US Army Corps of Engineers
New England District
BUILDING STRONG®

Draft Environmental Impact Statement/ Draft Environmental Impact Report

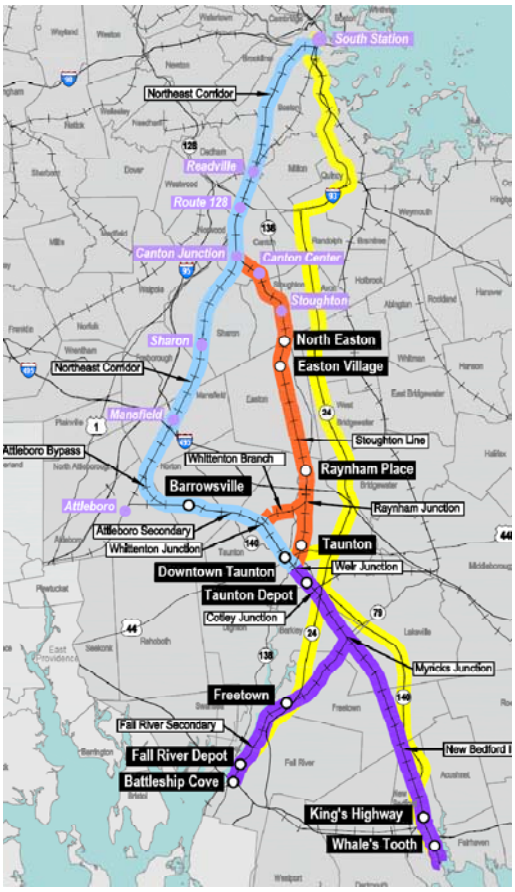
on the

South Coast Rail Project

proposed by the

Massachusetts Department of Transportation

Department of the Army Permit Application Number NAE–2007–00698
Executive Office of Energy and Environmental Affairs EEA No. 14346



U.S. Army Corps of Engineers
New England District

February 2011

Executive Summary

1.0 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 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.), ranging in area from less than eleven acres to approximately twenty-one acres (depending on the alternative selected), including 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 is considering several transportation facilities and corridor alternatives to implement this transit service over a distance of approximately 50 to 60 miles. Transportation modes under consideration include rail (diesel or electric) and rapid bus. Corridors under consideration include a rail corridor through Attleboro, Stoughton or Middleborough or a rapid bus service along the route 24, route 140, route 128 and I-93 corridors.

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, MA, 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 U.S. Army Corps of Engineers (USACE, Corps) is required to evaluate the proposal with regard to the U.S. Environmental Protection Agency (EPA) *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 the project is water-dependent. A project is water dependent if it requires access or proximity to, or siting within, a special aquatic site[1] 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

[1] 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.

technology, and logistics in light of *overall* project purpose (40 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 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 – see Figure 1.2-1) 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[2]), *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 by 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 sprawl 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.

1.3 REGULATORY CONTEXT OF THE ENVIRONMENTAL IMPACT STATEMENT (EIS)/ENVIRONMENTAL IMPACT REPORT (EIR)

This document has been prepared to comply with the requirements of the National Environmental Policy Act (NEPA), the Council on Environmental Quality (CEQ) regulations for implementing NEPA, [Title 40 Code of Federal Regulations (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,

[2] http://www.ctps.org/bostonmpo/4_resources/1_reports/1_studies/3_transit/pmt.html

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) (see Table 1-1), 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 EIS provides the basis for this public interest review, as outlined in Title 33 CFR Part 320.4.

Table 1-1 Public Interest Review Factors[1]

conservation	fish and wildlife values	water quality
economics	flood hazards, floodplain values	energy needs
aesthetics	land use	safety
general	navigation	food and fiber production
environmental concerns	shore erosion and accretion	mineral needs
wetlands	recreation	property ownership
historic properties	water supply and conservation	needs and welfare of the people

Notes: 1. As described in 33 CFR 320.4(a)(1)

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 Massachusetts Environmental Policy Act (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). The 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 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 Division of Fisheries and Wildlife, Natural Heritage and Endangered Species Program (NHESP), a land disposition agreement with the Department of Conservation and Recreation (DCR) as well as approval from the legislature and the Division of Capital Asset Management (DCAM) for a disposition of land protected by Article 97 of the Amendments to the Constitution of the

Commonwealth for particular alternatives. The project 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 DEIS/DEIR. The alternatives development process is called alternatives screening because its purpose is to narrow the range of potential alternatives to those likely to meet the project objectives and purpose and need, therefore warranting a more detailed analysis of transportation benefits and environmental impacts.

In order to assess a range of alternatives to be considered, MassDOT initiated an extensive civic engagement process. MassDOT also convened an Interagency Coordinating Group (ICG)[3], charged with evaluating all known potential alternatives and determining which were to be carried forward for further study. An initial range of 65 potential alternatives was identified by reviewing previous studies and soliciting input from the Massachusetts Bay Transportation Authority (MBTA), the ICG, the Commuter Rail Task Force, and through a series of public meetings that engaged interested stakeholders. The alternatives that were identified through the initial analysis were narrowed down to five alternatives, encompassing four routes and three modes that were advanced for further analysis in addition to the No-Build Alternative. These five build alternatives were identified in the Notice of Intent and in the Environmental Notification Form. They included the following:

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

The No-Build Alternative would provide enhancements to existing bus services with limited improvements to the existing transit and roadway system.

- **Alternative 1 – Through Attleboro**

This Alternative would provide new commuter rail service to South Station through Attleboro using the New Bedford Main Line, Fall River Secondary, Attleboro Secondary, a new bypass track and the Northeast Corridor. Both electric and diesel commuter rail options were evaluated for this alternative.

- **Alternative 2 – Through Middleborough**

This Alternative would provide commuter rail service to South Station through Middleborough by using the New Bedford Main Line, Fall River Secondary, Middleborough Secondary, Middleborough Line and the Old Colony Main Line Corridors. Variations to this alternative include: 1) providing major infrastructure improvements, also called Middleborough Full, and 2) providing this service without major infrastructure improvements to the Old Colony Main Line between Braintree and South Station, also called Middleborough Simple.

[3] 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.

- **Alternative 3 – Through Attleboro/Middleborough**

This Alternative would provide commuter rail service to South Station through Attleboro and Middleborough using the corridors described in Alternatives 1 and 2. Both electric and diesel commuter rail options were evaluated for the route through Attleboro, while only diesel commuter rail was evaluated for the route through Middleborough.

- **Alternative 4 – Through Stoughton (including Whittenton variation)**

This Alternative would provide commuter rail service to South Station through Stoughton, by the New Bedford Main Line, Fall River Secondary, Attleboro Secondary to Weir Junction in Taunton and an extension of the existing Stoughton Branch to Taunton. The Whittenton variation would follow the same route but rather than continuing north in a straight line towards Taunton, would swing northwest around Taunton in a more serpentine route, following the right-of-way of the former Whittenton Branch of the Stoughton Line. This option would serve the Whittenton section of Taunton. Both electric and diesel commuter rail options were evaluated for this alternative.

- **Alternative 5 – Rapid Bus**

This Alternative would provide rapid express bus service to Boston using a proposed dedicated, primarily reversible bus lane to be built along Routes 24 and I-93/128, the existing Interstate-93 HOV zipper lane, and a short portion through mixed traffic.

Subsequent to the publication of the NOI and ENF a scoping process was conducted under both NEPA and MEPA (the public review of the ENF). The scoping process served to identify the scope of environmental analysis and range of alternatives to be considered in the environmental review document and to identify new issues and alternatives not yet considered. Public and agency input was solicited by the Corps and MassDOT, including scoping and public meetings in the fall of 2008. In response to comments received during the scoping period, a supplemental ridership analysis was conducted[4] which measured each alternative identified in the NOI and ENF with regard to *Mode Shift* (the shift of the number of trips from automotive to transit use resulting from an alternative) and *Transit Ridership* (the increase in total transit ridership along the entire transit system resulting from an alternative). The supplemental ridership analysis, in combination with more detailed cost information resulted in the re-evaluation of the practicability of several alternatives, as described below.

Alternative 2 – Through Middleborough, Option 2A (Middleborough Full) was not considered practicable due to its low projected ridership numbers, high cost and significant construction-related disruption to the existing public transit system and to the City of Quincy.

Alternative 2 – Through Middleborough, Option 2B (Middleborough Simple), although less costly than the Middleborough Full Alternative, would have very low projected ridership and was therefore not considered practicable.

Alternative 3 – Through Attleboro and Middleborough (Hybrid) would have the same ridership as Alternative 1 (Through Attleboro), but would have greater impacts and would be more costly and was therefore deemed not practicable.

[4] Executive Office of Transportation. Supplemental Ridership Memorandum. February 17, 2009

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[5] 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 *(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)*

The Secretary's certificate and the public and agency comments received in response to the Notice of Intent, ENF, as well as other comments and input from agencies through the Interagency Coordinating Group (ICG) and other channels were taken into consideration by the Corps in its subsequent preparation of the DEIS/DEIR.

During the preparation of the DEIS/DEIR a new 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.

1.4.2 ALTERNATIVES DESCRIPTION

The following summarizes the alternatives that were advanced for further analysis in the DEIS/DEIR. Evaluation of these alternatives is required by the MEPA certificate. The alternatives are presented on Figure 1.4-1. The alternatives are distinguished between No-Build and Build. Among the Build Alternatives there is a rail mode and a bus mode. Within the rail mode, there are 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

[5] The Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs, Certificate of the Secretary of Energy and Environmental Affairs on the Environmental Notification Form, South Coast Rail Project (EEA# 14346), April 3, 2009.

- Stoughton Alternative
  - Stoughton Electric
  - Stoughton Diesel
- Whittenton Alternative
  - Whittenton Electric
  - Whittenton Diesel

▪ Rapid Bus Alternative

The corridor for the Whittenton Alternative is a variant of the Stoughton Alternative. The Whittenton Alternative corridor avoids the Pine Swamp by using the abandoned Whittenton Branch right-of-way. It is identical to the Stoughton Alternative corridor in all other respects. Table 1-2 provides a summary of key elements of the alternatives.

Table 1-2 Summary of Elements by Alternative

		Travel Time (min)			
Alternatives	Ridership[1]	New Bedford	Fall River	Station Stops[2]	Cost[3] (Billion)
Attleboro Electric	9,360	75	72	8	$2.01
Attleboro Diesel	8,040	84	82	8	$1.72
Stoughton Electric	9,580	76	73	10	$1.88
Stoughton Diesel	8,140	85	83	10	$1.48
Whittenton Electric	9,640	87	85	10	$1.81
Whittenton Diesel	8,040	96	94	10	$1.41
Rapid Bus	4,200	103	91	6	$0.81

1 New daily transit trips at proposed South Coast Rail stations
2 Proposed new stations
3 Capital cost in year-of-expenditure dollars

The following provides a description of the key elements of the alternatives, including infrastructure such as track, layover facilities, stations (including parking), bridges and culverts, electrical and signal and communication systems. For the rail alternatives an overview is first presented of common elements, followed by a discussion for each alternative highlighting specific elements. This is then followed by a discussion of the operational aspects of each alternative and the ridership projections for each alternative.

1.4.2.1 NO-BUILD (ENHANCED BUS) ALTERNATIVE

The No Build Alternative is included in the DEIS/DEIR as a means of evaluating the impacts and benefits of the Build Alternatives. The No Build Alternative represents a continued investment in the regional transportation network, but does not address the fundamental need for improved public transit service between New Bedford/Fall River and Boston, as described above. The No-Build Alternative would add more buses with smaller capital investments than are proposed in the Build Alternatives and also includes bus schedule enhancements, transportation demand management, and transportation policy

enhancements for commuter bus, based on existing bus service routes (Figure 1.4-2) using the following six commuter Park-and-Ride lots for bus service to Boston:

- Route 106 near Route 24 – West Bridgewater Park-and-Ride Lot
- Route 24 Exit 12 – Silver City Galleria – Taunton Park-and-Ride Lot
- Oak Street Bloom/GATRA Bus Terminal – Taunton Park-and-Ride Lot
- Route 138 – Raynham/Taunton Greyhound Track – Raynham Park-and-Ride Lot
- Mount Pleasant Street – New Bedford Park-and-Ride Lot
- 72 Sycamore Street, DATTCO Bus terminal – Fairhaven Park-and-Ride Lot

The Route 24 Exit 12 - Silver City Galleria Park & Ride would be restriped to improve circulation, as would the current Park & Ride facilities referred to as Route 106/Route 24 in West Bridgewater and Mount Pleasant Street in New Bedford.

The no-build alternative assumes that South Station in Boston would be expanded in accordance with the recent application by MassDOT to construct 7 new terminal tracks to accommodate existing and projected future demand for commuter rail service.[6] In addition, new midday layover facilities would be constructed in Boston to ensure that an adequate supply of trains is available to support evening peak hour commuter transit needs. This proposal has independent utility as a single and complete project, and is anticipated to be constructed regardless of the outcome of the MassDOT proposal that is the subject of this DEIS/DEIR.

1.4.2.2 COMMON ELEMENTS AMONG ALL RAIL ALTERNATIVES

The rail alternatives have several infrastructure elements in common in providing commuter rail service to South Station from New Bedford / Fall River. The following discusses common elements of the rail alternatives and summarizes differences among rail alternatives with regard to common elements. This discussion is followed by a description of improvements associated with each rail alternative.

Southern Triangle Rail Infrastructure

Improvements to the existing rail infrastructure in the Southern Triangle are common among all rail alternatives and include the following:

- *New Bedford Main Line*: reconstruction of existing tracks from Weir Junction to New Bedford, as two to three tracks from Weir Junction to Myricks Junction and single track with three sidings from Myricks Junction to New Bedford, a distance of 18.9 miles;
- *Fall River Secondary*: reconstruction of existing tracks from Myricks Junction to Fall River, as single track with three sidings, a distance of 11.8 miles.

Layover Facilities

The operations of all three rail alternatives would require overnight train layover facilities. The overnight layover facilities ideally would be located close to the terminal stations at the end of the New Bedford Main Line and Fall River Secondary. All rail alternatives would include two overnight layover

[6] http://www.eot.state.ma.us/default.asp?pgid=content/releases/pr102510_hiSpeed&sid=release

facilities, one on the New Bedford Main Line and one on the Fall River Secondary. Current layover facilities evaluated in the DEIS/DEIR include the following:

- New Bedford:
  - Wamsutta Overnight Train Layover Facility Site - This site is located on the east side of the right-of-way, opposite the proposed Whale's Tooth Station and adjacent to an existing CSX freight yard
  - Church Street Overnight Train Layover Facility Site - This site is located on the west side of the right-of-way, on the site of an existing waste disposal industry
- Fall River:
  - ISP Overnight Train Layover Facility Site - This site is located on the west side of the right-of-way, opposite the existing ISP Facility
  - Weaver's Cove East Overnight Train Layover Facility Site - This site is located on the east side of the right-of-way, opposite the existing Weaver's Cove Energy facility in Fall River
  - Weaver's Cove West Overnight Train Layover Facility Site - This site is located on the west side of the right-of-way, on the existing Weaver's Cove Energy facility in Fall River

The rail alternatives would also require midday storage of consists (train sets) in the Boston area to ensure that enough trains would be available for South Coast Rail trains to depart from South Station for the evening peak commute. All rail alternatives would utilize the expanded South Station and midday layover facilities in Boston referenced above to address existing and future MBTA and Amtrak capacity needs independent of the South Coast Rail project.

Stations

The rail alternatives have several existing and proposed stations in common. Table 1-3 summarizes the existing train stations affected by each rail alternative and provides a matrix identifying the train stations included in each of the alternatives.

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. 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.

Bridges and Culverts

All rail alternatives would require reconstructing undergrade bridges (railroad over road or river) and overhead bridges (highway over railroad) along the existing and new rights-of-way. The Attleboro Alternative requires a new third track along the existing two-track NEC that would require modifying and reconstructing existing bridges along the corridor. Other infrastructure elements such as electrical facilities and signal and communications systems are identified in the discussion of each rail alternative below.

Table 1-3 Summary of Stations by Alternative

Station Name	Municipality	Type	Attleboro Alternatives	Stoughton Alternatives	Whittenton Alternatives
Barrowsville	Norton	New	x		
Battleship Cove	*Fall River*	*New*	x	x	x
Canton Center	*Canton*	*Existing*		x	x
Canton Junction	Canton	Existing	x		
Taunton Depot	Taunton	New	x	x	x
Easton Village	*Easton*	*New*		x	x
Fall River Depot	Fall River	New	x	x	x
Freetown	Freetown	New	x	x	x
King's Highway	New Bedford	New	x	x	x
North Easton	*Easton/Stoughton*	*New*		x	x
Mansfield	Mansfield	Existing	x		
Raynham Place	*Raynham*	*New*		x	x
Sharon	Sharon	Existing	x		
Stoughton	*Stoughton*	*Existing*		x	x
Taunton	Taunton	New		x	
Downtown Taunton	Taunton	New	x		x
Whale's Tooth	New Bedford	New	x	x	x
TOTAL – NEW STATIONS			8	10	10
TOTAL – MODIFICATIONS TO EXISTING STATIONS			3	2	2

Notes: Underlined stations are common to all rail alternatives
Italicized stations are common between Stoughton and Whittenton Alternatives

Rolling Stock

Two common vehicles and power sources are proposed among the alternatives: diesel and electric locomotives. The rail alternatives would use commuter rail technology on a fixed-guideway system with steel wheels operating on steel rails, with typically a single locomotive pulling 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/60Hz overhead contact system (OCS). Commuter rail trains would consist of five to eight coaches. The coaches would be either single level or bi-level if additional capacity is needed. Single level coaches can carry 125 to 130 passengers and bi-level coaches can carry 175 to 185 passengers.

Locomotives

Electric trains have higher performance characteristics than diesel trains, including acceleration and top travel speeds: 100 mph for electric (without requiring costly signal upgrades) and 79 mph for diesel. Unlike a diesel locomotive, which is self powered, an electric locomotive requires an overhead wire (a catenary) to distribute power to the electric locomotive. MBTA does not currently have electric locomotives in their system, though some diesel powered trains travel on the electrified Northeast Corridor. In almost all other ways these two versions of commuter rail are nearly identical.

The proposed service frequency of the rail alternatives would utilize six or seven train sets ("consists"). Each train set would include one locomotive, five to eight coaches and one cab. Although the number of sets to be purchased varies among alternatives, any electric service would always require seven train sets because electric service is currently not provided and electric train set backups are thus not readily available within the MBTA system, should there be a mechanical failure. An additional (seventh) electric

train set would therefore need to be purchased to serve as backup in case of mechanical failure of any of the six electric train sets.

In terms of *new equipment* to be purchased, the Stoughton and Whittenton Diesel Alternatives would require purchase of only four new train sets. This is because the Stoughton and Whittenton Diesel Alternatives would simply extend the existing Stoughton commuter rail route from its existing terminus in Stoughton, further south to New Bedford and Fall River (i.e., trains already in service would simply travel further distances). The Attleboro Alternatives, however, would not have the benefit of extending existing service and using existing equipment, and therefore would require purchase of all new train sets. In addition to the six train sets that would have to be purchased for operation of the Attleboro Alternative, a backup train set would have to be purchased. This is because as a new service rather than extension of an existing service, there would not be a train set already available to serve as backup in case of mechanical failure. The Attleboro Alternatives would thus require purchase of three more train sets than would need to be purchased for the Stoughton or Whittenton Diesel Alternative. For electric service, all three alternatives would require the purchase of seven new train sets. The following provides a discussion of each alternative and specific improvements required to implement the alternative in addition to the common elements described above.

1.4.2.3 ATTLEBORO RAIL ALTERNATIVES TRACK INFRASTRUCTURE IMPROVEMENTS

The Attleboro Alternative 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. Figure 1.4-3 shows the route of the Attleboro Alternative.

The Attleboro Alternative requires the following track infrastructure improvements (in addition to those in the Southern Triangle common to all rail alternatives):

- Construction of a third track along the Northeast Corridor (NEC) between the proposed Attleboro Bypass and the Readville Interlocking in Boston, a distance of 18.7 miles;
- The Attleboro Bypass: reconstruction of a new two-track railroad on a new right-of-way between the Northeast Corridor and the Attleboro Secondary, a distance of 2.8 miles;
- The Attleboro Secondary: reconstruction of existing tracks from the Attleboro Bypass to Weir Junction, as a single track with one siding, a distance of 9.7 miles.

Infrastructure improvements required for the Attleboro Alternative include constructing, reconstructing, or widening 44 bridges and constructing or reconstructing 39 railroad at-grade crossings.

The Attleboro alternative (electric and diesel) would include eight new commuter rail stations (Barrowsville, Downtown Taunton, Taunton Depot, King's Highway, Whale's Tooth, Freetown, Fall River Depot, and Battleship Cove) and major reconstruction at three existing commuter rail stations (Canton Junction, Sharon, Mansfield) as well as minor work at the existing commuter rail station at Route 128.

The Attleboro Electric Alternative traction power system would include one main substation in Taunton, one switching station in Attleboro, and six paralleling stations (one in Norton, one in Berkley, two in Freetown, one in New Bedford, and one in Fall River).

1.4.2.4 STOUGHTON RAIL ALTERNATIVES TRACK INFRASTRUCTURE IMPROVEMENTS

The Stoughton Alternative would provide commuter rail service to South Station using the Northeast Corridor, Stoughton Line, New Bedford Main Line, and Fall River Secondary. Both electric (Stoughton Electric) and diesel (Stoughton Diesel) commuter rail options were evaluated for this alternative. The New Bedford route would be 54.9 miles long and the Fall River route would be 52.4 miles long. Figure 1.4-4 shows the route of the Stoughton Alternative.

The Stoughton Alternative requires the following track infrastructure improvements (in addition to those in the Southern Triangle common to all rail alternatives):

- Reconstruction of existing tracks of the Stoughton Line from Canton Junction to Stoughton, as double track, a distance of 3.8 miles;
- Construction of new tracks on existing, abandoned right-of-way from Stoughton to Winter Street in Taunton, as one to two tracks, a distance of 15.0 miles; and
- Reconstruction of existing tracks from Winter Street in Taunton to Weir Junction, as a single track, a distance of 1.7 miles.

Infrastructure improvements required for the Stoughton Alternative include constructing, reconstructing, or widening 45 bridges and constructing or reconstructing 46 railroad at-grade crossings.

The Stoughton Alternative would have ten new commuter rail stations (North Easton, Easton Village, Raynham Place, Taunton, Taunton Depot, King's Highway, Whale's Tooth, Freetown, Fall River Depot, and Battleship Cove) and major reconstruction at two existing commuter rail stations (Canton Center and Stoughton).

The Stoughton Electric Alternative would require a traction power system including two main electric 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 WHITTENTON RAIL ALTERNATIVES TRACK INFRASTRUCTURE IMPROVEMENTS

The Whittenton Alternative would provide commuter rail service to South Station through Stoughton, connecting to the existing Stoughton Line using the inactive Whittenton Branch right-of-way through the City of Taunton. Both electric (Whittenton Electric) and diesel (Whittenton Diesel) commuter rail options were evaluated for this alternative. Figure 1.4-5 shows the Whittenton Alternative. The Boston-New Bedford route would be 56.5 miles long and the Boston-Fall River route would be 54.0 miles long.

This alternative requires the following track infrastructure improvements (in addition to those in the Southern Triangle common to all rail alternatives):

- Reconstruction of existing tracks of the Stoughton Line from Canton Junction to Stoughton, as double track, a distance of 3.8 miles;
- Construction of new tracks on an existing, abandoned rail right-of-way from Stoughton to Raynham Junction, as one to two tracks, a distance of 11.6 miles;

- Construction of new tracks on an existing rail right-of-way from Route 138 in Raynham to Whittenton Junction (the former Whittenton Line), as a single track, a distance of 3.5 miles;
- Reconstruction of existing tracks on the Attleboro Secondary from Whittenton Junction to Weir Junction, as a single track with one siding, a distance of 2.4 miles.

The Whittenton Alternative also requires constructing, reconstructing, or widening 42 bridges and constructing or reconstructing 53 railroad at-grade crossings.

The Whittenton Alternative would have ten new commuter rail stations (North Easton, Easton Village, Raynham Place, Downtown Taunton, Taunton Depot, King's Highway, Whale's Tooth, Freetown, Fall River Depot, and Battleship Cove) and major reconstruction at two existing commuter rail stations (Canton Center and Stoughton).

The Whittenton Electric Alternative would require a traction power system that 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).

1.4.2.6 RAPID BUS ALTERNATIVE INFRASTRUCTURE IMPROVEMENTS

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 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. Figure 1.4-6 shows the Rapid Bus Alternative.

Highway Infrastructure

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 replacing 5 bridges and widening 15 bridges along the Route 24 and I-93 highway corridors. Four of the bridges to be replaced are the result of widening Route 24 between Route 140 and I-495 to accommodate the new 6-lane section. The Rapid Bus Alternative would require reconstructing 11 highway interchanges, including eight interchanges on Route 24, as well as the Braintree Split and the Route 24/I-93 interchange in Randolph.

Rapid Bus Stations

The Rapid Bus Alternative would include six new rapid bus stations: Downtown Taunton station in Taunton, Galleria Station in Taunton, King's Highway station in New Bedford, Whale's Tooth station in New Bedford, Freetown Station in Freetown and Fall River Depot in Fall River. All Rapid Bus Stations, except Galleria Station, would be in common with the rail stations. The Rapid Bus Alternative would

utilize the proposed expansion of the existing bus terminal at South Station from 35 to 50 bays. The expansion is part of an existing agreement between MBTA and the Hines Development Group and the environmental review for this project has been completed. The proposed expansion of South Station, while independent of the bus facility project, would be coordinated with the bus terminal to facilitate intermodal connectivity. The expansion of the bus facility is independent of the South Coast Rail Rapid Bus Alternative and the facility would be constructed prior to being used by the Rapid Bus Alternative.

Rapid Bus Layover Facilities

The Rapid Bus Alternative would require midday parking in the Boston area for approximately 35 to 40 buses. The site identified for the midday layover is the Logan Express station site on Interstate 93 in Braintree. The Logan Express site is currently used as a park-and-ride station for buses serving Logan Airport. Direct bus access ramps between the site and the exclusive busway would be constructed. A parking deck would be required to replicate park-and-ride spaces lost to bus storage.

The overnight storage and maintenance facilities for the Rapid Bus Alternative would be located close to the South Coast and Taunton terminals. This avoids buses having to travel far to get to the start of their morning trips or from the end of their evening trips. This alternative would be operated by a private bus company which would secure an overnight layover facility.

1.4.3 OPERATIONS OF ALTERNATIVES

1.4.3.1 NO-BUILD (ENHANCED BUS) ALTERNATIVE OPERATIONS

Enhancements to Bus Operations

Fall River Bus Service – The Fall River commuter bus service for the Boston commute is limited with six inbound and six outbound trips. To offer better service and shorter headways, it is recommended that half hour headways be added to the schedule to enhance ridership during inbound and outbound peak periods to offer more flexible service for the Fall River commuter.

New Bedford Bus Service - The New Bedford commuter bus service uses five buses constantly running throughout the day to cover the 11 inbound trips and 11 outbound trips to Boston South Station Bus Terminal. The service for the Boston commute offers a schedule similar to the Taunton service plan, although less extensive. There are half-hour headways provided for peak period commuters in the peak period direction. It is recommended that half-hour bus headways begin at 4:00 PM and continue to 6:00 PM. This schedule would offer more frequent service and shorter headways and provide more flexible service for the New Bedford commuter.

Taunton Bus Service - The Taunton commuter bus service consist of 15 inbound trips and 14 outbound trips daily. This schedule provides half-hour headways during the morning and evening peak period commuter times and is adequate for current demands. The addition of more buses for 15 minute headways during the peak period is not warranted at this time based on current ridership demands.

Enhancements to Operations at Park-and-Ride Lot Expansion/Bus Stations

Sites in the immediate area around the Silver City Galleria and the Route 24/Route 140 highway interchange could be explored for a potential new expanded park-and-ride/bus station. Such a facility

could integrate local fixed route GATRA bus service which already serves the mall throughout the day. This linkage to local fixed route bus could also encourage ridership on commuter bus.

A bus station and park-and-ride could be combined into one potential intermodal station near the existing Route 106/Route 24 park-and-ride lot. Such a facility could provide full bus access /egress and larger park-and-ride facilities, which might capture additional riders for all three commuter bus services that travel by this location via Route 24.

Depending on future ridership projections, an expansion of the Mt. Pleasant park-and-ride lot in New Bedford may have merit through construction on the existing lot, on adjacent land, or at another suitable location in the general area.

Joint Ticketing System Bus/Rail Enhancements

The commuter rail monthly fare provides a free ride on the MBTA bus or rapid transit for commuters who purchase monthly passes. SRPEDD and the commuter bus operators have advocated transportation policymakers to allow the bus operators to offer the same pass as commuter rail with free access to MBTA bus and rapid transit. A joint ticket for commuter bus would enhance bus service to the region.

1.4.3.2 RAIL ALTERNATIVES OPERATIONS

The NEC, Stoughton Line, Fall River Secondary, New Bedford Main Line, and Attleboro Secondary all currently provide some element of freight or passenger service. Amtrak operates the regional rail service and the high-speed Acela service on the NEC. The MBTA operates five commuter lines on the NEC between South Station and the state line. Each line branches off the corridor with the exception of the Providence service, which travels the entire NEC in the state of Massachusetts. The five branch lines include the Worcester Line, Needham Line, Franklin Line, Stoughton Line, and Providence Line. The NEC Infrastructure Master Plan and other documents such as the application for federal funding for Expansion of Boston South Station have included operational studies regarding the type, amount and frequency of service that can be provided in this section of the NEC between Providence and Boston. These studies indicate that this is a very congested portion of the NEC and that the addition of high-speed service has reduced the reserve capacity on the NEC. This reduction in capacity is exacerbated by the substantial discrepancy in operating speeds between the different types of service on the corridor.

Operating plans for the rail alternatives are similar and were developed to meet the current minimum of the MBTA Service Delivery Policy for commuter rail. Operating plans for all rail alternatives would include three peak period trains to each of the terminal stations of New Bedford and Fall River with a fourth train operating on the shoulder near the peak rush hour periods. This translates to approximately one train every forty minutes from Fall River/New Bedford and one every twenty minutes from Taunton northward. During the off-peak periods six additional trains would operate on a three-hour frequency from each of the terminal stations and every ninety minutes from Taunton northward. This translates to nine round trip trains per weekday operation from each terminal station with one additional round trip from East Taunton for a total of 38 weekday trains per day.

Stations and Stopping Patterns

Each commuter rail alternative would use the same station stops south of Taunton Depot. The alternatives utilize different rights-of-way once they extend north of Weir Junction in Taunton. Table 1-4 summarizes the proposed station stopping pattern for each of the rail alternatives.

The Stoughton and Whittenton alternatives have more station stops largely because the Stoughton and Whittenton alternatives are extensions of existing commuter rail service where established stopping patterns need to be maintained.

The Attleboro Alternative would be a new commuter rail service without established stopping patterns. Under this alternative, South Coast Rail trains would only stop at major stations along the existing NEC so as to not further congest the corridor.

Under the electric variations of the alternatives, South Coast Rail project trains can operate at a Maximum Authorized Speed (MAS) of 100 mph where the infrastructure can support it. For the diesel alternatives, the MBTA trains are restricted to MAS of 70 mph on the branch portion of the line and 79 mph on the Northeast Corridor where the infrastructure can support it. Table 1-5 summarizes the total trip time from each terminal station (New Bedford and Fall River) to South Station based on the station stopping pattern in Table 1-4.

Feeder Bus Service to Train Stations

The feeder bus plan for the South Coast Rail project is envisioned by MassDOT to connect the urbanized communities in the study area to the South Coast stations. Feeder Bus would provide an alternative to driving to stations and would support development in the project area. The Feeder Bus network is envisioned to provide frequent, convenient service connections with trains. Two regional transit authorities currently provide local bus service to the region: Southeastern Regional Transit Authority (SRTA) and Greater Attleboro Taunton Regional Transit Authority (GATRA). Current bus operators would provide enhanced Feeder Bus service to the proposed stations for the selected build alternative.

1.4.3.3 RAPID BUS ALTERNATIVE OPERATIONS

The operating plan for the Rapid Bus Alternative assumes 15-minute peak headways on the branches with express service from each station to Boston. These headways match the modeled ridership demand for the service. The alternative provides eight peak period trips between each terminal station and Boston's South Station. The alternative would provide a new transportation service, not an extension or modification of an existing service.

During the morning peak, buses would use the general purpose travel lanes of Route 24 and Route 140 from the terminal stations to a new zipper lane on Route 24 starting at the Interstate 495 interchange. A moveable barrier system, stored against the permanent median barrier during non-peak hour traffic, would be shifted to create the zipper lane for the buses using a barrier transfer machine before the bus service starts. The zipper lane would utilize the southbound, off-peak direction of Route 24. Once the morning peak service is complete, the movable barrier system would be shifted back to the center median to open three general purpose lanes in each direction of Route 24. For the evening peak, the

Table 1-4 Train Station Stopping Pattern for All Rail Alternatives

Attleboro Alternatives		Stoughton Alternatives		Whittenton Alternatives	
New Bedford Trains	**Fall River Trains**	**New Bedford Trains**	**Fall River Trains**	**New Bedford Trains**	**Fall River Trains**
Whale's Tooth	Fall River Depot	Whale's Tooth	Fall River Depot	Whale's Tooth	Fall River Depot
King's Highway	Freetown	King's Highway	Freetown	King's Highway	Freetown
Taunton Depot Downtown Taunton	Taunton Depot Downtown Taunton	Taunton Depot Taunton	Taunton Depot Taunton	Taunton Depot Downtown Taunton	Taunton Depot Downtown Taunton
Barrowsville	Barrowsville	Raynham Place	Raynham Place	Raynham Place	Raynham Place
Mansfield	Mansfield	Easton Village	Easton Village	Easton Village	Easton Village
--	--	North Easton	North Easton	North Easton	North Easton
--	--	Stoughton	Stoughton	Stoughton	Stoughton
--	--	Canton Center	Canton Center	Canton Center	Canton Center
--	--	Canton Jct	Canton Jct	Canton Jct	Canton Jct
Route 128	Route 128	Route 128	Route 128	Route 128	Route 128
		Hyde Park	Hyde Park	Hyde Park	Hyde Park
		Ruggles		Ruggles	
Back Bay	Back Bay	Back Bay	Back Bay	Back Bay	Back Bay
South Station	South Station	South Station	South Station	South Station	South Station
9 Stops	9 Stops	15 Stops	14 Stops	16 Stops	15 Stops

Table 1-5 Train Trip Duration (hr:min) for all Rail Alternatives

	Attleboro Alternatives		Stoughton Alternatives		Whittenton Alternatives	
Motive Power	**New Bedford Trains**	**Fall River Trains**	**New Bedford Trains**	**Fall River Trains**	**New Bedford Trains**	**Fall River Trains**
Diesel	1:24	1:22	1:25	1:23	1:36	1:34
Electric	1:15	1:12	1:16	1:13	1:27	1:25

barriers would be shifted again to create a zipper lane for the buses utilizing a lane from the northbound, off-peak direction of Route 24.

The service would provide at least one trip per hour in the off-peak direction during peak periods and one trip per hour in both directions during off-peak periods. The actual reverse peak and off-peak trips would be greater if vehicles recycle to provide more than one peak directional trip. Buses travelling in the off-peak direction would use the bi-directional exclusive bus lanes along Route 128 between the Braintree Split and the Logan Express terminal if this provides a travel advantage. These buses would use general purpose lanes for the remainder of the trip since the zipper lanes would be one-directional.

Should ridership on any of the branches require additional service beyond that provided by 15-minute headways, buses would depart in platoons. Table 1-6 summarizes the operational characteristics of the Rapid Bus alternative. Travel times reflect the capacity constraint posed by changes in station locations and future capacity constraints in the South Coast region as well as constraints posed by the existing

zipper lane along I-93. The zipper lane is projected by CTPS to reach capacity by the year 2030, resulting in travel times similar to those of the general-purpose lanes.

Table 1-6 Peak Directional Rapid Bus Operations Summary

	Estimated Travel Time (hr:min)	Peak Frequency (min)
New Bedford	1:43	15
Fall River	1:31	15
Downtown Taunton	1:08	15
Galleria Station	1:06	15

Considering the capacity constraints of the zipper lane by 2030 and its effect on the performance of the Rapid Bus Alternative, alternative zipper lane policies to increase zipper lane capacity were evaluated. These included the following: 1) the zipper lane under existing operation with free-flow condition, a scenario that cannot be achieved, 2) a bus only operation in the zipper lane, 3) a three plus operation, and 4) a two plus operation. The analysis indicated that the estimated two plus operation and the estimated three plus operation would be comparable in terms of AM peak travel time, boardings and diversion of auto users to passenger transportation. The bus-only zipper lane policy cannot be reasonably anticipated for several reasons, including its negative impact on congestion levels in the general purpose lanes and associated impact on air quality as a result of the increased congestion. The evaluation indicated that the Rapid Bus Alternative would be affected by highway congestion levels, which impacts the Rapid Bus Alternative's travel time and estimated ridership, regardless of changes to the zipper lane policy. Continuation of the current zipper lane policy which permits vehicles with two or more passengers (two plus) was therefore deemed reasonable and appropriate.

Rapid Bus service would be provided by a private contractor, with appropriate subsidies to purchase, operate and maintain the bus fleet and for terminal maintenance and layover facilities.

Rapid Bus Station Stopping Patterns

The Rapid Bus Alternative would include four branches in the project area. Inbound service would originate from New Bedford, Fall River, downtown Taunton, and Taunton Silver City Galleria. Each branch would operate with a maximum of two stations in the South Coast region. The Taunton branches would have one Taunton station per branch. While all four branches converge on Route 24 near Taunton, the only station shared by all the branches is South Station. Table 1-7 summarizes the station stopping patterns for the four branches.

Table 1-7 Rapid Bus Station Stopping Patterns along Four Branches

New Bedford Buses	Fall River Buses	Taunton (Downtown) Buses	Taunton (Galleria) Buses
Whale's Tooth	Fall River	Downtown Taunton	Galleria Station
King's Highway	Freetown		
South Station	South Station	South Station	South Station
3 Stops	3 Stops	2 Stops	2 Stops

Rapid Bus Vehicles

The vehicle for the service would be an approximately 45-feet long highway motor coach with approximately 50 forward facing seats, similar to those currently in use by private operators of existing commuter bus service in the corridor and in other regions. For the long distance coach application for this alternative, a "Clean diesel" bus is proposed with the potential for alternative fuels. The Rapid Bus operating plan would require 58 new buses.

1.4.4 RIDERSHIP OF ALTERNATIVES

In order to estimate future ridership projections for the South Coast Rail alternatives, the Central Transportation Planning Staff (CTPS) used a regional travel demand model. The travel demand model relies on the following elements and assumptions to estimate future ridership projections for each alternative: operating plan, station location, station parking (availability and cost) and transit fare, along with demographic forecasts created by the local Regional Planning Agencies (RPAs).

Key indicators of shifts in transit ridership resulting from the alternatives are: new transit trips at the proposed South Coast Rail project stations, new linked-trips, new system-wide trips and the total reduction in vehicle miles travelled (VMT). The number of new station boardings is an indicator of the overall benefit to the region provided by each alternative.

The total number of *linked trips* per alternative represents the shift in travel options that would be available due to a South Coast Rail project alternative. For instance, residents of the South Coast communities currently have few options outside driving to work. With the South Coast Rail project, people would have an additional option. The additional transit choice presented by the project would increase the number of people who would choose to take transit to work. This number is represented in the linked trips increase and represents the number of people who would have otherwise driven to work.

New system-wide boardings represent the overall draw to the commuter rail transit system due to the South Coast Rail project. This total is also used to calculate overall cost effectiveness of the project.

The *Vehicle Miles Traveled* (VMT) measure quantifies how many miles of travel by car would be removed from the region due to an alternative. As people switch from driving to using the new transit alternative, the reduction in VMT correlates to air quality benefits due to the alternative. A summary of ridership parameters for each alternative is presented in Table 1-8.

The ridership projections assume that the various alternatives would generally abide by the travel times identified above (Tables 1-5 and 1-6), with reasonable on-time performance. These numbers do not account for reductions in ridership that would accrue from poor on-time performance should any of the alternatives fail to meet MassDOT's Service Delivery Policy.

1.4.5 CAPITAL COSTS OF BUILD ALTERNATIVES

This section summarizes the estimated capital costs for the Build Alternatives. For the rail alternatives capital costs include the cost of new infrastructure such as new track and stations, and cost of new

Table 1-8 Ridership Breakdown for All Alternatives

	No-Build (Enhanced Bus)	Attleboro Alternatives		Stoughton Alternatives		Whittenton Alternatives		Rapid Bus
		Electric	Diesel	Electric	Diesel	Electric	Diesel	
Total Station Inbound Boardings	2,360	4,680	4,020	4,790	4,070	4,820	4,020	2,100
Total Daily Ridership	4,720	9,360	8,040	9,580	8,140	9,640	8,040	4,200
Total New Linked Boardings	400	5,300	4,500	5,900	5,000	5,500	4,600	1,700
Total New System Wide Transit Boardings	1,400	11,130	9,570	11,510	9,800	10,430	9,570	3,720
Total Reduction in VMT	75,100	296,600	256,400	295,900	228,700	228,000	174,000	81,500

transportation equipment, such as rail cars. The projected costs do not include those associated with the Boston mid-day layovers solution and the expansion of South Station, as they are independent projects from the South Coast Rail project. Capital costs for the Rapid Bus Alternative include the cost of new infrastructure such as modification to bridges, the highway, stations and the new zipper lane as well as the cost of new transportation equipment, such as buses. Table 1-9 provides a summary of the cost estimate for each Build Alternative.

Table 1-9 Summary of Capital Costs (in 000's) – All Build Alternatives

	Attleboro[1]		Stoughton		Whittenton		Rapid
	Electric	Diesel	Electric	Diesel	Electric	Diesel	Bus
Total Infrastructure	$979,059	$826,786	$944,904	$762,925	$905,202	$719,612	$449,777
Real Estate	$64,004	$63,784	$65,226	$64,316	$62,984	$62,064	$12,770
Professional Services	$132,662	$112,030	$128,034	$103,376	$122,655	$97,507	$60,945
Contingency	$310,362	$262,091	$299,535	$241,847	$286,949	$228,117	$142,579
Vehicles	$180,970	$163,972	$180,970	$103,832	$180,970	$103,832	$34,800
Total (in 000's)	**$1,667,057**	**$1,428,663**	**$1,618,669**	**$1,276,297**	**$1,558,760**	**$1,211,132**	**$700,871**
Year-of-Expenditure	$2,013,643	$1,722,471	$1,884,465	$1,484,652	$1,814,719	$1,408,751	$811,579

Notes:
Total infrastructure costs were estimated in 2009 dollars.
Professional services are 13.55% of infrastructure costs without contingency. Professional services include Design, Permitting, Construction Phase Inspection & Project Management.
Contingencies are 31.70% of infrastructure costs and include Indirect Soft Costs, Mitigation Contingency, and Construction Contingency.
Escalation was calculated at 3.25% per year per FTA criteria.
1. Attleboro Alternatives do not include the cost associated with a fourth track on a segment of the NEC

1.4.6 PRELIMINARY EVALUATION OF DEIS/DEIR ALTERNATIVES

This section provides an overview of the performance of the alternatives with regard to achievement of the purpose and need (overall project purpose), their practicability and their environmental impacts, in particular with regard to aquatic resources.

The evaluation described below was conducted following the requirements of the ENF certificate, and is consistent with the 404(b)(1) Guidelines for determining the Least Environmentally Damaging Practicable Alternative (LEDPA).

This section summarizes and compares the characteristics of the build alternatives analyzed in this DEIS/DEIR. The discussion includes a set of evaluation criteria that are consistent with the evaluation criteria utilized in the earlier stages of alternatives screening, but more refined in consideration of the more detailed level of information available. To facilitate an understanding of how the alternatives differ regarding the various criteria, each alternative was characterized through a scoring process of relative performance on a specific criterion. The scoring was developed for each criterion using the best performing alternative as a baseline. How well an alternative performed on a criterion was weighed against that baseline.

1.4.6.1 PROJECT PURPOSE MEASURE

Each of the build alternatives was evaluated in the DEIS/DEIR regarding its ability to meet the project purpose: "to more fully meet the existing and future demand for public transportation between Fall River/ New Bedford and Boston, Massachusetts to enhance regional mobility." The evaluation was based on the following measures: (1) ridership demand, (2) improvement of quality of service, (3) reduction of vehicle miles traveled (VMT) and (4) improvement of regional mobility.

The Stoughton Electric Alternative meets all project purpose measures to the greatest degree, followed closely by the Stoughton Diesel Alternative and the Whittenton Electric Alternative. The Attleboro Alternative, while it meets all the other project purpose measures, fails to meet the basic service delivery requirements, mostly due to poor on-time performance. The Rapid Bus Alternative performs most poorly among the build alternatives as it fails on two measures: Regional Mobility and VMT reduction.

In addition to the criteria above, MassDOT's Project Purpose includes the extent to which the alternatives would support smart growth planning and development strategies in affected communities.

As stated in the South Coast Rail Economic Development and Land Use Corridor Plan, commuter rail service to the South Coast is expected to generate nearly $500 million in new economic activity every year. This is new growth by the year 2030 that would not occur without the new infrastructure. The rail connection is projected to create between 3,500 and 3,800 net new jobs within the Commonwealth by 2030—about two-thirds of which would locate in the South Coast region with the remaining third in Boston-Cambridge and other communities outside the region.

The Corridor Plan would be implemented by MassDOT throughout the 31-community region regardless of which alternative was selected, so there would be no substantive difference among alternatives with regard to the majority of smart growth benefits resulting from the Corridor Plan. The principal differences among the alternatives would be with regard to their ability to promote concentrated

development (transit-oriented development) at station areas. While the alternatives would provide varying magnitudes of Transit Oriented Development (TOD) potential, all the Build Alternatives would provide opportunity for smart growth.

1.4.6.2 PRACTICABILITY MEASURE

The practicability of construction or operation for each of the proposed alternatives analyzed in this DEIS/DEIR was based on the 404(b)(1) Guidelines definition of practicable[7]: "capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purpose." The following three sub-criteria were used to evaluate how practicable the alternatives are: Cost per Rider, Construction Schedule and On-Time Performance.

The Stoughton and Whittenton Alternatives perform well across the board on the practicability measure. The Rapid Bus alternative does not perform well on the practicability measure, particularly on the cost per rider, which has the Rapid Bus Alternative at a cost of close to $100 per rider.

The Attleboro Alternatives perform poorest overall on the practicability measure. The network simulation analysis indicated that the Attleboro Alternatives are operationally infeasible as they do 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 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 of the construction costs and schedule implications as well as key property and other impacts associated with the construction of a fourth track. Between Readville Station and Forest Hills Station the fourth track would be constructed on the north side of the NEC within existing real estate. Between Forest Hills Station and Ruggles Station/Massachusetts Avenue the fourth track would be constructed on the south side of the NEC requiring demolition of the existing southern retaining wall and expansion of the existing cut section. Several Orange Line stations would need to be reconstructed in this area to accommodate the addition of the fourth track on the north side of the NEC. In addition to the multiple overhead bridge crossings, this section of the corridor contains a large amount of area where the existing track cut section is covered with parks or other recreational spaces. In these sections, the existing parks on the roofs would be removed and then replaced after the cut section has been widened. This includes Southwest Corridor Park, a 4.7 mile, 52-acre linear park stretching from Forest Hills Station to Back Bay Station that opened in 1987 and is owned and maintained by the Massachusetts Department of Conservation and Recreation. Permanent impacts to Southwest Corridor Park would result from the loss of 2.85 acres of parkland, and temporary impacts would include the loss of 8.54 acres of parkland throughout construction, for approximately 3-6 years at each construction zone. Existing utilities located along the corridor, including Southwest Corridor Park, on the south side of the existing tracks would need to be relocated in order to extend the cut section to the south. Between Ruggles Station/Massachusetts Avenue and Back Bay Station the corridor enters a cut section with a structural cap that runs under the Southwest Corridor Park north towards Back Bay and along a dense urban setting with many residential and commercial buildings, including high-rise

[7] 40 CFR 230.3(q)

structures, in the South End abutting the right-of-way. To avoid displacement impacts to the large number of business owners and residents, the fourth track would be constructed within the right-of-way of the Orange Line. This would avoid the need to widen the cut section and demolish numerous residential and commercial properties. The MBTA Orange Line service would be relocated to a new tunnel extension under the NEC approximately two miles from just east of Back Bay to just east of Ruggles Station. This would require the reconstruction of two Orange Line stations (Massachusetts Avenue and Back Bay). In order to construct the new tunnel underneath the existing Orange Line tracks and connect in to the existing tracks at the ends, Orange Line service from Tufts Medical Center to Forest Hills would need to be suspended and replaced with bus service for two years.

The length of time it would take to complete the fourth track would be approximately 10 to -12 years. Even considering that some of the fourth track construction activities could coincide with other construction activities for the Attleboro Alternative, the total construction period would be more than double that of any of the other alternatives under consideration, for which construction is estimated at 4 to -5 years and would far exceed the four-year construction schedule outlined in Governor Patrick's South Coast Rail, A Plan for Action.

There are several substantial cost items associated with the construction of the fourth track, including a 1.4-mile new tunnel extension of the Orange Line and retrofitting the existing Orange Line tunnel to accommodate commuter rail trains (with new ventilation), shuttle service for two years to replace the Orange Line during construction, reconstruction of Orange Line stations and construction and reconstruction of bridges, pedestrian overpasses, cut section roofs and retaining walls, and property acquisition costs. Construction of a fourth track to avoid the above delays would result in an additional construction cost for the Attleboro Alternative of more than $2.4B. This places it far above the other alternatives and even above the Middleborough Alternative, which was eliminated from further consideration earlier in the screening process, partially due to cost.

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 infeasible. In a previous study, the 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 has indicated to the Corps that it considers this alternative infeasible and appropriate to delete from any further environmental review/ consideration.[8]

1.4.6.3 ENVIRONMENTAL IMPACTS MEASURE

A preliminary comparison was made among alternatives with regard to their impacts on specific resources including impacts to wetlands, Areas of Critical Environmental Concern (ACECs), threatened and endangered species, protected open space, public water supplies, land use, noise, air quality and environmental justice communities.

These resources were selected from a full range of resources because they are principal categories that either must be considered for permits and approvals and/or represent the greatest magnitude of

[8] Email correspondence from FRA to Army Corps. March 3, 2010.

change among the alternatives. This screening process was undertaken in a manner compatible with the Corps' *Highway Methodology*[9] to screen alternatives and ensure that a transportation agency's preferred alternative is consistent with federal wetlands regulations.

The Attleboro Alternatives would result in the greatest combined environmental impact with regard to the above resources, while the Rapid Bus Alternative followed as a close second, followed by the Stoughton Electric. The Stoughton Diesel and the Whittenton Alternative performed best on the measure of environmental impact.

The evaluation of alternatives as described above and in greater detail in Section 3.3 of the DEIS/DEIR provides only a relative indication of performance across-the-board and do not pertain to site-specific or systemic impacts to a specific resource that could exceed the importance of the performance as indicated in the preceding discussion. In addition, the effects of mitigation are not weighed in the discussion above. Furthermore, only a limited set of resources were included in the evaluation, although these were the resources that made the greatest difference among the alternatives. Environmental benefits, such as those associated with electric options (compared to diesel options), including air quality benefits, are not part of the above discussion of environmental impacts. A summary of impacts and mitigation for all resources is provided in Section 1.5 below, with additional and more detailed information provided in Chapters 4 and 5.

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 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 DEIS/DEIR. Table 1-10 at the end of this Executive Summary provides a summary of 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 8,040 to 9,640 daily transit trips at proposed South Coast Rail stations. Of the rail alternatives, ridership projections were highest for the Whittenton Electric Alternative and lowest for the Attleboro Diesel and Whittenton Diesel Alternatives. Unlike the Stoughton Alternative for which a large number of passengers would board stations in the Southern Triangle area (especially in Fall River and New Bedford), the Whittenton Alternative would have far fewer boardings at Southern Triangle stations and instead would see a relatively large number of passengers boarding in the Taunton area, especially at the Downtown Taunton station. The Rapid Bus Alternative would result in substantially lower ridership than all of the rail alternatives, with a total of 4,200 daily trips at the proposed bus stations.

The ridership projections assume that the various alternatives would have reasonable on-time performance. The ridership projections do not account for reductions in ridership that would accrue from poor on-time performance should any of the alternatives fail to meet MassDOT's Service Delivery Policy (see Section 1.5.3).

1.5.1.2 TRAVEL TIMES

Reduced travel time is an important indicator of beneficial effects on transportation 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. Since New Bedford/Fall river commuters currently rely on cars and private bus services, an improved quality of service would 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 in the peak period and is expected to increase an additional 10 to 30 minutes by 2030 due to congestion.

The Attleboro Electric and Stoughton Electric Alternatives offer the fastest travel times to Boston (between 72 and 76 minutes depending on the origin station and alternative). Travel times would be approximately 10 minutes longer than this under the Attleboro Diesel and Stoughton Diesel Alternatives. The electric versions of these alternatives have shorter travel times due to the quicker accelerations and higher maximum speeds of electric commuter rail compared to diesel-powered commuter rail.

The Whittenton Alternatives (electric and diesel) would have longer travel times compared to the Attleboro or Stoughton Alternatives using the same commuter rail technology because of the longer route involved and greater number of station stops.

The Rapid Bus Alternative would result in the longest travel time (103 minutes) from New Bedford to Boston of any of the Build Alternatives due to congestion on the roadway network, which is expected to increase by 2030. This would still be faster than travel by car in the year 2030.

1.5.1.3 TRANSIT IMPACTS AND OPERATIONAL PERFORMANCE

Efficient transit operations in adherence to the MBTA's on-time standards are important indicators of beneficial effect of an alternative on the transportation system, as it enhances the transportation system with greater capacity. However an alternative that increases capacity but does so to the detriment of the existing transit operations would be considered to have an adverse impact on the operation of the transit system. The Stoughton, Whittenton and Rapid Bus Alternatives would all have acceptable operational performance and would meet MBTA's on-time standards. However, a rail network simulation analysis indicated that the Attleboro Alternatives are operationally infeasible as they do not meet the MBTA on-time standard in the morning peak and would experience even worse on-time performance during the evening peak commute. In addition, the Attleboro Alternatives would 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. Construction of a fourth track along the Northeast Corridor (NEC) to address the operational infeasibility

of the Attleboro Alternative is considered impracticable due to construction cost, schedule and environmental impacts, as summarized above in the practicability evaluation of the alternatives. The Rapid Bus Alternative would not affect the performance of the rail system.

1.5.1.4 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 Attleboro Electric and Stoughton Electric Alternatives achieve the greatest reduction in daily vehicle miles travelled (VMT) of all the alternatives. The reduction difference between these alternatives and their respective Diesel alternatives is approximately 40,000 daily VMT for Attleboro and 67,000 daily VMT for Stoughton. The Rapid Bus Alternative would achieve the least reduction in vehicle miles traveled of all the alternatives.

1.5.1.5 INTERSECTION TRAFFIC IMPACTS

The rail or bus 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 for 25 impacted intersections under the Attleboro Alternatives, 33 impacted intersections under the Stoughton Alternatives and 32 impacted intersections under the Whittenton Alternatives. No mitigation for intersection traffic impacts is proposed for the Rapid Bus Alternative.

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.

1.5.1.6 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 Attleboro Alternatives would require the lowest number (39) of reconstructed or newly constructed railroad at-grade crossings. The Whittenton Alternatives would require the largest number (53) of new or reconstructed railroad at-grade crossings. The Stoughton Alternatives would require an intermediate number (46) 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 Stoughton Alternatives would require the largest area of land acquisition (103 to 107 acres), compared to 88 to 91 acres under the Attleboro Alternatives and 75 to 79 acres under the Whittenton Alternatives. The electric versions of each of the rail alternatives require slightly larger amounts of land acquisition than the diesel versions because of the need for traction power substations with the electric alternatives. The Rapid Bus Alternative would require substantially less land acquisition than the rail alternatives (26 acres). 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 Attleboro Alternatives would require 6 residential displacements and 6 business displacements. The Stoughton Alternatives would require 4 residential displacements and 4 business displacements. The Whittenton Alternatives would require 3 residential displacements and 4 business displacements. The Rapid Bus Alternative would not require any residential displacements, but would require 4 business displacements.

Communities that would be impacted by residential displacements (Raynham and Mansfield) or business displacements (Mansfield and Fall River) have sufficient real estate capacity to absorb these displacements. Approximately 30 similar residential properties are currently for sale in Raynham, and 350 in Mansfield. The commercial property vacancy rate in Mansfield ranges between 13 and 18 percent. Commercial property vacancy rates in Fall River were not readily available; for comparison, the rate in nearby New Bedford is approximately 24 percent.

1.5.3.2 MUNICIPAL TAX REVENUE LOSS

The Rapid Bus Alternative would require the least amount of property acquisition and result in the least amount of municipal tax loss, in comparison to other alternatives. Loss of municipal tax revenue would be the highest under the Attleboro Alternatives. The largest component of the property tax revenue loss calculation (applicable to all rail alternatives) is the $40,411 estimate of loss for the Fall River Depot Station, an order of magnitude greater than for any other single element except for the $26,126 estimate of loss for the Mansfield Station. Since this Fall River Depot Station is common to all alternatives, this value dominates the total property tax revenue loss calculation for all alternatives. Conversely, the Mansfield Station is unique to the Attleboro Alternatives, and the combination of these

two values substantively raises the property tax revenue impact that would result from the Attleboro Alternatives as compared to others.

1.5.3.3 NEIGHBORHOOD FRAGMENTATION

There are moderate differences in neighborhood fragmentation effects among the rail alternatives. Where active rail service is currently provided (Fall River Secondary, New Bedford Main Line, Attleboro Secondary, active portion of Stoughton Line, and Northeast Corridor), no neighborhoods would be fragmented by the construction, reconstruction, or operation of the proposed commuter rail service. Where rail lines are out-of-service (inactive portion of Stoughton Line and Whittenton Branch) or have never previously existed (Attleboro Bypass), varying degrees of neighborhood fragmentation may result. Along the inactive portion of the Stoughton Line, some residential and commercial activity encroachment into the right-of-way has occurred, and 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. This appears to have been less common along the out-of-service Whittenton Branch, where residential neighborhoods tend to be located on one side of the alignment or the other. Accordingly, there would be less of a neighborhood fragmentation effect along the Whittenton Branch. The new Attleboro Bypass alignment would parallel an electrical transmission line corridor and pass near some low-density or rural neighborhoods. This alignment would not bisect any neighborhoods, but could temporarily disrupt traffic along rural roads connecting the neighborhoods when trains would be using the at-grade crossings. Each rail alternative contains at least one segment with some neighborhood fragmentation effect. Although not quantifiable, a qualitative ranking of the rail alternatives, from the greatest to the least effect, with the key contributing factors, is as follows:

- Attleboro Alternatives (new railroad construction for the Attleboro Bypass)
- Whittenton Alternatives (railroad reconstruction between Stoughton Station and Raynham Junction, and between Raynham Junction and Weir Junction)
- Stoughton Alternatives (railroad reconstruction between Stoughton Station and Weir Junction).
- The Rapid Bus Alternative is not expected to have any neighborhood fragmentation effect.

1.5.4 ENVIRONMENTAL JUSTICE

While some noise impacts would disproportionately affect environmental justice neighborhoods under the rail alternatives, these noise impacts would be mitigated (See Section 1.6.5). None of the impacts of the Build Alternatives would result in disproportionately high and adverse human health or environmental effects to environmental justice populations.

The beneficial effects to environmental justice populations that would result from the South Coast Rail Project vary considerably by alternative and community. The environmental justice populations in Fall River would see the greatest improvement in access and travel time to jobs, while the environmental justice populations in New Bedford would receive the least benefit. A broad range of improvements in access to jobs for environmental justice populations in Taunton would result from the entire range of Build Alternatives. The Attleboro and Stoughton Alternatives would provide the greatest overall benefits to, and the least adverse impacts among the rail alternatives, for environmental justice populations. The Rapid Bus Alternative would provide the least benefits to and the least overall adverse impacts on environmental justice populations.

1.5.5 VISUAL RESOURCES

The overall impacts to visual and aesthetic resources resulting from improving or constructing the rail alternatives would not vary considerably between the alternative alignments. Although all rail alternatives are rated with an overall moderate visual impact, each rail alternative alignment has at least one element with a substantial visual impact at the local level. The Attleboro Alternatives would substantially impact the visual environment for approximately 2.8 miles along the new Attleboro Bypass and at the Canton Viaduct. The Stoughton and Whittenton Alternatives would substantially impact the visual environment at the historic Easton train station 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 through the Hockomock Swamp wildlife management area, but will have a visual impact; however, there is limited public access to this area. Electric alternatives would have higher visual impacts than diesel alternatives due to the electrical infrastructure requirements.

Impacts to visual and aesthetic resources resulting from the Rapid Bus Alternative would be less than those of the rail alternatives. The visual environment along the highway alignments would be minimally impacted from changes to the already disturbed landscape of existing, active transportation corridors.

Visual impacts at station sites would vary locally, but overall there would be no important variations between the visual impacts of the package of stations for each alternative. Substantial visual impacts would result at the Mansfield Station for the Attleboro Alternatives and at the Easton Village Station for the Stoughton and Whittenton Alternatives. Beneficial visual impacts would result at the Fall River Depot Station for all alternatives and at the Taunton Station for the Stoughton Alternatives.

1.5.5.1 MITIGATION FOR VISUAL IMPACTS

Generally, mitigation for visual impacts 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. Unnecessary clear-cutting of trees and vegetation along the railroad rights-of-way would be avoided.

Where prudent, equipment including traffic signals and controller cabinets, street lights, street furniture, overhead catenary system poles, and railroad signal equipment housings would be dark colored to reduce the visual impact of this equipment. Special design of a low visual impact overhead catenary system would be considered where appropriate. Traffic signals and street lights would be of ornamental type in accordance with the towns' preferences to the extent reasonably possible, and would feature downward-facing hoods to minimize light pollution. Fencing where required will be implemented in consideration of local preferences and guidelines to the extent reasonably possible. Additional visual resource mitigation measures will be explored in detail during final design.

1.5.6 NOISE

The noise analysis for the South Coast Rail project identified potential noise impacts by comparing the existing sound levels to projected future sound levels in accordance with Federal Transit Administration (FTA) guidance. There are two levels of noise impacts—moderate and severe. Moderate noise impacts

involve a change in the cumulative noise level that is noticeable to most people, but may not be sufficient to cause strong, adverse reactions from the community. Severe impacts involve sounds levels that can be expected to cause a significant percentage of people to be highly annoyed by the new noise and represent the most compelling need for mitigation.

The Rapid Bus Alternative is not expected to result in any noise impacts. The Stoughton Diesel and Whittenton Diesel Alternatives would have the least noise impact of all the rail alternatives. Noise impacts are lower for diesel alternatives largely due to the traveling speeds of commuter trains; electric-powered trains travel faster than diesel-powered trains and therefore generate more noise. Trailing close behind on least noise impacts are the Stoughton and Whittenton Electric Alternatives. Attleboro Electric and Diesel result in the largest number of noise impacts out of the rail alternatives.

1.5.6.1 MITIGATION FOR NOISE IMPACTS

All of the severe noise impact locations were evaluated for noise mitigation measures. Noise mitigation including noise barriers, potential sound insulation treatments, and rail lubrication would be feasible, reasonable, and effective in mitigating all potential noise impact due to the proposed Project for all alternatives. The noise barriers would be effective in reducing noise levels from transit sources generally seven to 11 decibels and would result in substantial reduction in future noise levels in comparison to existing noise levels. The implementation of noise mitigation measures will substantially reduce the number of moderate and severe noise impacts. The preliminary mitigation recommendations would be refined further during the final design process.

1.5.7 VIBRATION

Vibration impacts of the South Coast Rail alternatives reflect annoyance and would not rise to a level considered to cause structural damage. The vibration impacts from the Stoughton Alternatives and the Whittenton Alternatives are similar (146 impacts vs. 150 impacts), because both of these alternatives follow the same track alignment for most of the corridor, except for the section between the Whittenton Branch turnout and Weir Junction. The Attleboro Alternatives result in the fewest impacted receptors (117 impacts) out of the rail alternatives.

The Rapid Bus Alternative results in no vibration impacts because the rubber tired buses generate much lower vibration levels than the trains, and because the buses operate on highways where the receptors are located more than 40 feet from the roadway.

1.5.7.1 MITIGATION FOR VIBRATION IMPACTS

Vibration mitigation is generally provided by installing ballast mats under the tracks to absorb or reduce the vibration levels before they enter the ground and propagate to the nearby receptors. In accordance with FTA guidance, a more detailed vibration analysis would be performed during final design for the preferred alternative before installing ballast mats.

Other vibration mitigation commitments applicable to specific areas include the use of spring-loaded “frogs” (sections of railroad track at a switch that guide rail car wheels from one track to the other) or changes in the design of the layover facilities to avoid placing switches near sensitive receptors.

During construction, if pile driving is required, vibration impacts can be reduced by pre-augering the hole so that the actual impact driving of the pile would only occur during the last few feet of installation. Another mitigation measure is sonic or vibratory pile driving (93 VdB at 25 feet), where the pile is vibrated into the ground eliminating the need for an impact hammer.

1.5.8 CULTURAL RESOURCES

The overall impacts to historic and archaeological resources vary considerably among the alternatives. Each of the rail alternatives would be similar in its adverse effects to historic structures, with impacts ranging from six (Stoughton) to eight (Attleboro). The majority of these effects, for all alternatives, would result from reconstructing historic bridges to accommodate an additional track, or to meet Federal Railroad Administration loading standards for commuter rail trains. Each of the rail alternatives would also result in indirect impacts to historic properties as a result in the change in setting (visual impacts) or increased noise (which could affect quiet setting or could result in noise mitigation that would alter the appearance or setting of a structure). These indirect effects (only visual, only noise, or a combination of the two) would impact the fewest properties (39) for the Attleboro Diesel Alternative, and the largest number of properties (72) for the Whittenton Electric Alternative. The vibration analyses for each of the diesel and electric alternatives indicate that the vibration levels from train pass-bys are below the threshold to cause structural damage to surrounding buildings or structures. The Rapid Bus Alternative would have no direct or indirect impacts to historic properties, pending the results of additional surveys prior to completion of environmental review and more detailed design.

Each of the alternatives would have the potential to affect known archaeological resources and areas of archaeological sensitivity (which would require further investigation to determine if archaeological resources were present). The Attleboro Alternatives and the Rapid Bus Alternative would not affect any known sites, while the Stoughton and Whittenton Alternatives would be likely to affect two known sites. Areas of archaeological sensitivity affected by the alternatives range from nine (the Attleboro Alternatives) to four (the Whittenton Alternatives and the Rapid Bus Alternative). There may also be the potential that traditional cultural properties may be affected. Should such potential exist, this would be resolved through dialogue with the tribes.

Specific mitigation commitments for cultural resources will be informed by additional, more detailed archeological and historic survey fieldwork and additional design detail for the preferred alternative and consultation with the tribes in the case of traditional cultural properties. 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 or other approaches will be considered.

Unavoidable impacts to archaeological resources will be identified by further analysis of specific construction sites and appropriate avoidance, minimization or mitigation selected during the Section 106 consultation process. Where impacts to archaeological resources are unavoidable, MassDOT will proceed with subsequent detailed site investigations and/or data recovery as may be stipulated in a Memorandum of Agreement (MOA) or Programmatic Agreement (PA) developed for this project. Where

the potential exists that traditional cultural properties could be affected, this would be resolved through dialogue with the tribes.

1.5.9 AIR QUALITY

The air quality analyses show that none of the alternatives would result in exceedances of the National Ambient Air Quality Standards intended to protect public health. The predominant sources of air pollution anticipated from the proposed South Coast Rail project include emissions of carbon monoxide (CO), nitrogen oxides (NOx), and volatile organic compounds (VOCs) from locomotive engines and from motor vehicles traveling to and from the train stations. However, there would be fewer motor vehicles traveling between south coast communities and greater Boston, resulting in net benefits to air quality from all of the alternatives. The Attleboro Electric and Stoughton Electric Alternative would have the most substantial air quality benefits of all the alternatives. Emissions of (regional criteria) air pollutants associated with any of the Build Alternatives would be 0.25 percent lower than those associated with the No Build (Enhanced Bus) Alternative.

The ridership projections and associated VMT reduction and air quality benefits for the Attleboro Alternatives do not take into account the decrease in ridership of the Attleboro Alternative that would result from its reduced reliability. Because of its poor reliability, air quality benefits for the Attleboro Alternatives are thus anticipated to be lower than projected.

As the project would reduce operational phase emissions, no operational air quality mitigation commitments are proposed. Construction air quality mitigation will include compliance with all applicable regulations for the control of construction vehicle emissions (e.g. maintenance, emissions control equipment, prohibition of excessive idling, etc.). Construction contract specifications will stipulate that all diesel construction equipment used on-site will be fitted with after-engine emission controls such as diesel oxidation catalysts (DOCs) or diesel particulate filters (DPFs)[10]. Construction contractors will be required to utilize ultra-low sulfur diesel fuel for all off-road construction vehicles as an additional measure to reduce air emissions from construction activities.

The contractor will be required to implement protective measures around the construction and demolition work associated with site preparation and new construction to protect pedestrians and prevent dust and debris from leaving the site or entering the surrounding community. Dust generated from earthwork and other construction activities like stockpiled soils will be controlled by spraying with water to mitigate wind erosion on open soil areas. Other dust suppression methods will be implemented to ensure minimization of the off-site transport of dust. Regular sweeping of the pavement of adjacent roadway surfaces will be required during the construction period to minimize the potential for vehicular traffic to create airborne dust and particulate matter.

1.5.9.1 GREENHOUSE GAS EMISSIONS

All Build Alternatives would reduce CO_2, (a leading contributor to climate change) emissions relative to the No Build Alternative. All rail alternatives would result in a greater reduction in CO_2 than the Rapid

10 This is consistent with the Certificate of Construction Equipment Standard Compliance Form required for all bids to the MBTA.

Bus Alternative. Among the rail alternatives the Attleboro Electric and Stoughton Electric would reduce CO_2 emissions to a greater extent than other alternatives. While the percentage change at the regional level (0.22 to 0.21 percent) seems small, these two real world comparisons offer perspective on how well the Attleboro Electric and Stoughton Electric perform in reducing CO_2 emissions:

- The Attleboro Electric and Stoughton Electric alternatives would reduce as much regional CO_2 production as removing an 18 megawatt power plant from operation.
- One mature deciduous tree (such as a large maple or oak found in eastern Massachusetts) removes 31 pounds of CO_2 from the atmosphere in a year. 65 mature deciduous trees remove approximately one ton of CO_2 over a year. During a one-year operating period, the Attleboro Electric and Stoughton Electric alternatives would reduce about 61,400 tons of regional CO_2 production compared to present conditions. To reduce that same amount, eastern Massachusetts would need an additional four million trees.

By comparison, the reduction of CO_2 emissions from the Rapid Bus Alternative is 80% to 89% less than that from the rail alternatives.

Mitigation for Greenhouse Gas Emission Impacts from Construction

As the project would reduce operational phase emissions, no operational air quality mitigation commitments are proposed. Construction air quality mitigation as described above will result in lower Greenhouse Gas Emissions during project construction.

1.5.10 OPEN SPACE

The Whittenton Alternatives would have the least impact on public open space (parks, conservation lands, recreation lands, and wildlife refuges), and the impact of the Stoughton Alternatives would be similar to that of the Whittenton Alternatives. The Attleboro Alternatives would result in the largest acreage of impacts to open space due to the need to acquire land along the Attleboro Bypass. The Rapid Bus Alternative would impact an intermediate amount of protected open spaces.

The South Coast Rail 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.

1.5.11 FARMLAND

Impacts to farmland soils would be highest under the Whittenton Electric and Attleboro Electric Alternatives, and lowest under the Rapid Bus Alternative. Using the USDA scoring system, all the impacts to farmland soils 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. Further investigations and determination of specific mitigation measures will be conducted for the LEDPA.

The Rapid Bus Alternative has six stations and the lowest number of RECs, with only 15 identified, while the Whittenton Alternatives, with ten stations, have the greatest number of RECs (24 total). Downtown Taunton Station and Fall River Depot Station have the majority of the RECs for the Whittenton Alternatives, with five each. Taunton Station and Fall River Depot Station along the Stoughton Alternatives have the majority of the RECs for that alternative, with five each.

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.

1.5.14 BIODIVERSITY

The Rapid Bus Alternative would impact the largest quantity of upland habitat (317 acres). However, the impacted areas under the Rapid Bus Alternative would all be adjacent to existing highways, and would not result in habitat fragmentation.

The loss of upland habitat would be similar for the rail alternatives, ranging from 178.5[11] acres for the Stoughton Diesel Alternative to 190.9 acres for the Attleboro Electric Alternative. The majority of these losses would be along the periphery of natural communities, resulting from reconstructing existing freight or passenger rail lines. Each of the rail alternatives would result in habitat fragmentation and associated indirect effects on natural communities. The Attleboro Alternatives include the Attleboro Bypass, which would fragment wetland and upland communities and could change the hydrology of the wetlands crossed by this new rail alignment section. The Stoughton Alternatives would increase existing fragmentation of wetland and upland communities, particularly through the Hockomock Swamp and Pine Swamp, although the barrier effect would be reduced in Hockomock Swamp by constructing the rail alignment on a trestle. The Whittenton Alternatives would also increase existing fragmentation of wetland and upland communities, particularly through the Hockomock Swamp and along the Whittenton Branch, although the barrier effect would be reduced in Hockomock Swamp by constructing a trestle.

Losses of wetland habitat are similar for the Rapid Bus and Attleboro Alternatives (20.3 to 21.5 acres), and they would result in the largest impacts to vernal pool wetland habitat (2.3 to 5.4 acres). The Stoughton and Whittenton Alternatives would have less wetland loss (10.3 to 11.9 acres), and the least impacts to vernal pool wetland habitat (1.0 to 1.8 acres).

[11] Acreages have been rounded to a single decimal.

1.5.14.1 MITIGATION FOR BIODIVERSITY IMPACTS

Specific measures to mitigate for unavoidable direct and indirect impacts to biodiversity (plant, wildlife, and aquatic communities) will be developed for the LEDPA. In addition to other mitigation measures not yet identified, these measures could include:

- Adjusting the grading to reduce the loss of plant or wildlife communities.
- Evaluating all culverts to determine whether replacing a culvert could adversely impact, or benefit, biodiversity.
- Using retaining walls to reduce the loss of unique natural communities.
- Replanting disturbed areas.
- Developing and implementing an invasive species control plan.
- Constructing wildlife crossings.
- Enhancing or replacing habitat.
- Preserving important habitat areas.
- Developing construction phasing schedules to protect species.

1.5.15 THREATENED AND ENDANGERED SPECIES

Each of the rail alternatives could impact nine state listed species, and would result in the loss of migratory route habitat because all rail alternatives require construction of new rail lines where currently there are none. The Rapid Bus Alternative could impact three state listed species. The Rapid Bus Alternative would result in minor losses of their habitat on the edge of the Priority Habitats and on the edge of the highway, because most of the construction of the bus route would be within the existing highway median, and there would be no new interruption of rare species migratory corridors.

The Stoughton and Attleboro alternatives would intersect the largest area of Priority and Estimated Habitat, approximately 32.6 acres and 30.7 acres for the Stoughton Electric and Diesel alternatives respectively, and approximately 31.2 acres and 30.4 acres for the Attleboro Electric and Diesel Alternatives respectively. The Whittenton Alternatives and Rapid Bus Alternative would intersect the smallest area of Priority and Estimated Habitat, approximately 13.2 acres and 11.3 acres for the Whittenton Electric and Diesel alternatives, and approximately 16.2 acres for the Rapid Bus Alternative.

1.5.15.1 MITIGATION FOR IMPACTS TO THREATENED AND ENDANGERED SPECIES

Measures to be developed in coordination with applicable regulatory agencies to avoid and minimize and mitigate rare species impacts within the project Study Area could include:

- Construct tunnels or other passages to facilitate movement across the railbed, with drift fencing; ;
- Construct new nesting or reproduction sites (e.g., for eastern box turtles);
- Supplement vegetation, particularly Atlantic white cedar populations;
- Conduct pre-construction studies to determine population size, distribution, or usage of the railbed to finalize mitigation measures;
- Develop protocols for protection of rare species during the construction process;

- Develop, in consultation with NHESP, mitigation measures that would be acceptable to provide a "net benefit to the local population" of each affected species. These measures may include:
- Establish new habitat areas based on the state of the science;
- Acquire land or secure conservation restrictions that protect identified critical habitats that are at risk of loss or degradation.

1.5.16 WETLAND RESOURCES

Wetland impacts are the principal category of environmental impacts that must be considered for 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 affect the lowest acreage of wetlands (10.4 acres[12]). The Stoughton Alternatives would impact 11.94 acres of wetlands including 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. The Attleboro and Rapid Bus Alternatives would impact the greatest acreage of wetlands (20.6 and 21.5 acres, respectively).

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. This is because these alternatives would use the existing railroad grade that already crosses the swamp, and which has been in existence since the late 19th Century. In fact, of the 1.8 acres of impacts to the ACEC, only approximately 0.5 acre would affect actual wetlands; the remaining 1.3 acre of impacts is located at the south end of the ACEC, where an existing stream has overtopped its original banks and now flows over an approximately quarter-mile portion of the existing railbed. Accordingly, this alternative envisions restoration of that stream to its approximate original and intact channel, and the net result would be an improvement in the ecology of the stream.

1.5.16.1 MITIGATION FOR WETLAND IMPACTS

Wetland impacts would be further evaluated during final design. As part of that process, additional steps would be taken to minimize specific impacts, such as tightening side slopes and using retaining walls to reduce the overall footprint associated with the proposed work.

For unavoidable impacts, a wetland mitigation plan would be developed for the LEDPA that identifies specific on-site or off-site locations proposed to serve as suitable wetland resource mitigation areas, demonstrates its ability to successfully replicate wetland functions and ecological values, and provides wetland mitigation at a ratio of 2:1 or more.

1.5.17 WATER RESOURCES

With mitigation and drainage features in place, none of the Build Alternatives is expected to substantially increase pollutant loading or impair any surface or ground water resources. Stormwater treatment practices would be constructed to meet or exceed regulatory requirements and protect water

[12] Acreages have been rounded to a single decimal.

quality from increases in pollutant loadings and stormwater runoff volumes. A series of low-impact development (LID) techniques will be employed at the station sites, including:

- Rain gardens;
- Infiltration basins;
- Vegetated filter strips;
- Vegetated swales;
- Engineered wetlands;
- Permeable pavement; and
- Narrower entrance ways and green "islands."

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.

1.5.18 COASTAL ZONE AND CHAPTER 91 WATERWAYS

All of the alternatives are consistent with the Massachusetts Coastal Zone Management Program Policies. The number of Chapter 91-regulated resources crossed by each alternative ranges from 29 under the Stoughton Alternatives to 3 under the Rapid Bus Alternative. This includes existing bridges that would require Chapter 91 approvals to replace.

1.5.19 INDIRECT AND CUMULATIVE IMPACTS

1.5.19.1 INDIRECT IMPACTS

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 74,371 by 2030. The Attleboro Alternatives are anticipated to add 2.8 percent to this total, the largest induced growth of the Build Alternatives. The Stoughton Alternatives would have the second largest growth, with a 2.7 percent increase. The Rapid Bus would have the lowest induced growth, at 1.8 percent of the baseline 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 amount of loss would be proportionate to the growth in households, with the Attleboro Alternative having a slightly greater amount of loss from induced growth than the Stoughton Alternative. 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 (referred to as Scenario 2) would be substantial in many instances. For example, the smart growth scenario would result in saving as much as 3,900 acres of farmland for the Attleboro Alternative (33 percent of the farmland loss in Scenario 1), or 14,997 acres of land (32 percent of the total in Scenario 1). Although the differences among the Build Alternatives are negligible, the results are indicative of the benefits of the smart growth measures that could be implemented as part of the South Coast Rail alternatives.

1.5.19.2 CUMULATIVE IMPACTS

Table 1-11 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 NEXT STEPS IN THE DECISION MAKING PROCESS

In accordance with the National Environmental Policy Act (NEPA) and the Massachusetts Environmental Policy Act (MEPA), the DEIS/DEIR is circulated for public review and comment and the public is invited to comment orally at public hearings and through submission of written comments during the public comment period.

Comments on the DEIS/DEIR will be considered in the preparation of the Final Environmental Impact Statement / Final Environmental Impact Report (FEIS/FEIR) and in the determination by the Corps of the Least Environmentally Damaging Practicable Alternative (LEDPA) for which a permit may be issued.

The FEIS/FEIR will respond to comments received relative to the DEIS/DEIR. The FEIS/FEIR will be distributed to all agencies, officials, and public libraries that received 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 that the FEIR is either adequate or inadequate. 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. This 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 1-10 Summary of Direct Impacts

	No-Build (Enhanced Bus) Alternative	Attleboro Electric Alternative	Attleboro Diesel Alternative	Stoughton Electric Alternative	Stoughton Diesel Alternative	Whittenton Electric Alternative	Whittenton Diesel Alternative	Rapid Bus Alternative
Description	Minor bus schedule enhancements, park-and-ride lot expansions, additional bus stations and a joint bus/rail ticketing system.	Electric or diesel commuter rail service to South Station using the Northeast Corridor, proposed Attleboro Bypass, Attleboro Secondary, New Bedford Main Line, and Fall River Secondary. Eight new commuter rail stations would be constructed (Barrowsville, Downtown Taunton, Taunton Depot, King's Highway, Whale's Tooth, Freetown, Fall River Depot, and Battleship Cove) and major reconstruction would occur at three existing commuter rail stations (Canton Junction, Sharon, Mansfield).		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 Place, 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 Place, Downtown 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).		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 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.
Capital Cost (billions)	N/A	$2.01	$1.69	$1.88	$1.48	$1.81	$1.41	$0.81
Cost per rider[13]	N/A	$57.03	$58.29	$45.76	$43.73	$48.16	$46.25	$99.79
Years to Construct	N/A	7	7	4.5	4	4.5	4	4.5
Transportation (Section 4.1)								
Reduction in Daily Regional Vehicle Miles Traveled	N/A	-296,569	-256,421	-295,922	-228,705	-228,018	-173,961	-81,495
Travel Time- New Bedford to South Station	N/A	75	84	76	85	87	96	103
Travel Time- Fall River to South Station	N/A	72	82	73	83	85	94	91
Daily Ridership[14]	N/A	9,360	8,040	9,580	8,140	9,640	8,040	4,200
Acceptable On-Time Performance?	N/A	No- Operationally infeasible and would result in negative impacts to the entire south side commuter rail system.		Yes	Yes	Yes	Yes	Yes
Number of impacted intersections in the vicinity of stations where mitigation is proposed	N/A	25	25	33	33	32	32	0
Land Use and Zoning (Section 4.2)								
Total Acreage to be Acquired	0	90.59	87.67	106.8	103.05	79.05	75.36	25.7
Socioeconomics (Section 4.4)								
Residential Displacements	0	6	6	4	4	3	3	0
Business Displacements	0	6	6	4	4	4	4	4
Property Tax Revenue[15] Loss	0	$81,332.57	$81,332.57	$71,098.54	$71,098.54	$59,614.25	$59,614.25	$41,638.35

[13] Annualized capital cost and annual operating and maintenance cost estimates divided by annual passengers.
[14] New daily round-trip transit trips at proposed South Coast Rail stations
[15] Additional property tax revenue losses may result from small and/or partial acquisitions.

Table 1-10 Summary of Direct Impacts, Continued)

	No-Build (Enhanced Bus) Alternative	Attleboro Electric Alternative	Attleboro Diesel Alternative	Stoughton Electric Alternative	Stoughton Diesel Alternative	Whittenton Electric Alternative	Whittenton Diesel Alternative	Rapid Bus Alternative
Environmental Justice (Section 4.4)								
	N/A	No disproportionate adverse impacts at the regional level. At the community level, environmental justice communities in Fall River, Canton and Taunton would be disproportionately affected by noise impacts relative to non-environmental justice communities. Beneficial effects on environmental justice communities resulting from these alternatives include improved access to jobs, colleges and hospitals.		No disproportionate adverse impacts at the regional level. At the community level, environmental justice communities in Fall River and Stoughton would be disproportionately affected by noise impacts relative to non-environmental justice communities. Beneficial effects on environmental justice communities resulting from these alternatives include improved access to jobs, colleges and hospitals.		No disproportionate adverse impacts at the regional level. At the community level, environmental justice communities in Fall River and Taunton would be disproportionately affected by noise impacts relative to non-environmental justice communities. Beneficial effects on environmental justice communities resulting from these alternatives include improved access to jobs, colleges and hospitals.		No disproportionate adverse impacts at the regional level. Beneficial effects on environmental justice communities resulting from this alternative include improved access to jobs, colleges and hospitals.
Visual Resources (Section 4.5)								
	Minimal impact.	Moderate overall impact on visual resources. Substantial impacts would occur in the previously undisturbed Attleboro Bypass corridor.	Moderate impact on visual resources overall, but less than Attleboro 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 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.	Minimal impact in areas adjacent to developed highway corridors.
Noise (Section 4.6)								
Moderate Impacts (# of Sensitive Receptors)	N/A	1730	1458	1320	1099	1409	1247	No noise impacts expected because of the lack of receptors near the roadways that would be used by the rapid bus service and the relatively small increase in sound levels that will be generated by the increased bus traffic on the major roadways (Route 24 and I-93).
Severe Impacts (# of Sensitive Receptors)	N/A	469	405	408	347	417	370	
Vibration (Section 4.7)								
Impacted Residences (Without Mitigation)	0	117	117	146	146	150	150	0
Cultural Resources (Section 4.8)								
Direct Impacts to Historic Resources	0	8	8	6	6	7	7	0
Indirect Impacts to Historic Resources (Visual Impacts)	0	32	5	24	7	31	7	0
Indirect Impacts to Historic Resources (Noise Impacts)	0	5	32	0	21	2	27	0

Table 1-10 Summary of Direct Impacts, Continued)

	No-Build (Enhanced Bus) Alternative	Attleboro Electric Alternative	Attleboro Diesel Alternative	Stoughton Electric Alternative	Stoughton Diesel Alternative	Whittenton Electric Alternative	Whittenton Diesel Alternative	Rapid Bus Alternative
Indirect Impacts to Historic Resources (Visual and Noise Impacts)	0	34	2	38	12	39	12	0
Known Archaeological Sites	0	0	0	2	2	2	2	0
High Sensitivity Archaeological Areas	0	5	5	2	2	2	2	2
Moderate Sensitivity Archaeological Areas	0	4	4	3	3	2	2	2
Air Quality (Section 4.9)								
Exceedance of National Ambient Air Quality Standards?	No	No	No	No	No	No	No	No
Regional Volatile Organic Compound Emissions (kg/day)	24,804	24,748	24,758	24,751	24,763	24,762	24,781	24,795
Regional Oxides of Nitrogen Emissions (kg/day)	20,878	20,835	20,867	20,838	20,870	20,847	20,875	20,883
Regional Particulate Matter 10 Emissions (kg/day)	3,671	3,665	3,667	3,666	3,668	3,667	3,669	3,673
Regional Particulate Matter 2.5 Emissions (kg/day)	1,705	1,703	1,704	1,703	1,704	1,704	1,705	1,706
Regional Carbon Monoxide Emissions (kg/day)	1,162,046	1,159,470	1,159,930	1,159,586	1,160,161	1,160,155	1,160,544	1,161,433
Regional Carbon Dioxide Emissions (Tons/Year)	27,802,094	27,739,761	27,752,483	27,742,380	27,758,087	27,756,510	27,769,493	27,795,506
Open Space (Section 4.10)								
Land Acquisition from Protected Open Space (acres)	0	8.93	8.93	1.69	0.15	1.24	0.15	4.5
Farmland (Section 4.11)								
Impacts to Designated Farmland Soils (Acres)	0	17.5	16.4	12.9	10.3	18.6	16	5.7
Hazardous Materials (Section 4.12)								
Recognized Environmental Conditions[16]	0	19	19	20	20	24	24	15
Geology (Section 4.13)								
	No long-term adverse impacts	No long-term adverse impacts		No long-term adverse impacts		No long-term adverse impacts		No long-term adverse impacts

[16] Sites with the presence or likely presence of hazardous materials

Table 1-10 Summary of Direct Impacts, Continued)

	No-Build (Enhanced Bus) Alternative	Attleboro Electric Alternative	Attleboro Diesel Alternative	Stoughton Electric Alternative	Stoughton Diesel Alternative	Whittenton Electric Alternative	Whittenton Diesel Alternative	Rapid Bus Alternative
Biodiversity (Section 4.14)								
Upland Habitat Loss (acres)	0	190.86	188.58	182.27	178.78	187.98	183.87	316.98
Wetland Habitat Loss (acres)	0	20.56	20.27	11.86	11.83	10.34	10.31	21.48
Vernal Pool Habitat Loss (acres)	0	5.36	5.36	1.77	1.77	1	1	4.33
Loss of Supporting Vernal Pool Upland Habitat (acres)	0	49.66	49.66	55.04	55.04	54.73	54.73	19.26
Habitat Fragmentation	None.	Majority of impacts in areas adjacent to existing development. Habitat fragmentation would result from the 2.8-mile Attleboro Bypass.		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.		None.
Threatened and Endangered Species (Section 4.15)								
Impacted Species Habitat	None	Impacts to the habitat of nine state-listed species (wood turtle, Blanding's turtle, eastern box turtle, mocha emerald, Hessel's hairstreak, pale green pinion moth, water-willow stem borer moth, ringed boghaunter, and Long's bulrush). All impacts considered minor.		Impacts to the habitat of nine state-listed species (blue-spotted salamander, wood turtle, Blanding's turtle, eastern box turtle, mocha emerald, Hessel's hairstreak, pale green pinion moth, water-willow stem borer moth, and ringed boghaunter). Barrier effect on Blue-spotted salamander, Blanding's turtle, and eastern box turtle considered moderate impacts.		Impacts to the habitat of nine state-listed species (blue-spotted salamander, wood turtle, Blanding's turtle, eastern box turtle, mocha emerald, Hessel's hairstreak, pale green pinion moth, water-willow stem borer moth, and ringed boghaunter). Barrier effect on Blue-spotted salamander, Blanding's turtle, and eastern box turtle considered moderate impacts.		Impacts habitat of three state-listed species (marbled salamander, Blanding's turtle, and eastern box turtle). All impacts considered minor.
Total Priority and Estimated Habitat Impacts (Acres)	0	31.2	30.4	32.6	30.7	13.2	11.3	16.2
Wetland Resources (Section 4.16)								
Edge Wetland Impacts (acres)	0	15.85	15.56	5.46	5.43	5.45	5.43	21.48
Interior Wetland Impacts (Acres)	0	4.71	4.71	6.4	6.4	4.89	4.88	0
Total Wetland Impacts (acres)	0	20.56	20.27	11.94	11.91	10.34	10.31	21.48
Wetlands Impacts within ACECs (acres)	0	2.59	2.59	1.72	1.72	1.72	1.72	4.03
Bank (lf)	0	240	240	3,480	3,480	3,480	3,480	0
Outstanding Resource Waters (acres)	0	5.34	5.34	1.71	1.71	0.95	0.95	2.15
Bordering Land Subject to Flooding (acres)	0	18.07	18.07	23.33	23.29	19.83	19.79	30.65
Riverfront Area (count)	0	62	62	65	65	52	52	26

Table 1-10 Summary of Direct Impacts, Continued)

	No-Build (Enhanced Bus) Alternative	Attleboro Electric Alternative	Attleboro Diesel Alternative	Stoughton Electric Alternative	Stoughton Diesel Alternative	Whittenton Electric Alternative	Whittenton Diesel Alternative	Rapid Bus Alternative
Water Resources (Section 4.17)								
	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.		Surface and groundwater resources would not be impaired due to the use of stormwater treatment practices.		The highway drainage systems would need to be expanded or modified to accommodate the extra runoff from 163 acres of new pavement and still meet the Massachusetts Stormwater Management Standards. Surface and groundwater resources would not be impaired due to the use of stormwater treatment practices.
Coastal Zone (Section 4.18)								
Consistent with Massachusetts Coastal Zone Management Program Policies?	N/A	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Chapter 91 Regulated Resources Crossed[17]	0	25	25	29	29	21	21	3

[17] 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 1-11 Summary of Indirect and Cumulative Impacts (Chapter 5)

	RESOURCE							
	Air Quality	**Biodiversity**	**Economy**	**Land Use**	**Protected Open Space**	**Threatened or Endangered Species**	**Water Quality**	**Wetlands (net change)**
NO-BUILD	Ambient Air Quality: Trend of improving air quality; projected to meet all NAAQS by 2010 Greenhouse Gas Emissions: Trend of increasing emissions, to be counteracted by new regulatory requirements. CO_{2e} emissions to be 80% of 1990 levels by 2050.	303,268 acres of natural land; 22 acres of land converted per day; 134,984 acres of decreased habitat quality; climate changes.	Population: 908,000 (363,200 households) Jobs: 590,000 Business Activity: $99B Tax Revenue: NA	Conversion of 1,315 acres per year; 302,268 acres of undeveloped land will remain in 2030.	Open space protected at average rate of 383.7 acres per year; 62,876 acres of protected open space will remain in 2030	Listed species protected by federal and state regulations. Indirect effects to habitat quality as a result of land conversion and climate change.	Trend of improving water quality. Indirect effects from new lawns and non-point sources.	No net loss policy; mitigation ratios of 1:1 to 3:1; 125,078 acres of wetlands will remain in 2030
ATTLEBORO	**Scenario 1**							
	Ambient Air Quality: Improvement Greenhouse Gas Emissions: -40,909 CO_{2e}	Loss of 266.44 acres of habitat; 1,261 additional acres land conversion; 138,496 acres of decreased habitat quality.	Population: +5,143 (+2,057 households) Jobs: +2,599 Business Activity + $487M Tax Revenue + 26M	1,261 additional acres land conversion	Loss of 8.93 acres of protected open space	Impacts to threatened and endangered species would be mitigated. Indirect effects to habitat quality as a result of land conversion and climate change	No process water discharges, stormwater discharges controlled by SWPPP. Indirect effects from new lawns and non-point sources	Increase of 60.47 acres of wetlands, +0.05% (loss of 33.98 acres, before mitigation)
	Scenario 2							
	Ambient Air Quality: Greater Improvement Greenhouse Gas Emissions: : - 40,909 CO_{2e}	Loss of 266.44 acres of habitat; 9,646 to 13,827 fewer acres land conversion; 65,777 to 83,778 acres of decreased habitat quality.	Population: +5,143 (+2,057 households) Jobs: +2,599 Business Activity + $487M Tax Revenue + 26M	9,646 to 13,827 fewer acres land conversion; no contribution to sprawl if PPAs and PDAs are enacted	Increase of protected open space due to PPAs, but number of acres is unknown.	Impacts to threatened and endangered species would be mitigated. Indirect effects to habitat quality reduced.	No process water discharges, stormwater discharges controlled by SWPPP. Indirect effects reduced.	Increase of 52.25 to 53.81 acres of wetlands, +0.04% (loss of 29.87 to 30.65 acres, before mitigation)

Table 1-11 Summary of Indirect and Cumulative Impacts (Chapter 5) (continued)

ALT.	Resource							
	Air Quality	**Biodiversity**	**Economy**	**Land Use**	**Protected Open Space**	**Threatened or Endangered Species**	**Water Quality**	**Wetlands (net change)**
STOUGHTON	**Scenario 1**							
	Ambient Air Quality: Improvement Greenhouse Gas Emissions: -38,964 CO_{2e}	Loss of 250.94 acres of habitat; 1,233 additional acres land conversion; 138,362 acres of decreased habitat quality.	Population: +4,930 (+1,972 households) Jobs: +2,533 Business Activity: +$479M Tax Revenue: +$26M	1,233 additional acres land conversion	Loss of 1.69 acres of protected open space	Impacts to threatened and endangered species would be mitigated. Indirect effects to habitat quality as a result of land conversion and climate change	No process water discharges, stormwater discharges controlled by SWPPP. Indirect effects from new lawns and non-point sources	Increase of 47.88 acres of wetlands, +0.04% (loss of 25.35 acres, before mitigation)
	Scenario 2							
	Ambient Air Quality: Greater Improvement Greenhouse Gas Emissions: -38,964 CO_{2e}	Loss of 250.94 acres of habitat; 9,674 to 13,698 fewer acres land conversion; 65,725 to 83,712 acres of decreased habitat quality.	Population: +4,930 (+1,972 households) Jobs: +2,533 Business Activity: +$479M Tax Revenue: +$26M	9,674 to 13,698 fewer acres land conversion; no contribution to sprawl if PPAs and PDAs are enacted	Increase of protected open space due to PPAs	Impacts to threatened and endangered species would be mitigated. Indirect effects to habitat quality reduced.	No process water discharges, stormwater discharges controlled by SWPPP. Indirect effects reduced.	Increase of 39.66 to 41.22 acres of wetlands, +0.03% (loss of 21.24 to 22.02 acres, before mitigation)
RAPID BUS	**Scenario 1**							
	Ambient Air Quality: Improvement Greenhouse Gas Emissions: + 6,839 CO_{2e}	Loss of 359.98 acres of habitat; 787 additional acres land conversion; 137,268 acres of decreased habitat quality.	Population: +3,275 (+1,310 households) Jobs: +1,678 Business Activity + $296M Tax Revenue + $15M	787 additional acres land conversion	Loss of 4.50 acres of protected open space	Impacts to threatened and endangered species would be mitigated. Indirect effects to habitat quality as a result of land conversion and climate change	No process water discharges, stormwater discharges controlled by SWPPP. Indirect effects from new lawns and non-point sources	Increase of 64.42 acres of wetlands, +0.05% (loss of 34.79 acres, before mitigation)
	Scenario 2							
	Ambient Air Quality: Greater Improvement Greenhouse Gas Emissions: + 6,839 CO_{2e}	Loss of 359.98 acres of habitat; 9,944 to 13,937 fewer acres land conversion; 65,222 to 83,071 acres of decreased habitat quality.	Population: +3,275 (+1,310 households) Jobs: +1,678 Business Activity + $296M Tax Revenue + $15M	9,944 to 13,937 fewer acres land conversion; no contribution to sprawl if PPAs and PDAs are enacted	Increase of protected open space due to PPAs	Impacts to threatened and endangered species would be mitigated. Indirect effects to habitat quality reduced.	No process water discharges, stormwater discharges controlled by SWPPP. Indirect effects reduced.	Increase of 56.26 to 57.80 acres of wetlands, +0.04% (loss of 30.71 to 31.28 acres, before mitigation)