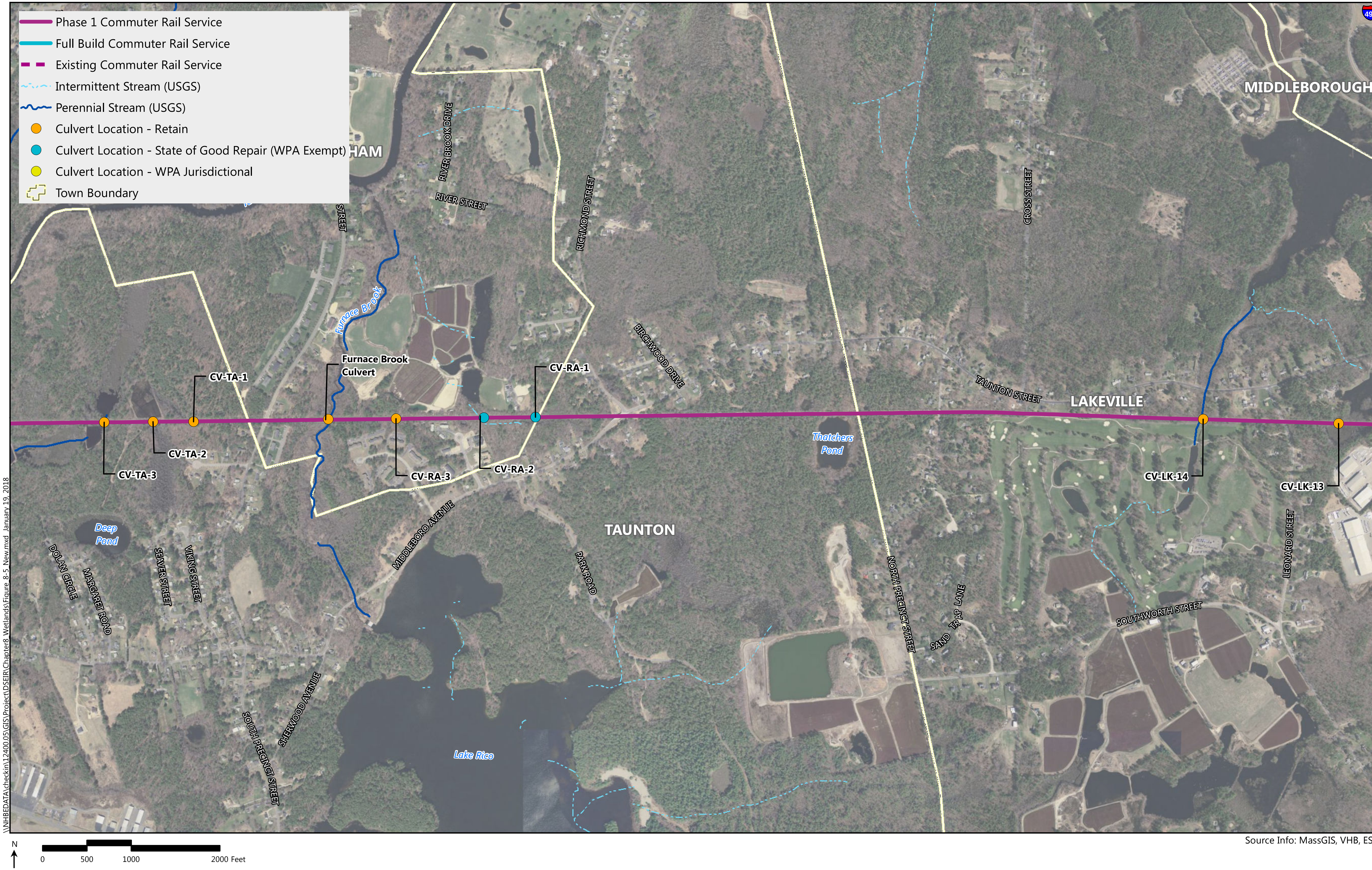

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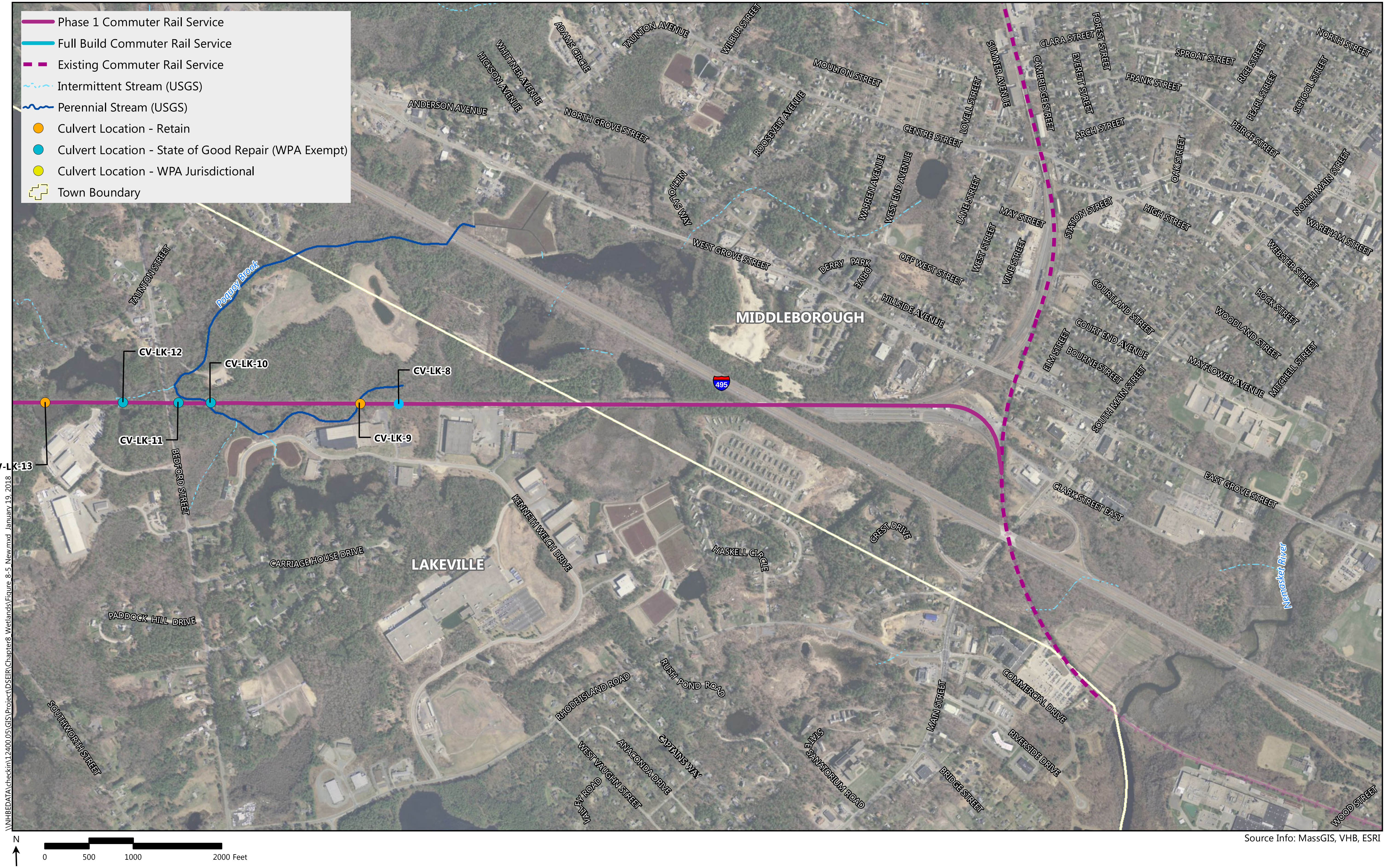
Figure 8-5: Middleborough Secondary Bridge and Culvert Locations



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8.3.3 Methodology

This section describes the methodology used to assess impacts to surface waters and groundwater resources due to the project.

For surface and groundwater resources, direct and indirect effects can usually be considered together, since direct and indirect effects are caused by the same sources. For example, any off-site or downstream impacts would have to be caused by on-site drainage or pollutant sources. The limits of work proposed for each station and along the Middleborough Secondary were assumed to be the maximum extent of impacts.

Potential effects on surface and groundwater resources were evaluated by reviewing areas where new construction will be required. For the purposes of this evaluation, "new construction" is defined as construction of stations, upgrades of existing rail lines, reconstruction of removed railroad infrastructure (e.g., old rails, ties, etc.) along existing railroad alignments, replacement of existing railroad bridges and culverts, and reconfiguration of at-grade road/railroad crossings. The purpose of this review was to identify where the rail corridors or stations will pass through or be located in or adjacent to surface and groundwater resources or water resource protection areas. Maps and aerial photographs were examined in reference to preliminary engineering plans to identify potential effects on surface and groundwater resources.

8.3.3.1 Surface Waters

Direct Impacts

Potential direct impacts to surface waters may result from a variety of actions as listed below.

- **Fill within surface waters:** Placing fill within a waterbody can disrupt the ecology of the streambed or lakebed and potentially increase flooding. During the construction period, placing fill may temporarily increase suspended sediment concentrations as well as the risk of contamination from spills or accidents with construction equipment.
- **Discharge of pollutants to surface waters:** Pollutants associated with the construction or operation of the project may contaminate local surface waters if spill controls and stormwater management features are not provided to contain or remove the pollutants. Contamination may occur from contaminated stormwater runoff or direct spills into a waterbody.
- **Changes in surface water hydrology:** Building new impervious surfaces, modifying channel geometry (such as by altering the shape of a culvert or the hydraulic opening beneath a bridge), or otherwise changing local drainage patterns can affect any receiving waters. Adding impervious surfaces to a watershed may change the hydrology by increasing the amount of runoff from precipitation. This can increase peak flows in surface waters, as flow rates during storms could increase due to the greater volume and rate of runoff. Increased peak flows of runoff can also

promote erosion of soil and streambeds and potentially increase flooding. Changes in hydrology can also decrease or relocate flow, resulting in draining wetlands and streams.

Indirect Impacts

Direct impacts involving substantial changes to site hydrology or pollutant sources may cause additional downstream indirect impacts to surface waters. The causes of these indirect (offsite) impacts are listed below.

- **Changes in stream geomorphology:** Increased peak flows result in bank erosion and/or down-cutting of stream systems. Sediment transported from eroding stream segments is deposited downstream in still water areas, resulting in shallower channels, higher water temperatures, and loss of deep water habitat.
- **Changes in water chemistry:** Some types of water-borne pollution are not harmful in and of themselves, however their presence may mobilize or alter naturally-occurring substances in ground or surface water that are harmful to aquatic life or are detrimental to human health.
- **Changes in water temperature:** Increases in water temperature, such as from the discharge of cooling water from plants, can disrupt the aquatic habitat values within waterbodies. In addition, impervious surfaces like asphalt can absorb heat thereby, increasing the temperature of runoff, which adversely affects the temperature of the aquatic habitat in the receiving waters.

Potential impacts to surface waters were identified based on proposed activities near or adjacent to surface waters or if stormwater discharges to surface waters.

8.3.3.2 Groundwater and Public Drinking Water Supplies

Direct Impacts

Potential direct impacts to groundwater and public drinking water supplies may result from a variety of actions as listed below.

- **Discharge of pollutants to groundwater:** Pollutants associated with the construction or operation of the project may contaminate local groundwater supplies if spills or contaminated runoff are allowed to infiltrate into the ground. The potential consequences increase the closer the pollution source is to drinking water wells, as contamination close to a well may require additional treatment at the well to make the water safe to drink.
- **Changes in groundwater recharge:** Building new impervious surfaces or otherwise changing local drainage patterns can reduce groundwater recharge, potentially reducing local groundwater supplies. Without mitigation, large-scale reductions in the groundwater supply may make low flows in streams more frequent and severe due to reduced baseflow (groundwater seeping into the stream through the streambed).

Potential impacts to drinking water wells were identified based on proposed activities within groundwater protection areas including Zone I, Zone II, and Interim Wellhead Protection Areas. These protection areas are established by MassDEP around registered public drinking water supplies. Residences in some areas may not be served by municipal water systems but instead rely on individual private wells that may be located in proximity to one or more alternatives. An analysis of individual impacts to private wells was not performed for this report, but the steps taken to minimize the potential for groundwater contamination and drinking water supply impairment under Phase 1 will also reduce the potential for any impacts to private wells. Prior to the construction of any element discussed in this report, private wells will be located and inventoried. Based on this inventory, appropriate design modifications will be undertaken to minimize or avoid impacts to private wells.

8.3.4 Impacts and Mitigation Measures

This section describes the analysis of the impacts and mitigation measures for surface waters and groundwater resources adjacent to the project. Potential pollutant sources were reviewed to evaluate their impacts if they were to discharge to surface waters or groundwater resources. The bridges and culverts along Middleborough Secondary were reviewed to identify which crossings will need replacement and potentially affect surface waters for impacts to surface and groundwater resources. See Section 8.4 on stormwater for analysis of increase in impervious cover and changes to groundwater recharge for the project.

8.3.4.1 Potential Pollutant Sources - Operations

Phase 1 will not introduce any new pollutants to surface or groundwaters through operation of the commuter rail line or new stations. Phase 1 will not result in the placement of fill in any surface water body, discharge pollutants, or alter the hydrology of a surface water. As described below, Phase 1 has the potential to produce minor amounts of contaminants that will be captured and treated in upland areas.

The various potential sources of pollutants that could be generated by the Phase 1 Project were reviewed in order to determine the different types of treatment measures that will be required to protect surface and groundwater resources. Most potential rail contaminants are due to the train traffic on the rails, which may result in hazardous contamination from spills, drips, or exhaust. Rail lines themselves are not significant sources of pollutants, as the rails and ballast are made of stable, non-hazardous materials. Most pollutants generated by train operations would be found adsorbed (attached) to the surface of the stone ballast supporting the rail ties. Rail lines generate different types of stormwater pollutants than highways, parking lots, and other paved surfaces.

Hydrocarbons are the most common contaminants found on rail ballast, primarily from drips of fuel or other fluids from trains. Rail greasers are also used to lubricate the inside edges of the rails near tight curves to reduce wheel friction and noise. Excess grease may build up on the nearby ballast and contribute additional hydrocarbons to surface waters and groundwater. As part of the proposed drainage improvements to the Middleborough Secondary, the existing drainage features (ditches and discharge points) will be maintained in their current locations where possible. Stormwater runoff that discharges to open ditches upgradient of resource areas will enter sediment forebays for suspended solid removal, which will also reduce other contaminants such as hydrocarbons and grease that bind to sediments.

Train operations may generate trace amounts of iron, which wears off train steel wheels and steel rails. Brake pads may also contain metals such as zinc that are worn off as the brakes are used for slowing and stopping the train. It is not anticipated that metals from either source will be generated in sufficient quantities to pose a threat to surface or groundwater resources.

Commuter trains incorporate on-board sanitary facilities and therefore store and transport sanitary waste during everyday operations. The sanitary waste (pathogens) could pose a risk to water resources if the storage tanks were to leak during travel. Unloading of sanitary sewage will be performed at an existing MBTA maintenance facility, and the risk of leakage during normal train operations is negligible. Leaks and spills of sanitary sewage would be considered an illicit discharge and are prohibited by the Stormwater Standards and the Clean Water Act. A leak or spill would also violate the TMDL waste load allocation (WLA) in watersheds with approved pathogen TMDLs.

In contrast to roadways or buildings, the track and associated ballast are pervious surfaces that would generate negligible quantities of total suspended solids (TSS). Aeolian (i.e., wind or atmospheric) deposition of fine particles that can be suspended by stormwater runoff would not be altered by the project. Such particles may be trapped by the ballast or may run off into the drainage system, which also occurs under existing conditions. As a result, aeolian depositions are not considered contaminants that require treatment. Outlets from closed drainage systems and other drainage discharge points can cause erosion and release sediment into the receiving waterbody. New and reconstructed swales and underdrains within the rail corridor will include water quality features such as check dams, sediment forebays, and outlet protection stone to reduce the concentration of TSS in runoff from the project area. See Section 8.4 for description on the proposed stormwater management for the project.

The rail lines will require limited use of herbicides to keep the rail corridors free of intrusive or obstructive vegetation. Overuse of herbicides near surface waters could introduce herbicides into surface waters and damage the overall health and biodiversity of waterbodies downstream. The MBTA will adhere to the approved Vegetation Management Plan, as implemented with its Yearly Operating Plans, which restrict the use of herbicides in areas adjacent to wetlands or sensitive resources such as public or private drinking water supplies (see Section 9.3.2 for additional information).

The commuter rail operations will generate a small amount of emissions generated by diesel-powered train locomotives; however, aerial deposition of train-generated emissions is not a significant source of pollution of water resources because of the very low concentrations of pollutants in the vicinity of the track. Because trains are moving at operating speeds, emissions are dispersed over a large area and are not deposited adjacent to the track. See Chapter 6 for a discussion on air quality and locomotive emissions.

Roadways, parking lots, and other impervious surfaces associated with the stations can contribute stormwater pollutants that are generated or deposited by the traffic they convey. However, stormwater that runs across these surfaces carry pollutants from other sources such as nearby land uses, wildlife and atmospheric deposition. The impact caused by an impervious area varies depending on the type of use that it receives, which can include new access roads, stations, and parking areas. Pollutants can collect on impervious surfaces and contaminate runoff, particularly the "first flush" of paved and unpaved areas. The largest source of airborne pollutants on a roadway is from vehicular exhaust. Therefore, pollutant loading from paved surfaces is more directly correlated to the amount and type of traffic they receive rather than the total area of pavement. For example, a heavily-travelled roadway or high-turnover parking lot is subject to greater deposition of hydrocarbons, salts, heavy metals, and exhaust by vehicles and road treatments than lower-usage facilities of comparable size. As a result, higher-usage areas can contribute greater quantities of pollutants to runoff. See Section 8.4 for a description on the proposed stormwater management systems proposed as part of Phase 1.

As a result of fecal deposition by birds and other wildlife, impervious surfaces in station parking lots may contribute some bacteria to stormwater, but they are not a major source of bacteria when compared to the potential impacts of septic systems or CSOs. The potential for bacteria contribution varies with the type of roadway. Local roads where wildlife and domestic pets have abundant access are more likely to contribute bacteria to stormwater than highways that offer little or no access for animals and pedestrians.

Impervious surfaces like asphalt also absorb heat and can therefore increase the temperature of runoff, affecting the temperature of the aquatic habitat in the receiving waters. The increase in impervious surfaces could therefore have an impact on the temperature of runoff, just as the urbanized runoff from neighborhoods is warmer than runoff from vegetated areas. The travel of runoff through swales and surface channels prior to reaching any major waterbodies would reduce the thermal impact by evaporation and infiltration.

8.3.4.2 Potential Pollutant Sources – Temporary Construction Activities

Quantities of TSS can be released as a result of construction activities, when large areas of exposed soil may be present. A Stormwater Pollution Prevention Plan (SWPPP) will be developed during final design that will identify BMPs that will protect receiving waters from sediment discharges during the construction period.

8.3.4.3 Bridges and Culverts

The bridges and culverts along the Middleborough Secondary were reviewed to determine impacts to the surrounding surface water and groundwater resources. Each culvert crossing was reviewed for hydraulic adequacy and structural integrity to determine its need for replacement. All culverts that need replacement will meet the Massachusetts Stream Crossing Standards to the maximum extent practicable considering site constraints. No fill will be introduced to surface waters as a result of the culvert replacements. All retained culverts will be cleaned of obstructions and organics where necessary. Table 8.3-4 lists the bridges and culverts, recommendations, and if culverts to be replaced will meet the Stream Crossing Standards. This list includes culverts that will be replaced by MassDOT as part of the SGR program. The Phase 1 project will replace two culverts, both in Taunton.

Table 8.3-4 Phase 1 Bridges and Culverts

Structure Name	Municipality	Description	Recommendation	Meets Stream Crossing Standards
CV-MI-1	Middleborough	Wetland equalizer	Retain	NA
CV-LK-8	Lakeville	Upland drainage	Retain	NA
CV-LK-9	Lakeville	Perennial stream	Retain	NA
CV-LK-10	Lakeville	Perennial stream	Reconstructed by MassDOT as part of its State of Good Repair program	To the maximum extent practicable
CV-LK-11	Lakeville	Intermittent stream	Reconstructed by MassDOT as part of its State of Good Repair program	Yes
CV-LK-12	Lakeville	Intermittent stream	Reconstructed by MassDOT as part of its State of Good Repair program	Yes
CV-LK-13	Lakeville	Wetland equalizer	Retain	NA
CV-LK-14	Lakeville	Intermittent stream	Retain	NA
CV-RA-1	Raynham	Intermittent stream	Reconstructed by MassDOT as part of its State of Good Repair program	In redesign
CV-RA-2	Raynham	Intermittent stream	Reconstructed by MassDOT as part of its State of Good Repair program	In redesign
CV-RA-3	Raynham	Wetland equalizer	Retain	NA
Furnace Brook Culvert	Raynham	Perennial stream tributary to Taunton River	Retain	NA
CV-TA-1	Taunton	Intermittent stream	Retain	NA
Cotley River (Barstow Pond) Bridge	Taunton	Bridge	Reconstructed by MassDOT as part of its State of Good Repair program	NA
CV-TA-2	Taunton	Wetland equalizer	Retain	NA
CV-TA-3	Taunton	Wetland equalizer	Retain	NA
CV-TA-4	Taunton	Intermittent stream	Reconstructed by MassDOT as part of its State of Good Repair program	Yes
Richmond Brook Bridge	Taunton	Tributary to Taunton River	Reconstructed by MassDOT as part of its State of Good Repair program	NA
CV-TA-5	Taunton	Perennial stream	Reconstructed by MassDOT as part of its State of Good Repair program	Yes
CV-TA-6	Taunton	Intermittent stream	Retain	NA

Table 8.3-4 Phase 1 Bridges and Culverts (Continued)

Structure Name	Municipality	Description	Recommendation	Meets Stream Crossing Standards
CV-TA-7	Taunton	Intermittent stream	Reconstructed by MassDOT as part of its State of Good Repair program	Yes
CV-TA-8	Taunton	Potential perennial stream	Retain	NA
CV-TA-9	Taunton	Intermittent stream	Retain	NA
CV-TA-10	Taunton	Intermittent stream	Retain	NA
CV-TA-11	Taunton	Wetland equalizer	Reconstructed by MassDOT as part of its State of Good Repair program	Yes
CV-TA-12	**Taunton**	**Intermittent stream**	**Replace**	**Yes**
CV-TA-13	Taunton	Intermittent stream	Reconstructed by MassDOT as part of its State of Good Repair program	Yes
East Taunton Station Culvert	**Taunton**	**Intermittent Stream**	**Replace**	**NA**

All culvert replacements will be designed to meet stream crossing standards to the maximum extent practicable. Culvert and streambed invert elevations will be maintained. Culvert design includes the appropriate hydrological studies so that the upstream and downstream hydrology does not negatively affect flood capacity or storage volume in wetlands. Detailed designs and cross-sections of proposed culverts and bridges will be included in the permit applications.

8.3.5 Regulatory Compliance

This section documents how the project complies with each water regulatory program under Federal and State jurisdiction.

8.3.5.1 Federal Regulations

Clean Water Act Section 303(d)

Segment MA62-04 of the Taunton River is covered by the *Final Pathogen TMDL for the Taunton River Watershed*. All project elements will be constructed to prevent the release of sanitary sewage into receiving waters, which is the major source of bacteria or other pathogens that are the cause of the impairment under this TMDL. As noted in the TMDL, "The expectation for WLAs [waste load allocations] and LAs [load allocations] for stormwater discharges is that they will be achieved through the implementation of BMPs and other controls."

The Freetown and Fall River Stations discharge stormwater runoff that ultimately drains to segment MA62-04 of the Taunton River, although there are no direct discharges to the river. The Middleborough Secondary, Pilgrim Junction Station, and East Taunton Station do not contribute stormwater runoff to any waterbodies with a TMDL. Stormwater BMPs are proposed at the Freetown and Fall River Stations to treat stormwater through infiltration, where feasible, to the underlying soils and promote groundwater recharge. These BMPs will help to minimize bacteria loading from ambient sources such as birds and other wildlife. The proposed stations and Middleborough Secondary will not add any new sources of bacteria or other pathogens within the watershed. Low impact development will be promoted for stormwater BMPs and all stations will be designed to meet the Massachusetts Stormwater Management Standards.

Safe Drinking Water Act

The project will not impact public drinking water supplies and includes measures to prevent the release of contaminants in the vicinity of public water supplies. Because the Pilgrim Junction Station is within Zone II to a municipal groundwater well, the stormwater management system at this station will be designed with additional pre-treatment as required.

8.3.5.2 State Regulations

The state applies regulatory measures pursuant to its authority under the Massachusetts Clean Waters Act (MGL Chapter 21, §26 53) and the Massachusetts Wetlands Protection Act (MGL Chapter 21, §26 53). Regulations promulgated under the Clean Waters Act related to surface waters and groundwater resources include the Surface Water Quality Standards (314 CMR 4.00) and Groundwater Quality Standards (314 CMR 6.00).

Massachusetts Surface Water Quality Standards (314 CMR 4.00)

The Massachusetts Surface Water Quality Standards (314 CMR 4.00) assign class designations to inland and coastal waters. These classes specify water quality standards based on the intended uses of the waterbodies and prohibit degradation of these waterbodies by new discharges. The Phase 1 Project does not include any new discharges that would impair the ability of a waterbody to meet its designated use.

Massachusetts Groundwater Quality Standards (314 CMR 6.00)

Compliance with the Stormwater Standards (see Section 8.4 for more information) means the project will not affect groundwater discharge that supports base stream flows, as well as protect water quality. The Phase 1 Project includes stormwater BMPs designed to promote recharge of groundwater to the maximum extent practicable. Groundwater quality is not impacted by the project due to the pretreatment of runoff prior to recharge.

8.4 Stormwater

8.4.1 Introduction

This section discusses the existing stormwater patterns at the new and reconfigured Phase 1 Project stations and along the Middleborough Secondary, the potential impacts due to the stations/corridors, and the proposed stormwater design to manage the impacts. Section 8.4.3 identifies existing stormwater conditions in the Phase 1 Study Area and Section 8.4.4 describes the potential impacts and the stormwater designs proposed at each station and along the Middleborough Secondary. Section 8.4.5 describes how the project will meet the Stormwater Management Standards.

The results of an initial analysis of stormwater impacts along the Stoughton Straight Electric Project corridor were presented in the SCR FEIS/FEIR. The proposed Phase 1 requires analysis of stormwater impacts along the new portions of the project corridor, including the relocated East Taunton Station, the new Pilgrim Junction Station, and along the Middleborough Secondary. Two of the stations, Freetown Station and the Fall River Depot Station, originally described in the SCR FEIS/FEIR have modified layouts under Phase 1, and therefore are included in this evaluation for Phase 1 stormwater impacts. The results of these stormwater analyses are presented as part of the impact analysis discussion.

8.4.1.1 Requirements of Certificate

The Secretary's Certificate requires that the DSEIR address the following:

- A description of how Phase 1 would comply with the Wetlands Regulations and associated SMS for work proposed in wetland resource areas and buffer zones;
- An impacts analysis and description of mitigation for impacts of rail tracks as well as new/relocated station sites and parking lots on the stormwater system;
- Stormwater management plans indicating how stormwater would be collected, treated, and discharged;
- Analyze and demonstrate compliance with the requirements of 310 CMR 10.05(6)(k) to the maximum extent practicable for all project elements within or discharging to wetland resource areas or their buffers including layover facilities, stations and park-and-ride lots;
- Provide additional stormwater treatment for layover facilities and stations classified as Land Uses with Higher Potential Pollutant Loading (LUHPPLs) subject to review pursuant to the WPA and WQC regulations;
- Provide appropriate setbacks and treatment for stormwater discharges to or near a critical area, such as vernal pools or public drinking waters;

- Evaluate Low Impact Development (LID) practices to manage stormwater at proposed stations, and parking areas such as: smaller parking stalls and circulation lanes; porous pavement; pavement disconnection versus traditional curb and gutter drainage; retention of existing mature non-invasive plants; exfiltrating bioretention in place of raised traffic islands; and tree box filters. It should identify where and how LID measures have been incorporated into the project design and operation;
- Where a variance is required pursuant to 310 CMR 4.00, provide documentation to support the request; and
- Identify potential impacts to public and private water supplies, existing and planned, and surface waters during construction and operation of Phase 1. Describe measure to avoid and minimize, or mitigate adverse impacts.

The remainder of this section addresses the requirements listed above.

8.4.1.2 Resource Definition

Stormwater

The term stormwater refers to water generated from rain events or snow/ice melt. Stormwater eventually finds its way to groundwater or surface waters through infiltration or overland flow.

Hydraulic Soil Groups

Soils are classified into four Hydraulic Soil Groups (HSGs) based on the soil's runoff potential. The four groups, called A, B, C, and D, separate the soils from smallest runoff potential to largest runoff potential respectively. The original classifications were done using measured rainfall, runoff, and infiltrometer data. Now, soils are classified based on a comparison of the unclassified soil characteristics and profiles to those that have previously been classified.

Land Uses with Higher Potential Pollutant Loading

The SMS states that LUHPPLs include, without limitation, industrial machinery and equipment and railroad equipment maintenance, log storage and sorting yards, aircraft maintenance areas, railroad yards, fueling stations, vehicle maintenance and repair, construction business, paving, heavy equipment storage and/or maintenance, the storage of petroleum products, high-intensity-use parking lots, and fleet storage areas. LUHPPLs also refer to areas within a site that are the location of activities that are subject to an individual National Pollutant Discharge Elimination System (NPDES) permit of the NPDES Multi-Sector General Permit. Discharge from LUHPPLs may be subject to additional requirement including the need to obtain an individual or general discharge permit pursuant to the MA Clean Waters Act or Federal Clean Water Act. Within the MBTA commuter rail system, rail yards where trainsets are stored (referred to as layover yards) are considered LUHPPLS.

Low-Impact Development

The MassDEP wetland regulations defines LID techniques as stormwater management systems that are modeled after natural hydrologic features. Low impact development techniques manage rainfall at the source using uniformly distributed decentralized micro-scale controls. Low impact development techniques use small cost-effective landscape features located at the lot level.

Best Management Practice

From the MassDEP wetland regulations, a BMP is a structural or nonstructural technique for managing stormwater to prevent or reduce non-point source pollutants from entering surface waters or ground waters. A structural stormwater BMP includes an infiltration basin, discharge outlet, swale, rain garden, filter or other stormwater treatment practice or measure either alone or in combination including without limitation any overflow pipe, conduit, weird control structure that is not naturally occurring, is not designed as a wetland replication area, and has been designed, constructed, and installed for the purpose of conveying, collecting, storing, discharging, recharging or treating stormwater. Nonstructural BMPs include source control and pollution prevention measures.

Redevelopment

Under the SMS, redevelopment projects are defined as the following:

- Maintenance and improvement of existing roadways, including widening less than a single lane, adding shoulders, and correcting substandard intersections and drainage, and repaving;
- Development, rehabilitation, expansion, and phased projects on previously developed sites, provided the redevelopment results in no net increase in impervious area; and
- Remedial projects specifically designed to provide improved stormwater management, such as projects to separate storm drains and sanitary sewers and stormwater retrofit projects.

New Development

A new development is any project that does not fit under the definition of redevelopment. See Section 8.4.6 for more information on the stormwater approach at the stations and Middleborough Secondary Line and which sites are considered redevelopment or new development.

8.4.1.3 Regulatory Context

The Phase 1 Project requires work within wetland resource areas and buffer zones as defined and regulated under the Massachusetts WPA. Projects that fall under the jurisdiction of the WPA must comply with the Massachusetts SMS, which are included in the WPA regulations (310 CMR 10(6)(k)). The SMS define the requirements for proper stormwater management for new or re-development sites in Massachusetts. The water quality parameters addressed by the standards include erosion control, peak discharge rates, groundwater recharge, TSS removal, wellhead protection, construction management, long-term maintenance, and illicit (non-stormwater) discharges to the stormwater management system.

Stormwater management and quality are regulated at both the state and federal levels. There are numerous regulations and policies setting the standard for achieving water quality in stormwater discharges. The Phase 1 Project requires regulatory review under state and federal stormwater regulatory programs, as described below.

Clean Water Act Section 402 - National Pollutant Discharge Elimination System (NPDES)

Owners of stormwater management systems operate their systems in accordance with permits issued by the U.S. EPA under the NPDES program where they are required to develop and implement stormwater management programs in order to meet specific water quality criteria for their respective stormwater discharges.

The Phase 1 Project will require a NPDES Construction Permit pursuant to Section 402 of the Clean Water Act, which regulates erosion control, pollution prevention, and other stormwater management issues at construction sites which disturb more than one acre. Compliance with this general permit will include developing a SWPPP that will specify proper stormwater management procedures for any disturbed areas.

In addition, the NPDES program regulates stormwater discharges from regulated MS4, where the system operator must develop and implement a Stormwater Management Plan (SWMP). The general MS4 permit does not establish numeric effluent limitations; however, it contains practices and minimum control measures that must be employed by the permit holders to meet permit conditions. The six minimum control measures include: public outreach and education; public participation/involvement; illicit discharge detection and elimination; construction site runoff control; post construction runoff control; and pollution prevention/good housekeeping. MassDOT is currently regulated as an MS4 under the NPDES program.

Massachusetts Stormwater Management Standards

Projects subject to the WPA are required to meet the Massachusetts SMS listed at 310 CMR 10.05(6)(k) of the WPA regulations and the MassDEP Massachusetts Stormwater Handbook (2008). The SMS establish clear and consistent guidelines for stormwater management in Massachusetts and are designed for use under multiple statutory and regulatory authorities of the MassDEP including the WPA.

Stormwater parameters addressed by the standards include erosion control, peak discharge rates, groundwater recharge, TSS removal, wellhead and ORW protection, construction management, long-term maintenance of BMPs, and illicit (non-stormwater) discharges to the stormwater management system.

The Phase 1 elements subject to the WPA and the Massachusetts Stormwater Management Standards include the Middleborough Secondary, Pilgrim Junction Station, East Taunton Station and Freetown Station. The Fall River Station is not subject to the standards because there are no wetlands near the site; therefore, the site is not subject to the Wetlands Protection Act and Massachusetts Stormwater Management Standards.

Local Stormwater Bylaws and Ordinances

Several communities along the right-of-way corridors enforce local stormwater bylaws that may further regulate stormwater discharges from the Phase 1 Area. As a state agency, MassDOT is exempt from local bylaws and therefore local bylaws are not addressed in this document.

8.4.2 Methodology

This section describes the methodology used to assess the stormwater impacts at the proposed stations and Middleborough Secondary. This section covers the efforts used to document existing stormwater patterns, review proposed stormwater patterns based on development, and assess stormwater impacts and propose mitigation. The study area was assessed using GIS mapping with available data from MassGIS and CAD design files with related survey and hydrologic modeling.

8.4.2.1 GIS Mapping and CAD Design Files

Much of the existing data related to stormwater resources within the Phase 1 Study Area is available from MassGIS. Various GIS layers (listed below) provided the starting point to evaluate existing stormwater conditions. ArcGIS was used to evaluate if the Phase 1 Project sites were in close proximity to critical environmental areas. Along with proximity to the environmentally critical area, the existing conditions and proposed conditions for each site were analyzed to determine if stormwater runoff would drain to and impact the critical areas. The following GIS layers were used for the analysis:

- MassDEP 2014 Integrated List of Waters (305(b)/303(d)). Released May 2016.
- USGS Drainage Sub-Basin. Last updated December 2007, downloaded on 7/23/2017
- MassDEP Hydrography (1:25,000). Last Updated April 2017.
- Public Water Supply. Last Updated 4/18/2017.
- Surface Water Supply Watersheds. Last updated 4/18/2017.
- MassDEP Wellhead Protection Areas (Zone II, Zone I, IWPA). Last updated 6/30/2017.
- Surface Water Supply Protection Areas (Zone A, B, C). Last Updated 4/18/2017.
- Outstanding Resource Waters. Last Updated March 2010.

- NHESP Certified Vernal Pools. Updated continuously, downloaded on 7/23/2017.
- NRCS Soil Survey. Updated continuously, downloaded on 7/23/2017.

For the stormwater analysis, CAD design files with site survey were used to evaluate the existing and proposed site impacts at each station. The CAD files include existing topographic data and survey data along with the proposed conceptual station layouts, grading, drainage design, and conceptual stormwater management systems. As the station design is refined, the stormwater management systems will be updated to incorporate design changes.

8.4.2.2 Hydrologic Modeling

An excel spreadsheet model was created to evaluate the impacts due to the increase in impervious area at each station. The model was used to calculate the following:

- Volume of storage required to maintain the existing peak runoff rate as compared to the proposed peak runoff rate during the 10-year, 24-hour storm. The SMS require that post-development peak runoff rates do not exceed pre-development peak runoff rates from the 2-year and 10-year 24-hour storms. By sizing the BMP to accommodate the volume necessary to mitigate for the change in peak flow for the 10-year storm, the BMP will also be sized appropriately for the 2-year storm. While this calculation does not provide pre- and post-development peak runoff rates, it provides the volume necessary to accommodate for the change in peak flow. Once station designs are refined, pre- and post-development peak runoff rates will be calculated and compared directly to show the stormwater designs meet the SMS.
- Required groundwater recharge volume based on hydrologic soil group soil at proposed impervious areas. The required groundwater recharge volume is based on the infiltration rates of each HSG as stated in the SMS.
- Water quality volume which is equal to the 0.5-inch rainfall depth over the proposed impervious area, in accordance with the SMS.

The results of the stormwater analysis were used to determine conceptual sizing of stormwater BMPs to mitigate for the increase in peak flow rates from the additional impervious area, as well as provide storage capacity for the required recharge volume and water quality volume. The spreadsheet model is based on TR-55 methodology[37] to calculate peak flow rates. Rainfall inputs were determined based on data provided by the National Oceanic and Atmospheric Administration (NOAA)'s Atlas 14[38].

37 The United States Department of Agriculture and Natural Resource Conservation Service. June 1986. *Urban Hydrology for Small Watersheds: Technical Release 55*. https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1044171.pdf.

38 National Oceanic and Atmospheric Administration. Last modified April 21, 2017. *NOAA Atlas 14 Point Precipitation Frequency Estimates*. https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html.

8.4.3 Existing Conditions

The following section provides background on the existing stormwater patterns at Pilgrim Junction Station, East Taunton Station, Freetown Station, Fall River Depot Station, and the Middleborough Secondary.

8.4.3.1 Pilgrim Junction Station

Pilgrim Junction Station will be located in Middleborough north of I-495 near the intersection of Routes 28 and 105, within the triangle formed by the MBTA Middleborough/Lakeville Commuter Rail Line and the Middleborough Secondary Line. See Section 3.2.1 for a complete description of the proposed station. The existing conditions of the limit-of-work is approximately 23 percent impervious (pavement and building rooftops) and 77 percent pervious (grass, disturbed earth, and trees). The site is wooded at the northeastern portion of the site adjacent to Route 28 and the site is cleared and previously developed at the southern portion.

According to the NRCS soil maps, the site is almost completely composed of Hinckley loamy sand and Udipsamments, both of which are considered HSG A soils. Udipsamments are sand dunes and depressional or level, sandy areas that have been stabilized by vegetation. HSG A soils are very well drained and infiltration rates are high.

The site is relatively flat and is contained between existing MBTA tracks and the existing layover facility to the south so stormwater typically infiltrates on site. During large storm events, stormwater that does not infiltrate drains as sheet flow toward the existing layover facility to the south and into a wooded area. There is an existing wetland southeast of the site and an unnamed stream that ultimately receives drainage from this area. The unnamed stream drains into the Nemasket River (MA62-25) which has no known water quality impairments. Pilgrim Junction is located within a Zone II to a municipal groundwater well which is located approximately 3,600 feet away and adjacent to the Nemasket River.

8.4.3.2 East Taunton Station

East Taunton Station location will be located at 1141 County Street (Route 140), near the exit 12 interchange on the Fall River Expressway (Route 24). See Section 3.2.2 for a complete description of the proposed station. The existing conditions of the limit-of-work is approximately 15 percent impervious (building rooftop, sidewalks, and pavement) and 85 percent pervious (grass and trees). The existing Taunton site was formerly a mini-golf course and driving range which is now abandoned.

According to the NRCS soil maps, the site is almost completely composed of Paxton fine sandy loam, which is considered a HSG C soil. Infiltration is not ideal in HSG C soils but infiltration at low rates will naturally occur.

There is one major drainage boundary that currently divides the site into two drainage areas. The majority of the site drains to the west into forested wetlands and an existing stormwater basin located to the north of the parking lot which has approximately 6,800 cubic feet of volume capacity. The eastern side of the site drains into a series of wetlands located along the eastern side of the parcel. The wetland system drains toward the northwest and ultimately to the Cotley River (MA62-41) which has not been assessed by MassDEP for water quality impairments.

8.4.3.3 Freetown Station

The Freetown Station was previously studied in the FEIS/FEIR for the SCR Project. However, due to development on a portion of the site, MassDOT is proposing to reconfigure this station to utilize the remaining undeveloped portions. See Section 3.2.3 for a complete description of the proposed station. The existing conditions of the limit-of-work is approximately 94 percent pervious (open field) and 6 percent impervious (gravel road).

According to the NRCS soil maps, the site is mostly made up of Hinckley gravelly fine sandy loam and Pits - Udorthents complex, gravelly. Both soils are considered HSG A soils which are well-drained and have relatively high infiltration rates. There is also a relatively small area of Sudbury fine sandy loam (HSG B) and a small area of Scarboro muck (HSG D). The Scarboro muck area is located along the western part of the site near an existing half-acre wetland along the western part of the site.

The site is generally sloped from the southeast at the Fall River Secondary down towards South Main Street to the northwest. The site is mainly split into two drainage areas, half the site draining toward a wetland to the northwest and half draining toward the northeast. The wetland along the western border drains toward the north into an unnamed stream which flows through a series of wetlands and eventually into the Taunton River (MA62-04) which is impaired for bacteria, fishes bioassessments, and dissolved oxygen and is covered under the Pathogen TMDL. Sheet flow that drains off-site towards the northeast flows towards a small, 0.1-acre wetland.

8.4.3.4 Fall River Depot Station

The Fall River Depot Station was previously reviewed under the SCR FEIS/FEIR. However, since that time, a portion of the site has been developed as a medical facility; therefore, the station has been redesigned and is being reevaluated for compliance with stormwater requirements. See Section 3.2.4 for a complete description of the proposed station. The existing conditions of the limit-of-work is approximately 47 percent impervious (building rooftops, sidewalks, and pavement) and 53 percent pervious (trees and grass). There are no wetlands near the site so this station is not subject to the Wetlands Protection Act and Massachusetts Stormwater Management Standards.

According to the NRCS soil maps, the site is entirely urban land which has an undefined HSG and infiltration rates are unknown.

Under existing conditions, the site is generally sloped from the eastern boundary at the Fall River Secondary down towards Davol Street to the west. Stormwater generated at the existing site drains as sheet flow and enters the Fall River stormwater system on municipal streets. The Fall River MS4 discharges to the Taunton River (MA62-04) which is impaired for bacteria, fishes bioassessments, and dissolved oxygen and is covered under the Pathogen TMDL. Minor infiltration of stormwater likely occurs on the eastern edge of the property where mature vegetation currently exists.

8.4.3.5 Middleborough Secondary

The Middleborough Secondary is an active freight line that runs from Pilgrim Junction in Middleborough west to Cotley Junction in Taunton. See Section 3.2.5 for a description of the rail line. For most of the length of the existing railroad track corridor, stormwater runoff is conveyed from the track bed area in shallow depth ditches or in sheet flow runoff to the edge of the track bed or fill slope, continuing on to numerous isolated, untreated discharge points along both sides of the track. These ditches have, in many places, been filled or blocked.

According to the NCRS soils maps, the soils within a 20-foot buffer of the Middleborough Secondary consist of mostly HSG A (26%), B (18%), and C (19%). The rest of the area consists of a combination of HSG A/D, B/D, C/D, D, and urban land which has an undefined HSG. The most common types of soil surrounding the Middleborough Secondary are Hinckley Loamy Coarse Sand (HSG A), Udorthents (HSG B), and Windsor Loamy Sand (HSG C). The rest of the area consists of thirty different soil types.

There are three named rivers, streams, and ponds and numerous, unnamed, minor waterbodies that are crossed by or immediately adjacent to the Middleborough Secondary: Box Brook, Poquoy Brook, Cotley River (MA62-41), and Taunton River (MA62-01). A detailed description of these waterbodies can be found in Section 8.3. Cotley Brook and Poquoy Pond have not been assessed by MassDEP for water quality impairments. Segment MA62-01 of the Taunton River is impaired for *E. coli*.

8.4.4 Impacts Analysis and Stormwater Design

This section provides a summary of the increase in impervious cover at each of the four stations and Middleborough Secondary and then describes the stormwater analysis and proposed stormwater designs at the stations and Middleborough Secondary.

8.4.4.1 Impervious Cover Analysis

The proposed layouts of the stations will impact stormwater runoff at the existing sites by increasing impervious area due to the construction of new roads, parking lots, walkways, and station platforms. Stormwater drainage patterns will change based on new grading and land cover.

The reconstruction of the Middleborough Secondary does not propose additional impervious cover, therefore stormwater runoff peak flows will not increase, although existing stormwater features will be improved where necessary.

Table 8.4-1 shows the approximate amounts of existing and proposed impervious surface area at each Phase 1 Project location and provides the change in impervious area.

Table 8.4-1 Impervious Cover Analysis

Station	Existing Impervious (ac)	Proposed Impervious (ac)	Change in Impervious (ac)
Pilgrim Junction	2.0	6.0	4.0
East Taunton	1.4	5.2	3.8
Freetown	0.5	2.4	1.9
Fall River Depot	1.4	2.5	1.1
Middleborough Secondary	0.0	0.0	0.0

Under proposed conditions, all stations will see an increase of impervious area which, without mitigation, would increase peak rates of runoff, potentially increasing pollutant loading to downstream receiving water bodies, and reducing recharge to groundwater.

8.4.4.2 Proposed Stormwater Design and Analysis

The general stormwater management approach at the stations involves the evaluation of potential LID practices and implementation of such practices where feasible. The general stormwater design at the stations includes closed drainage systems with deep sump catch basins and underground pipes to collect runoff and convey it to stormwater treatment areas for infiltration, where feasible, before discharging off-site. Vegetated swales and other open drainage features will be proposed on a site-by-site basis as the station designs are refined. Depending on site-specific soil conditions and environmental concerns, the stormwater BMPs promote low impact development and include a combination of detention, infiltration, and treatment techniques, such as rain gardens, water quality swales, and infiltration basins. Stormwater will be treated as close to its source as possible, and infiltration-based BMPs will be used whenever possible to maximize ground water recharge, reduce stormwater volumes, and remove contaminants. Environmental and site constraints will be reviewed and BMPs will be designed accordingly in compliance with MassDEP Stormwater Management Standards.

The designs generally include infiltration basins, where feasible, which will provide water quality treatment through infiltration and recharge to groundwater. Infiltration differs from detention in that it allows stormwater to percolate through soils and into groundwater while detention stores stormwater while slowly letting it release downstream and assumes no percolation into underlying soils. Each infiltration basin will be equipped with an outlet control structure which will release any stormwater that does not infiltrate through an outlet pipe to a flared end section with riprap protection. If a storm is large enough and fills the basin, stormwater may also overflow the basin through a riprap spillway. The infiltration basins will discharge to a vegetated area adjacent to the station and ultimately drain to the receiving waters.

During a later design phase, geotechnical investigation will be performed at each site to determine the specific soil type and depth to seasonal high groundwater and/or ledge at the BMP locations. Information gathered from the geotechnical investigation will be used to determine the most restrictive layer for infiltration and will help guide decisions on the most appropriate BMPs to install in the area. Depending on site constraints and further design iterations, other additional BMP sites may be investigated and proposed, and the design team will strive to implement the LID approach to the maximum extent practicable. Stormwater management plans will be created during a later design phase that detail how the stormwater is collected, treated, and discharged.

For each site, a stormwater analysis was performed to evaluate how the increase in impervious area will affect peak flow rates and what will be required for groundwater recharge volume and water quality volume. The proposed BMPs were sized to mitigate for the increase in peak flow rate and required recharge and water quality volumes. The current conceptual stormwater BMP design for each station is described in the respective station section below. As station designs are refined, proposed BMPs at the stations will be designed in accordance with MassDEP guidance for stormwater management. Refer to Section 8.4.6 for a more detailed discussion on proposed compliance with the MassDEP Stormwater Standards.

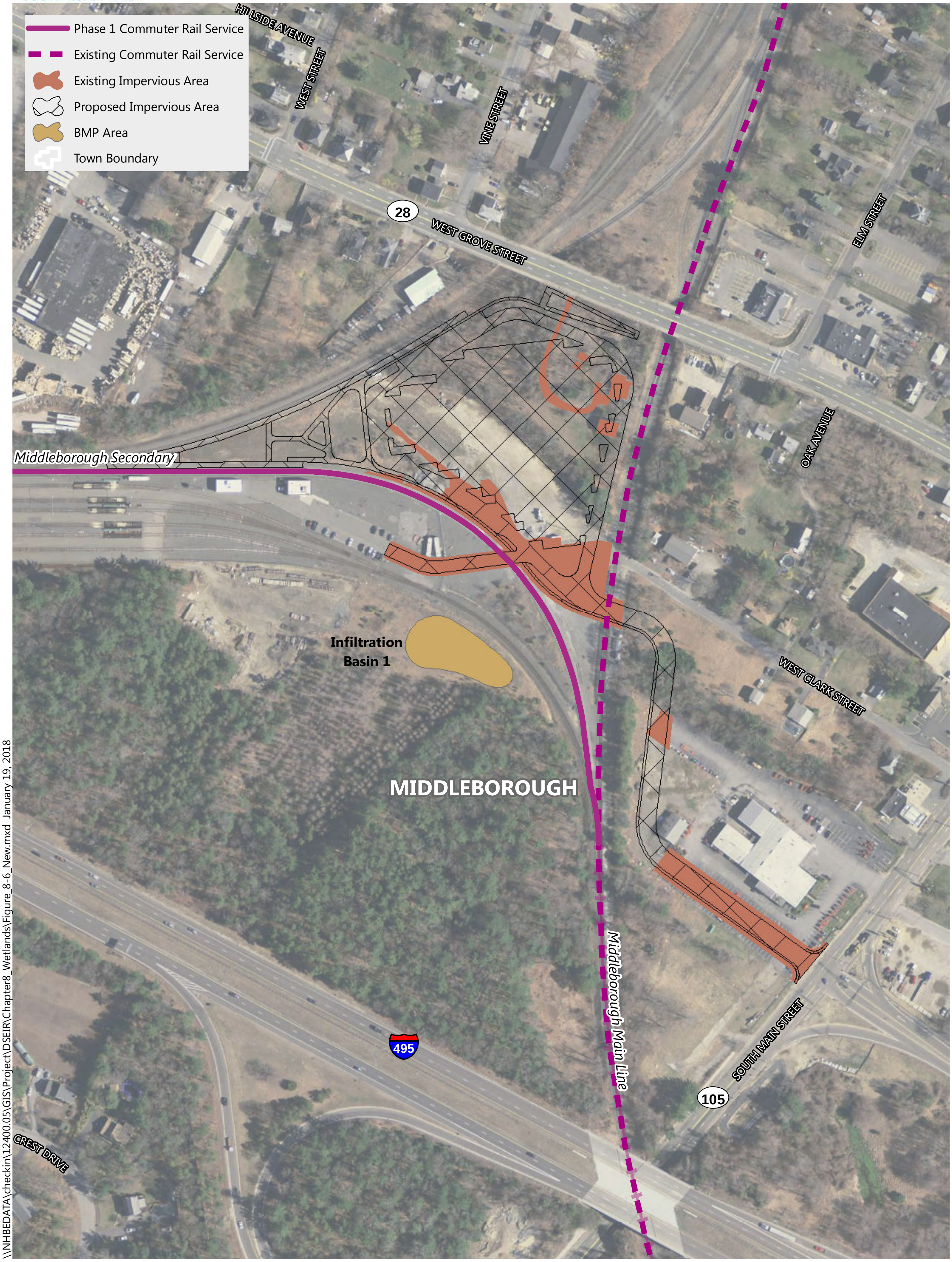
8.4.4.3 Pilgrim Junction Station

The proposed Pilgrim Junction Station design includes an access road to the station, a parking lot, a pick-up/drop-off area, bicycle parking facilities, side platform with a canopy along the Middleborough Secondary line, ancillary landscape improvements, and utility improvements. The proposed station will increase impervious area by 4.0 acres. Figure 8-6 shows the existing and proposed impervious areas at Pilgrim Junction.

The proposed stormwater drainage system will collect stormwater from impervious surfaces and treat runoff through stormwater BMPs to mitigate potential impacts to surface and groundwater resources. Because the station is located within a Zone II to a municipal groundwater well, stormwater runoff will be treated so that at least 44 percent of total suspended solids are removed prior to discharge to an infiltration structure and the infiltration BMPs will be sized to treat at least 1-inch of runoff over the impervious area. The stormwater BMPs for the Pilgrim Junction Station include deep sump catch basins, one sediment forebay, and one infiltration basin. The deep sump catch basins will be located at low points within the parking lot which will provide water quality pre-treatment through the settling out of suspended solids. The catch basins will collect the stormwater and piping will direct stormwater to the sediment forebay and infiltration basin. The sediment forebay will be located immediately upstream of the infiltration basin and will remove coarse sediments and debris by settling. The infiltration basin will be located southeast of the site (south of the southern rail line of the wye junction) which will require a new drainage pipe crossing underneath the railroad tracks. See Figure 8-6 for the location of the proposed BMP.

Massachusetts Bay Transportation Authority

Figure 8-6: Stormwater Features - Pilgrim Junction Station



\\NHBEDATA\checkin\12400.05\GIS\Project\DSEIR\Chapter8_Wetlands\Figure_8-6_New.mxd January 19, 2018

Source Info: MassGIS, VHB, ESRI

The proposed infiltration basin will discharge south off-site to a forested area and drain into a wetland which ultimately flows to the Nemasket River. As part of the stormwater analysis, the basin was conceptually sized to mitigate for the increase in peak flow rate and required recharge and water quality volumes. As shown in Table 8.4-2, the storage volume to mitigate for the 10-year peak discharge is the largest required volume to mitigate. The infiltration basin, as conceptually laid out, would be sufficient to attain the largest volume for mitigation, assuming the infiltration basin is built to an average treatment depth of two feet with appropriate freeboard.

Table 8.4-2 Results of Pilgrim Junction Station Stormwater Analysis

Stormwater Analysis	Volume (cf)
Storage Volume to Mitigate for 10-year Peak Discharge	27,900
Required Recharge Volume	10,900
Water Quality Volume for 1.0-inch Treatment Depth	21,800
Largest Required Treatment Volume	**27,900**
Infiltration Basin 1	37,700
Total BMP Volume	**37,700**

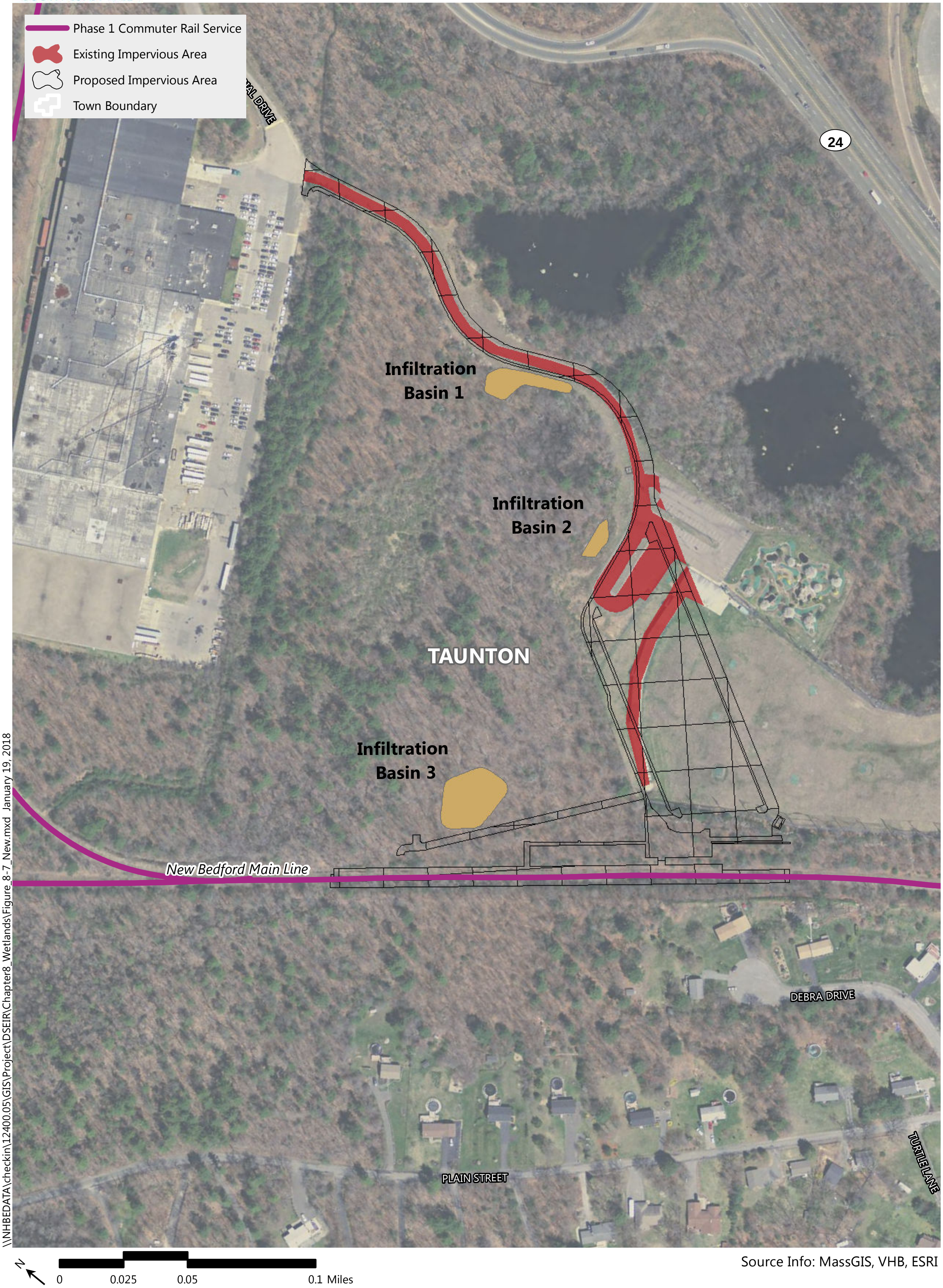
Appendix D provides the detailed calculations for the proposed BMP at the site.

8.4.4.4 East Taunton Station

The proposed East Taunton Station design includes an access road to the station, a parking lot, a pick-up/drop-off area, bicycle parking facilities, side platform with a canopy along the Middleborough Secondary line, ancillary landscape improvements, and utility improvements. The improvements to the site will increase the impervious area by 3.8 acres. Figure 8-7 shows the existing and proposed impervious areas at the East Taunton Station.

The proposed stormwater drainage system will collect stormwater from impervious surfaces and treat runoff through stormwater BMPs to mitigate potential impacts to surface and groundwater resources. The proposed stormwater management system includes nine deep sump catch basins, three sediment forebays (one to be located upstream of the existing stormwater basin to provide pretreatment), two infiltration basins, and one vegetated swale. The deep sump catch basins will be located at low points within the parking lot, and will provide water quality pre-treatment through the settling out of suspended solids. The vegetated swale will be located along the eastern edge of the access road and provide water quality treatment, runoff volume reduction, and infiltration of stormwater runoff before discharging off-site. Each sediment forebay will be located immediately upstream of the infiltration basin and will remove coarse sediments and debris via settling. Infiltration Basin 1 will be located to the north of the parking lot and west of the access road, and Infiltration Basin 3 will be located to the west of the parking lot and east of the platform. Basin 2 is the existing stormwater basin that provides detention located to the north of the parking lot.

Figure 8-7: Stormwater Features - East Taunton Station



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Source Info: MassGIS, VHB, ESRI

Stormwater runoff from the northern part of the access road will be captured by a deep sump catch basin and discharge to the wetland system to the east. Runoff from the majority of the access road will drain as sheet flow to the east into the vegetated swale. Stormwater in the swale will infiltrate during small storms or discharge through an outlet control structure during larger storms to the wetland system located along the eastern side of the parcel which ultimately flows to Cotley Brook (MA62-41). Runoff from the remaining portion of the access road will be captured by a deep sump catch basin and discharge to a sediment forebay and Infiltration Basin 1. Stormwater from the northern portion of the parking lot will be collected by a deep sump catch basin that will discharge to a sediment forebay and existing Basin 2. Stormwater from the remaining (and majority) of the parking lot will be collected by multiple deep sump catch basins and discharge to a sediment forebay and Infiltration Basin 3. See Figure 8-7 for the location of the proposed BMPs.

All three basins will discharge to the forested wetland that borders the site boundary to the west and ultimately to the Taunton River (MA62-02) after passing through a series of wetlands. As part of the stormwater analysis, the proposed infiltration basins were conceptually sized to mitigate for the increase in peak rates and required recharge and water quality volumes. As shown in Table 8.4-3, the storage volume to mitigate for the 10-year peak discharge is the largest volume to mitigate. The basins, as conceptually laid out, will be sufficient to attain the largest volume for mitigation. The infiltration basins are assumed to be built to an average treatment depth of three feet with appropriate freeboard.

Table 8.4-3 Results of East Taunton Station Stormwater Analysis

Stormwater Analysis	Volume (cf)
Storage Volume to Mitigate for 10-year Peak Discharge	26,600
Required Recharge Volume	4,400
Water Quality Volume for 0.5-inch Treatment Depth	9,400
Largest Required Treatment Volume	**26,600**
Infiltration Basin 1	19,100
Existing Basin 2	6,800
Infiltration Basin 3	38,400
Total BMP Volume	**64,300**

Appendix D provides the detailed calculations for the proposed BMPs at the site.

8.4.4.5 Freetown Station

The proposed Freetown Station design includes an access road from South Main Street to the station, a parking lot, a pick-up/drop-off area, bicycle parking facilities, side platform with a canopy along the Fall River Secondary line, ancillary landscape improvements, and utility improvements. The proposed station will increase the impervious area by 1.9 acres. Figure 8-8 shows the existing and proposed impervious areas at the Freetown Station.

The proposed stormwater drainage system will collect stormwater from impervious surfaces and treat runoff through stormwater BMPs to mitigate potential impacts to surface and groundwater resources. The stormwater BMPs for the Freetown Station include five deep sump catch basins, three sediment forebays, and three infiltration basins. The deep sump catch basins will be located at low points within the parking lot and along the access road, and will provide water quality pre-treatment through the settling out of suspended solids. The catch basins will collect the stormwater and piping will direct stormwater to the sediment forebays and infiltration basins. Each sediment forebay will be located immediately upstream of the infiltration basin and will remove coarse sediments and debris. The three infiltration basins will be located:

- Infiltration Basin 1 to the northeast of the parking lot;
- Infiltration Basin 2 to the west of the parking lot and access road; and
- Infiltration Basin 3 to the west along the access road near the entrance to the site.

Stormwater runoff from majority of the parking lot will be collected by two deep sump catch basins and discharge to a sediment forebay and Infiltration Basin 1. The remaining section of the parking lot and a section of the access road will drain to two deep sump catch basins and discharge to a sediment forebay and Infiltration Basin 2. Stormwater runoff from the majority of the access road will either drain to a roadside swale or be collected by a deep sump catch basin and discharge to a sediment forebay and Infiltration Basin 3. See Figure 8-8 for the location of the proposed BMPs.

Infiltration Basin 1 will discharge off-site to a vegetated area within the parcel and eventually drain as sheet flow to a small wetland. Infiltration Basins 2 and 3 will discharge off-site to a forested area and drain into the wetland west of the site which ultimately flows to the Taunton River (MA62-04). There will be no direct stormwater discharges from Freetown Station to the Taunton River. Since segment MA62-04 of the Taunton River is covered under the Pathogen TMDL and the station will be within its watershed, the BMPs proposed at Freetown Station will also be designed in alignment with the TMDL. BMPs will promote infiltration to groundwater thereby reducing stormwater runoff and any associated pathogens from draining directly to surface waters.

As part of the stormwater analysis, the basins were conceptually sized to mitigate for the increase in peak rate and required recharge and water quality volumes. As shown in Table 8.4-4, the storage volume to mitigate for the 10-year peak discharge is the largest volume to mitigate. The infiltration basins, as conceptually laid out, would be sufficient to attain the largest volume for mitigation, assuming the infiltration basins are built to an average treatment depth of two feet with appropriate freeboard.

SCR SOUTH COAST RAIL

Massachusetts Bay Transportation Authority

Figure 8-8: Stormwater Features - Freetown Station

N

0 0.025 0.05 0.1 Miles

Source Info: MassGIS, VHB, ESRI

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Table 8.4-4 Results of Freetown Station Stormwater Analysis

Stormwater Analysis	Volume (cf)
Storage Volume to Mitigate for 10-year Peak Discharge	15,800
Required Recharge Volume	1,600
Water Quality Volume for 0.5-inch Treatment Depth	4,400
Largest Required Treatment Volume	**15,800**
Infiltration Basin 1	13,600
Infiltration Basin 2	6,000
Infiltration Basin 3	2,800
Total BMP Volume	**22,400**

Appendix D provides the detailed calculations for the proposed BMPs at the site.

8.4.4.6 Fall River Depot Station

The proposed Fall River Depot Station design includes an access road to the station, a parking lot, bicycle parking facilities, side platform with a canopy along the Fall River Secondary line, ancillary landscape improvements, and utility improvements. The improvements to the site will increase the impervious area by 1.1 acres. Figure 8-9 shows the existing and proposed impervious areas at the Fall River Station.

The proposed stormwater drainage system will collect stormwater from impervious surfaces and treat runoff through stormwater BMPs to mitigate potential impacts to surface and groundwater resources. The stormwater BMPs for the Fall River Depot Station include deep sump catch basins, a bioretention basin, and underground infiltration system. The deep sump catch basins will be located at low points within the parking, and will provide water quality pre-treatment through the settling out of suspended solids. The catch basins will collect the stormwater and piping will direct stormwater to the underground infiltration system where stormwater will infiltrate into underlying soils. Any stormwater that does not infiltrate would overflow through an outlet pipe and discharge to Fall River's municipal stormwater system.

Stormwater runoff from the southern section of the parking lot will be collected by a deep sump catch basin and discharge to a bioretention basin. Bioretention uses an engineered soil mix, plants, and natural microbes to treat stormwater as it infiltrates through the basin bottom. Any stormwater that does not infiltrate would be diverted and discharge into Fall River's municipal stormwater system. See Figure 8-9 for the location of the proposed BMPs.

Massachusetts Bay Transportation Authority

Figure 8-9: Stormwater Features - Fall River Station

Source Info: MassGIS, VHB, ESRI

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Fall River's municipal stormwater system ultimately discharges to the Taunton River (MA62-04). There will be no direct stormwater discharges from the Fall River Station to Taunton River. Since segment MA62-04 of the Taunton River is covered under the Pathogen TMDL and the station will be within its watershed, the BMPs proposed at the Fall River Station will also be designed in alignment with the TMDL. BMPs will promote infiltration to groundwater thereby reducing stormwater runoff and any associated pathogens from draining directly to surface waters.

A stormwater analysis was performed to evaluate how the increase in impervious area would affect peak flow rates at the site. The proposed BMPs were conceptually sized to mitigate for the increase in peak flow rate of the 10-year storm and maintain runoff rates to Fall River's municipal stormwater system. The groundwater recharge volume and water quality volume were not assessed because the Fall River Station is not subject to the Stormwater Management Standards due to the absence of wetlands near the site. Table 8.4-5 provide a summary of the results.

Table 8.4-5 Results of Fall River Station Stormwater Analysis

Stormwater Analysis	**Volume (cf)**
Storage Volume to Mitigate for 10-year Peak Runoff Rate	4,900
Total Treatment Volume	**4,900**
Underground Stormwater System	4,900
Bioretention Basin 1	2,600
Total BMP Volume	**7,500**

Appendix D provides the detailed calculations for the proposed BMPs at the site.

The proposed Fall River Depot Station site is industrial. A Phase 1 Environmental Site Assessment was performed in 2016 that "determined there are on-Site releases of oil and/or hazardous materials (OHM) and off-Site releases of OHM that have the potential to impact environmental media, (soil, groundwater, airborne contaminants, etc.) at the Site". However, at this time, the extent of contamination is unknown and infiltration of stormwater may not be recommended. As design progresses and more information is gathered on the site, stormwater BMP design will be refined and the design goal of the BMPs may change from infiltration to detention. If this is the case, the bioretention basin and underground stormwater system would be lined to prevent infiltration to underlying soils. The BMPs will provide water quality treatment through detention only and all stormwater will discharge to the municipal stormwater system.

8.4.4.7 Middleborough Secondary

As part of the proposed drainage improvements to the Middleborough Secondary, the existing drainage features (ditches and discharge points) will be maintained where possible. In general, these existing features follow the topography and natural drainage patterns of the corridor and will be rehabilitated or maintained as required. Existing stormwater drainage features will be identified as the designs are refined, and the existing ditches and discharge points will be reused wherever possible. If the existing drainage features are structurally or operationally deficient, they will be reconstructed. Improved stormwater management measures will be incorporated into the drainage design in order to comply with the DEP Stormwater Standards.

If drainage features along the Middleborough Secondary need reconstruction, they will be designed to collect and convey the runoff from the 24-hour, 50-year storm. Piped systems must not surcharge for this storm and flow depths in ditches are not to exceed 3 feet below top of rail. In some locations, the proposed railroad track typical section will include a ditch that in many locations is deeper than what exists today. Much of the vertical railbed realignment includes raising the track profile 12 inches. In most cases, this raised track profile will allow the proposed ditches to mimic the existing conditions, and thus duplicate drainage patterns. Flow that discharges to open ditches upgradient of resource areas will enter sediment forebays for suspended solid removal. There are some instances where, due to topography or retaining walls, ditches are not practicable and underdrain systems will be installed. In these cases, the piped underdrains will eventually daylight to discharge to the same flow path or outlet point as the existing ditch. The pipes will be wrapped with a geotextile fabric to minimize sediment transport and stormwater runoff will discharge through a flared end to a riprap splash pad.

There are nine certified vernal pools along the Middleborough Secondary as further described in Chapter 9. Stormwater BMPs must be set back 100 feet from a certified vernal pool and a habitat evaluation must be performed to demonstrate that the stormwater BMPs meet the performance standard of having no adverse impact on the vernal pool's habitat functions. As the existing stormwater drainage features are identified and designs refined along the Middleborough Secondary, a 100-foot buffer will be maintained between discharge points and certified vernal pools wherever possible.

8.4.5 Regulatory Compliance

This section documents how the Phase 1 Project complies with each stormwater regulatory program under Federal and State jurisdiction.

8.4.5.1 Clean Water Act Section 402 - NPDES

Section 402 of the CWA regulates the discharge of pollutants to surface waters. Under the NPDES program that is authorized by this section of the CWA, owners and operators of point source discharges and certain non-point discharges (such as stormwater runoff) are required to obtain a permit prior to discharging.

The project will require authorization to discharge stormwater during construction under the NPDES General Permit for Construction Activities, administered in Massachusetts by the U.S. Environmental

Protection Agency, which regulates erosion control, pollution prevention, and stormwater management at construction sites over 1 acre. This permit will require a SWPPP that will specify proper stormwater management procedures for any disturbed areas. Construction period impacts to water quality will be reduced or eliminated through the use of appropriate BMPs. These BMPs will be documented in the SWPPP and will include perimeter sedimentation controls (silt fence, hay bales, filter berms, siltation booms), temporary stabilization of disturbed areas, and temporary siltation basins where appropriate. The SWPPP will be completed during the final design phase and must be implemented by the project contractor. Authorization to discharge stormwater under the General Permit for Construction Activities will be requested via a Notice of Intent prior to the commencement of construction.

8.4.5.2 Massachusetts Stormwater Management Standards and Guidelines

This section describes how the proposed off-site roadway improvements at the stations will be designed to fully comply with the ten MassDEP Stormwater Management Standards. Three of the four stations would be considered a mix of redevelopment and new development, while the Middleborough Secondary line is considered redevelopment. Freetown Station is the only station considered to be a full new development. Table 8.4-6 provides a summary of the acreage of existing and proposed land covers for each station and provides a determination at each site of redevelopment and/or new development.

Table 8.4-6 Land Covers and Determination of Re-/New Development

Station	Existing Pervious (ac)	Existing Impervious (ac)	Proposed Pervious (ac)	Proposed Impervious (ac)	Increase in Impervious (ac)	Redevelopment	New Development
Pilgrim Junction	6.6	2.0	2.5	6.0	4.0	X	X
East Taunton	9.0	1.4	5.2	5.2	3.8	X	X
Freetown	9.0	0.5	7.1	2.4	1.9	-	X
Fall River Depot	1.7	1.4	0.5	2.5	1.1	X	X
Middleborough Secondary	-	0.0	-	0.0	0.0	X	-

The Phase 1 Study Area will fully comply with the ten MassDEP Stormwater Management Standards as described below.

Pilgrim Junction Station

For the 4.0-acre impervious area considered to be new development, all ten stormwater standards will be fully met. The remaining area to be redeveloped will meet Standards 2, 3, 4, 5, and 6 to the maximum extent practicable as shown in Table 8.4-7 below.

Table 8.4-7 Compliance with the Massachusetts Stormwater Standards: Pilgrim Junction Station

Standard	Compliance Level Achieved
Standard 1: No New Untreated Discharges or Erosion to Wetlands	Full compliance will be achieved. An infiltration basin is proposed to treat stormwater runoff from the site. The outlet will be designed with rip rap protection to prevent erosion.
Standard 2: Peak Rate Attenuation	Full compliance will be achieved. A proposed infiltration basin will be designed to collect, detain, and infiltrate stormwater, and an outlet control structure will be incorporated into the BMP design to regulate the outflow of discharge so peak discharge rates do not increase. Analysis shows that the increase in impervious area creates a runoff volume of 27,900 cf that the proposed infiltration basin needs to detain to accommodate the increase in peak flow rate for the 10-year storm. The proposed infiltration basin is conceptually sized to accommodate 37,700 cf. Existing and proposed peak discharges will be calculated once design has progressed further.
Standard 3: Stormwater Recharge	Full compliance will be achieved. The infiltration basin at Pilgrim Junction is conceptually sized to recharge the required 12,100 cf of stormwater runoff to groundwater.
Standard 4: Water Quality	Full compliance will be achieved. Because Pilgrim Junction is within a Zone II, runoff will be treated so that at least 44% of the TSS load is removed prior to discharge to the infiltration basin which includes pre-treatment through deep sump catch basins and a sediment forebay. A total of 80% TSS removal will be achieved through the installation of deep sump catch basins, a sediment forebay, and infiltration basin. Pilgrim Junction is within a Zone II to a municipal groundwater well so the BMPs must be sized to treat at least 1-inch of runoff over the impervious area. The required water quality volume of 21,800 cf will be treated by the proposed infiltration basin. The proposed infiltration basin is conceptually sized to accommodate 37,700 cf.
Standard 5: Land Uses with Higher Potential Pollutant Loads	Full compliance will be achieved. None of the areas within Pilgrim Junction contain any type of land use with higher potential pollutant loads (LUHPPL). There is a layover facility adjacent to Pilgrim Junction but no stormwater runoff from the layover facility drains to Pilgrim Junction.
Standard 6: Critical Areas	Full compliance will be achieved. Pilgrim Junction is within a Zone II to a municipal groundwater well. An infiltration basin will be designed so that 44% TSS is removed through pre-treatment and sized so that the basin treats 1-inch of runoff over the impervious area. The basin will promote infiltration of runoff to recharge groundwater.
Standard 7: Redevelopment Standards	Full compliance will be achieved. For the 4.0-acre area considered new development, all ten stormwater standards will be fully met. The remaining area to be redeveloped will meet Standards 2, 3, 4, 5, and 6 to the maximum extent practicable.
Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Controls	Full compliance will be achieved. Pilgrim Junction will disturb more than 1 acre of land so the Phase 1 Project will obtain coverage under the NPDES Construction General Permit and develop a Stormwater Pollution Prevention Plan (SWPPP) prior to the start of earthmoving activities.
Standard 9: Operation and Maintenance Plan	Full compliance will be achieved. MassDOT will develop a detailed long-term O&M plan during the final design as part of the Notice of Intent submittal.
Standard 10: Prohibition of Illicit Discharges	Full compliance will be achieved. Storm drainage structures remaining from the previous development which are part of the redevelopment area will be removed. The proposed stormwater system will be designed so that the components included therein are in full compliance with current standards.

East Taunton Station

For the 3.8-acre impervious area considered to be new development, all ten stormwater standards will be fully met. The remaining area to be redeveloped will meet Standards 2, 3, 4, 5, and 6 to the maximum extent practicable, as shown in Table 8.4-8 below.

Table 8.4-8 Compliance with the Massachusetts Stormwater Standards: East Taunton Station

Standard	Compliance Level Achieved
Standard 1: No New Untreated Discharges or Erosion to Wetlands	Full compliance will be achieved. Two infiltration basins are proposed to treat stormwater runoff from the site and the outlets will be designed with rip rap to protect against erosion.
Standard 2: Peak Rate Attenuation	Full compliance will be achieved. Two proposed infiltration basins will be designed to collect, detain, and infiltrate stormwater, and an outlet control structure will be incorporated into the basin design to regulate the outflow of discharge so peak discharge rates do not increase. One existing stormwater basin will be improved with a sediment forebay upstream to manage peak flows as well. Analysis shows that the increase in impervious area creates a runoff volume of 26,600 cf that the basins need to detain to accommodate the change in peak flow rates for the 10-year storm. The proposed infiltration basins are conceptually sized, plus the existing basin, to accommodate 64,300 cf. Existing and proposed peak discharges will be calculated once design has progressed further.
Standard 3: Stormwater Recharge	Full compliance will be achieved. The infiltration basins at East Taunton are conceptually sized to recharge the required 4,400 cf of stormwater runoff to groundwater.
Standard 4: Water Quality	Full compliance will be achieved. A total of 80% TSS removal will be achieved through the installation of deep sump catch basins, three sediment forebays, two infiltration basins, and existing basin. The required water quality volume of 9,400 cf will be treated by the proposed infiltration basins and existing basin. The proposed infiltration basins are conceptually sized, plus the existing basin, to accommodate 64,300 cf.
Standard 5: Land Uses with Higher Potential Pollutant Loads	Full compliance will be achieved. None of the areas within East Taunton Station contain any type of land use with higher potential pollutant loads (LUHPPL).
Standard 6: Critical Areas	Full compliance will be achieved. The site does not discharge near or to a critical area.
Standard 7: Redevelopment Standards	Full compliance will be achieved. For the 3.8-acre area considered new development, all ten stormwater standards will be fully met. The remaining area to be redeveloped will meet Standards 2, 3, 4, 5, and 6 to the maximum extent practicable.
Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Controls	Full compliance will be achieved. East Taunton will disturb more than 1 acre of land so the Phase 1 Project will obtain coverage under the NPDES Construction General Permit and develop a Stormwater Pollution Prevention Plan (SWPPP) prior to the start of earthmoving activities.
Standard 9: Operation and Maintenance Plan	Full compliance will be achieved. MassDOT will develop a detailed long-term O&M plan during the final design as part of the Notice of Intent submittal.
Standard 10: Prohibition of Illicit Discharges	Full compliance will be achieved. Storm drainage structures remaining from the previous development which are part of the redevelopment area will be removed. The proposed stormwater system will be designed so that the components included therein are in full compliance with current standards.

Freetown Station

All of the Freetown Station's area is considered new development so all ten stormwater standards will be fully met as shown in Table 8.4-9 below.

Table 8.4-9 Compliance with the Massachusetts Stormwater Standards: Freetown Station

Standard	Compliance Level Achieved
Standard 1: No New Untreated Discharges or Erosion to Wetlands	Full compliance will be achieved. Three infiltration basins are proposed to treat stormwater runoff from the site. The outlets will be designed with rip rap protection to prevent erosion.
Standard 2: Peak Rate Attenuation	Full compliance will be achieved. Three proposed infiltration basins will be designed to collect, detain, and infiltrate stormwater, and an outlet control structure will be incorporated into the basin design to regulate the outflow of discharge so peak discharge rates do not increase. Analysis shows that the increase in impervious area creates a runoff volume of 15,800 cf that the proposed infiltration basins needs to detain to accommodate the increase in peak flow rates for the 10-year storm. The proposed infiltration basins are conceptually sized to accommodate 22,400 cf. Existing and proposed peak discharges will be calculated once design has progressed further.
Standard3: Stormwater Recharge	Full compliance will be achieved. The infiltration basins at Freetown Station are conceptually sized to recharge the required 3,800 cf of stormwater runoff to groundwater.
Standard 4: Water Quality	Full compliance will be achieved. A total of 80% TSS removal will be achieved through the installation of deep sump catch basins, three sediment forebays, and three infiltration basins. The required water quality volume of 4,400 cf will be treated by the proposed infiltration basins. The proposed infiltration basins are conceptually sized to accommodate 22,400 cf.
Standard 5: Land Uses with Higher Potential Pollutant Loads	Full compliance will be achieved. None of the areas within Freetown Station contain any type of land use with higher potential pollutant loads (LUHPPL).
Standard 6: Critical Areas	Full compliance will be achieved. The site does not discharge near or to a critical area.
Standard 7: Redevelopment Standards	Full compliance will be achieved. All ten stormwater standards will be fully met.
Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Controls	Full compliance will be achieved. Freetown Station will disturb more than 1 acre of land so the Phase 1 Project will obtain coverage under the NPDES Construction General Permit and develop a Stormwater Pollution Prevention Plan (SWPPP) prior to the start of earthmoving activities.
Standard 9: Operation and Maintenance Plan	Full compliance will be achieved. MassDOT will develop a detailed long-term O&M plan during the final design as part of the Notice of Intent submittal.
Standard 10: Prohibition of Illicit Discharges	Full compliance will be achieved. This station is new development so there is no exiting drainage infrastructure on site. The proposed stormwater system will be designed so that the components included therein are in full compliance with current standards.

Fall River Depot Station

There are no wetlands near the site so this station is not subject to the Wetlands Protection Act or Massachusetts Stormwater Management Standards.

Middleborough Secondary

The Middleborough Secondary is considered redevelopment so Standards 2, 3, 4, 5, and 6 will be met to the maximum extent practicable and Standards 1, 7, 8, 9, and 10 will be fully met, as shown in Table 8.4-10 below.

Table 8.4-10 Compliance with the Massachusetts Stormwater Standards: Middleborough Secondary

Standard	Compliance Level Achieved
Standard 1: No New Untreated Discharges or Erosion to Wetlands	Full compliance will be achieved. No new untreated discharges are proposed at this site. All existing discharges to be reconstructed will be designed with riprap protection, and all reconstructed piped underdrains will be wrapped with a geotextile fabric to minimize sediment transport.
Standard 2: Peak Rate Attenuation	Full compliance will be achieved. No new impervious area is proposed. All existing stormwater patterns will be maintained and peak flow rates will not be affected.
Standard3: Stormwater Recharge	Full compliance will be achieved. No new impervious cover is proposed; therefore, no additional groundwater recharge is required.
Standard 4: Water Quality	Full compliance will be achieved. No new impervious cover is proposed; therefore, there is no requirement for additional water quality treatment. Existing ditches that discharge to resource areas will be reconstructed to enter sediment forebays for suspended solid removal.
Standard 5: Land Uses with Higher Potential Pollutant Loads	Full compliance will be achieved. None of the areas within Middleborough Secondary contain any type of land use with higher potential pollutant loads (LUHPPL).
Standard 6: Critical Areas	Full compliance will be achieved. The site does not discharge near or to a critical area. Middleborough Secondary enters Pilgrim Junction which does discharge to a critical area. See the Pilgrim Junction table for further information.
Standard 7: Redevelopment Standards	Full compliance will be achieved. The entire site is considered redevelopment and will comply with Standards 2, 3, 4, 5, and 6 to the maximum extent practicable.
Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Controls	Full compliance will be achieved. Middleborough Secondary will disturb more than 1 acre of land so the Phase 1 Project will obtain coverage under the NPDES Construction General Permit and develop a Stormwater Pollution Prevention Plan (SWPPP) prior to the start of earthmoving activities.
Standard 9: Operation and Maintenance Plan	Full compliance will be achieved. MassDOT will develop a detailed long-term O&M plan during the final design as part of the Notice of Intent submittal.
Standard 10: Prohibition of Illicit Discharges	Full compliance will be achieved. Storm drainage structures on the Middleborough Secondary will be reconstructed where necessary. Any new stormwater system components will be designed so that they are in full compliance with current standards.

8.5 Waterways

8.5.1 Introduction

This Section describes the Phase 1 Project's relationship with the Public Waterfront Act, Massachusetts General Law Chapter 91 (Chapter 91).

8.5.1.1 Requirements of Certificate

The Secretary's Certificate required that the DSEIR include the following information related to waterways:

- An indication of whether Phase 1 will affect jurisdictional waterways that were not previously reviewed and, if so, a description of the proposed work and applicable c. 91 standards.

8.5.1.2 Regulatory Context

Chapter 91 is the modern codification of a series of statues which preserve certain rights in tidelands for the citizens of the Commonwealth. These rights date to the Massachusetts Colonial Ordinances of 1641-1647 and preserve the rights of the public to fish, fowl and navigate within (a) all tidal waters of the Commonwealth up to and including the natural high-water mark and (b) the navigable portions of non-tidal rivers and streams upon which public funds have been spent for stream clearance, channel improvement, or any form of flood control or prevention work. With relatively few legislative exceptions, these rights are preserved in perpetuity for the citizens of the Commonwealth.

Compliance with Chapter 91 is administered by the MassDEP through the Waterways Regulations at 310 CMR 9.00. These regulations establish procedures for the issuance of licenses for activities and the placement of fill and structures within jurisdictional areas. Maintenance, repair and minor modifications to existing, authorized and exempt structures within a jurisdictional area may be permitted without a new license or license amendment under the procedures at 310 CMR 9.22.

As it relates to the Project, Chapter 91 jurisdiction potentially extends to four key components:

- non-tidal rivers and streams;
- tidal waters (flowed tidelands);
- filled tidelands; and
- landlocked tidelands.

There are no tidal waters, filled tidelands or landlocked tidelands within the Phase 1 Project area (Middleborough Secondary and new/relocated stations) that is the subject of this DSEIR. Therefore, only non-tidal rivers and streams are included.

The Waterways Regulations at 310 CMR 9.04(1)(e) establish Chapter 91 jurisdiction over the following:

> *(e) any non-tidal river or stream on which public funds have been expended for stream clearance, channel improvement, or any form of flood control or prevention work, either upstream or downstream within the river basin, except for any portion of any such river or stream which is not normally navigable during any season, by any vessel including canoe kayak, raft or rowboat; The Department [DEP] may publish, after opportunity for public comment and review, a list of navigable streams and rivers….*

This regulation establishes Chapter 91 jurisdiction over any navigable river or stream to which public funds have been expanded. To date, the MassDEP has not published a list of navigable rivers and streams in the Commonwealth, and neither MassDOT nor MassDEP is aware of a definitive list of non-tidal rivers and streams upon which public funds have been spent. In the absence of such a list, MassDEP states the following in their comment letter on the DEIS/DEIR:

> *"As a general rule … only the non-navigable uppermost reaches of a river basin are not subject to review."*

Therefore, in order to determine the jurisdictional status of non-tidal rivers and streams, this evaluation considered the potential navigability of each river, stream, or wetland crossing within the rail corridor.

The following materials were relied upon in assessing navigability:

- Stream order as determined by reference to USGS maps and "StreamStats;" using the Strahler method;
- Presence of a defined channel upstream and/or downstream of the crossing;
- Upstream and downstream conditions in terms of density of vegetation or the presence of culverts or other obstructions to navigation;
- Available survey data; and
- Field observations.

Existing and planned transportation improvements within areas potentially subject to jurisdiction under Chapter 91 pursuant to 310 CMR 9.04 were reviewed and preliminary determinations made regarding jurisdiction. These preliminary determinations are based in part on written and verbal guidance provided by MassDEP during its review of the Southern Triangle Project elements. MassDEP has the sole authority for making such determinations under Chapter 91.

8.5.2 Existing Conditions

There are 28 bridges or culverts along the corridor. Culverts that convey drainage under public roads, stormwater in upland areas, and drainage parallel to the tracks were eliminated from further review because they have no potential for navigability. Table 8.5-1 lists the 28 crossings and provides the rationale for the Chapter 91 jurisdictional determination. Based on this analysis, there are two bridges that cross Chapter 91 jurisdictional waterways. Figure 8-5, sheets 1-3, show the locations of these structures. As demonstrated in Table 8.5-1, the Middleborough Secondary crosses three navigable waterways subject to Chapter 91.

Table 8.5-1 Chapter 91 Jurisdictional Status of Non-Tidal River and Stream Crossings

Structure Name	Town	Existing Structure	Waterbody	Stream Order	Description	Navigable?	Rationale
CV-TA-1	Taunton	2' x 2' stone box 30' long	NA	0	Equalizer culvert	NO	No defined channel
Bridge T-01-067	Taunton	deck beam bridge 15.5' long x 9' wide	Cotley River (Barstow's Pond)	River = 2 Pond = 0	Bridge over Barstow Pond tributary. Reconstructed by MassDOT as part of its State of Good Repair program.	YES	Well-defined channel upstream and downstream.
CV-TA-2	Taunton	2'x2' concrete box 60' long	NA	0	Culvert drains overland flow to Barstow Pond	NO	No defined channel.
CV-TA-3	Taunton	2' x 2' concrete box 60' long	NA	0	Culvert conveys flows to Taunton River	NO	Equalizing culvert only. No defined channel.
CV-TA-4	Taunton	30' dia. RCP 60' long	NA	1	Culvert conveys perennial stream towards Taunton River. Reconstructed by MassDOT as part of its State of Good Repair program.	NO	Narrow channel through wooded swamp.
Bridge T-01-077	Taunton	timber stringer 19' long x 3' wide	Richmond Brook (Taunton River Tributary)	2	Timber stringer bridge over Taunton River tributary. Reconstructed by MassDOT as part of its State of Good Repair program.	YES	Well-defined channel upstream and downstream.
CV-TA-5	Taunton	2' x 2' stone box 30' long	NA	0	Culvert conveys overland flows to cranberry bog. Reconstructed by MassDOT as part of its State of Good Repair program.	NO	No defined channel upstream or downstream of ROW.
CV-TA-6	Taunton	2' x 2' concrete box 30' long	NA	0	Equalizer culvert.	NO	No defined channel in wooded area (N); Cranberry bog (S).
CV-TA-7	Taunton	2' dia. RCP 30' long	NA	0	Equalizer culvert. Reconstructed by MassDOT as part of its State of Good Repair program.	NO	Equalizing culvert only. No defined watercourse.

Table 8.5-1 Chapter 91 Jurisdictional Status of Non-Tidal River and Stream Crossings (Continued)

Structure Name	Town	Existing Structure	Waterbody	Stream Order	Description	Navigable?	Rationale
CV-TA-8	Taunton	2.5'x2.5' Stone box	NA	0	Equalizer culvert.	NO	Equalizing culvert only. No defined channel.
CV-TA-9	Taunton	2' x 2' concrete box 25' long	NA	0	Equalizer culvert connecting two cranberry bogs.	NO	No defined watercourse. Equalizing culvert connecting two cranberry bogs.
CV-TA-10	Taunton	2' x 2' concrete box 30' long	NA	0	Culvert conveys wetland overflow to cranberry bog.	NO	No defined water-course. Culvert conveys overland flow to a cranberry bog.
CV-TA-11	Taunton	2.5'x2.5' Stone box	NA	0	Equalizer culvert. Reconstructed by MassDOT as part of its State of Good Repair program.	NO	Equalizing culvert only. No defined water course.
CV-TA-12	Taunton	15" CMP	NA	0	Equalizer culvert.	NO	No defined channel
CV-TA-13	Taunton	3' x 6' box	NA	0	Equalizer culvert. Reconstructed by MassDOT as part of its State of Good Repair program.	NO	No defined channel
East Taunton Station Culvert	Taunton	36" CMP	NA	0	Equalizer culvert.	NO	No defined channel
Furnace Brook Culvert	Raynham	2-4.5' x 5.5' stone box culverts	Furnace Brook	2	Culvert conveys Furnace Brook. Reconstructed by MassDOT as part of its State of Good Repair program.	YES	Second order stream, well-defined channel upstream and downstream of ROW.
CV-RA-1	Raynham	2'x2' Stone box	NA	0	Equalizer culvert. Reconstructed by MassDOT as part of its State of Good Repair program.	NO	No defined water course
CV-RA-2	Raynham	2' x 2' stone box 50' long	NA	0	Equalizer culvert. Reconstructed by MassDOT as part of its State of Good Repair program.	NO	No defined channel
CV-RA-3	Raynham	2' x 2' stone/steel box 25' long	NA	0	Equalizer culvert.	NO	No defined channel
CV-LK-8	Lakeville	2' x 2' stone box	NA	0	Equalizer culvert.	NO	No defined channel

Table 8.5-1 Chapter 91 Jurisdictional Status of Non-Tidal River and Stream Crossings (Continued)

Structure Name	Town	Existing Structure	Waterbody	Stream Order	Description	Navigable?	Rationale
CV-LK-9	Lakeville	4' x 4' stone box 50' long	NA	0	Equalizer culvert.	NO	No defined channel north of ROW. South of ROW is golf course ditch.
CV-LK-10	Lakeville	4' x 3' stone box culvert	NA	0	Equalizer culvert. Reconstructed by MassDOT as part of its State of Good Repair program.	NO	No defined channel
CV-LK-11	Lakeville	3' x 3' stone/steel box 25' long	NA	0	Equalizer culvert. Reconstructed by MassDOT as part of its State of Good Repair program.	NO	No defined channel
CV-LK-12	Lakeville	4' x 4' stone box 60' long	NA	0	Conveys flows from emergent. Reconstructed by MassDOT as part of its State of Good Repair program.	NO	No defined channel
CV-LK-13	Lakeville	2' x 2' stone box	Box Brook	0	Conveys remnants of Box Brook.	NO	No defined channel
CV-LK-14	Lakeville	4.5' x 3.5' stone box	NA	0	Equalizer culvert.	NO	No defined channel
CV-LK-15	Lakeville	4' x 4' stone box 30' long	Box Brook	0	Culvert conveys Box Brook under ROW	NO	Thickly wooded swamp
CV-LK-16	Lakeville	3' x 3' stone box 30' long	NA	1	Equalizer culvert.	NO	Poorly defined channel away from the ROW.
CV-LK-17	Lakeville		NA	0	Equalizer culvert.	NO	No defined channel

8.5.3 Methodology

The jurisdictional review of non-tidal rivers and streams conducted for this DSEIR considered all culvert and bridge crossings along the Middleborough Secondary to confirm the presence of a watercourse at each crossing. Each crossing was reviewed using current USGS topographic maps, aerial photography, on-site observations, track charts and selected historic cartography.

Each culvert or bridge identified by these resources was reviewed to determine the size of each structure and nature of the wetland or water body it conveys beneath the Middleborough Secondary. Rivers and streams were evaluated against the standard established by 310 CMR 9.04(1)(e) as follows:

1. All rivers and streams were assumed to have been improved for stream clearance, channel improvement, or flood control or prevention work, either upstream or downstream within the river basin;

2. Each water course was reviewed for potential navigability by a vessel as small as a canoe or kayak at any time during the year.
   - Streams lacking a defined channel or water course or so densely vegetated as to preclude navigation, were deemed not navigable and therefore not subject to the licensing standards of Chapter 91.
   - Rivers and streams with a clearly defined water course of sufficient size to potentially accommodate a canoe or kayak were deemed navigable and therefore subject to the licensing standards of Chapter 91.
3. The cartographic and jurisdictional review, including methodology and preliminary results were presented to MassDEP on September 26, 2017.

8.5.4 Impact Analysis

The Phase 1 Project does not include any work within areas within the geographic jurisdiction of Chapter 91, that is, it does not include any filed or flowed tidelands. The Middleborough Secondary crosses three jurisdictional non-tidal rivers and streams, however no work within these water courses is proposed as part of the Phase 1 Project. The bridges are currently being reconstructed by MassDOT as part of the SGR program, and no work is proposed at Furnace Brook as part of Phase 1. Accordingly, the project will not result in any temporary or permanent impacts to jurisdictional waters.

8.5.5 Mitigation

The Phase 1 Project elements described in this DSEIR do not include any impacts to areas subject to Chapter 91, and therefore do not require any mitigation.

8.5.6 Regulatory Compliance

The potential jurisdiction of Phase 1 Project elements described in this DSEIR have been reviewed in detail with MassDEP Waterways staff including review of cartographic, photographic and wetland delineation field reports. MassDEP has concurred with the jurisdictional assessment presented in this chapter.

8.5.6.1 Agency Coordination

The MassDOT project team has consulted extensively with MassDEP Waterways staff during the preparation of this DSEIR to review and confirm the jurisdictional status of all non-tidal rivers and streams crossing the Middleborough Secondary. This coordination included the following:

- **May 2017:** MassDOT team submitted preliminary jurisdictional assessment of Middleborough Secondary non-tidal rivers and streams;

- **July 2017:** MassDEP and MassDOT consultation meeting to review methodology for identifying potential jurisdictional non-tidal rivers and stream crossing the Middleborough Secondary;
- **September 2017:** MassDEP and MassDOT consultation meeting to review and confirm jurisdictional assessments for all non-tidal river and stream crossings on the Middleborough Secondary.
- **November 2017:** MassDOT submits confirmatory memo to MassDEP summarizing the results of jurisdictional consultation.

8.5.6.2 Chapter 91

Chapter 91, Section 12A authorizes MassDEP to *"license and prescribe the terms for the construction or extension of a dam, road, bridge or other structure, or the filling of land, the driving of piles, or the making of excavations, in, over or upon the waters below high water mark of any river or stream within the commonwealth with respect to which expenditures from federal, state or municipal funds have been made for stream clearance, channel improvement or any form of flood control or prevention work, and the provisions of this chapter shall apply to all such licenses."*

The Phase 1 Project does not require any approvals under Chapter 91 because no work is proposed within any geographic area subject to Chapter 91.

9. Biodiversity and Rare Species

9.1 Introduction

This chapter describes the biological resources and evaluates impacts, both direct and indirect, within and adjacent to the South Coast Rail (SCR) Phase 1 Study Area in terms of biodiversity, including plant communities, fish and wildlife, vernal pool habitat, and threatened and endangered species. Regulatory jurisdiction and compliance with local, state, and federal regulations is discussed, as well as measures to avoid, minimize, mitigate, and compensate for impacts.

This chapter provides information relative to biodiversity and associated regulations, identifies the Project Study Area and provides a regional overview of biodiversity including ecosystems, conservation lands, plant communities, fish and wildlife. The analysis covers the portions of the Study Area that were not addressed in the Final Environmental Impact Statement (FEIS)/ Final Environmental Impact Report (FEIR), and uses the same analysis methodologies presented in that document. Section 9.2 describes existing conditions within the Study Area, relative to biodiversity and rare species. Section 9.3 describes potential impacts and mitigation measures.

9.1.1 Requirements of Certificate

The Secretary of Energy and Environmental Affair's (EEA) Certificate on the Notice of Project Change (NPC), issued in May 2017, required that the Draft Supplementatal Environmental Impact Report (DSEIR):

- Identify conservation areas (bioregions) which could potentially be impacted by Phase 1;
- Identify ecosystems within each conservation area that would be impacted by the Phase 1 alternatives and included a quantitative and qualitative analysis of impacts to wildlife habitat;
- Evaluate direct and indirect environmental impacts on wildlife and their habitats including but not limited to: hydrological changes, fragmentation of habitat and populations, edge effects, noise and vibration, and restrictions to wildlife mobility;
- Identify any potential impacts to migratory birds and their habitats, including Important Bird Areas (IBAs);
- Include an analysis of biodiversity value in the Phase 1 Project Area. Include a description of the methodology and assumptions and supporting maps/graphics indicating biodiversity values for the Phase 1 Project Area;
- Evaluate potential impacts to fisheries resources;

- Describe best management practices (BMPs) for erosion and sedimentation control and time of year (TOY) restrictions on construction activity to avoid and minimize impacts to fisheries resources;
- Provide information on culvert and bridge replacement, address protection of fisheries including passage for diadromous species;
- Identify potential vernal pools and the extent of vernal pool habitat, including migratory pathways, using field verification. The DSEIR should include the results of potential vernal pool investigations associated with Phase 1, including a description and mapping of those meeting the criteria for certification;
- If mitigation is required, consider expansion of existing vernal pools that will receive fill and plantings to help maintain healthy vernal pool ecosystems and support reestablishment of native vegetation;
- Evaluate potential impacts to sensitive receptors such as Priority Habitat, aquatic organisms and water quality associated with the use of herbicides along the right-of-way (ROW). The DSEIR should outline any restrictions on herbicide application, identify areas proposed for herbicide use and identify areas that would be designated as “no spray” areas;
- Describe monitoring, identification and control of nuisance, non-native and invasive species;
- Describe how potential impacts of the alternatives on rare species habitat will be avoided and minimized, and describe in quantitative and qualitative terms any unavoidable impacts associated with Phase 1, including indirect impacts associated with loss of migratory routes, increase in habitat fragmentation resulting from ROW maintenance; increased mortality of turtles crossing tracks; and clearing in the vicinity of vernal pools;
- Identify existing and proposed wildlife crossings and barrier designs, measures to minimize turtle mortality during and after construction, and long-term measures to minimize impacts to state-listed species associated with regular operations and maintenance of the rail line; and
- Address how the Project will meet MESA performance standards, including the long-term “net benefit” standard in 321 CMR 10.23 and provide mitigation plans developed in consultation with NHESP.

9.1.2 Resource Definition

Biological diversity, or “biodiversity,” is an assessment of the numbers, types, and relative abundance of plant and animal species in natural communities. It also describes their relationships to each other and their interactions with the environment. There are three levels of biodiversity; the first is based on the genetic differences among individuals, the second on species richness (the abundance or rarity of species in a landscape), and the third on the variety of habitats, communities, ecosystems, and landscapes in which those species occur. The concept of biodiversity plays an important role in the connections within and between these levels, and how the interrelated elements sustain the system as a whole. Higher levels of biodiversity are important in maintaining robust ecological communities. This report evaluates the species richness and the variety of habitats, communities, ecosystems, and landscapes in which those species occur within the Project Study Area. For this chapter, biodiversity is described primarily in terms of important wildlife and vegetative resources or "biotic communities" that are known to occur in the Phase 1 Study Area. Biotic communities are populations of different organisms including fish, wildlife, and plants that live together in a particular place. Biotic communities are ecological systems in which the natural resources are interdependent. Rare species represent one of the most sensitive elements of biodiversity and are addressed specifically in Section 9.2.4 and 9.3.2.

9.1.3 Regulatory Context

There are currently no federal or state regulations that specifically regulate biodiversity. However, federal and state laws (Endangered Species Act)[1,2] protect rare plants and animals and their critical habitats, and state regulations (Wetlands Protection Act)[3] protect the wildlife habitat value of wetlands. Vernal pool habitats are protected under the Massachusetts Water Quality Certification[4] standards as Outstanding Resource Waters.

Federal Endangered Species Act

The Federal Endangered Species Act (ESA) of 1973[5] defines an endangered species as "any species which is in danger of extinction throughout all or a significant portion of its range." The ESA also defines a threatened species as "any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." The Federal Endangered Species Act of 1973[6] protects species that are listed as Endangered or Threatened on a national basis. Federal and state laws protect rare plants and animals and their critical habitats.

The Federal Endangered Species Act of 1973, Section 7 (16 USC 1531 *et seq.,* as amended),[7] authorizes the determination and listing of species as Endangered and Threatened and prohibits unauthorized taking, possession, sale, and transport of endangered species. Section 7 of the Act[8] requires federal agencies to ensure that any action authorized, funded, or carried out by a federal agency is not likely to jeopardize the continued existence of listed species or to modify their critical habitat. The U.S. Fish

1 Endangered Species Act of 1973, Section 7(16 USC 1531 et seq., as amended), United States Fish and Wildlife Service.
2 Massachusetts Endangered Species Act of 1990 (MESA [321 CMR 10.00: M.G.L. c. 131A.]), Natural Heritage Endangered Species Program.
3 Massachusetts Wetlands Protection Act regulations (WPA [310 CMR 10.00 et seq.]).
4 Massachusetts Water Quality Certification (Section 401 of the Clean Water Act [M.G.L. c. 21 §§ 26 – 53]).
5 Endangered Species Act of 1973, (16 U.S.C. 1531 et seq., as amended) United States Fish and Wildlife Service.
6 Ibid.
7 Endangered Species Act of 1973, Section 7(16 USC 1531 et seq., as amended), United States Fish and Wildlife Service.
8 Ibid.

and Wildlife Service (USFWS) administers the Act. The National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA Fisheries), a division of the U.S. Department of Commerce, is the lead federal agency responsible for the stewardship of the nation's offshore living marine resources and their habitats. NOAA Fisheries manages, conserves and protects fish, whales, dolphins, sea turtles, and other living creatures in the ocean, and administers the Endangered Species Act for species within its purview.

Massachusetts Endangered Species Act

Massachusetts enacted the Massachusetts Endangered Species Act (MESA) in 1990. The Act (M.G.L. Chapter 131A) and its regulations (321 CMR 10.00) prohibit the "taking" of any state-listed rare plants and animals unless specifically permitted for scientific, educational, or propagation purposes, or where a Conservation Permit is issued. "Take" includes protection of rare species habitat, and is defined as, "*in references to animals to harass, harm, pursue, hunt, shoot, hound, kill, trap, capture, collect, process, disrupt the nesting, breeding, feeding or migratory activity or attempt to engage in any such conduct, or to assist such conduct, and in reference to plants, means to collect, pick, kill, transplant, cut or process or attempt to engage or to assist in any such conduct. Disruption of nesting, breeding, feeding or migratory activity may result from, but is not limited to, the modification, degradation or destruction of Habitat*."

State-listed (rare) species are protected under MESA,[9] and are classified as Endangered, Threatened, or Species of Special Concern. An "Endangered" species is one that is in danger of extinction throughout all or a significant portion of its range within Massachusetts. A "Threatened" species is one that is likely to become endangered in Massachusetts in the foreseeable future. Species of Special Concern are those species that biological research has documented to have suffered a decline that could threaten the species if the decline continues unchecked, or those species that occur in such small numbers or with such a restricted distribution that they could easily become threatened within the Commonwealth.

The regulations (321 CMR 10.05) state that "All State Agencies shall review, evaluate, and determine the impact on Endangered, Threatened and Special Concern species or their habitats… and use all practicable means and measures to avoid or minimize damage to such species or their habitats." State agencies are responsible for demonstrating to the Secretary that all practicable means and measures to protect rare species and their habitats have been incorporated into the project design. The Massachusetts Department of Fish and Wildlife's (DFW) Natural Heritage and Endangered Species Program (NHESP) is the agency responsible for ensuring compliance with MESA. A proposed project that would result in a "take," requires a Conservation and Management Permit from the NHESP.

9 Massachusetts Endangered Species Act of 1990 (321 CMR 10.00: M.G.L. c. 131A.), Natural Heritage Endangered Species Program.

Massachusetts Wetlands Protection Act

The Massachusetts Wetlands Protection Act Regulations (WPA [310 CMR 10.00 et seq.]) state that proposed projects that alter estimated rare wildlife habitat shall not be permitted to have any short-term or long-term adverse effects on the habitat of the local population of that species. The regulations only apply to proposed projects that would alter the habitat of a rare animal species occurring in a wetland resource area for which an occurrence has been entered into the official NHESP database. Rare plants are not regulated under the WPA. The NHESP maintains an atlas of Estimated Habitat for state-listed rare species, which it updates every two years (most recently in 2008).

Massachusetts Wildlife Action Plan

The State Wildlife Action Plan (September 2006) is a Comprehensive Wildlife Conservation Strategy (CWCS) developed by the Massachusetts Division of Fisheries and Wildlife (DFW) with the goal of conserving wildlife biodiversity in Massachusetts. The CWCS describes past successful efforts to conserve the biodiversity of the Commonwealth and a review of the landscape changes that have affected wildlife populations. It identifies species and habitats in the greatest need of conservation and lists the primary strategies that DFW plans to use to conserve these species and their habitats through coordination and partnerships with governmental and non-governmental agencies and organizations.

The CWCS identifies seven broad conservation strategies for species and habitats in greatest need of conservation. These include: habitat protection, surveys and inventories of the CWCS species and habitats, conservation planning, environmental regulation, habitat restoration and management, coordination and partnerships, and conservation/environmental education. The CWCS describes 22 habitats and proposes conservation strategies for each of them. Eleven of these habitats are found within the Study Area and include:

- Large and mid-sized rivers;
- Upland forest;
- Large unfragmented landscape;
- Small streams;
- Shrub swamps;
- Forested swamps;
- Lakes and ponds;
- Young forests and shrublands;
- Riparian forest;
- Vernal pools; and

- Marshes and wet meadows.

Figure 9-4 shows the wetland habitats in proximity to the Middleborough Secondary. The CWCS does not designate specific areas for protection of high diversity. However, it proposes specific conservation actions for each habitat.

9.1.4 Regulatory Coordination

The NHESP provided comments on the NPC concerning state-listed species protected under MESA. The Massachusetts Department of Transportation (MassDOT) subsequently received approval to conduct field surveys to identify locations of protected species in proximity to the Middleborough Secondary, and has continued to coordinate with NHESP concerning potential impacts to listed species and mitigation measures. NHESP did not identify any state-listed species in the vicinity of the new Middleborough Station or the relocated Taunton or Freetown Stations.

9.2 Existing Conditions

This section provides information on existing biodiversity and protected species in proximity to the Middleborough Secondary, as required by the Secretary's Certificate on the NPC. This section includes information on federal and state-listed endangered and threatened species, conservation areas (bioregions, Biomap core habitats, Important Wildlife Habitats (IWH)) and vernal pools. Other regional biodiversity elements, including descriptions of the plant communities, mammal, bird, reptile and fish characteristic of the region were provided in Chapter 4.14 of the FEIS/FEIR and are incorporated by reference in this document.

The Middleborough Secondary is an existing active freight rail line that extends from Cotley Junction in Taunton to Pilgrim Junction in Middleborough (Figure 9-1). The freight line consists of a single track on ballast, with an average cleared width of 20 feet. In some locations, the railroad tracks are at approximately the same elevation as the uplands to the north and south, but throughout the central section the tracks are on an elevated berm. 20 culverts convey intermittent and perennial streams, or connect wetlands under the railbed, as described in Section 8.3, *Surface and Groundwater Resources*.

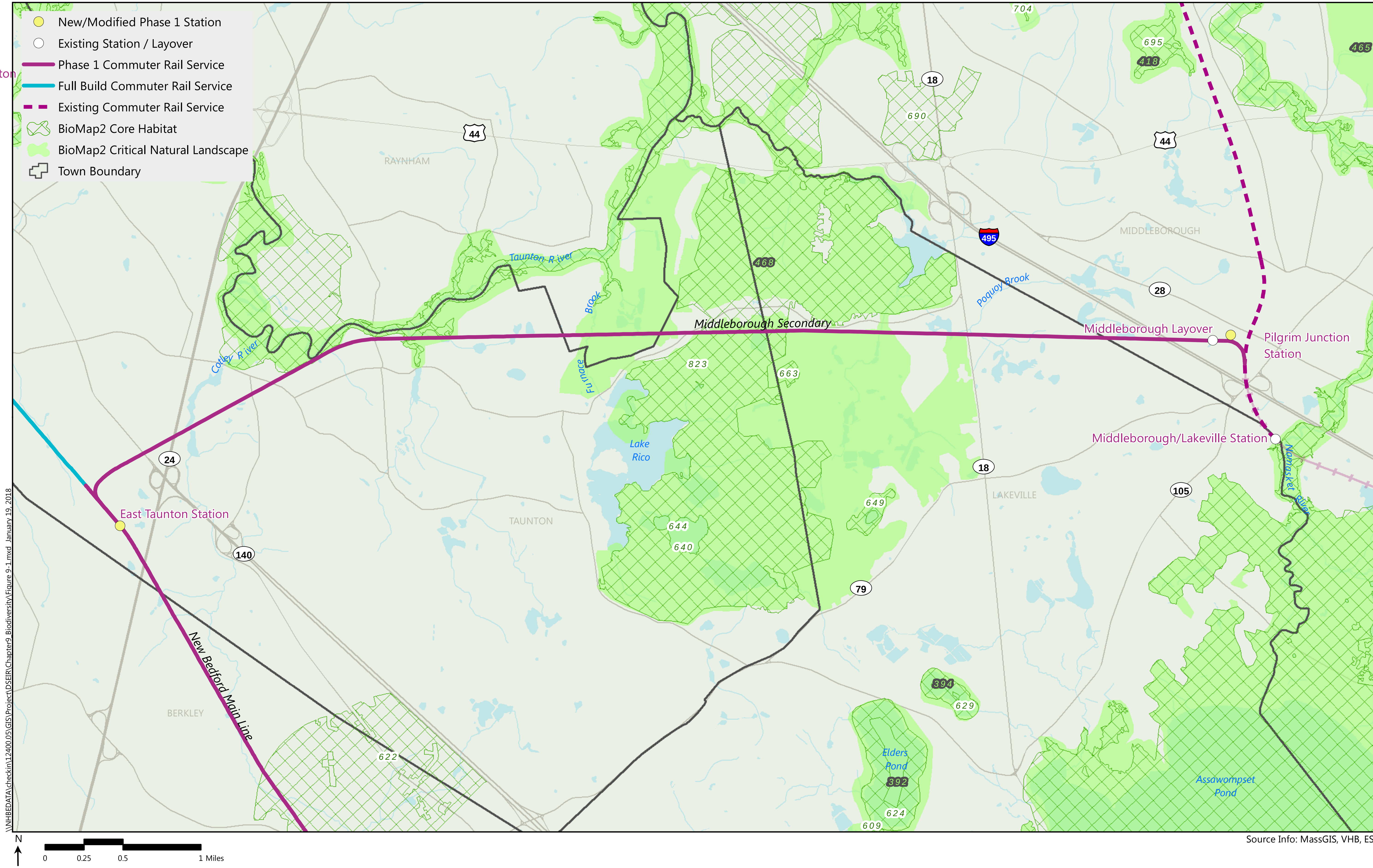
9.2.1 Biodiversity

This section includes a general description of the Phase 1 Study Area and identifies the associated bioregions and major concentrations of Core Habitats along the Project corridor. The South Coast Rail Phase 1 Study Area includes the portion of the South Coast region that is adjacent to or crossed by the Middleborough Secondary, and the areas of the proposed new stations.

SCR SOUTH COAST RAIL

Massachusetts Bay Transportation Authority

Figure 9-1: BioMap2 Core Habitat



\\NHBEDATA\checkin\12400.05\GIS\Project\DSEIR\Chapter9_Biodiversity\Figure 9-1.mxd January 19, 2018

Source Info: MassGIS, VHB, ESRI

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Bioregions

Bioregions are relatively large land areas characterized by broad, landscape-scale descriptions of their natural features and the environmental processes that influence functions of the entire ecosystem.The U.S. Environmental Protection Agency (EPA) defines Bioregions as Ecoregions which are "*areas of general similarity in ecosystems and in the type, quality, and quantity of environmental resources; they are designed to serve as a spatial framework for the research, assessment, management, and monitoring of ecosystems and ecosystem components.*"[10]

Bioregions provide a useful means for simplifying and reporting on more complex patterns of biodiversity, because they include large-scale geophysical patterns in the landscape that are linked to the faunal and floral assemblages and processes at the ecosystem scale. Bioregions vary in size since they can be defined by different criteria, including physical or ecological criteria such as watersheds or associations of biological communities. For example:

EPA has identified a set of 13 "ecoregions" in Massachusetts based on geology, hydrology, climate, and the distribution of species. The Project Study Area is within the ecoregion called "Bristol Lowland/Narragansett Lowland" which is defined as a region that has flat, gently rolling plains, the forests are mostly central hardwoods, and there are numerous wetlands, cranberry bogs, and rivers that drain this area.

The Project Study Area is within the Taunton River watershed as defined by the Massachusetts Department of Fish and Game Riverways Program.

As defined by the U.S. North American Bird Conservation Initiative Committee, the entire Project Area is within the New England/Mid-Atlantic Coast Bird Conservation Region (BCR). BCRs are ecologically distinct regions in North America with similar bird communities, habitats, and resource management issues.

BioMap2

BioMap2 is a conservation planning tool developed by NHESP to identify areas of importance to protecting biodiversity in Massachusetts. Based on data on rare species and natural communities, wildlife species and habitats, and an assessment of large well-connected and intact ecosystems and lands, BioMap2 identifies Core Habitats – specific areas necessary to promote the long-term persistence of rare species, exemplary natural communities and intact ecosystems. Biomap2 also identifies Critical Natural Landscapes, which are intact landscapes that are better able to support ecological processes and disturbance regimes and a wide array of species and habitats over long time frames.[11]

10 U.S. Environmental Protection Agency (EPA),Ecoregions of Massachusetts, Connecticut, and Rhode Island. Website accessed January 2009. (http://www.epa.gov/wed/pages/ecoregions/mactri_eco.htm)
11 https://www.mass.gov/service-details/biomap2

As shown on Figure 9-1, BioMap2 shows two Core Habitats adjacent to the Middleborough Secondary. A Core Habitat and associated Critical Natural Landscape is associated with the Taunton River north of the ROW in Taunton. In Raynham and Lakeville, the ROW bisects a large Core Habitat and Critical Natural Landscape that includes Massasoit State Park. These areas include coastal plain ponds and atlantic white cedar swamps as well as forest.

CAPS IEI Mapping

The Conservation Assessment and Prioritization System (CAPS) is an ecosystem-based approach for assessing the ecological integrity of lands and waters and subsequently identifying and prioritizing land for habitat and biodiversity conservation. Ecological integrity is defined as the ability of an area to support biodiversity and the ecosystem processes necessary to sustain biodiversity over the long term. CAPS is a computer software program that results in an Index of Ecological Integrity (IEI) for each point in the landscape. IEI maps depict the top 50 percent of lands with the highest ecological integrity.[12]

As shown on Figure 9-2, the CAPS IEI mapping shows area of high IEI in Taunton, containing forested and several small aquatic habitats. Thatcher's Pond is also shown as a high IEI aquatic habitat.

MassDEP Important Habitat Maps

DEP developed maps of wildlife habitat of potential regional or statewide importance using the CAPS system. These maps are based on the IEI that score in the top 40 percent for IEI, as well as 40 percent of each ecological community.[13]

As shown on Figure 9-2, the areas mapped as CAPS IEI habitats are also mapped as IWH.

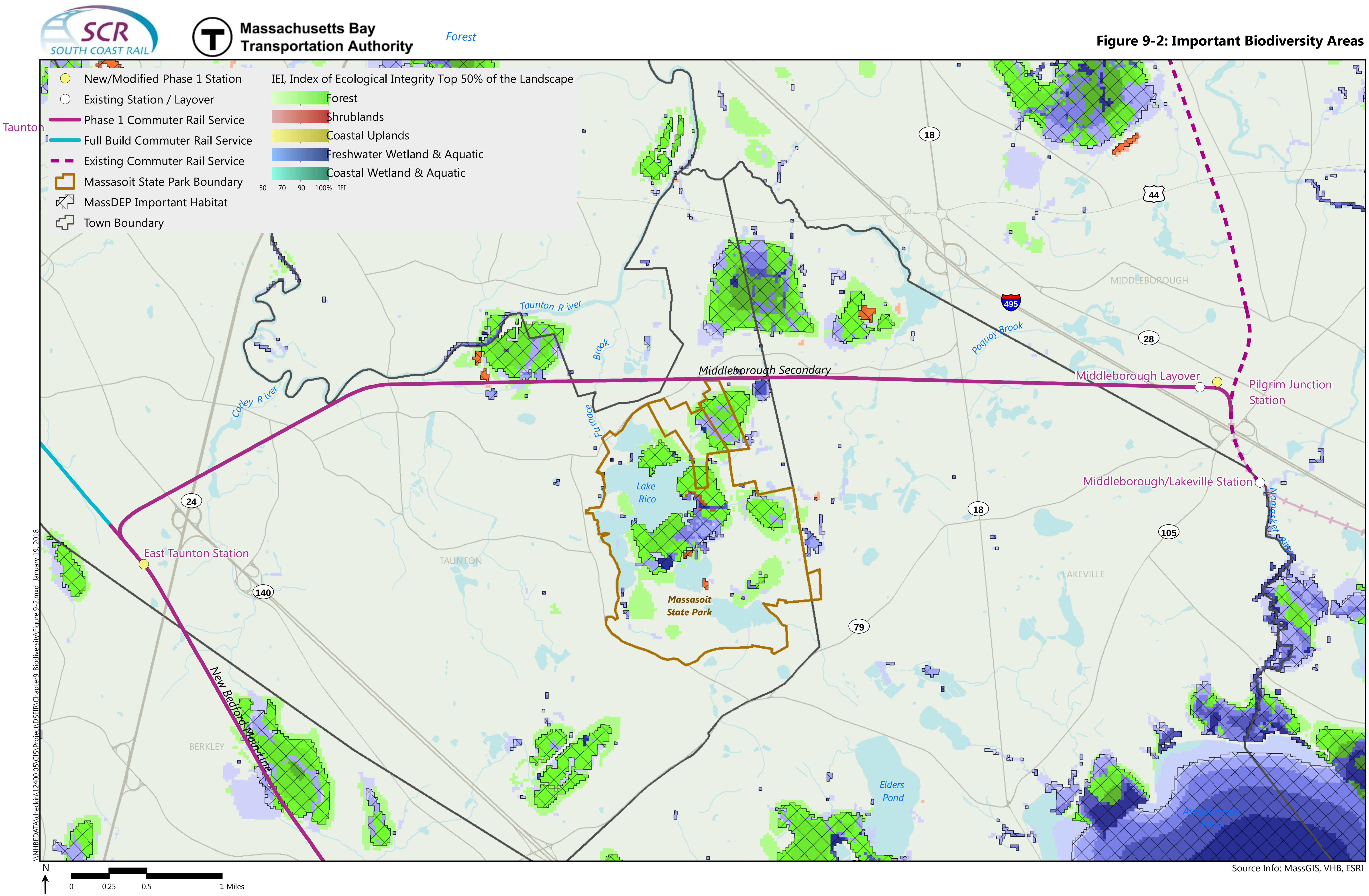
Other Areas of Biodiversity Importance

Massasoit State Park, a 1,200-acre parkland, is south of the Middleborough Secondary, south of Middleborough Avenue (Figure 9-2). The park contains six lakes and ponds and cranberry bogs. No specific information is available on the biological resources within the state park.

An Important Bird Area (IBA) is an area that provides important habitat to one or more species of breeding, wintering, and/or migrating birds.[14] These areas are designated as part of an international effort to protect bird habitat around the world. There are no mapped IBAs within the Phase 1 Study Area.

12 httops://www.umass.edu/landeco/research/caps/data/dep/dep.html
13 https://www.umass.edu/landeco/research/caps/data/iei/iei.html
14 Massachusetts Audubon Society, Massachusetts Important Bird Areas. Website accessed January 2009. (http://massaudubon.org/Birds_and_Birding/IBAs/index.php)

Figure 9-2: Important Biodiversity Areas



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Coastal plain pondshores are herbaceous communities dominated by a distinct coastal plain community on exposed pondshores in southeastern Massachusetts. Coastal plain ponds are shallow, highly acidic, low nutrient groundwater ponds in sandy glacial outwash, with no inlet or outlet. Annual fluctuations in water levels leave an exposed shoreline by late summer that supports common and rare herbaceous species. These annual fluctuations are key to maintaining the community. Substrates are usually sand. These pondshore communities include numerous state-listed rare plant species and also provide habitat for state rare animal species, including dragonflies and damselflies. One large coastal plain pond, Thatcher's Pond, is south of the Middleborough Secondary in Taunton.

Atlantic white cedar swamps are listed by NHESP as a Priority Natural Community. This community type includes Atlantic white cedar (*Chamaecyparis thyoides*) in association with red maple, fetterbush (*Leucothoe racemosa*), common winterberry, swamp azalea, cinnamon fern, and royal fern (*Osmunda regalis*). This community may occur in scattered locations near the Middleborough Secondary.

9.2.2 Vernal Pools

Vernal pools are generally small, seasonally-inundated wetland depressions that lack a permanent, population of predatory fish, provide breeding habitat for amphibians (wood frogs, ambystomid salamanders), and may also be utilized by reptiles and other wildlife. Numerous vernal pools, including NHESP certified and potential vernal pools, occur adjacent to the railroad embankment and other locations within the Study Area. These are small pools or seasonal ponding areas within bordering vegetated wetlands, or small isolated wetlands. Certified vernal pools (CVPs) are field verified and documented vernal pools that have been certified by the NHESP according to the *Guidelines for the Certification of Vernal Pool Habitat* (2009). Certified Vernal Pools receive protection under the Massachusetts Wetlands Protection Act (within other wetland resource areas) and the U.S. Clean Water Act under 404 and 401 permitting processes. They are included as points in the MassGIS data layer. Potential vernal pools (PVPs) are unverified, vernal pool habitats with a MassGIS data layer produced by the NHESP to help locate likely vernal pools across the state. Potential vernal pools do not receive protection under the Massachusetts Wetlands Protection Act Regulations (310 CMR 10.00), or under any other state or federal wetlands protection laws and are not classified as ORWs.

Methodology

A vernal pool survey was conducted in the spring of 2017 to identify and characterize the vernal pools along the Middleborough Secondary. The survey used the same methodology as vernal pool surveys conducted along the Stoughton route in 2014 and 2015, which were requested by the USACE and EPA to assist with the permitting process. The survey was undertaken in response to recommendations from USACE, EPA, and NHESP.

The main objectives of the 2017 survey were to:

- Determine whether mapped PVPs and other identified potential pools within 100 feet of the ROW are certifiable vernal pools in accordance with WPA or USACE criteria; and

- Delineate the limits of all certifiable vernal pools within 100 feet of the ROW.

MassDOT evaluated two categories of vernal pools:

- All mapped potential vernal pools (PVPs) as identified by the NHESP within 100 feet of the ROW of the Middleborough Secondary; and
- Several additional areas identified by VHB based on aerial photos or by observation in the field.

The 100-foot distance was selected for two reasons. Under the WPA regulations, if a vernal pool is within a regulated resource area, then all of that resource area within 100 feet is considered vernal pool habitat. Under the New England District of the USACE's vernal pool guidance, the area (including both wetlands and uplands) within 100 feet of a vernal pool is defined as the "Vernal Pool Envelope."

The protocol approved by USACE, EPA and DEP required MassDOT to evaluate PVPs up to 750 feet from the ROW in sections of inactive or abandoned rail. Since the Middleborough Secondary consists entirely of active rail, the study along this rail corridor was limited to pools up to 100 feet from the ROW, consistent with prior studies along the New Bedford Main Line and Fall River Secondary.

A Vernal Pool Survey was also conducted along the New Bedford Main Line in 2015, and evaluated Potential Vernal Pools at the East Taunton Station site.

Vernal Pools Within Study Area

A total of 18 pools and areas were evaluated in the field along the Middleborough Secondary. Of these, nine were determined to be certifiable vernal pools, and nine did not meet certification criteria, or were not pools. All the pools and areas visited were within 100 feet of the ROW. Table 9-1 lists the number of pools assessed in each municipality along the SCR Project corridor and how many were certifiable vernal pools. These nine certifiable pools include five mapped PVPs and four additional areas initially identified based on aerial imagery and field investigations. Two additional certifiable pools were delineated at the East Taunton Station site.

Figure 9-3 shows the certifiable vernal pools along the Middleborough Secondary. Figure 9-4 provides a more detailed mapping of these pools.

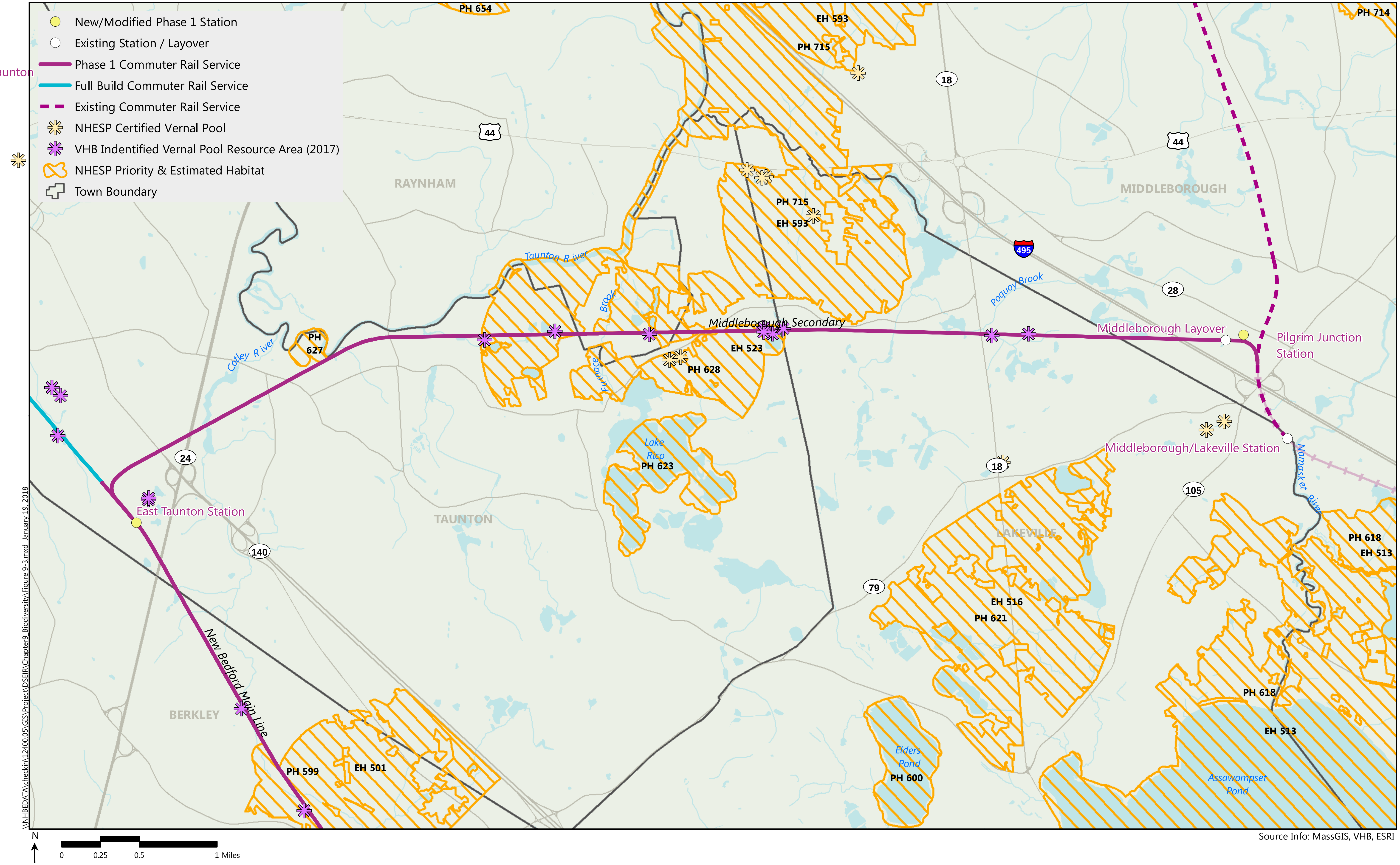
Table 9-1 Vernal Pool Summary – Middleborough Secondary

Municipality	Total Pools Surveyed	Delineated (Certifiable)
Taunton	13	5
Raynham	1	1
Lakeville	4	3
Middleborough	0	0
Totals	18	9

Source: VHB, 2017.

Massachusetts Bay Transportation Authority

Figure 9-3: NHESP Rare Species Habitat and Vernal Pool Habitat



Source Info: MassGIS, VHB, ESRI

\\NHBEDATA\checkin\12400.05\GIS\Project\DSEIR\Chapter9_Biodiversity\Figure 9-3.mxd January 19, 2018

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Taunton

In Taunton, a total of 13 pools or areas within 100 feet of the Middleborough Secondary ROW were surveyed. Five pools were found to be certifiable (Table 9-2) and eight pools were found to be not certifiable. Seven pools were mapped PVPs, and two of these were found to be certifiable (PVPs 25438 and 25490). Six areas were identified as potential vernal pools based on review of aerial photography, and two of these were found to be certifiable (VHB VPs 3 and 6). One area was identified as a potential vernal pool based on observation in the field and was determined to be certifiable (VHB VP 7). In Raynham, one mapped PVP within 100 feet of the right of-way (PVP 20481) was surveyed and found to be certifiable (Table 9-2). In Lakeville, a total of four pools or areas within 100 feet of the ROW were surveyed. Three pools were found to be certifiable (Table 9-2) and one pool it was found to be not certifiable. Three pools were mapped PVPs, and two of these were found to be certifiable (PVPs 11901 and 11944). One area was identified as a potential vernal pool based on observation in the field and was determined to be certifiable (VHB VP 8).

Table 9-2 Pools/Areas Determined to be Certifiable

Pool Number	Rationale	Comments
VHB VP3	~75 wood frog egg masses	Spring peepers also calling
PVP 25438	~100 wood frog egg masses	Sporadic wood frog calls
PVP 25490	~30 wood frog egg masses; ~30 spotted salamander egg masses	Upland depression across tracks from VHB VP 7
VHB VP 7	~10 wood frog egg masses	Small upland depression across tracks from PVP 25490
VHB VP 6	~50 wood frog egg masses; 2 spotted salamander egg masses	Coastal plain pond; evidence of ATV use
PVP 20481	~35 spotted salamander egg masses	Adjacent to several residences
PVP 11901	~35 wood frog egg masses; 4 spotted salamander egg masses	Small upland depression
PVP 11944	16 spotted salamander egg masses	Spring peeper noted calling; 6”-12” deep organic substrate
VHB VP 8	1 wood frog egg mass; 9 spotted salamander egg masses	Pool within larger wetland system
PVP 25399	7 wood frog egg masses	Wood frog tadpoles
PVP 25398	10 wood frog egg masses 27 spotted salamander egg masses	

Source: VHB, 2017.

9.2.3 Fisheries

The Massachusetts Division of Fisheries and Wildlife has developed a list of Coldwater Fish Resources (CFR), which are waterbodies where reproducing coldwater fish meet one or more of their life history requirements. CFRs are particularly sensitive habitats, and changes in land use or water use can reduce the ability of these waters to support trout and other species of coldwater fish (such as rainbow smelt, slimy sculpin, and American brook lamprey). The list of CFRs is intended to provide conservation commissions, planning commissions and conservation organizations with information useful in conservation planning.

The 2017 CFR list[15] and CFR Map[16] show that there are two CFR waterways within the Phase 1 study area. Poquoy Brook is north of the railroad ROW in Middleborough, and Box Brook, a tributary to Poquoy Brook, is immediately south of the railroad. Box Brook crosses under the railroad in two locations east of Route 18 (Figure 9-3).

MassDOT has consulted with the Division of Marine Fisheries (DMF) concerning fisheries resources along the Middleborough Secondary. The adjacent Taunton River supports several diadromous fish species (alewife, American eel, shad, blueback herring) and white perch, and the Cotley River supports American eel.

9.2.4 Rare Species

State-listed (rare) species are protected under MESA of 1990,[17] and are classified as Endangered, Threatened, or Species of Special Concern. An "Endangered" species is one that is in danger of extinction throughout all or a significant portion of its range within Massachusetts. A "Threatened" species is one that is likely to become endangered in Massachusetts in the foreseeable future. Species of Special Concern are those species that biological research has documented to have suffered a decline that could threaten the species if the decline continues unchecked, or those species that occur in such small numbers or with such a restricted distribution that they could easily become threatened within the Commonwealth. The Massachusetts DFW NHESP is the agency responsible for ensuring compliance with MESA. The Federal Endangered Species Act of 1973[18] protects species that are listed as Endangered or Threatened on a national basis.

Information provided by NHESP and a review of the 2017 Edition of the Massachusetts NHESP Natural Heritage Atlas were used to identify areas where the Phase 1 Study Area crosses Priority Habitats of Rare Wildlife and Estimated Habitats of Rare Species. Priority Habitat is based on the known geographical extent of habitat for all state-listed rare species, both plants and animals, and pertains to MESA. Maps are used for determining whether or not a Proposed Project must be reviewed by the

15 http://www.mass.gov/eea/agencies/dfg/dfw/wildlife-habitat-conservation/coldwater-fish-resources-list, accessed August 1 2017

16 http://www.mass.gov/eea/agencies/dfg/dfw/wildlife-habitat-conservation/coldwater-fish-reources-map, accessed August 1, 2017

17 Massachusetts Endangered Species Act of 1990 (321 CMR 10.00: M.G.L. c. 131A.), Natural Heritage Endangered Species Program.

18 Endangered Species Act of 1973, (16 U.S.C. 1531 et seq., as amended) United States Fish and Wildlife Service.

NHESP for MESA compliance.[19] Estimated Habitats are a sub-set of the Priority Habitats that are based on the geographical extent of habitat of state-listed rare wetlands wildlife. Each mapped Priority and Estimated Habitat is assigned a unique identification number that the NHESP uses to track information related to each Priority Habitat and Estimated Habitat polygon. The NHESP mapping is based on detailed recent occurrence records for each state- and federally-listed species. Since the Project is also subject to regulation under the federal Clean Water Act Section 404, the potential occurrences of federally-listed species were identified based on the U.S. Fish and Wildlife Service's Information for Planning and Consultation Website (IPAC) which identifies species occurrences at the county level. IPAC is used as an initial tool for federal agencies to assess compliance with the federal Endangered Species Act.

Table 9-3 lists the state-listed species that may be found within and/or adjacent to the Phase 1 elements. This list is based on information provided by the NHESP and USFWS. Figures 9-3 and 9-4 show the mapped polygons of Estimated and Priority Habitat.

Table 9-3 Potential State-Listed Species Documented Within Priority Habitat and Estimated Habitat Polygons Within the Phase 1 Study Area

Species	Status[1]
Mammals	
Northern Long-eared Bat (*Myotis septentrionalis*)	Fed T
Reptiles	
Northern Red-Bellied Cooter (*Pseudemys rubriventris pop1)*	E/Fed E
Eastern Box Turtle (*Terrapene carolina carolina*)	SC
Damselfly	
Pine Barrens Bluet (*Enallagma recurvatum*)	T
Plants	
Three-Angled Spike-Sedge (*Eleocharis tricostata)*	E
Plymouth Gentian (*Sabatia kennedyana*)	SC
Long's Bulrush (*Scirpus longii*)	T

Notes:
E = State Endangered, T =State Threatened, SC = State Special Concern. Fed E = Federal Endangered

Myotis septentrionalis Northern Long-Eared Bat (Federal Threatened)

The USFWS website, IPAC, identified the northern long-eared bat as a potential inhabitant of Bristol and Plymouth Counties. However, the more precise NHESP database does not include this species in the polygons adjacent to the ROW.

19 Natural Heritage and Endangered Species Program Information: Priority Habitat and Estimated Habitat for Rare Species (http://www.mass.gov/dfwele/dfw/nhesp/regulatory_review/priority_habitat/priority_habitat_home.htm).

The northern long-eared bat is a medium-sized bat with a body length of 3 to 3.7 inches and a wingspan of 9 to 10 inches. Their fur color can be medium to dark brown on the back and tawny to pale-brown on the underside. This bat is distinguished by its long ears, particularly as compared to other bats in its genus, *Myotis*. Northern long-eared bats spend winter hibernating in caves and mines, called hibernacula. They use areas in various sized caves or mines with constant temperatures, high humidity, and no air currents. Within hibernacula, surveyors find them hibernating most often in small crevices or cracks, often with only the nose and ears visible. During the summer, northern long-eared bats roost singly or in colonies underneath bark, in cavities or in crevices of both live trees and snags (dead trees). Males and non-reproductive females may also roost in cooler places, such as caves and mines. Northern long-eared bats seem to be flexible in selecting roosts, choosing roost trees based on suitability to retain bark or provide cavities or crevices. This bat has also been found rarely roosting in structures, such as barns and sheds.[20]

Terrapene carolina Eastern Box Turtle (State Special Concern)

The NHESP database indicates that this species is present within the large polygon that includes the Massasoit State Park and Thatchers Pond (PH1421/EH36), The eastern box turtle's range is from southeastern Maine to northern Florida to Michigan, Illinois, and Tennessee. Eastern box turtles occur throughout Massachusetts but are more heavily concentrated in the southeastern section of the state. In Massachusetts, the eastern box turtle inhabits many types of terrestrial habitats: both dry and moist woodlands, brushy fields, thickets, marsh edges, bogs, swales, fens, stream banks, and well-drained bottomland. Mating is opportunistic and may take place anytime between April and October. Females nest in June or early July and can travel great distances to find appropriate nesting habitat.

Pseudemys rubriventrus Northern Red-bellied Cooter (State Endangered, Federal Endangered)

The NHESP database indicates that this species is present within the large polygon that includes the Massasoit State Park and Thatchers Pond (PH1421/EH36). However, NHESP has informed MassDOT that this species does not occur in wetlands or waterbodies adjacent to the Middleborough Secondary. The Northern red-bellied cooter is an isolated disjunct population in Massachusetts and is currently confined to ponds within Plymouth County.

Eleocharis tricostata Three-Angled Spike-Sedge (State Endangered)

The NHESP database indicates that this species is present within the large polygon that includes the Massasoit State Park and Thatchers Pond (PH1421) (Figure 9-3). The three-angled spike-sedge is a perennial sedge associated with coastal plain pond shore communities. These ponds typically form in kettle hole depressions on glacial outwash plains and are fed by groundwater. Water levels in the ponds rises and falls seasonally with the water table. During dry years, the gradual, sloping shores recede, providing a broad expanse of open sandy beach for the three-angled spike-sedge and other coastal plain pond shore species to flower. Field investigations found that this species is present in in one wetland south of the Middleborough Secondary.

20 https://www.fws.gov/Midwest/endangered/mammals/nleb/nlebfactsheet

Scirpus longii Long's Bulrush (State Threatened)

The NHESP database indicates that this sedge is present within an area that includes a portion of the Taunton River (PH1196). The limited range of Long's bulrush includes Maine, New Hampshire, Massachusetts, Rhode Island, and New Jersey. It is rare in each state where it is known to occur, and is presumed to be extirpated from Connecticut and New York. In Massachusetts, it is currently known to exist from Bristol, Essex, Middlesex, Plymouth, and Worcester Counties, and was historically known from Suffolk County. Long's bulrush inhabits wet or damp, sandy or peaty soils of coastal plain pond shores and fens where seasonally variable water levels, and subsequent flooding, create unsuitable conditions for shrubs. Field investigations found that this species is not present in areas adjacent to the Middleborough Secondary, south of the Taunton River.

Sabatia kennedyana Plymouth Gentian (State Special Concern)

The NHESP database indicates that this plant is present within the large polygon that includes the Massasoit State Park and Thatchers Pond (PH1421). The Plymouth gentian is found on Cape Cod and in Plymouth, with smaller populations in Rhode Island. The Plymouth gentian is a perennial herb associated with coastal plain pond shore communities. These ponds typically form in kettle hole depressions on glacial outwash plains and are fed by groundwater. Water levels in the ponds rises and falls seasonally with the water table. During dry years, the gradual, sloping shores recede, providing a broad expanse of open sandy beach for the Plymouth gentian and other coastal plain pond shore species to flower. Field investigations found that this species is present within one wetland south of the Middleborough Secondary.

Engallama recurvatum Pine Barrens Bluet (State Threatened)

The NHESP database indicates that this damselfly is present within the large polygon that includes the Massasoit State Park and Thatchers Pond (PH1421/EH36). The pine barrens bluet has a very small range restricted to scattered locations in the northeastern United States. It has been found only in Maine, Massachusetts, Rhode Island, New York, and New Jersey. The species is known mainly from southeastern portions of Massachusetts, primarily Barnstable and Plymouth Counties. It has occasionally been found in large numbers at some locations, though its overall range is more limited.

Pine barrens bluets are regional endemics and appear to be restricted to coastal plain ponds. Their range coincides closely with the distribution of those ponds. Some of the common attributes shared by ponds inhabited by the pine barrens bluet include: sandy shallow shores, large amounts of vegetation close to the shore, especially military rush (*Juncus militarus*), and yearly natural fluctuations in water levels. The nymphs are aquatic and live among aquatic vegetation and debris. The adults inhabit nearby uplands and emergent vegetation along the shore.

9.2.5 Phase 1 Station Locations

The proposed new or relocated station sites included in Phase 1 were assessed to determine if these include any areas of high biodiversity value.

Pilgrim Junction

The proposed Pilgrim Junction Station is located within Pilgrim Junction in Middleborough. The site is bounded on all three sides by active rail lines, and on the west by the Massachusetts Bay Transportation Authority's (MBTA) Middleborough layover yard. The site is disturbed, with areas of open sandy soil, low second-growth shrub and tree growth, and has two railroad structures. The site is not located within Estimated Habitat or Priority Habitat of state species, is not within a Biomap area, and is not within a mapped important habitat. There are no wetlands or vernal pools on the site, and there are no fisheries streams on the site.

East Taunton

The proposed East Taunton Station site is a former mini-golf course and driving range. The majority of the proposed station area is paved or grassed. The structures of the driving range and mini-golf course remain in place, and much of the area is enclosed in a chain-link fence. Vegetation within this disturbed area consists of the invasive autumn olive (*Elaeagnus umbellata*), and the grassed areas are dominated by little bluestem (*Schizachyrium scoparium*). There is a narrow upland between the disturbed area and the New Bedford Main Line that is forested, with a mixed canopy of oaks, red maple, and white pine. Areas north and south of the proposed station location are forested wetland dominated by red maple and sweet pepperbush. The site is not within Estimated Habitat or Priority Habitat of state species, is not within a Biomap area, and is not within a mapped important habitat. There are no vernal pools on the site and no fisheries streams on the site.

Freetown

The relocated Freetown Station is on the same parcel as the station evaluated in the FEIS/FEIR. The site is an open grassed area dominated by introduced pasture grasses, and was used as a gravel pit and dumped fill material in the recent past. The site is not within Estimated Habitat or Priority Habitat of state-listed species, is not within a Biomap area, and is not within a mapped important habitat. There are no vernal pools on the site and no fisheries streams on the site.

Fall River Depot

The Fall River Depot Station is within a developed urban area and does not contain wildlife habitat. It is not within a mapped polygon for state-listed species.

9.3 Impact Analysis

This section describes and evaluates impacts that the new Phase 1 elements may have on threatened and endangered species within the Project Study Area. Both direct and indirect effects are considered and discussed for each of the Project elements. Measures incorporated in the alternatives' designs to minimize, mitigate and compensate for impacts are described for each of the Project elements. Regulatory jurisdiction and compliance with state, and federal regulations are also discussed.

9.3.1 Methodology

The proposed Phase 1 Project and associated stations may have direct and indirect effects on biodiversity, rare species and their habitats. This section discusses direct and indirect effects in general, and describes the methodology used to calculate and evaluate impacts to rare species within the Project Study Area.

Direct Impacts

Direct impacts include impacts from construction, grading, vegetation management, and mortality associated with potential collisions with rail traffic. These activities may result in degradation of ecological function, loss of habitat, as well as loss of rare plant and animal species individuals. Permanent effects may include losses or changes in habitat and rare plant and wildlife species through clearing, grading, construction, and the potential introduction of undesirable, invasive species.

Potential habitat loss is a direct effect of transportation projects. Habitat loss occurs if an area that previously provided food, cover, water, and/or breeding resources to a rare species is cleared, paved, filled or altered in such a way that it no longer provides one or more of these resources.

Direct impacts were calculated through the use of a Geographic Information Systems (GIS) model. This model quantified impacts by intersecting proposed work areas with NHESP Priority and Estimated Habitat polygons for rare species. The model quantified all loss of habitat along the Project corridors and at the proposed station sites based on the limit of permanent alteration. Areas within permanent alteration limits that are already disturbed, such as ballasted railbed and roads, were not counted as habitat loss.

Direct effects to vernal pools, a specific category of wildlife habitat that receives special attention under wetland protection regulations, were quantified as the loss of wetland containing a vernal pool. Since amphibians that breed in vernal pools use upland forested areas as non-breeding habitat, the loss of upland forest within 750 feet of a vernal pool was also quantified as the loss of upland habitat for these organisms. To provide a context for evaluating the numerical loss of upland habitat, the area lost was calculated as a percentage of the total upland area within 750 feet of the affected vernal pools. Calculated as a circle with a 100-foot radius, the area of upland within 100 feet of a vernal pool is 0.72 acres, and the area within 750 feet of a vernal pool (conservatively assuming the vernal pool to be a point) is 40.57 acres.

Indirect Impacts

The Council on Environmental Quality (CEQ) defines indirect effects (or impacts) as effects which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems. These impacts are generally not quantifiable, and may occur over a larger area or over a longer time. Indirect effects change the quality or functions of a resource, are measured qualitatively and, therefore, are more difficult to accurately assess than direct effects. Indirect effects include habitat fragmentation and associated edge effects; the introduction of invasive species; the loss of genetic diversity of rare plant and animal populations, increased competition for resources, and physical or psychological restrictions on movements caused by some feature within a corridor that wildlife are unwilling or unable to cross. Indirect effects can be caused by the increased noise and visual disturbance from land-clearing, earth-moving, and construction machinery during construction. Following construction, noise associated with the active rail line may cause indirect effects if wildlife avoid habitat near the embankment. The primary indirect impacts considered in this assessment are discussed below.

Fragmentation

Fragmentation is defined as the subdivision of once large and continuous tracts of habitat into smaller patches. It results from agriculture, urbanization, and transportation or other rights-of-way.[21] Fragmentation clearly has consequences on wildlife communities, especially on rare species. Habitat fragmentation is associated with edge effects when there is a disturbed or developed area created adjacent to a natural and/or forested area. Edge effects may include the spread of invasive species, increase in the canopy gap, and a decrease in species dependent on core and/or undisturbed habitat. In general, fragmentation of habitat is viewed as detrimental when considering original native, climax species composition and abundance, natural history, and relative ecological stability of unmanaged plant and animal populations.

A railroad corridor may act as a barrier that interferes with the movement of some mammals, amphibians, birds and reptiles from one habitat to another. The width of a railroad corridor can influence the frequency of wildlife crossings, as well as the mortality associated with potential collisions with rail traffic. The rail itself can create a barrier to smaller species such as amphibians, reptiles, and smaller mammals. Traffic density and traffic speed may also influence wildlife avoidance of transportation corridors.

Invasive Species

A potential indirect effect is the introduction of non-native invasive plant species along the linear corridors of disturbed land. Construction along any active or inactive rail corridor, or constructing a new rail line, may increase the width of the canopy gap over the railbed and would likely require removing existing vegetation on the elevated railbed. This linear gap, extending through natural communities, which include Atlantic white cedar swamp and red maple swamp, may allow invasive exotic plant species to colonize the railbed or areas adjacent to the railbed. This section examines the invasive species that may potentially be introduced, assesses the likelihood and magnitude of the impacts, and proposes monitoring and mitigation measures.

21 Rosenfield,R.N., C.M. Morasky,. J. Bielefeldt, and W.L. Loope. 1992. Forest fragmentation and island biogeography: a summary and bibliography. U.S. Department of the Interior Technical Report NPS/NRUW/NRTR 92/08.

Invasive species may be defined as "alien species whose introduction does or is likely to cause economic or environmental harm" (Federal Executive Order on Invasive Species)[22]. The Massachusetts Invasive Plant Advisory Group defines invasive plants as "non-native species that have spread into native or minimally managed plant systems in Massachusetts. These plants cause economic or environmental harm by developing self-sustaining populations and becoming dominant and/or disruptive to those systems.[23] When established in disturbed sites or old fields, these species suppress the natural pattern of plant community succession.

There is a wide range of invasive species known to occur in Massachusetts, occurring in many habitats from ponds and lakes to sand dunes. The primary potential invasive species that could affect wetland edges include:

- *Phragmites australis*, common reed;
- *Lythrum salicaria*, purple loosestrife;
- *Berberis thunbergii*, Japanese barberry;
- *Rhamnus frangula*, glossy buckthorn;
- *Phalaris arundinacea,* reed canary grass; and
- *Typha angustifolia; T. x glauca*, narrow-leaf and hybrid cattail.

Other upland species are potential colonizers of the railbed or the forest edges along the railbed, and include:

- *Polygonum cuspidatum*, Japanese knotweed;
- *Elaeagnus umbellata*, Autumn olive;
- *Celastrus orbiculatus*, oriental bittersweet; and
- *Rosa multiflora*, multiflora rose.

Noise

The study of noise and its effects on wildlife, or acoustic ecology, began in the 1970s, and several papers have been published documenting the effects of noise on wildlife populations. However, most of the research to date has been on noise generated from aircraft and sonic booms, with few studies on vehicle and rail traffic. Studies have also focused more on laboratory animals than wildlife because of the logistical difficulties and costs associated with evaluating noise effects outside of a controlled setting.

22 Executive Order 13112, 6183 Federal Register 64 (February 8, 1999).

23 Massachusetts Invasive Plant Advisory Group. 2005. The Evaluation of Non-Native Plant Species for Invasiveness in Massachusetts.

There is currently no accepted method of measuring the effects of noise on wildlife. Most of the research to date indicates that the sound exposure level (SEL) provides the most useful predictor in noise effects. Because wildlife differ in their sensitivities to noise from humans, and amongst other species, (for example, bats are sensitive to a greater sound frequency than humans, while bullfrogs have a much lower detection range), an A-weighted scale was devised. The A-weighted scale interprets the sound based on the loudness perceived by the listener.

Noise can induce physiological and behavioral responses in animals. Effects are most often noted when the noise source is brief in duration and in excess of 100 decibels (dB).[24,25] Physiological stress can include higher adrenal weights and ascorbic acid levels, and increased cortisol levels, which play a role in the stress reaction. Prolonged exposure to loud, abrupt noise (such as sonic booms) may decrease the life expectancy, induce weight loss, and lower reproductive success of animals that cannot move away from the noise source. Prolonged exposure to very high noise levels may also result in loss of hearing for animals that are unable to relocate from the noise source.

Behavioral responses of wildlife to noise are somewhat easier to document in the field. Noise may result in masking, which is the inability of animals to communicate effectively. This may have effects on reduced breeding success for courting birds that are unable to advertise territories or secure mates, lowered prey captures for species that depend on auditory cues to locate food, increased mortality for species that rely on hearing predators approach in order to escape, or increased mortality associated with winter-stressed animals attempting to escape a perceived threat.

Some wildlife species appear to be able to habituate to noise. For example, upland sandpipers (*Bartramia longicauda*), a state-listed species, are most frequently found nesting in airfields and adjacent open spaces in the northeast. Research has shown that some species, such as terns, caribou, and grizzly (none of which have been documented to occur within the study area), do not habituate but continue to experience each noise event as a stressor.

9.3.2 Impacts

In addition to the Southern Triangle infrastructure already reviewed in the FEIS/FEIR, the Phase 1 Project will use the existing active Middleborough Secondary freight rail line with ballasted right-of-way, tracks, and ties. Existing culverts carry streams beneath the railroad embankment. These culverts maintain wetland hydrology and provide crossing points for migratory wildlife to access wetland areas on either side of the embankment. Vegetation along the edges of the railroad embankments may provide foraging habitat for turtles and small mammals. The right-of-way itself

24 USEPA Office of Noise Abatement and Control. 1973. Public health and welfare criteria for noise. Government Publication 550/9-73-002. Washington, D.C.

25 Bradley, F., C. Book, and A.E. Bowles. 1990. Effects of low-altitude aircraft overflights on domestic turkey poults. Report No. HSD-TR-90-034. US Air Force Systems Command, Noise and Sonic Boom Impact Technology Program.

does not provide suitable habitat for any of the rare species and the tracks and ties prevent turtles and amphibians from moving across the right-of-way except through the culverts.

The proposed upgrade of the railbed, track and signals, and use of the Middleborough Secondary for rail service, is not anticipated to result in any new adverse impacts on vegetation or wildlife. All work will occur within the existing freight right-of-way. Reconstructing these tracks presents opportunities to improve wildlife habitat, particularly by reconstructing existing culverts to improve wildlife or fish passage and reduce fragmentation. Indirect impacts of noise will be reduced as a result of replacing the existing rail with continuous welded rail. The MBTA will adhere to the approved Vegetation Management Plan, as implemented with its Yearly Operating Plans, which restrict the use of herbicides in areas adjacent to wetlands or sensitive resources.

The Middleborough Secondary is an active rail road and the majority of the improvements will occur within the footprint of the existing track. Minor temporary and permanent impacts may occur within narrow strips immediately adjacent to the ballasted track as necessary for track reconstruction and minor re-alignment of track segments in certain areas. The only significant change will be an increase in train speed and frequency.

Station construction will include clearing vegetation, grading, and paving. In both cases, impacts to biodiversity will occur along the edges of natural habitats and will largely be limited to the loss of narrow strips of habitat along existing edges and will not result in fragmentation.

Biodiversity

Direct Impacts

The Proposed Project will have negligible effects on biodiversity. All construction will occur within the existing ROWs except at the Pilgrim Junction, East Taunton, and Freetown Stations. As noted above, narrow strips of vegetation will be removed along the existing ballasted areas to improve the track infrastructure. The loss of vegetation will primarily be secondary growth saplings and shrub vegetation that has become established on the railroad embankment, which will have a negligible effect on wildlife populations. The Project will not directly impact any BioMap areas or CAPS IWH areas.

The loss of vegetation at the Pilgrim Junction Station (1.3 acres) will not have an adverse effect on biodiversity. This area is isolated on all sides by active track, and is disturbed. The loss of vegetation at the East Taunton Station includes 2.5 acres of cultural grassland and invasive shrubs, and 1.2 acres of deciduous forest. The site is not within a BioMap or IWH area. The loss of vegetation at the Freetown Station is restricted to 2.1 acres of cultural grassland, which is not important wildlife habitat.

Indirect Impacts

The Phase 1 Project will not result in indirect effects to wildlife. No new habitat fragmentation will occur, as the Middleborough Secondary is currently active freight rail. The Project will not create a new gap in canopy closure or introduce a barrier to wildlife movement.

Land disturbance has the potential to create habitat for invasive species. Although minor, the clearing and disturbance along the Middleborough Secondary may allow invasive upland species to become established.

The addition of commuter rail trains to the Middleborough Secondary will not result in noise impacts to wildlife. Wildlife habitat areas adjacent to the track already experience noise from train pass-bys and noise associated with crossings (whistles and bells). As documented in Chapter 10, Noise and Vibration, the existing noise levels along the Middleborough Secondary range from 52 to 62 dBA (Leq). Future noise from trains is calculated to increase noise levels to 60 to 65 dBA (Leq) during peak periods. The loudest noise that the commuter rail will emit is the whistle as it approaches at-grade crossings (105 dB), the same as the existing freight trains. Under normal operating conditions, the train will produce a noise disturbance of between 80 and 88 dB that is infrequent, short in duration, and is below potential impact thresholds.

Vernal Pools

Direct Impacts

Phase 1 construction on the Middleborough Secondary or station sites will not place fill within a vernal pool or vernal pool habitat (a wetland resource area containing the vernal pool). The Project will require construction within 100 feet of two vernal pools, with a minor loss of natural vegetation along the track edges. The Project will require vegetation clearing along the track within the 750-foot Corps of Engineers-defined Surrounding Upland Habitat of 9 vernal pools, with the loss of a negligible amount of vegetation within these supporting upland areas. The total loss of vegetation within 750 feet of these vernal pools totals 4,094 sf (Table 9-4). Figure 9-4 shows the locations of these vernal pools.

Indirect Impacts

Improvements to the track infrastructure along the Middleborough Secondary will require construction within 100 feet of nine vernal pools. This work may require clearing trees and removing vegetation on the railroad embankment and right-of-way in proximity to a vernal pool. This work is not anticipated to substantially change habitat quality (microclimate) as clearing will be limited to small areas in the upland and will preserve vegetation between the work area and the limit of the vernal pool. The construction will not affect the ability of amphibians to move between vernal pools, as it will not change the existing ballast and track or add new barriers to movement.

Table 9-4 Impacts to Vernal Pools

	Direct Impacts		
Vernal Pool	Fill to VPH[1]	Loss of Buffer Habitat[2]	Loss of Upland Habitat[3]
PVP 11901	0	90 sf	860 sf
PVP 20481	0		-
PVP 25438	0		-
VP-3	0	400 sf	830 sf
VP-6	0	0	-
VP-7	0	0	-
PVP-25490	0	0	-
VP-7, PVP 25490	0	0	690 sf
VP-6, PVP 25490, PVP 11901	0	0	1144 sf
VP-8	0	0	450 sf
PVP 1194	0	0	120 sf
PVP 25399	0		
PVP 25398	0		
Totals	0	490 sf	4,094 sf

1 Fill to VPH (Vernal Pool Habitat) was calculated as the loss of wetland where a vernal pool occurs.
2 Loss of forested upland within 100 feet of vernal pool wetland.
3 Upland Habitat loss was calculated as the loss of forested upland habitat within 750 feet of a vernal pool, excluding the area within 100 feet of the wetland.

Fisheries

Phase 1 will require that eleven culverts along the Middleborough Secondary be replaced in order to maintain structural integrity (Table 9-5, Figure 9-4). These culverts will be replaced as part of the State of Good Repair project, with pre-cast concrete box culverts, embedded below the existing channel bottom in order to provide a natural substrate. Wherever feasible, the openness ratio of the culvert will be increased by increasing the cross-sectional dimensions or decreasing the culvert length.

Table 9-5 Culverts to be Replaced

Culvert	Stream Type
TA-4	Intermittent
TA-5	Intermittent
TA-7	Intermittent
TA-11	Intermittent
TA-13	Intermittent
RA-1	Intermittent
RA-2	Intermittent
LK-8	Intermittent
LK-10	Intermittent
LK-11	Box Brook - Intermittent
LK-12	Intermittent

Source: VHB, 2017.

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Figure 9-4: Middleborough Secondary - Biodiversity and Rare Species Impacts
Page Key Sheet

Massachusetts Bay Transportation Authority

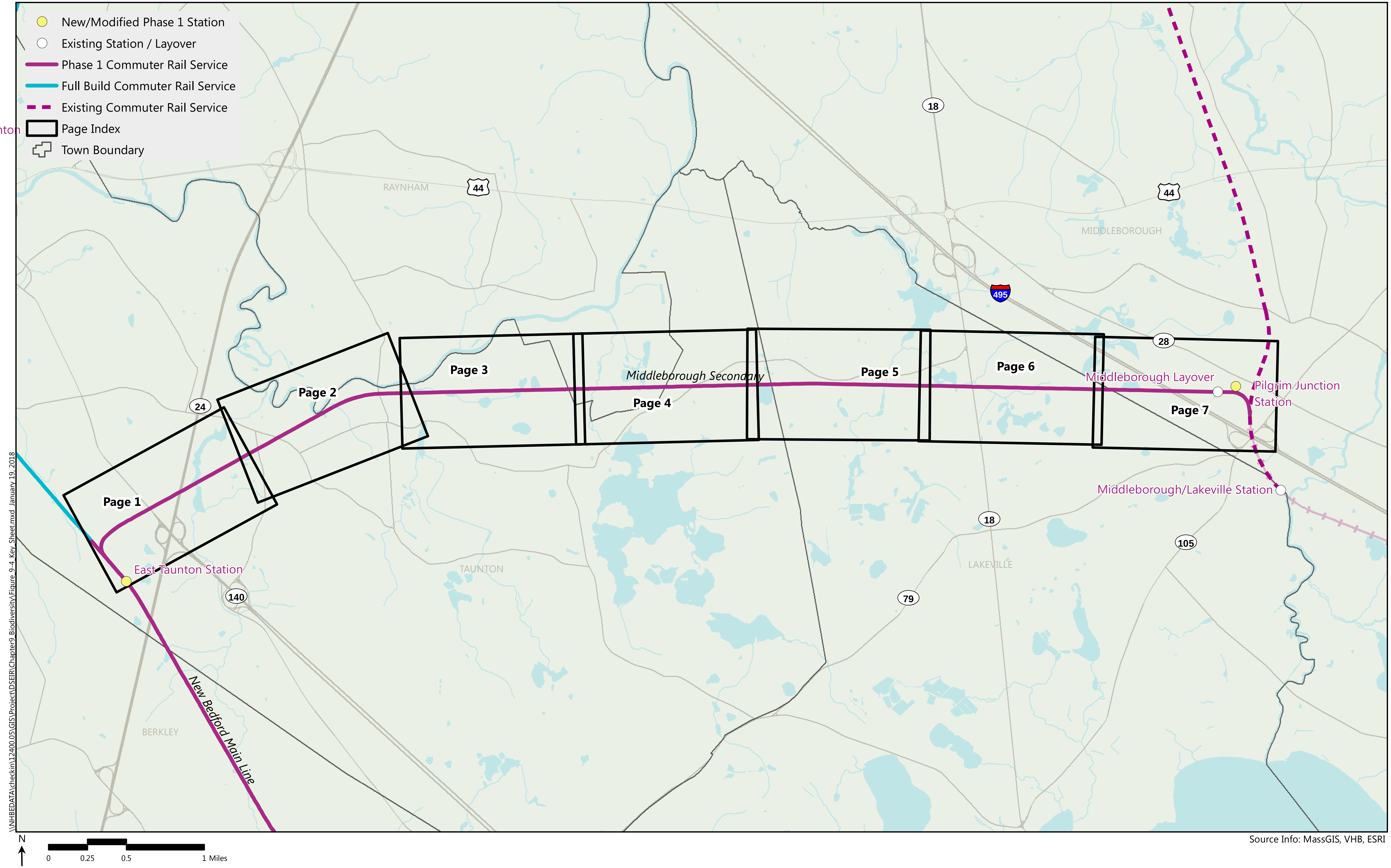

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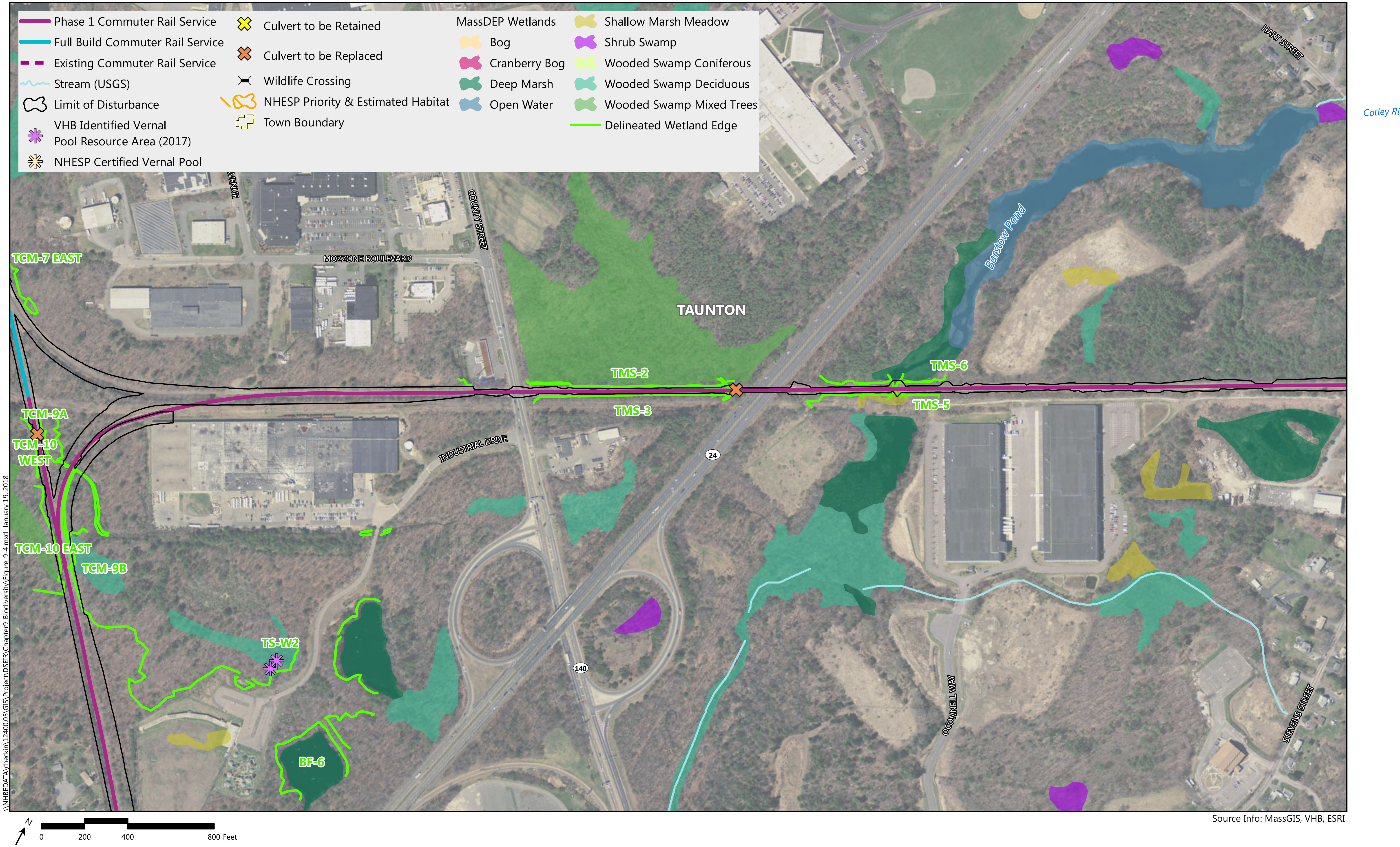
Figure 9-4: Middleborough Secondary - Biodiversity and Rare Species Impacts



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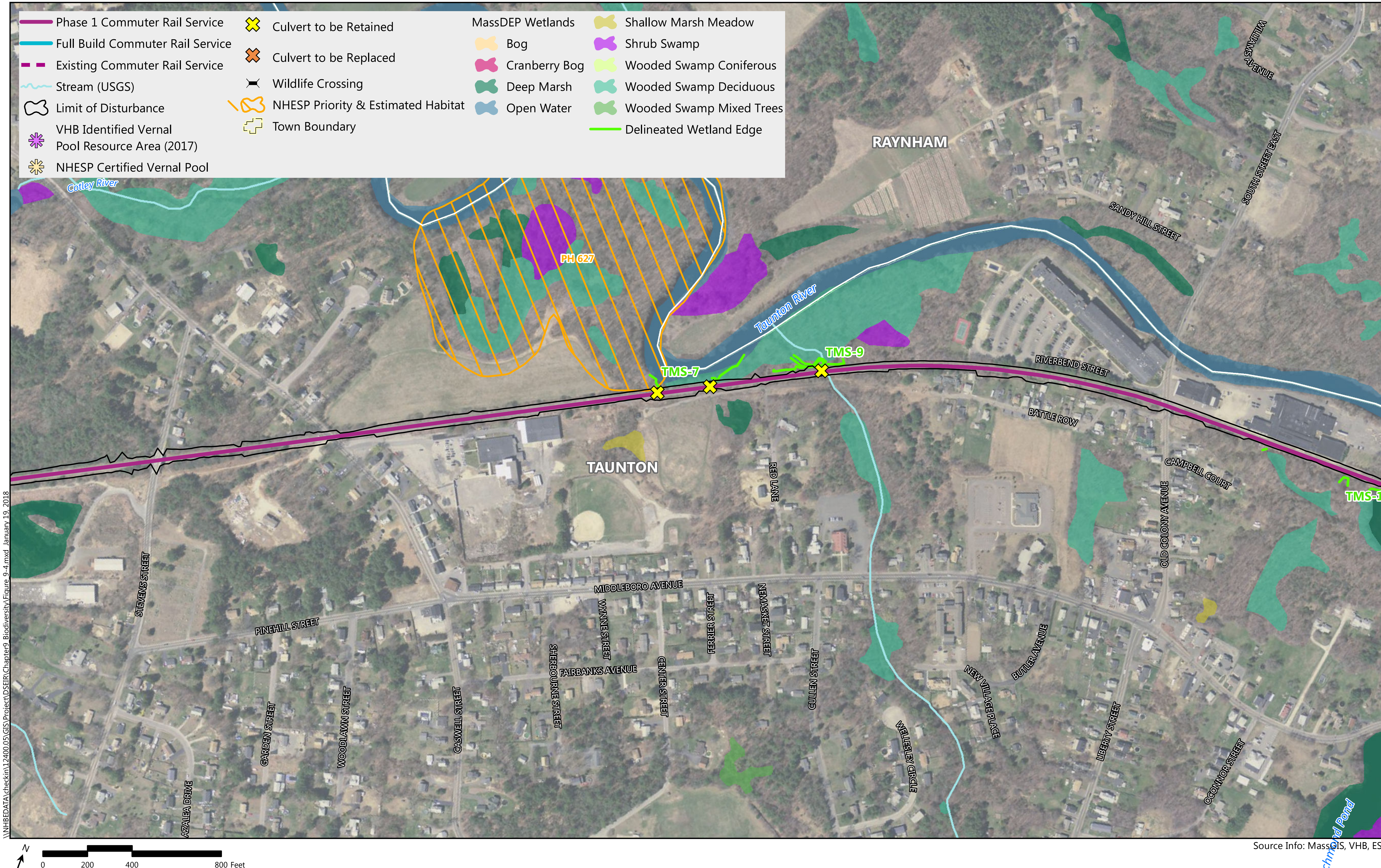
Massachusetts Bay Transportation Authority

Figure 9-4: Middleborough Secondary - Biodiversity and Rare Species Impacts



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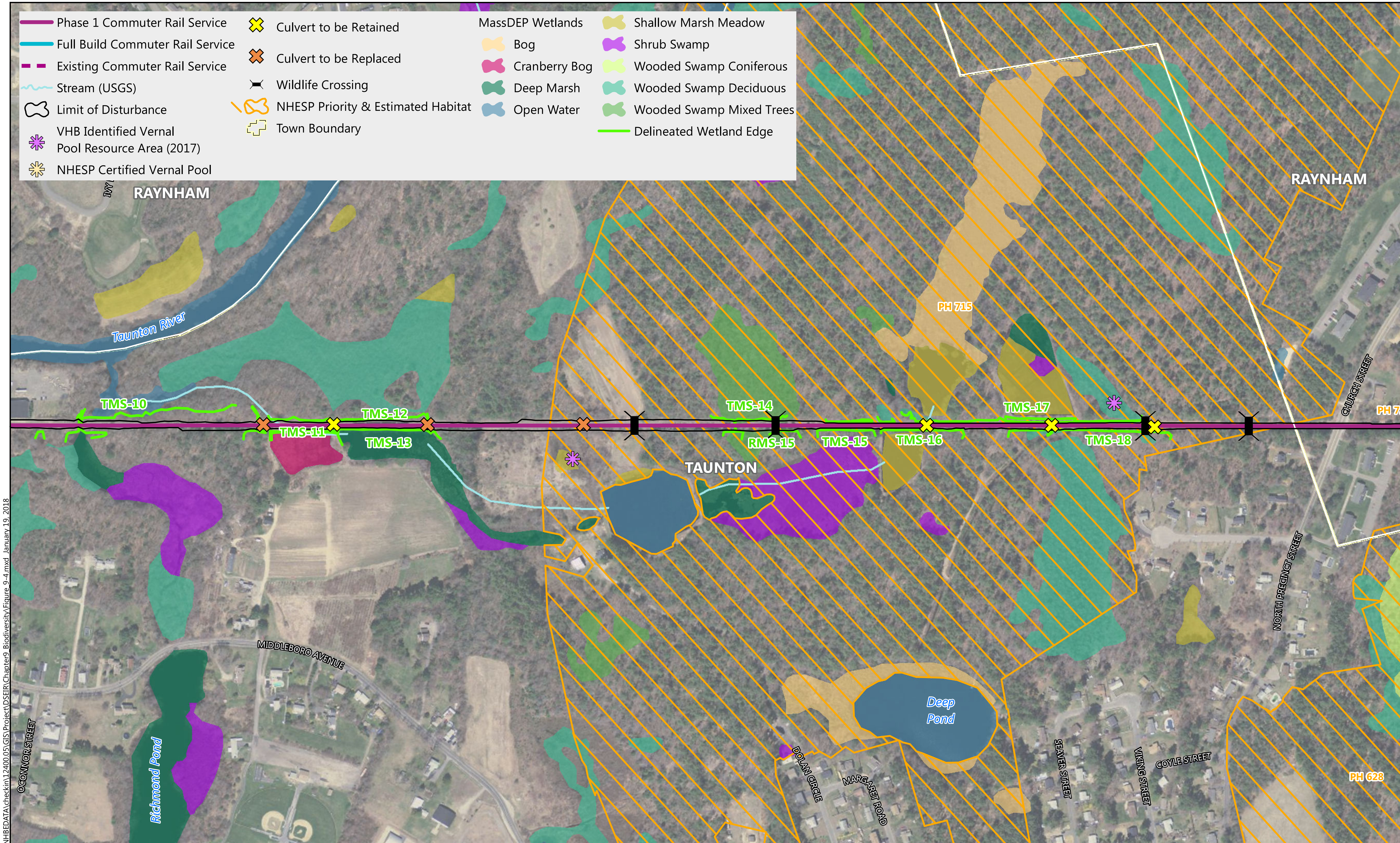
SCR SOUTH COAST RAIL

Massachusetts Bay Transportation Authority



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SCR SOUTH COAST RAIL

Massachusetts Bay Transportation Authority

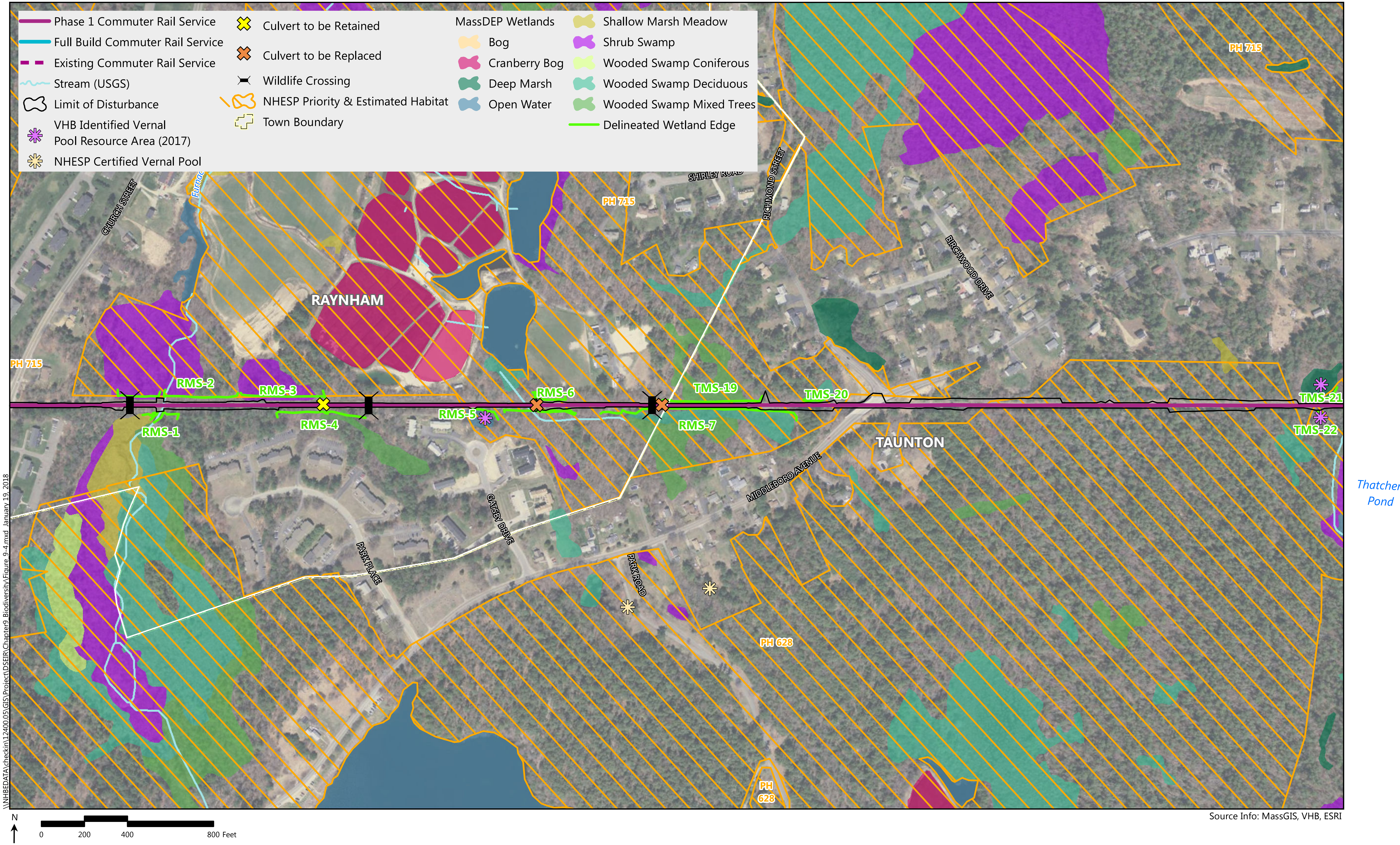

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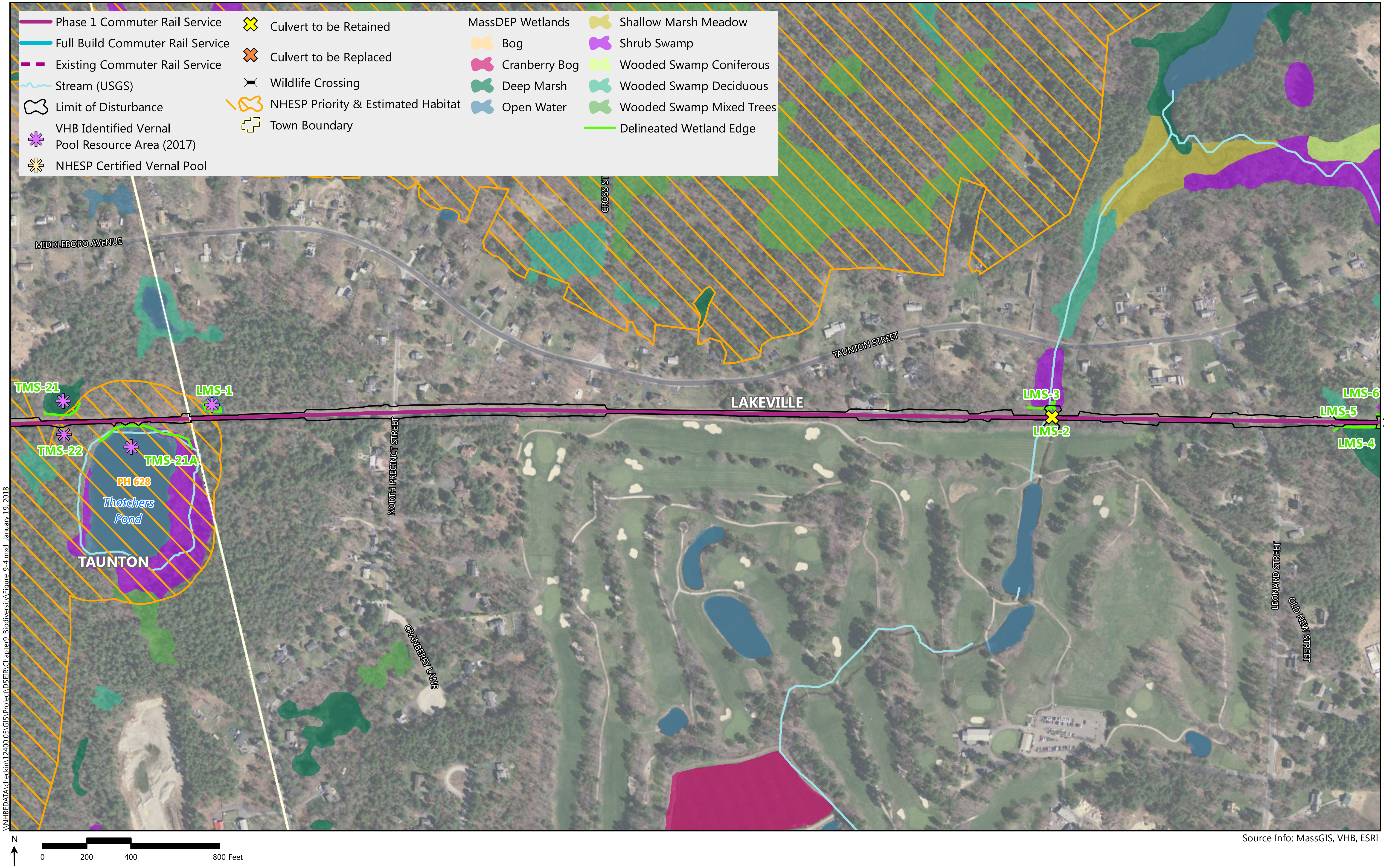
Figure 9-4: Middleborough Secondary - Biodiversity and Rare Species Impacts



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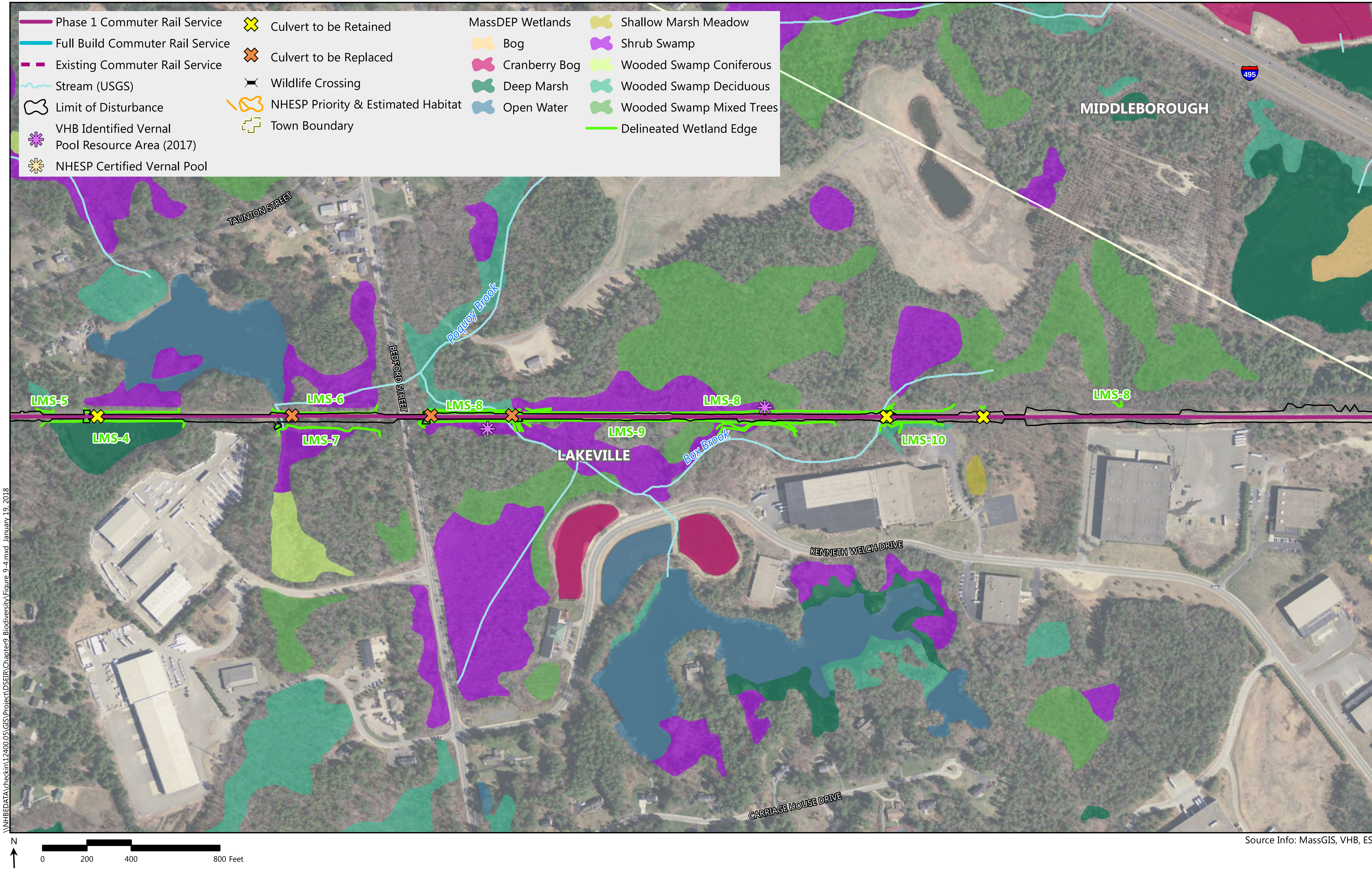

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SCR SOUTH COAST RAIL

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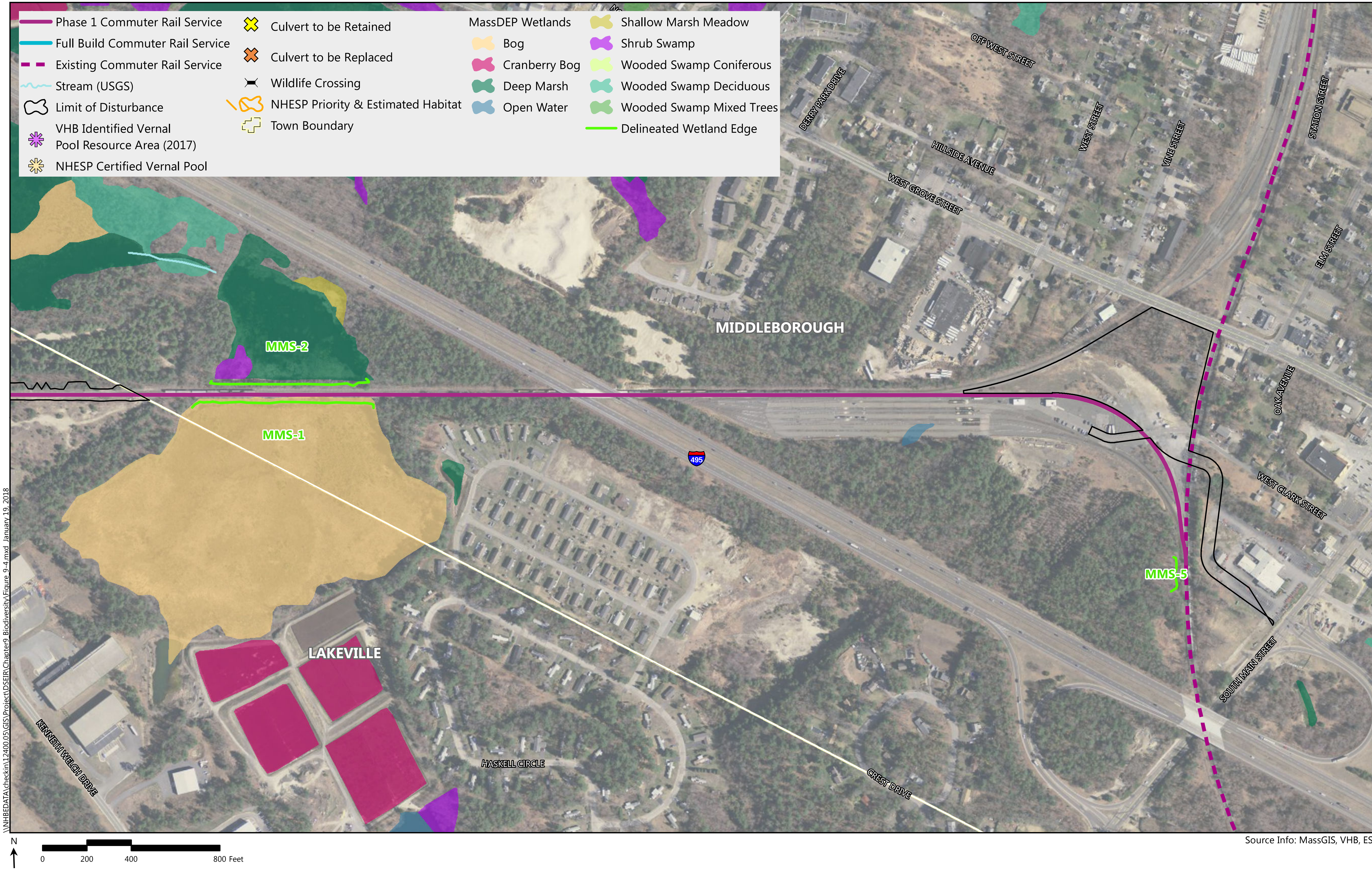

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Direct Impacts

Phase 1 will not have a direct impact on fisheries. The culverts to be replaced are intermittent streams which do not support populations. Replacing these deteriorated (in some cases collapsed) culverts will improve potential movement of fish during seasonal high flow periods. Phase 1 will not require any construction in the Taunton River or Cotley River along the Middleborough Secondary, therefore will not impact any diadromous fish species. No time-of-year restrictions will be required.

Indirect Impacts

As discussed in Section 8.3, *Surface and Groundwater Resources* and Section 8.4, *Stormwater*, the Proposed Project will not affect water quality along the Middleborough Secondary. The Project will not change runoff or pollutant loading from the railroad, and will add water treatment structures such as sediment forebays where ditches discharge to wetlands. The minor removal of trees adjacent to the track ballast and where culverts will be replaced will not have a substantial effect on water temperatures of these streams.

Rare Species

Direct Impacts

Proposed improvements to the existing Middleborough Secondary rail segment will result in the loss of approximately 0.55 acres of rare species habitat within Priority and Estimated Habitat (PH1093/EH951). This habitat loss will potentially affect the use of the rail embankments by eastern box turtles for nesting or foraging, but will not impact overwintering habitat. No direct impacts to rare plant species or the pine barrens bluet will occur, as there will be no impact to wetlands that provide habitat for these species. None of the station sites is within mapped Priority or Estimated Habitat.

The northern long-eared bat is regulated under the Federal Endangered Species Act. The Proposed Project is unlikely to have an adverse impact to the northern long-eared bat. The action area is located within the White-Nose Syndrome Zone buffer. The closest known hibernacula to the action area are located in Wellesley and the closest known maternity roost is in Barnstable County, per the Massachusetts' Natural Heritage Database. Incidental take resulting from tree removal is only prohibited if it occurs within a 0.25-mile radius of known northern long-eared bat hibernacula or if the proposed action cuts or destroys known occupied maternity roost trees, or any other trees within a 150-foot radius during the pup-rearing season (June 1 through July 31). The Proposed Project will avoid any incidental take by adhering to time of year cutting restrictions such that no tree clearing will occur in June and July, or as approved by the NHESP. No direct or indirect impacts will occur to the red-bellied cooter, as this species does not occur within the Phase 1 Project Area.

Indirect Impacts

Improvements to the Middleborough Secondary within Priority and Estimated Habitats will not cause additional habitat fragmentation or change shading or microclimate within habitat of listed species.

Upgrading the track will result in marginal loss of nesting, foraging, and wintering habitat for rare species.

Analysis by the NHESP confirms that improvements to the Middleborough rail segment will result in relatively minor impacts to state-listed species. There will be no habitat fragmentation because all habitat losses will be narrow strips at the edge of the existing railroad ballast. The loss of a small percentage of habitat is not anticipated to affect the long-term persistence of these species populations given the large area of suitable habitat for these species in, and in the vicinity of, the Project Area. This is especially the case for eastern box turtles which are habitat generalists and can use other adjacent areas (cleared and scrub-shrub) as basking and foraging habitat.
Indirect impacts to rare species associated with railroad rights of way include:

- Improved connectivity and movement for terrestrial wildlife, because reconstructing these tracks presents opportunities to reconstruct existing culverts or bridges to improve wildlife passage (e.g., wood turtle and eastern box turtle) and reduce fragmentation. During final design, each culvert or bridge that will be removed or replaced will be analyzed in order to avoid causing hydrologic changes;
- Increase in turtle mortality resulting from being struck by trains if they are able to climb the rail, but this is not expected to occur frequently because the steel rails are not easily climbed by turtles; and
- At grade crossings, when moving between habitats, turtles could die of dehydration if they are trapped between the rails and are not able to get out.

9.3.3 ROW Maintenance

Right-of-way maintenance is critical to the protection of the tracks and ties and to maintaining railroad safety. Right-of-way maintenance can only be done in accordance with an approved Vegetated Management Plan (VMP) and Yearly Operating Plan (YOP) that have been reviewed by the Massachusetts Department of Food and Agriculture (DFA) and made available for public comment. These management plans are developed in accordance with the DFA's regulations, which prohibit or restrict the application of herbicide in sensitive areas such as close proximity to wetlands and public or private drinking water supplies. Under existing conditions and the No-Action Alternative, MassCoastal Railroad maintains the track from Pilgrim Junction to Cotley Junction in Taunton, in accordance with approved VMPs and YOPs.

To protect state-listed species, as well as aquatic organisms and water quality, the MassDOT has committed to designate the portion of the corridor adjacent to Thatcher's Pond in Taunton as a No-Application sensitive area. In addition, in accordance with the DFA requirements, the following will be designated as No-Application zones:

- Areas within 10 feet of a surface water or wetland;

- Areas within 50 feet of a private drinking water supply;
- Areas within 100 feet of a surface water public water supply; and
- Areas within 400 feet of a public water supply well (Zone 1).

These specific locations will be identified and shown on detailed project plans during the subsequent final design and permitting phase of the Project, when a VMP is developed.

The vast majority of areas disturbed for construction (extending 14 feet to each side of the track centerline, for a total width of 28 feet for single track) will be surfaced with ballast and will be within the area where vegetation must be managed for railroad safety. These areas will not be allowed to revegetate. Disturbed areas outside of the trackbed will be seeded with an appropriate stabilization seed mix using native species. These seeded areas will be expected to revegetate within one growing season.

9.3.4 Temporary Construction-Period Impacts and Mitigation

Construction of Phase 1 along the Middleborough Secondary and at the East Taunton Station will be similar to the construction activities described in the FEIS/FEIR. Along the ROW, construction will include clearing and placing new ballast, and excavation and grading necessary to replace deteriorated culverts. Construction is anticipated to be completed within a two-year period.

Temporary impacts include short-term disturbances during construction that will cease once construction activities are complete. This may include, but is not limited to, the installation of erosion controls, the establishment of a work area, or the installation of a temporary structure at a stream crossing.

Potential short-term construction related impacts may include impairment of ground and surface water due to sedimentation in stormwater runoff or accidental spills; temporary loss of habitat, displacement of rare species due to physical disturbance and noise; and plant and animal injury or death from construction equipment and activities.

This construction will also result in the loss of natural habitat along the edges of the existing freight line, for a total natural habitat loss of approximately 55,000 square feet (1.2 acres). This impact is anticipated to be temporary, and all disturbed areas outside of the ballast will be revegetated with a native seed mix.

Erosion and sedimentation controls along the perimeter of the railroad corridor may affect the ability of small vertebrates (amphibians, turtles, small rodents) to cross the railroad right-of-way during construction. This barrier effect will be temporary and will cease when erosion controls were removed. Coffer dams or sandbags used to allow bridges or culverts to be replaced could affect the movement of fish if the entire waterway were blocked. However, all culvert replacement is expected to occur during summer months when there is no flow in the intermittent streams and therefore will not have a temporary impact on fish passage.

Replacing culverts that convey intermittent streams will require that work be done “in the dry”. Typically, construction will require that the work area be blocked with sand bags and stream flow diverted around the work area through a temporary pipe, using gravity flow. This will allow small fish to move along the intermittent stream channel during construction.

Construction noise and construction activity could displace wildlife from areas adjacent to the rail or highway corridor. This impact will be temporary, and wildlife is expected to return to areas near the rail or highway corridor once construction activities cease.

9.4 Cumulative Impacts

The Middleborough Secondary was constructed in 1856, and can be assumed to have fragmented important coastal plain wetland and upland habitats in Lakeville and Taunton by creating an elevated railroad berm and a gap in forest cover. The small culverts will have restricted fish and wildlife passage. The fragmentation effects may have been lessened as the 1850s were the peak of agricultural land use in Massachusetts, with little contiguous forest cover. In the subsequent 160 years, wildlife habitat adjacent to the railroad was reduced due to the development of cranberry bogs and industrial development (primarily in East Taunton), and later development of residential areas along the roads crossing the ROW. Despite this history of development, substantial blocks of natural landscape remain both north and south of the ROW (Figure 9-2, 9-3).

Incremental loss of habitat is anticipated to continue in the foreseeable future in the absence of the Project. Residential development is anticipated to continue, and planned developments such as the Taunton Casino will result in the loss of undeveloped lands. The proposed East Taunton Station site will be developed for commercial or industrial uses, resulting in the loss of 3.7 acres of forest and early successional habitats. The railroad will continue to act as a gap in the forest canopy in certain areas, and will continue to act as a barrier to turtle and amphibian movement, as the rail presents a continuous barrier.

With the Proposed Project, there will be a minor but negligible loss of vegetation associated with the reconstruction of the tracks and culverts, with little effect on the existing habitat fragmentation. Turtle and amphibian passage will be improved through the addition of wildlife crossings, and the improved culverts will have a larger openness ratio and will improve fish and wildlife connectivity along the Middleborough Secondary.

9.5 Mitigation

This section discusses strategies and measures that will be used to mitigate for impacts to biological diversity. Although there are no state or federal regulatory programs that establish mitigation requirements for impacts to biological diversity, the discussion below considers whether impacts to biodiversity could be avoided or minimized, and whether mitigation measures could be incorporated into the Project to mitigate for unavoidable impacts. No mitigation is proposed specifically for impacts to non-regulated plant, wildlife or fish communities. Mitigation for impacts to regulated resources such as wetlands, waterways, and threatened and endangered species will incorporate measures to protect and enhance the biodiversity of these resources.

9.5.1 Avoidance

Habitat used by state-listed species is present in wetlands and uplands within the Study Area. Due to the close proximity of state-listed species habitat to the ROW, there are no feasible or practicable alternatives that will entirely avoid the loss of habitat.

The Project will avoid impacts to rare species by:

- Locating all station sites outside of Priority Habitat;
- Keeping track construction and culvert replacements within the existing footprint; and
- Tree removal will not occur during the time-of-year restriction for Northern Long-Eared Bats, or as otherwise approved.

9.5.2 Minimization

All practicable measures have been taken to minimize adverse impacts where construction within rare species habitat cannot be avoided. Measures to minimize impacts to eastern box turtle habitat will continue through final design, including coordination with the regulatory agencies.

The impact minimization efforts include:

- Reducing the amount of rare species habitat loss by minimizing the width of work area within sections of the Middleborough Secondary by using single track instead of double track;
- Replacing and enhancing structurally deficient culverts within the Project corridor to allow movement through existing culverts to continue;
- Adjusting the grading to reduce the loss of plant or wildlife communities;
- Using retaining walls to reduce the loss of unique natural communities;
- Replanting disturbed areas; and

- Developing and implementing an invasive species control plan.

9.5.3 Mitigation Measures

Culverts within the Project corridor will be replaced in kind (if replacement is found to be necessary for structural reasons), and design measures will be identified to maintain, or improve, existing hydrology between wetland systems. This will allow movement through existing culverts to continue.

Under-rail troughs will be constructed within upland areas where eastern box turtle habitat is adjacent to the Middleborough Secondary. This crossing structure was used successfully in another rail project in Massachusetts, the Greenbush Rail Line project. This type of crossing structure has been previously reviewed and approved by regulatory agencies as a successful wildlife crossing structure and has been demonstrated to work well for spotted turtles. MassDOT will work with NHESP to refine the design to accommodate larger turtles such as eastern box turtles. The between-the-tracks crossings between three consecutive rail ties creates a 7- to 8-inch gap underneath the rails. These under-rail troughs could also be installed adjacent to grade crossings to allow turtles that wander onto the tracks to escape. NHESP recommended that the troughs be as deep as possible and lined with a natural material (not plastic), and that a long-term monitoring and maintenance program established for continued function. Mitigation measures for temporary construction impacts will include:

- Erosion and sedimentation controls;
- Turtle barriers;
- TOY restrictions; and
- Rare plant protections.

Timing of construction may affect the extent of impacts to rare species. Disturbance of habitat during the breeding season is likely to have greater short-term or individual effects on reproductive success; however short-term effects are not likely to have long-term repercussions unless the species population is already unstable. To avoid potential short-term effects to breeding wildlife and rare species construction may be phased to reduce disruption during breeding season. Daily monitoring of the work areas by a qualified biologist/technician, on both sides of the fencing, will be conducted from early Spring through late Fall. In all cases, construction will be limited to normal daylight hours.

Detailed site-specific, species-specific mitigation measures will be developed in the permit process in consultation with NHESP. Some of the mitigation measures will include:

- Staking, entrenching siltation fencing at all limits of work within identified rare species habitat areas;
- One-way turtle gates;
- Daily monitoring of the work area by a qualified biologist/technician, on both sides of the fencing, from early Spring through late Fall; more specifically monitoring will be conducted in areas of rare species habitat as required by NHESP in the Conservation and Management Plan (CMP);
- Removing any animals found within the work area; and

- Relocating any animals found along the drift fence (outside of the work area) to the opposite side of the corridor.

9.6 Regulatory Compliance

This section describes compliance of the SCR Phase 1 Project with regulations relevant to biological diversity and rare species. It specifically addresses compliance of those Project elements not reviewed in the FEIS/FEIR, specifically improvements to the Middleborough Secondary, the Pilgrim Junction Station, the East Taunton Station, and the relocated Freetown Station.

9.6.1 Federal Endangered Species Act

The Federal Endangered Species Act (ESA) of 1973, Section 7 (16 USC 1531 *et seq.,* as amended),[26] authorizes the determination and listing of species as Endangered and Threatened and prohibits unauthorized taking, possession, sale, and transport of endangered species.

Section 7 of the Act[27] requires federal agencies to ensure that any action authorized, funded, or carried out by a federal agency is not likely to jeopardize the continued existence of listed species or to modify their critical habitat. USFWS administers the Act. Under Section 7, Federal agencies must consult with the USFWS when any action the agency carries out, funds, or authorizes (such as through a permit) may affect a listed endangered or threatened species. Inasmuch as portions of the Project occur within known habitat of the Northern red bellied cooter, consultation under Section 7 will be completed to determine whether this Project will affect the species or critical habitat of this federally-listed threatened species, and if so, to seek a biological opinion from USFWS that the proposal will not jeopardize the continued existence of this species.

The National Marine Fisheries Service (NMFS), also known as NOAA Fisheries and a division of the U.S. Department of Commerce, is the federal agency responsible for protecting living marine resources including endangered marine life under the ESA. However, no federally-listed marine species occur within the Project Study Area.

9.6.2 Migratory Bird Treaty Act

The Migratory Bird Treaty Act of 1918 (16 U.S.C. 703-712, as amended) states that, unless permitted by regulations, it is illegal to "pursue, hunt, take, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer for purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time or in any manner, any migratory bird, included in the terms of this Convention … or any part, nest, or egg of such bird." As the USFWS states, "we regulate

26 Endangered Species Act of 1973, Section 7(16 USC 1531 *et seq.,* as amended), United States Fish and Wildlife Service.
27 Ibid.

most aspects of the taking, possession, transportation, sale, purchase, barter, exportation, and importation of migratory birds."

The USFWS does not, through the Migratory Bird Treaty Act, explicitly prohibit or regulate the incidental take of birds, bird nests, or bird eggs caused by land clearing. However, MassDOT will not undertake vegetation removal in critical during the nesting season for migratory birds (May 1 through July 15).

9.6.3 MA Endangered Species Act

MESA and its regulations (321 CMR 10.00) prohibit the "taking" of any state-listed rare plants and animals unless specifically permitted for scientific, educational, or propagation purposes, or where a Conservation and Management Permit is issued. "Take" includes protection of rare species habitat, and is defined as, "*in references to animals to harass, harm, pursue, hunt, shoot, hound, kill, trap, capture, collect, process, disrupt the nesting, breeding, feeding or migratory activity or attempt to engage in any such conduct, or to assist such conduct, and in reference to plants, means to collect, pick, kill, transplant, cut or process or attempt to engage or to assist in any such conduct. Disruption of nesting, breeding, feeding or migratory activity may result from, but is not limited to, the modification, degradation or destruction of Habitat*."

The regulations (321 CMR 10.05) state that "All State Agencies shall review, evaluate, and determine the impact on Endangered, Threatened and Special Concern species or their habitats… and use all practicable means and measures to avoid or minimize damage to such species or their habitats." State agencies are responsible for demonstrating to the Secretary that all practicable means and measures to protect rare species and their habitats have been incorporated into the Project design. The DFW NHESP is the agency responsible for ensuring compliance with MESA. If a proposed project will result in a "take," the Project must obtain a Conservation and Management Permit from the NHESP.

The South Coast Rail Project, Phase 1, will result in a "take" of rare species (eastern box turtle) and will require a Conservation and Management Permit. In consultation with NHESP, MassDOT will implement and develop a CMP that will provide a long-term benefit to impacted species. The FEIS/FEIR outlined the CMP commitment, which will include:

- On and/or off-site permanent habitat protection;
- On and/or off-site habitat restoration and management;
- Research to enhance conservation efforts and rare species recovery; and
- Contribution toward development or implementation of an off-site conservation and protection plan for the impacted species.

Avoidance and Minimization and Alternatives

MESA regulations at 321 CMR 10.05 state that "All State Agencies shall review, evaluate, and determine the impact on Endangered, Threatened and Special Concern species or their habitats and use all practicable means and measures to avoid or minimize damage to such species or their habitats." State agencies are responsible for demonstrating to the Secretary that all practicable means and measures to protect rare species and their habitats have been incorporated into the Project design.

As documented in the FEIS/FEIR and this DSEIR, all alternatives evaluated for the Full Build and Phase 1 will use the New Bedford Main Line and Fall River Secondary south of Cotley Junction, and there are no practicable route alternatives to use of the Middleborough Secondary. There are no alternatives that will avoid impacts to rare species habitat. Potential impacts to state-listed species habitats have been minimized to the extent practicable, as described in this chapter.

Insignificant Portion of the Local Population

321 CMR 10.23(2)(b) requires that a Conservation and Management Permit may only be issued where "an insignificant portion of the local population would be impacted by the Project or Activity".
As demonstrated in this chapter, the impacts to habitat of the eastern box turtle affected by improvements to the Middleborough Secondary will be a negligible portion of the total available habitat.

Net Benefit

321 CMR 10.23(2)(c) requires that a Conservation and Management Permit may only be issued where "the applicant agrees to carry out a conservation and management plan that provides a long-term Net Benefit to the conservation of the State-listed species". The MESA regulations at 321 CMR 10.23(7) establish certain performance standards including mitigation ratios to achieve the long-term Net Benefit performance standard. These ratios are based on the amount of areal habitat impacted and the category of state-listed species.

- Endangered species require a mitigation ratio of 3:1 (three times the amount of affected habitat);
- Threatened species require a mitigation ratio of 2:1; and
- Special Concern species require a mitigation ratio of 1.5:1.

The Director may approve an alternative mitigation approach that differs from these ratios where the alternative approach is appropriate, considering factors that include but are not limited to:

- The size and configuration of the habitat impact
- The threats to the affected state-listed species posed by uses or activities located adjacent to or in close proximity to the Project;
- The size, configuration and quality of the habitat proposed to be protected;

- The population density of the affected state-listed species; and
- The habitat management and research needs associated with the affected species.

The Proposed Project will provide a net benefit to the affected species by funding the protection of habitat at the appropriate ratio taking into consideration the loss of wetland and upland habitat as well as the length of the potential barrier to movement and the number and effectiveness of the proposed enhanced culverts and between-the-ties crossing structures.

For eastern box turtle (State Special Concern), a 1.5:1 mitigation ratio is required. This species will experience a loss of approximately 1.2 acres of potential habitat (successional habitats along the railbed) in Phase 1. For Phase 1, the anticipated loss of eastern box turtle habitat will be a total of 2.45 acres (including habitat along the Middleborough Secondary, Fall River Secondary and New Bedford Main Line). To provide a net benefit, the applicant has agreed to provide funding to the eastern box turtle mitigation bank equivalent to 3.7 acres of protected habitat.

10. Noise and Vibration

10.1 Introduction

The noise and vibration impact assessment considers the potential for the Phase 1 of the South Coast Rail (SCR) Project (the Project) to affect people within the study area. South Coast Rail's Phase 1 operations will change noise and vibration conditions along the Middleborough Secondary. Potential increases in noise and vibration could negatively affect sensitive receptors. Noise and vibration-sensitive uses typically include places where people sleep, such as residences, hotels, and hospitals, and institutions with daytime and evening use such as schools, libraries, museums, and parks. The Project will introduce new passenger rail service to the study area which includes existing freight rail operations. The additional passenger train operations could result in potential noise or vibration impacts.

This chapter defines noise, vibration, and ground-borne noise resources, summarizes the regulatory context of the assessment, and presents the requirements of the noise and vibration impact assessment according to the Certificate on the Notice of Project Change (NPC) issued by the Secretary of the Executive Office of Energy and Environmental Affairs (EEA). Noise and vibration impact have been assessed according to the methods and criteria in the Federal Transit Administration's (FTA) *Transit Noise and Vibration Impact Assessment*[1] guidance manual. This methodology is consistent with that used for the prior Massachusetts Environmental Policy Act (MEPA) review of the Final Environmental Impact Statement (FEIS)/Final Environmental Impact Report (FEIR).

This chapter presents the results of the noise and vibration study conducted for Phase 1 areas that were not previously assessed in the FEIR, including the process to define the noise and vibration study areas, identify sensitive locations, characterize existing noise and vibration conditions, predict future conditions, assess potential impact, and evaluate the need for and prepare the preliminary design of potential mitigation.

10.1.1 Requirements of Certificate

The Certificate on the NPC issued by the Secretary of the Executive Office of EEA on March 22, 2017[2] identified the following to be addressed in the evaluation of noise and vibration impacts:

1 Federal Transit Administration, "Noise and Vibration Impact Assessment", Report FTA-VA-90-1003-06, May 2006.

2 Massachusetts Executive Office of Energy and Environmental Affairs. Certificate of the Secretary of Energy and Environmental Affairs on the Environmental Notification Form. April 3, 2009.

- An analysis, consistent with the methodology used in prior MEPA review, of the noise and vibration impacts associated with the Phase 1 areas that were not previously assessed;
- Identification of relevant land use categories, metrics for evaluating transit-related impacts and information on background noise levels and monitoring locations;
- A discussion of the noise and vibration impacts in the context of applicable federal and state guidelines and regulations, including the MBTA's noise mitigation policy; and
- An evaluation and description of mitigation measures to avoid and minimize noise and vibration impacts.

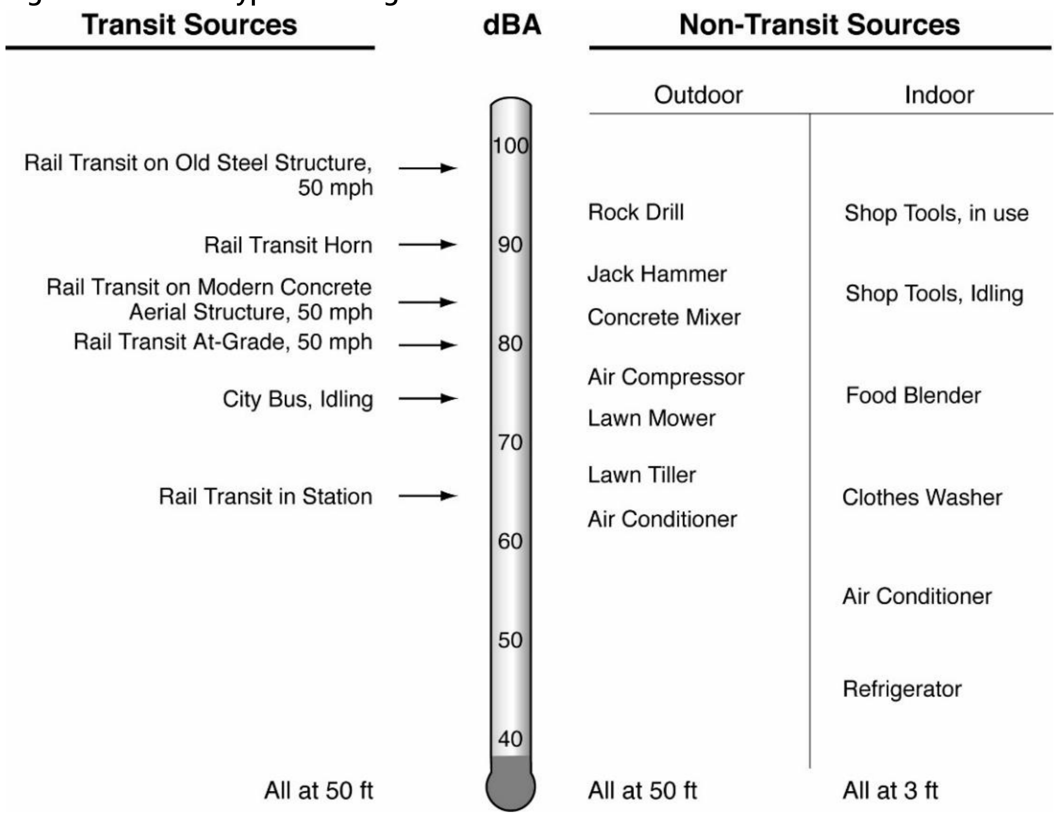
10.1.2 Resource Definition

Noise is typically defined as unwanted or undesirable sound. Noise is evaluated based on its potential to cause human annoyance. Because humans can hear certain frequencies or pitches of sound better than others, sound levels are measured and reported using a descriptor called the "A-weighted sound level." A-weighted sound levels weight different frequencies of sound to correspond to human hearing and are expressed in decibel notation as "dBA." Because sound levels fluctuate from moment to moment, it is useful to characterize the range of levels that may exist over a certain amount of time. This is commonly done by using the following sound level metrics:

- The *Maximum A-weighted Level* (Lmax) represents the highest sound level generated by a source. For mobile sources, the maximum level typically occurs when the source is closest to the measurement or analysis location.
- The *Energy-average Level* (Leq) is a single value that is equivalent in sound energy to the fluctuating levels over a period. The Leq accounts for how loud events are during the period, how long they last, and how many times they occur. Typically, Leq sound levels are used to describe the time-varying sound level over a 1-hour period and may be denoted as $Leq_{1h.}$ Leq is commonly used to describe environmental noise and relates well to human annoyance.
- The *Day-night Average Level* (Ldn) is a single value that represents the sound energy over a 24-hour period with a 10-decibel (dB) penalty applied to sound that occurs between 10:00 PM and 7:00 AM when people are more sensitive to noise. Ldn accounts for how loud events are, how long they last, how many times they occur, and whether they occur at night. Ldn is commonly used to describe environmental noise and relates well to human annoyance at places people sleep.
- The *Sound Exposure Level* (SEL) describes the cumulative noise exposure from a single noise event over its entire duration. In calculating SEL the noise exposure is normalized to a time-duration of 1 second so that events with different durations can be evaluated in terms of their sound energy.

Figure 10-1 shows typical A-weighted maximum sound levels for rail-related transit sources and non-transit sources.

Figure 10-1 Typical A-weighted Maximum Sound Levels

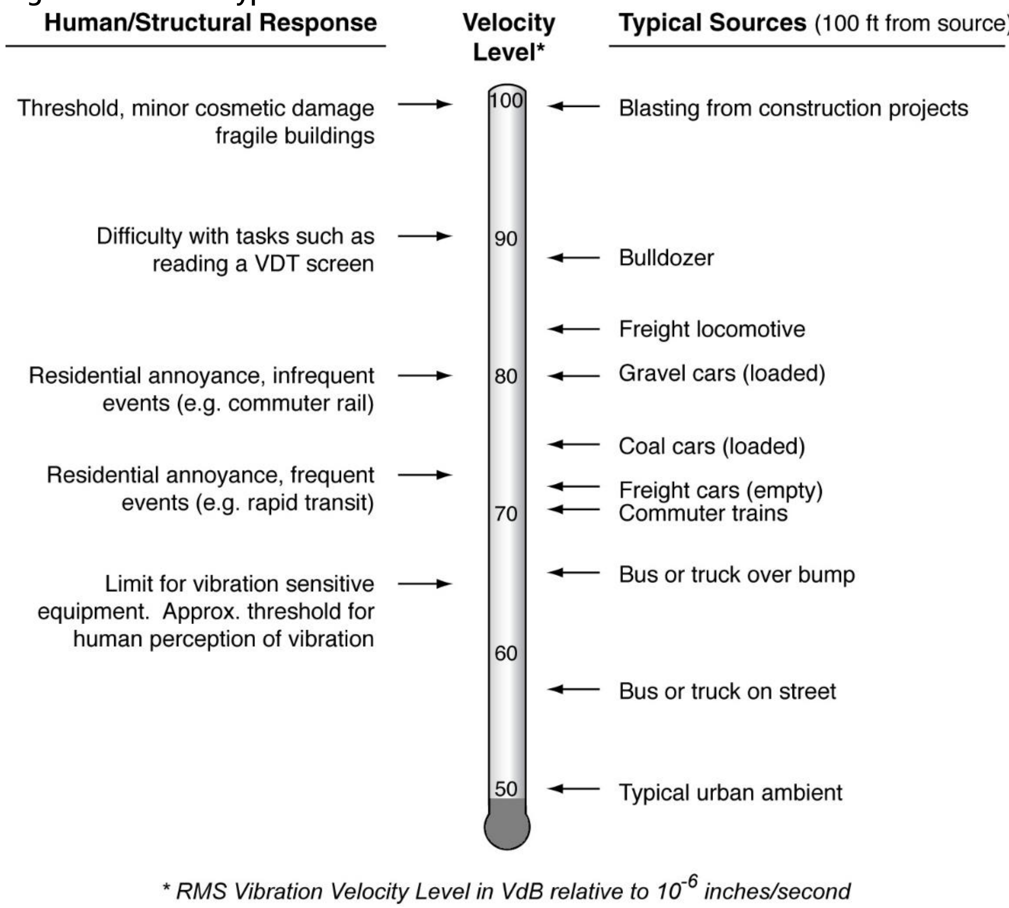


Source: FTA, 2006.

Trains also generate ground-borne **vibration** (defined as the oscillatory motion of the ground), when forces associated with the wheel-rail interaction are transmitted through the tracks into the ground and into adjacent buildings. Vibration may be perceptible and disturb people or sensitive activities in nearby buildings. Humans generally react to vibration in a low frequency range between approximately 4 and 80 hertz (Hz).

- Vibration levels are often expressed in decibel notation as "dBV" to differentiate them from sound decibels. Overall vibration levels reported in this study include frequencies between 4 and 400 Hz. Vibration levels may also be reported at particular frequencies such as one-third octave bands. Figure 10-2 presents typical ground-borne vibration velocity levels from transportation and construction sources and the typical human and structural response.

Figure 10-2 Typical Ground-borne Vibration Levels



Source: FTA, 2006.

Ground-borne noise is generated when vibration propagates into a room and causes the walls, ceilings, and floor to vibrate and generate a low frequency rumble. Ground-borne noise is generally only perceptible in buildings where airborne paths (such as paths through windows or openings) are not present. Ground-borne noise is of particular concern for special-use buildings such as theatres and recording studios.

Similar to airborne noise, ground-borne noise is expressed in A-weighted sound level decibels. Because ground-borne noise is generated by ground-borne vibration, it is most prevalent in a low audible frequency range and sounds like a rumble. Ground-borne noise is not a concern for the Project since there are no underground segments and no special-use buildings near the tracks where ground-borne noise would be a concern.

10.1.3 Regulatory Context

The Federal Railroad Administration's (FRA) "High-Speed Ground Transportation Noise and Vibration Impact Assessment"[3] guidance manual and the Federal Transit Administration's (FTA) "Transit Noise and Vibration Impact Assessment"[4] guidance manual describes the technical approach for assessing noise and vibration for rail and transit projects in the United States. These guidance manuals address how to identify and categorize noise and vibration-sensitive land uses, criteria thresholds, methods to measure and predict noise and vibration, and the process for evaluating the need for and effectiveness of potential mitigation. The FTA manual provides guidance for projects with passenger trains operating at conventional speeds (typically 100 mph or less) and has been used to assess noise and vibration conditions for the South Coast Rail Project.

Noise and Vibration Impact Assessment Methodology

The methodology for assessing potential noise and vibration impact is consistent with the FTA Noise and Vibration Impact Assessment guidance manual and the 2013 FEIS/FEIR. The state of Massachusetts regulates certain noise sources such as industrial and commercial sources under 310 Code of Massachusetts Regulation 7.10. The Massachusetts Department of Environmental Protection (MassDEP) Division of Air Quality Control Noise Policy (DAQC Policy 90-001) implements this regulation by evaluating whether sources of sound increase ambient background conditions by 10 dBA and whether there would be "pure tone" conditions which are more likely to cause annoyance. The Massachusetts noise regulation and policy are not designed to address transportation sources such as commuter rail trains, which are temporary in nature and transient as opposed to stationary sources.

The FTA noise assessment methodology includes defining the study area, identifying and categorizing noise and vibration-sensitive receptors within the study area, conducting ambient noise and vibration measurements to characterize the existing conditions, predicting future noise and vibration conditions with the proposed Project, assessing potential impact according to applicable criteria, and evaluating and recommending mitigation, as needed. Methodologies are provided in more detail in the following sections.

10.2 Existing Conditions

This section presents the existing noise and vibration conditions within the study area including the identification and categorization of sensitive receptor locations and results of existing noise and vibration measurements.

3 Federal Railroad Administration. September 2012. *High-Speed Ground Transportation Noise and Vibration Impact Assessment*. Report DOT/FRA/ORD-12/15. https://www.fra.dot.gov/eLib/Details/L04090.

4 Federal Transit Administration. May 2006. *Transit Noise and Vibration Impact Assessment*. Report FTA-VA-90-1003-06. https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/FTA_Noise_and_Vibration_Manual.pdf.

10.2.1 Noise and Vibration Study Area

The study area for noise and vibration includes the physical limits of the Project (the Project Area) and noise and vibration-sensitive locations near the Project. The study areas extend sufficiently far from the Project limits to include all locations where substantial noise and vibration effects, potential impacts, and benefits from potential mitigation may occur. The FTA has screening distances for different types of rail projects that can be used to define the study area. If there are sensitive uses within these screening distances, then there is the potential for impact and further evaluation is necessary to verify whether there would be impact, the context and intensity of impact and the need for mitigation. The following summarizes the FTA screening distances:

- For commuter rail projects with horn blowing at rail-highway grade crossings and with intervening buildings between the receptors and the noise sources, the standard screening distance for noise is 1,200 feet.
- For commuter rail mainline segments without horn blowing without intervening buildings, the standard screening distance is 750 feet.
- Vibration from commuter railroad projects is generally 200 feet for residential land uses, but may extend up to 600 feet to include buildings with high sensitivity to vibration such as concert halls, TV studios, hospitals, or research facilities that use vibration-sensitive equipment.

Similar to noise, the FTA vibration screening procedure is designed to identify locations where a project may cause vibration impact. If there is vibration-sensitive land use within the screening distance, then further evaluation is likely required. The following summarizes the FTA vibration impact screening distances for commuter train systems:

- For Category 1 (high sensitivity) land uses, the vibration screening distance is 600 feet.
- For Category 2 (residential) land uses, the vibration screening distance is 200 feet.
- For Category 3 (institutional) land uses, the vibration screening distance is 120 feet.

Since there are vibration-sensitive receptors within these screening distances, further vibration evaluation is required. Based on the FTA noise and vibration screening distances, the study area extends 750 feet from mainline segments and 1,200 feet within ¼-mile of grade crossings where horns would be sounded.

Noise and vibration impact assessment results for the Middleborough Secondary including the proposed new stations at Pilgrim Junction and in East Taunton south of Cotley Junction are presented in this Draft Supplemental Environmental Impact Report (DSEIR), assuming diesel-electric locomotive passenger rail service with 13 daily round-trip operations. Noise and vibration impact assessment results for Phase 1 along the Southern Triangle (New Bedford Main Line and Fall River Secondary line) were previously presented in the FEIS/FEIR, assuming full diesel-electric locomotive or electric locomotive passenger rail service. Phase 1 includes modifications to previously studied stations at Freetown and Fall River which will not affect the noise and vibration assessment previously completed in the FEIS/FEIR. Since Phase 1 includes a limited level of passenger rail service compared to the Full Build, the noise and vibration impact and mitigation findings in the FEIS/FEIR are conservative for passenger service south of the East Taunton Station in the Southern Triangle.

10.2.1 Noise and Vibration Receptors

Noise and Vibration Receptor Categories

Noise-sensitive receptors include land uses where noise has the potential to cause human annoyance due to effects such as speech interference or sleep interference. Vibration-sensitive receptors include buildings where ground-borne vibration has the potential to cause human annoyance due to perceptible vibration or to affect sensitive operations within a facility.

The FTA classifies land uses sensitive to noise from rail operations into the following three categories:

- **FTA Noise Category 1:** Tracts of land where quiet is an essential element in their intended purpose. This category includes lands set aside for serenity and quiet, and such land uses as outdoor amphitheaters and concert pavilions, as well as National Historic Landmarks with significant outdoor use. Also included are recording studios and concert halls.
- **FTA Noise Category 2:** Residences and buildings where people normally sleep. This category includes homes, hospitals, and hotels where a nighttime sensitivity is assumed to be of utmost importance.
- **FTA Noise Category 3:** Institutional land uses with primarily daytime and evening use. This category includes schools, libraries, theaters and churches where it is important to avoid interference with such activities as speech, meditation and concentration on reading material. Places for meditation or study associated with cemeteries, monuments, museums, campgrounds and certain historical sites and parks with passive use are included in this category. Active parks such as playground and athletic fields are not considered to be sensitive to noise.

Most receptors, such as residences and institutional land uses, are sensitive to both noise and vibration. Since people are less sensitive to vibration in outdoor areas compared to inside buildings, vibration is not assessed in parks. Certain land uses include vibration-sensitive equipment such as high-tech manufacturing, microscopes or imaging equipment. These receptors are not typically sensitive to airborne noise. The FTA classifies land uses sensitive to vibration into the following categories.

- **FTA Vibration Category 1:** Buildings where vibration would interfere with operations that may be well below the threshold of human annoyance. These receptors include vibration-sensitive equipment within research facilities, hospitals, or high-tech manufacturing.
- **FTA Vibration Category 2:** Residences and buildings where people normally sleep. This category includes homes, hospitals, and hotels.
- **FTA Vibration Category 3:** Institutional land uses with primarily daytime and evening use. This category includes schools, libraries, theaters and churches where it is important to avoid interference with such activities meditation and concentration on reading material.

There are some buildings, such as television studios, concert halls, recording studios and theaters that can be very sensitive to noise and/or vibration. Due to the sensitivity of these buildings, they may warrant special attention.

Noise and Vibration Sensitive Land Uses in Study Area

Noise and vibration receptors were identified in the study area by reviewing aerial photography, land use and zoning maps, and observations in the field. Receptors in the Phase 1 study area along the Middleborough Secondary include single-family residences, multi-family residences, a mobile home park, the Holy Family Parish Church on Middleboro Avenue in Taunton, the Pine Hill Cemetery on Stevens Street in East Taunton and the Town of Lakeville Cemetery located on Taunton Street.

10.2.2 Existing Noise Measurements

Existing noise levels were monitored at selected locations along the Middleborough Secondary. The noise monitoring sites were selected to characterize existing conditions in the study area. The measurement sites are representative of the noise conditions at other nearby sensitive receptor locations where the same ambient noise sources are present, such as nearby roads or existing freight train operations. Figure 10-3 shows the noise monitoring locations.

Measurements were conducted at eight locations along the Middleborough Secondary where Phase 1 service is proposed. All of the locations were in an area with Category 2 land uses (residences and buildings where people normally sleep). The measurements were conducted for approximately 24 hours at each site during weekdays using Larson Davis LxT and Larson Davis 831 sound level meters meeting American National Standards Institute Type 1 certification. All sound level meters were calibrated in the field prior to and after conducting measurements and by a laboratory traceable to the National Institute of Standards and Technology in accordance with best practices. The data collected included overall one-second A-weighted and octave band sound levels. The data were reduced into hourly sound level statistics including Leq and Ldn. See Appendix E, *Noise and Vibration Analysis*, for detailed ambient noise monitoring results.

Noise measurements of existing Massachusetts Bay Transportation Authority (MBTA) commuter train operations on the Middleboro/Lakeville line were conducted near Flagg Street in Bridgewater, Massachusetts, which is outside the study area. The noise measurements conducted at this location were used to determine the noise generated by existing MBTA train operations for predicting noise for the proposed Project. The train noise measurements showed that the noise emissions from MBTA commuter trains are consistent with the standard FTA reference levels used in the FTA General Assessment method and FTA Noise Assessment Spreadsheet. See Appendix E, *Noise and Vibration Analysis* for detailed noise measurement results of the MBTA commuter trains.

Table 10-1 summarizes the existing ambient noise measurement results throughout the study area. Existing train activity typically included two to three trains per day. Existing noise levels during the peak morning transit period ranged from 52 dBA to 62 dBA (Leq). Existing noise levels during the peak afternoon period ranged from 47 dBA to 59 dBA (Leq). Ldn noise levels ranged from 53 dBA to 62 dBA. These ambient conditions are typical of a suburban residential area or a "quiet" urban residential area. The primary source of noise in the environment was traffic on local roads and existing freight train operations. At some locations, highway noise from Route 24 and Interstate 495 contributed to the ambient noise environment.

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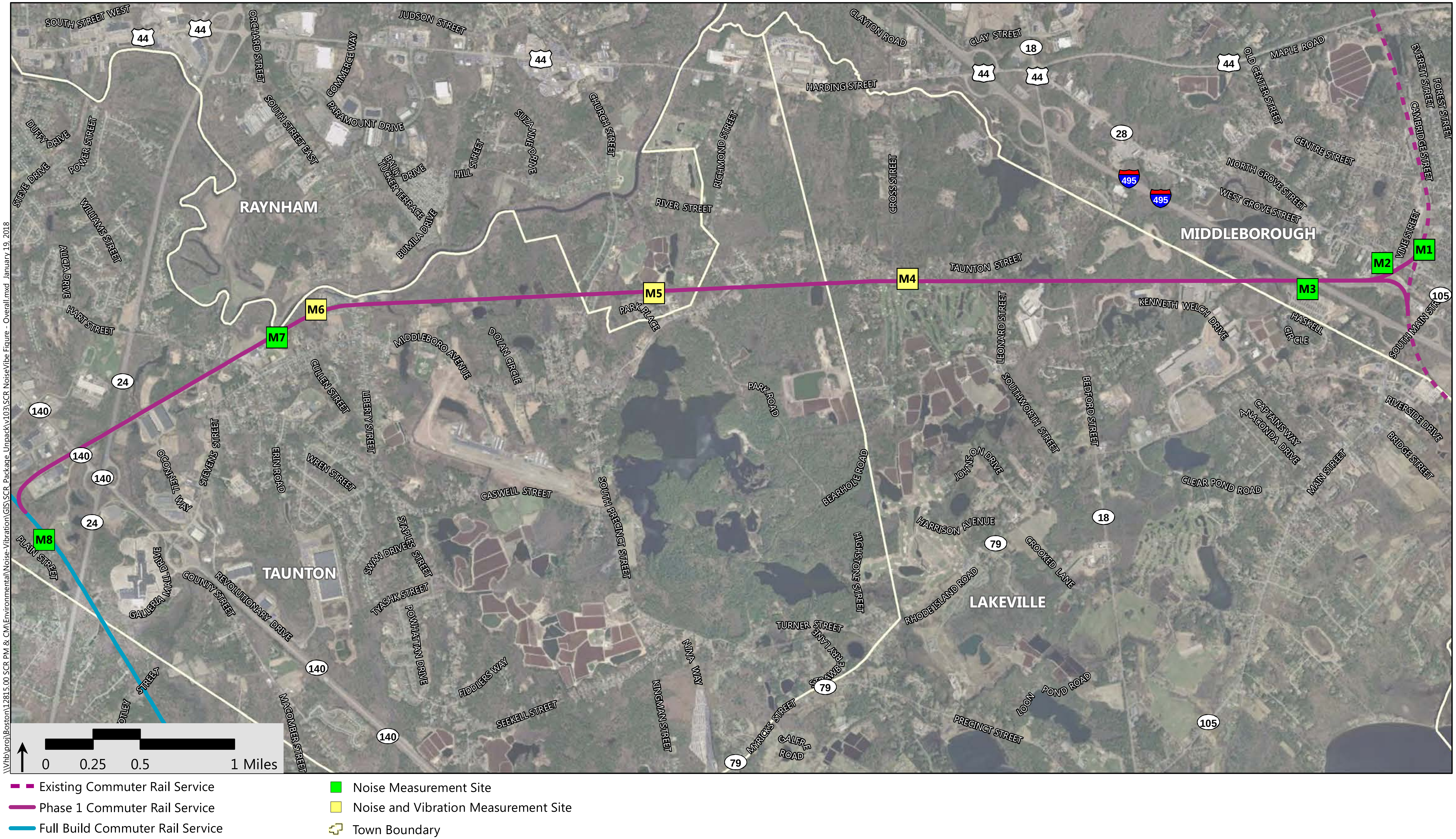
Massachusetts Bay Transportation Authority

Figure 10-3: Noise and Vibration Measurement Locations



Source Info: MassGIS, VHB, ESRI

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Table 10-1 Existing Noise Measurement Results

Site	Location	Land Use Category	Start Date (Start Time)	Duration (hours)	Morning Leq[1] (dBA)	Afternoon Leq[1] (dBA)	Ldn (dBA)
	Middleborough						
1	15 Elm St	2	8/30/17 (10:00 AM)	24	56	51	60
2	84 West Grove St	2	8/30/17 (10:00 AM)	24	57	59	62
3	17 Wesley Cr	2	8/28/17 (2:00 PM)	24	61	59	62
	Lakeville						
4	59 Taunton St	2	8/30/17 (12:00 PM)	24	56	55	62
	Raynham						
5	68 Gatsby Dr	2	8/29/17 (1:00 PM)	24	59	47	59
	Taunton						
6	96 Old Colony Ave	2	8/28/17 (12:00 PM)	24	62	47	58
7	Middleboro Ave Fields	2 [2]	8/28/17 (1:00 PM)	24	52	50	53
8	55 Debra Dr	2	8/28/17 (11:00 AM)	24	54	54	60

Source: VHB, 2017

1 The average Leq for the peak morning (6:00 AM to 9:00 AM) and afternoon (3:00 PM to 6:00 PM) periods of proposed service.

2 The measurement was conducted to represent nearby Land Use Category 2 receptors.

10.2.3 Existing Vibration Measurements

The most substantial source of existing vibration in the study area are freight operations along the rail corridor. Vibration measurements were conducted at three sites (M4, M5 and M6) along the Middleborough Secondary shown in Figure 10-3. These three sites were collocated with the noise monitoring sites described above. Vibration sensors (accelerometers) were located at two or three distances from the tracks at each site typically including the closest façade of nearby vibration-sensitive receptors. With accelerometers placed at varying locations, vibration was measured at distances of 40 to 200 feet from the existing track. The existing Middleborough Secondary track is continuously welded rail on timber ties. Trains operating on continuously welded rail typically produces quieter sound levels and less vibration than jointed rail.

Vibration measurements were conducted using Rion DA-21 four channel digital recorders with PCB Type 393A accelerometers. Accelerometers were secured to the ground using 12-inch steel stakes. Recorded accelerometer signals were subsequently converted into vibration velocity data using digital signal processing software. The vibration measurement systems were calibrated in the field using a PCB Type 394C06 handheld shaker prior to and after the measurements. Vibration measurements were conducted of MBTA commuter trains operations at Flagg Street in Bridgewater, MA which is outside the study area. The measurements at this location were conducted to determine the vibration generated by existing MBTA train operations for predicting vibration for the proposed Project. Figure

10-4 shows the maximum vibration measurement results for each train pass-by as a function of distance to the track and the FTA generalized surface vibration curve. The vibration measurements show that the vibration emissions from MBTA commuter trains are consistent with the FTA generalized surface vibration curves used in the FTA General Assessment method.

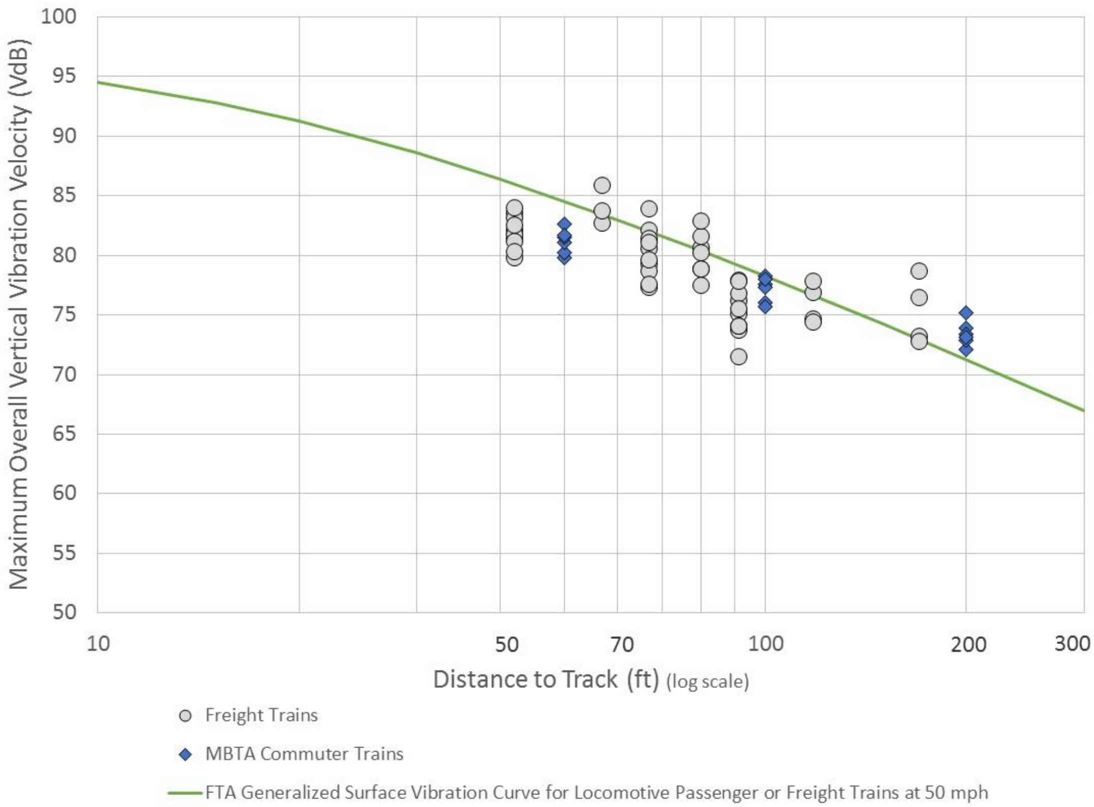
Table 10-2 presents the overall and maximum 1/3-octave band vibration level at varying distances from the track centerline at the four vibration monitoring locations based on an energy average of all the train pass-bys that were measured. The measurements show that existing freight trains generate overall vibration levels of 74 to 84 vibration decibels (VdB) at distances of 42 to 170 feet from the track. The maximum 1/3-octave band vibration levels ranged from 68 to 80 VdB. Within 100 feet the measured vibration levels are generally lower than the FTA curve and beyond 100 feet the measured vibration levels are generally higher. The overall vibration levels at the closest building facades at Sites 4 and 5 (68 Gatsby Drive in Raynham and 59 Taunton St in Lakeville) were 82 to 84 VdB. See Appendix E, *Noise and Vibration Analysis*, for more detailed vibration measurement results including the frequency content of vibration generated by freight and passenger train pass-bys.

Table 10-2 Existing Train Vibration Measurement Results

Site	Location	Distance from Track (ft)	Overall Vibration Velocity (VdB)	Maximum 1/3 Octave Band Vertical Vibration Velocity (VdB)	Maximum 1/3 Octave Band Range (Hz)
	Lakeville (Freight Trains)				
4	59 Taunton St	42	82	77	40-50
		67	81	77	50-63
		91	76	70	12.5-50
	Raynham (Freight Trains)				
5	68 Gatsby Dr	57	**84**	**80**	6.3
		80	81	77	10-31.5
	Taunton (Freight Trains)				
6	96 Old Colony Ave	80	79	75	8-10
		118	76	72	8-10
		170	75	70	10-12.5
	Bridgewater (MBTA Trains)				
	Flagg Street Soccer Field	50	81	75	10-12.5
		100	77	71	10-12.5
		200	**74**	**68**	10-12.5

Values in **bold** indicate maximum and minimum in range.
Source: VHB, 2017

Figure 10-4 FTA Generalized Surface Vibration Curve and Measurement Results



10.3 Methodology

Noise and vibration from the proposed MBTA commuter train operations have been predicted using the FTA General Assessment methods. The following describes the specific noise and vibration methods used in this analysis.

10.3.1 Noise Impact Criteria

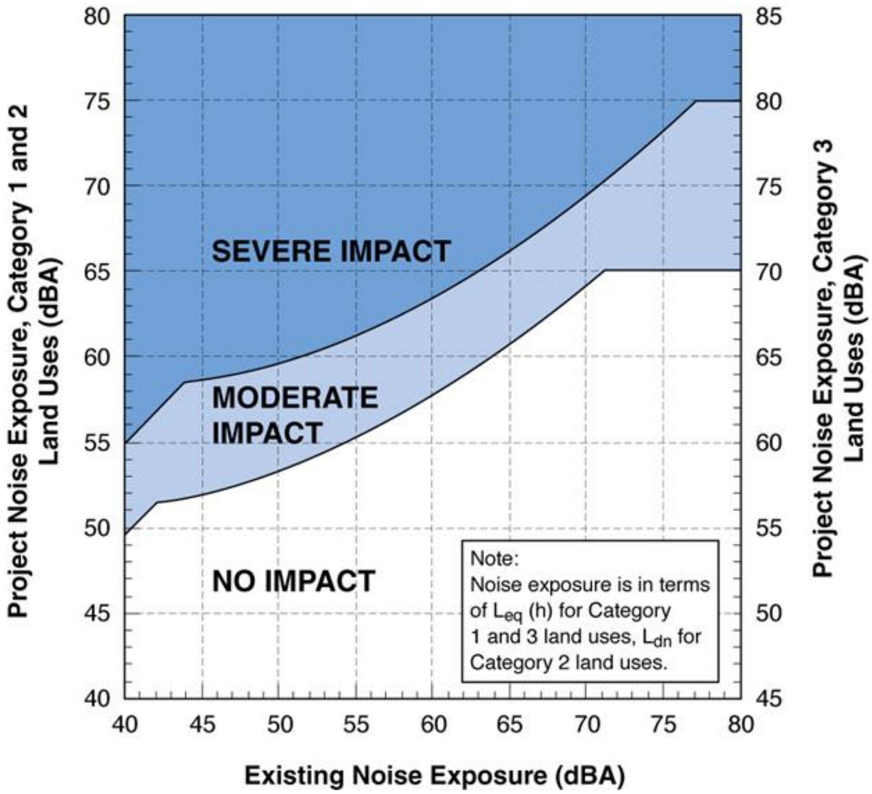
FTA noise impact criteria are founded on well-documented research on community reaction to noise and are based on changes in noise exposure using a sliding scale. Lower levels of transit noise are allowed in areas where existing noise levels are relatively low since the introduction of a new noise source can be more perceptible under these conditions. In neighborhoods where existing noise levels are higher, higher levels of transit noise are allowed since the existing noise will tend to mask the new source.

The noise impact criteria for human annoyance, presented in Figure 10-5, compare the existing outdoor Ldn for residential (Category 2) land use or peak transit hour Leq for institutional (Category 3) land use to the "Project Noise" which includes new sources that would be introduced by the project. The horizontal axis of the graph in Figure 10-5 is the existing noise exposure and the vertical axis shows the "Project Noise" which are the proposed commuter train operations. The scale on the left vertical axis applies to the more noise-sensitive land uses in Categories 1 and 2 (residential) as described earlier. The scale on the right vertical axis applies to Category 3 (institutional) land uses, which are less sensitive to noise.

The FTA defines two levels of impact (severe and moderate), as well as no impact, as summarized below:

- **No Impact:** If the project noise exposure is less than the No Impact criteria, there would be no impact and there is no need to consider mitigation.
- **Moderate Impact:** In this range of noise impact, the change in the cumulative noise level is noticeable to most people but may not be sufficient to cause strong, adverse reactions from the community. In this transitional area, other project-specific factors must be considered to determine the magnitude of the impact and the need for mitigation. These factors include the existing noise level, the predicted level of increase over existing noise levels, the types and numbers of noise-sensitive land uses affected, the noise sensitivity of the properties, the effectiveness of the mitigation measures, community views, and the cost of mitigating noise to more acceptable levels. Moderate noise impact means that commuter rail service is predicted to increase noise exposures at sensitive land uses adjacent to the track.
- **Severe Impact:** Project-generated noise in the severe impact range can be expected to cause a significant percentage of people to be highly annoyed by the new noise and represents the most compelling need for mitigation. Noise mitigation will normally be specified for severe impact areas unless there are truly extenuating circumstances that prevent it. Severe impact means that commuter rail service is predicted to substantially increase noise exposures at sensitive land uses adjacent to the track.

Figure 10-5 FTA Project Noise Impact Criteria



Source: FTA, 2006.

10.3.2 Vibration Impact Criteria

FTA vibration criteria are based on maximum levels for a single event and depend on the type of land use at the receptor and the frequency of train-passing events. For projects in existing rail corridors, such as the Proposed Project, the vibration impact assessment depends on existing vibration conditions in the study area.

FTA has different vibration impact criteria depending on whether a "General Vibration Assessment" or "Detailed Vibration Assessment" method is used. If overall vibration levels are used in the assessment, then the FTA Ground-Borne Vibration and Ground-Borne Noise Impact Criteria for General Assessment are used. Table 10-3 presents FTA's vibration impact criteria based on the land use category or special-use building and the frequency of train events. If vibration levels separated into different frequency bands, such as one-third octave bands, is measured or predicted, then the FTA's Criteria for Detailed Vibration Analysis are often used to assess impact. The FTA criteria for General Assessment are more conservative than the criteria for Detailed Assessment.

Similar to noise, vibration impact also depends on existing conditions in active rail corridors and whether the proposed Project would substantially increase existing vibration generated by train operations. The following criteria apply to projects along existing passenger rail or freight corridors.

- For existing rail corridors with infrequent use (defined as fewer than five trains per day), FTA recommends that the standard vibration impact criteria be used (see Table 10-3). Since there will be fewer than 30 train pass-by events per day for Phase 1 along the Middleborough Secondary, the absolute vibration threshold criteria for "infrequent" events (see Table 10-3) are applied to this project.

Table 10-3 FTA Ground-Borne Vibration and Ground-Borne Noise Impact Criteria for General Assessment

	Ground-Borne Vibration Levels (VdB)[1]			Ground-Borne Noise Levels (dBA)[2]		
Land Use Category	**Frequent Events[3]**	**Occasional Events[4]**	**Infrequent Events[5]**	**Frequent Events[3]**	**Occasional Events[4]**	**Infrequent Events[5]**
Category 1: Buildings where low vibration is essential for interior operations.	65	65	65	N/A[6]	N/A[6]	N/A[6]
Category 2: Residences and buildings where people normally sleep.	72	75	80	35	38	43
Category 3: Institutional buildings with primarily daytime use.	75	78	83	40	43	48
TV Studio/ Recording Studios/Concert Hall	65	65	65	25	25	25
Auditorium	72	80	80	30	38	38
Theatre	72	80	80	35	43	43

Source: FTA, 2006.
1 RMS vibration velocity levels are reported in VdB referenced to 1 micro inch per second (ips).
2 Ground-Borne noise levels are reported in dBA referenced to 20 micro Pascals.
3 "Frequent Events" is defined as more than 70 vibration events per day.
4 "Occasional Events" is defined as between 30 and 70 vibration events per day.
5 "Infrequent Events" is defined as less than 30 vibration events per day.
N/A means "not applicable." Vibration-sensitive equipment is not sensitive to ground-borne noise.

10.3.3 Construction Vibration Impact Criteria

During certain construction activities, there is the potential for an increased risk of structural damage to nearby buildings. Potential damage from vibration also depends on how the building is constructed. FTA criteria for potential structural damage are shown in Table 10-4. The criteria are presented in both VdB and peak-particle velocity (PPV) in inches per second (in/s). Structural damage is typically limited to impact-type construction equipment such as pile driving used in very close proximity to buildings (within 25 feet).

Table 10-4 FTA Criteria for Potential Structural Damage

Building Category		Vibration Criteria for Potential Damage to Structures	
		Vibration Level[1] (VdB)	Peak-Particle Velocity (in/s)
I.	Reinforced-concrete, steel or timber	102	0.5
II.	Engineered-concrete and masonry	98	0.3
III.	Non-engineered timber and masonry	94	0.2
IV.	Buildings extremely susceptible to vibration damage	90	0.12

Source: FTA, 2006.
1 Assumes a crest factor of 4 (12 dB)

10.3.4 Prediction Methods

Noise Prediction Methods

The FTA Noise Assessment spreadsheet was used to calculate Project noise levels at each receptor and the distance to moderate and severe impact based on the existing ambient conditions. Since MBTA commuter trains operate on the general rail network along with freight trains, they are required to sound horns that meet FRA noise requirements. Within ¼-mile of grade-crossings, train noise including horn sounding has been predicted using FRA's Horn Noise model.

Train noise predictions depend on several factors including the number of train operations per day, train speed, track type and condition, wheel condition and the presence of wheel flats, the train consist, throttle setting, the presence of intervening obstacles and whether there are track turnouts or crossovers. Track turnouts introduce gaps in the rail running surface that increase noise.

The following are the principal assumptions used to predict train noise from the proposed MBTA operations:

- Each train would have one diesel-electric locomotive and approximately eight passenger coaches.
- The maximum allowable speed would be up to 79 mph.
- 26 daily trains (13 round-trip operations) along the Middleborough Secondary segment including 21 daytime events (7:00 AM to 10:00 PM) and 5 nighttime events (10:00 PM to 7:00 AM).
- Continuous-welded rail will be used which reduces noise generated by gaps in the rail surface.
- Trains will sound their horn in accordance with the FRA's Train Horn Rule (49 CFR Part 222) which requires that horns generate sound between 96 and 110 dBA at a distance of 100 feet in front of the locomotive. The engineer must sound the horn for 15-20 seconds as the train proceeds through the crossing without sounding the horn farther than ¼-mile from the crossing.

Based on the Proposed Project and a range of existing Ldn noise levels between 50 and 70 dBA, the distances to moderate and severe noise impact from train pass-bys has been computed, as shown in Table 10-5. This table shows that the distance to moderate noise impact from train pass-bys ranges from 25 to 200 feet and for severe noise impact ranges from 25 to 130 feet. Table 10-1 shows that existing noise levels in the study area range from 53 to 62 dBA Ldn, which corresponds to severe impact occurring within 60 to 110 feet of the track and moderate impact occurring within 60 to 190 feet of the track.

Table 10-5 Distance to Train Pass-by Noise Impact

Existing Noise Level (Ldn)	Severe Noise Impact Distance (feet)	Moderate Noise Impact Distance (feet)	No Impact Distance (feet)
50	<130	130-200	>200
52	<110	110-190	>190
54	<100	100-190	>190
56	<95	95-190	>190
58	<80	80-190	>190
60	<70	70-170	>170
62	<60	60-140	>140
64	<50	50-110	>110
66	<40	40-95	>95
68	<35	35-75	>75
70	<25	25-60	>60

Source: VHB, 2017.
Note: Shaded area represents distances to impact for existing noise levels in study area.

Horn noise levels were predicted using the FRA's Horn Noise Model which takes into account the number of train operations, the amplitude of the horn, train speed, and existing noise conditions. Horn noise is evaluated within 1/4-mile of each grade-crossing. The horn noise model results are that severe and moderate horn noise impact would occur within 350 and 600 feet, respectively, from the track when the receptors are 1/8-mile to 1/4-mile along the track from the crossing. For receptors that are 1/8-mile or closer along the track from the crossing, the distance to severe and moderate impacts increase to 450 and 750 feet respectively.

Vibration Prediction Methods

Vibration generated by the proposed train operations for Phase 1 has been evaluated based on the FTA's general surface vibration curves, consistent with the methodology employed in the FEIS/FEIR. This includes standard FTA adjustments to predict vibration levels inside buildings. As discussed in Section 10.2.3. vibration measurements were conducted of existing MBTA train operations on the Middleboro line that correlated well with FTA's generalized ground surface vibration curves. The comparison indicates that actual vibration conditions are consistent with the FTA's generalized ground surface vibration curves.

The vibration assessment takes into consideration the number of train operations movements per day, train speed, track type, track condition, and receptor building type. The assumptions used for the vibration analysis are similar to those assumed for the noise analysis in the previous section. Table 10-6 presents the distance to vibration impact, based on an 80 VdB overall vibration criterion, for trains at speeds between 20 and 100 mph assuming standard outdoor-to-indoor vibration reduction for wood-frame buildings. This table shows that vibration impact for trains operating at 79 mph occurs within 110 feet of the track.

Table 10-6 Distance to Vibration Impact

Train Speed (mph)	Distance to Impact at 80 VdB (feet)
100	140
90	130
80	110
70	100
60	90
50	75
40	60
30	30
20	25

Source: VHB, 2017.
Note: Shaded area represents distance to vibration impact for maximum operating speed in study area.

Predicting vibration impacts accurately is a more complex undertaking than noise because ground-borne vibration may be strongly influenced by specific subsurface conditions and the track design. The geotechnical studies that reveal these conditions are normally undertaken during the final design stage after the NEPA process has been completed. Thus, for ground-borne vibration, it is common to rely on a General Assessment to identify potential problem areas. If there are such areas, the FTA recommends that a commitment be made to conduct a Detailed Analysis during final design. Detailed vibration information including frequency content will be available as the Project advances into advanced engineering and final design to verify the need for mitigation and to evaluate the effectiveness of vibration mitigation solutions.

The Massachusetts Department of Transportation (MassDOT) will conduct a "Detailed Vibration Assessment" in the areas where the potential for vibration impact and cost-effective mitigation has been identified. The Detailed Assessment will include conducting "force density" measurements of MBTA train operations in a location on the existing MBTA system where trains operate on continuous-welded rail, at typical speeds, with standard ballast, similar to the proposed Phase 1 operations. The assessment will also include vibration propagation measurements at several locations throughout the study area which quantify how effectively the soil propagates vibration and allows for detailed predictions of future vibration conditions. The detailed vibration predictions will be assessed according to the FTA's Criteria for Detailed Vibration Analysis. If vibration levels exceed the FTA criteria, the results will indicate what vibration mitigation is needed and how it should be designed/specified to effectively reduce vibration.

10.4 Impact Assessment

This section presents the results of the noise and vibration impact assessment for the Middleborough Secondary study area.

10.4.1 Noise Impacts (Train Operations)

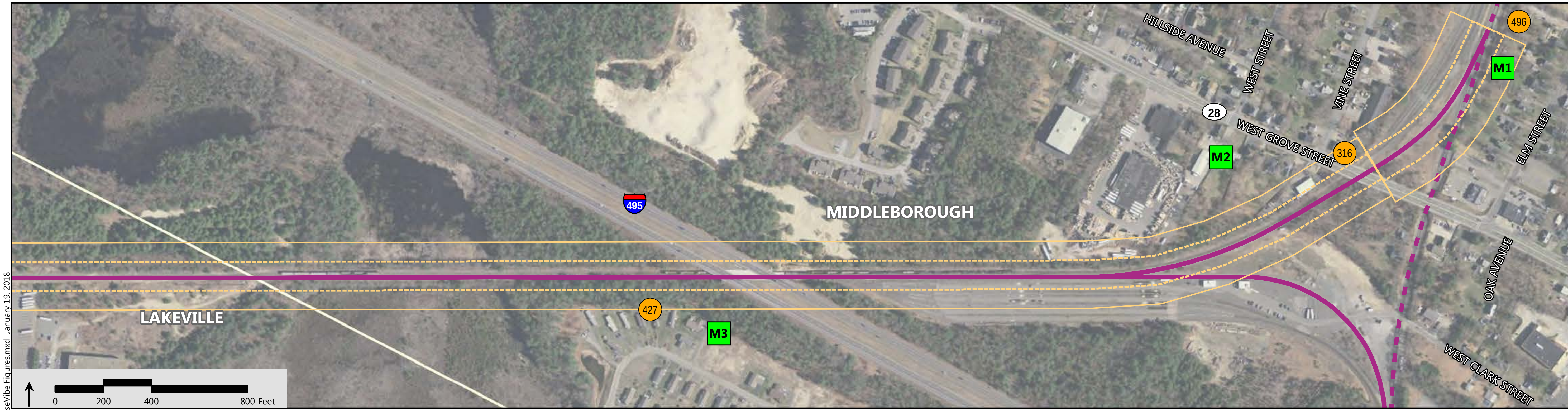
Noise impact has been assessed for Phase 1 at receptors throughout the Middleborough Secondary. As shown in Table 10-7 and Figures 10-6 to 10-9, there will be moderate and severe noise impact at residential (Category 2) receptors in close proximity to the track due to train pass-bys.

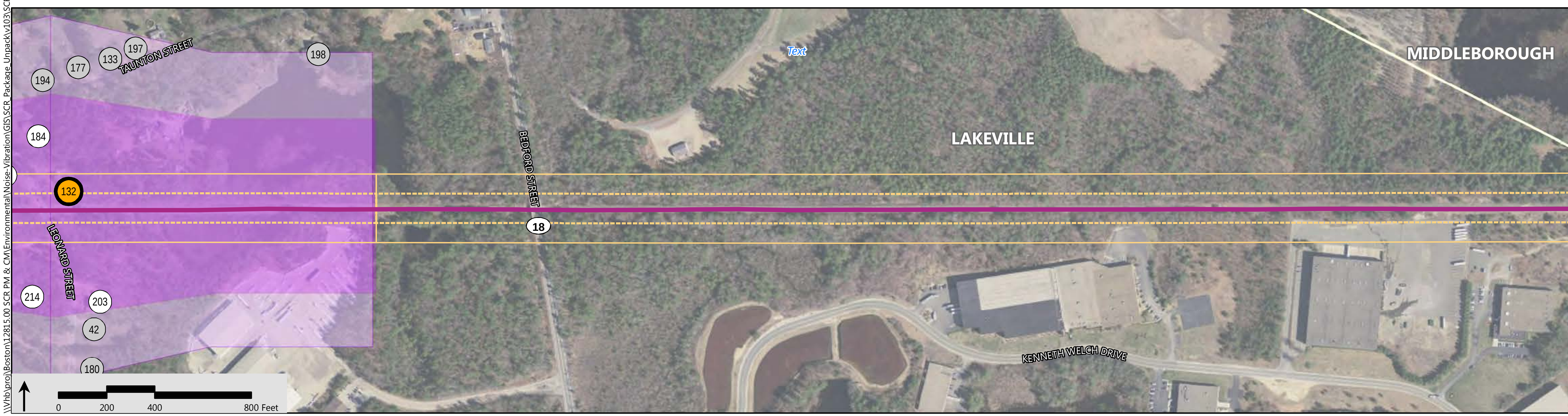
There will be a total of 65 moderate and 24 severe impacts due to train pass-by noise in Taunton with the majority on Battle Row and at the condominiums at 96 Old Colony Avenue. There will be 12 moderate and 6 severe noise impacts due to train pass-bys in Raynham and a total of 8 moderate and 3 severe noise impacts in Lakeville. In Middleborough, there will be 12 moderate impacts and no severe impacts due to train pass-by noise. Overall, there will be a total of 97 moderate and 33 severe impacts due to train pass-by noise in the Middleborough Secondary study area.

SCR SOUTH COAST RAIL

Massachusetts Bay Transportation Authority

Figure 10-6: Noise and Vibration Impact Assessment





- Existing Commuter Rail Service
- Phase 1 Commuter Rail Service
- Full Build Commuter Rail Service
- Proposed Noise Barrier
- Proposed Vibration Mitigation
- Noise Measurement Site
- Noise and Vibration Measurement Site
- Train Passby Noise Impact (Moderate)
- Train Passby Noise Impact (Severe)
- Horn Noise Impact (Moderate)
- Horn Noise Impact (Severe)
- Vibration Impact (Annoyance)
- Train Passby Noise Impact Zone (Severe) -Phase 1 Operations
- Train Passby Noise Impact Zone (Moderate) - Phase 1 Operations
- Train Passby Noise Impact Zone (Severe) - Full Operations
- Train Passby Noise Impact Zone (Moderate) - Full Operations
- Horn Noise Impact Zone (Severe)
- Horn Noise Impact Zone (Moderate)
- Town Boundary

Source Info: MassGIS, VHB, ESRI

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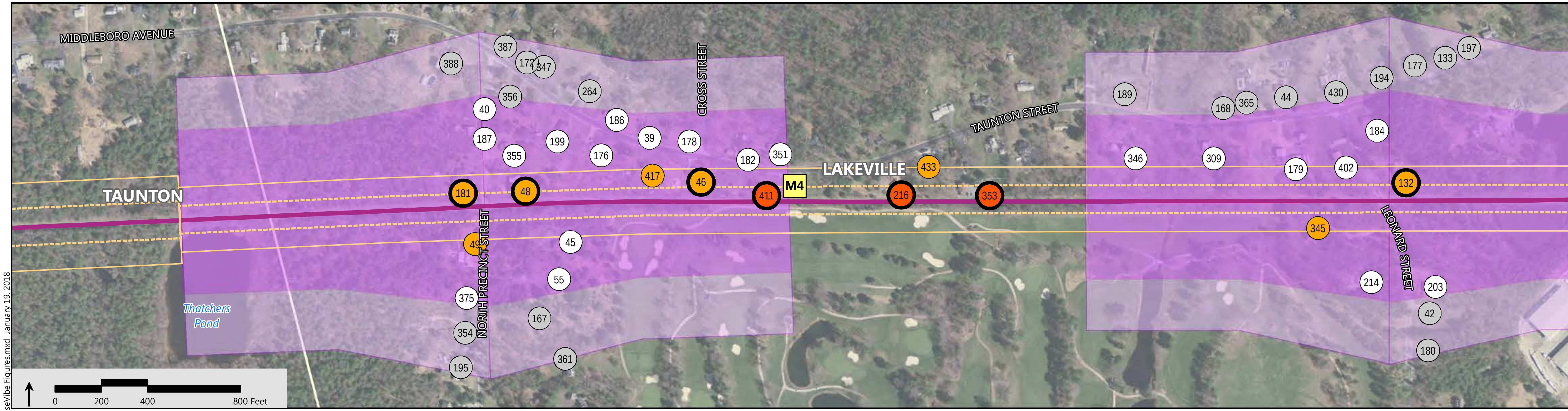
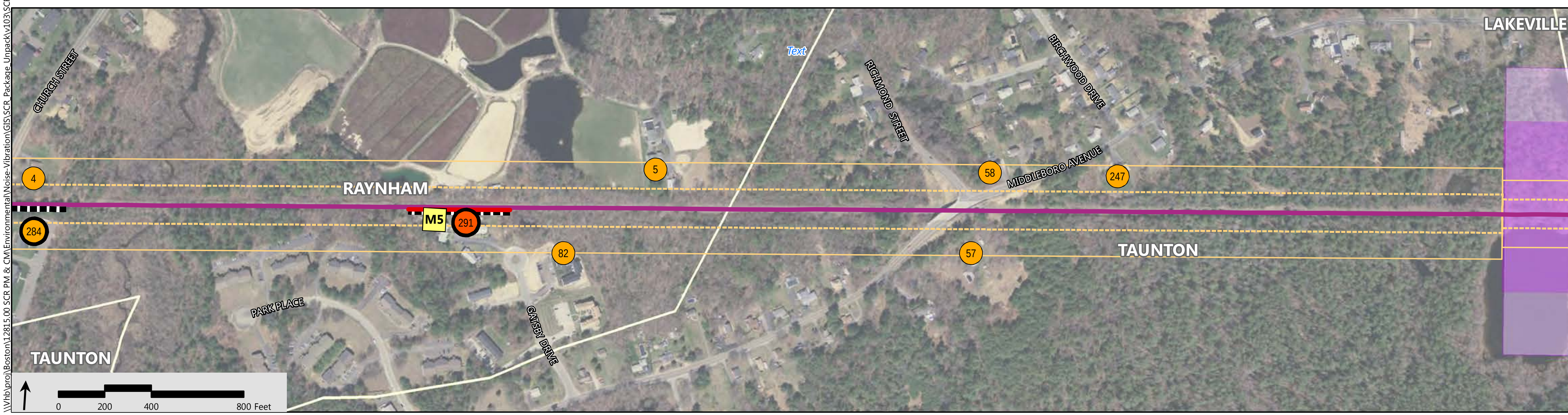
Massachusetts Bay Transportation Authority

Figure 10-7: Noise and Vibration Impact Assessment





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- Existing Commuter Rail Service
- Phase 1 Commuter Rail Service
- Full Build Commuter Rail Service
- Proposed Noise Barrier
- Proposed Vibration Mitigation
- Noise Measurement Site
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- Train Passby Noise Impact (Severe)
- Horn Noise Impact (Moderate)
- Horn Noise Impact (Severe)
- Vibration Impact (Annoyance)
- Train Passby Noise Impact Zone (Severe) -Phase 1 Operations
- Train Passby Noise Impact Zone (Moderate) - Phase 1 Operations
- Train Passby Noise Impact Zone (Severe) - Full Operations
- Train Passby Noise Impact Zone (Moderate) - Full Operations
- Horn Noise Impact Zone (Severe)
- Horn Noise Impact Zone (Moderate)
- Town Boundary

Source Info: MassGIS, VHB, ESRI

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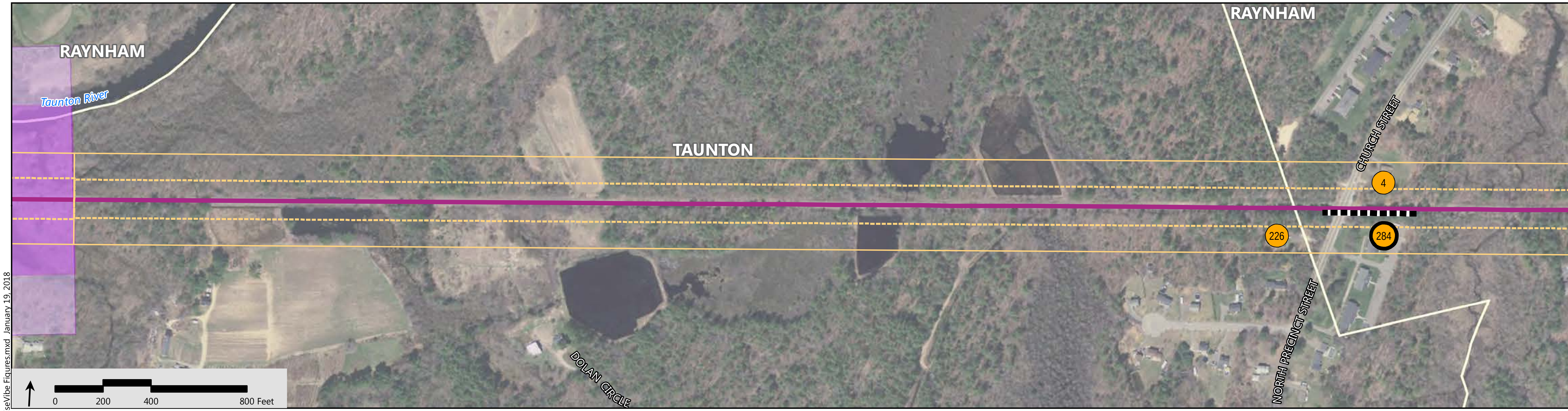

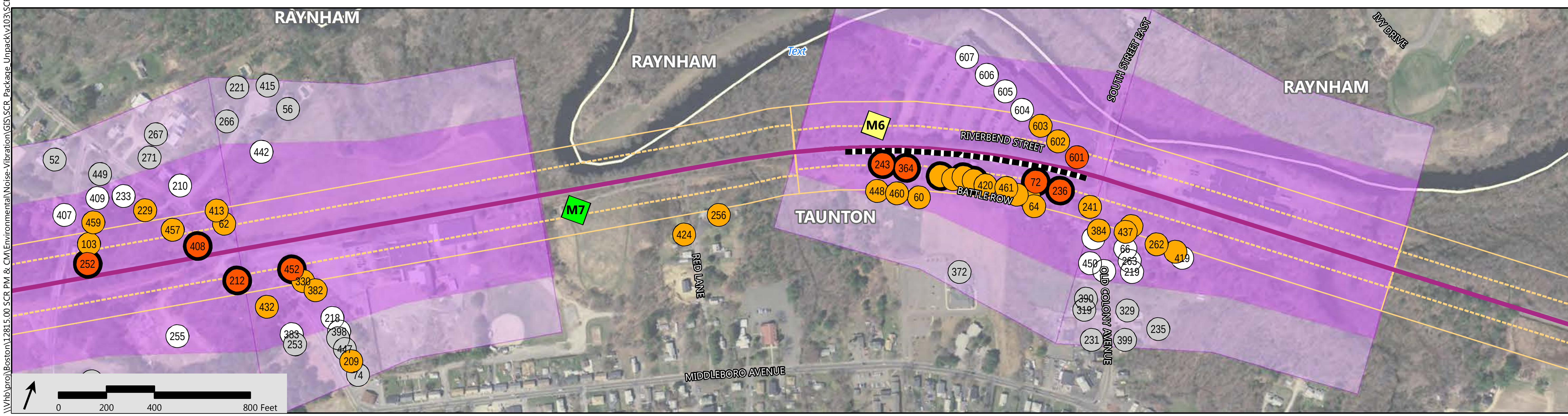

- Existing Commuter Rail Service
- Phase 1 Commuter Rail Service
- Full Build Commuter Rail Service
- Proposed Noise Barrier
- Proposed Vibration Mitigation
- Noise Measurement Site
- Noise and Vibration Measurement Site
- Train Passby Noise Impact (Moderate)
- Train Passby Noise Impact (Severe)
- Horn Noise Impact (Moderate)
- Horn Noise Impact (Severe)
- Vibration Impact (Annoyance)
- Train Passby Noise Impact Zone (Severe) -Phase 1 Operations
- Train Passby Noise Impact Zone (Moderate) - Phase 1 Operations
- Train Passby Noise Impact Zone (Severe) - Full Operations
- Train Passby Noise Impact Zone (Moderate) - Full Operations
- Horn Noise Impact Zone (Severe)
- Horn Noise Impact Zone (Moderate)
- Town Boundary

Source Info: MassGIS, VHB, ESRI

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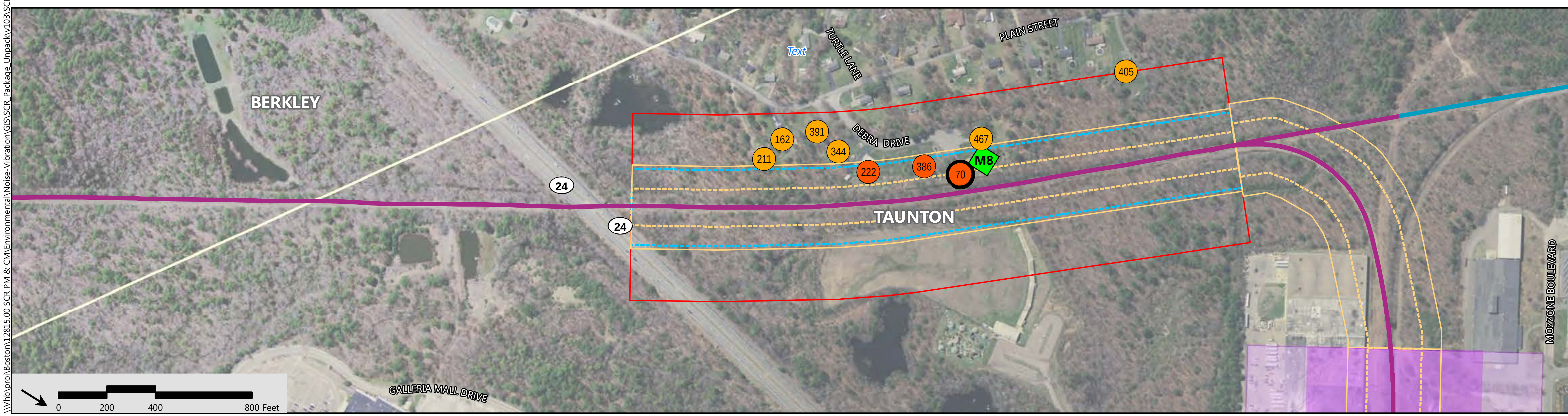
Massachusetts Bay Transportation Authority



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- Existing Commuter Rail Service
- Phase 1 Commuter Rail Service
- Full Build Commuter Rail Service
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- Proposed Vibration Mitigation
- Noise Measurement Site
- Noise and Vibration Measurement Site
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- Horn Noise Impact (Moderate)
- Horn Noise Impact (Severe)
- Vibration Impact (Annoyance)
- Train Passby Noise Impact Zone (Severe) -Phase 1 Operations
- Train Passby Noise Impact Zone (Moderate) - Phase 1 Operations
- Train Passby Noise Impact Zone (Severe) - Full Operations
- Train Passby Noise Impact Zone (Moderate) - Full Operations
- Horn Noise Impact Zone (Severe)
- Horn Noise Impact Zone (Moderate)
- Town Boundary

Source Info: MassGIS, VHB, ESRI

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Table 10-7 Train Pass-by Noise Impact Assessment, Middleborough Secondary

Municipality / Receptor Location	Land Use Category	Existing Noise Exposure (Ldn, dBA)	Project Noise (Ldn, dBA) Resulting in Impact		Train Pass-by Noise Impacts[1]	
			Moderate	Severe	Moderate	Severe
Middleborough						
West Grove/ Wesley Cr/ Court End Ave	2	60 - 62	59 - 61	n/a	12	0
Lakeville						
Leonard St	2	62	61 - 62	n/a	2	0
Taunton St	2 & 3	50 - 62	59 - 61	67 – 69	3	3
North Precinct St	2	62	59 - 63	n/a	3	0
Raynham						
Church St/ Richmond St/ Gatsby Dr.	2	59	57 - 62	63	12	6
Taunton						
Middleboro Ave and Precinct St	2	59	58 - 60	n/a	4	0
Battle Row and Old Colony Ave	2 & 3	50 - 58	55 - 62	63 – 65	42	16
Stevens St and Middleboro Ave	2	50 - 53	55 - 59	62 – 63	13	5
Debra Dr[2]	2	60	59 - 60	63	6	3
Total					97	33

Source: VHB, 2017.

1 Impacts are number of dwelling units for Category 2 land uses.

2 Assessment at Debra Drive includes proposed East Taunton Station with full passenger service.

As shown in Table 10-8, there will be additional noise impacts due to train horn soundings at grade-crossings. There will be an additional 26 moderate and 66 severe noise impacts due to horn noise in Taunton, particularly near the Old Colony Avenue grade crossing. In Lakeville, there will be an additional 22 moderate and 20 severe noise impacts due to train horn soundings at grade-crossings. There will be a total of 48 moderate and 86 severe additional impacts due to train horn noise in the Middleborough Secondary study area. No additional noise impacts associated with train horn soundings will occur in Raynham and Middleboro.

Table 10-8 Train Horn Noise Impact Assessment, Middleborough Secondary

Municipality / Receptor Location	Land Use Category	Moderate Horn Noise Impacts[1]	Severe Horn Noise Impacts[1]
Middleborough			
West Grove/ Wesley Cr/ Court End Ave	2	0	0
Lakeville			
Leonard St	2	2	3
Taunton St	2	16	11
North Precinct St	2	4	6
Raynham			
Church St/ Richmond St/ Gatsby Dr	2	0	0
Taunton			
Middleboro Ave and Precinct St	2	0	0
Battle Row and Old Colony Ave	2	7	55
Stevens St and Middleboro Ave	2	19	11
Debra Dr	2	0	0
Total		48	86

Source: VHB, 2017.
1 Impacts are number of dwelling units for Category 2 land uses.

As summarized in Table 10-9, there will be a total of 97 moderate and 33 severe impacts due to train pass-by noise and an additional 48 moderate and 86 severe impacts due to train horn noise at grade crossings along the Middleborough Secondary. Since there are severe noise impacts due to train pass-by noise, there is a need to evaluate mitigation, such as noise barriers or building sound insulation, according to the MBTA Noise Mitigation Policy. This evaluation is further detailed in Section 10.5 below.

Table 10-9 Summary of Noise Impacts, Middleborough Secondary

Area	Moderate Pass-by Noise Impacts[1]	Severe Pass-by Noise Impacts[1]	Moderate Horn Noise Impacts[1]	Severe Horn Noise Impacts[1]
Middleborough	12	0	0	0
Lakeville	8	3	22	20
Raynham	12	6	0	0
Taunton	65	24	26	66
Total	97	33	48	86

Source: VHB, 2017.
1 Impacts are number of dwelling units for Category 2 land uses.

10.4.2 Vibration Impacts

Vibration impact has been assessed for the proposed Phase 1 at receptors throughout the Middleborough Secondary. As shown in Table 10-10 and Figures 10-7 to 10-10, there will be a total of 30 receptors along the Middleborough Secondary with overall vibration levels exceeding 80 VdB. Since there are vibration impacts in the Middleborough Secondary study area, MassDOT will conduct a Detailed Vibration Assessment during final design in accordance with FTA guidelines, as described in Section 10.3.4, to verify the need for mitigation and to design/specify effective vibration mitigation solutions.

Table 10-10 Vibration Impact Assessment, Middleborough Secondary

Municipality / Receptor Location	Land Use Category	Vibration Impacts
Middleborough		
West Grove/ Wesley Cr/ Court End Ave	2	0
Lakeville		
Leonard St	2	1
Taunton St	2	4
North Precinct St	2	2
Raynham		
Gatsby Dr.	2	6
Church St	2	4
Taunton		
Battle Row and Old Colony Ave	2	7
Stevens St and Middleboro Ave	2	5
Debra Dr.	2	1
Total		30

Source: VHB, 2017.
1 Impacts are number of dwelling units for Category 2 land uses.

10.5 Mitigation

This section presents the results of the noise and vibration mitigation evaluation for the Middleborough Secondary study area, and discusses compliance with the MBTA's Train Pass-by Noise Mitigation Policy. See the FEIS/FEIR for information on noise and vibration mitigation for the Southern Triangle south of the proposed East Taunton Station as it relates to Phase 1 and for the Full Build.

10.5.1 Overview of MBTA Train Pass-by Noise Mitigation Policy

The need for noise mitigation in a specific location is determined based on the magnitude of the impacts and consideration of other factors such as safety, maintenance, constructability, feasibility, cost-effectiveness, and community input. The FTA guidance requires consideration of mitigation for severe impacts and outlines the available mitigation options. FTA allows transit providers to develop local agency-specific noise mitigation policies detailing the analysis process and criteria for their projects. MBTA has developed a noise mitigation policy consistent with the FTA guidance, the details of which are described below.

The MBTA is committed to providing noise mitigation for the locations that meet or exceed the Severe Noise Impact Level due to train pass-by noise. Noise mitigation measures will be provided to the extent that it is reasonably cost-effective. Where noise levels are projected to occur above the Severe Noise Impact Level, the MBTA may consider a reduced level of noise mitigation that is proportional to the level of impact over the threshold level and which, again is reasonably cost-effective.

The Severe Noise Impact Level is reached when the projected noise level from the project significantly exceeds the ambient noise level. Noise impacts are assessed at the outside of the building, at the corner or wall closest to the tracks, at 5 feet above the ground. Where sensitive land uses such as residences (as defined in the FTA guidelines) are impacted at the Severe Noise Impact Level, the MBTA will provide noise barriers or other noise-mitigation measures designed to reduce the noise impact, if cost-effective. Such measures will be considered cost-effective by the MBTA if the total cost of the barrier or other mitigation measure is less than $30,000 per dwelling unit.

There are several other factors that are considered in regard to mitigation recommendations including;

- Safety factors, such as maintaining adequate lines of sight near highway-rail grade crossings and maintaining adequate setback from buildings, the tracks and roads in the event of an accident,
- The ability to maintain the barrier and provide access to existing utilities,
- The constructability of a potential barrier in regard to structural requirements and barrier height limitations,

- The acoustical effectiveness of potential barriers (noise barriers must be effective in reducing noise levels below the impact threshold), and
- Viewpoints from the public in regard to their interest in getting noise barriers.

As the Project advances into final design, noise impact and specific noise mitigation measures will be evaluated in relation to these factors. The MBTA would initially evaluate the severe impact locations to determine if a noise barrier would be safe, maintainable, constructible, acoustically effective and cost-effective. Where noise barriers are not safe, maintainable, constructible, acoustically effective of cost-effective by the above standard of the MBTA noise mitigation policy, the MBTA would consider providing funding for building soundproofing enhancements. The cost-effectiveness criterion for building soundproofing would be $5,000 per dwelling unit per decibel of noise impact projected above the Severe Noise Impact Level (not to exceed $30,000 total). For example, if a dwelling unit is expected to have noise impact 3 decibels (using the Ldn metric) above the Severe Noise Impact Level, the building noise mitigation measures would be funded not to exceed $15,000 in cost for that dwelling unit. The $5,000 per dwelling unit per decibel figure was calculated by dividing the $30,000 total cost-effectiveness limit by 6 decibels, which is the typical difference between the "moderate" impact and "severe" impact thresholds.

Property owners that would be affected by noise above the Severe Noise Impact Level, and who may be eligible for building soundproofing under these guidelines, would be consulted during the advanced engineering design phase of the project. The MBTA would permit these homeowners to identify preferred building noise mitigation measures for their property from a list of potential measures that would be provided by the MBTA. The list would include measures such as window replacement or sound insulation in the house, provided that the MBTA noise consultants determine that such measures are reasonably effective as noise reducing techniques in the context of the specific location involved. Where a homeowner elects to have work done on his or her property, he or she would be responsible for selecting the contractor and obtaining necessary permits, and the MBTA would pay the contractor's bills from its own funds (thus avoiding the need for the homeowner to come "up front" with cash resources) up to the specified dollar limit for the particular location and noise condition involved.

The list of eligible measures may also include reduced-height noise barriers or similar measures, subject to the cost-effectiveness limit, in cases where a homeowner determines that despite the lack of acoustical effectiveness of the reduced-height barrier, the homeowner prefers the psychological "space" created by the barrier over the actual noise reduction achieved. Similarly, homeowners in this category may elect, singly or in concert with other similarly affected homeowners, to install measures that may not reduce exterior noise levels, or may not be fully effective in reducing interior noise levels. Some of these mitigation measures, such as air conditioning (to allow residents to keep their windows closed when sleeping) may not effectively reduce interior noise levels. As a result, there would be no guarantee that any particular level of noise reduction would be achieved based upon measures selected by the homeowner.

The MBTA's role would be limited to evaluating potential noise mitigation options and paying for the installation of appropriate noise mitigation treatments. The homeowner would obtain guarantees for equipment or for workmanship from their contractors. Future replacement or maintenance would be the responsibility of the homeowner. Homeowners would be expected to enter into letter agreements with the MBTA acknowledging this understanding as a condition of proceeding with the installation of noise mitigation measures under this policy.

10.5.2 Middleborough Secondary Proposed Noise Mitigation Plan

This section presents a summary of the proposed noise mitigation measures for the severe train pass-by noise impacts associated with the Middleborough Secondary study area. The severe noise impact locations were evaluated to identify the potential noise mitigation measures, either noise barriers or building soundproofing in accordance with the MBTA noise mitigation policy described above. The noise impact locations and proposed noise barrier are presented in Figures 10-7 to 10-10. A listing of the severe noise impact locations and their proposed noise mitigation measures are presented in Appendix E, *Noise and Vibration Analysis*. The following is a summary of the proposed noise mitigation measures by municipality.

As shown in Table 10-11, a noise barrier will be cost-effective to mitigate six severe noise impacts at Gatsby Drive in Raynham. This noise barrier will be approximately 400 feet long, approximately 15 feet tall and cost $20,000 per benefited dwelling unit, which is below the $30,000 per dwelling unit criterion. Building soundproofing is the most cost-effective noise mitigation for the remaining 27 severely impacted noise sensitive receptors due to the low density of residences at those noise impact locations.

Table 10-11 Train Pass-by Noise Mitigation Assessment, Middleborough Secondary

Municipality/Receptor Location	Severe Train Pass-by Noise Impacts[1]	Noise Mitigation	Barrier Length (feet)	Barrier Cost at $20/SF	Cost per Dwelling Unit
Lakeville					
Taunton St	3	Sound Insulation			
Raynham					
Gatsby Dr.	6	Noise Barrier	400	$120,000	$20,000
Taunton					
Old Colony Ave	12	Sound Insulation			
Battle Row	4	Sound Insulation			
Stevens St and Middleboro Ave	5	Sound Insulation			
Debra Dr.	3	Sound Insulation			
Total Impacts Mitigated with Soundproofing	27				
Total Impacts Mitigated with Noise Barrier	6				
Noise Barrier Total Length and Costs			400	$120,000	

Source: VHB, 2017.
1 Impacts are number of dwelling units for Category 2 land uses.

10.5.3 Train Horn Noise Mitigation

An option for reducing train horn noise impacts under FRA regulations (49 CFR Parts 222 and 229) would be to establish "quiet zones" at grade crossings. Because of safety improvements made to the at-grade crossings in a quiet zone, train operators would sound horns only in emergency situations rather than as a standard operational procedure.

Establishing a quiet zone requires cooperative action among the municipalities along the rail right-of-way, freight railroads as well as appropriate federal, state and local agencies. The municipalities are key participants as they must initiate the request to establish the quiet zone through application to FRA. In addition, to meet safety criteria, improvements are required at grade crossings; which may include modifications to the streets, raised medians, warning lights, four-quadrant gates and other devices. The FRA regulation also authorizes the use of automated wayside horns at crossings with flashing lights and gates as a substitute for the train horn. While activated by the approach of trains, these devices are pole-mounted at the grade crossings, thereby limit the horn noise exposure area to the immediate vicinity of the grade crossing.

Although the establishment of quiet zones or the use of wayside horns would be very effective noise mitigation measure (eliminating all or nearly all horn noise impacts), considerable design analysis and coordination efforts would be required to determine if these measures are feasible. For NEPA purposes, the establishment of quiet zones is the recommended noise mitigation measure for horn noise impacts. However, this mitigation measure is dependent on actions by local governments in conjunction with numerous other government agencies and cannot be implemented by MassDOT or the U.S. Army Corps of Engineers (USACE).

10.5.4 Unavoidable Noise Impacts

After the proposed noise mitigation measures (noise barriers or building soundproofing) have been finalized, noise impacts may still be present. Noise walls can provide a maximum of approximately 10 dB noise reduction, and usually protect only the yards and ground level floors. Building noise insulation (soundproofing) can provide 10 to 15 dB of additional exterior-to-interior noise reduction, but does not mitigate exterior noise and the building's windows must remain closed to maintain effectiveness.

10.5.5 Vibration Mitigation

The need for vibration mitigation in a specific location is determined based on the magnitude of the impacts and consideration of other factors such as feasibility and cost-effectiveness. The FTA guidance requires consideration of mitigation for vibration impacts and outlines the available mitigation options. FTA allows transit providers to develop local agency-specific noise and vibration mitigation policies detailing the analysis process and criteria for their projects.

The MBTA noise mitigation policy establishes a cost effectiveness criterion of $30,000 per dwelling unit. MBTA also utilizes this same cost effectiveness criterion ($30,000 per benefited receptor) for assessing potential vibration mitigation measures. The purpose of vibration mitigation is to reduce to the extent reasonably feasible, adverse effects from a project at sensitive locations. While the consideration of noise mitigation is well-defined, there is more variability in the approach to vibration mitigation and the specific measures that may be considered. The goal for mitigating potential vibration impact from the Proposed Project is to reduce future vibration levels below the vibration impact criteria.

The effectiveness of specific vibration mitigation measures is dependent on several factors such as the mitigation component design, installation technique and frequencies of concern. The following are common rail/transit system vibration mitigation options:

- Resilient rail fasteners are specially-designed fasteners between the rails and the ties that can reduce vibration by five to 10 VdB at frequencies above 30 to 40 Hz.

- Ballast mats are rubber or other elastomer pads placed in the trackform between the ballast and the sub-grade or ground. These can be effective in reducing vibration levels by as much as 10 to 15 VdB at frequencies above 25 Hz.
- Tire Derived Aggregate (TDA), also known as shredded tires, has also been used to provide track vibration isolation. A typical TDA installation consists of an underlayment of 12 inches of nominally 3-inch size tire shreds or chips wrapped with filter fabric, covered with 12 inches of sub-ballast and 12 inches of ballast above that to the base of the ties. Tests suggest that the vibration attenuation properties of TDA are equal or superior to that of ballast mats.
- Resiliently supported concrete ties have a rubber or other resilient material placed between the ties and the ballast. These ties are can be effective in reducing vibration by up to 10 VdB at frequencies above 15 Hz.
- Similar to noise, special trackwork such as turnouts and crossovers increase vibration levels of the trains. Mitigation may include using special hardware (i.e. flange-bearing or moveable-point frogs in place of standard rigid frogs), relocating special trackwork away from sensitive areas and using continuous welded rail rather than jointed rail.
- Maintenance programs can also be essential for controlling vibration. Maintaining a proper wheel/rail profile, minimizing the number and extent of wheel flats and minimizing potential rail corrugation are important factors. Rail grinding, truing wheels and monitoring wheel/rail profiles can be effective means of reducing potential vibration impact.

Table 10-12 presents the results of the vibration mitigation evaluation for the Middleborough Secondary. This table shows that there will be three locations for installing ballast mats, totaling 1,800 feet at a cost of $322,000 to mitigate potential vibration impact. As described earlier, more detailed vibration data will be available during the advanced engineering phase of the project to verify the need for vibration mitigation and to implement effective solutions.

Table 10-12 Vibration Mitigation, Middleborough Secondary

Municipality / Receptor Location	Vibration Impacts[1]	Length of Ballast Mat (feet)	Cost at $180/ft	Cost per Receptor	Cost Effective
Lakeville					
Leonard St	1	300	$54,000	$54,000	No
North Precinct St and Taunton St	6	2500	$450,000	$75,000	No
Raynham					
Gatsby Dr.	6	400	$72,000	$12,000	Yes
Church St	4	400	$72,000	$18,000	Yes
Taunton					
Battle Row and Old Colony Ave	7	1000	$180,000	$25,714	Yes
Stevens St and Middleboro Ave	5	1000	$180,000	$36,000	No
Debra Dr.	1	300	$54,000	$54,000	No
Total of Cost Effective Ballast Mats		1800	$322,000		

Source: VHB, 2017.
1 Impacts are number of dwelling units for Category 2 land uses.

10.6 Temporary Construction-Period Impacts

10.6.1 Construction Activities

Temporary noise and vibration impacts could result from construction activities associated with utility relocation, grading, excavation, track work and installation of systems components. Such impacts may occur in residential areas and at other sensitive land uses located within several hundred feet of the alignment. The potential for noise impact would be greatest at locations near pile driving operations for structures and at locations close to any nighttime construction activities.

Track Improvements

The Project may cause noise impacts as a result of track construction activities. Construction activities will increase sound levels in adjacent areas; however, these sound level increases will be temporary and will move with construction activities. Since rail replacement activities, which include grading, transporting ballast, and rail construction, will continuously move along the corridor, noise from these activities will only occur for several weeks at any one location. Grade crossing reconstruction activities will occur for a slightly longer duration, since these activities require more time.

Station Construction

Station construction activities may temporarily increase noise in adjacent areas during certain phases of the construction.

10.6.2 Construction Mitigation

MassDOT has indicated that every reasonable attempt will be made to minimize construction noise and vibration impacts. Construction noise control is accomplished by the use of quiet equipment and procedures. Construction vibration control is typically accomplished by the use of construction equipment that generates lower vibration levels, such as using vibratory pile driving or using smaller excavation equipment, when in close proximity to sensitive buildings. Noise guidelines, such as a construction noise and vibration control plan, will be incorporated into construction documents which will conform to local by-laws and ordinances, and state and federal regulations and standards. Specific noise control measures will be reviewed during advanced engineering design and be incorporated into the construction permitting process. Noise specifications will be enforced through a program of field inspection and compliance review.

Most of the track reconstruction will occur during the normal workday. Under special circumstances, where road or rail traffic interruptions have to be minimized, night work may occur. During these conditions, unusually noisy activities will be scheduled during daytime hours to minimize noise impacts to residential areas. The station construction work will occur during the normal workday. Under special circumstances, when night work may occur, unusually noisy activities will be scheduled during daytime hours to minimize noise impacts to residential areas.

10.7 Summary of Phase 1 Noise and Vibration Impacts

This section provides a summary of the noise and vibration impacts for Phase 1, including the new elements (Middleborough Secondary) and the Southern Triangle, based on information presented in the FEIS/FEIR.

Table 10-13 Summary of Noise Impacts, Phase 1

Area	Moderate Pass-by Noise Impacts[1]	Severe Pass-by Noise Impacts[1]	Moderate Horn Noise Impacts[1]	Severe Horn Noise Impacts[1]
Middleborough	12	0	0	0
Lakeville – Middleborough Secondary	8	3	22	20
Raynham	12	6	0	0
Taunton	65	24	26	66
Berkley – Fall River Secondary	13	8	0	
Berkley – New Bedford Main Line	18	6	37	6
Lakeville – Fall River Secondary	0	0	0	0
Lakeville – New Bedford Main Line	21	3	11	6
Freetown – Fall River Secondary	84	21	98	164
Freetown- New Bedford Main Line	2	2	21	29
Fall River	473	152	0	0
New Bedford	91	3	24	6
Total	799	799	239	86

Source: VHB, 2017: South Coast Rail FEIS/FEIR, 2013
1 Impacts are number of dwelling units for Category 2 land uses.

Table 10-14 Summary of Vibration Impacts, Phase 1

Area	Residential Impacts
Middleborough	0
Lakeville – Middleborough Secondary	7
Raynham	10
Taunton	13
Berkley – Fall River Secondary	8
Berkley – New Bedford Main Line	12
Lakeville – Fall River Secondary	0
Lakeville – New Bedford Main Line	7
Freetown – Fall River Secondary	22
Freetown- New Bedford Main Line	9
Fall River	123
New Bedford	10
Total	221

Source: VHB, 2017: South Coast Rail FEIS/FEIR, 2013
1 Impacts are number of dwelling units for Category 2 land uses.

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11. Cultural Resources

11.1 Introduction

This chapter identifies the effects to cultural resources that may result from implementing Phase 1 of the South Coast Rail (SCR) Project (the Project). This section describes the potential impacts to identified cultural resources within the Area of Potential Effects (APE) for the Phase 1 Study Area, as well as steps that may be taken to avoid, minimize, or mitigate any adverse impacts to significant historic and archaeological properties. Impact analyses are based on the cultural resource reconnaissance and identification surveys that have been completed to date for the Phase 1 Study Area, including updated existing conditions information for Project elements that were surveyed as part of the 2009 and 2013 cultural resource reconnaissance and intensive surveys completed for the Final Environmental Impact Statement (FEIS)/Final Environmental Impact Report (FEIR). Because of their extensive documentary nature, the results of the 2009 and 2013 surveys are included with this Draft Supplemental Environmental Impact Report (DSEIR) by reference.

11.1.1 Resource Definition

For the purposes of this section, "cultural resources" refers to historic above-ground buildings, structures, and areas/districts (collectively referred to as "historic resources") and below-ground archaeological sites and archaeologically sensitive areas (collectively referred to as "archaeological resources") within and adjacent to the Phase 1 Study Area. Archaeological resources include sites of significance to Native American tribes.

Direct impacts to historic resources could occur during the construction phase from the physical alteration of buildings, structures, and landscape or setting components within areas/districts, including demolition. Indirect impacts on historic resources could result during construction and/or operations from elevated noise or vibration levels, changes to the visual setting, increased traffic, or other environmental conditions affecting historic buildings, structures, and areas/districts. Direct impacts to archaeological resources could result from ground-disturbing construction activities in places where recorded/documented and under-documented pre-contact/contact Native American and post-contact EuroAmerican resources are, or could be, present.

11.1.2 Methodology

The 2017 historic reconnaissance surveys were conducted to determine the potential for the new Phase 1 Project elements to contain known or potentially significant historic resources. The 2017 archaeological reconnaissance surveys were conducted to determine the potential for the new Phase 1 Project elements to contain potentially significant pre- and post-contact archaeological resources. The archaeological reconnaissance surveys were conducted under a State Archaeologist's permit (950 CMR

70), issued by the Massachusetts Historical Commission (MHC) in May 2017 for the Middleborough Secondary and amended in August 2017 to include the Pilgrim Junction Station, East Taunton Station, Freetown Station, and Fall River Depot Station.

Historic Resources

Historic architectural resources reconnaissance surveys were conducted for the Phase 1 Study Area including new Project elements (the Middleborough Secondary right-of-way (ROW) and Pilgrim Junction Station) and previously proposed rail stations included in Phase 1 where Project changes have occurred since the 2009 reconnaissance surveys and the 2013 intensive surveys for the Full Build (East Taunton, Freetown, and Fall River Depot Stations). The APE for historic resources corresponds to direct and indirect impacts from the construction of Project elements and/or operations. The Project APE for historic resources for the 2017 historic survey is defined as 400 feet from either side of the center line and 250 feet around the boundary of proposed station sites. This approach is consistent with the APE approach used in the FEIS/FEIR (see Appendix F, *Cultural Resources* for more information).

The Massachusetts Department of Transportation (MassDOT) conducted historic aboveground reconnaissance surveys in 2017 consisting of research, windshield/walkover survey, and assessment. The research included a review of MHC Massachusetts Cultural Resource Inventory System (MACRIS) historic inventory and National Register of Historic Places (National Register) and State Register of Historic Places (State Register) files and any historic aboveground survey reports completed since the 2009 reconnaissance and 2013 intensive surveys to update information regarding known historic buildings, structures, and areas/districts in the new Phase 1 Project elements.

Historic town maps and atlases, historical U.S. Geological Survey (USGS) topographical maps, historical aerial imagery, and assessor's databases were used to assist in identifying resources built through 1967. Railroad valuation maps and bridge inventories were consulted for information about any historic resources that may be associated with the railroad ROW.

Fieldwork consisted of a windshield/walkover survey to collect existing conditions data. The windshield survey was designed to update photographs and data as needed for historic resources that have had significant changes since the 2009 reconnaissance and 2013 intensive surveys and to collect reconnaissance-level information for any new resources being added to the survey for Phase 1. A walkover survey was completed for the Middleborough Secondary ROW and the Pilgrim Junction, East Taunton, Freetown, and Fall River Depot Stations. Notes on the current aboveground conditions were recorded on current Project maps, and digital photographs were taken.

The results of the research and the windshield/walkover survey were used to confirm or update the designation status of historic resources and to update and develop recommendations regarding the potential National Register and State Register eligibility of historic resources.

Archaeological Resources

Archaeological reconnaissance surveys were conducted where ground disturbances may occur for improvements within new Phase 1 Project elements (the Middleborough Secondary ROW and Pilgrim Junction Station) and previously proposed rail stations where project changes have occurred since the 2009 archaeological reconnaissance surveys and 2013 intensive surveys for the Middleborough Secondary and Full Build alternative (East Taunton Station, Freetown Station, and Fall River Depot Station). The Project APE for archaeological resources corresponds to the entirety of the Middleborough Secondary ROW that includes the existing track structure, and the proposed station footprints that include platforms, parking lots, access driveways, and associated infrastructure where direct ground disturbances related to construction are proposed.

The 2017 archaeological reconnaissance surveys consisted of research, walkover survey, and sensitivity assessment. The research included a review of MHC archaeological site files and any archaeological survey reports completed since the 2009 reconnaissance and 2013 intensive surveys to update information regarding known pre-contact Native American and post-contact EuroAmerican sites in the new Phase 1 Project elements. Available environmental data were also reviewed to assist in identifying past land uses and soil characteristics. Historic town maps and atlases, historical USGS topographical maps, and historical orthoimagery were used to assist in understanding the nature and extent of past land uses, and local historical associations were contacted for additional land use information as needed.

Fieldwork consisted of a walkover survey to collect existing conditions data including information on previous disturbances that may affect the integrity of any archaeological deposits. The walkover survey included close ground surface inspection to identify visible archaeological deposits including isolated and/or concentrations of artifacts. Notes on the current ground surface conditions were recorded on current project maps, and digital photographs were taken.

The results of the research and walkover survey were used to develop sensitivity rankings and formulate predictive statements concerning the potential for the presence of significant archaeological resources. Archaeological sensitivity for Native American sites was determined by assessing the key environmental attributes, the presence of documented sites in and adjacent to the Project APE, and the degree of previous disturbances. The key environmental attributes are proximity to fresh or salt water, well-drained soils, and level topography. Archaeological sensitivity for EuroAmerican sites was determined by accessing information collected during the research and walkover. Numerous large-scale surveys have determined that historic EuroAmerican sites are not directly correlated with specific environmental variables and that documentary information is not always entirely accurate. As a result, documentary research used in conjunction with an evaluation of the physical condition and the presence of visible sites is the most useful approach to determining post-contact period sensitivity.

11.1.3 Requirements of the NPC Certificate

The Notice of Project Change (NPC) Certificate, dated May 26, 2017, requires that the DSEIR describe potential impacts (direct, indirect, temporary, and permanent) associated with Phase 1 to historic and archaeological resources, including sites of significance to native people. This includes evaluation of impacts to cultural resources associated with, but not limited to, noise and vibration, traffic, visual, physical modifications, and air quality, based on additional archaeological and historic surveys conducted along the Middleborough Secondary and at new station locations. The NPC Certificate affirms that MassDOT will work with U.S. Army Corps of Engineers (USACE), MHC, and other Section 106 parties to update the draft Programmatic Agreement (PA), which was developed as part of the review of the overall project, to accurately reflect the conditions and effects of Phase 1.

In response to the Project NPC, the MHC requested that the previously developed draft PA for the Full Build be revised to incorporate previous comments and the Phase 1 Project modifications. The MHC also requested Project information for Phase 1, including the DSEIR, scaled existing and proposed conditions Project plans at the 30 percent design phase, the draft Cultural Resources Management Plan with the USACE finding and final determinations regarding potential effects, and recommendations for additional archaeological survey, for review and comment.

As required by the NPC Certificate, the results of archaeological and historic investigations conducted for Phase 1 are summarized without revealing sensitive archaeological site locational information, and measures to avoid and minimize adverse impacts and proposed mitigation for any unavoidable impacts to cultural resources are discussed.

11.2 Existing Conditions

11.2.1 Historic Resources

The 2017 historic resources reconnaissance surveys provide an updated assessment for the Phase 1 Project elements to contain known or potentially significant historic resources. The assessment is based on research and windshield/walkover survey of Project elements new to Phase 1 of the SCR Project, as well as updates to previous assessments of Project elements included in Phase 1 surveys that were studied in 2009 and 2013 for the Full Build Alternative (Figures 11.2-1 to 11.2-6).[1],[2],[3]

1 Adams, Virginia H., John J. Daly, Kathleen M. Miller, Jenny Fields Scofield, Quinn R. Stuart, and Allison Cahoon. 2013. Historic Resources Intensive Survey, Evaluation, and Effects, South Coast Rail Project, Canton, Stoughton, Easton, Raynham, Taunton, Berkley, Lakeville, Freetown, New Bedford, Fall River in Southeast Massachusetts. The Public Archaeology Laboratory, Inc. Prepared for Massachusetts Executive Office of Transportation and Public Works, Boston, Massachusetts.

2 Adams, Virginia, Jenny Fields, John Daly, and Melissa Antonelli. 2009. Cultural Resources Reconnaissance Survey, South Coast Rail Project, Volume IV – Architectural Resources Results: Middleborough and Lakeville (Middleborough Secondary; Alternative 2B). The Public Archaeology Laboratory, Inc. Prepared for Massachusetts Executive Office of Transportation and Public Works, Boston, Massachusetts.

3 Adams, Virginia, Jenny Fields, John Daly, and Melissa Antonelli. 2009. Cultural Resources Reconnaissance Survey, South Coast Rail Project, Volume V – Architectural Resources Results: Canton, Stoughton, Easton, Raynham, Taunton (Stoughton Line and Whittenton Branch; Alternative 4). The Public Archaeology Laboratory, Inc. Prepared for Massachusetts Executive Office of Transportation and Public Works, Boston, Massachusetts.

Middleborough Secondary Right-of-Way

The 2017 survey update for the Middleborough Secondary portion of Phase 1, including the 2009 and 2013 survey information and new data collected in 2017, consists of nine areas/districts and 140 individual historic resources within the Project APE. This Project element crosses one city-wide multiple resource area (Taunton Multiple Resource Area, Map ID Tau.C), and one area/district (Old Colony Iron Works–Nemasket Mill Complex, 96 Old Colony Avenue, Map IDs Tau.D, Tau.9, Tau.10, and Tau.11) and contains one individual property (Enoch Williams House, 616 Middleborough Avenue, Map ID Tau.6) listed in the National Register and State Register, all in Taunton. The Project APE for the Middleborough Secondary includes one individual historic resource evaluated eligible for listing in the National Register and State Register by the MHC (Massachusetts Army National Guard Armory–182nd Calvary [Alpha Troop Readiness Center], 1 Elm Street, Middleborough, Map ID Mid.1). It includes one area/district and five historic resources identified as National Register and State Register eligible in the 2009 surveys and confirmed in the survey update. Three of these properties are in Lakeville: the North Lakeville School at 49 Taunton Street (Map ID Lak.8), the John Richmond House at 52 Taunton Street (Map ID Lak.52), and the house at 68 Taunton Street (Map ID Lak.20). An additional three properties are in Taunton: the Corr Manufacturing Company complex on Middleboro Avenue (Map ID Tau.E), the Mitchell House at 125 Middleboro Avenue (Map ID Tau.49), and the Pinehill Cemetery at the corner of Pine Hill and Stevens streets in Taunton (Map ID Tau.59). On the basis of the 2017 survey update, the Middleboro & Taunton Branch railroad is not eligible for listing in the National Register and State Register as it was historically a minor and relatively late rail line when compared to others in the region and is not an important example of railroad construction.

Pilgrim Junction Station

There are no National Register or State Register listed, determined eligible, or eligible historic areas/districts or individual resources within the Pilgrim Junction Station boundary or the APE.

East Taunton Station

There are no National Register or State Register listed, determined eligible, or eligible historic areas/districts or individual resources within the East Taunton Station boundary or the APE.

Freetown Station

There are no National Register or State Register listed, determined eligible, or eligible historic areas/districts or individual resources within the Freetown Station boundary or the APE.

Fall River Depot Station

There are no National Register or State Register listed, determined eligible, or eligible historic areas/districts or individual resources within the Fall River Depot Station Project APE.

11.2.2 Archaeological Resources

The 2017 archaeological reconnaissance surveys provide sensitivity assessments that assign low, moderate, and/or high rankings for Phase 1 Project elements to contain potentially significant pre-contact and post-contact archaeological resources. The sensitivity assessments are based on research and walkover surveys of Project elements new to Phase 1 of the South Coast Rail Project, as well as updates to previous assessments of Phase 1 Project elements reported in 2009.[4]

Middleborough Secondary Right-of-Way

The Middleborough Secondary ROW contains one recorded National Register-eligible pre-contact archaeological site, 19-BR-728 (First Light 2 Site). The site area overlaps slightly with the railroad ROW on the north side of the track and ballast structure in Taunton to allow for a 50-foot buffer zone around significant cultural deposits associated with a cluster of National Register-eligible pre-contact sites located on private lands to the north of the railroad ROW. Over three dozen other pre-contact archaeological sites are recorded within a one-half mile radius of the Middleborough Secondary ROW. No post-contact period resources are recorded within the railroad ROW, but a review of late-eighteenth- and nineteenth-century (pre-1856 railroad) maps of Middleborough, Lakeville, Raynham, and Taunton did not indicate the presence of structures or other improvements to these areas prior to the construction of this section of railroad, with one exception. In the area of present-day East Taunton, the railroad ROW crosses in close proximity to a “forge” complex documented adjacent to the Taunton River on the 1836 map of Taunton. The forge was expanded into an iron works and cotton factory in the late nineteenth century and occupied both sides of the railroad ROW into the twentieth century.

The 2017 reconnaissance survey updated and completed the 2009 archaeological sensitivity assessment for the Middleborough Secondary ROW. Because of the presence of recorded and documented archaeological sites combined with favorable environmental and cultural factors, areas of moderate and high archaeological sensitivity for potentially significant pre-contact and post-contact sites are assigned to 33 segments. These sensitive segments total approximately 18,035 linear feet (3.4 miles) on both sides and outside of the track and ballast structures within the ROW, which averages 75-100 feet wide in most locations. Low sensitivity is assigned to the existing approximately 30-foot wide track and ballast structures where significant archaeological deposits are not expected in previous ground disturbances from the original track construction and over 150 years of maintenance activities.

Pilgrim Junction Station

The Pilgrim Junction Station Project APE contains one recorded pre-contact archaeological site, 19-PL-737 (Sand Pit Site), which overlaps the southeast portion of the proposed access driveway east of

4 Cherau, Suzanne, and Jennifer Banister. 2009. Cultural Resources Reconnaissance Survey, South Coast Rail Project, Volume II – Archaeological Resources Survey Results, Southeast Massachusetts. The Public Archaeology Laboratory, Inc. Prepared for Massachusetts Executive Office of Transportation and Public Works, Boston, Massachusetts.

the existing layover facility between the Middleborough Main Line ROW and South Main Street (Route 105). The site yielded diagnostic stone tools from the Late Archaic, Middle Woodland, and Late Woodland cultural periods, of undetermined National Register eligibility, but was destroyed by the construction of I-495 and a car dealership complex (currently vacant buildings). Mid-to late-nineteenth century town maps depict an iron foundry with blast furnace adjacent to West Grove Street in the Project APE north of the existing layover facility, which was replaced by a residential structure and other residential structures to the east. There are two other pre-contact sites (19-PL-761 and 19-PL-782) recorded within and adjacent to the existing layover facility, south and west of the Project APE.

Because of the presence and proximity of the recorded pre-contact sites and documented post-contact residences, portions of the Project APE on the north side of the existing layover facility are assigned moderate sensitivity for potentially significant pre-contact archaeological sites, and are also assigned moderate sensitivity for post-contact archaeological deposits related to the documented late-nineteenth century domestic dwellings. The remainder of the Project APE including the areas southeast of the existing layover facility and railroad ROW are assigned low archaeological sensitivity because of previous disturbances related to grading and existing structures and paved parking/driveways that have compromised the below-ground soil integrity and potential for any meaningful archaeological contexts to be present. The portion of the Pilgrim Junction Station Project APE that extends slightly into the existing layover facility was previously determined to have low archaeological sensitivity, and no further investigations were recommended when it was originally surveyed in 1992 for the Old Colony Railroad Rehabilitation Project.[5]

East Taunton Station

The East Taunton Station Project APE does not contain any recorded archaeological sites, but there are six pre-contact sites located within one half-mile to the north and one post-contact mill and dam site approximately one mile to the north. A review of late-eighteenth- and nineteenth-century town maps does not indicate the presence of any documented structures or other improvements within the Project APE prior to or post-dating the construction of the Taunton Branch Railroad line in 1840 and the Middleborough and Taunton Branch Railroad line in 1856.

The portion of the Project APE containing a mini-golf and driving range complex and paved roadway was subjected to archaeological reconnaissance survey in 2009 and assigned low sensitivity; At that same time, the adjacent undisturbed forested area to the northwest was assigned moderate sensitivity for primarily pre-contact Native American archaeological resources. There are no changes to the 2009 sensitivity assessment. The 2017 reconnaissance survey was conducted for a larger Project APE to the north, east, and west for the station platform, parking lot, access driveway off Route 140, and associated infrastructure. The majority of the current East Taunton Station Project APE is assigned low

5 Glover, Suzanne, William Begley, and Virginia H. Adams. 1993. Archaeological Reconnaissance Survey and Intensive (Locational) Archaeological Survey of the Old Colony Railroad Rehabilitation Project: Main, Middleborough, and Plymouth Lines, Plymouth and Norfolk Counties, Massachusetts. The Public Archaeology Laboratory, Inc. Prepared for Sverdrup Corporation, Boston, Massachusetts.

sensitivity because of previous disturbances including those identified in 2009 during the reconnaissance survey. Areas of moderate sensitivity are assigned to portions of the three-proposed sediment forebays and stormwater detention basins along the west side of the Project APE. These forested areas are sensitive for primarily pre-contact archaeological resources because of favorable environmental attributes and known sites within a one-half-mile radius.

Freetown Station

The relocated Freetown Station Project APE abuts the north side of the originally-proposed Freetown Station Project APE subjected to an archaeological reconnaissance survey in 2009 and intensive (locational) archaeological survey of sensitive areas in 2013.[6] The intensive survey identified one pre-contact archaeological site of unknown temporal affiliation that contained three pieces of chipping debris in disturbed subsurface soil contexts. The site was not determined to be eligible for listing in the National or State Registers. The Project APE for the relocated station to the north does not contain any recorded archaeological sites. The 2017 reconnaissance survey assigned low archaeological sensitivity to the relocated Project APE based on previous ground disturbances associated with documented sand and gravel pit and landfilling operations and associated soil disturbances, including buried solid waste of unknown origin, that took place in the mid-to-late twentieth century. It is not anticipated that intact, significant pre-contact and post-contact archaeological deposits are present in the Project APE for the relocated station.

Fall River Depot Station

The Project APE on the west side of the Fall River Secondary railroad ROW, except for the southern portion of the proposed driveway, was subjected to archaeological reconnaissance survey in 2009 for the proposed rail station. At the time of the 2009 survey the Project APE contained two buildings: one ca. 1910–1915 industrial brick structure near Pearce Street and one ca. 1920/1930 corrugated metal structure near Davol Street (now demolished). The 2009 Project APE was assigned low archaeological sensitivity for significant archaeological resources. There are no changes to the 2009 sensitivity assessment.

11.3 Impact Assessment

The following sections identify the potential direct and indirect, as well as the permanent and temporary construction, impacts to historic and archaeological resources due to implementation of the new elements of the Phase 1 Project. For each Phase 1 Project element direct, indirect, temporary, and permanent impacts on historic resources are discussed first, followed by the discussion of direct and permanent impacts on archaeological resources. Impact analyses are based on the reconnaissance-level cultural resources identification completed to date. Specific Project elements

6 Cherau, Suzanne, Jenifer Elam, and Jennifer Banister. 2013. Intensive (Locational) Archaeological Survey, Stoughton and Whittenton Alternatives, South Coast Rail Project, Easton, Raynham, Taunton, Freetown, Fall River, and New Bedford, Massachusetts. The Public Archaeology Laboratory, Inc. Prepared for Vanasse Hangen Brustlin, Inc., Boston, Massachusetts.

where intensive survey and evaluation work may be required are discussed. Additional intensive-level surveys and evaluations may be conducted prior to the completion of permitting when more detailed design information is available.

11.3.1 Historic Resources

Potential direct and indirect, as well as temporary construction effects from Phase 1 of the SCR Project were evaluated for historic buildings, structures, and areas/districts that are listed, determined eligible by the MHC in its role as State Historic Preservation Officer (SHPO), or determined eligible by the USACE in consultation with the MHC within the South Coast Rail Project Phase 1 APE. Of the adverse effect criteria specified in 36 CFR 800.5, the following factors have been identified with potential to cause effects to historic aboveground properties listed or eligible for listing in the National Register and State Register:

- Atmospheric from dust and exhaust during construction and operations;
- Noise from construction and train operations; and
- Visual changes to the setting of historic properties and the cultural landscape resulting from new construction elements

A total of one citywide multiple resource area, one area/district, and eight individual historic properties have been identified in the Project APE and may be affected by implementation of Phase 1. These historic properties are listed along with the potential Project effects in Table 11-1 and depicted in Figures 11-1.

Table 11-1 Potential Effects to Historic Properties

Map ID	Town/City	Historic Property	Indirect Noise	Indirect Visual	Adverse Effects
Mid.1	Middleborough	Massachusetts Army National Guard Armory–182nd Calvary (Alpha Troop Readiness Center), 1 Elm Street	n/a	No	No
Lak.8	Lakeville	North Lakeville School, 49 Taunton Street	No	Possible: Proximity to ROW	Possible: Visual
Lak.10	Lakeville	John Richmond House, 52 Taunton Street	No	No	No
Lak.20	Lakeville	House at 68 Taunton Street	Yes Severe horn noise	No	Yes: Noise
Tau.C	Taunton	Taunton Multiple Resource Area, city-wide	n/a	n/a	n/a

Table 11-1 Potential Effects to Historic Properties (Continued)

Map ID	Town/City	Historic Property	Indirect Noise	Indirect Visual	Adverse Effects
Tau.D, Tau.9, Tau.10, and Tau.11	Taunton	Old Colony Iron Works–Nemasket Mill Complex, 96 Old Colony Avenue	Yes: Moderate and severe train passby noise	Possible: Proximity to ROW	No
Tau.E	Taunton	Corr Manufacturing Company, Middleboro Avenue	n/a	Possible: Proximity to ROW	Possible: Visual
Tau.6	Taunton	Enoch Williams House, 616 Middleborough Avenue	No	Possible: Proximity to ROW	Possible: Visual
Tau.49	Taunton	Mitchell House, 125 Middleboro Avenue	Yes: Moderate train and severe horn noise	Possible: Proximity to ROW	Yes: Noise
Tau.59	Taunton	Pinehill Cemetery, corner of Pine Hill and Stevens streets	No	No	No

There will be no direct effects to National Register and State Register-listed or -eligible historic properties on the Middleborough Secondary portion of Phase 1. Project APE. Indirect effects during construction and operations are identified for National Register and State Register-listed or -eligible historic properties. New construction of rail signal houses for train operations and of Positive Train Control antennae and signal houses for underground fiber optic cables (locations not yet determined) may have visual effects on the setting of nearby historic properties.

Indirect impacts during operations could result from the introduction of additional rail service with increased noise from train passbys and horn blowing at grade crossings that will cause moderate to severe noise at residential, contemplative, and quiet setting historic properties. The Rolling Mill and the Office of the Old Colony Iron Works in Taunton, which have been converted to apartments, will be affected by moderate and severe train passby noise, respectively. Moderate train passby noise and severe horn noise will affect the Mitchell House, 125 Middleboro Avenue, Taunton. Severe horn noise impact will occur at the house at 68 Taunton Street, Lakeville.

The Middleborough Secondary is an active rail line; however, changes to infrastructure, introduction of new structures, and vegetation clearing and grading along the Middleborough Secondary could have indirect visual effects on nearby historic properties. Properties that abut the ROW may be affected at the rear property line are North Lakeville School, 49 Taunton Street in Lakeville, and the Enoch Williams House, 616 Middleboro Avenue; Old Colony Iron Works, 96 Old Colony Avenue; Corr Manufacturing Company, Middleboro Avenue; and the Mitchell House, 125 Middleboro Avenue, all in

Taunton. The Pine Hill Cemetery in Taunton is separated from the rail line by another land parcel, and the rail is in a cut with an existing road bridge and around a bend in the road at this location, so there will be no visual effects.

There will be no indirect visual effects to National Register and State Register listed or eligible historic properties from work at grade crossings or at Pilgrim Junction Station on the Middleborough Secondary, East Taunton Station on the New Bedford Main Line, or the Freetown and Fall River Depot Stations on the Fall River Main Line as there are no historic properties within the site boundary or APE of the stations.

11.3.2 Archaeological Resources

The 2017 archaeological reconnaissance surveys identified one National Register-eligible site within the Taunton portion of the Middleborough Secondary ROW, and moderate and high archaeologically sensitive areas in the Middleborough Secondary ROW, the northern portion of the Pilgrim Junction Station Project APE, and along the west portion of the East Taunton Station Project APE. The one recorded National Register-eligible site in the Middleborough Secondary ROW slightly overlaps the ROW on the north side of the existing track and ballast structures. In order to avoid any inadvertent disturbances to significant cultural deposits, MassDOT will develop an archaeological site avoidance and protection plan (SAPP) to be implemented prior to and during construction activities within this section of the railroad ROW.

There will be direct Project impacts to the moderate and high sensitivity areas that extend into the proposed limit of work/limit of grading for the new track and associated infrastructure in the Middleborough Secondary ROW and to the moderate sensitivity areas in the proposed limits of work at Pilgrim Junction Station and East Taunton Station. Intensive (locational) archaeological surveys consisting of subsurface testing will be undertaken to identify any archaeological sites that may be impacted in these sensitive portions of the Project APE. Project impacts will be fully assessed once the intensive surveys in the Middleborough Secondary ROW and at these two proposed stations are complete.

There will be no impacts to archaeological resources in areas assigned low sensitivity in the Middleborough Secondary ROW, portions of the Pilgrim Junction Station and East Taunton Station, and in all of the Freetown Station and Fall River Depot Station parcels. No further archaeological investigations are needed in these low sensitivity areas.

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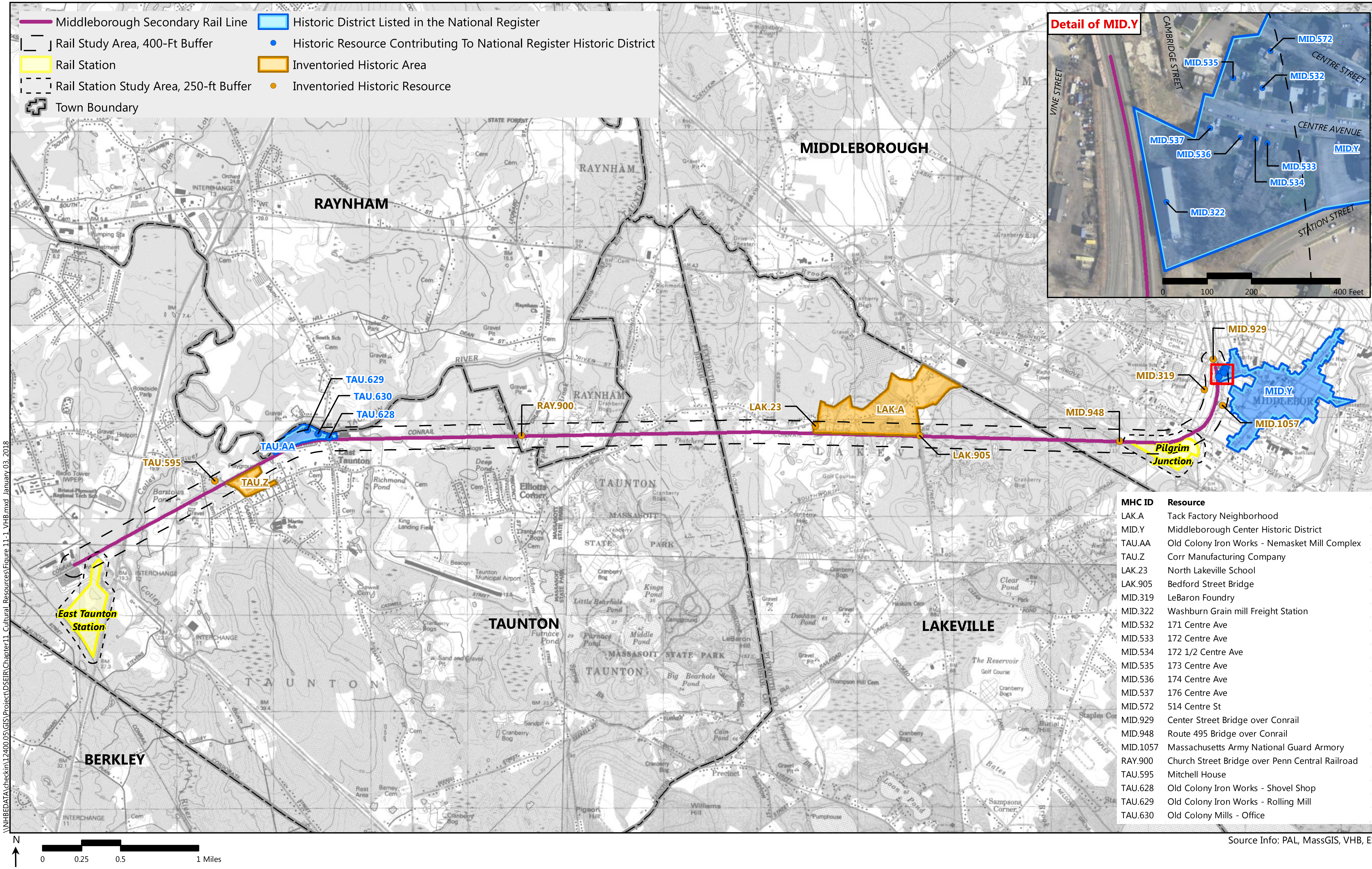
SCR SOUTH COAST RAIL

Massachusetts Bay Transportation Authority

Figure 11-1: Inventoried Historic Aboveground Resoures within 400-ft of the Middleborough Secondary Line



MHC ID	Resource
LAK.A	Tack Factory Neighborhood
MID.Y	Middleborough Center Historic District
TAU.AA	Old Colony Iron Works - Nemasket Mill Complex
TAU.Z	Corr Manufacturing Company
LAK.23	North Lakeville School
LAK.905	Bedford Street Bridge
MID.319	LeBaron Foundry
MID.322	Washburn Grain mill Freight Station
MID.532	171 Centre Ave
MID.533	172 Centre Ave
MID.534	172 1/2 Centre Ave
MID.535	173 Centre Ave
MID.536	174 Centre Ave
MID.537	176 Centre Ave
MID.572	514 Centre St
MID.929	Center Street Bridge over Conrail
MID.948	Route 495 Bridge over Conrail
MID.1057	Massachusetts Army National Guard Armory
RAY.900	Church Street Bridge over Penn Central Railroad
TAU.595	Mitchell House
TAU.628	Old Colony Iron Works - Shovel Shop
TAU.629	Old Colony Iron Works - Rolling Mill
TAU.630	Old Colony Mills - Office

Source Info: PAL, MassGIS, VHB, ESRI

\\NHBEDATA\checkin\12400.05\GIS\Project\DSEIR\Chapter11_Cultural_Resources\Figure 11-1_VHB.mxd January 03, 2018

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11.4 Regulatory Compliance

This section outlines the regulatory compliance requirements for cultural resources. These resources are regulated at the federal and state levels, and are always considered in National Environmental Policy Act (NEPA) and Massachusetts Environmental Policy Act (MEPA) analyses. At the federal level,"; Sections 106 of the National Historic Preservation Act of 1966, as amended and its implementing regulations (36 CFR 800) provides the regulatory framework for the compliance guidelines for the identification and evaluation of cultural resources. At the state level, MGL Chapter 9, Chapter 254, Sections 26-27C, as amended, and 950 CMR 71.00 and 950 CMR 70.00 provide the regulatory framework for the state compliance guidelines, under the jurisdiction of the MHC. Other relevant legislation and regulations include; Executive Order 11593, "Protection and Enhancement of Cultural Environment and the Procedures for the Protection of Historic Properties (Appendix C) at 33 CFR Part 325 – Processing of Department of the Army Permits.

The historic and archaeological resources reconnaissance surveys for Phase 1 of the South Coast Rail Project were undertaken in accordance with the Secretary of the Interior's *Standards and Guidelines for Identification* (48 FR 44720-23), the MHC standards and guidelines set forth in *Public Planning and Environmental Review: Archaeology and Historic Preservation* (1985), and the MHC historic resources survey standards. The surveys comply with the standards of the MHC, State Archaeologist's permit regulations (950 CMR 70), the Secretary of the Interior's *Standards and Guidelines for Identification* (48 FR 44720-23), the Standards of the Massachusetts State Register of Historic Places, and the National Park Service guidelines for assessing eligibility for listing in the National Register, specifically *National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation*. While the surveys conducted to date have informed the impact analysis, additional surveys will be conducted as needed prior to completion of environmental review to further and more specifically assess potential impacts to cultural resources.

11.4.1 National Historic Preservation Act

Section 106 of the National Historic Preservation Act of 1966 as amended (36 CFR 800), seeks to accommodate historic preservation concerns with the needs of federal undertakings through consultation among agency officials and other parties with an interest in the effects of the undertaking on historic properties. The goal of the consultation is to identify historic properties that might be potentially impacted by the undertaking, assess its effects, and seek ways to avoid, minimize, or mitigate any adverse effects on historic properties.

The USACE, as the lead federal agency for the SCR Project, has compliance responsibilities regarding cultural resources under the Procedures for the Protection of Historic Properties (Appendix C) at 33 CFR Part 325 – Processing of Department of the Army Permits, Section 106 of the National Historic Preservation Act as amended, the regulations of the Advisory Council on Historic Preservation (Council) at 36 CFR 800, and NEPA.

11.4.2 Massachusetts General Laws, Chapter 9

MassDOT serves as the lead state agency and is responsible for identifying and evaluating properties through archaeological and historic architectural surveys in accordance with MGL Ch. 9 Sections 26-27C, as amended; 950 CMR 71.00, 950 CMR 70.00, and MEPA. MGL Chapter 9 Sections 26-27C stipulates that any project that requires funding, licenses or permits from any state agency must be reviewed by the MHC.

11.4.3 Programmatic Agreement

USACE will prepare Programmatic Agreements (PAs) for Phase 1 and for the SCR Full Build Project. The PA will establish the process for consultation, review, and compliance with the federal and state historic preservation laws among the USACE, MassDOT, and the SHPO/MHC. A PA differs from a Memorandum of Agreement (MOA) in that MOAs are used to resolve known and definable adverse effects on historic properties that result from a federal undertaking. PAs are used when the effects of an undertaking are not fully known. PAs are also a tool for implementing approaches that do not follow the normal Section 106 process. This is done to streamline and enhance historic preservation and project delivery efforts.

The existing draft PA for the South Coast Rail Preferred Alternative prepared by the USACE in 2016 will form the basis for the outline of the Phase 1 and Full Build Project PAs, although the content for each new PA will be developed according to the design components that comprise each of the Project phases. The new PAs will provide for the development of a Cultural Resource Monitoring Program (CRMP) specific to this project that will require a Cultural Resource Monitor with specific responsibilities to coordinate the requirements of the PAs for the Project as the liaison for MassDOT and the USACE.

11.4.4 Agency Coordination

Agency coordination for the South Coast Rail Preferred Alternative dates back to 1999 when MBTA initiated consultation with the USACE and the MHC for a 66.6-mile project from Canton to New Bedford and Fall River. That iteration of the Project was put on hold until 2008 when the SCR Project was revived. During a five-year period, the MBTA and MassDOT consulted with the MHC and the USACE to consider the information that was gathered through cultural resource reconnaissance and intensive surveys. The USACE authored and circulated a draft PA, referenced above, to address the effects that were anticipated to result from the Project as it was proposed at that time.

During the development of the Phase 1 Alternative, MassDOT convened an Interagency Coordination Group, inviting both SHPO (MHC) and Tribal Historic Preservation Office (THPO) representatives. This group convened three times during the summer and fall of 2017 to review the Project area and anticipated Project effects. MassDOT will continue to coordinate with MHC and USACE though Project design and permitting.

The MHC received a State Archaeologist's Permit application (950 CMR 70) for archaeological reconnaissance survey of Phase 1 Project elements in March 2017 and a request to amend the permit to include additional Project elements in August 2017. MassDOT will provide the results of the 2017 historic and archaeological reconnaissance surveys to the MHC and USACE for their review and comment. An MHC State Archaeologist's Permit application and supporting technical proposal with research design for intensive (locational) archaeological survey of sensitive areas within the Pilgrim Junction Station and East Taunton Station Project APE will be submitted to the MHC for review and approval. MassDOT will provide the results of the intensive (locational) archaeological surveys and management recommendations for any identified resources to the MHC and USACE for review and comment.

MassDOT will also provide the MHC with the following documents for review and comment as they are developed:

- Scaled existing and proposed conditions Project plans at the 30 percent design level, with research designs for any additional historic and/or archaeological surveys that may be needed for changes or additions to Phase 1 Project design elements;
- The draft CRMP to be prepared in accordance with the PAs: and
- The USACE's findings and final determinations regarding potential effects to historic and archaeological resources, and recommendations for additional archaeological survey. The USACE will revise the draft PA document for the South Coast Rail Preferred Alternative prepared in 2016 to incorporate the MHC's August 5, 2015 comments and the Phase 1 Project modifications.

11.5 Mitigation

This section summarizes the mitigation measures that may be considered to avoid, minimize, or mitigate potential adverse impacts on historic and archaeological resources resulting from the implementation of Phase 1 of the SCR Project. The consultation and review process for determining and implementing mitigation measures will be provided in the revised PA. The specific type of mitigation will be informed by additional, more detailed archaeological and historic survey fieldwork and additional design detail. A discussion of such additional survey work is presented in Sections 11.3.1 and 11.3.2.

Mitigation measures include avoidance, minimization, historical documentation, and data recovery, which are discussed below. The documentation for any of these mitigation measures must provide evidence that consultation has been completed with Native American Tribes and individuals with knowledge of affected resources. Further, mitigation measures must consider the comments of these persons on the measure(s) under consideration. Actions that the parties agree upon to resolve adverse effects will then be detailed in a Mitigation Plan approved by all parties as stipulated in the PA.

11.5.1 Avoidance

Avoidance is the preferred approach when adverse effect is determined. Adverse effects can only be avoided for the No-Action scenario of the Project, which does not meet the Project purpose. Phase 1 may not be able to avoid direct and indirect impacts to historic resources and archaeological sites and sensitive areas. Impact to any archaeological sites that may be present in sensitive areas can be avoided through burial of the resource although this option has limited applicability. Avoiding indirect impacts resulting from noise and visual intrusions may be addressed for historic resources through design modification in some locations.

11.5.2 Minimization

Minimization options are usually only readily apparent in the latter stages of a project once the design has sufficiently advanced so that direct impact areas are defined and indirect effects are clearly understood. With these limitations in mind, minimization of impact to historic properties or archaeological resources will be focused on reducing the extent of ground disturbance, establishing vegetated buffers, and designing noise barriers and sound insulation to be compatible with the historic property and setting.

The Adverse Effects documentation for an individual archaeological site, historic property, or district is required to describe the option(s) selected to minimize impact. The Adverse Effect document also must contain a discussion about the direct/indirect effects of the option on other archaeological sites, districts, and/or historic properties in the Project's APE. In all cases, the archaeologists and historians will have to clearly document the horizontal and vertical boundaries of the archaeological site, historic property, or district in question as part of the Adverse Effects documentation.

11.5.3 Mitigation Measures

Phase 1 of the SCR Project may result in impacts to significant cultural resources that cannot be addressed through avoidance or minimization. Potential mitigation measures, including historical documentation, data recovery, and other approaches are listed in Table 11-2. Adverse Effects documents prepared in support of the PA will outline the mitigation approaches that will be taken for each historic property including districts. The Adverse Effects documents are referred to as Mitigation Plans, commonly called Treatment Plans for above-ground historic properties and Data Recovery Plans (DRP) for archaeological resources. The mitigation plans will be developed after all stages of intensive survey and National Register evaluations are complete and the results of the investigations reviewed and approved by federal and state agencies as stipulated in the PA.

11.5.3.1 Historic Resources

Mitigation responses for historic resources are often impact specific, especially if the resource in question was previously determined significant. Table 11-2 lists the approaches that might be used to mitigate adverse effects resulting from specific project actions. As noted, these various mitigation options are directed to maintaining the historic character of both buildings and settings and maintaining the integrity of existing buildings. The following sections describe mitigation measures designed to avoid impacts to above-ground resources.

Table 11-2 Historic Properties Mitigation Approaches

Project Action	Mitigation Response
General (applicable to multiple actions)	• Include in development and implementation of Cultural Resource Monitoring Program • Include in mitigation plan developed in consultation with USACE and MHC, to minimize adverse effects to historic properties as identified in the PA • Develop and install interpretive signs at selected stations and other suitable locations for historic interpretive information about the rail corridor, specific properties, and the adjacent communities as overall mitigation
Visual	• Where impacts to historic properties are unavoidable from a permanent change to visual setting, prepare archival documentation of historic properties • North Lakeville School, 49 Taunton Street, Lakeville • Old Colony Iron Works, 96 Old Colony Avenue, Taunton • Corr Manufacturing Company, Middleboro Avenue, Taunton • Mitchell House, 125 Middleboro Avenue, Taunton • Enoch Williams House, 616 Middleboro Avenue, Taunton • Site-specific design to be compatible with historic character in and adjacent to historic properties including areas/districts • Lighting: within and adjacent to historic properties, minimize number of poles, paint poles non-contrast colors, use directed lights • Built elements: use non-contrast paints on fence, roadway equipment, signal bungalows; locate signs and fixtures in a sensitive manner within and adjacent to historic properties
Construction	• Locate staging areas and access away from historic properties and areas/districts as much as possible. Screen staging areas from adjacent historic properties and areas/districts

<u>Visual Screening</u>

The Project has the potential to alter the setting of certain historic resources and historic districts where new stations, parking, or at-grade crossings are proposed. While the original construction of the railroad in the nineteenth-century may have "fit in" with the aesthetic nature of the communities, the reactivation of the rail line using modern materials and safety standards, faster engines, and larger passenger cars may result in undesirable changes in the visual environment. Screening certain structures and safety and signal equipment may mitigate these impacts. Potential screening techniques include the combination of wooden and opaque fencing with landscape plantings.

Unnecessary clear-cutting of trees and vegetation along the railroad ROW that could have an adverse visual impact on historic resources will be avoided and existing trees and vegetative screening will be retained to visually buffer historic properties from the rail line to the extent feasible and with due regard for public safety, operational requirements, cost, and maintenance considerations.

In and adjacent to historic districts or individual resources, equipment including traffic signals and controller cabinets, street lights, street furniture, and railroad signal equipment housings will be dark colored to reduce the visual impact of this equipment. Traffic signals and street lights will be ornamental type in accordance with the towns' preferences, to the extent reasonably possible.

These methods, when used in combination with other mitigation measures, may successfully reduce and mitigate some potential visual impacts to historic properties associated with the SCR Project.

<u>Use of Compatible Materials within Historic Districts</u>

To the extent practicable, the Project will use materials compatible in color, texture, and form to minimize adverse visual impacts to historic structures and districts.

A review of current conditions and materials will be undertaken prior to completion of final permitting and when more design information is available in order to ensure the use of compatible materials in the vicinity of historic properties. All repair, rehabilitation, or modification of historic properties, including sound insulation treatments for mitigation of noise impacts, will be performed in accordance with the U.S. Secretary of the Interior's "Standards for the Treatment of Historic Properties, including Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings."

<u>Construction Staging and Methods</u>

Construction staging and storage areas shall be located in protected areas outside historic districts and resources wherever possible, and in as unobtrusive a location as possible within historic districts or resources if alternative locations are infeasible. Where historic resources used as residences are within 50 feet of a staging area, a temporary solid wood fence, six-feet high, will be used a visual screen between the residence(s) and the staging area.

11.5.3.2 Archaeological Resources

Impacts to archaeological resources may occur when sensitive areas are disturbed during construction. Phase 1 of the SCR Project has been designed to minimize potential impacts to below-ground resources by maximizing reuse of the existing rail bed in the Middleborough Secondary ROW.

Unavoidable impacts to archaeological resources will be identified following the intensive (locational) surveys at the Pilgrim Junction Station and East Taunton Station Project APE, designed to locate and identify any potentially significant sites within sensitive areas, and appropriate, avoidance, minimization, or mitigation selected during the Section 106 consultation process. Where impacts to archaeological resources are unavoidable, MassDOT will proceed with subsequent detailed site investigations and/or data recovery as stipulated in the PA documents to be developed for each phase of the SCR Project.

The mitigation approaches for archaeological sites tend to focus on data recovery: the acquisition of additional site-specific data usually consisting of more feature information and/or artifacts. There are other alternatives, referred to as Creative or Alternative Mitigation Strategies that can be explored once the impacts to archaeological sites are known. Such creative approaches may include oral histories (for historical archaeological sites), whole site excavation, laboratory work to the exclusion of additional excavation, and non-traditional reporting. Data recovery and these other options are briefly explored below.

Data recovery typically involves block excavations or the complete excavation of specific features such as privies or wells. These excavations are designed to augment and expand upon prior work to reach a cumulative percentage of site area ranging from five to ten percent. Except in certain instances, the only area of the site that will be subjected to data recovery excavation is that within the direct impact area. The exception involves whole site excavation.

Whole site excavation is a relatively new concept that was originally introduced as an alternative mitigation approach for significant sites adversely affected by gas pipeline projects. Whole site excavation involves the selection of a single site from a site group to be subjected to complete data recovery. Rather than concentrating on just the site area within the impact zone, the whole site is considered. Other sites in the same class which may have been determined significant are effectively 'sacrificed' and not subjected to further work. The underlying premise to whole site excavation is that more will be learned about the site class as a whole by examining a single site fully than by looking at bits and pieces of several sites. The whole site excavation approach is very effective when examining questions dealing with site function, activity areas, and intra-site patterning.

Other mitigation options that will be considered are non-excavation strategies and some of these may be used in tandem with excavation. For historical archaeological sites, the acquisition of information about site function through oral histories is particularly effective for sites that may represent particular industrial or commercial enterprises, or that represent the homes of persons from particular religious or cultural backgrounds. Laboratory analyses of particular artifact types or artifact collections have also been used as an alternative mitigation measure to additional excavation. This has been particularly effective when large collections of artifacts acquired by avocational archaeologists are available for analysis by professionals. Finally, the use of non-traditional reporting is proving to be exceptionally welcome by the public and a critical deliverable in all data recovery efforts. Non-traditional reporting includes, for example, educational web sites; the creation of teaching plans and supporting materials; video/DVD production showing the range and types of cultural resources in areas or other appropriate stories; and the production of popular books, pamphlets, or brochures for use in public outreach.

12. Hazardous Materials

12.1 Introduction

This chapter discusses the potential presence or release of Oil or Hazardous Materials (OHM) in relation to the South Coast Rail (SCR) Phase 1 Study Area during construction and operation and supplements the information in the SCR Final Environmental Impact Statement (FEIS)/Final Environmental Impact Report (FEIR) to include those areas that will be constructed as part of Phase 1 that were not previously considered. Since publication of the FEIS/FEIR, the Fall River Depot and Freetown Stations have been redesigned on different portions of the previously-identified parcels. East Taunton Station has been relocated to a location approximately one mile south of the previously proposed station site. The Middleborough Secondary is being proposed as an additional right-of-way (ROW), including a new station at Pilgrim Junction.

Potential operational impacts of the new areas being constructed as part of Phase 1 may include spills or releases of OHM. However, since derailments are an extremely rare event, particularly on tracks that are maintained in good condition, spills of diesel fuel or hydraulic fluids resulting from a train derailment are not anticipated to occur. As noted in the SCR FEIS/FEIR, the spill or release of OHM in the process of constructing the alternatives is an unlikely event, and measures will be required to prevent and control/contain any such spills, including a Spill Control Program in compliance with Massachusetts Bay Transportation Authority (MBTA) policy and the Massachusetts Contingency Plan (310 CMR 40.0000, "the MCP") as issued by Massachusetts Department of Environmental Protection (MassDEP).

Rail beds can be contaminated with OHM from a variety of sources, some of which may be exempt from the reporting requirements of the MCP. However, once the materials are excavated or moved, they may be subject to the MCP or other regulations.

While the construction activity itself is unlikely to result in the spill or release of OHM, constructing the SCR will require acquisition of properties where OHM may already be present in soils or groundwater, or in existing buildings, potentially under conditions that could constitute a prior release pursuant to the MCP. Therefore, prior to land acquisition, Massachusetts Department of Transportation (MassDOT) conducts American Society for Testing and Materials (ASTM) International Phase I Environmental Site Assessments (ESAs) and when applicable, ASTM Phase II ESAs to determine whether the property to be acquired has been impacted by environmental conditions.

After acquisition of a contaminated property, the new owner will be responsible for its cleanup under the MCP. Response actions must be completed for the entire contaminated area, which may extend beyond the property boundaries, if the release occurred to groundwater and/or surface water.

Response actions may need to be continued beyond what is required for station construction, as a Permanent Solution must be achieved for regulatory closure.

Construction may also encounter contaminated soils or groundwater, or other OHM, within the existing railroad ROWs. The MCP defines the responsibilities of property owners regarding OHM. Several state and federal regulatory programs also govern the requirements for site remediation, transport of regulated hazardous materials, and potential spills during construction.

The following provides a summary of each of the proposed Phase 1 components not previously discussed under the FEIS/FEIR and describes the potential OHM conditions within these locations.

12.2 Resource Definition

Recognized Environmental Conditions (RECs), as defined by the ASTM E1527-13 standard practice (Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process), "means the presence or likely presence of any hazardous substance or petroleum products in, on, or at a property: (1) due to any release to the environment; (2) under conditions indicative of a release to the environment; or (3) under conditions that pose a material threat of a future release to the environment." The term includes hazardous substances or petroleum products even under conditions in compliance with laws."

In the Commonwealth of Massachusetts, the management of hazardous substances and petroleum products when released into the environment is generally governed by the MCP. Hazardous substances include oil, hazardous material and hazardous waste and are defined as those substances that that may constitute a present or potential threat to human health, safety, welfare, or the environment.

Hazardous materials, as defined in the MCP, include any material in whatever form that, because of its quantity, concentration, chemical, corrosive, flammable, reactive, toxic, infectious or radioactive characteristics, either separately or in combination with any substance or substances, constitutes a present or potential threat to human health, safety, welfare, or to the environment, when improperly stored, treated, transported, disposed of, used, or otherwise managed. The term can also be used to describe hazardous wastes and asbestos.

Hazardous wastes are waste materials that, because of their quantity, concentration, or physical, chemical or infectious characteristics, may cause, or significantly contribute to an increase in serious irreversible, or incapacitating reversible illness or pose a substantial present or potential hazard to human health, safety, public welfare or the environment when improperly treated, stored, transported, used or disposed of, or otherwise managed. Oil includes insoluble or partially soluble oils of any kind or origin or in any form, including, without limitation, crude or fuel oils, lube oil, asphalt, insoluble or partially soluble derivatives of mineral, animal or vegetable oils and white oil.

When a hazardous substance impacts (or potentially impacts) an environmental medium, then a release (or threat of release) of OHM is said to occur. The MCP defines a "release" as "spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping or disposing into the environment." The MCP defines a threat of release as "a substantial likelihood of a release of OHM which requires action to prevent or mitigate damage of health, safety, public welfare or the environment which may result from the release."

MCP terminology and references are used as a refinement of the ASTM E1527-13 definition of RECs, since the management of OHM once released in the environment is governed by the MCP.

12.3 Regulatory Context

It is customary and good commercial practice to conduct a Phase I ESA to assess commercial property for potential impacts from the range of contaminants defined within the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) (42 U.S.C. §9601) as well as petroleum products. The ESA constitutes "all appropriate inquiry" into the previous ownership and uses of the property in order to permit a user or purchaser of a property to satisfy one of the requirements to qualify for the "innocent landowner, contiguous property owner, or bona fide prospective purchaser" limitations on CERCLA liability. A Phase I ESA is conducted to determine if RECs, defined in Section 12.1.1, are likely to be present at the prospective property. A Phase I ESA was or will be performed for all properties which may be subject to potential acquisition for the SCR Project.

Properties with confirmed OHM impacts are generally managed in accordance with the MCP, 310 CMR 40.0000 and associated policies or guidance issued by MassDEP. However, depending on the type and concentrations of OHM present at a property, other regulations implemented by the Commonwealth of Massachusetts or U.S. Environmental Protection Agency (EPA) may apply.

A Special Project Designation (SPD) Permit can also be filed in order to extend MCP deadlines for response action and report submittals so that the response actions can be coordinated with the schedule of construction.

Exemptions exist within the MCP for certain types of releases of hazardous materials. For instance, releases of hazardous materials indicated by residues in the environment from lead-based paint and exhaust emissions are not considered reportable under the MCP. Therefore, certain rail bed contaminants may be considered statutorily exempt from reporting to the MassDEP.

12.4 Methodology

The additional Project elements that comprise Phase 1 will require construction, including soil removal, within the station and ROW locations. Properties will need to be acquired (in part or in full) for station construction for the Freetown, East Taunton, Fall River Depot and Pilgrim Junction Stations. Ballasts and railroad ties will need to be replaced along the existing railroad tracks. Soil will also need to be removed for the construction of new stations. Buildings may also need to be demolished. These activities have the potential to result in the following:

- Encountering contaminated soil or groundwater;
- Disposing of contaminated materials;
- Disposing of solid waste containing lead-based paint, asbestos-containing materials, or other regulated materials such as railroad ties.
- The new owner (MassDOT) would become responsible for compliance with the MCP for any property that was acquired for station, layover facility, or track construction. Remediation of contaminated "brownfield" sites would be a beneficial effect of the alternatives.

12.4.1 Types of Impacts

Potential impacts at each site were determined based on the type of REC identified through ESAs. Based on the environmental screenings/ASTM Phase I ESAs that were prepared, a detailed description of each REC and potential environmental concern or *de minimis* condition identified is provided for each of the proposed stations.

The ESAs and the tables provided in the following sections of this chapter identify the RECs for each location and the state-listed hazardous waste sites and corresponding Release Tracking Numbers (RTNs) applicable to each location.

SCR Project ASTM E1527-13 sets forth a standard practice for determining whether a REC is present. The ASTM Standard Practice includes a review of databases, a site reconnaissance, interviews, and a review of sources such as historic aerial photographs, topographic maps, and Sanborn maps by an Environmental Professional to determine if RECs are present at the property.

Potential impacts were evaluated for each REC identified, based on available information, and classified according to their potential for contamination as either high, medium, or low (discussed below).

Depending on the type of REC, additional investigations may be warranted to assess whether a release has actually occurred. An ASTM Phase II ESA is frequently recommended in order to determine whether the RECs have impacted a site. In addition, soils to be excavated may be characterized as part of construction, so as to identify potential COCs that may be encountered. In the event that contamination is identified, response actions will be implemented in accordance with the MCP.
The ESA Opinion also includes a section for potential environmental concerns or *de minimis* conditions. Such conditions have less of a potential to impact properties than RECs, and are conditions generally not subject to extensive regulation. An example of a potential environmental concern or *de minimis* condition will be the potential presence of asbestos-containing materials or lead-based paint,

based on the age of the building, which will have to be properly managed during building demolition and will require proper disposal.

Buildings that need to be demolished may be constructed with asbestos-containing materials, which is considered a potential environmental concern or *de minimis* condition. Such materials include roof flashing, tiles, and other materials that may be present in the building materials based on the age of the buildings. In addition, lead-based paint, mercury and polychlorinated biphenyls (PCBs) may also be present in the building materials and/or fixtures.

The presence of railroad tracks adjacent to properties proposed for acquisition represents a potential environmental concern, which is common to all stations and bypasses, as railroad operations can be sources of OHM. On-site railroad tracks were deemed a REC since historical railroad ROWs are often impacted with residual OHM, including metals, pesticides, and petroleum constituents such as polycyclic aromatic hydrocarbons (PAHs). Railroad related sources of OHM may include creosote- or arsenic-laced railroad ties, herbicides, lubricating oils, diesel fuel, and diesel exhaust. In addition, fill of unknown origin used to bring tracks to grade may contain debris, coal, coal ash, coal slag, or other potential contaminants. Removing ballast, ties or soil along railway corridors will require proper disposal; however, a detailed risk assessment or risk reduction measures may not be required if the material is either statutorily exempt from MGL c. 21E or is consistent with background conditions. The soil exemption may apply only if the soil remains *in situ*. If the material is not exempt from MGL c. 21E and not consistent with background conditions, then appropriate response actions must be performed and a Permanent Solution Statement prepared as a regulatory endpoint.

12.4.2 Beneficial Effects

The activities will likely have a positive effect on confirmed areas of soil and groundwater contamination in the proposed station locations. On-site contamination encountered will be assessed and if necessary, remediated prior to and during construction activities as per the MCP. Re-use of as much excavated soil as possible, including impacted soil with concentrations below the applicable MCP standards, is the preferred option and is recommended if pre-characterization of the material shows that there are no risk-based limitations that will affect the current and foreseeable use of the property. Remediation of soil which could not be re-used will most likely consist of soil excavation and off-site disposal.

The following describes the locations where environmental screenings/Phase I ESAs were conducted, the methodology used for these assessments, and the methodology used to evaluate the potential impacts associated with RECs (the potential presence of OHM) at each site.

12.4.3 Environmental Screening/Phase I Environmental Site Assessments Study Area

To assess the potential for encountering OHM during the implementation of the SCR Project, ASTM Phase I ESAs were prepared for property being acquired to construct the proposed stations being discussed in this DSEIR, including the following.

- Pilgrim Junction Station;
- East Taunton Station;
- Freetown Station; and
- Fall River Depot Station

The parcels encompassing the Freetown and Fall River Depot Stations were previously assessed with Phase I ESAs under the SCR FEIS/FEIR. Since these stations are relocated within the previously studied parcels, there is no expected change in impacts from those presented in the SCR FEIS/FEIR, and the findings for these stations will not be discussed in this chapter. The Phase I ESAs for these and all parcels proposed for acquisition will be updated as needed to facilitate future property transactions. In addition, Phase II ESAs will be performed when recommended based on the findings of the Phase I ESAs.

ASTM Phase I ESAs were not performed for the properties located within the existing rail alignment that will not involve property acquisition. Instead, environmental screenings were performed for properties within the boundaries of the existing rail alignment. The environmental screenings consisted of a limited assessment including a site reconnaissance and records review conducted in accordance with the methods specified in the ASTM Phase I ESA Standard. Due to the nature of land use along rail alignments there is the potential for elevated concentrations of OHM in soils or groundwater in these areas, as railroad operations are common sources of OHM releases, such as semi-volatile organic compounds. Therefore, the environmental review for the Middleborough Secondary included a database search, MassDEP file review, historical records review, and site reconnaissance, which were conducted in general compliance with the ASTM Phase I ESA process.

12.4.4 Phase I ESA Methodology

Phase I ESAs were performed as per the ASTM E1527-13 Standard Practice and All Appropriate Inquiries pursuant to 40 CFR Part 312. The purpose of the Phase I ESAs is to identify RECs that may exist at each of the properties, to the extent feasible pursuant to the process described in the Standard. The Phase I ESAs were completed using the Standard as guidance. The only major modifications to the methodology of the ASTM E1527-13 standard is that interviews with property owners/managers were not conducted, and building interiors were not accessed.

The methodology for the Phase I ESAs included the following:

- A computer database search of federal and state files. The federal databases included the current Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) also referred to as Superfund Enterprise Management System (SEMS), National Priorities List (NPL), Resource Conservation and Recovery Act (RCRA), Storage and Disposal (TSD), RCRA Generators, and Emergency Response Notification System (ERNS). The state databases included the state-equivalent CERCLIS list, spills, underground storage tanks (UST), Solid Waste Landfills (SWL), and public water supply list.
- A review of available MassDEP files to provide more information about reported releases of OHM identified through the database search on or adjacent to the site. Where the MassDEP files provided additional information regarding past ownership; historic site usage; past usage, storage and disposal of OHM on and adjacent to the subject site and other evidence of potential environmental impacts, such information was documented.
- A review of available municipal and historical files to assist in confirming ownership history and past usage. Resources included tax records, aerial photographs, Health Department records, Building Department records, Fire Department records, Conservation Commission records, and Sanborn fire insurance maps. Where available, the site history review also identified reports of historic spills, disposal areas, or other past releases of OHM on or adjacent to the property.
- A review of previous site documents including ESAs, if applicable and/or available for review.
- A visual site reconnaissance to observe the site for overt evidence of a release or threat of release of oil and/or hazardous materials within interior and exterior portions of the entire property. The uses of adjoining properties are also documented.
- To the extent possible, interviews with past and present owners and occupants, and state and/or local government officials to obtain information regarding the uses and physical characteristics of the property.

As noted above, the methodology for conducting environmental hazardous materials screenings for the Middleborough Secondary ROW involved a review of the regulatory databases identified above, a MassDEP file review, historical records review, and a site reconnaissance.

12.4.5 REC Impact Criteria

The ASTM Standard requires an opinion regarding the potential for each REC to affect a site. The potential impact for each REC identified was classified as high, moderate, or low, based on available information. Criteria used to determine the potential impacts are discussed below.

- RECs that are deemed to have a **high** potential impact consist of sites such as those with confirmed soil, ground water, and/or indoor air impacts that either were not reported to MassDEP or were reported to the MassDEP and have undergone some type of cleanup or remain an active case. Those properties that have undergone a cleanup and have achieved a Permanent Solution (formerly known as a Response Action Outcome (RAO)), are still considered high potential impact due to the fact that changing site use or regulations, construction activities, a MassDEP audit of the closure documents, or identification of new environmental conditions (such as indoor air impacts in nearby structures) could trigger the need to conduct additional assessment and/or remediation activities. Other RECs with high potential impacts are those for which UST installation records exist but for which removal documentation is absent, indicating a likelihood that USTs may be present and those where the historical uses of the property indicate that substantial quantities of OHM were used and could constitute a release of OHM.

- Properties with RECs that are deemed to have a **moderate** potential impact consist of properties such as those with potential sources of OHM with limited or inconclusive information. For instance, a single-walled steel UST which has been removed, but limited or no documentation was available to show that proper sampling was conducted at the time of the UST removal to confirm that the UST did not leak, may be deemed a REC of medium potential impact.
- RECs that have **low** potential to impact a site include off-site properties where releases have occurred but have been mitigated or USTs where proper documentation is available indicating a release has not occurred, as well as for properties that have more recently installed USTs equipped with leak detection, are double walled, and/or contain overfill protection and spill containment.

12.5 Requirements of MEPA Certificate

The Secretary's Certificate on the NPC indicated that the DSEIR should characterize the existing and anticipated solid and hazardous waste generated for Phase 1 (new stations and track upgrades). The results of ASTM Phase I ESAs for properties requiring acquisition and environmental screening for the railroad alignment are summarized in Section 12.6 and Section 12.7, which identify the general location, types of impacts from hazardous materials and their potential to impact the Project.

Section 12.8 summarizes the mitigation and regulatory compliance that will be required to manage contaminated media and debris. In addition, the Certificate notes that a soil management plan should be developed to manage risk of exposure to materials during construction as recommended by the MassDEP. The implementation of a soil management plan is detailed in Section 12.8.1. It should also be noted that there will be limited excavation needed to upgrade tracks on the Middleborough Secondary, which predominantly consist of adding or replacing ballast.

12.6 Existing Conditions

The following describes RECs and potential environmental concerns relative to OHM associated with the additional properties that are being included as part of Phase 1, beginning with the railroad alignment, followed by those stations located in the Middleborough Alternative, and proceeding with stations being discussed as part of this DSEIR that were not previously evaluated with Phase I ESAs in the FEIS/FEIR (the East Taunton and Pilgrim Junction Stations). It should be noted that the presence of railroad tracks at or adjacent to a site is identified as a REC common to all stations, and corridors, as railroad operations are often sources of OHM.

12.6.1 Middleborough Secondary

The Middleborough Secondary consists of approximately 7.1 linear miles of railroad ROW (Figure 12-1). According to historical topographic maps, the site appears to have been used as a railroad since at least the 1850s. The majority of the alignment is unpaved and does not appear to be accessed by persons other than railroad workers. Visual observations of Middleborough Secondary identified minor debris, at least six inactive battery storage wells along the railroad ROW and several signal boxes. Creosote ties and oil-absorbing track mats were observed on the easternmost end of the Middleborough Secondary railroad ROW near an existing layover yard.

Based on a review of available resources for Middleborough Secondary, four RECs and two potential environmental concerns were identified and are described below.

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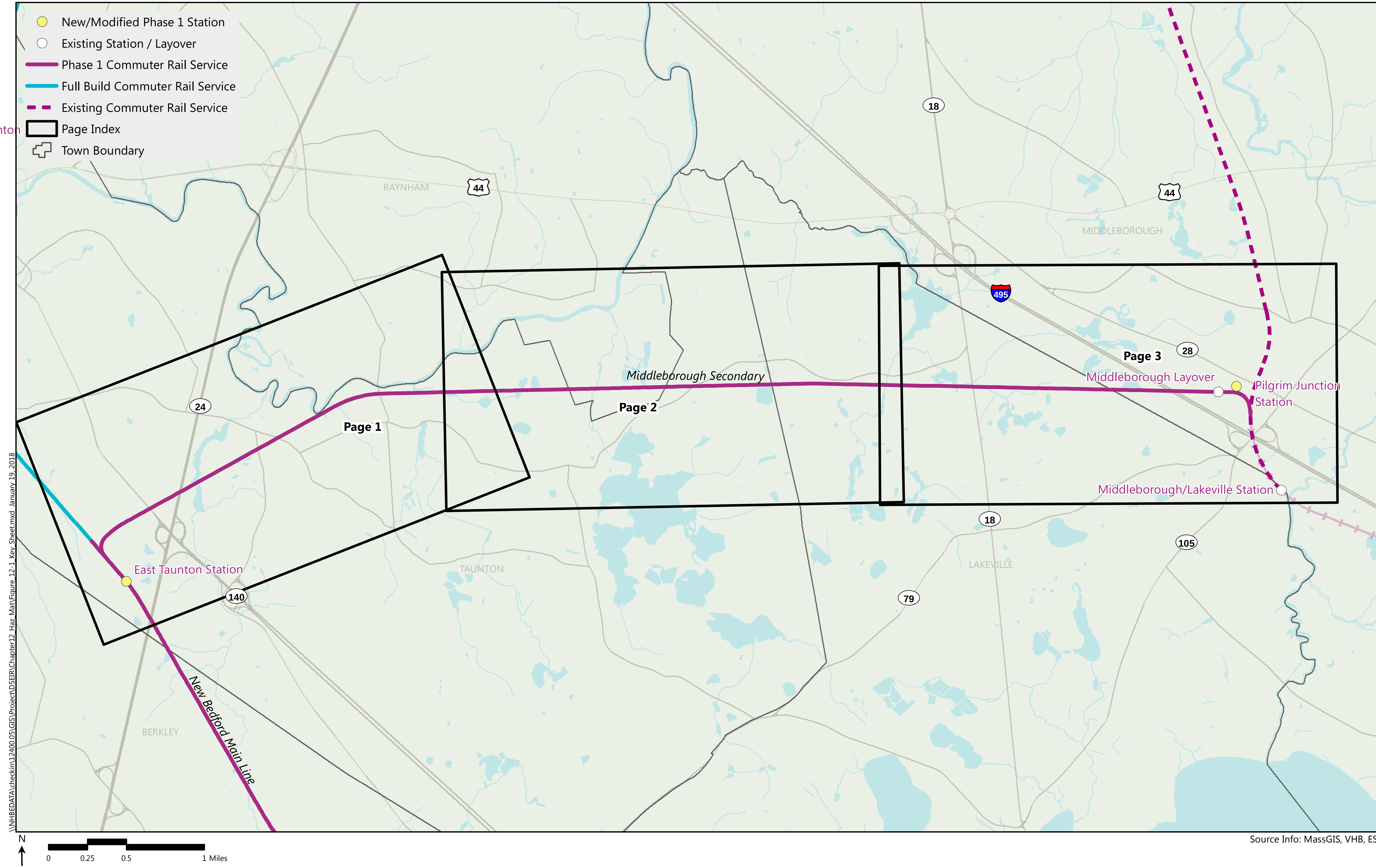
SCR SOUTH COAST RAIL

Massachusetts Bay
Transportation Authority

Figure 12-1: RTN Locations
Page Key Sheet



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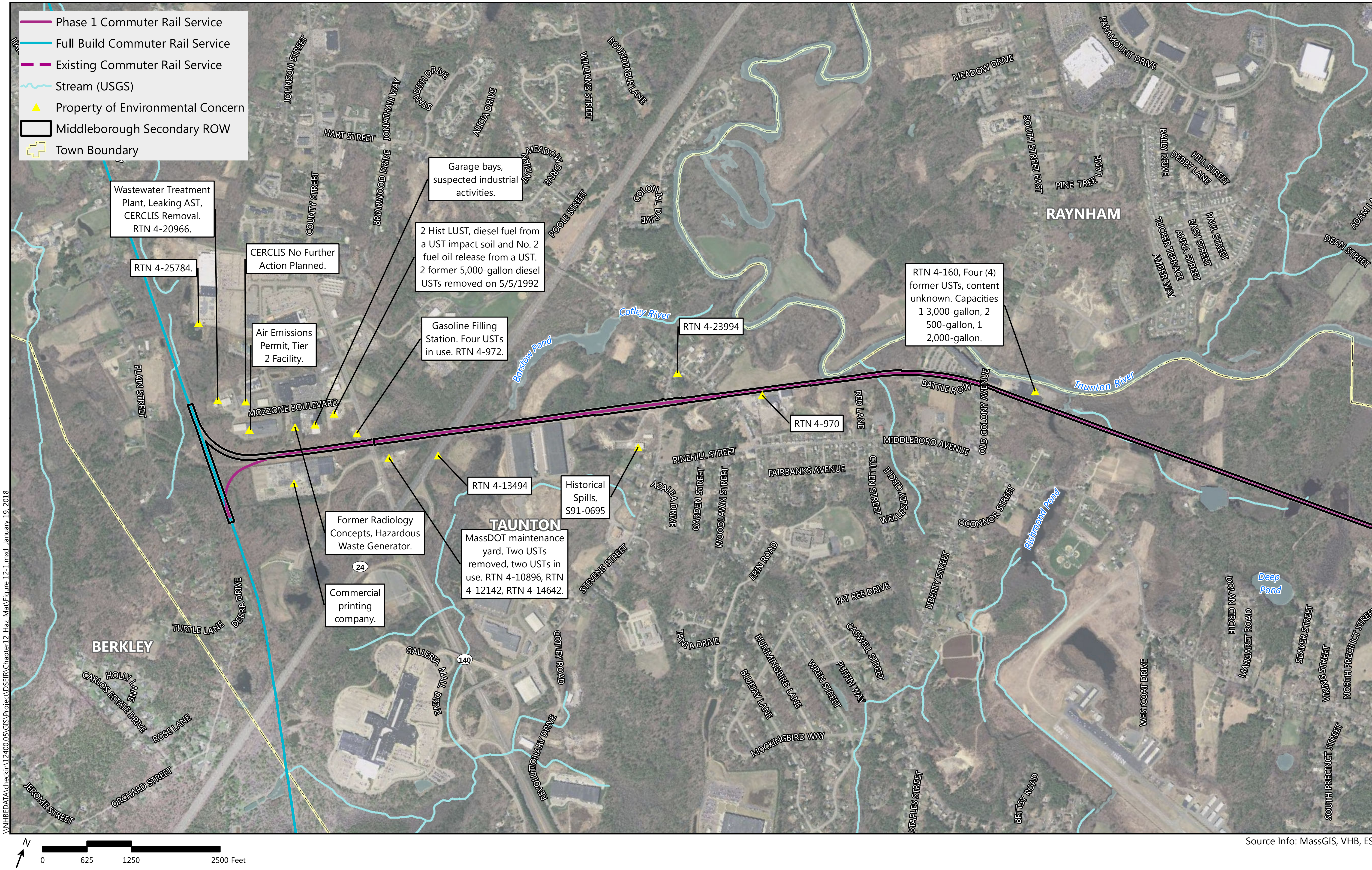

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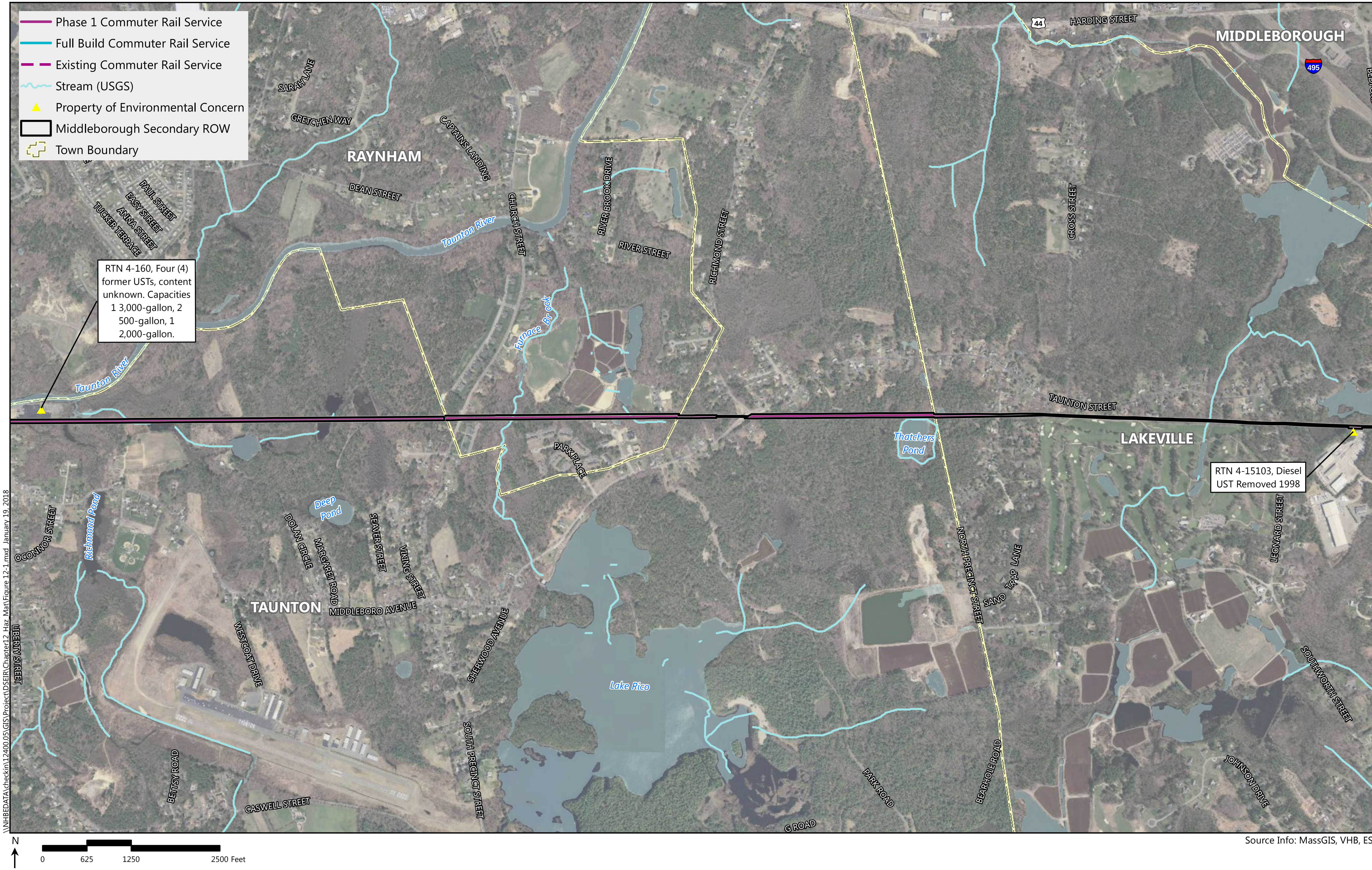

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Massachusetts Bay Transportation Authority

Figure 12-1: RTN Locations

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- **REC #1 Documented Releases of OHM within Middleborough Secondary, Release Tracking Numbers (RTNs) 4-19934, 4-22510, 4-25843** – Three documented releases were identified within the railroad alignment on the eastern end of the Middleborough Secondary and are associated with historical railroad operations. A release from a diesel fuel tank occurred on tracks in Middleborough in July 2006 and was assigned RTN 4-19934. The release impacted soil in the vicinity of the tracks within two separate areas. Approximately 20 cubic yards of impacted soils were removed from the two defined areas. A Class A-2 RAO was filed with the MassDEP to obtain regulatory closure in October 2006. A Class A-2 RAO indicates that a Condition of No Significant Risk was achieved, however residual impacts remained.

  In March 2010, RTN 4-22510 was assigned to a release of lube oil to the railroad tracks. Approximately 12 cubic yards of petroleum-impacted soil was removed from the release area. A Class A-2 RAO was submitted for the release in June 2010.

  In October 2015, RTN 4-25843 was assigned to a release of 5 gallons of hydraulic oil and 15 gallons of diesel fuel just east of the railroad tracks. A Permanent Solution with No Conditions was filed with the MassDEP in February 2016, which indicted that a Condition of No Significant Risk was achieved and contaminant concentrations were reduced to background.

  The presence of three documented releases of OHM within the limits of the Middleborough Secondary and potential for residual impacts associated with these releases to impact the site are considered to be a REC with high potential to affect environmental conditions within the Middleborough Secondary. The "high" classification is defined in Section 12.4.5.

- **REC #2 Nearby Industrial Properties with Associated Releases of OHM** - Properties in the area surrounding the Middleborough Secondary have been used for industrial purposes and several associated releases of OHM were noted. At least 28 RTNs and two leaking underground storage tanks (LUST) sites were identified adjacent to Middleborough Secondary as noted on Figure 12-1, most notably the former Bacon Felt Company and a MassDOT maintenance facility. Due to the close proximity of these industrial and LUST properties to the Middleborough Secondary and the active regulatory status of several disposal sites, nearby industrial properties are deemed to have moderate potential to affect environmental conditions within the Middleborough Secondary.

- **REC #3 Historical Uses of Adjoining Properties -** According to historical Sanborn Fire Insurance Maps and aerial photographs, the adjoining properties historically located along Vine Street in Middleborough, as well as at 160 Middleborough Avenue and 103 Old Colony Avenue in Taunton were used for industrial processes since at least 1885. Furthermore, a printing company has operated off County Street in Taunton since at least 1975. The properties located along Vine Street have included a lumber yard, a wood and coal yard, Standard Oil Company, and state-owned highway maintenance facility. A textile manufacturing company was identified at 160 Middleborough Avenue in Taunton from at least 1937 through 1950. Two additional textile manufacturers were identified in Taunton at the intersection of the railroad and Old Colony Road. In some cases, no historical documented releases were identified in connection with these properties, however, given the industrial history and close proximity to the site, the potential presence of OHM from undocumented releases at these properties is considered to be a REC with moderate potential to affect environmental conditions within the Middleborough Secondary.

- **REC #4 Railroad ROW –** There is a potential for OHM-impacted environmental media to exist within the railroad alignment. In particular, battery storage wells and oil-absorbing track mats were noted during the Site reconnaissance. The railroad-related activities and railroad-type contaminants are considered a REC with moderate potential to affect environmental conditions within the Middleborough Secondary.

Two potential environmental concerns were identified for the Middleborough Secondary.

- During the site reconnaissance, tires, scrap metal, and other miscellaneous debris were observed along the tracks. The source of the material was not determined, although some of the debris was identified as household goods and potentially the result of unauthorized dumping. The disposal of this material on the site is of potential concern but was not noted in sufficient amounts to warrant classification as a REC.
- A railroad storage yard is located at the eastern end of the Middleborough Secondary. Based on observations made during project reconnaissance, various newly treated railroad ties as well as old railroad ties awaiting installation are stored within this area. Although these ties may be treated with OHM, the newly treated railroad ties were covered appropriately with polyethylene sheeting to minimize infiltration and leaching.

12.6.2 Pilgrim Junction Station

The Pilgrim Junction Station site is southwest of the intersection of South Main Street and West Grove Street, and northeast of Interstate 495 in Middleborough, and will require the acquisition of three parcels (Figure 12-2), which include:

- 52 West Grove Street – This parcel is currently occupied by one residential structure with a storage garage in the northeastern and southeastern portion of the property, respectively.
- 18 West Clark Street – This parcel is currently vacant.
- 161 South Main Street – This parcel is developed with one vacant structure, which formerly operated as an automotive dealership and repair shop. A storage shed is located in the northwestern portion of the Site.

Based on the tasks conducted for the Pilgrim Junction Phase I ESA, two RECs and two potential environmental concerns were identified. The RECs are described below.

- **REC #1 Industrial Site Usage and On-Site Releases at 161 South Main Street** - Based on a review of Sanborn Maps, the property at 161 South Main Street historically operated as an automotive dealership from at least 1989 through 2008. Automotive dealerships often involve the use of automotive fluids such as motor oil, diesel fuel, antifreeze, and cleaning solutions. Three gasoline, one fuel oil, and one waste oil USTs were formerly located on the property and have since been removed or closed in place.

Two documented releases were identified at 161 South Main Street. RTN 4-18472 was assigned to a release of separate-phase petroleum product in groundwater at the site in June 2004. During assessment activities under RTN 4-18472, additional product was identified and conservatively reported to the MassDEP and assigned RTN 4-20492. The RTNs were subsequently linked and all response actions were conducted under RTN 4-20492. The disposal sites achieved a Permanent Solution with Conditions in March 2016 indicating that a Condition of No Significant Risk was achieved; however, an activity and use limitation (AUL) was placed on the footprint of the building where separate-phase product was still present. An AUL is a type of deed restriction, designed to limit activities and control exposure. As such, the former industrial operation at the site and the associated releases of OHM are deemed a REC with high potential.

- **REC #2 Industrial Use of Adjacent Properties and Associated Releases of OHM** - Abutting properties including 157 South Main Street, 150 South Main Street, 138-140 South Main Street, 2 West Grove Street/129 South Main Street, and 64 Vine Street were historically occupied by industrial businesses associated with documented releases. Two documented releases (RTN 4-11589 and 4-11510) occurred at the northerly abutting property identified as 157 South Main Street associated with the property's former use as an automotive repair shop and gasoline service station. Multiple documented releases (RTNs 4-15652, 4-17951, and 4-666) were reported for the gasoline service station located at 150 South Main Street. Two additional documented releases (RTN 4-19216, 4-116) were identified at 138-140 South Main Street located approximately 280 feet east of the Site associated with the property's use as an automotive service station. A Downgradient Property Status (DPS) was filed by the owner of 6 West Clark Street under RTN 4-16341 due to petroleum constituents in groundwater that were attributed to releases that had migrated from the surrounding properties on South Main Street. Petroleum constituents were also identified at 2 West Grove Street/129 South Main Street located farther north of the Site under RTN 4-12655. The MassDOT Facility located north of the Site at 64 Vine Street is associated with several documented releases associated with vehicle maintenance, OHM storage, and additional industrial operations conducted at the property. The historical usage of the surrounding properties, documented releases, and the historical and current OHM storage in the vicinity of the Site at the adjacent properties are considered a REC with moderate potential.

Two potential environmental concerns were identified as described below.

- Based on the age of the site buildings, asbestos-containing materials such as roof flashing, shingles, tiles, and pipe insulation, as well as lead-based paint, mercury switches, polychlorinated biphenyl-containing light ballasts and other hazardous building materials may be present in association with the site buildings. Although considered to be non-scope items as part of the ASTM Phase I ESA Standard, these materials will require special handling in the event that the structures are demolished or renovated.

- An adjacent Railroad ROW abuts the parcels associated with the proposed Pilgrim Junction Station. The ROW may be associated with various sources of OHM and fill of unknown origin used to bring tracks to grade as further detailed in Section 12.4.1.

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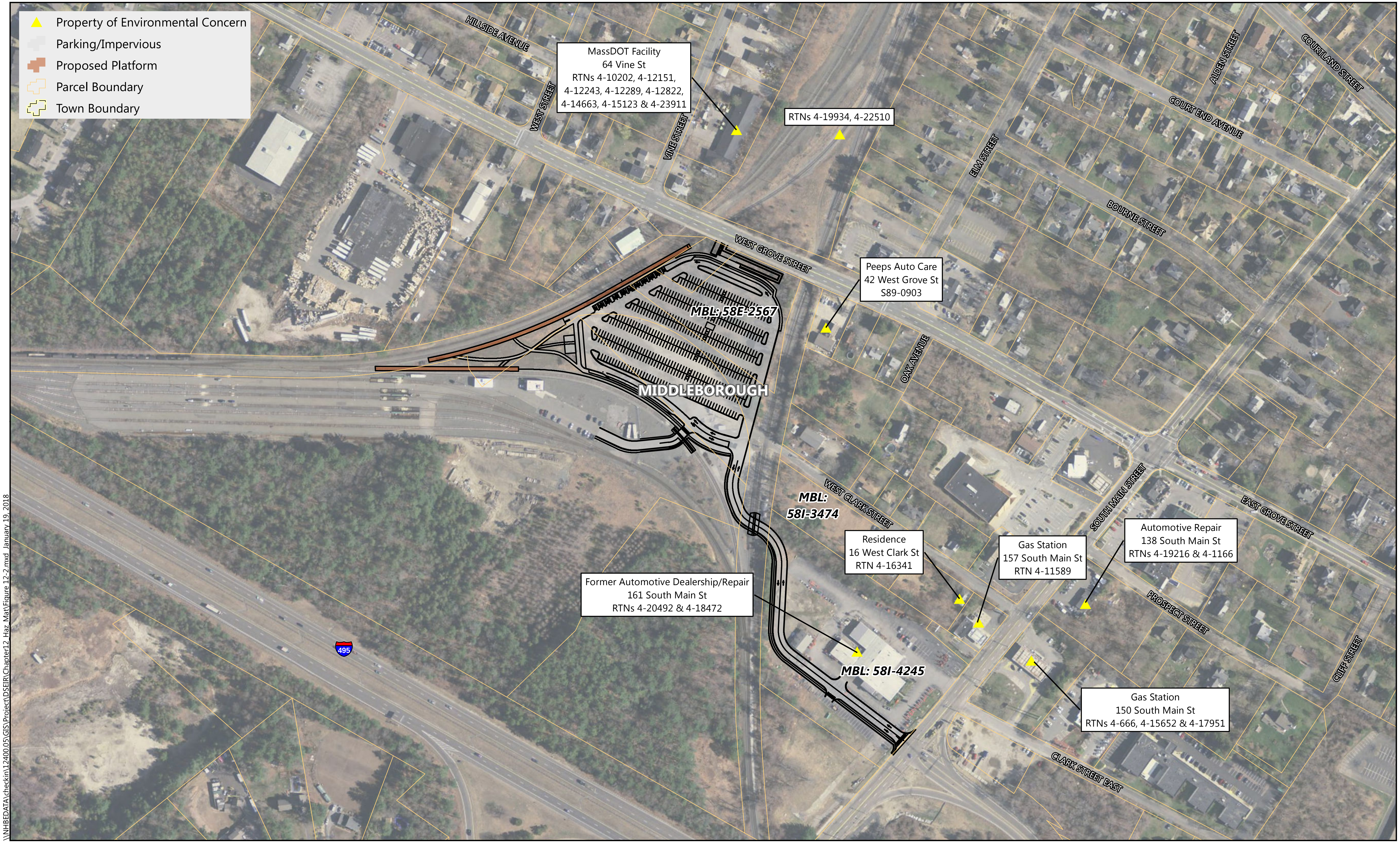
Figure 12-2: Hazardous Materials Detail Map - Pilgrim Junction Station



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12.6.3 East Taunton Station

The East Taunton station site is located west of the intersection of Route 140 and Route 24 and consists of one parcel located at 1141 County Street (Figure 12-3) that was most recently used as a golf driving range and miniature golf course. The remainder of the site is vacant.

Based on the tasks conducted for the East Taunton Station Phase I ESA, two RECs and three potential environmental concerns were identified and are described below.

- **REC #1 Former USTs on Abutting Property**-Based on the historical records received by the Taunton Fire Department, two USTs were removed from the adjacent property at 1133 County Street (parcel 108-019). The exact location of these tanks on the adjacent parcel are unknown, and due to groundwater flow direction, there is a potential for these tanks to have impacted the environmental conditions at 1141 County Street. Therefore, this is being identified as a REC with moderate potential.
- **REC #2 Industrial Use of Nearby Properties and Storage/Use of OHM**—Properties in the area surrounding the East Taunton Station have been used for industrial purposes. A book printing company is located to the northwest; USTs have been removed from this property. An automobile repair facility was located north of 1141 County Street in the mid-1900s along with the Massachusetts Highway Department (currently known as MassDOT) at 64 Vine Street. Northwest of the Site are more industrial businesses on Mozzone Boulevard such as Atlantic Plywood Corporation and ABF Freight System Inc. A filling Station has been located northwest of the East Taunton Station since at least 1975. The potential current and historical industrial usage and OHM storage and/or usage on these abutting and nearby properties are deemed a REC with moderate potential.

Three potential environmental concerns were identified as detailed below.

- Railroad tracks abut the site to the west that may be associated with various sources of OHM and fill of unknown origin used to bring tracks to grade.
- A total of 36 pole-mounted electrical transformers were noted along the perimeter of the driving range. It is unknown whether the transformers contain PCB oil; however, there was no overt evidence of staining or leaking transformers. Many of the poles showed signs that the wood preservative had melted onto the surrounding ground surface at the base of the poles. It is unknown whether this material contains creosote or pentachlorophenol; however, residues resulting from utility poles in use are considered exempt from reporting under the MCP.
- Given the presence of buildings on the Site, it is possible that hazardous material, including roof flashing, tiles, and other materials, as well as lead-based paint, may be present in remaining building materials, surrounding debris piles, and soils.

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000-gallon diesel USTs
removed on 5/5/1992

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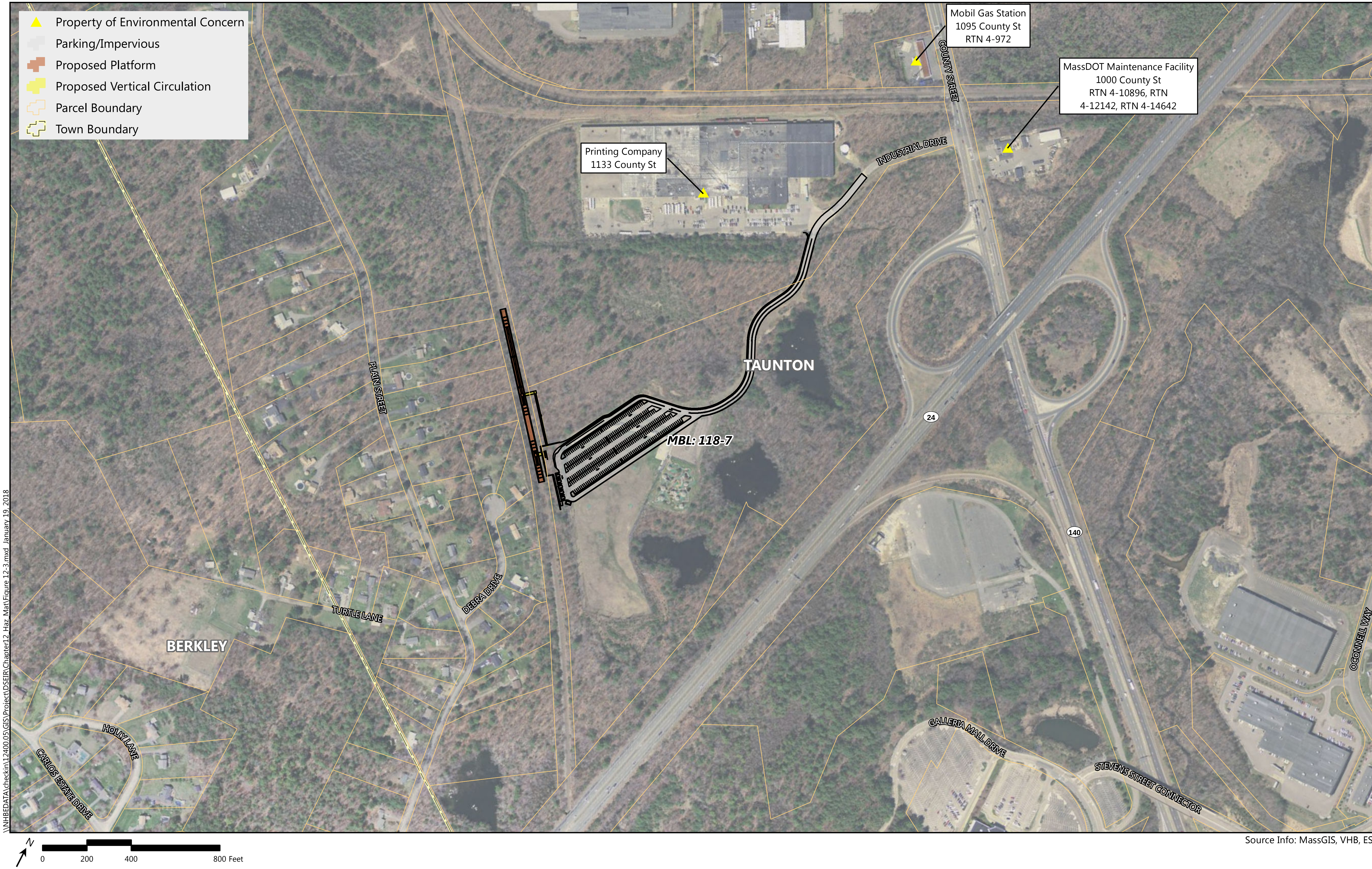
Figure 12-3: Hazardous Materials Detail Map - East Taunton Station



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12.6.4 Summary

Phase I ESAs or environmental screenings were conducted for land proposed for acquisition as part of the station sites and an environmental screening was conducted for the Middleborough Secondary alignment. The Phase I ESAs indicated that multiple proposed station locations either border or are the location of known and/or suspected OHM contamination and buildings at these locations may also contain hazardous building materials that can include asbestos, lead, and other OHM. These conditions indicate that there is a potential to encounter OHM impacts when demolishing buildings or constructing new stations and tracks, which will require appropriate soil and groundwater management/handling. A table summarizing the RECs and potential environmental concerns for each station site is provided in Table 12-1.

Based on the findings of the Phase I ESAs, further evaluation for subsurface contamination will be conducted for proposed station and track locations with RECs classified as having a high or medium potential to impact each site and which may be subject to disturbance during implementation of the SCR Project prior to acquisition and/or construction. Therefore, Phase II ESAs are planned to be conducted at the parcels that will need to be acquired to construct the Freetown, Fall River Depot, Pilgrim Junction and East Taunton Stations. The Phase II ESAs will consist of the collection of soil and groundwater samples to evaluate environmental media. The purpose of this sampling will be to determine whether the RECs have impacted environmental conditions at each of the parcels, as well as provide preliminary information to evaluate potential impacts to construction. In addition, soil samples are planned to be collected from a subset of geotechnical borings being conducted within the Middleborough Secondary ROW to determine if OHM impacts exist that will impact soils being excavated during construction.

Table 12-1 Summary of RECs by Location

Location	REC No.	Ranking	Address	RTN(s)	Impact
Pilgrim Junction	1	High	Site (161 South Main Street)	4-18472, 4-20492	Confirmed contamination (petroleum)
Pilgrim Junction	2	Moderate	Adjacent Properties (157 South Main Street, 150 South Main Street, 138-140 South Main Street 2 West Grove Street/ 129 South Main Street, 64 Vine Street)	4-11859, 4-11510, 4-15652, 4-17951, 4-666, 4-19216, 4-116, 4-12655, 4-10202, 4-1224--15123, 4-12822, 4-14663, 4-23911	Disposal sites with property uses such as gasoline service stations, automotive repair shop, and automotive maintenance. Confirmed contamination of MBTE and petroleum at 2 West Grove Street/129 South Main Street)

Table 12-1 Summary of RECs by Location (Continued)

Location	REC No.	Ranking	Address	RTN(s)	Impact
East Taunton	1	Moderate	Abutting Property (1133 County Street)	-	Former USTs
East Taunton	2	Moderate	Adjacent Properties (1141 Country Street, Mozzone Boulevard)	-	Industrial Usage
Middleborough Secondary	1	High	Site (Railroad ROW)	4-19934, 4-22510, 4-25843	Confirmed Contamination (Petroleum Constituents)
Middleborough Secondary	2	Moderate	Nearby Industrial Properties with Associated Releases of OHM	4-160, 4-972, 4-970, 4-26246 (25 additional noted on Figure 12-1)	Confirmed Contamination (VOCs) and LUSTs
	3	Moderate	Historical Uses of Adjoining Properties (103 Old Colony Avenue, 160 Middleborough Avenue, Taunton)	-	Industrial Usage
Middleborough Secondary	4	Moderate	Site (Railroad ROW)	-	OHM associated with historical operations or fill.

The purpose of the subsurface investigations will be to screen each site for the presence of OHM that could impact property value, construction and/or operation of the stations. In areas determined to be impacted by a release of OHM, soil and groundwater information will be useful in developing a management plan for impacted media and defining worker protection requirements and required response actions (if any) under the MCP.

12.7 Impact Analysis

Each of the stations under consideration will require acquisition of properties with RECs that will require further investigation. In each case, remediation or soil/groundwater management during construction could be required. Table 12-2 summarizes the number of RECs and the impact that were identified for each station location not previously evaluated under the FEIS/FEIR. In addition, the Middleborough Secondary alignment has three RECs, and also the potential to encounter soil or groundwater contamination. However, given the limited intrusive work being planned for the alignment (primarily ballast, culvert and tie replacement), the likelihood of encountering contaminated environmental media may be lower.

The construction of both the stations and track modifications will have environmental benefits. Although sites containing RECs could increase construction costs, there will be an environmental benefit associated with remediating contaminated sites, particularly the station sites with known soil and groundwater contamination, such as the Fall River Depot Station site (summarized in the FEIS/FEIR). The stations that will have the greatest environmental benefits are the stations with the most RECs since these properties are the most likely to have contaminated environmental media that will be cleaned up as part of the Phase 1 Project.

Table 12-2 Summary of RECs by Station/Alignment

Station/Alignment	Total Number of RECs	Number of Low Impact RECs	Number of Moderate Impact RECs	Number of High Impact RECs
Pilgrim Junction	2	0	1	1
East Taunton Station	2	0	2	0
Middleborough Secondary	4	0	3	1

12.8 Mitigation and Regulatory Compliance

The following section details the mitigation requirements for management of contaminated media/debris and regulatory compliance that may be required during construction and post-construction.

12.8.1 Management of Contaminated Media and Regulatory Compliance

MassDOT will notify MassDEP if a reportable condition is identified as per the MCP or if OHM is detected in soil and/or groundwater above the applicable standards, referred to as the Reportable Concentrations. In these circumstances, MassDOT will retain a Licensed Site Professional (LSP) to verify if notification is required, further assess and manage the site, direct response actions, and specify procedures for work performed in the contaminated areas, such as soil excavation, in accordance with the MCP and, if need be, to render appropriate opinions. The LSP will also determine if risk reduction measures are required. The timing of these response actions will be in accordance with the milestones outlined in the MCP.

To extend MCP deadlines for response action and report submittals so that the response actions can be coordinated with the construction of the stations, layovers, and expansion of the rail lines, the MBTA has received an SPD Permit (as per 310 CMR 40.0060 of the MCP) for the South Coast Rail Project. The SPD Permit was granted on March 10, 2016 and assigned "mother" RTN 4-25663. MassDOT is coordinating with MassDEP to amend the SPD Permit to account for Project changes described in this DSEIR.

At many sites containing impacted soil, it is often not possible to reach a regulatory endpoint by using soil excavation and off-site disposal as the only type of remediation. It is advisable to explore other options such as the re-use of soil in order to minimize the quantity of soil to be excavated and disposed off-site. For low levels of impacted soil where a risk assessment shows an unacceptable risk for current and future unrestricted use, a deed restriction consisting of an AUL may be implemented after construction is completed to control site uses and meet a regulatory endpoint. As per 310 CMR 40.1013(1)(c) of the MCP, AULs are not required to be implemented within railroad ROW.

Soil impacted with OHM above the Reportable Concentrations that is encountered during the implementation of the SCR Project will be managed appropriately in accordance with the MBTA Design Construction Standard Specifications, Section 02282, entitled "Handling, Transportation and Disposal of Excavated Material." Preliminary assessment activities may assist in identifying the type and quantity of OHM impacted media which will require management under these protocols and help select the optimal disposal methods and/or destination prior to generation. A summary of the MBTA Specification is provided in the following sections.

Management of Impacted Soil

Contaminated media may be located on proposed stations and railroad ROWs due to the presence of undocumented historical releases or urban fill not previously reported to the MassDEP Should OHM impacted soil be generated during project-related excavation that requires export or on-site re-use, this material will also need to be properly characterized and managed in accordance with applicable regulations. Proper management will ensure appropriate re-use on the project site to prevent exposure to contaminants or export to appropriate destinations. Characterization may entail the collection of soil samples and analysis for specific parameters specified in MassDEP policies for re-use and disposal of contaminated soil. Pre-characterization should eliminate the need to stockpile excess soil onsite pending characterization and if export is needed, generation of the required paperwork. A minimum of ten business days are required for laboratory analysis and approval at a disposal facility or landfill. The stockpiling of soil before characterization on such a large project may lead to delays or outright stoppages of work resulting from management and segregation difficulties and could result in a large volume of soil for which there may not be space to accommodate.

Therefore, a Soil Management Plan will be prepared for the project that is consistent with MBTA specifications. The Soil Management Plan will be implemented as a waste management tool during soil excavation and removal activities that will occur during construction to ensure soil is properly characterized, re-used and/or exported. The primary goals of the Soil Management Plan are to expedite construction and avoid unexpected costs by minimizing costly off-site disposal, and maximize the re-use of soil within the boundaries of the project whilst protecting human health and the environment.

In order to minimize the need to stockpile and manage the excavated soil, which often can be problematic due to dust, runoff, regulatory time limits on stockpiles, the need for large areas, and impacts to other area, the Soil Management Plan prepared by the PM/CM will require the identification of the soil that will be disposed of off-site prior to being excavated, as well as the types of the receiving facilities that will be accepting the soil. It will categorize the soil based on its regulatory status from the specific areas to be excavated. Based on the subsurface investigation analytical results, the soil will fall into four groups, consisting of:

- non-regulated;
- soil subject to the Similar Soils Provision Guidance (WSC#13-500) (i.e., “anti-degradation” policy in the MCP);
- MCP regulated (containing contaminants equal to or in excess of MCP Reportable Concentrations); and
- RCRA Hazardous Waste.

Re-use and disposal options for each category will then be designated under the Soil Management Plan during construction activities, and soil receiving facilities or destinations will be pre-selected on either a daily or weekly basis. The soil requiring excavation will be loaded directly into trucks at the site of excavation requiring soil to be removed only once.

Based on the anti-degradation policy and a pre-risk screening, that will be performed to determine the risk associated with the current and foreseeable use of the property, the re-use of soil that contains contaminants above the MCP standards may be possible within the project ROW as long as regulatory endpoints could be met.

Properties with confirmed OHM impacts are generally managed in accordance with the MCP, 310 CMR 40.0000 and associated policies or guidance issued by the MassDEP. However, depending on the type and concentrations of OHM present at a property, other federal regulations implemented by the EPA may apply (for example, CERCLA).

Although re-use should be the preferred option, when characterization of soil after excavation is necessary, the soil should be segregated into approximately 500-cubic yard sections and placed on and covered with polyethylene sheeting of 10 mil or greater thickness. Covers will be placed on each stockpile at the end of each day’s operations, and will be secured in place to prevent runoff and erosion. A composite soil sample will be collected from each of the 500 cubic yard segments. The soil samples will be submitted for the following, at a minimum, chemical analyses: MCP 14 metals, VOCs via EPA Method 8260, PCBs via EPA Method 8081, total petroleum hydrocarbons (TPH) via modified EPA Method 8100, SVOCs via EPA Method 8270, reactive cyanide and sulfide using EPA Method SW-846, ignitability and conductivity. The specific analyses to be performed will depend upon the requirements of the receiving facility that was selected to accept the soil. Any samples found to contain contaminant concentrations equal to or greater than 20 times their hazardous waste toxicity threshold (for example, the theoretical 20-times rule) will be analyzed for toxicity characteristic leaching procedure (TCLP).

It is assumed that the analysis of pesticides and herbicides will not be required; however, this assumption may be modified based on the requirements of the disposal facility and history of the generator site. Should alternate soil disposal options be pursued (such as asphalt batching), analytical requirements may vary depending on the analytical requirements for that facility. Based on the results of the characterization, a Bill of Lading (BOL) will be prepared to facilitate the export of the soil that will need to be disposed of off-site to the selected disposal facility to ensure that the facility is appropriate to handle the impacted soil. The Bill of Lading will need to be prepared and/or certified by an LSP. Soil that is not regulated and does not require a BOL will be disposed of under a Material Shipping Record.

Management of Impacted Ground Water

If OHM impacted groundwater is encountered during construction, it will be managed in accordance with applicable regulations. If the volume is limited and subsequent off-site disposal is deemed to be the most cost-effective disposal option, the groundwater can be temporarily stored in a holding tank will then be characterized, at a minimum, via laboratory analysis for the following parameters: VOCs via EPA Method 8260, TPH via EPA Method 8100 and SVOCS by EPA Method 8720. For managing larger volumes of ground water, it may be more cost effective to obtain an EPA Construction General Permit or Remediation General Permit for discharge to surface waters/storm drains or a permit from the local sewer authority, if allowed, for discharge to sanitary sewers. These types of permits have specific ground water testing requirements as well.

Contaminated groundwater may also need to be dewatered. However, since dewatering is often not cost effective, it is not recommended and therefore should be thoroughly assessed before any decision is made as to remediation. When impacted groundwater has originated from an off-site property, the filing of a Downgradient Property Status (DPS) Opinion may be prudent to suspend response actions and compliance fees. However, response actions may still be necessary to achieve a regulatory endpoint beyond those required for project construction.

Large quantities of impacted groundwater encountered by construction activities will also be managed with proper permitting. For smaller quantities, ground water will be pumped into a containerized fractionation tank and removed by a manifest for off-site disposal at an approved facility.

Management of Hazardous Demolition Debris and Used Railroad Ties

There are currently buildings present at the proposed Pilgrim Junction Station. Asbestos-containing materials, including roof flashing, tiles, and other materials may be present in the building materials for the buildings that will be undergoing demolition, based on their age. In addition, lead-based paint, mercury, and PCBs may also be present in the building materials and/or fixtures. It is envisioned that prior to demolition, a licensed asbestos and hazardous materials contractor will sample the building material, including roof flashing, tiles, and other materials, as well as the potential lead-based paint, mercury, and PCBs. If these hazardous materials are found to be present in the structures, then they must be removed by a licensed contractor in accordance with state regulations.

Re-use of asphalt, brick, and concrete, should be considered, as their re-use could reduce disposal costs and may not require a permit. The re-use will depend on whether they are coated with a contaminant or considered "contaminated" based on the concentrations of contaminants present on the material.

Used wooden railroad ties are typically coated with chemical preservatives including creosote which contains SVOCs and will require special handling procedures. The discarded railroad ties must be managed and disposed of in accordance with applicable regulations.

12.8.2 Health and Safety Requirements

In addition, health and safety procedures must be followed under the guidelines of the Occupational Safety and Health Administration. All construction workers involved in performing the response actions must be appropriately health and safety trained in accordance with the Occupational Safety and Health Act (OSHA) of 1970 (Title 29 United States Code, Chapter 15), which mandates specific procedures that must be followed to be protective from exposure to contaminated media.

12.8.3 Closure Reports

At the completion of response actions at properties acquired by the applicant for which an RTN was obtained from the MassDEP, but a closure report consisting of a Permanent Solution Statement (formerly RAO) has not yet been submitted, a condition of No Significant Risk must exist as defined by the MCP. The preferred outcome is a Permanent Solution with No Conditions in which contamination is reduced to background levels to as close to background levels as feasible. In some situations, the confirmatory sampling results may not support a Permanent Solution with No Conditions, and in these situations, alternatives will be evaluated. The MassDEP will need to be consulted regarding the planning and implementation of demolition and management of contaminated soil to ensure consistency with the applicable regulations.

Additional response actions beyond those necessary for project construction may be necessary at some of these properties in order to achieve regulatory closure. Such foreseeable response actions could occur pursuant to the MCP as permitted under provisions such as those of a RAM Plan, SPD Permit, or others, and applicable MCP policies pertaining to construction and waste management.

12.8.4 Temporary Construction-Period Impacts

Mitigation measures during construction may include special handling, dust control, and management and disposal of contaminated soil and groundwater in order to prevent construction delays and to provide adequate protection to workers and any nearby sensitive receptors. All response actions must ensure that any nearby or adjacent receptors are adequately protected.

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13. Indirect and Cumulative Impacts

13.1 Introduction

The Massachusetts Department of Transportation's (MassDOT) stated purpose of the implementation of South Coast Rail (SCR) Phase 1 (the Project) is consistent with the Full South Coast Rail Project, as documented in the Final Environmental Impact Statement (FEIS)/ Final Environmental Impact Report (FEIR) released in September 2013 (see Chapter 1, *Introduction & Project Purpose* for more information on the Full Build). This purpose is to meet the existing and future demand for public transportation between Fall River/New Bedford and Boston, Massachusetts, to enhance regional mobility while supporting smart-growth planning and development strategies in affected communities. Phase 1 allows MassDOT to serve these objectives in a timelier manner than would be possible if service was delayed until the completion of the Full SCR Project.

The South Coast Rail Economic Development and Land Use Corridor Plan[1] (Corridor Plan) was the result of widespread collaboration between the Commonwealth, 31 Corridor communities, and three Regional Planning Agencies (RPAs); Old Colony Planning Council (OCPC), Metropolitan Area Planning Council (MAPC), and Southeastern Regional Planning and Economic Development District (SRPEDD). As documented in the Corridor Plan, the Full SCR Project is anticipated to result in economic benefits and growth in jobs and households within the South Coast region. While these changes are economically beneficial, induced growth has the potential to affect land use and other resources. To guide future development, the Corridor Plan created "a blueprint for clustering jobs and homes around stations, maximizing the economic benefits of rail investment, minimizing sprawl development, and preserving the farms, fields, and forests of the South Coast."[2] To promote such smart growth, it identified Community Priority Areas of Regional Significance, including Priority Development Areas (PDAs) and Priority Protection Areas (PPAs). According to the Corridor Plan, PDAs are areas "with the greatest capacity or potential to accommodate new development," while PPAs "include land or environmental resources that are not permanently protected but are worthy of increased levels of protection through planning, regulation, conservation or acquisition."[3]

In fall 2010, Gov. Patrick issued Executive Order 525 (E.O. 525) providing for the implementation of the Corridor Plan and Corridor Map through state agency actions and investments. The Executive Order calls for state investments to be consistent with the Corridor Plan's recommendations to the maximum extent feasible. These state actions have the potential to leverage local and private investments in the priority areas. The Executive Order also directs state agencies to conduct a retrospective analysis to

1 Goody Clancy. 2009. *South Coast Rail Economic Development and Land Use Corridor Plan*. Goody Clancy: Boston, MA. June 2009.
2 *Ibid.*
3 *Ibid.*

determine how consistent their actions and investments in the region have been. with the Corridor Plan goals.

As part of the SCR FEIS/FEIR, MassDOT incorporated smart-growth planning consistent with the Corridor Plan and its associated PDAs and PPAs into the Project to provide communities with the opportunity to organize new growth and direct it away from sensitive areas with significant natural and cultural resources. The Project area associated with Phase 1 service has already been studied as part of the SCR smart-growth planning efforts and is included in the Corridor Plan. The use of the Middleborough Secondary line, a relocated Taunton Station, and new Pilgrim Junction Station in Middleborough are new elements that can be added to the Corridor Plan to ensure consistency in approach for analysis of the Phase 1 service.

After the publication of the SCR FEIS/FEIR, MassDOT released the *South Coast Rail Corridor Plan Update*, in cooperation with the Executive Office of Housing and Economic Development (EOHED) and the three RPAs associated with the development of the Corridor Plan. The focus of this five-year update was to review and revise, as necessary, the Community Priority Areas of Regional Significance. The proposed design modifications to the Freetown and Fall River design will have no impact on considerations included in the 2008 Corridor Plan and the 2013 Update. Through extensive public engagement led by the RPAs and updated mapping technologies, the 2013 Corridor Plan Update adjusted the boundaries of the PDAs and PPAs such that the number of PDA acres was reduced 63 percent, while the number of PPA acres increased by 13 percent. Overall, acreage within Community Priority Areas of Regional Significance declined by just one percent between 2008 Corridor Plan and the 2013 Update.

Section 13.2 of this chapter discusses the indirect effects of the proposed Phase 1 service compared to the No-Action Alternative (Non-Phased Service). It addresses the new elements associated with Phase 1 service only, and does not re-assess Project elements associated with the Full SCR Project that were already analyzed as part of the SCR FEIS/FEIR. Section 13.3 discusses the implementation of the Corridor Plan, including related performance metrics and the associated monitoring and reporting program, as well as the consistency of State investment commitments with the Corridor Plan. Section 13.4 provides an analysis of the cumulative impacts of Phase 1 service on natural, social, cultural, and physical resources.

This chapter specifically addresses the Secretary's Certificate on the Notice of Project Change (NPC), as described in Chapter 1, Section 1.3, which requires this DSEIR to include several specific analyses and information related to indirect and cumulative effects, as listed below.

- The impact assessment should include temporary and permanent impacts, direct and indirect impacts, and secondary and cumulative impacts. Impact analysis provided in the DSEIR should be conducted consistent with the methodology applied in the DEIS/R and the FEIS/FEIR, to the extent possible and updated as necessary, to support comparison of impacts and benefits.

- Changes associated with phasing of the project should be incorporated into the long-term evaluation and monitoring plan, which will include periodic reporting to the public and other agencies on progress. The DSEIR should identify how Phase 1 will be incorporated into the reporting (for example, publication of a separate/interim report) and how phasing may shift commencement of timelines. The first report was scheduled to be issued four years after the South Coast Rail project is put into service, and subsequent reports were to be issued every three years, for a maximum of 20 years.
- The DSEIR should provide an update on the monitoring and collection of data.
- The DSEIR should address how sustainable growth associated the South Coast Rail project will be affected by Phase 1, including relocation and/or delayed construction of stations.
- It should identify public infrastructure investments, land preservation funding, identification of PDAs and PPAs that may shift or be introduced as a result of routing interim service along the Middleborough Secondary line.
- MassDOT should describe how efforts to provide technical assistance to municipalities in Phase 1 will be implemented.
- Smart Growth benefits under Phase 1 should be assessed in the DSEIR. Given the reduction of three stations under Phase 1, as compared to the Full SCR Project, the SEIR should include an assessment of how, or to what extent, Smart Growth goals may be altered by this project change. As part of this assessment, MassDOT should provide a status report on the public infrastructure investments, land preservation funding, identification of priority development and protection areas, as well as any advances in municipal zoning changes which have occurred since E.O. 525 was issued in 2010.

13.2 Indirect Effects

Indirect effects "are caused by the action and are later in time and/or farther removed in distance, but are still reasonably foreseeable." Indirect effects "may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems," (as defined in federal regulations 40 CFR 1508.8).

Induced-growth indirect effects are changes in the location and/or magnitude of future development attributed to changes in accessibility caused by the transportation Project. Accessibility is the ease of movement from an origin (to all other places) or to a destination (from all other places). Transportation improvements change accessibility by reducing the time cost of travel between destinations. Changes in accessibility can affect the location decisions of residents and businesses if favorable economic, regulatory and infrastructure conditions are also supportive of new development. An example of an induced-growth indirect effect is commercial development occurring around a new rail station and the environmental impacts associated with this development. The transportation project is a necessary condition for this development to occur (by providing new or improved access), but is not a sufficient condition. For the development to occur, other favorable conditions may be required, including:

- economic conditions that support development (such as markets, acceptable rate of return on investment in land purchase, design, construction, and other costs);
- zoning and other land use controls and policies suitable for the type of development suggested by market conditions;
- other infrastructure that supports development (for example, water and sewer service); and
- amenities (such as good schools and access to recreational opportunities).

As stated in the SCR FEIS/FEIR, potential indirect effects (beneficial and adverse) of the Rail Alternatives were evaluated with and without smart-growth measures (including transit-oriented development [TOD]) within a study area that included the 31 Corridor communities (such as, where induced growth will be likely to occur because of the SCR Project [the "commute shed"]). Phase 1 service does not introduce any new communities to this commute shed.

The Phase 1 study area that this DSEIR analyzes includes only those communities that will receive the new elements associated with Phase 1 service: Middleborough, Lakeville, Raynham, and Taunton. This DSEIR discusses the potential of Phase 1 service to change the induced growth projections that the SCR FEIS/FEIR presents. This DSEIR does not address the communities where no new elements are planned. The SCR FEIS/FEIR already evaluated these communities and their respective development plans. This included the communities in the Southern Triangle that were expected to receive the same benefits from the Project that the SCR FEIS/FEIR describes and communities north of Taunton that were also expected to receive the same benefits though in delayed fashion (no sooner than 2030). Although modifications to the design of the Freetown and Fall River Depot Stations will take place, these stations will be developed within the same previously-identified parcels and are therefore the modifications are not anticipated to change induced growth effects from those previously disclosed.

The analyses in the SCR FEIS/FEIR considered reasonably foreseeable indirect effects of implementing the SCR Project. Induced growth that will result from the Rail Alternatives included the creation of new residential development and jobs. To assess the indirect effects of this induced growth, two scenarios were developed to allocate growth in the South Coast region. The first scenario (Scenario 1) allocated induced growth under business-as-usual conditions, including baseline growth, and assumed that induced growth would occur in a traditional pattern. The second scenario (Scenario 2) assumed that growth would be directed to PDAs and away from PPAs based on the planning efforts of each municipality in the South Coast region. Refer to Chapter 5, *Indirect and Cumulative Impacts* of the 2013 SCR FEIS/FEIR for details on the associated methodology.

Potential indirect effects to environmental resources with the implementation of Phase 1 service are not anticipated to change significantly from those that the SCR FEIS/FEIR describes. The Middleborough Secondary route is an active freight line and will therefore not lead to new segmentation or fragmentation of habitat. Phase 1 may lead to the conversion of undeveloped lands to developed land uses; however, such conversions will be limited to Pilgrim Junction Station, Middleborough/Lakeville Station, and East Taunton Station. Moving the existing commuter rail station from the Middleborough/Lakeville Station to Pilgrim Junction Station is not expected to create new development opportunities, as such opportunities would just shift from one station to the other. Development opportunities proximate to the Pilgrim Junction Station are constrained due to a lack of lands available for development; most of these lands are either already developed or are within the Town's Water Resource Protection Districts that aim to protect existing and potential drinking water supplies. Any new development at the Middleborough/Lakeville Station will take place on land previously developed as surface parking. At East Taunton Station, similar levels of residential development are possible as compared with the concept plan for Taunton Depot Station that the Corridor Plan presents.

13.2.1 No-Action Alternative (Non-Phased Service)

If MassDOT does not implement phased service to the region, then the Full SCR Project, as the FEIS/FEIR describes, will proceed, though in delayed fashion, from the originally anticipated commencement of operations no sooner than 2030.

13.2.2 Build-Alternative (Phased Service)

The implementation of phased service will not bring any new communities into the service plan that the SCR FEIS/FEIR did not already evaluate. Phase 1 service, therefore, does not necessitate the full re-evaluation of the projections presented in the SCR FEIS/FEIR. All Phase 1 stations except for Pilgrim Junction Station are in communities that had a new station proposed as part of the Full SCR Project. Phase 1 service will bring commuter rail service to Taunton and the communities in the Southern Triangle earlier than originally anticipated, thus providing economic and transportation benefits in the near term. The Towns of Middleborough and Lakeville already have access to a commuter rail station (Middleborough/Lakeville) and have already experienced a certain amount of induced growth as a result of having such access. Communities north of the City of Taunton are still expected to realize the projected growth in households and jobs that the SCR FEIS/FEIR describes as part of the Full SCR Project.

Transit-Oriented Development

This section discusses anticipated changes to TOD opportunities as the Corridor Plan presents them and the potential for new TOD from the implementation of Phase 1 service. Allocations of projected jobs and housing reported in the SCR FEIS/FEIR are not anticipated to change, however, levels of TOD similar to those presented in the Corridor Plan are anticipated in communities with Phase 1 stations. Projected ridership at Pilgrim Junction Station in the Town of Middleborough is similar to, if not slightly lower than, existing levels at the Middleborough/Lakeville Station.[4] It is anticipated that current riders who use the Middleborough/Lakeville Station will instead use stations that are closer to them throughout the Southern Triangle once Phase 1 goes into service.

Pilgrim Junction Station

The proposed Pilgrim Junction Station is only three quarters of a mile from the existing Middleborough/Lakeville Station in Lakeville. Due to limited availability of undeveloped land proximate to Pilgrim Junction Station, opportunities for TOD are not expected to be significant. These lands are largely developed, fragmented by existing rail infrastructure, or are subject to zoning that restricts the types and scale of development without a zoning variance or special use permit, including the overlying Water Resource Protection District.[5] Middleborough has already seen development pressures from the existing commuter rail station, and any TOD at Pilgrim Junction Station will likely represent a shift from the existing station and not result in additional induced jobs and households beyond what the SCR FEIS/FEIR presents. There is no existing concept plan for potential TOD at Pilgrim Junction Station.

Middleborough/Lakeville Station

The existing Middleborough/Lakeville Station, which could remain open to service existing Cape Flyer riders and to support a potential future Cape shuttle service connection, may also see new TOD. The daily demand for parking spaces will be lower, and the parking lot could become partially available for redevelopment.

East Taunton Station

Although the Taunton Depot Station will be relocated to East Taunton (less than 1 mile from its original planned location), similar TOD opportunities and range of modes for access as those considered in the Corridor Plan are possible at the new station location. This is due to the availability of land proximate to the new station that is under the same ownership with an owner who has expressed interest in TOD development. The development program in the Corridor Plan for Taunton Depot Station envisioned up to 250 additional housing units at that location.

Aside from land availability and ownership, the potential for TOD at the proposed East Taunton Station is dependent on the City of Taunton. The proposed East Taunton Station is outside of the Transit Oriented Overlay District that the City adopted in 2007.[6] If the City wants to continue to promote and facilitate TOD, it could revise its zoning ordinance to include the area around the proposed East Taunton Station in its Transit Oriented District. East Taunton Station is in an area currently zoned for industrial uses, and accordingly, special permits are required for new residential developments and many types commercial uses.

4 CTPS Ridership Projections for SCR Phase 1, 2017 (Appendix A).

5 Town of Middleborough. 2012. Middleborough Zoning Bylaws.

6 City of Taunton. 2007. City of Taunton, Transit-Oriented Development District (TOD). http://www.srpedd.org/manager/external/ckfinder/userfiles/resources/Comprehensive%20Planning%20and%20Zoning/By-Laws/TauntonTOD43007.pdf. Accessed October 24, 2017.

Freetown and Fall River Station

It is anticipated that riders who currently commute to the Middleborough/Lakeville Station will instead board the train at stations that are closer to them, and as such, the potential development opportunities discussed in the Corridor Plan can carry forward with minor layout modifications that are not anticipated to change their overall development programs. As the Corridor Plan presents, these programs include up to 25,000 square feet of new retail/office space and 200 housing units within a ¼ mile radius of the Freetown Station, and up to 200,000 square feet of commercial space and 200 housing units at the Fall River Depot Station. Since the publication of the Corridor Plan and the SCR FEIS/FEIR, the area around the Fall River Deport Station has experienced partial redevelopment that includes a medical office building of approximately 19,500 square feet at 775 Davol St., the site of the former Massasoit Steam Mill.[7] This Project type is generally consistent with the mixed-use focus of the original concept plan, although its location was the site of a planned parking structure that will have supported station functions. The proposed station parking has been reconfigured as a result of this development.

Effects of Phase 1 to the Corridor Plan and Community Priority Areas of Regional Significance

The proposed Phase 1 station locations align with the intent of the PDAs, as defined in the Corridor Plan. Chapter 2, *Alternatives Analysis*, discusses how the site locations of the proposed Pilgrim Junction and East Taunton Stations were chosen because they met certain site-selection criteria, which overlap with the criteria of PDA screening, including good transportation access, few environmental constraints, and smart-growth potential.

Since the modifications to the design for Freetown and Fall River Stations take place within the same parcels, they remain within their PDAs and outside the PPAs. As the Corridor Plan Update depicts, however, the proposed Pilgrim Junction and East Taunton Stations are outside of existing PDAs, though not within PPAs. The proposed Pilgrim Junction and East Taunton Stations are slightly more than ¼ mile (about a five-minute walk) from their nearest PDAs, including Downtown Economic Opportunity Area [182-03] in Middleborough and Target Station Site [293-12] in Taunton, respectively. This distance limits the potential for TOD in these areas, as it reduces their attractiveness for new transit-oriented homes and businesses. In consideration of Phase 1 service, as part of the next update to the Corridor Plan, the City of Taunton and Town of Middleborough should engage residents, business owners, officials, and organizations, assisted by MassDOT and SRPEDD, in updating their Community Priority Areas. These communities should consider revising the areas they have designated as most important to them for development (PDAs) to include areas at or within ¼ mile of the proposed Pilgrim Junction and East Taunton Stations. Such revisions will ensure that future Commonwealth investments, primarily infrastructure investments, continue to support smart growth within their communities.

7 Fall River Office of Economic Development, City of Fall River. 2016. TIF Board OKs Three Projects, Including New Mall: $2M in Tax Breaks Aim to Spur Development. http://froed.org/2016/09/09/tif-board-oks-three-projecs-including-new-mall2m-tax-breaks-aim-spur-development/. Accessed October 24, 2017.

13.3 Implementation *of the South Coast Rail Economic Development and Land Use Corridor Plan*

This section discusses the implementation of the Corridor Plan, including the provision of technical assistance to ensure future sustainable development in concert with the Project, monitoring and reporting of performance metrics to measure the anticipated environmental and smart-growth benefits, and consistency of State commitments with the Corridor Plan.

13.3.1 Technical Assistance

Through Fiscal Year (FY) 2015, MassDOT provided technical assistance grants totaling more than $1.7 million to the Corridor communities in support of advancing smart-growth land use policies in the South Coast region.[8] Such technical assistance is intended to enable these communities to prepare for the induced growth associated with the SCR Project in a manner that is sustainable from a land development and environmental impact perspective.

The communities that will be served by commuter rail service under Phase 1 will have the most to gain from the implementation of smart-growth measures, as they will face the greatest development pressures from the introduction of such service. The following are examples of technical assistance grants awarded to communities within the Phase 1 service area; they are presented here to add context to the grant program and do not represent the full list of projects that have received such grants to date.

- The Town of Middleborough received $8,000 in FY2015 to complete its Open Space and Recreation Plan;
- The Town of Lakeville received $25,000 in FY2015 for studying the redevelopment of the State Hospital site and adjacent areas along Route 105;
- The Town of Raynham received $10,000 in FY2013 to develop a Mixed-Use Overlay District Bylaw;
- The City of Taunton received $15,000 in FY2015 to develop a Use and Occupancy Inventory of properties and companies located in the Myles Standish Industrial Park/Dever School Expansion and the Liberty and Union Industrial Park;
- The Town of Freetown received approximately $15,000 in FY2012 for rezoning efforts along South Main Street in the areas surrounding the proposed Freetown commuter rail station; and
- The City of Fall River received $25,000 in FY2011 for TOD planning and design and waterfront development at the Battleship Cove Priority Development Area.

8 Massachusetts Department of Transportation. 2014. South Coast Rail: Technical Assistance Grants. https://blog.mass.gov/transportation/south-coast-rail/south-coast-rail-technical-assistance-grants/. Accessed October 24, 2017.

Funding for technical assistance temporarily stopped after the FY2015 awards due to project uncertainty. As Phase 1 service will bring about transportation benefits to the communities in the Southern Triangle sooner, these communities are anticipated to receive priority in the awarding of technical assistance grants to prepare them for the advanced schedule. Northern communities are still anticipated to experience the full range and extent of benefits associated with the Full SCR Project; these communities will also be eligible for technical assistance to help them realize the project's full benefits in alignment with sustainable development patterns.

Phase 1 service does not introduce any new communities to the service area; therefore, no shifting of technical assistance funds outside of the Corridor communities will take place. Consistent with the Secretary's Certificate on the SCR FEIS/FEIR, MassDOT will continue to provide funding of an average of $200,000 per year to the RPAs to provide technical assistance to South Coast communities for the next several years.

13.3.2 Evaluation and Monitoring Plan

MassDOT consulted with the Interagency Coordinating Group (ICG) to develop a long-term Evaluation and Monitoring Plan for the anticipated environmental and smart-growth benefits of the SCR Project. This included working with EOEEA, the ICG, RPAs, and local communities to develop evaluation indicators and metrics tailored to the SCR Project. It also proposed a mechanism for periodic reporting out to the public and other agencies on progress in achieving the smart-growth and environmental goals of the Project, including its commitments to the protection of ecologically significant habitat.

This section summarizes the performance metrics as well as the proposed monitoring and reporting programs as required in the Secretary's Certificate on the SCR FEIS/FEIR that will be carried forward during Phase 1. In response to the Secretary's Certificate on the NPC, this section also provides an update on the monitoring and collection of data, and discusses how the phasing of the Project will be incorporated into the long-term Evaluation and Monitoring Plan.

Performance Metrics

The purpose of the Evaluation and Monitoring Plan is to verify the accuracy of impact projections, which will allow for mid-course corrections and adaptive strategies as needed. Section 5.5.2, *Performance Metrics* in the SCR FEIS/FEIR identifies the performance metrics associated with the SCR Smart Growth Evaluation Plan of the SCR FEIS/FEIR, along with detailed information on the methodology associated with their development and how related data could be collected. These cover general metrics such as growth projections, as well as impacts to forestland, farmland, and wetlands. They also cover PDA metrics, PPA metrics, TOD metrics, and social equity metrics. Section 5.5.3, *Monitoring and Reporting Program* in the SCR FEIS/FEIR describes the responsibilities for such data collection among the RPAs and state agencies, including MassDOT, the Executive Office of Administration and Finance (A&F), EOEEA, EOHED, and the Department of Housing and Community Development.

Since data collection was set to begin during the first year of construction of the Full SCR Project, MassDOT and its evaluation partners have not begun monitoring the performance metrics. For Phase 1 service, MassDOT is not proposing changes to the performance metrics or associated data collection processes. In accordance with the Secretary's Certificate on the SCR FEIS/FEIR, however, MassDOT does intend to expand the social equity metrics beyond just Chapter 40B and inclusionary zoning to include other socio-economic factors, as appropriate. For the Full Build, the Certificate on the SCR FEIS/FEIR required MassDOT to "develop an additional biodiversity metric to evaluate the change in Index of Ecological Integrity value of impacted areas and mitigation sites." Because Phase 1 elements are located on active rail track, this biodiversity metric is not applicable to the Project, but it will be relevant when the Full Build expands to areas that do not currently have active freight service.

Reporting

As the SCR FEIS/FEIR states, MassDOT will be responsible for the reporting of results of performance metrics evaluation. MassDOT will draft a report, which will be published on MassDOT's website. The first report will be published approximately four years after the commencement of SCR Service, and subsequent reports will be available every three years after this first report for a maximum of 20 years. The first report will include data collected for the baseline year (the first year of construction) and data collected three years after the baseline data collection year. Each subsequent report will include the historical data, as well as data collected for the additional reporting period.

In response to the Secretary's Certificate on the NPC for Phase 1 service, MassDOT proposes to follow the same general structure for the proposed monitoring and reporting program as the SCR FEIS/FEIR outlines. The same responsibilities among MassDOT, the RPAs, state agencies, and municipalities will apply. Due to Project phasing, however, MassDOT proposes a modified reporting schedule. The first year of data collection will commence during the first year of construction of Phase 1 service.

13.3.3 Consistency of State Commitments with the Corridor Plan

Executive Order (E.O.) 525 mandates policy commitments made in the Corridor Plan for "Strategic Investments" by committing the Commonwealth to use its discretionary grant funds and its investments to target technical assistance and infrastructure investments to priority areas, to the maximum extent practicable. This E.O. requires annual reporting by directing A&F to develop a retrospective analysis to measure the consistency of state investment commitments with the Corridor Plan in addition to a web-based tracking tool.

Released in February 2012, the retrospective analysis covered over 245 state investment commitments made between FY2009 and FY2011.[9] This report found that 78.5 percent of state spending advanced

9 South Coast Rail Inter-Agency Working Group. State Investment in the South Coast Region and Implementation of the Corridor Plan: A Retrospective Analysis. February 23, 2012.

the development and preservation goals of the Corridor Plan. As noted in this report, agencies have taken the following implementation actions to ensure compliance:

- Developing a strategic plan, by agency, for implementing E.O. 525, which will include considerations and issues raised in this report;
- Collecting data to report the implementation of E.O. 525 by agency, which will be summarized in an annual report;
- Seeking approval from other agencies for investments that are inconsistent with the *Corridor Plan* (for example, EOEEA would need to justify an exception to the E.O. 525 for land conservation in a PDA); and
- Targeting technical assistance and infrastructure investments to priority areas, to the maximum extent feasible.

Aside from the Retrospective Analysis and web-based tracking tool, E.O. 525 also directed A&F to collect and report state investment commitments each year in the South Coast region. Due to uncertainty surrounding the Full SCR Project, however, such measurements have not been conducted to date.

13.4 Cumulative Impacts

According to the U.S. Environmental Protection Agency (EPA), an adequate cumulative effects analysis of impacts that are due to past, present, and reasonably foreseeable future actions needs to consider the following factors: 1) whether the environment has been degraded, and if so, to what extent; 2) whether ongoing activities in the area are causing impacts; and 3) the trends for activities and impacts in the area.

A cumulative impact analysis should examine actions that are relevant to reasonably foreseeable significant adverse impacts (i.e., those that are probable or likely, not merely possible), are "essential to a reasoned choice among alternatives," and can be obtained without exorbitant cost.[10] A cumulative impact analysis identifies:

- The area in which the effects of the proposed project will be felt;
- The impacts that are expected in that area from the proposed project;
- Other past, present, and reasonably foreseeable actions that have or are expected to have impacts in the area;

10 Connaughton, James L., "Guidance on the Consideration of Past Actions in Cumulative Effects Analysis." Memorandum to Heads of Federal Agencies. June 24, 2005.

- The impacts or expected impacts from these other actions; and
- The overall impact that can be expected if the individual impacts are allowed to accumulate.

Phase 1 service associated with the SCR Project is anticipated to result in direct or indirect, adverse and/or beneficial effects to a range of resources, as described in Chapters 3 through 12. Additional effects may result from induced growth, as described in the indirect effects portion of this chapter. Much of the Project Area to be utilized for Phase 1 Service was already studied as part of the SCR overall Smart Growth Plan. The Phase 1 alignment will include 7.1 miles of new track area (the Middleborough Secondary) and a new station at Pilgrim Junction. The station in Taunton previously studied as part of the Corridor Plan will be relocated.

Potential cumulative impacts related to Phase 1 service were analyzed as compared to the No-Action Alternative. The evaluation was conducted for a selected set of resources that are within certain temporal and spatial boundaries, result from historical trends or effects from specific other projects, and (for the most part) are regulated by various governmental agencies.

Resources Evaluated

Chapters 3 through 12 describe the potential direct and indirect effects of Phase 1 service for a broad range of resources. Some resources have historically experienced substantial impacts from other projects or human activity; may experience substantial future impact from other projects or activities; and/or are of specific interest to decision-makers, regulators, and residents of the South Coast region. To be generally consistent with the cumulative impact analysis provided in the FEIS/FEIR, the evaluation for the new Phase 1 elements focuses on land use, wetlands, biodiversity, threatened and endangered species, water quality, and air quality. Other resources evaluated in Chapters 3 through 12 either did not meet the selection criteria; are expected to be little-affected by Phase 1 service; and/or do not hold specific interest to stakeholders. They are therefore not explored here.

Temporal or Spatial Boundaries

Current impacts have been evaluated based on 2017 conditions, taking into consideration publication delays for the availability of the most recent data. Future impacts have been evaluated to 2030, the design year of Phase 1 service. The Phase 1 design year represents the year in which the Project is planned and designed to meet the future, anticipated needs and characteristics.

Spatial boundaries for the analyses varied by resource according to the specific characteristics of the resource, regulatory jurisdictions, and the availability of meaningful data.

- **Land Use—**Land use was evaluated at the local (municipal) and regional levels.
- **Wetlands and Waterways—**Wetlands were evaluated at the watershed level when useful data were available. State or regional data were used for historical perspective.

- **Biodiversity—**Biodiversity was evaluated at the ecosystem level (the Bristol Lowlands Ecoregion), considering the biotic communities present in the South Coast region but using the geographic boundaries of the 31 South Coast communities.
- **Threatened and Endangered Species—**Threatened and endangered species were evaluated at the ecosystem level, but also considering the range of each identified species.
- **Water Quality—**This resource was evaluated at the watershed level.
- **Air Quality—**The air quality of the South Coast region is strongly influenced by predominant winds from the southwest and west, bringing air pollutants from upwind states Connecticut, Rhode Island, and New York.[11] Based on regulatory agency jurisdictions and reporting conventions, the three counties within the SCR study area (Bristol, Norfolk, and Plymouth) are considered to constitute the airshed.

Trends and Reasonably Foreseeable Future Actions

The analysis used readily available data sources for past and future changes, EEA data and publications, EPA list of local EIS documents, MassDEP wetland change mapping, federal and state agency major permit applications, and other readily available resources. For each resource, the analysis took into consideration:

- Past changes to the selected resources that resulted from development trends or major projects within the study area; and
- Future changes to the selected resources from anticipated growth based on historic or recent trends, or specific projects, including all reasonably foreseeable projects (for example, those that are undergoing or have completed major environmental permitting actions or MEPA and/or NEPA reviews), such as:
  - First Light Resort and Casino (East Taunton);
  - Fall River Executive Park (Freetown); and
  - Riverfront Business Park (Freetown).

Regional transportation planning was taken into consideration to the greatest extent possible. The most current regional plan covers the period from 2013 to 2016, and is primarily composed of road and bridge resurfacing and reconditioning projects.[12] Although several are identified as congestion relief projects, and specifically reference air quality improvements, quantified impacts to the resources evaluated in this analysis are not provided. Some projects, identified as "congressional earmarks

11 DEP. 2008. Final Massachusetts State Implementation Plan to Demonstrate Attainment of the National Ambient Air Quality Standard for Ozone. Commonwealth of Massachusetts, Executive Office of Energy and Environmental Affairs, Department of Environmental Protection: Boston.

12 Southeastern Massachusetts Metropolitan Planning Organization. 2009. FFY 2013-2016 Transportation Improvement Program. Prepared by the Southeastern Regional Planning and Economic Development District: Taunton, MA.

waiting for project approval and full funding" are also listed, and include projects such as Route 79 Improvements in Fall River and highway interchange and freight rail improvements throughout the South Coast region. It also identifies the relocation of Route 79 in Fall River to create a 4-lane urban boulevard with a landscaped median and improved access to developable areas along the waterfront. Potential impacts associated with these projects are incorporated in the general resource trends described in the cumulative impact assessment.

Although not a "reasonably foreseeable future action" in the traditional sense of cumulative impacts analysis, the possible effects of climate change on resources such as biodiversity, threatened and endangered species, and wetlands have been taken into consideration to the extent possible.

The cumulative impacts evaluation analyzes the past and future changes to the selected resources from development trends and other specific projects within the resource-specific study areas, together with the added impacts of Phase 1 service.

Federal, state, or local governmental agencies regulate most of the resources evaluated for cumulative impacts. The regulatory programs drive many of the trends for improving resource values (for example, air quality, water quality, and wetlands area) and are therefore important in determining resource impacts of Phase 1 service and other regional projects. Regulatory programs typically prohibit impacts except as authorized by a permit, are charged with reviewing permit applications, and, generally, only authorize activities that provide the least impact to the resource while still meeting the proposed project's purpose and need. For this evaluation, existing permitted facilities and proposed actions indicate the current and likely future impacts to the resources.

The agencies responsible for administering these programs are typically charged with managing the resources on a project-by-project basis but in the context of the common good. For example, the federal government has a "no net loss" policy on wetlands; project proponents seeking permits to fill wetland areas are commonly required to offset losses by replacing filled wetlands at a negotiated ratio, such as 2:1 or 3:1. These replacement ratios recognize the inherent unpredictability in creating or restoring replacement wetlands that offset the wetland functions from the project-specific loss, as well as the necessary passage of time between establishing adequate wetland hydrology, and succession to vegetative stability and ultimately functional maturity. This passage of time is particularly lengthy for forested wetlands. Thus, certain regulated resources can experience improvements, rather than degradations, over time.

Active Land Use

The cumulative impacts of the Phase 1 elements in addition to the Full Build will not additively result in a significant environmental impact. The Phase 1 elements that were not considered in the Stoughton Straight Alternative consist of active rail lines and an additional station in Middleborough. Although a new Taunton Station is included in Phase 1 in a new location, it effectively replaces the station in Taunton already considered under the Full Build and already documented in the FEIS/FEIR cumulative impact assessment.

The proposed station site at Pilgrim Junction is within the existing wye formed by the convergence of the Middleborough Secondary and the Middleborough Main Line. Portions of the wye are currently used for rail-related activities, while others are disturbed, undeveloped land. As described in section 13.2.2 above, opportunities for TOD at this site are not expected to be significant. According to the Town of Middleborough's Fiscal Year 2018 Strategic Plan, one of the Town's goals is to facilitate economic development on Route 28 and in the Route 495 business corridor. Another goal is to improve downtown Middleborough's economic development prospects. Implementation of Phase 1 may help the Town to meet these two goals. However, no specific proposed actions related to land use are anticipated at this time.

As indicated in Section 13.2.2 above, there may be TOD opportunities at the East Taunton Station similar to those considered in the Corridor Plan for the previously proposed station location at Taunton Depot. Such development will be dependent on the City of Taunton's interest in revising its zoning ordinance to include the area around the proposed East Taunton Station in its Transit Oriented District. If this were to occur, shifts in land use from undeveloped land to residential or mixed uses. However, there are no specific changes in land use proposed in the vicinity of the proposed station at this time.

A portion of the parcel at 870 North Main Street in Fall River is required in order to provide expanded parking based on ridership projections for the Full Build. Currently, the City of Fall River is developing an Urban Renewal Plan that includes this parcel. Once the Urban Renewal Plan is approved by the City Council, the City's land acquisition process will begin and relocation assistance will be provided to impacted businesses.

Wetlands

Wetland impacts from Phase 1 Service, including the Southern Triangle portion of the Project, are significantly reduced from original impact estimates in the FEIS/FEIR. Cumulative impacts from both the Phase 1 and Full Build will not exceed what was originally estimated in the FEIS/FEIR.

With Phase 1, there will be a minor loss of wetlands with the reconstruction of the tracks and culverts, with little effect on the existing fragmentation of important wetland complexes. Hydrologic interaction and wildlife habitat connectivity among Project Area wetlands will be improved through the improved culverts which will have a larger openness ratio and will improve conveyance of surface water across the Middleborough Secondary.

The Middleborough Secondary was constructed in 1856, and can be assumed to have fragmented wetland habitats along the alignment creating an elevated railroad berm and a gap in forest cover. The small culverts will have restricted hydrologic connections among formerly contiguous wetland systems. In the subsequent years, additional wetland loss and hydrologic alteration occurred due to the development of cranberry bogs, commercial and industrial development, impoundment of waterways, and later development of residential areas along the roads crossing the right of way (ROW). Despite this history of development, substantial areas of contiguous wetland habitats remain both north and south of the ROW.

Residential development is anticipated to continue, and planned developments will likely result in direct and indirect wetland alteration. The railroad will continue to influence the hydrology of adjacent wetland systems and reduce wildlife connectivity within the corridor. Therefore, no increase in cumulative impacts to wetland resources is expected to result from Phase 1.

Biodiversity

With the Project, there will be a minor loss of vegetation associated with the reconstruction of the tracks and culverts, with little effect on the existing habitat fragmentation. Turtle and amphibian passage will be improved through the addition of wildlife crossings, and the improved culverts will have a larger openness ratio and will improve fish and wildlife connectivity along the Middleborough Secondary.

Residential development is anticipated to continue, and planned developments will result in the loss of undeveloped lands. The proposed East Taunton Station site will be developed for commercial or industrial uses, resulting in the loss of 3.7 acres of forest and early successional habitats. Therefore, no increase in cumulative impacts to biodiversity is expected to result from Phase 1.

Threatened and Endangered Species

The addition of Phase 1 Project areas is not anticipated to have a significant effect on Threatened and Endangered Species. Improved connectivity across the right of way through culvert replacement will enhance wildlife mobility across the Middleborough Secondary Corridor. The culverts along the Middleborough Secondary will be replaced and provide improved connectivity across the existing rail line.

Water Quality

The Project is not expected to have a negative impact on water quality. Due to use of Best Management Practices (BMPs) the Phase 1 Project will result in minor improvements to water quality along the existing freight system and at the proposed station locations. BMPs will be used whenever possible to maximize ground water recharge, reduce stormwater volumes, and remove contaminants.

Air Quality

The Phase 1 Project will reduce emissions of carbon monoxide (CO), volatile organic compounds (VOC), and carbon dioxide (CO_2) earlier than they will otherwise be reduced without the SCR Project. For particulate matter ($PM_{2.5}$ and PM_{10}), the increase in locomotive emissions generally offset the reduction in motor vehicle emissions as described in Chapter 6, *Air Quality & Greenhouse Gas*. The additional rail service will result in a *de minimis* increase in regional nitrogen dioxide (NO_X) emissions. When the Stoughton Straight Electric Alternative commences, there will be a decrease in regional NO_x emissions due to additional reductions in vehicle miles traveled and replacement of diesel service with electric.

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14. Mitigation and Draft Section 61 Findings

14.1 Introduction

The Massachusetts Environmental Policy Act (MEPA) regulations at 301 CMR 11.07(j) outline mitigation measures to be addressed in the Environmental Impact Report (EIR) process, including an "assessment of physical, biological and chemical measures and management techniques designed to limit negative environmental impacts or to cause positive environmental impacts during development and operation of a Project." The Secretary of the Executive Office of Energy and Environmental Affairs' (EEA) Certificate on the Notice of Project Change (NPC) for the South Coast Rail (SCR) Project (the Project) included requirements for the scope of the Draft Supplemental EIR (DSEIR). The Certificate required that the DSEIR provide a mitigation chapter that includes:

- A summary table of all mitigation commitments;
- An indication of any changes to mitigation and/or draft Section 61 Findings associated with Phase 1; and
- Proposed Massachusetts General Law (M.G.L.) Chapter 30, Section 61 Findings for all state permits with a clear commitment to mitigation, an estimate of the individual costs of the proposed mitigation and the identification of the parties responsible for implementing the mitigation.

This chapter provides a description of the Massachusetts Department of Transportation's (MassDOT) commitments to mitigation for impacts to each of the environmental and social resources identified in the Secretary's Certificate on the NPC, with a summary table listing all mitigation commitments associated with Phase 1 (Table 14-1). MassDOT continues its commitment to implementing all mitigation measures described in the Final Environmental Impact Statement (FEIS)/Final Environmental Impact Report (FEIR) for the Full Build Project.

14.2 Proposed Section 61 Findings

Massachusetts General Law Chapter 30, Section 61 authorizes state agencies with permitting responsibilities to make an official determination regarding potential impacts from a proposed project and whether impacts have been avoided, minimized, and/or mitigated for appropriately. The Law requires agencies/authorities to issue a determination that includes a finding describing the environmental impact, if any, of the project and whether all feasible measures have been taken to avoid or minimize said impact.

This section provides a brief overview of the proposed SCR Project and the Phase 1 Project; explains the history of the MEPA review process for the Project; outlines required state and federal permits and their authorities; summarizes mitigation commitments for permanent and construction-related impacts; and provides draft Section 61 determination language for state agencies.

14.2.1 Project Description

The Commonwealth of Massachusetts is committed to moving forward with the SCR Project and to doing so in a manner that provides long-awaited commuter rail service for the South Coast region as soon as possible. For this reason, MassDOT is proceeding with permitting and early actions on the Stoughton Straight Electric Alternative already reviewed under MEPA while also proposing to adopt a phased approach that will provide service years before revenue service is possible at Full Build. MassDOT has advanced the option of an interim service extending to both New Bedford and Fall River using the existing Middleborough Main Line, while work simultaneously proceeds to design, permit and fund the Full Build Project. Phase 1 (the Phase 1 Project) will provide service from New Bedford, Fall River and Taunton to Boston using the existing Middleborough Secondary Line and the existing Middleborough Main Line.

The majority of the Phase 1 corridor will consist of the Southern Triangle, which has already been reviewed as part of the FEIS/FEIR. The Southern Triangle extends from Cotley Junction in Taunton to Fall River (using the Fall River Secondary Line) and to New Bedford (using the New Bedford Main Line). The Southern Triangle is an existing active freight rail corridor, and the Project will improve the track infrastructure and add stations and overnight layover facilities for commuter rail service. The new element to be included in the Phase 1 Service is the use of the Middleborough Secondary to connect to the Middleborough Main Line.

This DSEIR analyzes new elements being proposed as part of Phase 1 (new Phase 1 elements), which include:

- Improvements to track infrastructure on the Middleborough Secondary, an active freight line;
- A new station at Pilgrim Junction in Middleborough;
- A new station in East Taunton south of Cotley Junction; and
- Modifications to previously studied stations at Freetown and Fall River.

14.2.2 History of MEPA Review

The SCR Project has been extensively studied in different configurations for over 25 years. In 2002, a FEIR, prepared by the Massachusetts Bay Transportation Authority (MBTA), concluded that the Stoughton Alternative was the most practicable and feasible of the alternatives and identified it as the preferred route. On August 30, 2002, the MEPA Secretary of Environmental Affairs (now the Secretary of Energy and Environmental Affairs) issued a Final Certificate (Executive Office of Environmental Affairs [EOEA] File # 10509) stating that the FEIS/FEIR adequately and properly complied with MEPA and its implementing regulations. The Certificate authorized MassDOT to proceed with planning for the SCR Project as an extension of the existing Stoughton Line. However, further planning was delayed until April 2007, when the Commonwealth of Massachusetts released *South Coast Rail: A Plan for Action*, and the Project became a priority transportation initiative for the Commonwealth under the Patrick Administration.

For the Project to proceed to construction it will be necessary for MassDOT to obtain a permit for the discharge of dredged or fill material in waters of the United States under Section 404 of the Clean Water Act from the U.S. Army Corps of Engineers (USACE). This requires the USACE to conduct a federal environmental review in accordance with the National Environmental Policy Act (NEPA). The USACE and MEPA agreed to coordinate the environmental review for the Project. As the lead federal agency for the environmental review pursuant to NEPA, the USACE prepared a federal Environmental Impact Statement (EIS), which MassDOT reviewed and adopted as its state-required EIR.

The coordinated environmental review process began with a joint federal/state scoping process. Key milestones included:

- MassDOT, as the lead state agency, submitted an Environmental Notification Form (ENF) to EEA on November 15, 2008 for public review under MEPA, concurrent with the USACE's public scoping process under NEPA.
- The Secretary of EEA reviewed the Project (EEA No. 14346) and issued a Certificate on the ENF, with a Scope for the Draft EIR (DEIR), on April 3, 2009.
- A combined DEIS/DEIR was filed with the MEPA Office on March 15, 2011, and the Secretary issued a Certificate on the DEIR, with a Scope for the FEIS/FEIR, on June 29, 2011.
- The FEIS/FEIR was released in September 2013. The Secretary issued a Final Certificate in November 2013, indicating that the FEIR adequately and properly complied with MEPA and its implementing regulations and that the Project could proceed to permitting, thus completing the MEPA process.

To date, the USACE has not issued the Record of Decision needed to complete the NEPA process.

Since the 2013 FEIS/FEIR, MassDOT has advanced the design of the Project, and determined that the timeline for implementing service was significantly longer than originally anticipated and, in fact, extended out several years beyond the previously produced schedule. MassDOT also determined that the cost of the Project was substantially greater than previously anticipated. MassDOT believes that service to the South Coast communities is critical, and such a delay (anticipated to be constructed no sooner than 2030) is not ideal. Therefore, MassDOT has adopted a phased approach to the Project. In accordance with 310 CMR 11.00, MassDOT filed a NPC on March 15, 2017 describing the phased approach to Project implementation. A Certificate was issued on May 26, 2017, with a scope for a DSEIR limited to an analysis of the proposed changes associated with Phase 1 of the Project. According to the Certificate, upon review of the DSEIR, the Secretary may determine that no substantive issues remain to be addressed and that the document shall be reviewed as a FEIR, or that the Proponent must file a Response to Comments on the DSEIR and Proposed Section 61 Findings, which shall be reviewed as the FEIR.

14.2.3 Related Permits and Approvals

The FEIS/FEIR provided a detailed discussion of permits required to construct the Project. Phase 1 will require the agency permits and approvals listed in Table 14-1. Permits for the remainder of the SCR Project (Full Build) would be deferred.

Table 14-1 State and Federal Permits and Clearances

Permit	Phase 1	Full Build (Post Phase 1)
Wetland Protection Act Orders of Conditions	Middleborough Lakeville Raynham Taunton Berkley Freetown Fall River New Bedford	Canton Stoughton Easton Raynham Taunton Berkley Lakeville Freetown Fall River New Bedford
Section 401 Water Quality Certification	Individual WQC required for State of Good Repair Project Individual WQC for Phase 1 Infrastructure	Required
Section 404 Clean Water Act	Required	Required
Chapter 91 Licenses	Required (Weaver's Cove Layover only)	Required
Massachusetts Coastal Zone Management Consistency Determination	No additional consistency determination	No additional consistency determination
Conservation and Management Permit	Required	Required
MEPA Clearance	Required for new Phase 1 elements (Middleborough Secondary, new stations)	Issued in 2013
NEPA Clearance	Required for USACE Section 404 Permit	Required for USACE Section 404 Permit

The on-going MassDOT State of Good Repair (SGR) program will require Water Quality Certification, a Section 404 Permit (anticipated under the Massachusetts General Permit), and a "no-take" determination under the Massachusetts Endangered Species Act. These permits are being undertaken as part of the SGR program and schedule.

14.2.4 Draft Section 61 Findings

Proposed Section 61 Findings for the Project have been prepared by MassDOT to comply with the requirements of Massachusetts General Laws, Chapter 30, Section 61, and MEPA regulations at 301 CMR 11.07(6)(k), which require state agencies and authorities to review, evaluate, and determine the impacts on the natural environment of all projects or activities requiring permits issued by the state. State agencies are also asked to issue findings describing environmental impacts and to certify that all feasible measures have been taken by MassDOT to avoid or minimize these impacts. Revised Section 61 Findings will be required from agencies with responsibilities for issuing the following permits for work associated with Phase 1 as described in this DSEIR and the FEIS/FEIR, and from MassDOT for funding for construction. These permits include:

- Wetlands Protection Act Orders of Conditions (if a Superseding Order is required);
- Chapter 91 License (Weaver's Cove Layover Facility); and
- Massachusetts Endangered Species Act Conservation and Management Permit.
- 401 Water Quality Certification

The italicized text in the following paragraphs is a proposed Section 61 Finding by MassDOT that extends to cover all potential impacts of the Project.

Project Name: *South Coast Rail Phase 1*
Project Location: *Fall River/New Bedford to Boston*
Project Proponent: *Massachusetts Department of Transportation*
EOEA Number: *14346*

The potential environmental impacts of the project have been characterized and quantified in the DSEIR, which is incorporated by reference into this Section 61 Finding. Throughout the planning and environmental review process, MassDOT has been working to develop measures to mitigate significant impacts of the proposed project. With the mitigation proposed and carried out in cooperation with state agencies, [Agency] finds that there are no significant unmitigated impacts.

MassDOT has prepared a table of Proposed Mitigation Commitments (Table 14-2 of the DSEIR) that specifies, for both temporary and permanent impacts, the mitigation that MassDOT will provide.

Therefore, [Agency] having reviewed the MEPA filings for the South Coast Rail Project, including the mitigation measures summarized in Chapter 14 of the DSEIR, finds pursuant to M.G.L. C. 30, §61 that, with the implementation of these mitigation measures, all practicable and feasible means and measures will have been taken to avoid or minimize potential damage from the project to the environment. In making this finding, [Agency] has considered reasonably foreseeable climate change impacts, including additional greenhouse gas emissions, and effects, such as predicted sea level rise.

14.3 Avoidance and Minimization

As described throughout this DSEIR, measures have been identified to avoid and minimize impacts, while meeting the transportation purpose and need of the Project.

Each element of Phase 1 has been designed by MassDOT to avoid impacts to environmental and social resources. Each element was developed to maximize the use of existing transportation infrastructure corridors, thereby avoiding or minimizing impacts to undeveloped lands and natural resources. The Project used an iterative process of identifying sites for potential stations that sought to avoid impacts to wetlands, threatened and endangered species habitat, water resources, Areas of Critical Environmental Concern and open space, as well as to residential areas and businesses. Single track, with passing sidings as needed, will be employed to reduce wetland impacts. Stations have been designed to minimize traffic impacts, and to minimize land acquisitions.

MassDOT anticipates that additional measures to minimize unavoidable impacts will be undertaken during the preliminary and final design stages through (among other elements) the refined grading design of tracks and roadways, station layout, and the design of bridges and culverts.

14.4 Summary of Mitigation Commitments

The following sections provide an overview of the conceptual mitigation measures for impacts identified in this DSEIR that will be developed as more specific, implementation-oriented mitigation measures during final design and permitting. The mitigation measures that MassDOT and MBTA have committed to related to the content of this DSEIR are listed in Table 14-2. The mitigation requirements of the Secretary's Certificate on the 2011 DEIR that apply to previously-studied aspects of the Project were provided in the 2013 FEIS/FEIR and are summarized in Table 14-2. Estimated costs are provided when available.

14.4.1 Land Alteration

The Project has been designed to eliminate, minimize and/or mitigate potential impacts of land alteration to the extent practicable by:

- Selecting locations for new Project elements that are on previously developed lands and lands that are adjacent or proximate to the existing freight line;

- Designing the stations to comply with the Massachusetts Stormwater Standards; and
- Implementing erosion and sedimentation controls during construction.

14.4.2 Environmental Justice

No mitigation for environmental justice communities is required for Phase 1 because there are no disproportionate adverse impacts to environmental justice communities. Phased service will benefit all environmental justice communities previously identified and evaluated in the FEIS/FEIR because it provides passenger rail service to the South Coast earlier than the Full South Coast Rail Project.

14.4.3 Traffic and Transportation

Intersection and roadway operations at each of the municipalities impacted by Phase 1 will be mitigated as follows:

Middleborough

- Complete a road safety audit (RSA) at the intersection of Route 105/Route 28 and implement recommended improvements;
- Modify traffic signal timing/phasing at Route 105/Route 28, including providing adequate pedestrian crossing times;
- Modify traffic signal timing/phasing at Route 105/I-495 northbound. Provide new crosswalk across Route 105;
- Install high visibility materials, advanced signage, and flashing beacon warning devices at the existing unsignalized crosswalks across Route 28 at West Street and at Elm Street; and
- Modify the traffic signal timing at Route 105/Route 79/Commercial Street.

Taunton

- Install new traffic signal at Route 140/Industrial Drive;
- Install pre-signals at the Route 140 grade crossing;
- Restripe Route 140 southbound between Industrial Drive and Route 24 southbound; and
- Modify traffic signal timings/phasing at Route 140 with Mozzone Boulevard and with Route 24 southbound ramps to provide preemption phasing during gate closure.

Freetown

- Install advanced warning signage along South Main Street and at Freetown Station driveway; and
- Install dynamic messages signing along approach where sight distance is deficient.

Fall River

- Widen North Main Street on both approaches to President Avenue;
- Update traffic signal timing/phasing at North Main Street/President Avenue and increase pedestrian crossing time; and
- Increase the pedestrian crossing time at North Davol Street/President Avenue.

Construction Period Impacts

Each municipality is expected to have limited traffic impacts associated with construction of stations and parking. Temporary construction impacts include construction related traffic and potentially minor traffic disruptions for the construction or upgrading of station driveways. These impacts are expected to terminate when construction is complete. The Project will work with the agency or municipality that has jurisdiction over the roadway (as well as public safety officials from each municipality) during the development of temporary traffic control plans. Construction is proposed to take place during off peak traffic periods to minimize impacts to the traveling public. With respect to grade crossing improvements, at this stage of design, no detours are anticipated given the proposed improvements. If detours are found necessary as design progresses, the Project will coordinate with appropriate state and local officials.

14.4.4 Air Quality and Greenhouse Gas Emissions

The results of the mesoscale air quality analysis of the Phase 1 stations demonstrate that all the pollutant concentrations will be below the National Ambient Air Quality Standards (NAAQS), therefore no mitigation is required.

The microscale analysis, which evaluated the potential for impact of motor vehicles and train locomotives on hotspot locations around the grade crossings and proposed stations under worst-case scenarios in association with Phase 1, demonstrates that operations will comply with federal and Massachusetts ambient air quality regulations, therefore no mitigation is required.

Since the Project will not increase greenhouse gas (GHG) emissions, further mitigation measures are not required by the MEPA GHG Policy. However, as part of the Phase 1 Service, the Project will further reduce GHG emissions by:

- Installing electric vehicle charging equipment in commuter rail station parking lots; and
- Utilizing light emitting diode (LED) technology for lighting at the commuter rail stations to further reduce the minimal electricity consumption.

To reduce criteria pollutants and GHG emissions from temporary construction activities, construction contractors will be contractually required to adhere to all applicable regulations regarding control of construction vehicles emissions. MBTA construction contractors will:

- Require all contractors to maintain all motor vehicles, machinery, and equipment associated with construction activities;
- Prohibit excessive idling of construction equipment engines in compliance with 310 CMR 7.11, including posting of on-site signage;
- Specify that all diesel construction equipment used on-site will be fitted with after-engine emission controls such as diesel oxidation catalysts (DOCs) or diesel particulate filters (DPFs);
- Require contractors to utilize ultra-low sulfur diesel fuel for all off-road construction vehicles as an additional measure to reduce air emissions from construction activities;
- Implement protective measures around the construction and demolition work to protect pedestrians and prevent dust and debris from leaving the site or entering the surrounding community;
- Mitigate wind erosion to open soil areas by requiring spraying with water;
- Implement other dust control methods, such as wheel washing and avoiding dust-generating work on high wind days, to ensure minimization of the off-site transport of dust; and
- Regularly sweep adjacent roadway surfaces during the construction period to minimize airborne dust and particulate matter from vehicular traffic.

14.4.5 Climate Change

For Phase 1, Project designers are analyzing all Project components in terms of their vulnerability to the climate change impacts associated with heat and flooding based on the following procedure:

1. Refer to projected future climate conditions scenario;
2. Identify exposure to climate change impacts;
3. Identify sensitivity to changing climate conditions;
4. Consider the component's adaptive capacity based on the component's useful life; and
5. Choose appropriate design solution(s).

Potential design solutions for mitigating and adapting to potential climate-related impacts may include, but are not limited to:

- Reducing runoff from impervious surfaces;
- Appropriately sizing drainage structures;
- Consider movable and/or permanent barriers to protect vulnerable portions of rail lines;

- Design new/replacement culverts to stream crossing standards;
- Raise electrical components above future flood elevations;
- Design station shelters and landscaping to maximize shade and reduce heat gain;
- Periodically monitor effectiveness of current rail-neutral temperatures; and
- Explore potential use of off-grid renewable energy for back-up power generation at station sites.

In addition, Phase 1 will help improve the SCR Project's future flexibility and adaptive capacity by providing an alternate route that will continue to connect the South Coast to Metro Boston in the case of an emergency that renders the Stoughton Line temporarily inoperable.

14.4.6 Wetlands, Water Quality and Waterways

Wetlands and Floodplains

Mitigation will be provided in each community where unavoidable permanent wetland impacts are proposed, with the goal of providing an adequate area of mitigation on-site and in-kind to offset the lost functions and values, in accordance with the Wetlands Protection Act (WPA) regulations (310 CMR 10.00), as follows:

- Mitigation for impacted Bordering Vegetated Wetland (BVW) will be located in the same watershed, and support the same habitat type, hydrological regime, ecological functions, and other key characteristic as the impacted resource area;
- Mitigation will be provided at a minimum impact to mitigation ratio of 1:1 for all proposed permanent BVW impacts at one location within each municipality; and
- Bordering Land Subject to Flooding (BLSF) mitigation, which will be at a 1:1 ratio to provide compensatory flood storage for any flood storage lost due to fill required, would be designed to provide sufficient flood storage volume incrementally equal to the theoretical volume of flood water at each elevation, up to and including the 100-year flood elevation, which would be displaced by the proposed fill. All BLSF mitigation will occur within the same floodplain as the impact.

Mitigation for wetland resources subject to federal jurisdiction will be provided in addition to the mitigation developed for WPA impacts to meet the requirements for each wetland cover type impacted, as follows:

- Mitigation will be in-kind with respect to the cover type of the impacted wetlands, within the same watershed, and of sufficient area to offset the functions and values of the impacted resources; and
- Where compliance with USACE mitigation guidance ratios would require additional mitigation over and above WPA required mitigation, an In-Lieu Fee (ILF) Agreement will be established in accordance with USACE procedures.

Surface and Groundwater Resources

Impacts to surface and groundwater resources are not anticipated. The following Best Management Practices (BMP) will be employed to ensure protection of Water Quality through construction and operation of the system:

- Sediment forebays will be constructed to remove suspended solids and reduce other contaminants, such as hydrocarbons and grease, that may result from spills, drips, or exhaust due to the train traffic on the rails.
- A Stormwater Pollution Prevention Plan (SWPPP) will be developed during final design that will identify BMPs that will be used to protect receiving waters from sediment discharges during the construction period.
- New and reconstructed swales within the rail corridor will include water quality features such as check dams, sediment forebays, and outlet protection stone to reduce erosion and the concentration of total suspended solids (TSS) in runoff from the Project Area.
- The MBTA will adhere to the approved Vegetation Management Plan (VMP), as implemented with its Yearly Operating Plans (YOPs), which restrict the use of herbicides in areas adjacent to wetlands or sensitive resources such as public or private drinking water supplies.
- Areas subject to heavy vehicular use will be treated as Land Uses with Higher Potential Pollutant Loads (LUHPPLs) under the Stormwater Management Standards.
- In compliance with the Clean Water Act, Section 303 (d), and the Massachusetts Surface Water Quality Standards (314 CMR 4.00), all Project elements will be constructed to prevent the release of sanitary sewage into receiving waters, which is the major source of bacteria and other pathogens that are the cause of the impairment under *Final Pathogen TMDL for the Taunton River Watershed*. Infiltration practices are proposed at the Freetown and Fall River stations to treat stormwater through infiltration to the underlying soils and promote groundwater recharge. These BMPs will help minimize bacteria loading from ambient sources such as birds and other wildlife.
- In compliance with the Safe Drinking Water Act, the stormwater management system at Pilgrim Junction Station, which is within Zone II to a municipal groundwater well, will be designed with additional pre-treatment.
- In compliance with the Massachusetts Groundwater Quality Standards (314 CMR 6.00), the Project includes stormwater BMPs designed to promote recharge of groundwater to the maximum extent practicable. Pretreatment of runoff prior to recharge will ensure that groundwater quality is not impacted by the Project.

Stormwater and Water Quality

The Project has been designed to comply with Section 402 of the Clean Water Act and the Massachusetts Stormwater Management Standards and Guidelines. The Project will:

- Implement stormwater improvements at Pilgrim Junction, East Taunton, Freetown, and Fall River Depot Stations as described in Section 8.4.5 of the DSEIR, including:
    - Design BMPs in accordance with Massachusetts Department of Environmental Protection (MassDEP) guidance for stormwater management;
    - Comply with MassDEP's Total Maximum Daily Loads (TMDL) for the Taunton River;
    - Mitigate for the increase in peak flow rate and required recharge and water quality volumes associated with an increase in impervious area; and
    - Perform geotechnical investigations at each site to obtain the necessary information to determine final BMP locations and designs as Project design progresses.
- Implement stormwater improvements along the Middleborough Secondary as described in Section 8.4.5 of the DSEIR, including:
    - Reconstruct existing drainage features; and
    - Design drainage systems to collect and convey runoff from the 50-year storm.
- Obtain authorization to discharge stormwater during construction under the National Pollutant Discharge Elimination System (NPDES) program General Permit for Construction Activities; and
- Draft and implement a SWPP in compliance with the NPDES General Permit for Construction Activities.

Waterways

The new Phase 1 elements described in this DSEIR do not include any impacts to areas subject to Chapter 91, and therefore do not require any related mitigation.

14.4.7 Biodiversity and Wildlife Habitat

Mitigation for impacts to regulated resources such as wetlands, waterways, and threatened and endangered species would incorporate measures to protect and enhance the biodiversity of these resources. Detailed site-specific, species-specific mitigation measures will be developed in the permit process in consultation with NHESP.

The proponent will continue to explore strategies and measures that could be used to mitigate for impacts to biological diversity, which may include the following actions:

- Avoid impacts to rare species by:
    - Locating all station sites outside of Priority Habitat;
    - Keeping track construction and culvert replacements within the existing footprint;

  - Adhering to tree removal time-of-year (TOY) restrictions related to Northern Long-Eared Bats;
  - Reducing the amount of rare species habitat loss by minimizing the width of the work area within sections of the Middleborough Secondary by using single track instead of double track;
  - Replacing and enhancing structurally deficient culverts and bridges within the Project corridor to allow and enhance cross right-of-way movement;
  - Adjusting the grading to reduce the loss of plant or wildlife communities;
  - Using retaining walls to reduce the loss of unique natural communities;
  - Replanting disturbed areas; and
  - Developing and implementing an invasive species control plan.
- Mitigate temporary construction impacts by:
  - Implementing erosion and sedimentation controls;
  - Installing Turtle barriers;
  - Adhering to the turtle protection plan;
  - Complying with Time of Year restrictions; and
  - Employing rare plant protections.

14.4.8 Noise and Vibration

Noise

The MBTA is committed to providing noise mitigation for the locations that meet or exceed the Severe Noise Impact Level due to train pass-by. As the Project advances into final design, the MBTA will evaluate the severe impact locations to determine if a noise barrier would be safe, maintainable, constructible, acoustically effective and cost-effective. Where noise barriers are not safe, maintainable, constructible, acoustically effective of cost-effective by the standard of the MBTA noise mitigation policy, the MBTA will consider providing funding for building soundproofing enhancements.

Specific noise mitigation measures may include:

- Replacing windows or installing sound insulation in affected residential structures;
- Erecting reduced-height noise barriers or similar measures on a property with a sensitive receptor;
- Constructing full-height noise barriers in areas of impact; and
- Installing automated wayside horns at crossings as a substitute for train horns.

Vibration

Adverse vibration effects from at sensitive locations may include the following common vibration mitigation options, which will be considered as design progresses:

- Install resilient rail fasteners between the rails and the ties to reduce vibration by five to 10 VdB at frequencies above 30 to 40 Hz;
- Place ballast mats in the trackform between the ballast and the sub-grade or ground to reduce vibration levels by as much as 10 to 15 VdB at frequencies above 25 Hz;
- Use Tire Derived Aggregate to provide track vibration isolation;
- Install resiliently supported concrete ties to reduce vibration by up to 10 VdB at frequencies above 15 Hz;
- Use special hardware (i.e. flange-bearing or moveable-point frogs in place of standard rigid frogs), or relocate special trackwork away from sensitive areas, and use continuous welded rail (CWR) rather than jointed rail; and
- Establish a maintenance program for controlling vibration, which may include maintaining a proper wheel/rail profile, minimizing the number and extent of wheel flats, and minimizing potential rail corrugation.

Detailed vibration data will be available during the advanced engineering phase of the Project to verify the need for vibration mitigation and to implement effective solutions.

Temporary Construction Period Impacts

MassDOT will make every reasonable attempt to minimize construction noise and vibration impacts by employing the following strategies as appropriate:

- Use construction equipment that generates lower vibration levels, such as vibratory pile driving or using smaller excavation equipment when in close proximity to sensitive buildings;
- Incorporate noise guidelines into construction documents, such as a construction noise and vibration control plan, that conform to local by-laws and ordinances, and state and federal regulations and standards;
- Review specific noise control measures during advanced engineering design and incorporate into the construction permitting process;
- Enforce noise specifications through a program of field inspection and compliance review;
- Under special track reconstruction circumstances, where road or rail traffic interruptions have to be minimized during the normal workday resulting in night work, schedule unusually noisy activities during daytime hours to minimize noise impacts to residential areas; and

- Under special circumstances, when night work related to station construction may occur, schedule unusually noisy activities during daytime hours to minimize noise impacts to residential areas.

14.4.9 Cultural Resources

MassDOT will work with USACE, the Massachusetts Historical Commission (MHC), and other Section 106 parties to update the draft Programmatic Agreement (PA), which was developed as part of the review of the overall Project, to accurately reflect the conditions and effect of Phase 1. Adverse Effects documents prepared in support of the PA will outline the mitigation approaches that will be taken for each historic property including districts. The Adverse Effects documents are referred to as Mitigation Plans, commonly called Treatment Plans for above-ground historic properties and Data Recovery Plans for archaeological resources. The mitigation plans will be developed after all stages of intensive survey and National Register evaluations are complete, and the results of the investigations have been reviewed and approved by federal and state agencies as stipulated in the PA.

Potential approaches to mitigation may include:

- Develop and implement a Cultural Resource Monitoring Program;
- Install interpretive signage;
- Reduce visual impacts to historic properties through vegetative screening and compatible lighting and materials;
- Locate staging areas away from identified cultural resources.
- Prepare archival documentation when impacts to historic properties/archaeological sites are unavoidable; and
- Explore Creative or Alternative Mitigation Strategies once impacts to archaeological sites are known.

14.4.10 Hazardous Materials

The following is a list of additional measures related to the handling and disposal of hazardous materials that may be required:

- Manage properties with confirmed Oil or Hazardous Materials (OHM) impacts, and/or impacted groundwater, in accordance with the Massachusetts Contingency Plan (MCP), 310 CMR 40.0000, MassDEP policies and guidance, and any applicable federal regulations;
- If required, retain a Licensed Site Professional (LSP) to verify if notification is required, further assess and manage the site, direct response actions, and specify procedures for work performed in the contaminated areas, such as soil excavation, in accordance with the MCP and, if need be, to render appropriate opinions;

- Conduct a pre-characterization of soils prior to excavation, and prepare a Soil Management Plan if necessary;
- Test structures to be demolished for hazardous materials and remove in accordance with state regulations;
- Reuse non-contaminated building materials as appropriate;
- Manage and dispose of used railroad ties in accordance with applicable regulations; and
- Ensure compliance with Occupational Safety and Health Administration (OSHA) procedures.

Table 14-2 MassDOT Mitigation Commitments

Environmental Category	Mitigation Measure	Schedule
Land Alteration	Site Project elements on previously developed lands to minimize new disturbance.	During design
	Design stations to comply with the Massachusetts Stormwater Standards.	During design
	Implement erosion and sedimentation controls during construction.	During construction
Environmental Justice	No mitigation required.	N/A
Traffic and Transportation	Modify traffic and pedestrian signal timing/phasing (Middleborough, Taunton, Fall River).	During design
	Complete RSA (Middleborough).	Post construction
	Restripe pedestrian and vehicular ROW elements (Middleborough, Taunton).	During construction
	Install new traffic signal (Taunton).	During construction
	Install grade crossing safety improvements (Middleborough, Taunton, Freetown).	During construction
	Provide approach warning signage (Freetown).	During construction
	Install signal interconnect infrastructure between Mount Pleasant Street and Church Street (King's Highway, New Bedford).	During construction
	Revise signal phasing and timings (Mount Pleasant Street at Jones Road/King's Highway, New Bedford).	During construction
	Improve signal equipment, phasing and timing to provide concurrent pedestrian crossing (King's Highway at Shaw's Drive, New Bedford).	During construction

Table 14-2 MassDOT Mitigation Commitments (Continued)

Environmental Category	Mitigation Measure	Schedule
	Pre-empt grade crossing signals. Reconfigure Stop & Shop Drive to accommodate diverted Tarkiln Hill Road traffic (King's Highway at Stop & Shop Drive, New Bedford).	During construction
	Pre-empt grade crossing signal. Revise signal timing, including longer pedestrian timings (Tarkiln Hill Road at Church Street, New Bedford).	During construction
	Improve crosswalks and pedestrian ramps (Acushnet Avenue at Hillman Street, New Bedford).	During construction
	Construct approximately 300 feet of sidewalk along east side of Acushnet Avenue (New Bedford).	During construction
	Revise signal timing, including longer pedestrian timings (Mill Street at Pleasant Street and Kempton Street, New Bedford).	During construction
	Install traffic signal (Coggeshell Street at North Front Street, New Bedford).	During construction
	Construct approximately 1,600 feet of sidewalk along the east side of South Main Street (Freetown).	During construction
	Improve crosswalks and pedestrian ramps (South Main Street at Narrows Road, Freetown).	During construction
	Improve crosswalks and pedestrian ramps (South Main Street at Copicut Street, Freetown).	During construction
	Widen North Main Street to provide an exclusive northbound and southbound left-turn lane. Modify traffic signal phasing to provide a wetbound lead phase and exclusive pedestrian phase (North Main Street at President Avenue, Fall River).	During construction
	Improve pedestrian timing (President Avenue at N. Davol Street, Fall River).	During construction
Air Quality	Adhere to all applicable regulations for control of construction vehicle emissions.	During construction
	Prohibit excessive idling of construction equipment engines in compliance with 310 CMR 7.11, including posting of on-site signage.	During construction
	Ensure all diesel construction equipment used on-site is fitted with after-engine emission controls such as DOCs or DPFs.	During construction
	Utilize ultra-low sulfur diesel fuel for all off-road construction vehicles.	During construction

Table 14-2 MassDOT Mitigation Commitments (Continued)

Environmental Category	Mitigation Measure	Schedule
	Implement protective measures around the construction and demolition work to protect pedestrians and minimize off-site dust transport.	During construction
	Mitigate wind erosion and implement dust suppression methods.	During construction
	Conduct regular sweeping to minimize vehicular airborne dust and particulate matter.	During construction
	Consult with the Massachusetts Department of Energy Resources, Division of Green Communities in regard to developing a joint approach to promote energy efficiency and greenhouse gas reductions in South Coast Rail communities.	During design
	Use plug-ins and electric block heaters at rail layover facilities.	During construction and operation
Greenhouse Gas	Install electric vehicle charging equipment at stations.	During construction
	Utilize LED technology for station lighting.	During design
Climate Change	Follow vulnerability identification procedure.	During design
	Prevent/reduce impacts of flooding by reducing runoff from impervious surfaces; appropriately sizing drainage structures; consider flood barriers in vulnerable locations; and raise electrical components above future flood elevations.	During design
	Protect equipment and passengers from increased heat by designing station shelters and landscaping to maximize shade and reduce heat gain; monitor effectiveness of current rail-neutral temperatures; and explore potential use of off-grid renewable energy for back-up power generation at stations.	During design
Wetlands and Floodplains	Minimize impacts through design revisions. Provide 1:1 Wetland Mitigation to meet WPA requirements Provide additional mitigation to meet USACE Guidelines.	During design
	Monitor compensatory wetlands for success and invasive plant species, and implement an Invasive Species Control Plan during a post-construction monitoring period as required by the Section 404 permit.	5-10 year post-construction monitoring period
Surface and Groundwater Resources	Construct sediment forebays to remove suspended solids and reduce other contaminants.	During construction
	Develop a SWPPP that identifies construction-period BMPs	Prior to construction

Table 14-2 MassDOT Mitigation Commitments (Continued)

Environmental Category	Mitigation Measure	Schedule
	Include water quality features in new and reconstructed swales to reduce erosion and TSS concentration in runoff.	During design
	Adhere to the approved VMP and YOPs.	Post construction
	Treat LUHPPLs in accordance with the Stormwater Management Standards.	During design
	Comply with the Clean Water Act by choosing BMPs that meet the TMDL for the Taunton River Watershed.	During design
	Comply with the Safe Drinking Water Act by designing the stormwater management system at Pilgrim Junction Station with additional pre-treatment.	During design
	Comply with the Massachusetts Groundwater Quality Standards by choosing BMPs designed to promote groundwater recharge and avoid impacts to groundwater quality.	During design
Stormwater and Water Quality	Implement stormwater improvements at Pilgrim Junction, East Taunton, Freetown, and Fall River Depot Stations.	During construction
	Implement trackside stormwater improvements	During construction
	Obtain authorization to discharge stormwater during construction under the NPDES program General Permit for Construction Activities.	Prior to construction
	Draft and implement a SWPPP in compliance with the NPDES General Permit for Construction Activities.	Prior to construction
	Improve railroad drainage system to promote settling and infiltration.	During construction
	Install sediment forebays and check dams upgradient of discharge points.	During construction
	Line drainage ditches within drinking water protection areas.	During construction
	Install retention ponds, rain gardens, and other treatment/control features at station sites.	During construction
	Design and install stormwater management systems at layover facilities to meet stormwater management standards for LUHPPLs.	During design and construction
	Adhere to the approved Vegetation Management Plan, as implemented with MassDOT's Yearly Operating Plans, which restrict the use of herbicides in areas adjacent to wetlands or sensitive resources.	During operation
Waterways	No mitigation required.	N/A

Table 14-2 MassDOT Mitigation Commitments (Continued)

Environmental Category	Mitigation Measure	Schedule
Biodiversity and Rare Species	Develop detailed site-specific, species-specific mitigation measures via consultations with NHESP.	During design
	Avoid impacts to rare species by locating stations outside of Priority Habitat; keeping tracks and culverts within their existing footprints; and avoiding tree removal TOYs related to the Northern Long-Eared Bat.	During design
	Minimize impacts to rare species habitat by using single track along the Middleborough Secondary; modifying culverts to allow through-movement; adjusting grading and using retaining walls to reduce habitat loss; replanting disturbed areas; and implementing an invasive species control plan.	During design
	Mitigate temporary construction impacts by implementing erosion and sedimentation controls; installing turtle barriers; complying with TOY restrictions; and employing rare plant protections.	During construction
	Where possible when engineering constraints and hydrology are taken into consideration, replace bridges and culverts that connect areas of high biodiversity with structures that meet Massachusetts River and Stream Crossing Standards to facilitate fish and wildlife passage through the rail bed.	During construction
	Replant disturbed areas.	During construction
	Install wildlife crossings (tunnel and between-tie crossings) to maintain population continuity for state-listed wildlife, at locations approved by NHESP.	During construction
Noise and Vibration	Where noise levels are projected to occur above the Severe Noise Impact Level, choose noise mitigation measures that are proportional to the level of impact over the threshold level and are safe, maintainable, constructible, acoustically effective and cost-effective.	During design
	Consider appropriate vibration mitigation measures at sensitive locations as design progresses.	During design
	Incorporate noise guidelines and construction noise and vibration control plans that conform to applicable regulations and standards into construction documents and permitting processes.	Prior to construction
	During construction, use equipment that generates lower vibration levels when near sensitive buildings.	During construction
	Enforce noise specifications in the field.	During construction

Table 14-2 MassDOT Mitigation Commitments (Continued)

Environmental Category	Mitigation Measure	Schedule
	Schedule unusually noisy activities to avoid impacting sensitive receptors.	During construction
	Provide noise walls or other noise measures where sensitive land uses would be subject to Severe impacts (if cost-effective according to MBTA and FTA criteria; e.g., less than $30,000 per dwelling unit) at two locations along the alignment: • Murray Street Area, Fall River (Brightman St to Cory St) • Almay Street Area, Fall River (Cory Street to President Ave)	During construction
	Provide funding for building noise mitigation where sensitive land uses would experience severe impacts but walls are not cost-effective, at a rate of $5,000 per dwelling unit per decibel of noise impact above the Severe level, up to a maximum of $30,000 for: • 14 residences in Berkley • 8 residences in Lakeville • 25 residences in Freetown • 12 residences in New Bedford • 53 residences in Fall River	During construction
	Incorporate vibration mitigation measures into the design and operating plan, including continuously welded rail, ballast and sub-ballast depth specifications, turnout locations at least 100 feet away from sensitive receptors, and train and track maintenance (such as regular wheel re-truing) schedules.	During design
Cultural Resources	Work with USACE, MHC, THPO, and other Section 106 parties to update the draft a Phase 1 Programmatic Agreement.	During design
	Conduct intensive archeological surveys.	During design
	Develop Mitigation Plans after all stages of intensive survey and National Register evaluations are complete and the results of the investigations are reviewed and approved by federal and state agencies as stipulated in the PA.	Prior to construction
	Where impacts to historic resources are unavoidable, prepare archival documentation and provide interpretive signs that describe for the public the site's history, features, and significance.	During construction
	Develop and implement a Cultural Resource Monitoring Program.	During design and during construction

Table 14-2 MassDOT Mitigation Commitments (Continued)

Environmental Category	Mitigation Measure	Schedule
	Develop a mitigation plan, in consultation with the USACE and MHC, to minimize adverse impacts to historic properties as identified in the Programmatic Agreement.	During design
	In areas where there is a potential for vibration damage to historic structures, inspect building foundations prior to construction and monitor foundations during construction.	During design and construction
	Use non-contrasting paints on fences, roadway equipment, and signal bungalows; locate signs and fixtures in a sensitive manner within and adjacent to historic properties.	During construction
	Within historic districts, reduce visual impacts by reducing clearing and using screening planting and landscaping.	During design
	Minimize number of lighting poles adjacent to historic properties; paint poles a non-contrasting color.	During design
Hazardous Materials	Manage existing contaminated sites pursuant to the MCP and other applicable regulations and policies.	During construction
	Retain a LSP if required.	During construction
	Conduct a pre-characterization of soils and prepare a Soil Management Plan if necessary.	Prior to construction
	Test structures for hazardous materials and remove in accordance with applicable regulations.	Prior to construction
	Manage and dispose of used railroad ties in accordance with applicable regulations.	During construction
	Ensure compliance with OSHA procedures.	During construction
Visual	Select station lighting fixtures, designs, and technologies that minimize night sky impacts.	During design
	Install station lighting that minimizes night-sky impacts.	During construction
	Design facilities and structures to blend with the surrounding landscape.	During design
Land Use	Implement the Smart Growth measures of the Corridor Plan as applicable in accordance with Executive Order 525.	Prior to, during, and after construction
	Provide incentives and guidance to municipalities for Smart Growth implementation.	Prior to, during, and after construction

Table 14-2 MassDOT Mitigation Commitments (Continued)

Environmental Category	Mitigation Measure	Schedule
	Monitor Smart Growth implementation using approved performance metrics.	Prior to, during, and after construction
	Consistent with the Secretary's Certificate on the SCR FEIS/FEIR, MassDOT will continue to provide funding of an average of $200,000 per year to the RPAs to provide technical assistance to South Coast communities for the next several years.	During Design

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15. Circulation

This chapter contains the lists of agencies and organizations who commented on the Environmental Notification Form (ENF), Draft Environmental Impact Statement (DEIS)/Draft Environmental Impact Report (DEIR), Final Environmental Impact Statement (FEIS)/Final Environmental Impact Report (FEIR), and the Notice of Project Change (NPC); federal, state and municipal agencies from whom the Proponent will seek permits or approvals; and other parties as specified in 301 CMR 11.16.

15.1 Federal Elected Officials

Senator Edward Markey
Boston Office
975 JFK Federal Building
15 New Sudbury Street
Boston, MA 02203

Senator Elizabeth Warren
Boston Office
2400 JFK Federal Building
15 New Sudbury Street
Boston, MA 02203

Congresswoman Katherine Clark, 5th District
701 Concord Avenue, Suite 101
Cambridge, MA 02138

Congressman William R. Keating, 9th District
558 Pleasant St., Suite 309
New Bedford, MA 02740

Congressman Joseph P. Kennedy III, 4th District
29 Crafts Street, Suite 375
Newton, MA 02458

Congressman Stephen Lynch, 8th District
155 West Elm Street, Suite 200
Brockton, MA 02301

15.2 Federal Agencies

Advisory Council on Historic Preservation
Office of Federal Agency Programs
Attn: LaShavio Johnson/Anthony G. Lopez
401 F Street NW, Suite 308
Washington, DC 20001-2637

Federal Highway Administration
U.S. Department of Transportation
Attn: NEPA Coordinator
Kendall Square
55 Broadway, 10th Floor
Cambridge, MA 02142

Federal Railroad Administration
U.S. Department of Transportation
Attn: NEPA Coordinator
1200 New Jersey Avenue, SE
Washington, DC 20590

Federal Transit Administration
Attn: NEPA Coordinator, Region 1 Office
Kendall Square
55 Broadway, Suite 920
Cambridge, MA 02142-1093

National Park Service, Northeast Region
U.S. Custom House
Attn: Mike Caldwell, Regional Director
200 Chestnut Street, Fifth Floor
Philadelphia, PA 19106

National Park Service
National Natural Landmarks Program
Northeast Region
Attn: Deb DiQuinzio
15 State Street
Boston, MA 02109

Adams National Historical Park
Attn: Environmental Compliance Program
135 Adams Street
Quincy, MA 02169

National Park Service - Boston Support Office
Attn: Environmental Compliance Program
15 State Street
Boston, MA 02109

National Oceanic and Atmospheric Administration
Greater Atlantic Region Fisheries Office
Attn: Regional Administrator
55 Great Republic Drive
Gloucester, MA 01930

United States Coast Guard
Attn: RADM Steven Poulin
Commander, First Coast Guard District
408 Atlantic Avenue
Boston, MA 02110

United States Department of the Interior
Office of Environmental Policy & Compliance
Attn: Andrew L. Raddant, Regional Environmental Officer, Northeast Region
15 State Street, Suite 400
Boston, MA 02110

U.S. EPA New England Headquarters
Attn: Timothy Timmermann, NEPA Office
5 Post Office Square, Suite 100
Boston, MA 02109-3912

U.S. EPA New England Headquarters
Attn: Alexandra Dunn, Regional Administrator
5 Post Office Square, Suite 100
Boston, MA 02109

United States Fish and Wildlife Service
New England Field Office
Attn: Maria Tur
70 Commercial Street, Suite 300
Concord, NH 03301-5087

United States Fish and Wildlife Service
Northeast Regional Office
Attn: NEPA Coordinator
300 Westgate Center Drive
Hadley, MA 01035

U.S. Army Corps of Engineers
New England District
Attn: Alan Anacheka-Nasemann
696 Virginia Road
Concord, MA 01742-2751

15.3 State Elected Officials

Senator Michael Brady
State House, Room 109E
Boston, MA 02133

Senator Cynthia Creem
State House, Room 312A
Boston, MA 02133

Senator Julian Cyr
State House, Room 218
Boston, MA 02133

Senator Ryan Fattman
State House, Room 213A
Boston, MA 02133

Senator John Keenan
State House, Room 413B
Boston, MA 02133

Senator Mark Montigny
State House, Room 312C
Boston, MA 02133

Senator Patrick O'Connor
State House, Room 520
Boston, MA 02133

Senator Marc R. Pacheco
State House, Room 312B
Boston, MA 02133

Senator Michael J. Rodrigues
State House, Room 213B
Boston, MA 02133

Senator Richard Ross
State House, Room 419
Boston, MA 02133

Senator Michael F. Rush
State House, Room 504
Boston, MA 02133

Senator James E. Timilty
State House, Room 507
Boston, MA 02133

Representative Bruce Ayers
State House, Room 167
Boston, MA 02133

Representative Antonio Cabral
State House, Room 466
Boston, MA 02133

Representative James Cantwell
State House, Room 22
Boston, MA 02133

Representative Tackey Chan
State House, Room 26
Boston, MA 02133

Representative Mark Cusack
State House, Room 544
Boston, MA 02133

Representative Angelo L. D'Emilia
State House, Room 548
Boston, MA 02133

Representative Shawn Dooley
State House, Room 167
Boston, MA 02133

Representative Michelle DuBois
State House, Room 146
Boston, MA 02133

Representative Carole Fiola
State House, Room 443
Boston, MA 02133

Representative Denise Garlick
State House, Room 167
Boston, MA 02133

Senator Karen Spilka
State House, Room 212
Boston, MA 02133

Senator Walter Timilty
State House, Room 320
Boston, MA 02133

Representative Jay F. Barrows
State House, Room 542
Boston, MA 02133

Representative Thomas Calter
State House, Room 446
Boston, MA 02133

Representative Gerry Cassidy
State House, Room 134
Boston, MA 02133

Representative Claire Cronin
State House, Room 136
Boston, MA 02133

Representative Josh Cutler
State House, Room 473F
Boston, MA 02133

Representative David DeCoste
State House, Room 236
Boston, MA 02133

Representative William Driscoll
State House, Room 437
Boston, MA 02133

Representative Dylan Fernandes
State House, Room 236
Boston, MA 02133

Representative William Galvin
State House, Room 166
Boston, MA 02133

Representative Susan Gifford
State House, Room 124
Boston, MA 02133

Representative Patricia Haddad
State House, Room 370
Boston, MA 02133

Representative Paul Heroux
State House, Room 540
Boston, MA 02133

Representative Steven S. Howitt
State House, Room 237
Boston, MA 02133

Representative Louis L. Kafka
State House, Room 185
Boston, MA 02133

Representative Robert M. Koczera
State House, Room 448
Boston, MA 02133

Representative Ronald Mariano
State House, Room 343
Boston, MA 02133

Representative Christopher Markey
State House, Room 527A
Boston, MA 02133

Representative Paul McMurtry
State House, Room 448
Boston, MA 02133

Representative Joan Meschino
State House, Room 437
Boston, MA 02133

Representative Matt Muratore
State House, Room 39
Boston, MA 02133

Representative James Murphy
State House, Room 156
Boston, MA 02133

Representative Shaunna O'Connell
State House, Room 237
Boston, MA 02133

Representative Keiko M. Orrall
State House, Room 540
Boston, MA 02133

Representative Alice Peisch
State House, Room 473G
Boston, MA 02133

Representative Elizabeth Poirier
State House, Room 124
Boston, MA 02133

Representative John Rogers
State House, Room 162
Boston, MA 02133

Representative Jeffrey Roy
State House, Room 527A
Boston, MA 02133

Representative Paul Schmid
State House, Room 473F
Boston, MA 02133

Representative Alan Silvia
State House, Room 174
Boston, MA 02133

Representative Frank Smizik
State House, Room 274
Boston, MA 02133

Representative William Straus
State House, Room 134
Boston, MA 02133

15.4 State Agencies

Executive Office of Energy and Environmental Affairs
Attn: Secretary Matthew A. Beaton
100 Cambridge Street, Suite 900
Boston, MA 02114

Executive Office of Energy and Environmental Affairs
Attn: Undersecretary for Policy
100 Cambridge Street, Suite 900
Boston, MA 02114

Executive Office of Energy and Environmental Affairs
Attn: Deirdre Buckley, Director, MEPA Office
100 Cambridge Street, Suite 900
Boston, MA 02114

Central Transportation Planning Staff (CTPS)
Attn: Scott Peterson, Director of Technical Services
State Transportation Building
10 Park Plaza, Suite 2150
Boston, MA 02116

MA Department of Conservation & Recreation
Conservation, Ecology & ACEC Programs
Attn: Nancy Putnam, Director
251 Causeway Street
Boston, MA 02114

MA Department of Conservation & Recreation
Division of Water Supply Protection
Attn: Jonathan Yeo, Director
251 Causeway Street
Boston, MA 02114

Massachusetts Office of Coastal Zone Management
Attn: Project Review Coordinator
251 Causeway Street, Suite 800
Boston, MA 02114-2138

MassDEP - Northeast Regional Office
Attn: Regional Director
205B Lowell Street
Wilmington, MA 01887

MassDEP - Southeast Regional Office
Attn: Chris Ross, MA DOT Coordinator
20 Riverside Drive
Lakeville, MA 02347

MassDEP – Bureau of Water Resources
Attn: Douglas Fine, Assistant Commissioner
One Winter Street
Boston, MA 02108

MassDEP - Wetlands
Attn: Michael Stroman, Program Chief
One Winter Street
Boston, MA 02108

Executive Office of Energy and Environmental Affairs
Attn: Purvi Patel, MEPA Office
100 Cambridge Street, Suite 900
Boston, MA 02114

MA Department of Conservation & Recreation
Attn: Leo Roy, Commissioner
251 Causeway Street
Boston, MA 02114

MA Department of Conservation & Recreation
Attn: MEPA Coordinator
251 Causeway Street, Suite 900
Boston, MA 02114

Massachusetts Office of Coastal Zone Management
Attn: Bruce Carlisle, Director
251 Causeway Street, Suite 800
Boston, MA 02114-2138

Department of Environmental Protection (MassDEP)
Attn: Martin Suuberg, Commissioner
One Winter Street
Boston, MA 02108

MassDEP - Southeast Regional Office
Attn: Millie Garcia-Serrano, Regional Director
20 Riverside Drive
Lakeville, MA 02347

MassDEP – Bureau of Air & Waste
Attn: Christine Kirby, Acting Assistant Commissioner
One Winter Street
Boston, MA 02108

MassDEP – Waterways/Chapter 91
Attn: Ben Lynch, Program Chief
One Winter Street
Boston, MA 02108

MA Department of Fish & Game
Division of Fisheries & Wildlife
Attn: Jack Buckley, Director
1 Rabbit Hill Road
Westborough, MA 01581

MA Department of Fish & Game
Division of Marine Fisheries
Attn: David E. Pierce, Director
251 Causeway Street, Suite 400
Boston, MA 02114

MA Department of Fish & Game
Division of Fisheries & Wildlife,
Attn: Richard Lehan, General Counsel, Natural Heritage and Endangered Species Program
1 Rabbit Hill Road
Westborough, MA 01581

MA Department of Fish & Game
Division of Fisheries & Wildlife
Attn: Jonathan Regosin, Chief of Conservation Science, Natural Heritage & Endangered Species Program
1 Rabbit Hill Road
Westborough, MA 01581

Massachusetts Department of Transportation
Highway Division, District 5
Attn: MEPA Coordinator
1000 County Street
Taunton, MA 02780

Massachusetts Historical Commission
The MA Archives Building
Attn: Jonathan Patton
220 Morrissey Boulevard
Boston, MA 02125

Massachusetts Historical Commission
Attn: Ms. Brona Simon, SHPO & Executive Director
The MA Archives Building
220 Morrissey Boulevard
Boston, MA 02125

MA Department of Fish & Game
Division of Marine Fisheries, South Shore
Attn: Environmental Reviewer
838 South Rodney French Boulevard
New Bedford, MA 02744

MA Department of Fish & Game
Division of Fisheries & Wildlife
Attn: Jesse Leddick, Endangered Species Review Biologist
1 Rabbit Hill Road
Westborough, MA 01581

Massachusetts Bay Transit Authority
Attn: Luis Manuel Ramírez, General Manager
10 Park Plaza, Room 3910
Boston, MA 02116

Massachusetts Bay Transit Authority
Attn: Andrew Brennan, Director of Environmental Affairs
10 Park Plaza, 6th Floor
Boston, MA 02116

Massachusetts Bay Transit Authority
Attn: Ronald K. Morgan, Project Manager, Planning & Development
10 Park Plaza, Room 3920
Boston, MA 02116

Massachusetts Water Resources Authority
Attn: MEPA Reviewer
Charlestown Navy Yard
100 First Ave., Building 39
Charlestown, MA 02129

15.5 Libraries

Acushnet Public Library
232 Middle Road
Acushnet, MA 02743

Attleboro Public Library
74 North Main Street
Attleboro, MA 02703

Guilford H. Hathaway Library
6 North Main Street
Assonet, MA 02702

Berkley Public Library
2 North Main Street
Berkley, MA 02779

State Transportation Library of Massachusetts
10 Park Plaza, 2nd Floor
Boston, MA 02116

Boston Public Library - Central Library
700 Boylston Street
Boston, MA 02116

Thayer Public Library
798 Washington Street
Braintree, MA 02184

Canton Public Library
786 Washington Street
Canton, MA 02021

Dedham Public Library
43 Church St
Dedham, MA 02026

Dighton Public Library
395 Main Street
Dighton, MA 02715

James White Memorial Library
5 Washburn Rd.
East Freetown, MA 02717

The Millicent Library
45 Center Street, P.O. Box 30
Fairhaven, MA 02719

Fall River Public Library
104 North Main Street
Fall River, MA 02720

Boyden Library
10 Bird Street
Foxborough, MA 02035

Lakeville Public Library
4 Precinct Street
Lakeville, MA 02347

Mansfield Public Library
255 Hope St
Mansfield, MA 02048

Mattapoisett Free Public Library
7 Barstow Street
Mattapoisett, MA 02739

Middleborough Public Library
102 North Main Street
Middleborough, MA 02346

Milton Public Library
476 Canton Avenue
Milton, MA 02186

New Bedford Free Public Library
613 Pleasant Street
New Bedford, MA 02740

Ames Free Library
53 Main Street
North Easton, MA 02356

Norton Public Library
68 East Main Street
Norton, MA 02766

Norwood Morrill Memorial Library
33 Walpole Street (Route 1A)
Norwood, MA 02062-0988

Thomas Crane Public Library
40 Washington St.
Quincy, MA 02169

Turner Free Library
2 North Main Street
Randolph, MA

Raynham Public Library
760 South Main Street
Raynham, MA 02767

Blanding Public Library
124 Bay State Road
Rehoboth, MA 02769

Joseph H. Plumb Memorial Library
17 Constitution Way
P.O. Box 69
Rochester, MA 02770

Sharon Public Library
11 N Main St
Sharon, MA 02067

Somerset Public Library
1464 County Street
Somerset, MA 02726

Southworth Library
732 Dartmouth Street
South Dartmouth, MA 02748

Stoughton Library
84 Park Street
Stoughton, MA 02072

Swansea Public Library
69 Main Street
Swansea, MA 02777

Taunton Public Library
12 Pleasant Street
Taunton, MA 02780

West Bridgewater Public Library
80 Howard Street
West Bridgewater, MA

Westport Free Public Library
408 Old County Road
Westport, MA 02790

15.6 Municipalities

Town of Acushnet:

Acushnet Board of Selectmen
Attn: Garry L. Rawcliffe, Chair
Town Hall
122 Main Street
Acushnet, MA 02743

Acushnet Board of Health
130 Main Street
Acushnet, MA 02743

Acushnet Planning Board
Town Hall
122 Main Street
Acushnet, MA 02743

Acushnet Conservation Commission
Town Hall
122 Main Street
Acushnet, MA 02743

Town of Attleboro:

Mayor Kevin J. Dumas
City Hall, Government Center
77 Park Street
Attleboro, MA 02703

Attleboro Conservation Commission
City Hall, Government Center
77 Park Street
Attleboro, MA 02703

Attleboro Health Department
City Hall, Government Center
77 Park Street
Attleboro, MA 02703

Attleboro Department of Planning & Development
City Hall, Government Center
77 Park Street
Attleboro, Ma. 02703

The Attleboro Municipal Council
Attn: Frank B Cook, Council President
City Hall, Government Center
77 Park Street
Attleboro, MA 02703

Town of Berkley:

Board of Selectman
Attn: George F. Miller, Chair
1 North Main Street
Berkley, MA 02779

Berkley Board of Health
1 North Main Street
Berkley, MA 02779

Town of Berkley
Attn: Deborah Pereira, Town Clerk
One North Main Street
Berkley, MA 02779

Berkley Planning Board
Town Office Building
1 North Main Street
Berkley, MA 02779

Berkley Conservation Commission
Town Office Building
1 North Main Street
Berkley, MA 02779

City of Boston:

Boston City Council
1 City Hall Square, Room 550
Boston, MA 02201-2043

Boston Department of Neighborhood Development
Attn: Sheila A. Dillon, Chief of Housing &
Director of Neighborhood Development
26 Court Street
Boston, MA 02108-2501

Boston Public Health Commission
1010 Massachusetts Ave, 2nd Floor
Boston, MA 02118

Boston Conservation Commission
1 City Hall Square, Room 709
Boston, MA 02201

City of Boston Environment Department
Attn: Carl Spector, Commissioner
1 City Hall Square, Room 709
Boston, MA 02201

City of Braintree:

Braintree Town Council
Town Hall
One JFK Memorial Drive
Braintree, MA 02184

Braintree Conservation Commission
Town Hall
One JFK Memorial Drive
Braintree, MA 02184

Braintree Planning Board
Town Hall
One JFK Memorial Drive
Braintree, MA 02184

Braintree Board of Health
Town Hall
One JFK Memorial Drive
Braintree, MA 02184

Town of Bridgewater:

Bridgewater Town Council
Attn: Peter Colombotos
66 Central Square
Bridgewater, MA 02324

Town of Canton:

Charles J. Aspinwall, Town Administrator
Memorial Hall
801 Washington Street, Second Floor
Canton, MA 02021

Canton Board of Selectmen
Attn: Robert E. Burr Jr., Chair
Memorial Hall
801 Washington Street, Second Floor
Canton, MA 02021

Canton Conservation Commission
801 Washington St
Canton, MA 02021

Canton Planning Board
Memorial Hall
801 Washington Street, Second Floor
Canton, MA 02021

Canton Board of Health
79 Pleasant Street
Canton, MA 02021

Town of Dartmouth:

Select Board, Town Hall
Attn: Stanley M. Mickelson, Chair
400 Slocum Road
Dartmouth, MA 02747

Dartmouth Planning Board
Town Hall
400 Slocum Road, Room 317
Dartmouth, MA 02747

Dartmouth Board of Health
Town Hall
400 Slocum Road, Room 119
Dartmouth, MA 02747

Dartmouth Conservation Commission
Town Hall
400 Slocum Road, Room 119
Dartmouth, MA 02747

Town of Dedham:

Dedham Board of Selectmen
Attn: Dennis J. Guilfoyle, Chair
26 Bryant Street
Dedham, MA 02026

Dedham Board of Health
26 Bryant Street
Dedham, MA 02026

Dedham Planning Board
26 Bryant Street
Dedham, MA 02026

Dedham Conservation Department
26 Bryant Street
Dedham, MA 02026

Town of Dighton:

Dighton Board of Selectmen
Attn: Dean V. Cronin, Chair
979 Somerset Avenue
Dighton, MA 02715

Dighton Planning Board
979 Somerset Ave
Dighton, MA 02715

Dighton Health Department
979 Somerset Avenue
Dighton, MA 02715

Dighton Conservation Commission
979 Somerset Avenue
Dighton, MA 02715

Town of East Bridgewater

Board of Selectman
East Bridgewater Town Hall
175 Central Street
East Bridgewater, MA 02333

Town of Easton:

Easton Town Administrator
Town Hall
136 Elm Street
Easton, MA 02356

Board of Selectmen's Office
Attn: Kevin McIntyre, Chair
136 Elm Street
Easton, MA 02356

Easton Conservation Commission
Attn: Stephanie Danielson
136 Elm Street
Easton, MA 02356

Easton Historical Commission, c/o Department of Planning & Community Development
136 Elm Street
Easton, MA 02356

Easton Planning and Community Development
136 Elm Street
Easton, MA 02356

Town of Fairhaven:

Chair, Board of Selectmen
Town Hall
40 Center Street
Fairhaven, MA 02719

Fairhaven Planning Board
Town Hall
40 Center Street
Fairhaven, MA 02719

Fairhaven Board of Health
40 Center Street
Fairhaven, MA 02719

Fairhaven Conservation Commission
Town Hall
40 Center Street
Fairhaven, MA 02719

Fairhaven Planning & Economic Development Dept.
Attn: Bill Roth
40 Center Street
Fairhaven, MA 02719

City of Fall River:

Office of the Mayor
Attn: Mayor Jasiel F. Correia II
One Government Center, Room 619
Fall River, MA 02722

Fall River City Council
Attn: Raymond A. Mitchell
1535 Meridian Street
Fall River, MA 02722

Fall River Office of Economic Development
One Government Center
Fall River, MA 02722-7700

Fall River Department of Health & Human Services
Attn: Henry R. Vaillancourt, MPH Director
One Government Center, Room 431
Fall River, MA 02722

Fall River Conservation Commission
Attn: Dennis Silva, Chairman
One Government Center
Fall River, MA 02722

Fall River Planning Department
Attn: City Planner
One Government Center
Fall River, MA 02722

City of Fall River
Attn: Alison M. Bouchard, City Clerk
One Government Center, Room 227
Fall River, MA 02722

Town of Foxborough:

Foxborough Board of Selectmen
Attn: David S. Feldman, Chair
40 South Street
Foxborough, MA 02035

Foxborough Planning Board
40 South Street
Foxborough, MA 02035

Foxborough Board of Health
40 South Street
Foxborough, MA 02035

Foxborough Conservation Commission
40 South Street
Foxborough, MA 02035

Foxborough Town Manager
Attn: William Keegan, Jr.
40 South Street
Foxborough, MA 02035

Town of Freetown:

Chair, Freetown Board of Selectmen
P.O. Box 438
Freetown, MA 02702

Freetown Planning Board
3 North Main Street
Freetown, MA 02702

Freetown Board of Health
3 North Main Street
Freetown, MA 02702

Freetown Conservation Commission
3 North Main Street
Freetown, MA 02702

Town of Lakeville:

Board of Selectmen, Town Hall
Attn: Miriam Hollenbeck, Chair
346 Bedford Street
Lakeville, MA 02347

Lakeville Historical Commission
346 Bedford Street
Lakeville, MA 02347

Lakeville Planning Board
346 Bedford Street
Lakeville, MA 02347

Lakeville Conservation Commission
346 Bedford Street
Lakeville, MA 02347

Lakeville Board of Health
346 Bedford Street
Lakeville, MA 02347

Lakeville Open Space Committee
346 Bedford Street
Lakeville, MA 02347

Lakeville Town Administrator
Atttn: Rita Garbitt
346 Bedford Street
Lakeville, MA 02347

Town of Mansfield:

Mansfield Board of Selectmen,
Attn: Jess Aptowtiz, Chair
Town Hall
6 Park Row, 3rd Floor
Mansfield, MA 02048

Mansfield Planning Board
Town Hall, First Floor
6 Park Row
Mansfield, MA 02048

Mansfield Board of Health
Town Hall, First Floor
6 Park Row
Mansfield, MA 02048

Mansfield Conservation Commission
Town Hall, First Floor
6 Park Row
Mansfield, MA 02048

Town of Mansfield
Attn: William R. Ross, Town Manger
6 Park Row, 3rd floor
Mansfield, MA 02048

Town of Mattapoisett:

Mattapoisett Board of Selectmen
Attn: R. Tyler Maccallister, Chair
16 Main Street
PO Box 435
Mattapoisett, MA 02739

Mattapoisett Planning Board
16 Main Street
PO BOX 435
Mattapoisett, MA 02739

Mattapoisett Board of Health
16 Main Street
PO Box 434
Mattapoisett, MA 02739

Mattapoisett Conservation Commission
16 Main Street
PO BOX 435
Mattapoisett, MA 02739

Town of Middleborough:

Middleborough Board of Selectmen
Attn: Allin Frawley, Chair
10 Nickerson Avenue
Middleborough, MA 02346

Middleborough Planning Department
20 Center Street, 2nd Floor
Middleborough, MA 02346

Town of Middleborough
Office of Economic & Community Development
20 Centre Street, 3rd Floor
Middleborough, MA 02346

Middleborough Conservation Commission
20 Centre Street, 2nd Floor
Middleborough, MA 02346

Middleborough Health Department
20 Center Street, 2nd Floor
Middleborough, MA 02346

City of New Bedford:

New Bedford City Hall
Attn: Mayor Jonathan F. Mitchell
133 William Street
New Bedford, MA 02740

New Bedford City Council
Attn: City Council President Joseph Lopes
133 William Street, Room 215
New Bedford, MA 02740.

City Clerk Office
Attn: Rita Arruda
133 William Street, Room 118
New Bedford, MA 02740

New Bedford Board of Health
1213 Purchase Street
New Bedford, MA 02740

New Bedford Economic Development Council
Attn: Derek Santos, Executive Director
1213 Purchase Street, 2nd Floor
New Bedford, MA 02740

New Bedford Conservation Commission
133 William Street, Room 304
New Bedford, MA 02740

New Bedford Planning, Housing & Community Development Department
Attn: Patrick Sullivan, Director
133 William Street, Room 303
New Bedford, MA 02740

New Bedford Planning Department
Attn: Anne Louro, Preservation Planner
133 William Street, Room 303
New Bedford, MA 02740

Town of North Attleborough:

Town of North Attleborough
Attn: Michael Gallagher, Town Administrator
43 South Washington St.
North Attleborough, MA 02760

Town of Norton:

Norton Board of Selectmen
Attn: Timothy Giblin, Chair
70 East Main Street
Norton, MA 02766

Norton Planning Board
Town Hall
70 East Main Street
Norton, MA 02766

Norton Fire - Rescue Department
70 East Main Street
Norton, MA 02766

Norton Board of Health
Town Hall
70 East Main Street, 2nd Floor
Norton, MA 02766

Norton Conservation Commission
Attn: David Henry
70 East Main Street
Norton, MA 02766

Town of Norwood:

Norwood Board of Selectmen
Attn: Allan D. Howard, Chair
566 Washington Street
Norwood, MA 02062

Norwood Board of Health
Town Hall
566 Washington Street
Norwood, MA 02062

Norwood Planning Board
Town Hall
566 Washington Street
Norwood, MA 02062

Norwood Conservation Commission
Public Works Office
165 Nahatan Street
Norwood, MA 02062

Norwood General Manager
Attn: John J. Carroll
566 Washington St., Room 27
Norwood, MA 02062

City of Quincy:

Thomas P. Koch, Mayor
City of Quincy
City Hall
1305 Hancock Street
Quincy, MA 02169

Quincy Planning Board
Monroe Building
1245 Hancock Street
Quincy, MA 02169

Quincy City Council
City Hall
1305 Hancock Street
Quincy, MA 02169

Quincy Health Department
The Kennedy Center
440 East Squantum Street
Quincy, MA 02171

Quincy Conservation Commission
City Hall
1305 Hancock Street
Quincy, MA 02169

Quincy Planning & Community Development
City Hall
1305 Hancock Street
Quincy, MA 02169

Town of Raynham:

Veterans Memorial Town Hall
Attn: Randall Buckner, Town Administrator
558 South Main Street
Raynham, MA 02767

Raynham Board of Selectmen/Health
Attn: Joseph Pacheco, Chair
558 South Main Street
Veterans Memorial Town Hall
Raynham, MA 02767

Raynham Planning Board
Veterans Memorial Town Hall
558 South Main Street
Raynham, MA 02767

Raynham Health Department
Veterans Memorial Town Hall
558 South Main Street
Raynham, MA 02767

Raynham Conservation Commission
Veterans Memorial Town Hall
558 South Main Street
Raynham, MA 02767

North Raynham Water District
Attn: Arthur Bendinelli, Superintendent
P.O. Box I
Raynham, MA 02767

Town of Rehoboth:

Rehoboth Board of Selectmen
Attn: Frederick Vadnais, Jr., Chair
148 Peck Street
Rehoboth, MA 02769

Rehoboth Planning Board
148 Peck Street
Rehoboth, MA 02769

Rehoboth Board of Health
148 Peck Street
Rehoboth, MA 02769

Rehoboth Conservation Commission
148 Peck Street
Rehoboth, MA 02769

Town of Rochester:

Rochester Board of Selectmen
Attn: Naida L. Parker, Chair
Town Hall
1 Constitution Way
Rochester, MA 02770

Rochester Conservation Commission
Town Hall Annex
37 Marion Road
Rochester, MA 02770

Rochester Planning Board
Town Hall Annex
37 Marion Road
Rochester, MA 02770

Rochester Board of Health
Town Hall Annex
37 Marion Road
Rochester, MA 02770

Town of Seekonk:

Town of Seekonk
Attn: Shawn E. Cadime, Town Administrator
100 Peck St.
Seekonk, MA 02771

Town of Sharon:

Sharon Board of Selectmen
Attn: Walter B. Roach, Chair
Town Office Building
90 South Main Street
Sharon, MA 02067

Sharon Planning Board
Town Office Building
90 South Main Street
Sharon, MA 02067

Sharon Board of Health
Town Office Building
90 South Main Street
Sharon, MA 02067

Sharon Conservation Commission
219 Massapoag Avenue
Sharon, MA 02067

Town of Sharon
Attn: Frederic Turkington, Town Administrator
90 South Main Street
Sharon, MA 02067

Town of Somerset:

Somerset Board of Selectmen
Attn: David Berube, Chair
Town Office Building, Room 23
140 Wood Street
Somerset, MA 02726

Somerset Planning Board
Town Office Building, First Floor
140 Wood Street
Somerset, MA 02726

Somerset Board of Health
Town Office Building, Room 22
140 Wood Street
Somerset, MA 02726

Somerset Conservation Commission
Town Office Building, Room 22
140 Wood Street
Somerset, MA 02726

Town of Somerset
Attn: Richard M. Brown, Town Administrator
Town Hall, Room #23
140 Wood Street
Somerset, MA 02726

Town of Somerset
Attn: Susana Medeiros, Town Clerk
979 Somerset Ave
Dighton, MA 02715

Town of Stoughton:

Robert J. O'Regan, Chair
Stoughton Board of Selectmen
10 Pearl Street, 3rd Floor
Stoughton, MA 02072

Kopelman and Paige, P.C.
Attn: George Pucci, Legal Counsel to Stoughton
101 Arch Street
Boston, MA 02110

Stoughton Board of Health
10 Pearl Street, 2nd Floor
Stoughton, MA 02072

Stoughton Conservation Commission
10 Pearl Street, 2nd Floor
Stoughton, MA 02072

Stoughton Planning Board
10 Pearl Street, 2nd Floor - Engineering Office
Stoughton, MA 02072

Stoughton Redevelopment Authority
Attn: Lou Gitto
10 Pearl Street
Stoughton, MA 02072

Town of Swansea:

Swansea Board of Selectmen
81 Main Street
Swansea, MA 02777

Swansea Planning Board
68 Stevens Road
Swansea, MA 02777

Swansea Board of Health
68 Stevens Road
Swansea, MA 02777

Swansea Conservation Commission
68 Stevens Road
Swansea, MA 02777

Town of Swansea
Attn: Susan E. Taveira, Town Clerk
81 Main St
Swansea, MA 02777

City of Taunton:

Taunton City Hall
Attn: Mayor Tom Hoye
141 Oak Street
Taunton, MA 02780

Taunton Planning Board
City Hall Annex
15 Summer Street
Taunton, MA 02780

Taunton City Council
141 Oak Street
Taunton, MA 02780

Taunton Board of Health
45 School Street
Taunton, MA 02780

Taunton Conservation Commission
City Hall Annex
15 Summer Street
Taunton, MA 02780

Taunton Economic & Community Development Dept.
Attn: Kevin Shea
45 School Street
Taunton, MA 02780

Town of Wareham:

Wareham Board of Selectmen
Attn: Alan Slavin
54 Marion Road
Wareham, MA 02571

Town of West Bridgewater:

West Bridgewater Board of Selectmen
Attn: Eldon F. Moreira, Chair
65 North Main Street
West Bridgewater, MA 02379

Town of Westport:

Westport Board of Selectmen
Attn: R. Michael Sullivan, Chair
816 Main Road
Westport, MA 02790

Westport Board of Health
856 Main Road
Westport, MA 02790

Westport Conservation Commission
816 Main Road
Westport, MA 02790

Westport Community Schools
Attn: Ann Marie Dargon, Superintendent
17 Main Road
Westport, MA 02790

Westport Planning Board
856 Main Road
Westport, MA 02790

15.7 Regional Agencies

Cape Cod Commission
3225 Main Street
Barnstable, MA 02630

Greater Attleboro-Taunton Regional Transit Authority
Administrative Offices
Attn: Francis Gay, Administrator
10 Oak Street, Second Floor
Taunton, MA 02780

Old Colony Planning Council
Attn: Pasquale Ciaramella, Executive Director & RAO
70 School Street
Brockton, MA 02401-4097

Old Colony Planning Council
Attn: Robert Overholtzer, Council Delegate
(Hanson)
70 School Street
Brockton, MA 02401-4097

Metropolitan Area Planning Council
Attn: Marc Draisen, Executive Director
60 Temple Place
Boston, MA 02111

Southeastern Regional Planning and Economic
Development District
Attn: Sandy Conaty, Deputy Director
88 Broadway
Taunton, MA 02780

Southeastern Regional Planning and Economic
Development District
Attn: Jeffrey Walker, Executive Director
88 Broadway
Taunton, MA 02780

Southeastern Regional Planning and Economic
Development District
Attn: Deborah Melino-Wender, Chair
88 Broadway
Taunton, MA 02780

Southeastern Regional Transit Authority
Attn: Erik Rousseau
700 Pleasant Street, Suite 320
New Bedford, MA 02740

15.8 Tribes

Mashpee Wampanoag Tribe – Tribal Historic
Preservation Officer (THPO)
Attn: Ramona Peters
483 Great Neck Road South
Mashpee, MA 02649

Narragansett Indian Tribe Tribal – Tribal Historic
Preservation Officer
Historic Preservation Department
Attn: John Brown
P.O. Box 700
Charlestown, RI 02813

Wampanoag Tribe of Gay Head (Aquinnah) – Tribal
Historic Preservation Officer (THPO)
Cultural Resource Protection Department
Attn: Bettina Washington
20 Black Brook Road
Aquinnah, MA 0253

15.9 Non-Governmental Organizations

Brockton Area Transit Authority
155 Court Street
Brockton, MA 02302

Bristol Community College
Attn: Jennifer Menard
777 Elsbree Street
Fall River, MA 02720

Bristol County Chamber of Commerce
Attn: Robert Mellion, Esq., President and CEO
200 Pocasset Street
Fall River, MA 02721

Buzzards Bay Coalition
Attn: Mark Rasmussen, President
114 Front Street
New Bedford, MA 02740

Conservation Law Foundation (MA)
Attn: Rafael Mares, Vice President and Director,
Healthy Communities & Environmental Justice
62 Summer Street
Boston, MA 02110

Citizens Concerned About Tracks
Attn: Heather Graf, Coordinator
229 N. Worcester Street
Norton, MA 02766

Commuter Rail Task Force
Attn: Susan Teal, Chair
567 New Bedford Rd.
Rochester, MA 02770

Downtown Taunton Foundation
8 Trescott Street
Taunton, MA 02780

Easton Historical Society
80 Mechanic Street
North Easton, MA 02356

Fairmount Indigo CDC Collaborative
Attn: Joan Tighe
c/o DBEDC
594 Columbia Road, Suite #302
Dorchester, MA 02125

Greater Fall River Land Conservancy
PO Box 9155
Fall River, MA 02720

The Greenwich Bay Watershed Group
170 Budlong Farm Road
Warwick, RI 02886

Green Futures: Citizen Action for a Better Community
P.O Box 144
Fall River, MA 02724

Ipswich River Watershed Association
Attn: Wayne Castonguay, Executive Director
P.O. Box 576
Ipswich, MA 01938

Massachusetts Association of Conservation Commissions
Attn: Eugene Benson, Executive Director
10 Juniper Road
Belmont, MA 02478

Massachusetts Association of Conservation Commissions
Attn: Michele Girard, Associate Director & Education Coordinator
10 Juniper Road
Belmont, MA 02478

Massachusetts Audubon Society
Attn: Gary Clayton, President
208 South Great Road
Lincoln, MA 01773

Massachusetts Maritime Academy
101 Academy Drive
Buzzards Bay, MA 02532

Massachusetts Rivers Alliance
Attn: Julia Blatt, Executive Director
14 Beacon Street, Suite 607
Boston, MA 02108

Mystic River Watershed Association
Attn: Patrick Herron, Executive Director
20 Academy Street, Suite 306
Arlington, MA 02476

The Natural Resources Trust of Mansfield
Attn: Lou Andrews, President
255 Fruit Street
Mansfield, MA 02048

The Nature Conservancy, Massachusetts Chapter
Attn: Wayne Klockner, State Director
99 Bedford Street, 5th Floor
Boston, MA 02111

Neponset Valley Chamber of Commerce
Attn: Thomas J. O' Rourke
520 Providence Highway, Suite 4
Norwood, MA 02062

New England Public Employees for Environmental Responsibility
Attn: Kyla Bennett, Director
P.O. Box 574
North Easton, MA 02356

Parker River Clean Water Association
P.O. Box 798
Byfield, MA 01922

Sierra Club Massachusetts Chapter
Attn: Emily Norton, Chapter Director
10 Milk Street, #417
Boston, MA 02108

South Coast CEO Roundtable
c/o New Bedford Area Chamber of Commerce
794 Purchase Street
New Bedford, MA 02740

Metro South Chamber of Commerce
Attn: Christopher Cooney, President & CEO
60 School Street
Brockton, MA 02301

Natural Resources Trust of Mansfield
Attn: Leonard Flynn
255 Fruit Street
Mansfield, MA 02048

The Nature Conservancy, Massachusetts Chapter
Attn: Allison Bowden, Freshwater Program Director
99 Bedford Street, 5th Floor
Boston, MA 02111

Neponset River Watershed Association
Attn: Ian Cooke, Executive Director
2173 Washington Street
Canton, MA 02021

New Bedford Harbor Development Commission
Attn: Edward C. Anthes-Washburn, Executive Director
52 Fisherman's Wharf
New Bedford, MA 02740

New England Regional Council of Carpenters
750 Dorchester Avenue, Unit 1
Boston, MA 02125

Rail to Boston Coalition
c/o Southeastern MA Association of REALTORS
Attn: Paul Chasse
651 Orchard Street, Ste. 101
New Bedford, MA 02744

SouthCoast Chamber of Commerce
Attn: Rick Kidder, President & CEO
794 Purchase Street
New Bedford, MA 02740

SouthCoast Development Partnership
University of Massachusetts, Dartmouth
151 Martine Street
Fall River, MA 02723

South Eastern Economic Development Corporation
Attn: Maria Gooch-Smith
80 Dean Street
Taunton, MA 02780

Southeastern MA Convention & Visitors Bureau
c/o New Bedford Area Chamber of Commerce
Attn: Rick Kidder
794 Purchase Street
New Bedford, MA 02742

South Shore Chamber of Commerce
1050 Hingham Street
Rockland, MA 02370

Taunton Area Chamber of Commerce
Attn: Kerrie Babin, President & CEO
6 Pleasant Street, Suite A
Taunton, MA 02780

Taunton Business Improvement District
8 Trescott Street
Taunton, MA 02780

Taunton Industrial Development Commission
Attn: Richard Shafer, Economic Development Director
12 Taunton Green, Suite 201
Taunton, MA 02780

Taunton River Watershed Alliance
P.O. Box 1116
Taunton, MA 02780

The United Regional Chamber of Commerce
310 South Street
Plainville, MA 02762

UMass Dartmouth, Office of the Chancellor
Foster Administration Building, Room 330
285 Old Westport Road
North Dartmouth, MA 02747

WalkBoston
Attn: Wendy Landman, Executive Director
Old City Hall
45 School Street
Boston, MA 02108

15.10 Other Groups and Individuals

Paul Alexio
Sara Arbour
Jeanne Azarovitz
Paul and Pearl Bacdayan
Anna Mae Baker
Carolyn M. Basler
Arthur Battistini
Nora Bicki
Ron Blau
Lisa Boragine
Bourne Republican Town Committee
Malcolm Boyd
Becca Britt
Elizabeth Brown
Karen Brown
Joseph Callahan
Linda Callahan
William Cantor
Judith Caporiccio
Steve Castellina
David Cavanaugh
Robert S. Chase
Ruth Chicca
Kelly Churbuck
Donald L. Cleary
Samuel Clemens
Gail Coelho
Richard Conron
P. Cook
Janet Cooke
Marc Craig
James Currin

Nancy Davies
Sabrina Davis
Rosa De Oliveira
Steve Doire
Daniel Doucette
Dottie and Dana Dudley
John Dufresne
James Dufresne
Celeste Dufresne
Jan Elliot
Andrew Farer
Roseanne Felago
Stacey Fernandes
Peter Fuller
Rita Anne Garrick
William and Cheryl Gay
Matthew Gorham
Wendy M. Graca
Chuck Hanegan
Sherry Costa Hanlon
Ralph Hawkins
Mark Hess
James Hornsby
Independence Associates, Inc.
Andrew Januse
Andrew Jenning
Pamela Jernberg
Alan Johnson
Robert J. Kelly
Nolan Kitts
Stephen P. Kobialka
Todd Kohn
Lisa Kopecky
Donna Kulpa
Carolyn Lattin
Paul Letendre
Heather and Doug Lewis
Lisa DaCosta Lopez
James MacDonald
Michael Margulis
Scott Martin
Eileen Marum
Brian McCarthy
Virginia McKenna
Stephen McKinnon
Holly McNamara
Lloyd Mendes
Brenda Moriera
Mary Agnes Murphy
Katie Murray
Paul Newman
Randi Pacheco
Richard S. Prone
Dawn Quirk
Lisa K. Ray
John Read
Bill Reidy
Sallie K. Riggs
Teresa Robinson
Justin Rogers
Rita Rooney
Dr. T.K. Roy
Lisa Rudenstein
Margaret Russell
Andrew Rys
Coralia Merritt
Cathleen M. Salley
Amy Sharpe
George Slade
Stephen C. Smith
Brian Sullivan
Grant Taylor

Victoria Taylor
John Tehan
Gabe Tempestoso
Joseph A. Tutino
Karen Vergoni
Steve Voluckas
Olivia M. White
Douglas White
Diane Wignall
Nancy Lee Wood
Robert Wood
Ross Woodfall
Kathy Zagzebski

South Coast Rail

Draft Supplemental Environmental Impact Report