

## 1 EXECUTIVE SUMMARY

### 1.1 INTRODUCTION

On May 8, 2008, the Massachusetts Executive Office of Transportation and Public Works (EOT) (currently known as the Massachusetts Department of Transportation, or MassDOT) submitted an application to the U.S. Army Corps of Engineers (USACE or the Corps) under Section 404 of the Clean Water Act and potentially Section 10 of the Rivers and Harbors Act of 1899 for a Department of the Army (DA) permit to discharge fill material into waters of the United States (U.S.), including adjacent wetlands, incidental to the construction of new public passenger rail (or other public transportation) facilities connecting the terminal stations of Fall River and New Bedford with South Station in Boston, Massachusetts (the project). MassDOT (the project sponsor and state lead agency) and the U.S. Army Corps of Engineers (the federal lead agency) have evaluated several alignment and mode alternatives to implement this transit service over a distance of approximately 50 to 60 miles.

Environmental review under the National Environmental Policy Act (NEPA) and Massachusetts Environmental Policy Act (MEPA) is being conducted jointly. The Notice of Availability for the Draft Environmental Impact Statement (DEIS)/Draft Environmental Impact Report (DEIR) for the South Coast Rail Project was published in the Federal Register on March 25, 2011.<sup>1</sup> USACE also issued a Public Notice on March 23, 2011, in conjunction the public notice on the DEIR published in the MEPA Environmental Monitor. Approximately 270 written comment documents were submitted during the public review period of the DEIS/DEIR, with additional comments provided public hearings in New Bedford and Mansfield. The Massachusetts Secretary of Energy and Environmental Affairs approved the DEIR on June 30, 2011 and outlined information required in the Final Environmental Impact Report (FEIR).

This Final Environmental Statement (FEIS)/FEIR addresses comments on the DEIS/DEIR and provides updated environmental impact analyses to account for changes in the design of the alternatives since the DEIS/DEIR. The FEIS/FEIR also documents compliance of the Applicant's preferred alternative with the U.S. Environmental Protection Agency 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), at Title 40 of the Code of Federal Regulations Part 230.10 *et seq.*

### 1.2 PROJECT PURPOSE AND NEED

#### 1.2.1 Purpose of the Project

MassDOT's stated purpose is "to more fully meet the existing and future demand for public transportation between Fall River/New Bedford and Boston, Massachusetts, and to enhance regional mobility, while supporting smart growth planning and development strategies in the affected communities."

As part of its review of the Department of the Army (DA) permit application, the USACE is required to evaluate the proposal with regard to the U.S. Environmental Protection Agency (USEPA) *Guidelines for Specification of Disposal Sites for Dredged or Fill Material* (USEPA Guidelines) at Title 40 of the Code of Federal Regulations, part 230. The basic project purpose is examined by the Corps to determine whether

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<sup>1</sup> <https://www.federalregister.gov/articles/2011/03/25/2011-7070/notice-of-availability-of-the-draft-environmental-impact-statement-for-the-proposed-south-coast-rail>

the project is water-dependent. A project is water dependent if it requires access or proximity to, or siting within, a special aquatic site<sup>2</sup> in order to fulfill its basic purpose. The Corps has determined that the basic project purpose for the MassDOT proposal is: “to more fully meet the existing and future demand for public transportation between Fall River/New Bedford and Boston, Massachusetts.” Since ground-based public transportation does not fundamentally require siting within a special aquatic site to meet this basic project purpose, the USEPA Guidelines stipulate that practicable alternatives are (1) presumed to exist and (2) presumed to be less environmentally damaging than the proposed action, unless clearly demonstrated otherwise.

The overall project purpose is used by the USACE to evaluate whether there are less environmentally damaging practicable alternatives available. The 404(b)(1) Guidelines state that an alternative is practicable if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of *overall* project purposes [(40 Code of Federal Regulations (CFR) 230.10(a)(2)]. This evaluation applies to all waters of the United States, not just special aquatic sites.

Determination of the overall project purpose is the USACE’s responsibility; however, MassDOT’s needs and the type of project being proposed are considered by the USACE in reaching this determination. The overall project purpose is defined by the USACE as: “to more fully meet the existing and future demand for public transportation between Fall River/New Bedford and Boston, MA, and to enhance regional mobility.” This definition is specific enough to define MassDOT’s needs, but not so restrictive as to constrain the range of alternatives that must be considered under the USEPA Guidelines.

For purposes of the current NEPA analysis, USACE considers and expresses the proposed project’s underlying purpose and need from a public interest perspective when appropriate, but generally focuses on MassDOT’s purpose and need statement. The Council on Environmental Quality (CEQ) regulations at 40 CFR 1502.13, stipulate that the EIS purpose and need statement “shall briefly specify the underlying purpose and need to which the agency is responding in proposing the alternatives including the proposed action.” The USACE exercises independent judgment in defining the purpose and need for the project from both MassDOT’s and the public’s perspectives. The purpose and need as independently determined by the USACE is: to more fully meet the existing and future demand for public transportation between Fall River/New Bedford and Boston, MA, and to enhance regional mobility.

### 1.2.2 Need for the Project

The current transportation system connecting Southeastern Massachusetts with Boston and internally is primarily a highway system and characterized by a lack of transportation mode choice, especially public transit. The highway system is composed of major, limited access state routes, regional highways, and local roadways (Figure 1.2-1). As the population in the South Coast region and employment in the Boston area have grown, the demands on the roadway system linking Southeastern Massachusetts to Boston and the rest of the region have increased, as reflected by increased traffic volumes, resulting in traffic congestion and adverse effects on air quality, climate change and transportation safety. Projected regional growth and the trend of commuters to locate to areas further away from the Boston metropolitan core will exacerbate the existing problems and affect an increasing number of people.

Although important investments in regional transportation facilities and services are planned and being implemented, they are localized and would not fundamentally address the lack of regional mobility and

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<sup>2</sup> 40 CFR Part 230 Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material. Subpart E--Potential Impacts on Special Aquatic Sites.

service quality. Expansion of the existing South Coast transit services (bus, taxis, park-and-ride and vanpool) is limited by the roadway congestion.

In consideration of the above, MassDOT therefore proposes enhancement of public transit connections (collectively known as the South Coast Rail Project) to improve transportation between New Bedford/Fall River and Boston and between South Coast cities.

The South Coast Rail project is proposed by MassDOT as part of a comprehensive effort to achieve a series of broad transportation and development goals, as well as specific objectives for improving the quality of transportation services and the equity of the distribution of services within the state. These goals and objectives have been developed by MassDOT over several decades as part of both broad-based policies and specific regional documents, including the *GreenDOT Policy Directive* (2010), *South Coast Rail Plan for Action* (2007), *MBTA Program for Mass Transportation* (2003, 2010 Draft Update<sup>3</sup>), *Toward a New Growth Policy for Massachusetts* (1977) and *Boston Transportation Planning Review* (1970-1973). In addition to statewide plans, regional transportation goals provide a basis for evaluating options for improvement of transportation services and facilities in the South Coast region. These regional goals are included in the 2007 Regional Transportation Plans for New Bedford/Fall River/Taunton Region (adopted by the Southeastern Regional Planning & Economic Development District - SRPEDD); the Brockton Region (adopted by the Old Colony Planning Council - OCPC) and the Boston Region (adopted by the Metropolitan Area Council - MAPC). The long-term transportation plans of the region support the development of transportation improvements that enhance accessibility, increase mobility, encourage alternatives to automobiles, and provide a more equitable distribution of transit services.

A key component of MassDOT's South Coast Rail proposal is Smart Growth, as it integrates two needs identified by MassDOT for the South Coast region that are related to transportation: *economic development* and *environmental preservation*. Southeastern Massachusetts has been the fastest growing region in the Commonwealth for many years both in terms of population and housing units and this growth has been characterized by development sprawl in exurban areas resulting in the loss of farms, fields and forests and damages to the character of the historic villages and cities within the region. At the same time, the historic cities of Fall River and New Bedford have seen a decline in population and economic vitality and their economic growth has been constrained by poor transportation access to the Boston employment market.

MassDOT's intent is for the South Coast Rail project to provide opportunity to generate new economic development, including that resulting from improved access from New Bedford and Fall River to labor markets in Boston and reverse commute access from areas such as Taunton to New Bedford and Fall River, while shaping this growth so that the project helps preserve environmental resources. The South Coast Rail project envisions clustering people and jobs near transit facilities in conjunction with local land use planning, thereby reducing the potential for sprawl and loss of open space. MassDOT is implementing the South Coast Rail smart growth initiatives in partnership with municipalities.

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<sup>3</sup> [http://www.ctps.org/bostonmpo/4\\_resources/1\\_reports/1\\_studies/3\\_transit/pmt.html](http://www.ctps.org/bostonmpo/4_resources/1_reports/1_studies/3_transit/pmt.html)

### 1.3 REGULATORY CONTEXT OF THE ENVIRONMENTAL IMPACT STATEMENT/ENVIRONMENTAL IMPACT REPORT

This document has been prepared to comply with the requirements of NEPA, the CEQ regulations for implementing NEPA, (Title 40 CFR Parts 1500-1508), and the USACE Regulatory Program NEPA implementing regulations at Appendix B to 33 CFR Part 325. On May 7, 2008, the USACE determined that an EIS is required for this proposed project because of the project's potential to significantly affect the quality of the human and natural environment. The purpose of this EIS is to assess the environmental impacts associated with the construction and operation of transit enhancements between Fall River/New Bedford and Boston proposed by MassDOT.

Pursuant to its responsibilities under Section 404, the USACE, therefore, has a responsibility to review permit requests seeking authorization to discharge dredged or fill material into all waters of the United States. The USACE review considers MassDOT's purpose and need from a public interest perspective, which involves more than an evaluation of impacts to the aquatic environment. Once the project has been determined to comply with the USEPA Guidelines, the project must also be evaluated to ensure that it is not contrary to the public interest. The district must evaluate the project in light of specific factors listed in 33 CFR 320.4(a) (1), other relevant public interest factors, and the interests of MassDOT to determine the overall balance of the project with respect to the public interest.

The USACE is neither a proponent nor opponent of any proposal. The decision to issue or deny a permit is based, in part on the weighing and balancing of the public interest factors. In order to issue a permit, the District Engineer must determine that it would not be contrary to the public interest (33 CFR 320.4(a)). Further, the USEPA Guidelines prohibit the issuance of a permit if the discharge is not the least environmentally damaging practicable alternative, or would cause or contribute to significant degradation of waters of the United States (40 CFR 230.10(a)(4)).

The proposed project is subject to review by the Commonwealth of Massachusetts under the MEPA because it is being undertaken by a state agency and because it meets or exceeds the review thresholds set forth in the MEPA regulations, including thresholds for a mandatory Environmental Impact Report (EIR). MEPA imposes a requirement on project proponents to understand and fully disclose the potential impacts of a project, both positive and negative; to study feasible alternatives to a project; and to avoid, reduce, or mitigate environmental impacts to the maximum extent feasible. Because the proposed project is being undertaken by a state agency MEPA jurisdiction is broad and extends to all aspects of the project that are likely, directly or indirectly, to cause damage to the environment as defined in the MEPA regulations.

In order to streamline the environmental review process and to facilitate public involvement, MEPA and the USACE are coordinating review of a joint EIS/EIR with the intent to provide the information and analysis required for both federal and state review.

Additional state approvals, reviews and permits required for the project include a Water Quality Certification pursuant to Section 401 of the Clean Water Act, and a Chapter 91 License<sup>4</sup> and a Variance under the Wetlands Protection Act (WPA) from the Massachusetts Department of Environmental Protection (MassDEP). Other permits or approvals required for the project include a Conservation and Management Permit from the Natural Heritage and Endangered Species Program (NHESP). The project

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<sup>4</sup> Massachusetts General Law (MGL) Chapter 91. The Massachusetts Public Waterfront Act. Regulatory program pertaining to tidelands and other waterways.

is subject to review by the Massachusetts Historical Commission and the Office of Coastal Zone Management. The project is also subject to the MEPA Greenhouse Gas Emissions Policy and Protocol.

## 1.4 ALTERNATIVES

### 1.4.1 Alternatives Development

This section explains the process that led to the alternatives that are evaluated in this FEIS/FEIR. The alternatives analysis process included review of 65 potential alternatives during the scoping process, detailed transportation and environmental impact analyses of seven build alternatives in the DEIS/DEIR, and post-DEIS/DEIR technical studies and interagency coordination. Throughout the alternatives analysis process public, agency and stakeholder input was taken into consideration in the development and evaluation of alternatives, through the federal process, the state environmental review process and public involvement efforts. The Interagency Coordinating Group (ICG)<sup>5</sup> provided an opportunity for input into the technical analyses for the DEIS/DEIR and was also consulted during the FEIS/FEIR process.

An overview of key steps in the alternatives analysis process is provided below, with further detailed information being provided in Chapter 3, *Alternatives*.

#### 1.4.1.1 Initial (PRE-DEIS/DEIR) Alternatives Analysis Overview

An initial range of 65 potential alternatives was identified by reviewing previous studies and soliciting input from the MBTA, the Interagency Coordinating Group, the Commuter Rail Task Force,<sup>6</sup> and interested stakeholders through an extensive civic engagement process conducted by MassDOT. The alternatives are described in detail in the Analysis of South Coast Rail Alternatives: Phase 1 Report, Appendix 3.1-A to this FEIS/FEIR.

These alternatives also included several different components along five main corridors:

- The Attleboro route (using the active freight rail lines from New Bedford and Fall River to Attleboro, then using the Northeast Corridor from Attleboro to South Station) with a new track bypass or connecting at the existing Attleboro Station.
- The Mansfield route (using the active freight rail lines from New Bedford and Fall River to Taunton, then using the abandoned rail line north to Mansfield Station, then using the active commuter rail line to South Station).

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<sup>5</sup> The Interagency Coordinating Group (ICG) was convened by MassDOT and includes representatives of the United States Army Corps of Engineers; United States Environmental Protection Agency; United States Fish and Wildlife Service; Federal Highway Administration; Federal Transit Administration; National Marine Fisheries Service; Narragansett Indian Tribe; Wampanoag Tribe of Gay Head (Aquinnah); Massachusetts Executive Office of Energy and Environmental Affairs; Massachusetts Environmental Policy Act Office; Massachusetts Bay Transportation Authority; Massachusetts Department of Environmental Protection; Massachusetts Office of Coastal Zone Management; Massachusetts Department of Conservation and Recreation, Areas of Critical Environmental Concern Program; Massachusetts Department of Fish and Game, Natural Heritage and Endangered Species Program; Massachusetts Historical Commission and the Southeastern Regional Planning and Economic Development District.

<sup>6</sup> The Commuter Rail Task Force was formed in 2004 and provides a forum for state officials and local representatives to review and discuss all aspects of the Project and to work toward consensus on strategies and actions to plan ahead for new growth in the region. The Task Force provides advice and assistance to MassDOT and the MBTA in the design of the South Coast Rail Project and in the implementation of the South Coast Rail Economic Development and Land Use Corridor Plan. Its membership includes representatives from the MBTA, regional transit authorities, cities and towns, environmental groups, and business and economic development organizations.

- The Stoughton route (using the active freight rail lines from New Bedford and Fall River to Taunton, then using the inactive rail bed north to Stoughton, then using the active commuter rail tracks to South Station).
- The Middleborough route (using the active freight rail lines from New Bedford and Fall River to the existing Middleborough/Lakeville Station, then using the Old Colony Middleborough Line to South Station).
- The Highway route (using Routes 140, 79, 24, 128, and I-93 to the existing Route 128 commuter rail station, the existing Quincy Adams Red Line station, or South Station).

A step-by-step screening process was used to narrow the range of alternatives. The screening analyses considered the ability of alternatives meet the purpose and need for the project, whether they were practicable to construct and operate, and environmental impacts.

At the conclusion of the ENF review and public scoping process, the Secretary of EOEEA on April 3, 2009 issued a Certificate that specified the analyses, studies, and information to be included in the DEIR and the alternatives to be evaluated:

- No-Build Alternative (Enhanced Bus)
- Attleboro Electric Alternative (Previously referred to as Alternative 1, Option 1B)
- Attleboro Diesel Alternative (Previously referred to as Alternative 1, Option 1A)
- Stoughton Electric Alternative (Previously referred to as Alternative 4, Option 4B)
- Stoughton Diesel Alternative (Previously referred to as Alternative 4, Option 4A)
- Whittenton Electric Alternative (Previously referred to as Alternative 4, Option 4D)
- Whittenton Diesel Alternative (Previously referred to as Alternative 4, Option 4C)
- Rapid Bus Alternative (Previously referred to as Alternative 5 - Rapid Bus)

During the preparation of the DEIS/DEIR a new “Hybrid Alternative” that combined the Middleborough Simple Rail Alternative with the Rapid Bus Alternative was evaluated at the request of EPA. The evaluation indicated that complementing the low ridership of the Middleborough Simple Alternative with the ridership of the Rapid Bus Alternative would result in a combined ridership for the Hybrid Alternative less than that of the Rapid Bus Alternative by itself and just slightly more than the Middleboro Simple Alternative (which was already considered underperforming in terms of ridership). The combination alternative would require much of the infrastructure improvements needed for each individual alternative, resulting in a higher cost of the hybrid alternative than either the Rapid Bus Alternative or the Middleboro Simple Alternative. This would render the cost of the combination alternative impractical (i.e., fewer riders but higher cost of either Rapid Bus or Middleboro Simple alone). This alternative was therefore not advanced for further analysis in the DEIS/DEIR.

Along with the identification of alternative alignments, potential station sites were identified. Potential station locations to serve each of the five public transportation alternatives were identified for each

alternative and evaluated with regard to their ability to meet the Project Purpose, practicability and environmental considerations.

Potential station locations for the South Coast Rail alternatives were initially identified by the Southeastern Regional Planning & Economic Development District (SRPEDD),<sup>7</sup> and screened in an iterative process by the multi-disciplinary project team. SRPEDD staff with input from the public identified a total of 73 rail and bus station locations, some of which overlapped, totaling 55 rail stations and 30 bus stations. The locations identified include stations that are located on all potential rail segments, including the Fall River Secondary, New Bedford Main Line, the rail bed that extends south of the Stoughton Station, Whittenton Branch variation on the Stoughton alternative, Attleboro Secondary, and Middleborough Secondary.

#### **1.4.1.2 Alternatives Analyzed in the DEIS/DEIR**

The following alternatives were analyzed in detail in the DEIS/DEIR. The alternatives analyzed in the DEIS/DEIR were distinguished between No-Build and Build. Among the Build Alternatives there was a rail mode and a bus mode. Within the rail mode, there were three different corridors (Attleboro, Stoughton and Whittenton) and two different propulsion alternatives: electrically powered and diesel powered, as follows:

- No-Build (Enhanced Bus) Alternative
- Commuter Rail Alternatives
- Attleboro Alternative
- Attleboro Electric
- Attleboro Diesel
- Stoughton Alternative
- Stoughton Electric
- Stoughton Diesel
- Whittenton Alternative
- Whittenton Electric
- Whittenton Diesel
- Rapid Bus Alternative

The corridor for the Whittenton Alternative was a variant of the Stoughton Alternative. The Whittenton Alternative corridor avoids the Pine Swamp by using the out-of-service Whittenton Branch right-of-way and a portion of the active Attleboro Secondary rail line. It is identical to the Stoughton Alternative corridor in all other respects.

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<sup>7</sup> SRPEDD is a regional planning agency serving 27 cities and towns in Southeastern Massachusetts.

During the DEIS/DEIR analysis, conceptual operating plans, capital improvement requirements, capital costs, and operating and maintenance costs were developed for each alternative. DEIS/DEIR alternatives were modeled by the Central Transportation Planning Staff (CTPS) using their regional transportation model, providing quantitative results on the performance of each alternative in terms of ridership, highway/vehicular travel, air quality, and environmental justice. Detailed analyses of environmental impacts (to natural resources, air quality, noise and vibration, historic resources, social and economic impacts among others) were conducted. Smart growth strategies were as identified in the South Coast Rail Corridor Plan were evaluated for all Build Alternatives analyzed in the DEIS/DEIR.

#### **1.4.1.3 Alternatives Eliminated Following the DEIS/DEIR**

This section briefly describes the alternatives eliminated following the DEIS/DEIR and the rationale for not advancing these alternatives to this FEIS/FEIR.

##### **Attleboro Alternatives**

The Attleboro Alternatives would provide commuter rail service to South Station using the Northeast Corridor, proposed Attleboro Bypass, Attleboro Secondary, New Bedford Main Line, and Fall River Secondary. Both electric (Attleboro Electric) and diesel (Attleboro Diesel) commuter rail options were evaluated for this alternative. The New Bedford route would be 60.4 miles long and the Fall River route would be 57.9 miles long.

Based on the RAILSIM capacity simulations, the Attleboro Alternatives would operate with very poor on-time performance (especially in the evening peak period) (See Appendix 3.1-D). The analysis indicated that the Attleboro Alternatives would be operationally infeasible as they would not meet the MBTA on-time standard in the morning peak and would experience even worse on time performance during the evening peak commute. The Attleboro Alternatives would also contribute to a cascading negative impact on the on-time performance of the entire southerly commuter rail system, including Worcester, Franklin, Needham, and Providence commuter rail lines.

In order to address the operational infeasibility of the Attleboro Alternative, capacity on the Northeast Corridor (NEC) would have to be increased through construction of a fourth track along the NEC between Forest Hills Station and Back Bay Station. An analysis was conducted in the DEIS/DEIR of the construction costs and schedule implications as well as key property and other impacts associated with the construction of a fourth track. The analysis in the DEIS/DEIR (Section 1.4.6.2) indicated that the potential impacts, construction costs and construction schedule and other aspects of the fourth track along the NEC would render implementation of this infrastructure requirement not practicable considering costs, existing technology and logistics in light of overall project purposes. In a previous study, the Federal Railroad Administration (FRA; a cooperating federal agency) also explored the option to expand capacity of the NEC north of Canton Junction Station. However, due to substantial constraints, it was proposed that such capacity expansion end at Forest Hills in Jamaica Plain. In reviewing the RAILSIM capacity simulations conducted for the Attleboro Alternative, the FRA indicated to the Corps during the preparation of the DEIS/DEIR that it considered the Attleboro Alternatives infeasible and appropriate to eliminate from further environmental review/ consideration.<sup>8</sup> Accordingly, the Corps has determined that the Attleboro alternatives are not practicable, after taking into consideration cost, existing technology and logistics in light of overall project purposes (40 CFR 230.10(a)(2)), and therefore, the alternative was eliminated from further consideration in the FEIS/FEIR

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<sup>8</sup> Email correspondence from FRA to Army Corps. March 3, 2010.

### Rapid Bus Alternative

As proposed at the time of the DEIS/DEIR, the Rapid Bus Alternative would provide commuter bus service to South Station via I-93, Route 140 and Route 24. North of I-495, buses would use a combination of new zipper bus lanes, new reversible bus lanes, two-way bus lanes, existing zipper high occupancy vehicle (HOV) lanes, and existing HOV lanes, along with a short section in mixed traffic. South of the I-495 interchange in Raynham, buses would travel in the general purpose lanes with mixed traffic. The New Bedford route would be 56.4 miles long and the Fall River route would be 51.5 miles long.

This alternative requires improvements to highway infrastructure along Route 24 (construct third lane from Route 140 to I-495, a distance of 5.8 miles; widen Route 24 to accommodate movable barriers; construct zipper bus lane from I-495 to Harrison Boulevard, a distance of 15.4 miles); and Route 128/I-93 (construct reversible bus lane from Harrison Boulevard on Route 24 to Logan Express Lot, a distance of 4.2 miles; and construct two-lane bus roadway from Logan Express Lot to existing HOV zipper lane on the Southeast Expressway, a distance of 1.6 miles). Infrastructure improvements also include constructing, reconstructing, or widening 20 bridges and reconstructing 11 highway interchanges.

In response to the comments received on the DEIS/DEIR, the Rapid Bus Alternative was re-evaluated and modified to attempt to improve ridership performance and eliminate bottlenecks. Multiple alternatives were developed and evaluated based on the criteria established in the DEIS/DEIR. The changes that were selected and became part of the Modified Rapid Bus Alternative are described in detail in Appendix 3.1-E: *Modified Rapid Bus Alternative Technical Memorandum*.

In developing the Modified Rapid Bus Alternative several major constraints and concerns were identified:

- A fully exclusive bus lane (to reduce travel time) could not be feasibly constructed all the way into Boston;
- Because the Modified Rapid Bus Alternative requires the use a section of the existing highway system that is already subject to heavy congestion and is vulnerable to significant delays, the reliability of the Modified Rapid Bus Alternative would be severely impacted, which would negatively affect ridership;
- Annual operating and maintenance costs of the Modified Rapid Bus Alternative would be more than double those of the Stoughton Electric Alternative; and
- The Modified Rapid Bus Alternative would have twice as much wetland impact (in area) as the DEIS/DEIR Stoughton Electric Alternative and approximately 30 percent less air quality benefit based on a reduction of annual carbon dioxide (CO<sub>2</sub>) emissions from commuters switching from automobiles to the public transportation options under consideration.
- In sum, the Modified Rapid Bus Alternative would still have substantially lower ridership, much higher cost and greater adverse environmental impact compared to the commuter rail alternatives.

The Federal Highway Administration (FHWA) provided its review of the DEIS/DEIR Rapid Bus Alternative and subsequent related information (including the Modified Rapid Bus Alternative).<sup>9</sup> The role of the Federal Highway Administration (FHWA) as a cooperating agency on the EIS for the South Coast Rail project is to provide special expertise and technical assistance with respect to issues concerning the transportation system. The FHWA commented that “Based on the information provided in the DEIS and related materials, it is our opinion that the analysis of the Rapid Bus Alternative accurately presents the impacts to the transportation corridor and the region. Furthermore, FHWA believes that the impacts to the roadway network, in particular those which degrade service on the Interstate System associated with the Rapid Bus Alternative and its various modifications are unacceptable, and thus the alternative is not a viable option”

In sum, the substantial analysis conducted for the Rapid Bus Alternative during the DEIS/DEIR and subsequent consideration of optimized Modified Rapid Bus Alternatives (see Appendix 3.1-E), including its multiple design variations, indicates very low ridership, fewer regional mobility benefits (interregional links), greater impact on the environment and on the transportation system than the rail alternatives and high cost of the (Modified) Rapid Bus Alternative and its variants. The Corps has thoroughly considered this data and the determination by the FHWA (in its capacity as a Cooperating Agency with technical expertise on this alternative) of this alternative as non-viable. The Corps concludes that, at best, the Modified Rapid Bus Alternative (1) meets the overall project purpose only marginally by generating approximately 1/3 fewer riders than MassDOT’s preferred alternative, (2) is unreasonably costly to construct and maintain (more than double the annual operating and maintenance cost of the Stoughton Electric Alternative), and (3) is logistically infeasible to construct in a manner that would not be highly likely to eventually degrade the already stressed Interstate Highway transportation system. Accordingly, the Corps has determined that the Modified Rapid Bus alternative is not practicable, after taking into consideration cost, existing technology and logistics in light of overall project purposes (40 CFR 230.10(a)(2)), and therefore, the alternative was eliminated from further consideration in the FEIS/FEIR.

#### **1.4.2 Description of Alternatives Evaluated in the FEIS/FEIR**

This section provides a description of the alternatives evaluated in the FEIS/FEIR: the No-Build (Enhanced Bus) Alternative, the Stoughton Alternative (electric and diesel variants) and the Whittenton Alternative (electric and diesel variants).

An overview of the rail corridors within which the proposed Build Alternatives would be constructed is presented first. The organization of the description of these corridors forms the basis for the characterization of the affected environment and environmental consequences of the rail alternatives in Chapter 4. Figure 1.2-1 provides an overview of the various rail corridors discussed in this section.

A summary of Build Alternatives modes follows the overview of rail corridors.

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<sup>9</sup> Letter from FHWA to USACE re: South Coast Rail Project. January 17, 2013.

### 1.4.2.1 Overview of Build Alternatives Corridors

#### The “Southern Triangle”

This section, common to all rail alternatives, provides an overview of two components of the transportation system south of Weir Junction, referred to as the “Southern Triangle.” These components include the New Bedford Main Line and the Fall River Secondary.

##### *New Bedford Main Line Rail Segment*

The New Bedford Main Line is an active rail line running from the Attleboro Secondary at Weir Junction in Taunton to the waterfront piers in New Bedford. The line connects with the Middleborough Secondary at Cotley Junction and the Fall River Secondary at Myricks Junction. The line is in service for freight only at the present time. The line is mostly single track (but was constructed to carry two tracks), with a two-track section north of Cotley Junction. The line was acquired from CSX by MassDOT.

The line passes through some environmentally sensitive areas, including the Assonet Cedar Swamp in Berkley and Lakeville and is adjacent to the Acushnet Cedar Swamp State Reservation in New Bedford. Other constraints include dense development along the line in New Bedford.

##### *Fall River Secondary Rail Segment*

The Fall River Secondary is an active rail line running between the New Bedford Main Line at Myricks Junction in Berkley and the waterfront in Fall River. The line is in service for freight only at the present time. The line is all single-track, and was acquired by MassDOT from CSX.

The line passes through some environmentally sensitive areas, including the Assonet Cedar Swamp in Berkley. Other constraints include dense development along the line in Fall River, and large slopes above and below the line in Fall River along the Taunton River.

#### Northeast Corridor Rail Segment

The Northeast Corridor is an active rail line running between New York and South Station in Boston. The portion of interest for this project runs from Attleboro to Boston. The corridor experiences heavy use, including Amtrak Regional and Acela service, MBTA commuter rail service, and freight rail service. The MBTA Providence Line uses the entire length of this portion of the corridor; the Stoughton Line, Franklin Line, and Needham Lines join farther north at Canton Junction, Readville, and Forest Hills, respectively.

The corridor has at least two tracks on this section, with three tracks from Readville to Boston. There are also two station siding tracks at Attleboro Station. The corridor is electrified, meaning that both diesel and electric trains can operate, and is designed and signaled for high-speed rail operations. The corridor is owned by the MBTA. Train operations are controlled by Amtrak.

#### Attleboro Secondary Rail Segment

The Attleboro Secondary is an active rail line running from the Northeast Corridor in Attleboro to the Stoughton Line and New Bedford Main Line at Weir Junction in Taunton. The line is in service for freight only at the present time. The line is mostly single track, with a two-track section just east of the Northeast Corridor in Attleboro. The line is currently owned by MassDOT and operated by CSX.

The line runs through some environmentally sensitive areas, including Chartley Pond and the Three Mile River Area of Critical Environmental Concern (ACEC). It also has many grade crossings in downtown Taunton, because it runs directly through the densely developed core of the city.

### **Stoughton Alternatives Corridor**

This section provides an overview of the Stoughton Main Line, the main component of the transportation corridor for the Stoughton alternatives under consideration. Alternatives through Stoughton would also use the Northeast Corridor north of Canton Junction.

The Stoughton Main Line is a rail line running from the Northeast Corridor at Canton Junction to the Attleboro Secondary and New Bedford Main Line at Weir Junction in Taunton. The line is active between Canton Junction and Stoughton Station serving commuter rail on the MBTA Stoughton Line and freight rail to customers in Canton and Stoughton. A short piece of the line north of Weir Junction is active, serving freight only. The remainder of the line, from Stoughton Station to Taunton, is out of service, and some tracks were removed.

The active sections of the corridor are single-track, except at the approach to Canton Junction, where there are two tracks. The corridor is owned by the MBTA, north of Britton Street in Raynham. Parts of the right-of-way north of Longmeadow Road in Taunton were sold and in various public/private ownership. The active freight rail segment north of Weir Junction is owned by MassDOT and operated by the MassCoastal Railroad.

The corridor passes through some environmentally sensitive areas, including Pine Swamp in Raynham and the Hockomock Swamp ACEC in Raynham and Easton. Hockomock Swamp is one of the most important wetlands in the state for rare species habitat and protects regional water quality.

### **Whittenton Alternatives Corridor**

This section provides an overview of the main component of the transportation corridor for the Whittenton alternatives under consideration. Like the Stoughton alternatives, the Whittenton alternatives would use the Northeast Corridor north of Canton Junction to the Stoughton Main Line to the Whittenton Branch. The Whittenton Branch is an out-of-service rail line in Raynham and Taunton, running around the northwest edge of the core of the City of Taunton and connecting the Stoughton Line with the Attleboro Secondary.

The corridor runs through the Hockomock Swamp ACEC in Easton and Raynham, but would avoid impacts to Pine Swamp in Raynham. The Whittenton Branch is currently owned by the MBTA.

#### **1.4.2.2 Description of Build Alternatives Modes**

This section discusses the modes used by the FEIS/FEIR alternatives and the operating assumptions used to evaluate each mode.

### **Diesel Commuter Rail**

Diesel commuter rail refers to a fixed-guideway system with steel wheels operating on steel rails, with one or two locomotives pulling a number of passenger coaches; on the MBTA system, trains are generally six to nine coaches. Coaches would be bi-level, to increase capacity. Diesel commuter rail maximum speed was assumed to be 79 mph, the maximum currently operated on the MBTA system.

While the maximum speed would be 79 mph, actual operating speeds would often be lower due to station stops, curves, and other track features.

### **Electric Commuter Rail**

Electrified commuter rail refers to a fixed-guideway system with steel wheels operating on steel rails, with one or two locomotives pulling a number of passenger coaches. For consistency with the MBTA system, trains are assumed to be six to nine coaches. Coaches would be bi-level to increase capacity. Commuter rail locomotives are powered by an overhead electrical contact system. For electric commuter rail, the maximum speed was assumed to be 100 mph, the maximum speed that can be operated without incurring significant signal costs because of the need to signal civil restrictions. While the maximum speed would be 100 mph, actual operating speeds would often be lower due to station stops, curves, and other track features. The primary travel time advantage of electric commuter rail over diesel for this project is faster acceleration when departing stations (savings of approximately 20 seconds per station, see Section 1.4.3.2).

#### **1.4.2.3 No-Build Alternative – Enhanced Bus**

Under this alternative, no new rail or bus service would be provided to Southeastern Massachusetts; however, existing routes would be enhanced. The No-Build Alternative would improve transit service to Boston from New Bedford, Fall River, and Taunton by adding more buses with smaller capital investments than are proposed in the Build Alternatives (Stoughton Alternative and Whittenton Alternative). The No-Build Alternative is shown in Figure 1.4-1.

Also included in the No-Build Alternative are the expansion of South Station in Boston, the construction of new mid-day layover facilities in the Boston area and the reconstruction of railroad bridges in the New Bedford area. These improvements are proposed based on existing and future needs and would be implemented irrespective of the South Coast Rail alternatives.

#### **1.4.2.4 Stoughton Electric Alternative**

The Stoughton Electric Alternative would provide commuter rail service to South Station using the NEC, Stoughton Line, New Bedford Main Line, and Fall River Secondary. Figure 1.4 -2 shows the Stoughton Alternative. The New Bedford route would be 55.0 miles long and the Fall River route would be 52.7 miles long.

A summary of this alternative is provided Table 1.4-1. The Stoughton Alternative would:

- Utilize 15.5 miles of existing NEC track infrastructure between Boston and Canton Junction;
- Require improvements to track infrastructure along the Stoughton Line including:
  - Reconstructing existing tracks from Canton Junction to Stoughton, as double track, a distance of 3.8 miles; and
  - Constructing new tracks on existing right-of-way from Stoughton Station to Weir Junction in Taunton, as one to two tracks, a distance of 16.4 miles;
- Require reconstructing track on the Southern Triangle (common to both the Stoughton and Whittenton Alternatives), including:

- Reconstructing the existing New Bedford Main Line tracks from Weir Junction to New Bedford, as two to three tracks from Weir Junction to Myricks Junction, a distance of 4.9 miles; and single track with three sidings from Myricks Junction to New Bedford, a distance of 14.5 miles; and
- Reconstructing the existing Fall River Secondary tracks from Myricks Junction to Fall River, as single track with four sidings, a distance of 12.3 miles.
- Infrastructure improvements for the Stoughton Alternative also includes constructing, reconstructing, or widening 40 bridges and constructing or reconstructing 46 railroad at-grade crossings.

This alternative would have ten new commuter rail stations (North Easton, Easton Village, Raynham Park, Taunton, Taunton Depot, King’s Highway, Whale’s Tooth, Freetown, Fall River Depot, and Battleship Cove) and major reconstruction of two existing commuter rail stations (Canton Center and Stoughton). This alternative would include two overnight layover facilities, one in New Bedford and one in Fall River.

To support electric locomotives, a traction power system would be built and would include two main substations (one in Easton and one in New Bedford), two switching stations (one in Canton and one in Berkley), and six paralleling stations (one in Easton, one in Taunton, two in Freetown, one in New Bedford, and one in Fall River).

**1.4.2.5 Stoughton Diesel Alternative**

The Stoughton Diesel Alternative would be identical to the Stoughton Electric Alternative with the exception of the electrical facilities, which would not be required for the diesel alternative.

**Table 1.4-1 Summary of Rail Alternatives**

Segment	Stoughton Alternative			Whittenton Alternative		
	Length (miles)	Number of Tracks	Number of Sidings	Length (miles)	Number of Tracks	Number of Sidings
Canton to Stoughton Station	3.8	2		3.8	2	
Stoughton Station to Weir Junction	16.4	1-2		17.9	1-2	1
Weir Junction to Myricks Junction	4.9	2-3		4.9	2-3	
Myricks Junction to New Bedford	14.5	1	3	14.5	1	3
Myricks Junction to Fall River	12.3	1	4	12.3	1	4
Total Length (South Station to New Bedford)	55.0			56.6		
Total Length (South Station to Fall River)	52.7			54.3		

**1.4.2.6 Whittenton Electric Alternative**

The Whittenton Alternative would provide commuter rail service to South Station through Stoughton, connecting to the existing Stoughton Line using the Whittenton Branch and a short segment of the Attleboro Secondary through the City of Taunton. The Whittenton Alternative is shown in Figure 1.4-3. The New Bedford route would be 56.6 miles long and the Fall River route would be 54.3 miles long.

Table 1.4-1 presents a summary of the Whittenton Alternative. This alternative would:

- Utilize 15.5 miles of existing NEC track infrastructure between Boston and Canton Junction;
- Require improvements to track infrastructure along the Stoughton Line, including:
  - Reconstructing existing tracks from Canton Junction to Stoughton, as double track, a distance of 3.8 miles; and
  - Constructing new tracks on existing right-of-way from Stoughton to Raynham Junction, as one to two track sections a distance of 11.9 miles;
- Require constructing new single track on existing Whittenton Branch right-of-way from Raynham Junction in Raynham to Whittenton Junction;
- Require reconstructing existing Attleboro Secondary tracks from Whittenton Junction to Weir Junction, as a single track with one siding, a distance of 6.0 miles);
- Require reconstructing track on the Southern Triangle (common to both rail alternatives) including:
  - Reconstructing the existing New Bedford Main Line tracks from Weir Junction to New Bedford, as two to three tracks from Weir Junction to Myricks Junction, a distance of 4.9 miles; and single track with three sidings from Myricks Junction to New Bedford, a distance of 14.5 miles; and
  - Reconstructing the existing Fall River Secondary tracks from Myricks Junction to Fall River, as single track with four sidings, a distance of 12.3 miles.

Infrastructure improvements for the Whittenton Alternative also include constructing, reconstructing, or widening 38 bridges and constructing or reconstructing 53 railroad at-grade crossings.

This alternative would have ten new commuter rail stations (North Easton, Easton Village, Raynham Park, Dana Street, Taunton Depot, King's Highway, Whale's Tooth, Freetown, Fall River Depot, and Battleship Cove) and major reconstruction of two existing commuter rail stations (Canton Center and Stoughton), as well as expansion of South Station. This alternative would include two overnight layover facilities, one in New Bedford and one in Fall River.

To support electric locomotives, a traction power system would be built and would include two main substations (one in Easton and one in New Bedford), two switching stations (one in Canton and one in Berkley), and six paralleling stations (one in Easton, one in Taunton, two in Freetown, one in New Bedford, and one in Fall River).

#### **1.4.2.7 Whittenton Diesel Alternative**

The Whittenton Diesel Alternative would be identical to the Whittenton Electric Alternative with the exception of the electrical facilities, which would not be required for the diesel alternative.

### 1.4.3 Operations of the Alternatives

#### 1.4.3.1 No-Build Alternative

##### Commuter Rail Service

Under the No-Build Alternative, no commuter rail service is offered within the South Coast area. Although commuter rail service is offered in nearby southeastern Massachusetts communities by the MBTA, this service is difficult for most residents to access and is approaching or over capacity under existing conditions.

##### No-Build Commuter Bus Service

Existing commuter bus service to Boston from New Bedford, Fall River, and Taunton is currently provided by three commuter bus carriers: DATTCO provides Boston – New Bedford service; Peter Pan provides Boston – Fall River bus service; and Bloom provides Boston – Taunton service.

These bus companies offer a fare structure that is competitive to commuter rail service. The three commuter bus routes travel through the downtown core of New Bedford, Taunton, and Fall River. The routes all board passengers in the downtown before traveling to other locations to pickup/drop-off passengers at external bus stops/park-and-ride lots and intermediate flag stops. The Fall River commuter bus runs express to Boston with no intermediate stops.

In addition to the private commuter bus service to Boston, two regional transit authorities (RTAs) provide transit service in the study corridor: SRTA operates in New Bedford and Fall River sub-region, and GATRA operates in the Taunton/Attleboro area sub-region. Each RTA shares terminal facilities with commuter bus companies. These authorities share infrastructure and terminals with the commuter bus carriers and provide passengers an intermodal link from other points within the local communities to the Boston commuter bus service.

Detailed information regarding the existing operating schedule of the bus services in the project area is provided in Chapter 3, along with recommendations of operating schedule enhancements. While bus service operations would be improved, no major capital transit improvements serving the South Coast Region would occur under the No-Build Alternative.

#### 1.4.3.2 Rail Alternatives

##### Commuter Rail Operations

The Stoughton and Whittenton Electric Alternatives have similar operating plans that were developed to meet the current minimum requirements of the MBTA Service Delivery Plan for commuter rail. The infrastructure proposed for each alternative has been designed to support these levels of operation.

The proposed operations would have four peak period trains to each of the terminal stations of New Bedford and Fall River. This translates to approximately 30-minute service on both the Fall River Secondary and the New Bedford Main Line, and an 18 minute headway on the trunk (shared) portion of the route north of Myricks Junction. During the off-peak periods, six additional trains would operate on a 3 hour frequency from the terminal stations and 90 minutes on the trunk portion. This provides 10 round trip trains per weekday from each terminal station.

Both commuter rail alternatives would use the same station stops south of Taunton Depot. By employing a zone-express service pattern (where trains stop at a few stations and then run express), travel times for passengers traveling from Fall River and New Bedford would decrease as compared to those presented in the DEIS/DEIR.

Table 1.4-2 summarizes the total trip time from each terminal station (New Bedford and Fall River) to South Station based on the revised station stopping pattern. These trip times are between 5 and 7 minutes faster than shown in the DEIS/DEIR due to the revised service plan. As shown in the table, the Stoughton Alternative would be 6 to 7 minutes faster than the Whittenton Alternative for service to New Bedford, and 8 minutes faster for service to Fall River.

**Table 1.4-2 Average Trip Time Table (hr:min)**

Operation	Stoughton Electric Alternative		Whittenton Electric Alternative	
	New Bedford Trains	Fall River Trains	New Bedford Trains	Fall River Trains
Peak Period Service	1:17	1:15	1:24	1:23
Non-Peak Period Service	1:16	1:18	1:22	1:26

- 1 Overall travel times for each branch of the Stoughton and Whittenton Electric Alternatives were developed using the Rail Traffic Controller model.
- 2 Assumptions were made based on track and signal layout.
- 3 Express trains may have longer travel times than local trains since they only operate during peak periods.

The average trip times in Table 1.4-2 are based on simulation of the Stoughton Electric Alternative. Diesel Alternatives would add approximately 20 seconds per station due to the additional time diesel locomotives need to accelerate from the stations. Deceleration rates would be identical to those of the Electric Alternatives. It is noted that although its operating plan skips a few stops, the peak period service has a longer travel time due to longer dwell times at each station in order to load and unload passengers during peak commuting hours. The off-peak period service would stop at every station but would have much shorter dwell times and would, therefore, have a shorter average travel time than the peak service.

**Feeder Bus**

The Feeder Bus plan for the South Coast Rail project is envisioned to connect the urbanized communities in the study area to the South Coast stations. A Feeder Bus network would provide an alternative to driving to stations and would support transit oriented development and other smart growth initiatives in the study area by connecting surrounding areas to the train station. The Feeder Bus network would provide frequent, convenient service connections with trains.

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 would encourage multi-modal integration for the South Coast Rail project. Current bus operators would provide enhanced Feeder Bus service to the proposed stations for the selected build alternative.

Feeder Bus service would connect the South Coast Rail stations with the services shown in Table 1.4-3.

**Table 1.4-3 Proposed Feeder Bus Operations**

Station Name	Operator	Route #	Extension Length (miles)	Existing Headway (minutes)	Proposed Peak Frequency
Easton Village	BAT	8	3.0	40	same
Taunton Station	GATRA	7	0.4	30	same
Dana Street Station	GATRA	18	0.3	30	same
Taunton Depot	GATRA	8	0.2	60	same
Freetown Station	SRTA	2	1.0	30	same
Fall River Depot	SRTA	2	0.4	20	same
Kings Highway	SRTA	8	0	45	same
Whale's Tooth	SRTA	1	0.7	20	same
Whale's Tooth	SRTA	2	0	20	same

### ***Freight Operations***

Although future freight demand was not modeled as part of the project, future operating windows for freight trains were included. Freight trains would be allowed to operate on certain sections of track, during specified time periods (see Chapter 3).

Freight service would be restricted to standard freight size and weight, and would not support high-and-wide or double-stack operations. Freight services is anticipated to continue on the track segments where freight is currently provided (on the Stoughton Line north of Stoughton Station, on the Attleboro Secondary, on the Stoughton Line in Taunton between Longmeadow Road and Weir Junction, and on the New Bedford Main Line and Fall River Secondary south of Weir Junction). No future freight service is currently planned on the out-of-service Whittenton Branch or Stoughton Line between Stoughton Station and Longmeadow Road.

### **1.4.4 Track Infrastructure of the Rail Alternatives**

Subsequent to the DEIS/DEIR, MassDOT has advanced the preliminary track design for the Stoughton Alternative and the Whittenton Alternative. All track changes have been minor. The design of bridge structures has been advanced, particularly for the Hockomock Trestle between Foundry Street and the former Raynham Greyhound Park.

#### **1.4.4.1 FEIS/FEIR Track Design**

All of the rail alternatives require reconstructing existing active tracks and constructing new tracks either on out-of service or new rights-of-way. The new track infrastructure would consist of new 132RE rail, new rail ties, new stone ballast, subballast and other track material. The horizontal and vertical geometry for the new track has been designed to conform to the applicable design speed for the alternatives in accordance with the MBTA commuter rail design standards and American Railway Engineering and Maintenance-of-Way Association (AREMA) design standards. The alignments have also been designed to minimize impacts to adjacent environmental resources and private properties.

**1.4.4.2 Track Infrastructure - Stoughton Alternative**

The New Bedford Main Line from Weir Junction in Taunton to the Whale’s Tooth Station, and the Fall River Secondary from Myricks Junction in Berkley to Battleship Cove Station, are segments of track common to both commuter rail alternatives as is the track from Raynham Junction to South Station. Only the segment from Raynham Junction to Weir Junction would differ between the alternatives. Except in certain locations, the track would be designed for a maximum authorized speed (MAS) of 100 MPH. Locations which would be designed for less than 100 MPH MAS would be at certain sidings (which would be too short to achieve 100 MPH), and south of the King’s Highway Station, where it would be precluded by single track operations.

**Stoughton Line**

The existing single track commuter rail line would be upgraded and maintained to FRA Class 7. A new second track would be constructed from Canton Junction to the existing Stoughton Station, where existing passenger service ends. A new double track would extend south of Stoughton Station to the proposed North Easton Station. The remainder of the line south to Weir Junction would be single-track, with a 2.2-mile-long double-track section in Raynham, and a 0.6-mile-long double-track section in Taunton. Approaching Weir Junction, an additional 0.4-mile siding track would be provided for freight use only. Weir Junction would also be reconfigured to accommodate four tracks as well as 45 MPH for operations through the curve while maintaining existing rail connections. These track segments are listed in Table 1.4-4.

**Table 1.4-4 Track Infrastructure—Stoughton Alternative**

Track Segment	Single Track	Double Track	Triple Track	Quadruple Track	Total (miles)
Canton Junction to Stoughton Station <sup>1</sup>	-	3.8	-	-	3.8
Stoughton Station to Raynham Junction <sup>1</sup>	7.1	4.8	-	-	11.9
Raynham Junction to Weir Junction <sup>1</sup>	2.9	1.1	-	0.4	4.5
Weir Junction to Cotley Junction <sup>2</sup>	-	0.7	0.9	-	1.6
Cotley Junction to Myricks Junction <sup>2</sup>	-	3.3	-	-	3.3
Myricks Junction to Battleship Cove <sup>3</sup>	9.4	2.9	-	-	12.3
Myricks Junction to Whale’s Tooth <sup>2</sup>	10.1	4.5	-	-	14.5
<b>TOTAL (miles)</b>	<b>29.5</b>	<b>21.1</b>	<b>0.9</b>	<b>0.4</b>	<b>51.9</b>

- 1 Stoughton Line
- 2 New Bedford Main Line
- 3 Fall River Secondary

A frontage road would be constructed in Stoughton connecting to Morton Street to eliminate multiple grade crossings, and a new grade-separated crossing is proposed at Route 138 in Raynham. A trestle section is proposed in Easton and Raynham to minimize environmental impacts to the Hockomock Swamp Area of Critical Environmental Concern.

**New Bedford Main Line**

The 19.4-mile existing track along the New Bedford Main Line would be upgraded and maintained to FRA Class 7 options. The line would be double-track from Weir Junction to Myricks Junction, with a 0.9-mile third track for freight movements near Taunton Depot Station. A short segment of the line would be double-track south of Myricks Junction, 0.8 mile. The remainder of the line would be single-

track, with the exception of 1.8-mile double-track section in Freetown and a 1.7-mile section in New Bedford. These sidings are required by the operations analysis and also allow flexibility between commuter and freight operations.

**Fall River Secondary**

The 12.3 miles of existing track along the Fall River Secondary would be upgraded and maintained to FRA Class 7 options. The majority of this line would be single-track with a 0.7-mile double-track segment at Myricks Junction. A 1.0-mile long section of double track would be installed adjacent to the Fall River Golf Club. Three double-track sections are also proposed in Freetown and Fall River, at 0.6, 0.3, and 0.2 miles long, respectively, to allow flexibility between commuter and freight operations.

**1.4.4.3 Track Infrastructure - Whittenton Alternative**

The route for the Whittenton Alternative is similar to the Stoughton Alternative except in Raynham and Taunton. The New Bedford route would be 56.6 miles long and the Fall River route would be 54.3 miles long. This alternative would extend through the out-of-service Stoughton Line, as previously described, and connect to the out-of-service Whittenton Branch at Raynham Junction. The Whittenton Branch would extend south and west to the Attleboro Secondary at Whittenton Junction. Along the Attleboro Secondary, the Whittenton Alternative would extend to Weir Junction in Taunton. South of Taunton, the alternative would continue on the New Bedford Main Line and Fall River Secondary track, identical to the Stoughton Alternative.

Track infrastructure improvements would include 3.6 miles of new single-track on the Whittenton Branch and 2.2 miles of single-track reconstruction on the Attleboro Secondary with a 0.3-mile siding reserved for the proposed Dana Street Station. Improvements on the Stoughton Line between Canton Junction and Route 138 in Raynham would be the same as the Stoughton Alternative. Table 1.4-5 summarizes the track infrastructure improvements along the Whittenton Alternative.

**Table 1.4-5 Track Infrastructure—Whittenton Alternative**

Track Segment	Single Track	Double Track	Triple Track	Quadruple Track	Total (miles)
Canton Junction to Stoughton Station <sup>1</sup>	–	3.8	–	–	3.8
Stoughton Station to Raynham Junction <sup>1</sup>	7.1	4.8	–	–	11.9
Raynham Junction to Whittenton Junction <sup>2</sup>	3.6	–	–	–	3.6
Whittenton Junction to Weir Junction <sup>3</sup>	2.2	0.3	–	–	2.5
Weir Junction to Cotley Junction <sup>4</sup>	–	0.7	0.9	–	1.6
Cotley Junction to Myricks Junction <sup>4</sup>	–	3.3	–	–	3.3
Myricks Junction to Battleship Cove <sup>5</sup>	9.4	2.9	–	–	12.3
Myricks Junction to Whale’s Tooth <sup>4</sup>	10.1	4.5	–	–	14.5
<b>TOTAL (miles)</b>	<b>32.4</b>	<b>20.3</b>	<b>0.9</b>	<b>0.4</b>	<b>53.5</b>

- 1 Stoughton Line
- 2 Whittenton Branch
- 3 Attleboro Secondary
- 4 New Bedford Main Line
- 5 Fall River Secondary

**1.4.5 Grade Crossings**

The majority of existing public grade crossings on the active railroad rights-of-way have automatic grade crossing gates and flashers installed. All existing grade crossings to remain and all reactivated crossings would be equipped with new, state-of-the-art Automatic Highway Crossing Warning (AHCW) systems. Trains would use horns when they approach grade crossings, which is MassDOT’s standard highest level of warning. Sounding a horn while approaching a grade crossing is a well-proven and effective method of providing warning of an approaching train. MassDOT is not proposing Quiet Zones for noise mitigation and is committed to designing the South Coast Rail project grade crossings to the safety standard provided by the Federal Railroad Administration (FRA).

Grade crossings would be closed or consolidated whenever feasible. Private grade crossings would be closed, gated, and locked if possible; if not, new AHCW systems would be installed. At a minimum each public grade crossing would consist of automatic gates, LED flashers, and an electronic bell. Where required, this standard arrangement may be supplemented with additional equipment such as additional gates and cantilevered flashers to optimize visibility for the roadway approaches.

A summary of the number of grade crossings by alternative is provided in Table 1.4-6.

**Table 1.4-6 Summary of Public Grade Crossings by Alternative**

Commuter Rail Alternative	Existing	Existing Grade	Proposed	Total
	Active Grade Crossings	Crossings Recommended for Closure	New Grade Crossings <sup>1</sup>	Proposed Grade Crossings
Stoughton Alternative	31	3	15	43
Whittenton Alternative	40	3	13	50

<sup>1</sup> Includes grade crossings that are existing but not active

**1.4.6 Bridges and Culverts**

All of the rail alternatives require reconstructing undergrade bridges (railroad over road or river) and overhead bridges (highway over railroad) along the active and restored rights-of-way.

Table 1.4-7 provides a general summary of required bridge improvements for the two alternatives, to enable comparison. The summary includes existing bridges to be reconstructed and new bridges required to restore/provide grade separation or traverse sensitive areas.

**Table 1.4-7 Summary of Bridge Improvements by Alternative**

Commuter Rail Alternative	Reconstruct Undergrade (Railroad) Bridges	Reconstruct Overhead (Highway) Bridges	New Bridges for Grade Separation or Environmental
Stoughton Alternative	31	3	6
Whittenton Alternative	29	4	5

**1.4.7 Signals and Communications**

The Signals and Communications design remains the same as described in the DEIS/DEIR. The following sections summarize the design and compare the Stoughton and Whittenton Alternatives.

**1.4.7.1 Stoughton Alternative Signals and Communications**

The Stoughton Alternative requires a new Positive Train Control (PTC) signal system for the New Bedford Main Line, Fall River Secondary, and the Stoughton Line. Modifications to the existing NEC signal system are limited to updating the signal logic at the Canton Junction Interlocking. These minor improvements would be needed to make the signal logic on the corridor consistent with the signal logic of the new system on the Stoughton Line.

**1.4.7.2 Whittenton Alternative Signals and Communications**

The Whittenton Alternative requires a new PTC signal system for the New Bedford Main Line, Fall River Secondary, Attleboro Secondary, Whittenton Branch, and Stoughton Line. Modifications to the existing NEC signal system are limited to updating the signal logic at the Canton Junction Interlocking. These minor improvements would be needed to make the signal logic on the corridor consistent with the signal logic of the new system on the Stoughton Line.

**1.4.8 Rolling Stock**

Both the Stoughton and Whittenton Alternatives would use commuter rail technology on a fixed-guideway system with steel wheels operating on steel rails, with typically a single locomotive pulling (outbound) or pushing (inbound) a number of passenger coaches. On the MBTA system, coaches can be either single level or bi-level. Commuter rail trains would be powered by diesel or electric locomotives, depending on the alternative. The electric locomotives would be powered by a 25 kV/60 Hz overhead catenary system (OCS). The diesel alternatives would not require an OCS.

Table 1.4-8 summarizes the number of new coaches and locomotives required for each commuter rail alternative.

**Table 1.4-8 Rolling Stock Requirements<sup>1</sup>**

Alternatives	Locomotives	Coaches	Cab Cars
Stoughton	10	72	10
Whittenton	10	72	10

<sup>1</sup> Includes spare locomotive, coaches, and cab cars since the MBTA currently does not have electric locomotives.

**1.4.9 Electrification System**

A new traction electrification system is required to provide electric power to locomotives for the electric commuter rail alternatives. The diesel alternatives would not require these infrastructure improvements.

The new traction electrification system would tie into the existing NEC electrification system with some modifications to that system. The traction electrification system would provide power to the trains from wayside traction power facilities through an overhead catenary system (OCS) that distributes the power

to the trains' pantographs. The pantographs, mounted on the roof of the rolling stock, would collect the electrical power from the OCS, through mechanical contact by sliding under the OCS contact wire. The electrical circuit would be completed back to the source substation via multiple return paths, including running rails and static wires.

Three major elements would make up the traction electrification system:

- Traction Power System, which include traction power substations, switching stations and paralleling stations.
- Overhead Catenary System (OCS), which distributes the electrical power to the rolling stock, and includes the messenger and contact wires, and the associated supporting structures and hardware. The track negative feeder wires are considered associated with the OCS.
- Traction Power Return System, which makes up the running rails, impedance bonds and static wires.

#### 1.4.10 Stations

New commuter rail stations generally would consist of high-level platforms, canopies, commuter parking, and a pick-up/drop-off area for buses and “kiss & ride” that conform to MBTA Commuter Rail Station design criteria and the Americans with Disabilities Act (ADA). Stations are intended to function similarly to the majority of existing MBTA commuter rail stations; they would be unattended and would require self-pay parking. The proposed stations would not include station buildings. The locations of stations under the Stoughton and Whittenton Alternatives are shown in Figures 1.4-2 and 1.4-3, respectively. As shown in Table 1.4-9, the stations are common to both the Stoughton and Whittenton Alternatives, except for the Taunton Station (Stoughton Alternatives only) and the Dana Street Station (Whittenton Alternatives only).

Station locations have remained as shown in the DEIS/DEIR, with the exception of the Stoughton Station and Downtown Taunton Station. Stoughton Station was relocated to eliminate conflicts with traffic in Stoughton Center and to support downtown revitalization efforts. Several alternatives for the relocation of the Stoughton Station were evaluated (see Chapter 3).

Downtown Taunton Station as described in the DEIS/DEIR was replaced by Dana Street Station, due to development of the originally selected site near the GATRA bus terminal since the publication of the DEIS/DEIR. The Dana Street site was chosen as a replacement for the Downtown Taunton station site since it is a sizable vacant parcel along the right-of-way and is proximate to the previously selected Downtown Taunton site.

**Table 1.4-9 Summary of Stations**

Station Name	Municipality	Station Type	Parking Spaces	Platform Type <sup>4</sup>	Stoughton Alternative	Whittenton Alternative
Canton Center	Canton	Existing	210 <sup>1</sup>	Side (2,Low)	x	x
Stoughton	Stoughton	Relocated	636	Side (2)	x	x
North Easton	Easton/Stoughton	New	501	Center Island	x	x
Easton Village	Easton	New	0 <sup>2</sup>	Side	x	x
Raynham Park	Raynham	New	432	Center Island	x	x
Taunton	Taunton	New	210	Side	x	-
Taunton Depot	Taunton	New	398	Center Island	x	x
Freetown	Freetown	New	173	Side	x	x
Fall River Depot	Fall River	New	528	Side	x	x
Battleship Cove	Fall River	New	0 <sup>2</sup>	Side	x	x
King’s Highway	New Bedford	New	360 <sup>3</sup>	Side	x	x
Whale’s Tooth	New Bedford	New	748	Side	x	x
Dana Street	Taunton	New	477	Side	-	x
TOTAL – NEW STATIONS					10	10
TOTAL – MODIFICATIONS TO EXISTING STATIONS					2	2

- 1 Existing lot
- 2 Pick up/Drop off only
- 3 Shared parking
- 4 All platforms are single high-level unless denoted otherwise

**1.4.11 Layover Facilities**

Midday Facilities - The South Coast Rail project would require midday storage in the Boston area, anticipated to be constructed as part of the South Station Expansion Project. The South Station Expansion Project and the need for increased layover facility capacity near South Station is independent of the South Coast Rail Project.

Overnight Layover Facilities - Both of the commuter rail alternatives would require overnight layover facilities along the Fall River Secondary and New Bedford Main Line.

The DEIS/DEIR identified five alternative sites for overnight layover facilities. Church Street and Wamsutta sites were identified on the New Bedford Main Line, and the ISP Site, Weaver’s Cove East, and Weaver’s Cove West were identified on the Fall River Secondary. The DEIS/DEIR did not identify a preferred site on either branch. Subsequent to the DEIS/DEIR, the alternative sites were reviewed and recommended sites identified on each branch, as documented in the February 2012 Layover Facility Site Selection (provided in Appendix 3.2-E).

On the New Bedford Main Line, Wamsutta was considered the most favorable location to site a New Bedford layover facility as it has less environmental impact than the Church Street site from the perspective of land acquisition, tax revenue loss, wetlands, and hazardous materials. Wamsutta would also be operationally more efficient with its close proximity to the terminal station, saving the project roughly \$500,000 annually.

On the Fall River Secondary, Weaver’s Cove East was considered the most favorable location for a Fall River layover facility as it has the least environmental impacts of the Fall River sites with the fewest land acquisition requirements, wetland impacts, impacts to cultural resources and to wild and scenic rivers, and from the perspective of encountering hazardous materials. Weaver’s Cove East would also be operationally more efficient than the ISP site with its close proximity to the terminal station, saving the project roughly \$500,000 annually.

**1.4.12 Cost**

The estimated capital costs for the rail alternatives are presented as incremental funding needs over a 30-year period, a typical financing period. Capital equipment costs are presented as the incremental cost of the life of the equipment as defined by FTA guidelines. The net result of this analysis is the identification of the annual funding requirements above and beyond the costs already programmed for the horizon year (No-Build Alternative).

Table 1.4-10 provides a summary of the cost estimate and analysis for the Stoughton Electric Alternative. The Whittenton Alternative would have a similar cost. Based on the O&M cost estimates developed for the DEIS/DEIR the Diesel Alternatives would be approximately 30 percent lower than the Electric Alternatives.

The Operations and Maintenance Cost (O&M) was calculated for the Stoughton Electric Alternative. This calculation was based off of updated projected service for 2030. The total amount in 2012 dollars is \$33,914,000. The O&M cost for the Whittenton Alternative would be \$36,210,000. The Whittenton Alternative would have a similar, but somewhat greater cost due to its increased track length. Based on the O&M cost estimates developed for the DEIS/DEIR, the Diesel Alternatives would be approximately three percent lower than the Electric Alternatives.

**Table 1.4-10 Stoughton Electric Alternative Capital Cost Summary**

Item	
Total Infrastructure Cost	\$1,090,568,000
Real Estate Cost	\$52,430,000
Professional Services Cost	\$147,767,000
Contingency	\$345,700,000
Vehicle Cost	\$180,970,000
<b>Total</b>	<b>\$1,817,435,000</b>

Notes: Total infrastructure costs were estimated in 2012 dollars.  
 Professional services are 13.55 percent of infrastructure costs without contingency. Professional services include Design, Permitting, Construction Phase Inspection & Project Management.  
 Contingencies are 31.70 percent of infrastructure costs and include Indirect Soft Costs, Mitigation Contingency, and Construction Contingency.  
 Escalation was calculated at 3.25 percent per year per FTA criteria.

**1.5 SUMMARY OF ENVIRONMENTAL IMPACTS AND MITIGATION**

This section summarizes the adverse and beneficial impacts of the alternatives and the mitigation measures that would be implemented for each resource category, where applicable. For additional and more detailed information on the impacts and mitigation measures, refer to Sections 4.1 through 5.0 of

the FEIS/FEIR. Table 1.5-1 at the end of this Executive Summary provides a summary of direct permanent impacts for all alternatives and resources.

### **1.5.1 Transportation**

#### **1.5.1.1 Ridership**

Increased transit ridership is an important indicator of beneficial transportation effects of an alternative and given the purpose of the project also a measure of how well an alternative would be able to meet existing and future demand for public transportation between Fall River/New Bedford and Boston. The rail alternatives would result in 5,670 to 5,240 daily transit boardings in the South Coast region (commuter rail boardings at new stations plus existing commuter bus service boardings). Due to a faster travel time to Boston, the Stoughton Alternatives achieve greater ridership in the Southern Triangle than the Whittenton Alternatives. For example, the Stoughton Electric would have 840 daily boardings at Fall River Depot compared to 750 under the Whittenton Electric Alternative.

The Whittenton Alternatives ridership is also less than the Stoughton Alternatives because the Whittenton alignment does not include the Taunton Station, which has 670 daily boardings under the Stoughton Electric Alternative. The Whittenton Alternative station closest to downtown Taunton (Dana Street) has substantially lower ridership (320 daily boardings under the electric alternative).

#### **1.5.1.2 Travel Times**

Since New Bedford/Fall River commuters currently rely on cars and private bus services, an improved quality of service would have to provide a comparable or competitive travel time and improved reliability with respect to existing commuter options during peak commuting periods. The average commuting time by car during rush hour in 2009 was 90 minutes and travel time by car is projected by CTPS to deteriorate further to 100-120 minutes under the No-Build scenario. There would be no measurable change in travel time by car under the Build Alternatives because due to the saturated nature of the corridor, any trips that shift to rail with the Build Alternatives would be replaced and would result in no change to travel time by car. Travel time for the rail alternatives was based on rail operations analysis, which identified the segments of the rail corridors that would 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. Each commuter rail alternative has two overall run times: one for electric locomotives and one diesel locomotives. The primary factor differentiating the travel time performance of the electric vs. diesel option is the greater acceleration time for diesel trains.

The Stoughton Electric Alternative achieves the fastest travel times (77 minutes between New Bedford and Boston during the peak period). The Stoughton Diesel Alternative takes approximately six minutes longer than the electric alternative to travel the same route because of the additional time diesel locomotives need to accelerate from the stations.

The longer route, and the lower speed needed to maintain safety on the sharp curves in Taunton under the Whittenton Electric Alternative, results in a total travel time approximately seven minutes longer than the Stoughton Electric Alternative (84 minutes compared to 77 minutes). The Whittenton Diesel Alternative takes 6.5 minutes longer to travel from New Bedford to Boston than the Whittenton Electric Alternative and has the longest travel time of the rail alternatives.

### 1.5.1.3 Vehicle Miles Traveled

Reduction in vehicle miles traveled (VMT) as a result of implementing an alternative is an important indicator of beneficial effect of an alternative on the transportation system, as it enhances the transportation system by reducing travel on roadways through shifting trips from automobile to train or bus. Reductions in driving have several environmental benefits, notably cleaner air and fewer greenhouse gas emissions. Fewer cars on the road also eases congestion along highway corridors, resulting in time benefits.

The Stoughton Electric Alternative achieves the greatest reduction in regional daily vehicle miles traveled of all the Build Alternatives, approximately 54,700 VMT per day greater than the Whittenton Electric Alternative. The Stoughton Diesel Alternative has the second greatest VMT reduction, approximately 6.5 percent less than the Stoughton Electric Alternative. With the longest travel time and lowest ridership, the Whittenton Diesel Alternative is also the least effective of the rail alternatives in reducing regional VMT, although it still provides substantial benefits (reduction of 186,306 vehicle miles traveled per day when compared to the 2035 No-Build condition).

### 1.5.1.4 Intersection Traffic Impacts

The rail service proposed as part of each of the Build Alternatives would affect traffic patterns, particularly in the vicinity of new stations. To varying degrees, all rail alternatives resulted in traffic impacts substantial enough to warrant mitigation. Traffic mitigation measures are proposed at 35 impacted intersections under the Stoughton Alternatives and 32 impacted intersections under the Whittenton Alternatives.

#### Mitigation for Intersection Traffic Impacts

Traffic impacts will be addressed through mitigation measures including new traffic signals, traffic signal timing adjustment and addition of turning lanes.

### 1.5.1.5 Railroad At-Grade Crossing Impacts

Railroad at-grade crossings have the potential to cause traffic impacts due to excessive queuing and traffic spillback while the crossing is closed in order to let a train pass. The Whittenton Alternatives would require the largest number (50) of new or reconstructed railroad at-grade crossings. The Stoughton Alternatives would require (43) of new or reconstructed grade crossings. Traffic analyses conducted for the new or reconstructed alternatives indicated that none of the rail alternatives would result in unmitigatable impacts due to excessive queuing and spillback of traffic.

#### Mitigation for At-Grade Crossing Traffic Impacts

Traffic impacts will be mitigated by roadway reconfigurations and traffic flow improvements. All existing grade crossings to remain and all reactivated crossings would be equipped with new, state-of-the-art Automatic Highway Crossing Warning (AHCW) systems.

## 1.5.2 Land Use and Zoning

The Build Alternatives would all require property acquisitions outside existing rights-of-way to accommodate the new stations and rail infrastructure or bus lanes. The total acreage of property acquisition impacts of the Stoughton Electric Alternative (136.7 acres) and Whittenton Electric Alternative (136.8 acres) are nearly identical. The diesel versions of the rail alternatives result in 2.2

fewer acres of impact because of the lack of need for traction power substations, which would be required with the electric alternatives. Property acquisitions and compensation of affected property owners would be conducted in accordance with federal and state requirements.

### 1.5.3 Socioeconomics

#### 1.5.3.1 Residential and Business Displacements

Property acquisitions associated with the Stoughton Electric Alternative would require 4 residential displacements and six business displacements. Based on average household size in the affected communities, nine persons would be relocated. Job losses are expected from business displacements resulting from acquisition of privately owned commercial buildings. Based on a review of residential and commercial property availability,<sup>10</sup> communities that would be impacted by residential displacements or business displacements have sufficient real estate capacity to absorb these displacements. Affected property owners would be provided compensation/relocation assistance in accordance with federal and state requirements.

The Stoughton Diesel Alternative would be comprised of the same elements as the Stoughton Electric Alternative, but would not need electrical infrastructure. The property acquisitions needed for the Stoughton Diesel Alternative are therefore 2.2 acres smaller than for the Stoughton Electric Alternative. The other effects to the social and economic environment that would result from the Stoughton Diesel Alternative (such as property acquisitions for stations, layover facilities, right-of-way, property tax revenue loss, residential and business displacements) are identical to those that would result from the Stoughton Electric Alternative.

The Whittenton Electric Alternative would require 3 residential displacements and 6 business displacements. Based on average household size, nine persons would be relocated. Job losses are expected from business displacements resulting from acquisition of privately owned commercial buildings, but are not quantifiable at this time. Based on a review of residential and commercial property availability, communities that would be impacted by residential displacements or business displacements have sufficient real estate capacity to absorb these displacements. Affected property owners would be provided compensation/relocation assistance in accordance with federal and state requirements.

The Whittenton Diesel Alternative would be comprised of the same elements as the Whittenton Electric Alternative but would not need electrical infrastructure; thus the property acquisitions needed for the Whittenton Diesel Alternative would be somewhat smaller than for the Whittenton Electric Alternative. The other effects to the social and economic environment that would result from the Whittenton Diesel Alternative are identical to those that would result from the Whittenton Electric Alternative.

#### 1.5.3.2 Property Tax Revenue Loss

Property tax revenue losses as a result of the Stoughton Electric Alternative are estimated at \$197,251 per year, in 2009 dollars; additional property tax revenue losses may result from small and/or partial acquisitions. Property tax revenue losses as a result of the Whittenton Electric Alternative are relatively less and are estimated at \$181,351 per year, in 2009 dollars; additional property tax revenue losses may

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<sup>10</sup> Online research of residential real estate property availability conducted by reviewing current listings of similar homes (based on zoning of affected properties) in the affected communities at [www.realtor.com](http://www.realtor.com). Commercial real estate vacancy rates conducted by telephone inquiries to chambers of commerce in the affected communities.

result from small and/or partial acquisitions that were not estimated. The direct property tax revenue losses for affected communities would be insignificant as compared to the total property tax receipts for each town.

### **1.5.3.3 Neighborhood Fragmentation**

Moderate neighborhood fragmentation is expected to result from implementation of the Stoughton Electric Alternative. Along the inactive portion of the Stoughton Line, some residential and commercial activity encroachment into the right-of-way has occurred in Stoughton, Easton, Taunton, and Raynham. The railroad has been out of service for some 50 years between Stoughton Station and Raynham Junction, and nearly 100 years between Raynham Junction and Longmeadow Street in Taunton. Over time, some neighborhoods on either side of the alignment have developed continuity across the inactive railroad bed as residents have used the alignment for pedestrian transit to neighbors or commercial districts within walking distance. Re-establishing rail service would include safety fencing along the railroad right-of-way through high-density residential and commercial districts, preventing such informal use of the railroad bed as a path. Additionally, motorists, pedestrians, and bicyclists would be temporarily delayed at at-grade railroad crossings when trains pass, potentially disrupting car-based transit between neighborhoods.

Moderate neighborhood fragmentation is also expected to result from implementation of the Whittenton Electric alternative. Neighborhood fragmentation within the Stoughton Line portion would be similar to that described for the Stoughton Alternative. The inactive Whittenton Branch has been out of service for some 50 years. However, neighborhoods on either side of the alignment do not appear to have developed substantive continuity across the inactive railroad bed, partially due to the industrial nature of parcels on either side of the corridor, and partially because portions of the corridor in residential areas are located in a cut section with steep-sided banks, wherein disposal of yard waste and other refuse (rather than pathways to promote neighborhood continuity) has been the primary use of the embankment. Motorists, pedestrians, and bicyclists would be temporarily delayed at at-grade railroad crossings when trains pass, but this effect is not expected to impact continuity among neighborhoods along the Whittenton Branch.

### **1.5.4 Environmental Justice**

Adverse effects to environmental justice populations that would result from the South Rail project are similar for all applicable resource topics with the exception of noise and vibration. Among the rail alternatives, the Whittenton Alternatives would impact the greatest number of residences, and the Stoughton Alternatives the least. Additionally, a greater percentage of noise impacts would be experienced by designated environmental justice populations under the Whittenton Alternatives than the Stoughton Alternatives. Under all rail alternatives and on a regional level, adverse noise impacts would not be disproportionately borne by state-listed environmental justice communities. However, on the municipal level, the analysis concludes that state-listed environmental justice populations in Fall River would experience disproportionately high and adverse noise impacts as compared to non-environmental justice populations. This impact would be addressed through mitigation, specifically a combination of noise walls and building sound insulation.

Vibration impacts would be experienced across the region in both designated and non-designated environmental justice communities. Overall, adverse impacts would not be predominately borne by designated environmental justice communities under the Stoughton or Whittenton Alternatives. At the local level, designated environmental justice communities would experience a disproportionately high

share of vibration impacts in Fall River under both the Stoughton and Whittenton Alternatives. Environmental justice communities in Taunton would experience a disproportionately high share of vibration impacts under the Whittenton Alternatives. Identified mitigation measures would be able to offset these impacts. There are also benefits associated with the rail alternatives that would be recognized by all populations regardless of designation. Increased access would reduce travel times to Boston and other employment centers. Average travel time savings from Fall River, Taunton, and New Bedford are greatest under the Stoughton Electric Alternative, followed by the Whittenton Alternative which would improve travel times by 14 percent. The Stoughton Electric Alternative also represents the greatest travel time savings to colleges and hospitals. The Whittenton Diesel Alternative typically represents the least travel time savings of the rail alternatives.

The beneficial effects to environmental justice populations that would result from the South Coast Rail project vary considerably by alternative and community. Property values in environmental justice neighborhoods near stations may increase as a result of improved access to transit and subsequent TOD. If property values get too high, environmental justice populations may be priced out of their current locations. Conversely, property values in environmental justice neighborhoods along the alternative alignments may decrease as a result of increased noise from train operations. Overall, impacts to environmental justice populations due to property value changes are possible, but are too uncertain to predict precisely. 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. Because the impact is speculative and the mitigation measures are beyond the authority of USACE or MassDOT to implement, no mitigation for displacement/gentrification impacts is proposed. Measures local governments can enact to preserve affordable housing in the vicinity of station areas are identified in Section 4.4.3.3.

### **1.5.5 Visual Resources**

The overall impacts to visual and aesthetic resources resulting from improving or constructing the Build Alternatives would not vary considerably between the alternative alignments. Although all alternatives are rated with an overall moderate visual impact, each alternative alignment has at least one element with a substantial visual impact at the local level. The Stoughton and Whittenton Alternatives would substantially impact the visual character in the vicinity of the historic district and historic train depot in Easton, and in currently out-of-service segments of the Stoughton Line and Whittenton Branch for some 15 miles. Public views of the proposed 1.6-mile trestle would be limited throughout the Hockomock Swamp wildlife management area and would have a visual impact; however there is limited public access to this area. All Build Alternatives would have moderate beneficial impacts at the Fall River Depot Station due to new station construction in a developed area; the Stoughton Alternatives would have an additional moderate beneficial impact at Taunton Station. Electric alternatives would have higher visual impacts than diesel alternatives due to the electrical infrastructure requirements (i.e., overhead catenary system and the traction power facilities).

#### **1.5.5.1 Mitigation for Visual Impacts**

Generally, mitigation is appropriate where facilities are most visible and present a change to the existing visual environment, but are not outweighed by safety considerations. Mitigating impacts to the visual environment generally involves screening a facility or structure, or blending its design with the surrounding environment.

The proposed visual mitigation measures include siting and designing facilities to minimize changes to the visual landscape, and minimizing vegetation removal along the right-of-way. Mitigation measures such as screening and light minimization would be incorporated during preliminary or final design.

Screening and design methods could successfully reduce and mitigate some potential visual impacts to properties associated with the reactivation of any of the historic railroads for the South Coast Rail project. Impacts would be minimized by siting the power substations and stations where they would reduce changes to the visual landscape, and lighting has been selected to minimize night-sky impacts. However, visual impacts cannot be completely avoided for any alternative.

### 1.5.6 Noise

The Stoughton Electric Alternative (Stoughton, Southern Triangle - Fall River, and Southern Triangle - New Bedford segments) would result in 1,106 moderate and 341 severe impacts to residential receptors (excluding horn noise). The diesel operations would have similar impacts, with 1,085 moderate and 344 severe impacts.

The Whittenton Electric Alternative (Stoughton partial, Whittenton, Southern Triangle - Fall River, and Southern Triangle - New Bedford segments) would result in 1,232 moderate and 381 severe impacts to residential receptors (excluding horn noise). The diesel operations would have lower impacts, with 1,228 moderate and 367 severe impacts.

Train horns along the Stoughton Alternative would have 628 moderate and 689 severe impacts. The Whittenton Electric Alternative would result in the train horns producing 1,019 moderate and 1,322 severe impacts. The Whittenton alternative results in the highest railroad grade crossing noise impacts.

The No-Build Alternative would not result in any noise impacts.

#### 1.5.6.1 Mitigation for Noise Impacts

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 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 wall or other measure is less than \$30,000 per dwelling unit, and the wall is found to be effective in reducing noise levels below the impact threshold.

The MBTA will initially evaluate the severe impact locations to determine if a noise barrier can be provided. Where noise barriers are not cost-effective by the above standard, or where noise barriers cannot provide a sufficient level of noise reduction, the MBTA will consider providing funding for building noise mitigation. The cost-effectiveness limit for building noise mitigation will 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 the Stoughton Electric Alternative, severe noise impact locations were evaluated to identify the potential noise mitigation measures. A noise analysis was performed in order to develop the Stoughton Electric Alternative Noise Mitigation Plan (NMP) and found that a noise barrier would be the most cost-effective mitigation measure at four locations. In total, 5,500 linear feet of noise barriers costing \$1.65 million are proposed for the Stoughton Electric Alternative. For the remaining severely impacted

sensitive receptor locations, building insulation is the most cost-effective noise mitigation for reducing the noise impact associated with the rail operations along the Stoughton Electric Alternative.

A detailed NMP has not been developed for the Stoughton Diesel, Whittenton Electric or Whittenton Diesel Alternatives. As these alternatives would result in noise impacts in many of the same locations as the Stoughton Electric Alternative, noise barriers similar to those described for the Stoughton Electric Alternative would likely be feasible. Building insulation would be used to address severe impacts in locations where noise barriers are not cost effective.

An option for reducing train horn noise impacts under FRA regulations (49 CFR Parts 222 and 22) would be to establish “quiet zones” at grade crossings. In a quiet zone, train operators would sound horns only in emergency situations rather than as a standard operational procedure because of safety improvements made to the at-grade crossings. Establishing a quiet zone requires cooperative action among the municipalities along the rail right-of-way, freight railroads and appropriate federal, state and local agencies. 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 mitigation (eliminating all or nearly all horn noise impacts), considerable design analysis and coordination efforts would be required to determine their feasibility. MassDOT is not recommending quiet zones and the implementation of quiet zones is not within the control of USACE because the application to FRA must be made by the affected local governments.

Noise impacts may still be present after the NMP proposed noise mitigation measures have been finalized. Noise walls can provide a maximum of approximately 10 dBA noise reduction, and usually protect only the yards and ground level floors. Building noise insulation (soundproofing) can provide 10 to 15 dBA of additional exterior-to-interior noise reduction, but does not mitigate exterior noise and the building’s windows must remain closed to maintain effectiveness.

### **1.5.7 Vibration**

Vibration impacts of the Build Alternatives reflect annoyance and would not rise to a level considered to cause structural damage. The vibration impacts from the Build Alternatives are similar because they follow the same track alignment for most of the corridor, except for the section between the Whittenton Branch turnout (Raynham Junction) and Weir Junction. Based on the vibration impact assessment results, the Stoughton Alternatives would impact 369 residences, while 417 residential impacts would occur under the Whittenton Alternatives. The Whittenton Alternatives result in 48 more impacted receptors, with the Attleboro Secondary segment of the Whittenton Alternatives being the primary cause of the greater impacts.

The bus services added as part of the No-Build Alternative would not generate vibration levels sufficient to cause human annoyance.

#### **1.5.7.1 Mitigation for Vibration Impacts**

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. MBTA has developed a noise mitigation policy that is consistent with the FTA guidance and 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.

Several mitigation measures were assumed to be incorporated in the project design and were included in the vibration modeling analysis:

- Use of continuously welded rail to minimize vibrations caused by wheels impacting rail joints.
- Ballast (the crushed rock under the tracks) and sub-ballast (gravel base) will be emplaced to standard depths established by the MBTA to reduce transmission of vibration from the tracks to the ground.
- Turnouts will be located at least 100 feet away from homes and other sensitive buildings, to minimize higher vibration levels due to passage of wheels over the gap in turnout frogs.
- Trains and track will be maintained in such a manner as to minimize vibration generated by the trains, including regular wheel re-truing to eliminate wheel flats.

Additional mitigation measures, such as ballast mats (rubber mats placed under the ballast) will be provided where vibration mitigation is justified, and soil conditions are appropriate, as determined by on-site inspection of each potential mitigation location. Ballast mats, which can give vibration reductions of between 3 and 10 VdB, are very effective in attenuating frequencies of greater than 100 Hz found in vibrations near the source, and for track-receptor geometries traveling through dense soil and rock. The vibration analysis identified a total of 369 residences likely to be impacted by the Stoughton Electric Alternative. Based on the length of the ballast mat, and the cost of this mat at \$180 per track foot, a mitigation price was determined for each receptor location. As discussed above, only cost-effective mitigation measures under \$30,000 were considered. Of the total impacted receptors, 296 (39 locations) were considered to be cost-effective for vibration mitigation. Approximately 33,350 linear feet of ballast mat would be required along the rail corridor at a cost of approximately \$6,003,000. The use of “frogs” (sections of railroad track at a switch that guide rail car wheels from one track to the other) with spring-loaded mechanisms, rather than conventional frogs, would eliminate the impact at the receptor located within 225 feet of the switch at Weir Junction.

Along shared segments, the vibration mitigation under the Whittenton Alternatives would be the same as described above for the Stoughton Alternatives (e.g. Southern Triangle and portion of Stoughton Line). For the Whittenton Branch and Attleboro Secondary portions of the Whittenton Alternatives, a total of 6,300 feet of ballast mat costing \$1,134,000 was found to be cost effective for these segments.

### 1.5.8 Cultural Resources

The rail alternatives would all result in direct adverse effects to five above-ground historic properties, including one National Historic Landmark (specifically, the existing Old Colony Railroad Station which is part of the H.H. Richardson National Historic Landmark, located in North Easton). The electric versions of the alternatives would result in greater visual indirect effects to historic resources than the diesel versions because of the overhead electrical infrastructure and traction power substations required for the electric alternatives. The Stoughton Alternative could impact ten known archaeological sites that are eligible for the National Register (NR), compared to eleven archaeological sites under the Whittenton Alternatives.

Each of the alternatives would also have the potential to affect as yet to be determined archaeological resources and areas of archaeological sensitivity (which would require further investigation to determine if archaeological resources were present).

Based on a comparison of the results of the Intensive Archaeological Survey on the Stoughton Line between Route 138 and Weir Junction, and the Whittenton Alternatives within the same section, the Whittenton Alternatives would have greater impacts to archaeological resources recommended as eligible for the National Register.

The Stoughton Alternatives in this section would likely affect three sites: the King Philip Street Site and the Chickering Road site, and the East Britannia Street Site. Each of these sites yielded a low density of quartz chipping debris and other stone tools (a broken rhyolite point tip and an argillite cobble cortex, and a quart scraper). These three sites show evidence of stone tool manufacturing/maintenance.

The Whittenton Alternatives in this section would affect three sites near the northern end of the Whittenton Branch: the Mel's Diner Site, Brown Couch Site, and ATV Site. Each of these yielded a low density of quartz chipping debris, and one granite hammerstone. These sites appear similar to the Pine Swamp sites.

More importantly, the Whittenton Alternatives would likely affect the Cedar Swamp Site, potentially related to a known village site. The Cedar Swamp Site yielded a more complex array of pre-contact materials, including quartz chipping debris, an argillite flake, a chert flake, fire-cracked rock, and a "bowl-shaped cultural feature" potentially associated with a hearth.

Based on this information, the Whittenton Alternatives are likely to have greater adverse effects to cultural resources eligible for listing in the National Register of Historic Places pursuant to Section 106 of the National Historic Preservation Act than do the Stoughton Alternatives.

#### **1.5.8.1 Mitigation for Cultural Resources Impacts**

Mitigation measures may be considered to avoid, minimize or mitigate the potential impacts on historic and archaeological resources resulting from the implementation of the South Coast Rail project alternatives. Avoidance is the preferred response when an adverse effect is determined. Adverse effects can only be avoided for the No-Build Alternative, which does not meet the project purpose. Neither of the Build Alternatives can entirely avoid direct impacts to archaeological and above-ground resources. Minimization of impact to historic properties or archaeological resources would 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 setting, and would be addressed in the Adverse Effects documentation for each individual resource.<sup>11</sup>

The proposed project likely would result in unavoidable impacts to significant cultural resources that cannot be addressed through avoidance or minimization. Mitigation through data recovery and other approaches discussed below may include more than one action. The Adverse Effects documents prepared in support of the Programmatic Agreement (Appendix 4.8-A) will outline the mitigation

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<sup>11</sup> The Adverse Effects documentation for an individual archaeological site, historic property, or district has to describe the option(s) selected to minimize impact; and has to contain a discussion about the direct/indirect effects of the option on other archaeological sites, districts, and/or historic properties in the option's Area of Potential Effect (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.

approaches that will be taken for each cultural resource including districts. The Adverse Effects documents are commonly referred to as Data Recovery Plans (DRP) for archaeology and Treatment Plans for above-ground historic properties. The plans would be developed after all stages of intensive (locational) survey and, as needed, evaluative testing are completed and the results of the investigations evaluated by the applicable consulting parties.

Specific mitigation commitments for cultural resources will be informed by additional, more detailed archeological survey fieldwork and additional design detail for the preferred alternative and consultation with the applicable consulting parties (including, but not limited to, federal agencies such as the Advisory Council on Historic Preservation, federally recognized Indian Tribes, and the Massachusetts State Historic Preservation Office). In general, the types of mitigation measures that will be considered for above-ground historic resources include engineering methods that reduce noise generation or vibration, and visual barriers that help to minimize aesthetic impacts. For unavoidable adverse impacts, mitigation through data recovery, treatment plans, photographic documentation or other approaches will be considered.

### **1.5.9 Air Quality**

All alternatives comply with the Clean Air Act Amendments (CAAA) and the Executive Office of Energy and Environmental Affairs (EEA) policy on Greenhouse Gas emissions. The ozone mesoscale analysis demonstrated that the Build Alternatives would result in a decrease of volatile organic compounds (VOC) and nitrogen oxides (NO<sub>x</sub>) emissions (precursor emissions to the formation of ground level ozone or smog), as compared to the No-Build Alternative.

The Alternatives would incorporate reasonable and feasible mitigation measures to reduce carbon dioxide (CO<sub>2</sub>) and greenhouse gas (GHG) emissions consistent with DEP guidelines. All Build Alternatives meet the EEA policy on GHG emissions because they include mobile and stationary source mitigation measures that will reduce the GHG emission from levels expected from a project without mitigation.

#### **1.5.9.1 Mesoscale Analysis Results**

The air quality study included a mesoscale analysis that estimates the area wide emissions of VOC, NO<sub>x</sub>, CO<sub>2</sub>, carbon monoxide (CO), and particulate matter (PM) emissions. The mesoscale analysis calculated the 2035 mobile source emissions from the major roadways in the study area as well as train emissions.

All rail alternatives would reduce emissions of NO<sub>x</sub>, CO, and CO<sub>2</sub>, in comparison to the No-Build Alternative. All of the rail alternatives have a negligible effect on particulate matter emissions. The electric alternatives all have lower emissions than the corresponding diesel alternative for all of the pollutants. This difference is most notable for NO<sub>x</sub>, where the emissions for the electric alternative are substantially less than the corresponding diesel alternative (due to the higher NO<sub>x</sub> output related to the locomotives burning diesel fuel). The Stoughton Electric Alternative generally results in the greatest reduction in emissions, consistent with the greatest estimated reduction in VMT.

#### **1.5.9.2 Microscale Analysis Results**

The air quality analysis evaluated the potential for impact of motor vehicles and train locomotives on hotspot locations around stations. Hotspot locations are typically congested intersections. The microscale analysis followed EPA guidelines and included motor vehicle and train emissions to calculate worst-case concentrations.

The trains that will be used on the rail alternatives could be electric or diesel. The electric trains do not emit air pollutants and will not contribute to air quality impacts on receptor locations. The microscale analysis, which typically focuses on motor vehicle emissions, added the emissions of the diesel commuter rail trains to the intersection receptor locations to calculate the highest concentrations of CO, PM<sub>10</sub>, and PM<sub>2.5</sub> (representing a worst-case condition). All of the pollutant concentrations are below (in compliance with) the National Ambient Air Quality Standards (NAAQS). The rail alternatives would not substantially change any of the concentrations of CO, PM<sub>10</sub>, and PM<sub>2.5</sub>.

The results demonstrate that all alternatives will meet the NAAQS for CO, PM<sub>10</sub>, and PM<sub>2.5</sub>. The worst-case modeling results indicate that the alternatives will not cause any new violation of the NAAQS, increase the frequency or severity of any existing violations, or delay attainment of any NAAQS.

### 1.5.9.3 Greenhouse Gas Emissions

The EEA has developed a policy that requires project proponents to identify and describe the feasible measures to minimize GHG emissions. The policy requires quantification of the project's direct and indirect GHG emissions and identification of measures to avoid, minimize, or mitigate such emissions.

The air quality analysis evaluated the motor vehicle and train locomotive GHG emissions and discussed a commitment to using train engine plug-ins and electric block heaters at layover facilities. All Build Alternatives represent a GHG mitigation measure because they are all designed to reduce VMT. All Build Alternatives will reduce GHG emissions as compared to the No-Build conditions. Of the Build Alternatives, the Stoughton Electric Alternative would have the greatest GHG reduction benefit at 60,859 tons of carbon dioxide per year, followed by the Whittenton Electric Alternative at 49,490 tons of carbon dioxide per year. The diesel alternatives would be less effective than the electric alternatives in reducing greenhouse gas emissions, with the Stoughton Diesel and Whittenton Diesel reducing 2035 carbon dioxide emissions by 29,166 and 14,164 tons/year, respectively.

### 1.5.9.4 Air Toxics

Mobile sources emit "hazardous air pollutants" or air toxics that can cause cancer and other serious health effects. The air quality study qualitatively evaluated the potential for impact due to mobile source air toxics (MSAT).

For each alternative, the amount of MSATs emitted would be proportional to VMT, assuming that other variables such as fleet mix are the same for each alternative. The VMT estimated for each of the Build Alternatives are lower than that for the No-Build Alternative, because any of the South Coast Rail alternatives will remove vehicles (and therefore reduce VMT) from the study area roadways by shifting mode choice to public transportation (i.e. the South Coast Rail). This reduction in VMT would lead to lower MSAT emissions for the Build Alternatives. The differences in VMT between the various alternatives will result in similar differences in the MSAT emissions.

Based on an FHWA analysis using EPA's MOVES2010b model even if national VMT increases by 102 percent as assumed from 2010 to 2050, a combined reduction of 83 percent in the total annual emissions for the priority MSAT is projected for the same time period.<sup>12</sup> Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures. However, the magnitude of the EPA projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the study area are likely to be lower in the future in all cases.

<sup>12</sup> [http://www.fhwa.dot.gov/environment/air\\_quality/air\\_toxics/policy\\_and\\_guidance/aqintguidmem.cfm](http://www.fhwa.dot.gov/environment/air_quality/air_toxics/policy_and_guidance/aqintguidmem.cfm)

### 1.5.10 Protected Open Space and Areas of Critical Environmental Concern

The South Coast Rail project alternatives would use existing railroad or highway alignments to the maximum extent possible, avoiding or minimizing impacts to protected open spaces. Where property acquisition of protected open spaces is necessary, direct mitigation will be required. Once the preferred alternative is selected and final design completed, such direct mitigation would be negotiated with the affected entity.

The area of protected open space and publicly owned parcels within Areas of Critical Environmental Concern (ACECs) required for improving or constructing the project is very similar among the alternatives. For all alternatives, the overall impact (0.16 acre) would be small relative to the total area of protected open space within the South Coast Rail Project area. All of the alternatives would impact considerably less than 0.01 percent of the total area of protected open space.

Legal access to protected open spaces and Areas of Critical Environmental Concern (ACECs) would not be significantly impacted by constructing, reconstructing, or using the railroad alignments, stations, or layover facilities. Current but unauthorized access to protected open space and the Hockomock Swamp ACEC via the MBTA-owned, out-of-service portion of the Stoughton Line would cease.

The No-Build Alternative would not require any new construction or land acquisition and would not directly affect protected open spaces and/or ACECs.

#### 1.5.10.1 Mitigation for Impacts to Protected Open Space and Areas of Critical Environmental Concern

The South Coast Rail project alternatives would use existing railroad or highway alignments to the maximum extent possible, avoiding or minimizing impacts to protected open spaces. Where property acquisition of protected open spaces is necessary, direct mitigation will be required. Once the final design is completed, such direct mitigation would be negotiated with the affected entity.

### 1.5.11 Farmland Soils

Based on the conservative assessment used to complete the Natural Resources Conservation Service (NRCS) forms, no significant impacts are anticipated for designated farmland soils that would be altered by this project. Note that farmland soils as defined by NRCS are unrelated to the land use of the affected properties—farmland soils can exist in areas where no active farming is occurring. Impacts for each alternative to farmland soils are as follows:

- Stoughton Electric Alternative would result in impacts to 18.6 acres of designated farmland soils;
- Stoughton Diesel Alternative would result in impacts to 16.0 acres of designated farmland soils;
- Whittenton Electric Alternative would result in impacts to 18.8 acres of designated farmland soils;
- Whittenton Diesel Alternative would result in impacts to 16.2 acres of designated farmland soils

Using the USDA scoring system, impacts to farmland soils under all Build Alternatives would not be considered significant under the Farmland Protection Policy Act, and mitigation for these losses would not be required.

#### **1.5.12 Hazardous Materials**

Each of the build alternatives under consideration would require acquisition of properties with Recognized Environmental Conditions (RECs; sites with the presence or likely presence of hazardous materials) that would require further investigation. In each case, remediation or soil/groundwater management during construction could be required. The Stoughton, and Whittenton Alternatives each have at least five high impact RECs that were identified, and these alternatives also have the potential to encounter soil or groundwater contamination. Taunton Station on the Stoughton Alternatives, and Dana Street on the Whittenton Alternatives have three and one high impact RECs, respectively, that were identified. Overall, a greater number of RECs were identified for the Whittenton Alternatives (32) than for the Stoughton Alternatives (29).

The Stoughton Alternatives and the Whittenton Alternatives would have environmental benefits. Although sites containing RECs could increase construction costs, there would be an environmental benefit associated with remediating contaminated sites, particularly the station sites with known soil and groundwater contamination such as the Taunton Station site. The alternatives that would have the greatest environmental benefits are the alternatives with the most RECs (i.e., Stoughton Alternatives) since these properties are the most likely to have contaminated environmental media that would be cleaned up for the proposed South Coast Rail project.

Both layover sites would involve acquisition of properties with RECs. Five RECs were identified at the Wamsutta site, none of which are high impact RECs. Five RECs, two of which are high impact RECs, were identified for the Weaver's Cover East Site.

The spill or release of Oil or Hazardous Materials (OHM) in the process of constructing the South Coast Rail project is an unlikely event, and measures would be required to prevent and control any such spills. The construction contractors would implement a Spill Control Program in compliance with the Massachusetts Contingency Plan (310 CMR 40.0000, "the MCP") and MBTA policy. These measures would be employed both at the rail reconstruction sites and station construction sites.

#### **1.5.13 Geology**

Soil and rock affected by the Build Alternatives would be excavated and disturbed during construction. Once a Build Alternative is operational, no further potential long-term impacts to the underlying bedrock geology or soils would be anticipated due to the elements of the Build Alternatives.

None of the Build Alternatives would require tunneling or other deep excavation that would significantly affect geological conditions. Most disturbance activities would encompass a relatively small area within or adjacent to previously disturbed areas and infrastructure. These include active rail and out-of-service rail beds (Stoughton line and Whittenton Branch) that have previously been established to be compatible with subsurface conditions. No long-term changes to geologic structures or faults, to bedrock, soils, or geologic stability, to seismicity, or to the rock and soil units surrounding excavations would be expected as a result of the Build Alternatives

No specific impacts with respect to soils or geology would be anticipated under the No-Build Alternative.

No long-term adverse impacts to soils and geology would occur with any project alternatives; therefore, no mitigation will be required.

#### 1.5.14 Biodiversity

All build alternatives would result in the loss of upland habitat, wetland habitat, and vernal pool habitat (including direct and indirect impacts to vernal pools as well as supporting upland habitat used by vernal pool amphibians). All build alternatives would also result in increased habitat fragmentation and exacerbate existing barriers to wildlife movement.

Wetland habitat loss, vernal pool habitat loss and loss of surrounding vernal pool upland habitat would all be greater under the Stoughton Alternatives (12.3, 1.43 and 43.40 acres respectively) than under the Whittenton Alternatives (11.2, and 0.8 and 41.61 acres, respectively). However, in other respects the Whittenton Alternatives would have greater impacts on biodiversity than the Stoughton Alternatives. For example, the Whittenton Electric Alternative would impact 187.98 acres of upland wildlife habitat, over 5 acres greater than the impacts under the Stoughton Electric Alternative (182.27 acres). The University of Massachusetts' Conservation Assessment and Prioritization System (CAPS) model analysis also indicates that the Whittenton Alternatives would have a slightly higher loss of Index of Ecological Integrity (IEI) Units with a total loss of 484.6 versus 474.5 for the Stoughton Alternative.

Each of the rail alternatives would result in habitat fragmentation and associated indirect effects on natural communities. The Stoughton Alternatives would exacerbate fragmentation of wetland and upland communities, particularly through the Hockomock Swamp and Pine Swamp, although the barrier effect in Hockomock Swamp would be reduced by constructing a trestle. The Whittenton Alternatives would also exacerbate fragmentation of wetland and upland communities, particularly through the Hockomock Swamp and along the Whittenton Branch, although the barrier effect would be reduced by constructing a trestle in the Hockomock Swamp.

The No-Build Alternative would not create any new impacts to natural communities or biodiversity.

##### 1.5.14.1 Mitigation for Biodiversity Impacts

Strategies and measures that could be used to mitigate for impacts to biological diversity were evaluated. The assessment considered whether impacts to biodiversity could be avoided or minimized, and whether mitigation measures could be incorporated into the alternatives to mitigate for unavoidable impact.

The Build Alternatives use existing, active rail lines (e.g., New Bedford Main Line, Fall River Secondary and Stoughton MBTA line) where possible to reduce impacts to natural communities. Station and layover facility sites were selected to avoid impacts to sensitive biological resources. Where avoidance is not possible, impacts would be minimized to the best extent practicable. Measures to minimize direct and indirect impacts to biodiversity (plant, wildlife, and aquatic communities) will be developed as part of the mitigation for impacts to wetlands, threatened and endangered species, and water resources. In addition to other minimization measures not yet identified, these measures would include:

- Adjusting the grading to reduce the loss of plant or wildlife communities.
- Evaluating all existing culverts to determine whether replacing a culvert could adversely impact, or benefit, biodiversity.

- Installing new crossing structures within railroad grades and/or between railroad ties to facilitate safe passage of fauna across the right-of-way.
- Using retaining walls to reduce the loss of unique natural communities.
- Replanting disturbed areas.
- Developing and implementing an invasive species control plan within the Hockomock Swamp.

The Stoughton and Whittenton alternatives were designed with specific measures to minimize habitat fragmentation. Both the Stoughton and Whittenton Alternatives include the proposed Hockomock trestle, extending for approximately 8,500 feet. The trestle would maintain habitat connectivity for small terrestrial and aquatic vertebrates and other wildlife and thus minimize impacts to biodiversity. The Whittenton Alternative would further minimize impacts to biodiversity by avoiding the Pine Swamp area in Raynham, which would be crossed by the Stoughton Alternative.

Each of the alternatives presents opportunities to improve wildlife habitat, particularly by reconstructing existing culverts or bridges to improve wildlife or fish passage and reduce fragmentation. In addition, the proposed Hockomock trestle would eliminate unauthorized access to the ACEC by all-terrain-vehicles (ATVs) that have been observed leaving the right-of-way and entering adjacent vernal pools, thereby affecting sensitive (breeding, egg and larval) stages of amphibians, including rare species. The result would be a reduction in adverse effects to these communities that would otherwise continue under the No-Build condition.

#### 1.5.15 Threatened and Endangered Species

There are no species listed on the Federal Threatened and Endangered Species Lists that would be affected by any of the alternatives.

Each of the Build Alternatives could impact eight species listed under the Massachusetts Endangered Species Act, including one salamander (blue-spotted salamander: *Ambystoma laterale*), two turtles (Blanding's turtle: *Emydoidea blandingii* and eastern box turtle: *Terrapene carolina carolina*), one freshwater crustacean (coastal swamp amphipod: *Synurella chamberlaini*), and four insects (mocha emerald dragonfly: *Somatochlora linearis*; Hessel's hairstreak butterfly: *Callophrys hesseli*; pale green pinion moth *Lithophane viridipallens*; and water-willow stem borer moth: *Papaipema cataphracta*), and would result in the loss of migratory route habitat because all rail alternatives require reconstruction of rail lines on out-of service rights-of-way where currently there are none.

The Stoughton and Whittenton Electric Alternatives would have identical impacts to the upland habitat of the Blanding's turtle (12.5 acres) and blue-spotted salamander (7.5 acres). The Whittenton Electric Alternative would have greater impacts to the upland habitat of the eastern box turtle compared to the Stoughton Electric Alternative (13.8 acres compared to 12.6 acres). The Whittenton Alternatives would also have a greater barrier effect on rare species—loss of 3.6 miles of migratory route habitat, compared to 3.2 miles under the Stoughton Alternatives. The relatively higher impacts of the Whittenton Alternatives are due to impacts along the Whittenton Branch, which includes areas surrounded by rare species habitat. The additional barrier effect of the Whittenton Alternatives is specifically attributable to potential impacts to the migration of the eastern box turtle across the Whittenton Branch.

The No-Build Alternative is not expected to create any new impacts to rare species and/or their habitat.

#### 1.5.15.1 Mitigation for Impacts to Threatened and Endangered Species

Proposed measures to be developed in coordination with the Natural Heritage and Endangered Species Program (NHESP) to avoid, minimize and mitigate rare species impacts within the project Study Area are provided in Chapter 7. Proposed project mitigation measures for permanent impacts include:

- Construct wildlife corridors and passages through the rail bed in areas to maintain population continuity for state-listed wildlife, at the locations specified in Chapter 4.14, *Biodiversity*.
- Provide funding or land acquisition to protect up to 25 acres of land potentially used by the Hockomock Swamp population of Blanding's turtle.
- Fund a study of the Hockomock Swamp population of Blanding's turtle to assist NHESP in developing long-term protective measures, if required by NHESP in the Conservation and Management Permit.
- Provide funding or land acquisition to protect up to 11 acres of land potentially used by the Hockomock Swamp population of blue-spotted salamander.
- Provide funding to the NHESP Eastern Box Turtle Mitigation Bank equivalent to protecting up to 17 acres of habitat, or directly protect up to 17 acres of habitat through land acquisition or restriction.

#### 1.5.16 Wetland Resources

Wetland impacts are the principal category of environmental impacts that must be considered for federal Clean Water Act Section 404 permits and variances under the Massachusetts Wetlands Protection Act. In addition to total wetland impacts, wetland fill within ACECs was also quantified, as wetlands within ACECs receive a higher level of state regulatory protection. The Whittenton Alternatives would result in direct permanent impacts to 11.2 acres of waters of the United States (including vegetated wetlands and waterbodies), compared to 12.3 acres under the Stoughton Alternatives. The impacts of the Stoughton Alternatives include some wetlands within and north and south of Pine Swamp. Both the Whittenton and Stoughton Alternatives would affect the same acreage of wetlands within Hockomock Swamp.

It should be noted that although the Stoughton and Whittenton Alternatives both cross the Hockomock Swamp ACEC, direct wetland impacts of these alternatives within this ACEC are actually quite limited (0.2 acre). This is because these alternatives would use the existing railroad grade that already crosses the swamp, which has been in existence since the late 19th Century. In fact, the actual area of impact would be on an existing stream that has overtopped its original banks (i.e. the railroad drainage ditches) and now flows over an approximately quarter-mile portion of the existing railbed.

The No-Build Alternative is not expected to create any new impacts to wetlands.

#### 1.5.16.1 Mitigation for Wetland Impacts

Chapter 4.16, Wetlands, provides a mitigation plan to address unavoidable wetland impacts in accordance with federal and state requirements. Based on USACE requirements, permanent direct impacts of the Stoughton Electric Alternative are estimated to require 31.3 acres of compensatory wetlands mitigation—1.9 acres open water, 2.1 acres emergent wetlands, 1.8 acres scrub-shrub wetlands and 25.5 acres of forested wetlands. The Whittenton Electric Alternative would require 28.4 acres of compensatory mitigation for direct permanent impacts. The mitigation site search discussed in Chapter 4.16 also takes into consideration the mitigation requirements for temporary, temporal and secondary impacts.

A wetland mitigation site search analysis was conducted. Based on GIS analysis and agency review, the lists of sites were narrowed down to those sites with the highest potential value for wetland establishment or restoration. Based on input from the reviewing agencies, five sites were chosen from the preliminary list as having the highest potential for wetland establishment or restoration. Conceptual design was undertaken for these sites, including development of planting plans, wildlife habitat features, construction methods, invasive species control, and monitoring and reporting plans. The identified potential mitigation sites can meet the mitigation goals of the project. Specific sites will be selected by MassDOT in coordination with USACE and other agencies and the design of the selected sites advanced.

#### 1.5.17 Water Resources

All of the Build Alternatives would have the potential to affect waterbodies and drinking water protection areas. The Stoughton Alternatives would not require construction within public water supply Zone 1 Areas (i.e. within 400 feet of the well). The Whittenton Alternatives would require construction within public water supply Zone 1 Areas (i.e. within 400 feet of the well). All of the Build Alternatives would upgrade existing transit corridors, which would have a negligible effect on pollutant loading. The Build Alternatives would upgrade existing transit corridors but would also build new rail lines on disused rail corridors, potentially introducing new pollutant sources in those areas. With mitigation and drainage features in place, none of the Build Alternatives are expected to impair any water resources.

Potential impacts to the Hockomock Swamp would occur due to stormwater discharges to Black Brook, from the Stoughton and Whittenton Alternatives. However, minimal impacts to ACECs from stormwater discharges would occur from the project. None of the above-mentioned discharges are associated with constructed stations, station platforms or parking areas. These discharges would primarily occur from conveyed overland flow from ditches along the railroad, which would carry negligible contaminant loads. None of the proposed actions are expected to impair surface or groundwater resources within the ACEC. Compliance with the Massachusetts Stormwater Management Standards is provided for all stations except Stoughton and Dana Street. Compliance will be documented for these stations (as necessary) during later project design phase phases.

#### 1.5.17.1 Mitigation for Impacts to Water Resources

Proposed station and parking facilities for all alternatives were located on developed sites whenever possible to minimize any increases in impervious area and to avoid introducing new pollutant sources to undeveloped areas. Additional minimization measures to reduce impervious surfaces such as deck parking, the use of water quality swales, narrower streets and green "islands", a reduced building footprint, and alternative (permeable) materials for parking areas, sidewalks and roads at stations will be considered during the design stage of the project. Further minimization along the proposed transit

corridors was not possible, as the corridors themselves were determined by existing and former highway and rail alignments and could not be relocated without substantial increases in impacts to other resources.

All Build Alternatives would require specific stormwater management measures to prevent flooding and protect water quality. All stormwater Best Management Practices will meet or exceed regulatory requirements to suggest mitigation for potential impacts. These BMPs will be further refined during the design stage of the project. With the proposed mitigation measures in place, none of the Build Alternatives would be expected to substantially increase pollutant loading or impair any surface or groundwater resources.

Construction of the Build Alternatives would require a National Pollution Discharge Elimination System (NPDES) construction permit pursuant to Section 402 of the Clean Water Act. NPDES is administered in Massachusetts by the U.S. Environmental Protection Agency, and generally qualifies for a General Permit. The project would be constructed pursuant to a comprehensive Stormwater Pollution Prevention Plan (SWPPP). The SWPPP would describe potential pollutant sources on a site and dictate what best management practices (BMPs) must be implemented to manage stormwater and protect water quality during construction.

#### **1.5.18 Coastal Zone and Chapter 91 Waterways**

Depending on the alternative selected, the project is expected to require several licenses for bridges, stations and layover facilities. Additional approvals will be required for certain bridge, track and ballast improvements at existing railroad crossings of non-tidal rivers and streams. The jurisdiction of many of these crossings will be determined during further consultation with DEP and the United States Coast Guard.

The alternatives are anticipated to comply with the policies and principles of the Massachusetts Coastal Zone Management Program (MCZM). The alternatives will support water-dependent industrial uses within the New Bedford and Mt. Hope Bay DPAs by maintaining a critical transportation system supporting these uses.

Section 307(c) of the Coastal Zone Management Act of 1972 requires any non-federal applicant for a federal license or permit to conduct an activity affecting land or water uses in the state's coastal zone to furnish a certification that the proposed activity will comply with the state's coastal zone management program. The Build Alternatives would require a Federal Consistency Certification under the Massachusetts Coastal Zone Management Plan from the MCZM Office. It is anticipated that the alternatives would be consistent with the applicable policies.

None of the elements proposed under the No-Build Alternative are located within Chapter 91 or Coastal Zone jurisdiction. Therefore, no impacts would occur.

#### **1.5.19 Indirect and Cumulative Impacts**

##### **1.5.19.1 Indirect Impacts**

Potential indirect effects (beneficial and adverse) of the Rail Alternatives were evaluated with and without smart growth measures (including TOD). Scenario 1 considers reasonably foreseeable indirect effects from implementing the South Coast Rail project without smart growth strategies, including TOD;

while Scenario 2 outlines a future of smart growth development patterns across the South Coast region wherein housing and jobs are clustered in areas appropriate for development, while preserving important natural resource lands such as fields, forests, farmland, and wetlands.

Each of the three Build Alternatives is anticipated to induce additional growth within the South Coast Region as a result of improved transit access. However, the induced growth from each is relatively small in comparison to the No-Build Alternative, which is projected to increase the number of households by 75,212 by 2035. The Stoughton and Whittenton Alternatives would increase growth by 2,804 households over the No-Build condition, Job growth would be 1,341 greater under the Stoughton and Whittenton Alternatives by 2035 compared to the No-Build Alternative.

The No-Build Alternative and each of the Build Alternatives would result in the loss of land, including undeveloped forest land and farmland, loss of wetlands, and loss of biodiversity value. The differences among the Build alternatives are negligible. Each of the Build Alternatives would also slightly increase the effects of the No-Build baseline growth on water demand, greenhouse gas emissions, and vehicle miles traveled. The Build Alternatives would also slightly increase municipal property tax revenues as a result of new home construction.

### **Smart Growth**

Implementing smart growth measures would not change the overall numbers of households or jobs within the Study Area, but it would re-distribute them to create compact development zones and protect undeveloped land. The savings that would accrue from fully implementing smart growth measures (Scenario 2) would be substantial in many instances. For example, the smart growth scenario would result in saving as much as 3,100 acres of farmland for the Stoughton Alternative (30 percent of the farmland loss in Scenario 1), or 12,189 acres of land (30 percent of the total in Scenario 1). The results are indicative of the benefits of the smart growth measures that could be implemented as part of the South Coast Rail alternatives. To help encourage smart growth development patterns to become reality in the future, MassDOT has developed an implementation plan for the South Coast Rail Economic Development and Land Use Plan, including performance metrics and reporting requirements (see Section 5.5).

#### **1.5.19.2 Cumulative Impacts**

Table 1.5-2 includes a summary of the incremental changes to the evaluated resources from the South Coast Rail alternatives that, in combination with past activities or trends and other known current and future projects, would potentially result in a substantive cumulative effect. Because there is no substantive difference between the impacts from rail alternatives' electric- or diesel-powered trains, these options are not included in this summary comparison. Additionally, the impacts from the Whittenton Alternative are substantively equivalent to those from the Stoughton Alternative therefore, they are incorporated in the Stoughton Alternative summary.

## **1.6 APPLICANT'S PREFERRED ALTERNATIVE**

Section 3.3.4 provides USACE's findings with respect to the Section 404(b)(1) Guidelines. The conclusions of this section are as follows:

- The Stoughton and Whittenton Alternatives (diesel and electric variants) all meet the basic project purpose and are practicable alternatives.

- The Stoughton Alternatives (the applicant’s preferred alternatives) have slightly greater impacts on aquatic resources than the Whittenton Alternatives.
- Despite having less aquatic resource impacts, the Whittenton Alternatives have other significant adverse environmental consequences and is not less environmentally damaging than the Stoughton Alternatives. Specifically, the Whittenton Alternatives have greater impacts or less benefits than the Stoughton Alternatives in the following areas:
  - Regional emissions of air pollutants (due to lower ridership and VMT reduction)
  - Habitat of state-listed threatened, endangered, or special concern species
  - Biodiversity, habitat fragmentation, and ecological integrity
  - Noise and vibration impacts to environmental justice communities due to Attleboro Secondary through downtown Taunton.
  - At-grade crossings/public safety in Taunton
- Between the Stoughton Electric and Diesel Alternatives, the Stoughton Electric Alternative is environmentally preferable due to greater reductions in regional air pollutant emissions compared to the Stoughton Diesel Alternative and no contribution to local-level air pollutant hot-spots.

The U.S. Army Corps of Engineers has therefore determined that there is no practicable alternative to the Stoughton Electric Alternative which would have less adverse impact on the aquatic ecosystem, and also does not have other significant adverse environmental consequences.

## 1.7 NEXT STEPS IN THE DECISION MAKING PROCESS

The FEIS/FEIR will be distributed to all agencies, officials, and public libraries that received the DEIS/DEIR, as well as organizations and individuals that provided comments on the DEIS/DEIR. Agencies, officials, and the public will be invited to submit their comments on the FEIR following publication of the FEIR and submission to the Secretary of Environmental Affairs.

Following the review period, the Corps and the Massachusetts Secretary of Environmental Affairs will consider the information in the FEIS/FEIR and the comments received. The Corps will also consider the comments received as part of the process under Section 106 of the National Historic Preservation Act. The Corps will then issue a Record of Decision (ROD), which will complete the federal environmental review process, and continue with the permitting process.

The Secretary will issue a Certificate finding whether the FEIR adequately and properly complies with MEPA and 301 CMR 11.00. If the FEIR is found to be adequate, the Secretary may specify the conditions to be satisfied in a Section 61 Finding for the project. Following the receipt of the Certificate from the Secretary, the Massachusetts Department of Transportation will prepare and issue a final Section 61 Finding.<sup>13</sup> A draft Section 61 Finding is included in Chapter 7 of the FEIS/FEIR. Massachusetts General

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<sup>13</sup> Massachusetts General Laws, Chapter 30, Section 61  
<https://malegislature.gov/Laws/GeneralLaws/PartI/TitleIII/Chapter30/Section61>

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. The Section 61 Finding will incorporate the results of the consultations undertaken with the Corps, the Advisory Council on Historic Preservation, and the Massachusetts Historic Commission (MHC) under both Section 106 of the National Historic Preservation Act and the State Antiquities Act (Massachusetts General Laws, Chapter 9, Sections 26 et seq.). The issuing of this finding will end the Massachusetts environmental review process during planning. Additional reviews will be performed during the permit, design and construction phases.

Following these actions, and depending on the outcome of the decision making process, the project could proceed to the subsequent stages of project development. This will include final design, permitting, equipment procurement, construction, and preparation for system operations.

**Table 1.5-1 Summary of Direct Impacts**

	<b>No-Build (Enhanced Bus) Alternative</b>	<b>Stoughton Electric Alternative</b>	<b>Stoughton Diesel Alternative</b>	<b>Whittenton Electric Alternative</b>	<b>Whittenton Diesel Alternative</b>
<b>Description</b>	Minor bus schedule enhancements	Electric or diesel commuter rail service to South Station using the Northeast Corridor, Stoughton Line, New Bedford Main Line, and Fall River Secondary. Ten new commuter rail stations would be constructed (North Easton, Easton Village, Raynham Park, Taunton, Taunton Depot, King’s Highway, Whale’s Tooth, Freetown, Fall River Depot, and Battleship Cove) and major reconstruction would occur at two existing commuter rail stations (Canton Center and Stoughton).		Variation of the Stoughton Alternative route using the abandoned Whittenton Branch right-of-way through the City of Taunton to avoid the Pine Swamp in Raynham. Ten new commuter rail stations would be constructed (North Easton, Easton Village, Raynham Park, Dana Street, Taunton Depot, King’s Highway, Whale’s Tooth, Freetown, Fall River Depot, and Battleship Cove) and major reconstruction would occur at two existing commuter rail stations (Canton Center and Stoughton).	
Capital Cost (billions)	N/A	\$1.82	\$1.27	\$1.82	\$1.27
Operating and Maintenance Cost (millions)	N/A	\$33.9	\$33.8	\$36.2	\$36.1
Cost per rider <sup>1</sup>	N/A	\$35.28	\$29.71	\$39.60	\$33.32
Years to Construct	N/A	4.5	4	4.5	4
<b>Transportation (Section 4.1)</b>					
Reduction in Daily Regional Vehicle Miles Traveled (2035)	N/A	-255,932	-240,348	-201,232	-186,306
Travel Time- New Bedford to South Station (peak period), 2035	100	77	82	84	89
Daily Ridership (2035) at new stations <sup>2</sup>	N/A	4,570	4,430	4,040	3,930
Increase in Total Commuter Rail System Daily Ridership (2035)	N/A	10,300	9,750	9,400	8,950
<b>Land Use and Zoning (Section 4.2)</b>					
Total Acreage to be Acquired (private and public)	0	136.73	134.33	136.83	134.63

	No-Build (Enhanced Bus) Alternative	Stoughton Electric Alternative	Stoughton Diesel Alternative	Whittenton Electric Alternative	Whittenton Diesel Alternative
<b>Socioeconomics (Section 4.3)</b>					
Residential Displacements	0	4	4	3	3
Business Displacements	0	6	6	6	6
Property Tax Revenue <sup>3</sup> Loss	0	\$197,251	\$197,251	\$181,351	\$181,351
<b>Environmental Justice (Section 4.4)</b>					
Noise Impacts in Environmental Justice Neighborhoods (number of residences impacted by moderate and severe increases in noise levels)	N/A	361		842	
Percent of Total Noise Impacts in Environmental Justice Neighborhoods	N/A	25%		30%	
Vibration Impacts in Environmental Justice Neighborhoods (impacted sensitive receptors)	N/A	86		105	
Percent of Total Vibration Impacts in Environmental Justice Neighborhoods	N/A	23%		25%	

	No-Build (Enhanced Bus) Alternative	Stoughton Electric Alternative	Stoughton Diesel Alternative	Whittenton Electric Alternative	Whittenton Diesel Alternative
<b>Visual Resources (Section 4.5)</b>					
	Minimal impact.	Moderate overall impact on visual resources. Substantial impacts would occur in the out-of-service portion of the Stoughton line segment, from the Stoughton Station south to Weir Junction.	Moderate impact on visual resources overall, but less than Stoughton Electric because overhead electrical infrastructure would not be needed.	Moderate overall impact on visual resources. Substantial impacts would occur in the out-of-service portion of the Stoughton line and Whittenton Branch segments, from the Stoughton Station south to Raynham Junction and on to Whittenton Junction.	Moderate impact on visual resources overall, but less than Whittenton Electric because overhead electrical infrastructure would not be needed.
<b>Noise (Section 4.6)</b>					
Moderate Impacts Before Mitigation (# of Sensitive Receptors)	N/A	1,106	1,085	1,232	1,228
Severe Impacts Before Mitigation (# of Sensitive Receptors)	N/A	341	344	381	367
<b>Vibration (Section 4.7)</b>					
Impacted Residences (Without Mitigation)	0	369	369	417	417
<b>Cultural Resources (Section 4.8)</b>					
Direct Impacts to Historic Resources	0	5	5	5	5
Indirect Impacts to Historic Resources (Visual Impacts)	0	25	9	32	11

	No-Build (Enhanced Bus) Alternative	Stoughton Electric Alternative	Stoughton Diesel Alternative	Whittenton Electric Alternative	Whittenton Diesel Alternative
Indirect Impacts to Historic Resources (Noise Impacts)	0	0	16	0	14
Indirect Impacts to Historic Resources (Visual and Noise Impacts)	0	35	19	33	19
Known Archaeological Sites	0	10	10	11	11
<b>Air Quality (Section 4.9)</b>					
Exceedance of National Ambient Air Quality Standards?	No	No	No	No	No
Regional Volatile Organic Compound Emissions (kg/day)	22,200	22,160	22,160	22,170	22,170
Regional Oxides of Nitrogen Emissions (kg/day)	19,256	19,159	19,210	19,169	19,227
Regional Particulate Matter 10 Emissions (kg/day)	3,240	3,240	3,241	3,240	3,241
Regional Particulate Matter 2.5 Emissions (kg/day)	1,490	1,490	1,491	1,490	1,491
Regional Carbon Monoxide Emissions (kg/day)	1,050,356	1,048,074	1,048,400	1,048,554	1,048,908
Regional Carbon Dioxide Emissions (Tons/Year)	24,717,339	24,656,479	24,688,173	24,667,849	24,703,175

	No-Build (Enhanced Bus) Alternative	Stoughton Electric Alternative	Stoughton Diesel Alternative	Whittenton Electric Alternative	Whittenton Diesel Alternative
<b>Open Space (Section 4.10)</b>					
Land Acquisition from Protected Open Space (acres)	0	0.16	0.16	0.16	0.16
<b>Farmland (Section 4.11)</b>					
Impacts to Designated Farmland Soils (Acres)	0	18.6	16.0	18.8	16.2
<b>Hazardous Materials (Section 4.12)</b>					
Recognized Environmental Conditions (including layover facilities) <sup>14</sup>	0	39	39	42	42
<b>Geology (Section 4.13)</b>					
	No long-term adverse impacts	No long-term adverse impacts		No long-term adverse impacts	
<b>Biodiversity (Section 4.14)</b>					
Upland Habitat Loss (acres)	0	182.27	178.78	187.98	183.87
Wetland Habitat Loss (acres)	0	12.3	12.3	11.2	11.2
Vernal Pool Habitat Loss (acres)	0	1.43	1.43	0.8	0.8
Loss of Supporting Vernal Pool Upland Habitat (acres)	0	43.40	43.40	41.61	41.61

<sup>14</sup> Sites with the presence or likely presence of hazardous materials.

	No-Build (Enhanced Bus) Alternative	Stoughton Electric Alternative	Stoughton Diesel Alternative	Whittenton Electric Alternative	Whittenton Diesel Alternative
Habitat Fragmentation	None	Increase in existing habitat fragmentation would result from reconstructing the Stoughton Line on the currently unused railbed, including in the Hockomock Swamp ACEC and the Pine Swamp.		Increase in existing habitat fragmentation would result from reconstructing the Stoughton Line and Whittenton Branch on currently unused railbeds, including in the Hockomock Swamp ACEC.	
<b>Threatened and Endangered Species (Section 4.15)</b>					
Impacted Species Habitat	None	Impacts to the habitat of eight state-listed species (blue-spotted salamander, Blanding’s turtle, eastern box turtle, coastal swamp amphipod, mocha emerald dragonfly, Hessel’s hairstreak, pale green pinion moth, and water-willow stem borer). Barrier effect on blue-spotted salamander, Blanding’s turtle, and eastern box turtle considered moderate impacts.		Impacts to the habitat of eight state-listed species (blue spotted salamander, Blanding’s turtle, eastern box turtle, coastal swamp amphipod, mocha emerald, Hessel’s hairstreak, pale green pinion moth, and water-willow stem borer moth). Barrier effect on Blue-spotted salamander, Blanding’s turtle, and eastern box turtle considered moderate impacts.	
Loss of migratory route habitat (barrier effect) (linear feet)	0	3.2 miles	3.2 miles	3.6 miles	3.6 miles
<b>Wetland Resources (Section 4.16)</b>					
Waterway Direct Permanent (acres)	0	1.9	1.9	1.8	1.8
Vegetated Wetland Direct Permanent Impacts (acres)	0	10.4	10.4	9.4	9.4
Total Federal Wetland Impacts (acres)	0	12.3	12.3	11.2	11.2
Wetlands Impacts within ACECs (acres)	0	0.2	0.2	0.2	0.2
Bank (lf)	0	16,813	16,813	16,581	16,581
Outstanding Resource Waters (acres)	0	1.5	1.5	1.1	1.1

	No-Build (Enhanced Bus) Alternative	Stoughton Electric Alternative	Stoughton Diesel Alternative	Whittenton Electric Alternative	Whittenton Diesel Alternative
Bordering Land Subject to Flooding (acres)	0	6.7	6.7	5.0	5.0
Riverfront Area (acres)	0	7.9	7.9	7.8	7.8
<b>Water Resources (Section 4.17)</b>					
	None	Surface and groundwater resources would not be impaired due to the use of stormwater treatment practices.		Surface and groundwater resources would not be impaired due to the use of stormwater treatment practices.	
<b>Coastal Zone (Section 4.18)</b>					
Consistent with Massachusetts Coastal Zone Management Program Policies?	N/A	Yes	Yes	Yes	Yes
Number of Chapter 91 Regulated Resources Crossed <sup>5</sup>	0	36	36	31	31

1 Annualized capital cost and annual operating and maintenance cost estimates divided by annual passengers.

2 New daily round-trip transit trips at proposed South Coast Rail stations

3 Additional property tax revenue losses may result from small and/or partial acquisitions.

4 Sites with the presence or likely presence of hazardous materials

5 Massachusetts General Law Chapter 91 is implemented by Massachusetts Regulations at 310 CMR 9.00 (Waterways Regulations). The purpose of Chapter 91 and the Waterways Regulation is to protect certain public rights that are inherent in tidal waters of the Commonwealth and certain non-tidal rivers and streams. New construction, changes in use or substantial expansions of existing structures within these jurisdictional areas require approval under these regulations.

**Table 1.5-2 Summary of Cumulative Impacts**

	Resource					
	Land Use	Wetlands	Biodiversity	Protected Open Space	Air Quality	Economy
<b>No-Build Alternative</b>	Conversion of 1,315 acres per year	No net loss policy	22 acres of land converted per day	Protected at average rate of 383.7 acres per year	Trend of increasing GHG emissions counteracted by new regulatory requirements	Population: 928,031
	308,371 acres of undeveloped land remaining in 2035	Mitigation ratios of 1:1 to 3:1  124,748 acres of wetlands remaining in 2035	116,675 acres of decreased habitat quality in 2035  307,813 acres of natural land remaining in 2035	64,795 acres of open space remaining in 2035	CO <sub>2</sub> -equivalent emissions to be 80% of 1990 levels by 2050  28,691,855 tpy CO <sub>2</sub> emissions in 2035	Households: 75,212  Jobs: 417,864 Business Activity: \$99B Tax Revenue: N/A
<b>Stoughton Alternative Scenario 1</b>	Conversion of 1,315 acres per year	No net loss policy	22 acres of land converted per day	Protected at average rate of 383.7 acres per year	Trend of increasing GHG emissions counteracted by new regulatory requirements	Population: 935,040
	307,030 acres of undeveloped land remaining in 2035	Mitigation ratios of 1:1 to 3:1  124,756 acres of wetlands remaining in 2035	120,605 acres of decreased habitat quality in 2035  303,883 acres of natural land remaining in 2035	64,794 acres of open space remaining in 2035	CO <sub>2</sub> -equivalent emissions to be 80% of 1990 levels by 2050  27,842,309 tpy CO <sub>2</sub> emissions in 2035	Households: 78,016  Jobs: 419,206 Business Activity: \$99.5B  Tax Revenue: +\$8.5-9.5M (municipal) +\$16-18M (state)

		Resource					
		Land Use	Wetlands	Biodiversity	Protected Open Space	Air Quality	Economy
Whittenton Alternative Scenario 1	Conversion of 1,315 acres per year	No net loss policy	22 acres of land converted per day	Protected at average rate of 383.7 acres per year	Trend of increasing GHG emissions counteracted by new regulatory requirements	Population: 935,040	
	307,045 acres of undeveloped land remaining in 2035	Mitigation ratios of 1:1 to 3:1  124,754 acres of wetlands remaining in 2035	120,595 acres of decreased habitat quality in 2035  303,893 acres of natural land remaining in 2035	64,795 acres of open space remaining in 2035	CO <sub>2</sub> -equivalent emissions to be 80% of 1990 levels by 2050  27,842,309 tpy CO <sub>2</sub> emissions in 2035	Households: 78,016  Jobs: 419,206 Business Activity: \$99.5B Tax Revenue: +\$8.5-9.5M (municipal) +\$16-18M (state)	
Stoughton Alternative Scenario 2	Conversion of 1,315 acres per year	No net loss policy	22 acres of land converted per day	Protected at average rate of 383.7 acres per year	Trend of increasing GHG emissions counteracted by new regulatory requirements	Population: 935,040	
	315,583 to 319,259 acres of undeveloped land remaining in 2035	Mitigation ratios of 1:1 to 3:1  124,759 to 124,760 acres of wetlands remaining in 2035	58,760 to 75,021 acres of decreased habitat quality in 2035  349,331 to 365,592 acres of natural land remaining in 2035	>64,794 acres of open space remaining in 2035	CO <sub>2</sub> -equivalent emissions to be 80% of 1990 levels by 2050  <27,842,309 tpy CO <sub>2</sub> emissions in 2035	Households: 78,016  Jobs: 419,206 Business Activity: \$99.5B Tax Revenue: +\$8.5-9.5M (municipal) +\$16-18M (state)	

		Resource					
		Land Use	Wetlands	Biodiversity	Protected Open Space	Air Quality	Economy
<b>Whittenton Alternative Scenario 2</b>		Conversion of 1,315 acres per year	No net loss policy	22 acres of land converted per day	Protected at average rate of 383.7 acres per year	Trend of increasing GHG emissions counteracted by new regulatory requirements	Population: 935,040
		315,598 to 319,274 acres of undeveloped land remaining in 2035	Mitigation ratios of 1:1 to 3:1  124,757 to 124,758 acres of wetlands remaining in 2035	58,750 to 75,011 acres of decreased habitat quality in 2035  349,477 to 365,738 acres of natural land remaining in 2035	>64,795 acres of open space remaining in 2035	CO <sub>2</sub> -equivalent emissions to be 80% of 1990 levels by 2050  <27,842,309 tpy CO <sub>2</sub> emissions in 2035	Households: 78,016  Jobs: 419,206 Business Activity: \$99.5B Tax Revenue: +\$8.5-9.5M (municipal) +\$16-18M (state)