ENVIRONMENTAL ASSESSMENT

NEW HAMPSHIRE CAPITOL CORRIDOR
RAIL PLANNING STUDY

STATE PROJECT NUMBER 63037 A

April 2015

New Hampshire DOT
Department of Transportation

This document was prepared by AECOM for The New Hampshire Department of Transportation for submittal to The U.S. Department of Transportation Federal Railroad Administration.

Table of Contents

Table of Figures

List of Tables

List of Appendices

List of Acronyms

AA	Alternatives Analysis
ADA	Americans with Disabilities Act
AHWD	Automatic Highway Warning Devices
APE	Area of Potential Effect
ATSM	American Society for Testing and Materials
B&M	Boston and Maine Railroad
BMP	Best Management Practices
BX	Boston Express
CAA	Clean Air Act
CBP	Central Business Performance
CE	Categorical Exclusion
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO	Carbon Monoxide
CO_2e	Carbon Dioxide Equivalent
CTC	Centralized Traffic Control
CWA	Clean Water Act
CWR	Continuous Welded Rail
dBA	Decibels
DCS	Data Communication System
DFIRMs	Digital Flood Insurance Rate Maps
DPM	Diesel Particulate Matter
EA	Environmental Assessment
EDR	Environmental Data Resources, Inc.
EIS	Environmental Impact Statement
EJ	Environmental Justice
ESA	Environmental Site Assessment
FHWA	Federal Highway Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
GHG	Greenhouse Gases
GIS	Geographic Information System
GPS	Global Positioning System
GWP	Gateway Performance District
HSIPR	High-Speed Intercity Passenger Rail
L_{dn}	Day-Night Noise Levels
LLPs	Landowner Liability Protections

LOD	Limit of Disturbance
LOS	Level of Service
LUST	Leaking Underground Storage Tank
MA	Massachusetts
MACRIS	Massachusetts Cultural Resource Information System
MassDEP	Massachusetts Department of Environmental Protection
MassDOT	Massachusetts Department of Transportation
MassGIS	Massachusetts Geographic Information System
MHT	Boston-Manchester Regional Airport
MBTA	Massachusetts Bay Transportation Authority
MESA	Massachusetts Endangered Species Act
MHC	Massachusetts Historical Commission
NHESP	Massachusetts Natural Heritage and Endangered Species Program
NMFS	National Marine Fisheries Service
MHT	Boston-Manchester Regional Airport or Manchester Airport
MOVES	Motor Vehicle Emission Simulator
mph	miles per hour
MSAT	Mobile Source Air Toxics
NAAQS	National Ambient Air Quality Standards
NEGS	New England Southern Railroad
NEPA	National Environmental Policy Act
NH	New Hampshire
NH GRANIT	New Hampshire Geographically Referenced Analysis and Information Transfer System
NHB	New Hampshire Natural Heritage Bureau
NHDES	New Hampshire Department of Environmental Services
NHDOT	New Hampshire Department of Transportation
NHDRED	New Hampshire Department of Resources and Economic Development
NHESP	Massachusetts Natural Heritage and Endangered Species Program
NHF&G	New Hampshire Fish and Game Department
NHL	National Historic Landmark
NHML	New Hampshire Main Line
NHPA	National Historic Preservation Act
NHRTA	New Hampshire Rail Transit Authority
NMFS	National Marine Fisheries Service
NO_2	Nitrogen dioxide
NO_x	Nitrogen oxide
NORAC	Northeast Operating Rules Advisory Committee
NRHP	National Register of Historic Places
O_3	Ozone
OCP	Opportunity Corridor Performance
PAC	Project Advisory Committee
PAH	Polycyclic Aromatic Hydrocarbons
PAR	Pan Am Railways
PCBs	Polychlorinated Biphenyls
POM	Polycyclic Organic Matter
PM	Particulate Matter

PRICP	Passenger Rail Corridor Investment Plan
PSIP	Public and Stakeholder Involvement Plan
PSNH	Public Service of New Hampshire
PTC	Positive Train Control
RCRA	Resource Conservation and Recovery Act
REC	Recognized Environmental Condition
ROW	Right-of-way
RPC	Central New Hampshire Regional Planning Commission
SDP	Service Development Plan
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SO_2	Sulfur Dioxide
TMDLs	Total Maximum Daily Loads
TOD	Transit-Oriented Development
tpy	tons per year
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFWS	US Fish and Wildlife Service
USGS	U.S. Geologic Survey
UST	Underground Storage Tanks
VdB	Vibration Velocity Level
VMT	Vehicle Miles Travelled
VOCs	Volatile Organic Compounds
WPA	Massachusetts Wetlands Protection Act

Executive Summary

Purpose and Need

This Service-level Environmental Assessment (EA) was prepared by the New Hampshire Department of Transportation (NHDOT) in coordination with the Federal Railroad Administration (FRA). The EA was prepared in accordance with the National Environmental Policy Act of 1969 (NEPA), as amended, 42 U.S.C. §§ 4321 et. seq.; its implementing regulations, 40 Code of Federal Regulations (CFR) 1500-1508; and FRA's Procedures for Considering Environmental Impacts, 64 Federal Register (FR) 28545 (May 26, 1999) and 78 FR 2713 (January 14, 2013).

NHDOT received a funding grant for the New Hampshire Capitol Corridor Rail Planning Study (Study) under FRA's High-Speed Intercity Passenger Rail Program. The Study included preparation of a Service Development Plan (SDP) and accompanying environmental analysis, and was developed by a team of transportation planning, engineering, and environmental experts from FRA, NHDOT, and their respective consultants (Study Team). The overarching purpose of the Study was to identify and implement the intercity passenger rail investment strategy that will best leverage the existing transportation infrastructure to improve connectivity to and from Boston, the region's largest economic hub; diversify options and reduce the primarily single-mode reliance on roadways for the movement of people and goods; support mobility options that match emerging demographic trends and preferences in the corridor; and maintain the region's high quality-of-life through strategic infrastructure investments. More specifically, the purpose of the Study was to evaluate options for introducing intercity passenger rail service between Boston, Massachusetts (MA) and Concord, New Hampshire (NH) over existing transportation infrastructure, namely the portion of the New Hampshire Mail Line (NHML) owned by Pan Am Railways (PAR), which is currently used for freight rail only.

There are a number of reasons why investment in an improved transportation strategy within the Capitol Corridor is needed, including:

- Increased roadway congestion: Projected population growth will result in increased congestion on the existing roadway network.
- Gaps in Connectivity: New Hampshire's existing transportation network does not effectively connect existing modes.
- Lack of Transportation Options: The regional economy is singularly dependent on automobile travel/roadways for movement of goods and passengers.
- Stagnant Economic Growth & Brain Drain in the Capitol Corridor: Multi-modal transportation investment is necessary to link New Hampshire's Millennial and Generation X workforce with the knowledge-based employment found in and near Boston. Without it, these employees will continue to move closer to these jobs rather than remaining New Hampshire residents and

driving to work. Young New Hampshire professionals are leaving the area to be closer to employment and cultural/social opportunities associated with larger urban centers.

- Aging Population: New Hampshire's growing senior population needs more "car-light" mobility options.
- Sustainability: Multi-modal transportation investment is necessary to sustainably accommodate increases in traffic volume and development pressure associated with projected population growth.
- Insufficient Capacity: The existing transportation network cannot accommodate increased levels of demand without negative environmental consequences.

Planning Study Objectives

This EA follows FRA's guidance for compliance with NEPA at the Service-level. Service-level NEPA "…typically addresses the broader questions relating to the type of service(s) being proposed, including cities and stations served, route alternatives, service levels, types of operations (speed, electric, or diesel powered, etc.), ridership projections, and major infrastructure components." This Study, if it advances to the project level, will be followed by a future Tier2 NEPA analysis, or analyses, which may be an Environmental Impact Statement (EIS), an Environmental Assessment (EA), or a Categorical Exclusion (CE), depending on the details of the project, site-specific conditions and resources present, and the significance of potential impacts to the human environment.

The Study identified three intercity passenger rail service alternatives; one of these, the Intercity 8 alternative, was selected as the Build Alternative and carried forward for analysis in this EA (see Appendix 5, Preliminary Evaluation of Conceptual Alternatives, Section 4, to the Capitol Corridor AA Final Report). Service under the Build Alternative was found to be the lowest cost per new NH rider of the three intercity alternatives (8, 12, and 18 trains per day, respectively) and maintains all existing bus service on I-93 and US Route 3. The Build Alternative performs about the same in terms of ridership, is slightly less favorable for land use and economic development and has no significant difference in overall environmental impact. This EA evaluates the potential environmental impacts of the Build and No Build Alternatives for an Amtrak-operated (or similar) intercity rail service between Boston, Massachusetts and Concord, New Hampshire.

The Build Alternative would operate eight trips per day between Boston North Station and Concord. The four daily round trips over the 73-mile route would stop at five intermediate stations – (Three new stations in New Hampshire: Manchester, Manchester-Boston Regional Airport [Manchester Airport or MHT], Nashua and two existing stations in Massachusetts: Lowell and Woburn). Track improvements north of the Stony Brook wye in North Chelmsford and the New Hampshire stations would be new construction. No improvements south of Lowell would be required. End-to-end trip time would be approximately 96 minutes. The service would operate at a maximum speed of 75 miles per hour (mph) between Bedford/Manchester Airport and Nashua and 70 mph at many other locations and is expected to attract 172,645 passengers per year.

Connections to private bus service- would allow travelers to reach additional North Country destinations. The Build Alternative proposes no changes to express bus service for commuting to Boston via I-93 or Route 3. Local bus service to the intercity rail stations could be offered, but would not be integral to the service design. A Boston Express (BX)/Concord Coach/Intercity Rail fare integration scheme similar to that employed by the Amtrak *Downeaster* at Portland, Maine could be employed at the Concord and Manchester stations that would be shared by both intercity rail and coach bus services.

The purpose of this EA is to identify and evaluate potential environmental, social, and economic impacts associated with the Build Alternative and determine appropriate mitigation measures (see Table 1 for a summary). As this is a Service-level NEPA document, some resources will not have mitigation determined at this level of analysis.

Table 1: Summary of Build Alternative Impacts and Proposed Mitigation

Resource	Impact	Mitigation
Air Quality	Improved air quality through vehicle trips shifting to intercity rail	A number of sustainable mitigation measures that could be implemented to improve air quality including using higher tier locomotive engines, and biodiesel fuel; electrification of the line, sustainable station design; local, recycled and renewable construction materials and replanting trees. During project construction, appropriate Best Management Practices (BMPs) would be implemented to address air quality impacts.
Noise and Vibration	707 moderate noise impacts and 75 severe impacts due to warning horns; four potential daytime construction impacts and up to 324 potential nighttime construction impacts have been identified as a result of the analysis conducted pursuant to Federal Transit Administration (FTA) guidelines; no vibration impacts are expected.	Mitigation measures would be applied during Tier 2. Potential measures include installation of stationary wayside horns at severely impacted intersection locations.
Hazardous Waste Sites	Short-term adverse impacts may occur during construction of rail and station sites due to potential for movement of contaminated soils or material.	Phase I Environmental Site Assessments (ESAs) would be completed during Tier 2, as necessary, for each property acquired to be eligible for Landowner Liability Protections (LLPs).
Water Quality	Negligible to minor, short-term, localized impacts during construction activities.	All impacts would be mitigated through construction BMPs and improvements to drainage and storm water management.

Resource	Impact	Mitigation
Wetlands	▪ No impact to wetlands in most areas of the corridor and minor temporary and permanent impacts to jurisdictional wetland resource areas in a few discrete areas of the corridor ▪ The Bedford/Manchester Airport station has several wetlands and watercourses ▪ North of Ray Wieczorek Drive, the majority of the site is forested wetland ▪ South of Ray Wieczorek Drive, there are two small forested wetlands and one emergent/scrub-shrub wetland ▪ Minor temporary impacts may occur during construction activities	If the project advances to Tier 2, these impacts would be defined in greater detail. Any wetland impacts would be subject to state and federal permitting requirements which would include compensatory mitigation for any unavoidable impacts.
Threatened and Endangered Species	Impacts have not been identified at the Tier 1 stage.	Coordination and consultation with the appropriate state and federal agencies (NHESP, NHB, NHF&G, USFWS, and NMFS) will occur at the Tier 2 level study or project level, as necessary. This may include the identification of ways to avoid, reduce, or mitigate impacts.
Floodplains	Minor to negligible impacts to floodplains	In locations where floodplain elevations will be altered, the project will provide compensatory floodplain storage. Through mitigation, adverse impacts to floodplains will be kept to a minimum.
Energy Resources	Beneficial impact: Diverting trips from vehicles to passenger rail will reduce the overall Vehicle Miles Travelled (VMT) and greenhouse emissions. During construction, the project would consume energy through the processing of materials and construction activities.	Energy impacts from the operation of the service are expected to be positive, but there would be energy consumption during construction that could have temporary negative impacts.
Visual Resources	Impacts to visual resources, including natural and cultural resources, were not assessed at the Tier1 level study. Visual impacts of the project will be better understood at the Tier 2 level of study when the project plans are more fully developed.	All mitigation measures associated with visual resource impacts would be addressed in the Tier 2 level study.
Accessibility	Beneficial impact: Platform, stations and facilities will meet the American with Disabilities Act (ADA) requirements.	None
Property Acquisition	Minor impacts: Station development would require acquisition of two privately held parcels.	All mitigation measures associated with property acquisitions would be addressed in the Tier 2 level study.

Resource	Impact	Mitigation
Land Use	Land uses around the four station locations are compatible with proposed stations. The local comprehensive plans and policies are supportive of intercity rail service. Overall, intercity rail service would not result in negative impacts to the existing land uses within a half-mile of the four proposed stations.	None
Environmental Justice (EJ)	Major beneficial impacts for those EJ populations within proximity to proposed stations in Concord, Manchester, and Nashua, as the project provides increased access to transportation options within the corridor.	None
Public Safety	Beneficial impact through mitigation and upgraded safety features.	A number of mitigation measures would improve the safety of the 35 at grade crossings: the Centralized Traffic Control (CTC) signal system would be renewed and upgraded; all new equipment for the Automatic Highway Warning Devices (AHWD) would be installed; and it is assumed that Positive Train Control (PTC) would be in-place by the time the proposed service is operational. In addition, public safety benefits would be realized from travelers shifting from road to rail.
Cultural Resources	Impacts to archaeological and historic architectural resources were not assessed at the Tier 1 level study and will be better understood at the Tier 2 level study when the project plans are more fully developed.	As the area's archaeological potential is generally high, archaeological testing and monitoring of construction activities may be necessary. Consultation with the Massachusetts and New Hampshire State Historic Preservation Officers (SHPOs), and other parties such as Native American Tribes, would occur at the Tier 2 level. Such consultation would resolve any adverse effects to historic properties.
Parks and Recreation	Impacts to Section 4(f) resources have not been identified during Tier 1. Impacts will be identified during the Tier 2 level study.	If impacts to Section 4(f) resources are identified during the Tier 2 level study. Any necessary mitigation would also be determined at that stage.

Resource	Impact	Mitigation
Socioeconomics	Beneficial impact on New Hampshire economics by potentially generating the following: ▪ 1,600 new residential units* ▪ 819,000 square feet of commercial space ▪ 2,480 new station area jobs in 2030 and beyond, plus 1,100 other new jobs due to expansion of the economy ▪ 350 new jobs over the construction period (2019-2022) and 2,460 jobs related to new real estate development between 2021 and 2030 ▪ Real estate development would add $750 million to the state's output between 2021 and 2030	None
Transportation	Beneficial impact on rail options and mobility in the corridor by increasing transportation options	None
Indirect Effects	Indirect Effects: Beneficial long-term effects due to induced growth and development around station locations. Development in cities and communities along the corridor has the potential to impact land use, transportation systems, air, storm water runoff/water quality, cultural resources and visual resources. Increases in traffic associated with development have the potential for a cumulative effect on wildlife mortality and public safety.	During Tier 2, the indirect effects would be more defined and any necessary mitigation measures will be determined.
Cumulative Impacts	Cumulative Impacts: Incremental beneficial impact on the environment through greater access to transportation options and reduction in VMT within the US Route 3 and I-93 corridors. Depending on extent and location incremental development has the potential for impacts to natural areas, wetlands, property, vegetation, noise, parks and cultural resources. Incremental increases in freight rail and/or passenger rail operations would bring additional noise and vibration to the proposed project corridor, posing a potential for cumulative effects	During Tier 2, the cumulative impacts would be more defined and any necessary mitigation measures will be determined.
Construction Period Impacts	Minor temporary impacts may occur during construction activities, such as replacing or rehabilitating bridges or culverts, relocating utilities for track work and grading work associated with station construction. Noise associated with the construction of the project is expected to have four potential daytime impacts, and up to 324 potential nighttime impacts have been identified as a result of the analysis.	These impacts would be mitigated during design and restored after construction has been completed. Minor permanent impacts may occur during these same activities in cases where temporary impacts cannot be mitigated. During Tier 2 the impacts and mitigation measures would be more defined.

Resource	Impact	Mitigation

*Residential units rounded to the nearest 100

Public Involvement Objectives

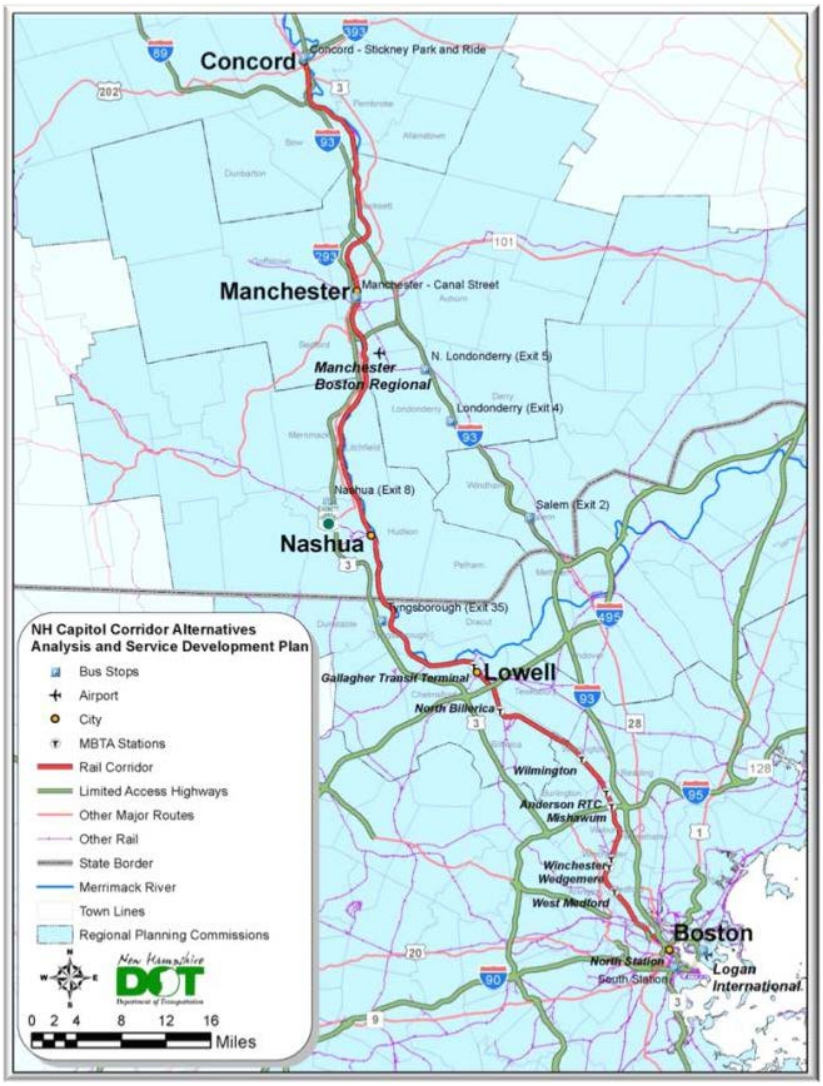
The Capitol Corridor Study, which includes the NEPA process, featured a robust public involvement program designed to solicit input from a broad, diverse range of stakeholders who have a demonstrated interest in the future of passenger rail in New Hampshire. During the study, contacts within agencies, public officials, civic and business groups, relevant interest groups, present and potential riders/users, and private service providers/shippers were identified. The project team conducted 91 stakeholder meetings, three Project Advisory Committee (PAC) meetings, and three public meetings (Concord, Manchester, and Nashua) including a scoping meeting. The main objectives of the public and stakeholder outreach are as follows:

- Build support for the study and NEPA processes among different stakeholder groups.
- Encourage stakeholders (appropriate federal, state, and local authorities, and the public) to engage in the study efforts at the earliest practicable time.
- Provide clear and understandable information at each step of the study.
- Document public and stakeholder opinion as part of the decision-making process concerning the consequences of the current and any future grant applications.
- Create a high-level of transparency regarding how the project is conducted.

As the project moves forward, the public and stakeholders will continue to be encouraged to participate.

1 Introduction

Figure 1.1: Capitol Corridor



The New Hampshire Department of Transportation (NHDOT), through a funding grant from the Federal Railroad Administration (FRA), has prepared this Service-level Environmental Assessment (EA) consistent with NEPA of 1969, as amended, 41 U.S.C. §§ 4331 et seq.; the regulations of the Council on Environmental Quality (CEQ), 40 CFR 1500-1508; the FRA Procedures for Considering Environmental Impacts, 64 FR 28545 (May 26, 1999) and 78 FR 2713 (January 14, 2013); the National Historic Preservation Act (NHPA) of 1966, 16 U.S.C. 470(f); Section 4(f) of the Department of Transportation Act (of 1966, as amended, Title 49U.S.C. 303; the Federal Clean Air Act (CAA) Amendments of 1990; the Endangered Species Act of 1973, 16 U.S.C. 1531; the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, 42 U.S., 4601; Section 402 of the Clean Water Act (CWA), 33 U.S.C. 1342; Executive Order 12898, Federal Actions to Address Environmental Justice in Minority and Low Income Populations; Executive Order 11990, Protection of Wetlands; Executive Order 11988, Floodplain Management, and FRA's guidance on compliance with NEPA in Implementing the High-Speed Intercity Passenger Rail (HSIPR) Program, issued August 13, 2009.

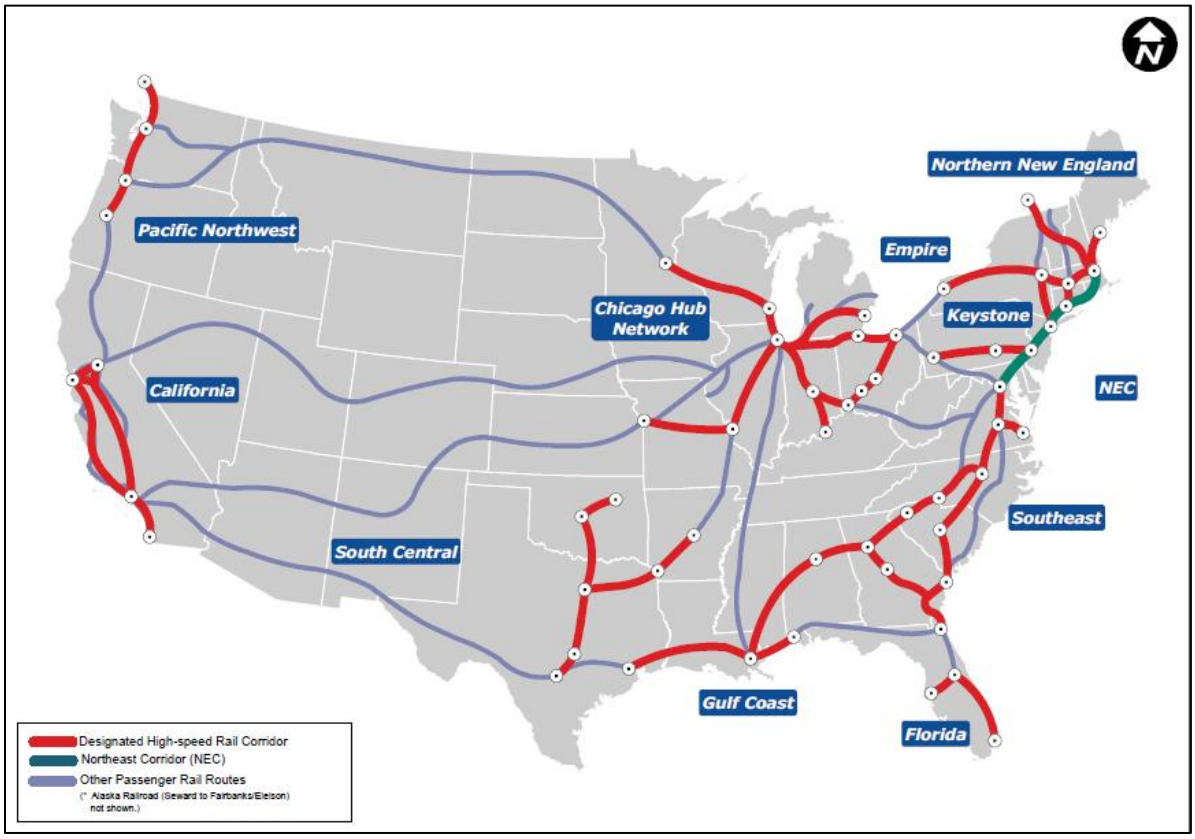
The Capitol Corridor extends 73 miles from Boston, Massachusetts (MA) to Concord, New Hampshire (NH). The geographic area of the corridor encompasses the existing track alignment that runs north from Boston, through Lowell, Nashua, and Manchester to Concord. The portion of the alignment within Massachusetts is owned by the Massachusetts Bay Transportation Authority (MBTA) and the portion within New Hampshire is owned by Pan Am Railways (PAR). The corridor also includes US Route 3 and I-93 highway corridors, as well as Boston Logan International Airport and Manchester Airport (Figure

1.1). The corridor connects Boston with the three largest cities in New Hampshire: Concord, Manchester, and Nashua. These cities, as well as the other communities on the corridor, represent nearly 39 percent of the population and just over 41 percent of the employment in the entire State of New Hampshire. Manchester is the largest city in the northeast currently without passenger rail service.

1.1 High-Speed Intercity Passenger Rail and Service-level NEPA Overview

In the *High-Speed Rail Strategic Plan*, published in April 2009, FRA announced its vision for high-speed intercity passenger rail in America. The HSIPR Program was created to help address the nation's transportation challenges by making strategic investments in an efficient network of passenger rail corridors that connect communities across the country. The goal of the strategy is to (1) ensure safe and efficient transportation choices; (2) build a foundation for economic competitiveness; (3) promote energy efficiency and environmental quality; and (4) support interconnected, livable communities. The Capitol Corridor makes up a section of the larger Boston to Montreal (Northern New England) Corridor (Figure 1.2).

Figure 1.2: Designated High-Speed Rail Corridors and the Northeast Corridor



This Tier 1 EA addresses Build and No Build Alternatives for new intercity passenger rail service between Boston, MA and Concord, NH. Because of the scope (corridor- or service level study), and the length of the corridor between Boston and Concord (73 miles), the FRA determined that a Tier 1EA is the

appropriate level of NEPA analysis. In the future, Project-level NEPA analyses may result in one or more Environmental Impact Statements (EIS), EAs, or Categorical Exclusions (CE). The appropriate level of Tier2 NEPA analyses will depend on site-specific conditions and resources present, project details, and the significance of potential impacts to the human environment.

1.2 Corridor History

The New Hampshire Capitol Corridor occupies the same alignment as the New Hampshire Main Line (NHML), a rail corridor that has been in continuous use for freight service for 175 years. The first passenger train in New Hampshire pulled into Nashua from Lowell, Massachusetts in October 1838 on the NHML.[1] Passenger rail service along this alignment soon extended further into New Hampshire, to Manchester and Concord with further extensions into the White Mountains and westerly to Hanover and White River Junction. NHML passenger service ran for almost 130 years until it was abandoned in 1967. Passenger service was briefly restored in 1980, but abandoned again when federal funding expired. The NHML was a principal artery of the Boston and Maine Railroad (B&M), and remains a vital portion of the PAR's network. The NHML functions as a key economic link between New Hampshire and the national economy.

In 2006, the Community Advisory Committee to the NHDOT Commissioner recommended expanded passenger rail as one of the five "initial action items" in its final report, which is a component of the state's long-range transportation plan.[2] In 2007, the New Hampshire Legislature created the New Hampshire Rail Transit Authority (NHRTA) to establish passenger rail service in New Hampshire. In 2009, the New Hampshire Climate Action Plan, prepared by the New Hampshire Climate Change Policy Task Force, recommended maintaining and expanding passenger rail service within New Hampshire as part of a balanced, state-wide, multi-modal transportation system that keeps the state competitive with and accessible to the region. Initial actions would focus on sustaining and improving existing passenger rail service. Near- to mid-term actions would focus on improving and expanding New Hampshire's primary travel corridors (I-93 from Salem through Manchester to Concord, and the I-95 corridor on the Seacoast). Long-term actions would address the goal of expanding passenger rail service throughout New Hampshire.[3] The following are examples of recent state-level recognition of the need for the Capitol Corridor Study.

1.2.1 Previous Corridor Planning

In 2003, the state DOTs from New Hampshire, Vermont, and Massachusetts commissioned a feasibility study for the Boston, MA to Montreal, QC, Canada rail corridor: *Boston to Montreal High-Speed Rail*

[1] Crowninshield-Bradlee, Francis Boardman; *The Boston And Lowell Railroad, The Nashua And Lowell Railroad, And The Salem And Lowell Railroad (1918);* Kessinger Publishing; 2009

[2] The report of the Community Advisory Committee to the Commissioner of the New Hampshire Department of Transportation; June 9, 2006; http://www.nhcf.org/document.doc?id=34

[3] http://des.nh.gov/organization/divisions/air/tsb/tps/climate/action_plan/documents/nhcap_final.pdf; Pg 53 - Maintain and Expand Passenger Rail Service (TLU Action 2.B.2.a)

Planning and Feasibility Study Phase I: Final Report.[4] The study describes existing conditions, including those within the Boston, MA to Concord, NH portion of the Study corridor, as well as a ridership analysis of corridor stations. The feasibility study found that "further study of associated operational, engineering and cost/revenue factors is warranted," a recommendation that supports the Capitol Corridor Study.

In 2004, NHDOT developed a draft EA, *Lowell, MA to Nashua, NH Commuter Rail Extension Project Environmental Assessment (2004),*[5] for the corridor segment from Lowell, MA to Nashua, NH in anticipation of extending MBTA commuter rail service to New Hampshire. Because the study focuses on a segment of the Capitol Corridor Study area, NHDOT used the environmental analysis to support the Capitol Corridor Study.

The 2010 *New Hampshire Capitol Corridor Project Overview,* based on a white paper prepared for Amtrak,[6] details this corridor's state-of-readiness to function as part of the intercity passenger rail system. The overview includes many elements of the Capitol Corridor project including proposed service, ridership forecast, capital costs, and economic impacts.

Also in 2010, NHRTA commissioned the *Economic Impact of Passenger Rail Expansion along the New Hampshire Capitol Corridor.*[7] The report assessed the economic impacts of restoring intercity passenger rail service between Boston, MA and Concord, NH. The study supports the case that the implementation of passenger rail along this corridor is a net economic benefit for New Hampshire.

In 2011, a poll was conducted by the University of New Hampshire Survey Center of New Hampshire residents to assess attitudes about the extension of commuter rail service through the New Hampshire Capitol Corridor. Findings suggest a majority of residents strongly favor extending passenger rail service in New Hampshire, and using federal funding to study the issue.

1.2.2 Other Related Planning

A number of other planning studies reference the Capitol Corridor, and are relevant to the current Study:

- The *Ten Year Transportation Improvement Plan (2013-2022)* includes a provision that requires legislative approval for capital and operating budgets associated with passenger rail service prior to expenditure.
- The *Massachusetts Department of Transportation Rail Plan (2010)* and the *New Hampshire State Rail Plan (2012)* both identify the corridor as a potential for passenger service, and the New Hampshire plan recommendations include "implement recommendations of studies of the New Hampshire Capitol Corridor."

[4] https://www.nh.gov/dot/org/aerorailtransit/railandtransit/documents/BostonMontrealHSR.pdf
[5] http://www.nhcapitolcorridor.com/wp-content/uploads/Nashua-EA-6-23-05-ver1_3_Part1.pdf
[6] http://www.cometolowell.com/pdfs/NHCCorridorOverview.pdf
[7] http://www.edrgroup.com/pdf/NH-PassRail-Economic-Impact-Memo.pdf

- The *I-93 Corridor Multi-Modal Transit Investment Study (2009)* does not focus on studying the Capitol Corridor, but recognizes it as a viable candidate for passenger rail service.

1.3 Corridor Existing Conditions

The Capitol Corridor's transportation network includes roadways, highways, transit services, intercity passenger rail service (in Massachusetts), freight railroads, airports, and pedestrian and bicyclist facilities. Despite the multi-modal nature of this transportation network, demand is exceeding capacity (particularly within the highway network) and there are opportunities to encourage shifts to less congested and more efficient modes.

- **Highway Facilities**: The limited access highways that connect New Hampshire's major population centers to metropolitan Boston are I-93, US Route 3/Everett Turnpike, Route 128/I-95, I-293, and, I-495. Under current conditions, severe traffic congestion occurs inbound towards Boston during the weekday morning peak hour. I-93 between Route 128/I-95 and I-495 is generally over-capacity with level of service (LOS) E and F conditions (E = unstable traffic flow, operating at capacity; F = forced or breakdown traffic flow). This LOS represents roadway conditions with bumper-to-bumper or completely stopped traffic. Route 128/I-95 between US Route 3 and I-93 is generally over capacity with traffic congestion. I-495 is over capacity closer to US Route 3. Near I-93, I-495 is close to and above capacity. US Route 3 operates near capacity during the weekday morning peak hour and has LOS E and F conditions between Route 128 and I-495, with congestion focused in the vicinity of the US Route 3 and I-495 interchange and the Lowell Connector. US Route 3 is close to capacity in the vicinity of North Chelmsford (Massachusetts), Tyngsborough (Massachusetts), and Nashua (New Hampshire). US Route 3 and I-93 are close to capacity in the vicinity of Manchester (New Hampshire) and Concord (New Hampshire).

- **Bus Service**: Seven regional and four local bus operators provide service within New Hampshire and intercity service to Boston and beyond. A partnership between NHDOT and Concord Coach operates two Boston Express (BX) commuter bus routes along I-93 and US Route 3 between New Hampshire park and ride lots and Boston South Station. This service provides 42 southbound trips to Boston and 38 northbound to New Hampshire and typically carries 1,800 passengers per day. Existing traffic congestion along I-93 significantly impacts BX's scheduled travel times. The level of recurring daily congestion delays is built-in to the schedules. For example, the 6:30 am southbound departure from Londonderry (Exit 4) on the I-93 service is scheduled for a one-hour trip to Boston South Station. Meanwhile, the 9:50 am southbound departure is scheduled for a two-hour and 20 minute trip, which is a built-in or induced delay of one hour and 20 minutes.

- **Commuter Rail**: On a typical weekday, Lowell is served by 44 MBTA revenue trains to and from Boston's North Station. The 25-mile trip serving up to seven intermediate station stops takes 44 to 49 minutes. Typical weekday MBTA ridership on the entire line is 17,500 passenger trips

including both northbound and southbound travel. Lowell is the busiest passenger station on the line with 4,280 weekday boardings and alightings.

- **Freight Rail**: The NHML was a principal artery of B&M's (now PAR's) network and remains a key economic link between New Hampshire and the national economy. While the freight received is quite diverse, traffic flow is dominated by coal for electric generation shipped to the Bow Power Plant.

- **Airports:** Boston's Logan International Airport is currently New England's largest transportation center and ranks 20th in the nation in passenger volume. Manchester Airport ranks 140th in the nation and handled 2.452 million passengers in 2012 and remains New England's fourth largest airport by passenger volume, behind Boston Logan, Bradley International in Connecticut, and T. F. Green in Rhode Island. It contributes over $1 billion annually to the region's economy and accounts for more than 3,500 jobs in the three-county region contiguous to the airport.[8]

Once a busy main line railway, the NHML was originally double-tracked to Concord and beyond. However, today the railway is largely single-tracked north of Chelmsford with some passing sidings, yards in Nashua and Manchester, and numerous turnouts to freight customer sidings. The following provides an overview of the conditions of the existing rail line along this corridor.

- **Ownership:** In Massachusetts, MBTA acquired the southernmost 34.5 miles of the NHML in the 1960s. In New Hampshire, PAR owns the NHML. PAR has conveyed trackage rights for the operation of passenger trains on the NHML northward into New Hampshire between the state line and Concord to the MBTA.

- **Railway Signal System and Traffic Regulation**: The train control signal system for the route supports Northeast Operating Rules Advisory Committee (NORAC) Rule 261 between North Station and Manchester. Rule 261 allows for bi-directional operation with automatic wayside block signals on all main line tracks. North of Manchester, there are no wayside signals and operations are governed by Data Communication System (DCS) rules, wherein a Form D train order issued over the radio by the railroad dispatcher in Billerica, MA is necessary to move a train.

- **Track Class and Speed**: Within the southern 25 miles of the NHML between Boston and Lowell, most of the trackage is rated for 60 miles per hour (mph) passenger operations, with some segments maintained to a 70 mph speed standard to accommodate higher speed MBTA operations. North from Lowell is a three-mile section of track to North Chelmsford that experiences heavy freight traffic, which is maintained for a maximum freight speed of 40 mph (Class 3). North of Chelmsford the track is maintained for 40 and 30 mph freight speeds on

[8] *Manchester-Boston Regional Airport Economic Impact Study*, 2008-2009, Jacobs Consultancy

predominately Class 3 track north to Bow, and with Class 2 track north to Concord with 25 mph freight speeds.

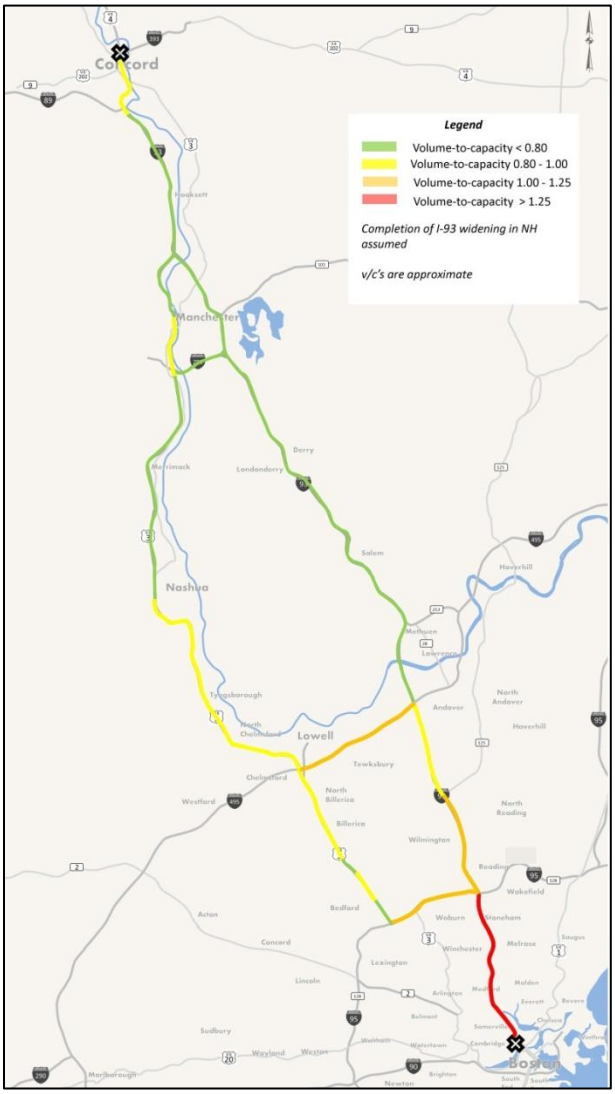
- **Track Condition:** The track conditions along the route are consistent with the FRA Track Class and maximum speeds.
    - *Boston to Lowell:* The entire rail is welded with the latest major tie renewal completed in 1992. The oldest rail on this segment was manufactured in 1980. Much of the track uses 132-pound (per yard) rail, but approximately 20 of the 51 track miles between Boston and Lowell uses 115-pound rail.
    - *Lowell to Chelmsford*: The track is jointed here and the northbound track is primarily constructed with 100-pound rail manufactured in 1927. The southbound track is mostly constructed with 112-pound relay rail from 1965.
    - *North of Chelmsford*: Similar to the southern portion, the rail is almost all jointed. There are approximately two miles of welded rail just north of downtown Manchester. Nearly the entire rail is 112-pound manufactured during the first half of the 1940s.
- **Alignment**: The NHML track north of Lowell to Concord runs along the Merrimack River. This alignment has mostly gentle grades, with none steeper than 0.35 percent. The horizontal alignment curves to follow the river with few tangent (straight) segments more than one-mile long. Between Lowell and Concord, 29.6 of the 48.5 track miles are curved, which is 61 percent of the route. Many of the curves are sufficiently tight to impact maximum train speeds.
- **Bridges**: There are 25 bridges along the NHML between Lowell and Concord rated generally fair to good, with one bridge noted in poor condition in Tyngsborough, Massachusetts. The two longest bridges crossing the Merrimack River are not rated and should be inspected before passenger service is restored.
- **Highway Grade Crossings**: There are 35 locations identified between Lowell and Concord where roadways or pedestrian paths cross the railway at grade. Federal safety regulations require trains to sound their horns at all grade crossings. The density of 35 crossings along the 48-mile route is relatively low for a suburban railway. Of the 35 grade crossings, 21 are public roads, 13 are private drives, and one is an informal community crossing.

2 Purpose and Need

2.1 Purpose

The overarching purpose of the Capitol Corridor Study was to identify and implement the intercity passenger rail investment strategy that will best leverage the existing transportation infrastructure to improve connectivity to and from Boston, the region's largest economic hub; diversify options and reduce the primarily single-mode reliance on roadways for the movement of people and goods; support mobility options that match emerging demographic trends and preferences in the corridor; and maintain the region's high quality-of-life through strategic infrastructure investments. More specifically, the purpose of the Study was to evaluate options for introducing intercity passenger rail service between Boston, MA and Concord, NH over existing transportation infrastructure, namely the portion of the NHML owned by PAR, which is currently used for freight rail only.

Figure 2.1: Existing Volume-to-Capacity Ratio during the Inbound Morning Peak



2.2 Need

Projected population growth will result in increased roadway congestion. As population density increases over the coming years, an increased number of multi-modal transportation options to Boston, the region's largest employment center, will be critical to mitigate corresponding increases in roadway congestion, particularly along I-93 and US Route 3, as shown in Figure 2.1.

New Hampshire's existing transportation network does not effectively connect existing modes. Increased levels of corridor transportation investment will improve local and regional mobility by linking travelers to the network of existing transportation modes: roadway, buses, commuter rail, heavy rail, light rail, bicycles, and airplanes. These increased linkages will improve ridership and usage across all of the modes, while promoting sustainable mobility.

Regional economy suffers from predominantly singular dependency on automobile travel/roadways for movement of goods and passengers. Investing in transportation infrastructure that provides an alternative to roadway transport will link New Hampshire's businesses, industries, and residents to the national and New England transportation network.

Improved transportation options will attract employers to New Hampshire and improve employment options for New Hampshire residents. A mismatch between locations of residence and employment forces many in New Hampshire to spend comparatively long periods of time commuting to work. Investing in more efficient transportation modes will not only improve connectivity between existing centers of residence and employment, but increased levels of multi-modal access may catalyze additional business investment within New Hampshire.

New Hampshire is experiencing a young professional "brain drain." While the region's overall population is projected to grow in the coming decades, young professionals are choosing to leave southern New Hampshire to be closer to the employment, cultural, and social opportunities that are associated with larger urban centers. Improved transportation connectivity will support the attraction and retention of young professionals within the Study area.

New Hampshire is getting older. New Hampshire's senior population continues to grow. Additional shared transportation accommodations that support "car-light" mobility will be required to accommodate these emerging demographic and lifestyle trends, and will continue to make New Hampshire attractive to residents from childhood through retirement.

Residential development patterns resulting from population growth may negatively impact the region's existing quality-of-life. Population growth, if not guided through strategic infrastructure investments that promote efficiency, will result in uncoordinated development patterns and sprawl that will diminish the region's high quality-of-life and negatively impact its unique character.

The existing transportation network cannot accommodate increased levels of demand without negative environmental consequences. The expansion of existing roadways and construction of new roadways will not be sufficient to sustainably accommodate the projected growth in travel demand, causing negative environmental consequences associated with an increased number of vehicle miles traveled (VMT) and corresponding congestion.

2.3 Goals and Objectives

To determine how well intercity passenger rail investment within the Capitol Corridor will address regional and corridor needs, NHDOT developed a set of goals and objectives. These goals and objectives, outlined in Table 2.1, build on the work that has been completed or is ongoing within the corridor and region. Each goal reflects an understanding of the role that integrated transportation and land use planning can play in supporting an economically, environmentally, and socially sustainable community. Intercity passenger rail investment will be a major step in implementing this integrated planning approach within the Capitol Corridor.

Table 2.1: Capitol Corridor Study Goals and Objectives

Goals	Objectives
Transportation and Mobility Leverage the existing transportation network to improve access and mobility within the corridor and throughout the region	▪ Provide alternatives to address congestion within the Study corridor ▪ Expand the rail network capacity ▪ Increase intercity passenger rail ridership and mode share by expanding the existing rider base and attracting new riders ▪ Provide travel time savings ▪ Improve the efficiency, convenience, and reliability of transportation
System Integration Invest in transportation improvements that complement the existing multi-modal transportation network	▪ Increase corridor modal connectivity ▪ Provide connections to other corridors within the region ▪ Increase access to the Manchester Airport through additional intercity passenger rail service ▪ Balance system capacity (MBTA, BX, Concord Coach) ▪ Ensure operating efficiency
Economic Development and Land Use Support the vision for growth laid out in local/regional development plans	▪ Improve access to higher-paying jobs in greater Boston ▪ Support development patterns/lifestyle choices that attract younger, highly educated professionals to New Hampshire ▪ Leverage younger, highly educated employee base to attract new businesses/grow existing ones ▪ Promote Transit-Oriented Development (TOD) to mitigate sprawl development patterns ▪ Improve the potential for additional freight rail business through infrastructure upgrades
Sustainability Support transportation investments that contribute to an environmentally, economically, and socially sustainable community	▪ Leverage existing transportation infrastructure to qualify for federal transportation investment dollars ▪ Mitigate potential adverse environmental impacts resulting from anticipated development ▪ Support growth patterns that attract and retain residents from childhood through retirement ▪ Improve access to other tourism, recreation, and cultural attractions in greater Boston and New Hampshire

3 Alternatives Evaluation

The Study team examined three intercity passenger rail alternatives, and selected one of them (Intercity 8, which stands for eight trains per day) as the Build Alternative to be carried forward for analysis in this EA. The Build Alternative was selected because it was found to be the lowest cost of the three intercity alternatives (the other two being 12 and 18 trains per day) and maintains all existing bus service on I-93 and US Route 3. The Build Alternative performs about the same in terms of ridership, is slightly less favorable for land use and economic development and has no significant difference in overall environmental impact. This EA evaluates the Build and No-Build Alternative described in the SDP.

In addition to looking at train service levels, the Study team performed a layover facility alternatives analysis and a passenger station location alternatives analysis. The Build Alternative is composed of one layover facility and four passenger station locations. The analysis of the Build Alternative is detailed in Section 3.2.

3.1 No Build Alternative

NEPA requires that the No Build Alternative be evaluated as a baseline for comparing build alternatives' impacts. Under the No Build Alternative, the existing condition of the rail corridor would remain unchanged. There would be no intercity passenger rail service and there would be no other rail improvement projects planned for the corridor. Freight traffic would continue to serve the existing customers located on the NHML, and intercity bus service would continue to serve passengers between Concord, Manchester, Nashua, and Boston. Population growth in the region and the demand for jobs in the greater Boston market would further negatively impact corridor traffic conditions.

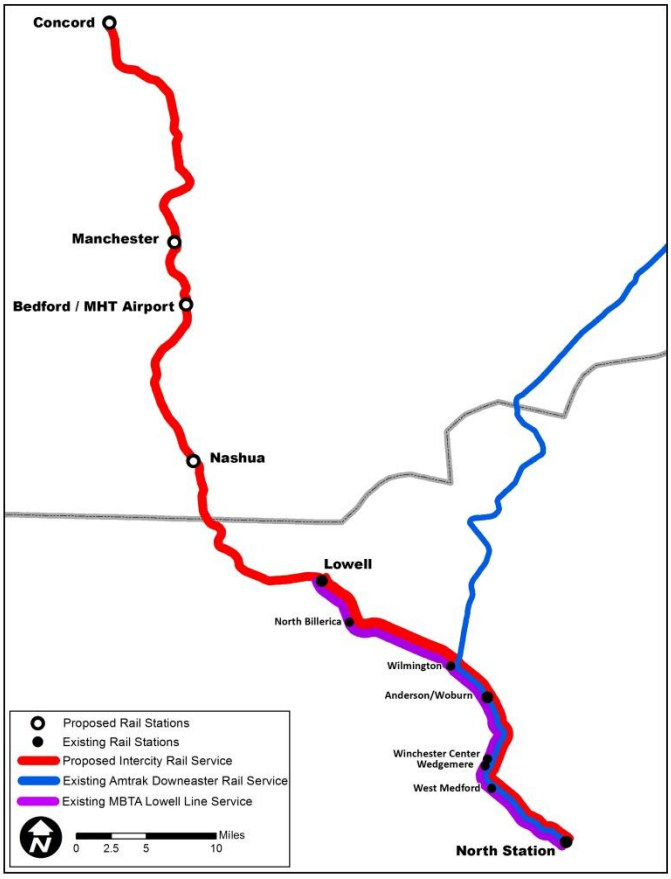
The No Build Alternative does not satisfy the project's purpose and need for several reasons:

- It fails to improve connectivity to and from Boston, the region's largest economic hub.
- It maintains single-mode reliance on roadways for the movement of people and goods.
- It does not increase mobility options that match emerging demographic trends and preferences in the corridor.
- The region's high quality-of-life may deteriorate without strategic infrastructure investments.

3.2 Build Alternative (Intercity 8)

After evaluating three intercity passenger rail build alternatives and consulting with stakeholders primarily on the fiscal constraints faced by the State of New Hampshire, NHDOT in consultation with FRA selected the Intercity 8 alternative as the preferred Build Alternative because of its low net operating cost and mobility benefits. Section 3.4 briefly discusses the alternatives that NHDOT did not carry forward for analysis in this EA. The Build Alternative would operate eight trips per day between Boston North Station and Concord. The four daily round trips over the 73-mile route would stop at five intermediate stations (Manchester, Bedford/Manchester Airport, Nashua, Lowell and Woburn) as shown in Figure 3.1. The end-to-end trip time would be approximately 96 minutes. In order to add intercity passenger rail service, a variety of work would be necessary. This includes the construction of new stations, improvements to infrastructure such as track, bridges, grade crossings, train control, and signal systems. These activities are summarized below and described in detail in the SDP.

Figure 3.1: Build Alternative Service



Under the Build Alternative, the new intercity passenger rail service could connect to private bus service to reach North Country destinations. The Build Alternative would not likely result in any substantial changes in express bus service for commuting to Boston via US Route3/Everett Turnpike. Local bus service to the intercity rail stations could be offered but would not be integral to the service design. The FRA considers local connection critical to supporting intercity travel, but determining the nature of local bus service is outside the scope of this study. A Boston Express/Concord Coach/Intercity Rail fare integration scheme similar to that employed by the *Downeaster* at Portland, Maine could be employed at the Concord and Manchester stations that would be shared by both intercity rail and coach bus services.

The Build Alternative anticipates that travelers would be attracted to the new intercity rail service over other modes. It is assumed that few current MBTA commuter rail passengers living in New Hampshire would shift from using the MBTA Lowell and North Billerica Stations to the new intercity rail service.

Some Boston Express and Concord Coach customers might shift to intercity rail service from Nashua, Manchester, and Concord. The overall increase in the quality and frequency of rail options to Manchester and Concord may also stimulate bus ridership as has seemed to be the case at the shared terminal in Portland, Maine. Ridership figures show that Concord Coach served 216,000 passengers in Portland in 2003 while the *Downeaster* carried 250,000 passengers. In 2008, those numbers had increased to 400,000 passengers on Concord Coach and 320,000 passengers on the *Downeaster*.

3.2.1 Route

The Build Alternative route would utilize the existing NHML rail line from Boston to Concord that travels through Lowell, Nashua, and Manchester. Existing commuter rail service operates between Boston and Lowell, and freight service currently operates along the entire length of the line.

3.2.2 Stations and Layover Facility

The corridor connects the two state capitals (Concord and Boston) and the two major population centers in each state (Manchester and Boston). The Intercity passenger rail service proposed in the Build Alternative would make four stops in New Hampshire (Concord, Manchester, Bedford/Manchester Airport, and Nashua), in addition to three existing Massachusetts commuter rail stops (Lowell, Woburn, and Boston). Four new passenger stations with high-level platforms would be constructed.

In the station alternatives analysis, NHDOT considered a wide-range of alternatives at each location. NHDOT conducted field inspections, interviews with local officials, and reviews of previous studies to determine the station alternatives. NHDOT then selected the preferred station locations through coordination with local officials and a screening process that took into account standard criteria for each alternative. Each of the rail stations would require ADA[9]-compliant platforms for passengers to board and alight the trains, provide a canopy for shelter, have provisions for buses and automobiles to pickup and drop-off passengers, and provide direct access to and from major highways and nearby land uses. All, but one, of the stations would require parking designated for rail passengers. Following is a summary of preferred station locations. For a detailed description of the station and layover yard alternatives and a discussion of the site evaluation and screening criteria, please refer to *the SDP Chapter 6 - Stations and Layover Yards*.

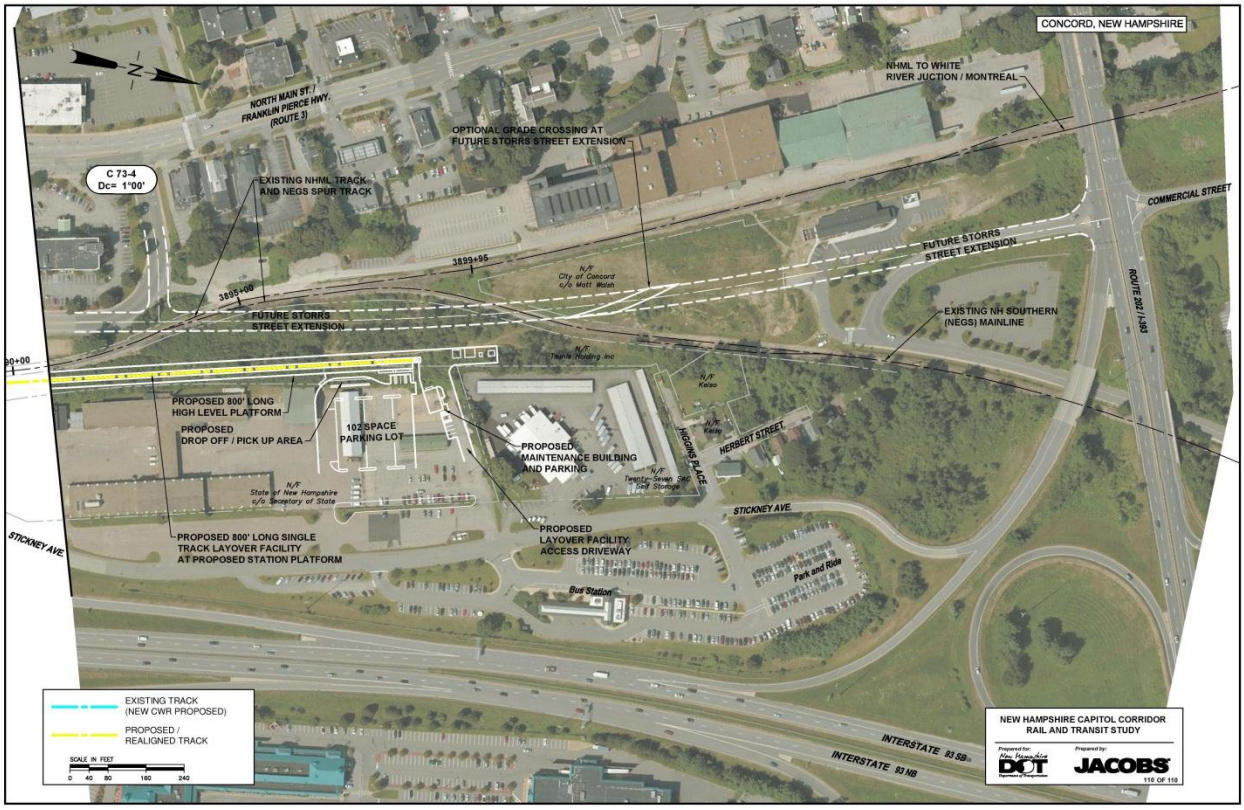
Concord – Stickney Avenue

The preferred station location in the City of Concord is located at Stickney Avenue, the location of the existing bus depot and park-and-ride facility (see Figure 3.2). It is also the former NHDOT headquarters, and the State of New Hampshire owns a number of parcels in the vicinity of the rail line. This site is highly rated because it could accommodate both a station and layover yard. The station would have one platform serving one or two tracks and operate as a joint station/layover facility. Requirements for implementing the service levels in the Build Alternative call for only one track, but with future expansion

[9] Americans with Disabilities Act

of intercity passenger rail service, two storage tracks may eventually be necessary. The preliminary station design shows ample land within the larger site for construction of a railway station with parking, train layover on the station tracks or on an adjacent track and New England Southern Railroad (NEGS) run around track. This design would still allow for the City of Concord's redevelopment plans and the Boston-Concord project for I-93 improvements to proceed.

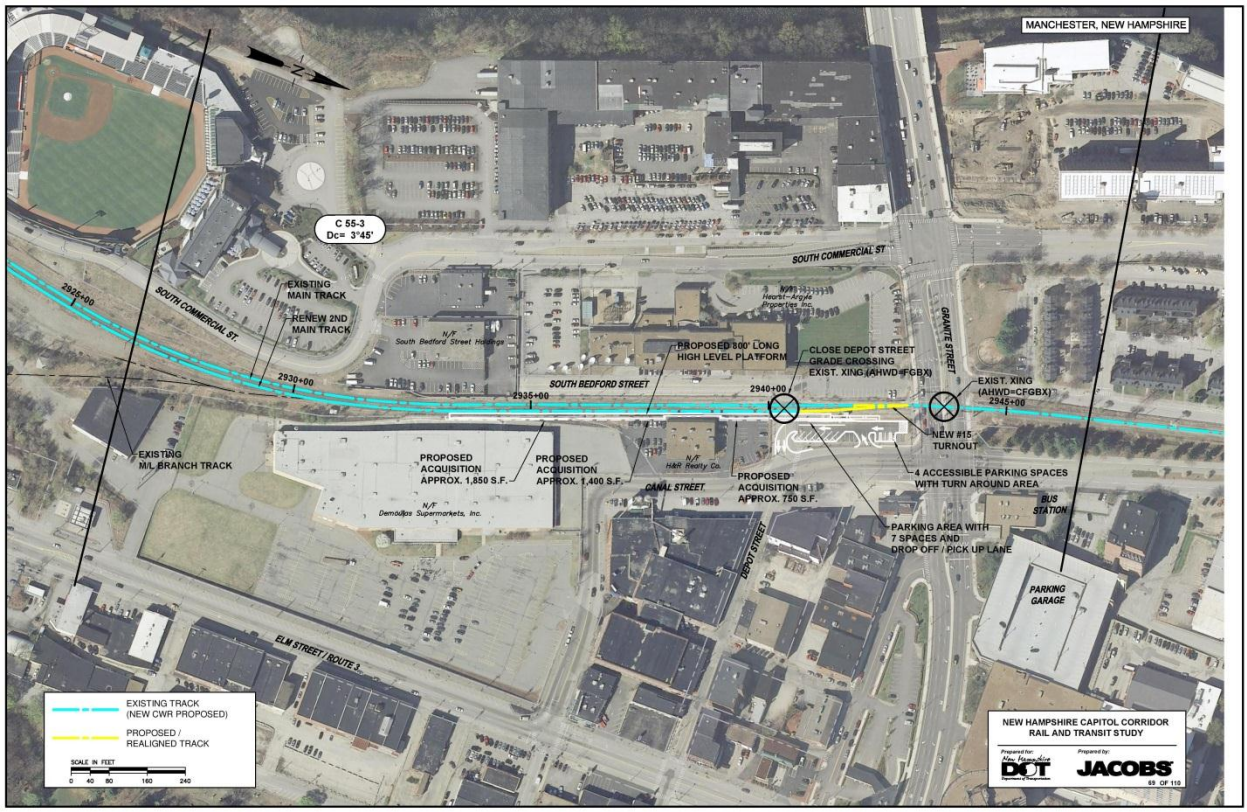
Figure 3.2: Proposed Concord Stickney Avenue Station



Manchester – Granite Street

Manchester's main passenger rail station stood for nearly 90 years on the south side of Granite Street before the building was demolished and the site redeveloped. The site is proximate to the center of Manchester's densest urban development, across the street from the intercity bus terminal, and a short walk to the Manchester Transit Authority's downtown hub at Veteran's Park (see Figure 3.3). Public parking is available in the 940-space Center of New Hampshire parking garage located diagonally across the Granite and Canal Streets intersection from the proposed station site. The recommended station design would close the Depot Street crossing and develop the city-owned parcel on the corner of Granite and Canal Streets, which is presently used for public parking. NHDOT developed a two-track station option with a single high-level platform serving the east track. This would enable efficient operation of a terminal station and allow for unimpeded freight traffic to and from the north.

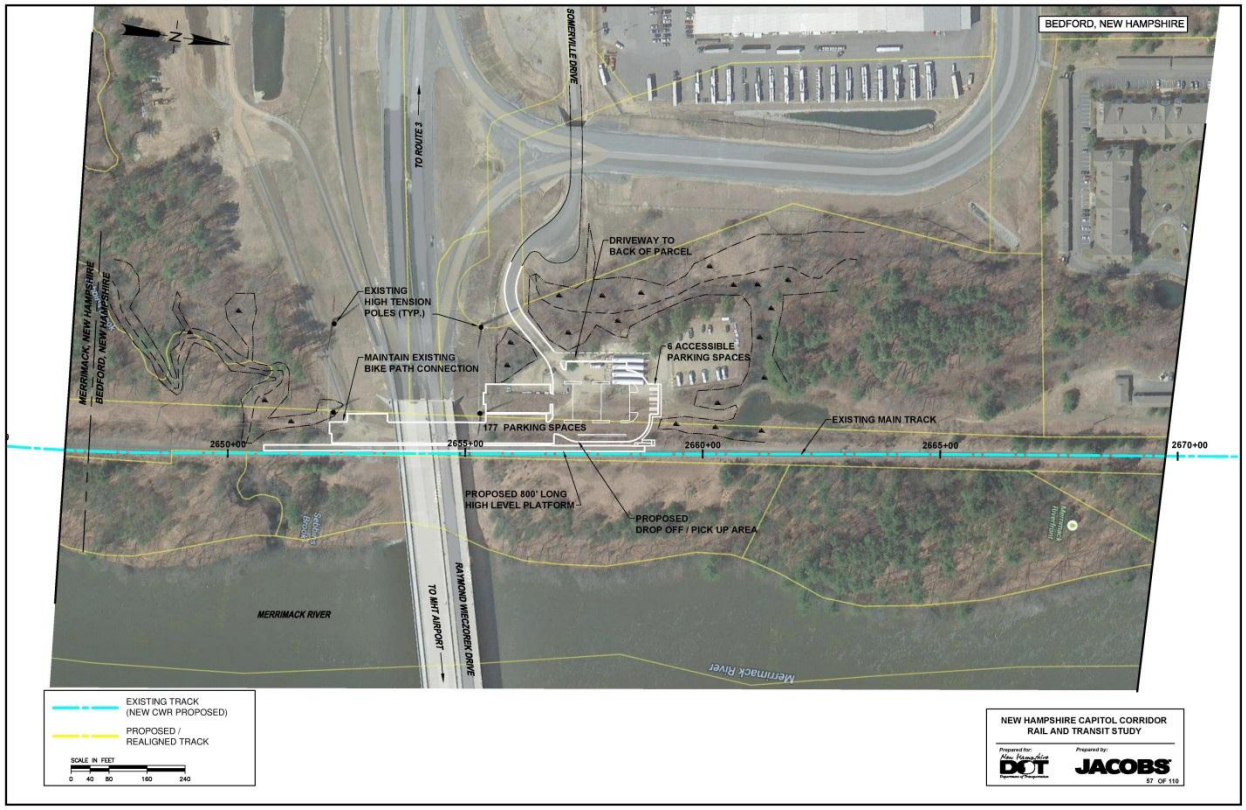
Figure 3.3 Proposed Manchester Station



Bedford/Manchester Airport

The proposed station at Boston-Manchester Regional Airport in Bedford would provide a location for air-rail passenger interchange and also serve as a regional park-and-ride for northern Hillsborough and southern Merrimack counties. The site is located under the Ray Wieczorek Drive/Pearl Harbor Memorial Bridge that provides a direct connection between US Route 3 and Manchester Airport. This is a largely vegetated site with little development. This site has been proposed as a development node within the Town of Bedford. A proposed shuttle bus would provide connecting service, meeting all trains, along the 2.8-mile (six-minute) route between the airport passenger terminal and the proposed station (see Figure 3.4). Similar air-rail shuttle connections are used at airports in Baltimore, Boston, and Milwaukee. The station parking lot would be managed to prohibit overnight parking, avoid use by air passengers, and keep spaces available for rail passengers from Manchester, Bedford, and other nearby communities.

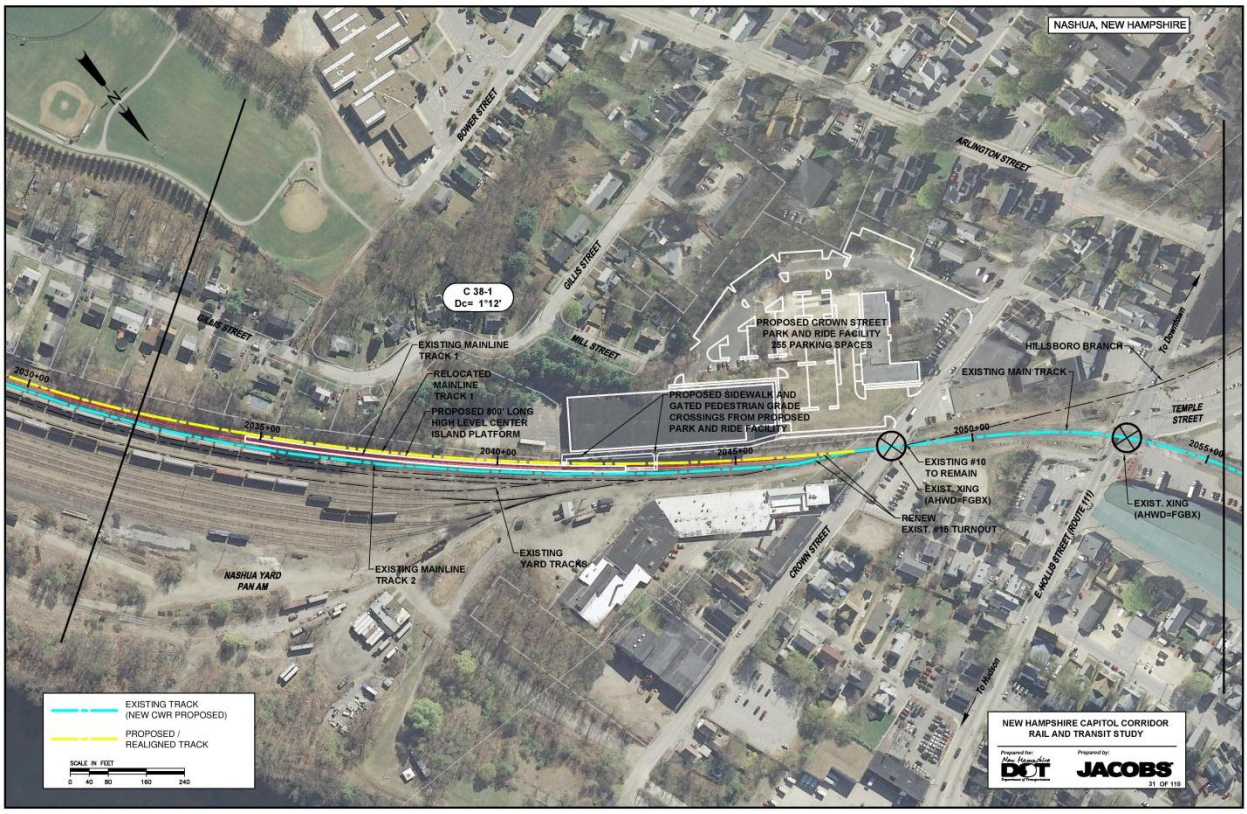
Figure 3.4: Proposed Bedford/Manchester Airport Station



Nashua – Crown Street

This site is located south of the Crown Street site and north and west of the PAR yard, as shown on Figure 3.5. It is the approximate location of Nashua's historic main line train station. The proposed center-island, high-level station platform would be located adjacent to the Triangle Pacific building, which could potentially be redeveloped. The city and state recently cooperated to acquire the site with the intention of developing a park-and-ride lot independent of the proposed rail service. City plans call for 255 parking spaces and reuse of existing industrial buildings. Additional parking supply would be constrained by the size of the parcel. Since this location would rely on pedestrian and bicycle accessibility, a new sidewalk would be necessary on the south side of Crown Street and east of Arlington Street to ensure safe access to the site. A pedestrian/bicycle connection off Harvard Street would provide improved accessibility from the surrounding neighborhoods.

Figure 3.5: Proposed Nashua Station



Massachusetts Stations

The preferred intercity rail service would make three stops in Massachusetts at existing rail stations. Each station is currently constructed with high-level platforms and no modifications are anticipated to be necessary:

- **Gallagher Intermodal Transit Center located in Lowell, Massachusetts**: The current terminus of MBTA's Lowell Commuter Line, with connections to local bus and intercity bus service
- **Anderson Regional Transportation Center located in Woburn, Massachusetts:** Services MBTA's Lowell Commuter Line, the Amtrak *Downeaster*, as well as a regional shuttle
- **North Station located in Boston Massachusetts:** The terminus for Amtrak's *Downeaster* and the four northern MBTA Commuter Rail Lines, and also provides connections to local buses and the MBTA subway

3.3 Train Service Levels

Four round trips per day are proposed under the Build Alternative. Table 3.1 shows the proposed service schedule. This LOS mimics that first used on the *Downeaster*, a model for the proposed project. The

Build Alternative would not preclude a commuter rail service to either Nashua or Manchester along the same alignment.

Table 3.1: Proposed Service Schedule

380	382	384	386		Station	MP		381	383	385	387
6:38am	10:38am	2:53pm	7:53pm	Read Down	**Concord NH**	73.3		10:07am	2:22pm	6:57pm	11:37pm
6:52	10:52	3:07	8:07		**Manchester NH**	55.7		9:41	1:56	6:31	11:11
7:05	11:05	3:20	8:20		**Bedford/MHT**	50.1		9:33	1:48	6:23	11:03
7:18	11:18	3:33	8:33		**Nashua**	39.0		9:20	1:35	6:10	10:50
7:36	11:36	3:51	8:51		**Lowell**	25.5		9:02	1:17	5:52	10:32
7:52	11:52	4:07	9:07		**Anderson/Woburn**	12.6	Read Up	8:46	1:01	5:36	10:16
8:15	12:15	4:30	9:30		**North Station**	0.0		8:30	12:45	5:20	10:00

3.3.1 Train Operating Speeds

The maximum speed of train service is dependent on existing track characteristics and the amount of investment required to increase the speeds in the corridor. The maximum historic passenger speed along the NHML was 70 mph. The NHML track profile or vertical alignment north of Lowell to Concord runs along the banks of the Merrimack River. Many of the curves are sufficiently tight to impact maximum train speeds. The engineering required to achieve train speeds of 79 mph or higher is substantially more challenging with sharp curves. Between Lowell and Concord there are 19.6 miles of such restrictive curves that constitute 40 percent of the route miles. As such, the service would operate at maximum speeds up to 75 mph between the Manchester Airport and Nashua and 70 mph at many other locations.

3.3.2 Ridership Projections

All ridership estimates presented in this chapter are station boardings. It is expected that travel patterns would be symmetrical and each station would have an equal number of alightings, thus total system ridership is two times the estimated boardings. The estimates are all present-day forecasts and do not assume any changes in regional socioeconomics, travel demand, or auto congestion. Ridership estimates for the Build Alternative are based on the Fiscal Year 2013 Amtrak *Downeaster* ridership/revenue data and are presented in Table 3.2. Each station on the proposed service is associated with a *Downeaster* "surrogate" station with similar travel time, station demographics, and train service characteristics.

Table 3.2: Ridership Demand Forecast (Start of Service)

Station	Annual Average Boardings	Average Daily Boardings
Concord	28,470	78
Manchester	67,890	186
Bedford/MHT Airport	28,105	77
Nashua	48,180	132
Total	**172,645**	**473**

3.3.3 Major Infrastructure Components

Historically, the NHML had two tracks along the entire length between Boston and Concord. Today, aside from sidings, the rail line is single-tracked north of Chelmsford. To balance the need to achieve maximum allowable speed with an acceptable level of capital and operating expense, the Build Alternative would involve upgrades to the existing rail and provide enough second track to accommodate both passenger rail and freight on the same line. As such, double track will not need to be installed throughout the corridor.

No improvements south of MBTA's Lowell Gallagher Terminal would be required. North of Lowell the railroad would be upgraded to permit safe, reliable operation of eight daily passenger trains at speeds of up to 75 mph. Recommended upgrades to track, bridges, crossings, and signals are summarized below.

- **Track:** All of the existing 70-plus-year-old 112-pound main line rail between Lowell and Concord would be upgraded with new continuous welded rail (CWR) of a similar weight. Along segments where the rail is renewed with CWR, approximately one-third of the existing ties would be replaced. No double track would be required between North Chelmsford (MP 28.5) and the southern end of the Tyngsborough Curve (MP 32). Industrial sidings would be created at three key areas of freight activity in Nashua and Merrimack to eliminate conflicts between local freight deliveries and through passenger trains. At these locations the existing main line track would be retained as an industrial siding with an entirely new parallel main line track constructed in the same alignment for use by through trains. Adding a second track would be relatively straightforward, as the railway was once entirely double-tracked with the double-track bed still largely intact. However, fitting turnouts in double-track sections would be difficult. Also, reinstalling a second track on bridges can be challenging depending on the type and condition of the bridge. The study team's conceptual design for the railway identified and responded to these and other challenges as necessary.

- **Bridges:** The service expansion would use 25 existing bridges over watercourses or roadways. Most of the bridges are rated as having sufficient strength to accommodate the proposed additional traffic. One bridge in Tyngsborough is a candidate for complete replacement. The large steel (circa 1930) structure spanning the Merrimack River between Manchester and Bedford is subject to more detailed inspection. In Hooksett, the 488-foot steel bridge also spanning the Merrimack is similarly subject to more detailed inspection. The other 22 bridges should receive a renewal of worn and weakened components when the rails crossing them are replaced.

- **Grade Crossings:** With an increased frequency of faster trains, most of the 35 roadway grade crossings between Concord and downtown Lowell would need upgrades in their Automatic Highway Warning Devices (AHWD). The density of crossings just north of the proposed Granite Street Station in Manchester is especially high.

- **Other:** Upgrades to the train control and signal systems would also be required as well as some new switches and reconfigurations of track.

3.4 Alternatives Considered but Dismissed from Further Analysis

During the alternatives development process, the Study team considered a wide-range of alternatives. This section provides an overview of the development process and justification for dismissal.

3.4.1 Route Alternatives

The Study corridor encompasses two highway corridors (US Route 3 and I-93), and two existing rail lines that historically ran between New Hampshire and Massachusetts. A previous study, *I-93 Corridor Multi-Modal Transit Investment Study*, completed in 2009 by NHDOT, evaluated the NHML, which is the preferred route alternative for this Study, the old Manchester & Lawrence (M&L) Branch, which extends north from Lawrence off of the existing MBTA Haverhill line, and, lastly, the I-93 Corridor, which can accommodate a new rail line within the existing right-of-way. The current Study dismissed the M&L Branch and I-93 corridor alternatives for similar reasons – each line would require either extensive rail upgrades, or in some cases entirely new rail infrastructure to accommodate future rail use. The NHML is the only corridor that has intact and maintained rail infrastructure along its entire length; therefore, it was chosen by NHDOT as part of the Build Alternative. Use of the existing NHML achieves the project purpose and need objectives at a reasonable cost.

3.4.2 Station Alternatives

The Study team determined station alternatives based on field inspections, interviews with local officials, and reviews of previous studies. The Study team chose the preferred locations described above through coordination with local officials and a screening process that took into account standard criteria for each alternative. The standard screening criteria considered are the travel market; adequate access; track operational characteristics; parcel size/configuration/ownership; land use; sensitive receptors; and environmental sensitivity. If the Build Alternative progresses to the next phase of project development, additional information may become available that could alter station location alternatives. The following is a summary of the station locations that were identified but dismissed from detailed analysis at this time.

- **Concord:** In addition to the Stickney Avenue site, the Study team analyzed a site at the base of Depot Street, which was the historic site of Concord's rail station. The original station was torn down in 1960, and the existing land use at the site is commercial and retail, with private ownership. Because the existing land use was incompatible with the proposed station, and a more feasible alternative consistent with Concord downtown development plans was available, this alternative was dismissed from analysis.
- **Manchester:** In addition to the Granite Street site, the Study team analyzed two additional sites: (1) at the base of Spring Street and underneath the overpass for West Bridge Street, and (2) in the gaslight district near the location of the existing Market Basket supermarket. Of the three alternatives analyzed, the Granite Street location best fit the Study purpose and need due to its close proximity to the bus depot and existing

development in the city. As mentioned above, if future development plans emerge in the next project phase, they could alter the preferred station location for Manchester.

- **Nashua:** In addition to the Crown Street site, the Study team analyzed three additional sites: 1) Beazer East property north of downtown adjacent to Greeley Park, 2) Dow Chemical property at the base of Spit Brook Road, and 3) adjacent to the Pheasant Lane Mall. The Beazer East property was the least desirable site as it was located furthest from the highest density development in the city and was the least accessible location. The Study team considered two additional sites as commuter rail stations. For the Build Alternative, the Study team determined that one station location would serve the City of Nashua to best balance demand and schedule efficiencies. Under this scenario, the Crown Street site best fit the purpose and need.

3.4.3 Train Service Levels

The Study team initially developed three service-level alternatives. In addition to the four round trips per day under the Build Alternative, the Study team analyzed six round trips per day and nine round trips per day. The main difference between the alternatives was operations cost, as the six and nine round trip alternatives would require an additional train set to accommodate this LOS. The Build Alternative performs about the same in terms of ridership, is slightly less favorable for land use and economic development and has no significant difference in overall environmental impact. The four-round-trips-per-day alternative is the same as the level of service the *Downeaster* used at the beginning of its operation. Based on the *Downeaster's* success, the Study team determined that the four-round-trips-per-day alternative was the most feasible service level that was still able to satisfy the Study purpose and need.

4 Affected Environment and Environmental Impacts

This section describes existing environmental conditions and potential impacts resulting from construction and operation of the Build Alternative for the following resources: Air Quality, Noise and Vibration, Hazardous Waste Sites, Water Quality, Wetlands, Threatened and Endangered Species, Floodplains, Energy Resources, Visual Resources, Accessibility, Property Acquisition, Land Use, Environmental Justice, Public Safety, Cultural Resources, Parks and Recreation, Socioeconomics, Transportation, and Indirect Effects and Cumulative Impacts. No construction is proposed in areas protected under the Farmland Protection Policy Act. The EA for the Capitol Corridor Rail Study is a "Service-Level" or "Tier 1" EA undertaken to identify and evaluate potential environmental impacts of service alternatives. Because rail planning studies may include numerous alternatives and extend over long corridors, project implementation may ultimately be through a series of smaller projects at a later date that are reviewed in

more detail at the project level ("Tier 2").[10] This Tier 1 EA identifies the potential impacts of the preferred service alternative, based on conceptual identification of infrastructure improvements and railroad operations. Impacts were identified and assessed with regard to the anticipated level of intensity based on a review of scientific literature, previously prepared documentation, data and information available on websites maintained by state and federal environmental agencies, and the professional judgment of resource specialists.

Potential impacts are described in terms of the following:

- **Type**: Beneficial impact (a positive change in condition of the resource) or adverse impact (a change that reduces or degrades the condition of the resource)
- **Context**: Local, regional, global, or any combination
- **Duration**: Short- or long-term

4.1 Air Quality

The Capitol Corridor Air Quality and Global Climate Change Study follows the Service-level NEPA process as outlined in the HSIPR NEPA guidance from FRA. The Study and related analyses looked at the following pollutants: ozone (O_3), particulate matter (PM), including PM_{10}, (10 micrometers or less in diameter and PM 2.5, 2.5 micrometers or less in diameter), carbon monoxide (CO), nitrogen oxide (NO_x), sulfur dioxide (SO_2), lead, asbestos, and mobile source air toxics (MSAT). In addition, greenhouse gases (GHGs), including carbon dioxide, methane, nitrous oxide, and synthetic GHGs, were analyzed for climate change impacts.

40 CFR Part 51, Subpart W, applies where a state has an approved State Implementation Plan (SIP) revision adopting General Conformity regulations. 40 CFR Part 93, Subpart B, applies in states where the state does not have an approved SIP revision adopting General Conformity regulations. The project is subject to the general conformity regulations, but not the transportation conformity guidelines in 40 CFR Part 93.109 and 93.119.

On a local scale, the potential effect of the Build Alternative on air quality is limited to increases in locomotive emissions, and both increases and decreases in on-road emissions. Decreases in on-road emissions could have a beneficial impact on local air quality if large numbers of vehicle trips are shifted to rail. Since the details of that shift are not clearly known at this time, this potential benefit has not been analyzed; however, a more meaningful analysis of the region-wide benefits of this mode shift is included in the regional analysis (see Appendix A).

[10] FRA. 2009. High-Speed Intercity Passenger Rail (HSIPR) Program. Docket No. FRA-2009-0045, and Compliance with the National Environmental Policy Act in Implementing the High-Speed Intercity Passenger Rail Program. http://www.fra.dot.gov/eLib/Details/L02855

For local impacts, CO hotspot and PM hotspot analysis were not conducted because this is a Tier1 document (this would be performed during the project's next phase), but locomotive emissions factors were obtained from "2009 Technical Highlights for Locomotive Emissions" by the U.S. Environmental Protection Agency (USEPA). The total emissions were distributed to each state (Massachusetts and New Hampshire) and by attainment areas. For regional impact, the locomotive emission factors are the same as for the local impact. An on-road vehicle emission analysis was conducted using average daily VMT estimates and associated average daily speed estimates for each of the affected areas. The criteria pollutants emissions for the vehicles were obtained from USEPA Motor Vehicle Emission Simulator (MOVES) model (national level allocated to the Hillsborough and Merrimack counties in New Hampshire). Total VMT were obtained from the project traffic study. The analysis was conducted for the modeling year 2020, which is expected to be the earliest possible build out year. The emission factors in the earliest build out year are more conservative since the control technology improves over time and therefore the average emission factors will decrease in the later years.

To determine overall pollutant burdens generated by on-road vehicles, estimated VMT increases or decreases were multiplied by applicable pollutants' emission factors, which are based on national default speeds and vehicle speciation data, and using a 2020 analysis year. The regional or local specific data are not required for this Tier 1analysis, but will be in the Tier II quantitative analysis. Therefore, the national default values were used in the EPA MOVES model for this Tier 1 EA. Based on the Federal Highway Administration (FHWA) guidance, the Build Alternative does not require a detailed quantitative analysis for MSAT. In addition, the detailed project level MSAT and GHG emission factors for vehicles and locomotives are not available in the current version of MOVES. Therefore, the hazardous air pollutant and GHG emissions were estimated by scaling either NO_x emissions from the MOVES model, SO_2 emissions from locomotive engines, or NO_x emissions from USEPA's 2011 National Emissions Inventory data. The Air Quality Technical Memorandum in Appendix A to this EA has the detailed methodology and the results.

4.1.1 Affected Environment

Ambient air quality standards have been set by both the federal government and state agencies. Both New Hampshire and Massachusetts do not designate areas as state attainment or nonattainment with these standards. USEPA, in response to the federal CAA of 1970, established National Ambient Air Quality Standards (NAAQS) in Title 40 CFR Part 50. The NAAQS include both primary and secondary standards for six "criteria pollutants." These criteria pollutants are O_3, CO, nitrogen NO_2, SO_2, PM_{10}, $PM_{2.5}$, and lead. Primary standards were established to protect human health, and secondary standards were designed to protect property and natural ecosystems from the effects of air pollution. The NAAQS and related requirements can be found in the Air Quality Technical Memorandum in Appendix A.

The Study area is classified as attainment with respect to the NAAQS for O_3, NO_2, PM_{10}, $PM_{2.5}$, SO2, and CO, except for some areas in Massachusetts that are maintenance areas for CO (1971 standard) and nonattainment areas for O_3 (1997 standard). Some areas in New Hampshire are nonattainment areas for SO_2 (2010 standard) and maintenance areas for CO (1997 standard).

NO_x and SO_2 are regulated as PM_{10} precursors, and NO_x and volatile organic compounds (VOCs) as O_3 precursors. Table 4.1 provides the area, pollutant, attainment status, and the General Conformity applicable *de minimis* emission levels for the Study area.

Table 4.1: Air Pollutants and NAAQS Attainment Status

Area	Pollutant	Attainment Status	General Conformity applicable de minimis emission levels tons per year (tpy)
MA – Boston and Lowell	CO (1971 standard)	Maintenance	100
MA – Boston-Lawrence-Worcester	Ozone (1997 standard)	Nonattainment - Moderate	100 (NO_x and VOC)
NH – Hillsborough County	CO (1971 standard)	Maintenance	100
NH – Central New Hampshire	Sulfur Dioxide (2010 standard)	Nonattainment	100
NH – Boston-Manchester-Portsmouth	Ozone (1997 standard)	Maintenance	100 (NO_x and VOC)

The ambient air quality in the project area is monitored at a number of permanent air quality monitoring stations operated by USEPA, Massachusetts Department of Environmental Protection (MassDEP), and New Hampshire Department of Environmental Services (NHDES). The monitoring stations within Massachusetts that are closest to the project area are in Chelmsford, Lawrence, and Boston (Charlestown, North End, Kenmore Square, and Roxbury). In New Hampshire, the monitoring stations nearest to the project area are in Nashua (Gilson Road and Crown Street), Concord, Peterborough, and Manchester. For each pollutant, the maximum concentration from these stations was selected as a conservative background. These numbers can be found in the Air Quality Technical Memorandum in Appendix A.

Hazardous Air Pollutant Emissions: The federal CAA Amendments of 1990 listed 188 Hazardous Air Pollutants (HAPs) and addressed the need to control toxic emissions from transportation. USEPA's 2007 MSAT rule identified a subset of seven HAPs as having significant contributions from mobile sources: benzene, 1,3-butadiene, formaldehyde, acrolein, naphthalene, polycyclic organic matter (POM), and diesel particulate matter (DPM).

Greenhouse Gas Emissions: Climate change and GHG emission reductions are a concern at the federal level. Laws and regulations, as well as plans and policies, address global climate change issues. This section summarizes key federal regulations relevant to the project.

In Massachusetts v. U.S. Environmental Protection Agency, et al., 549 U.S. 497 (2007), the United States Supreme Court ruled that GHG does fit within the CAA definition of a pollutant and that USEPA has the authority to regulate GHG.

On February 18, 2010, the White House CEQ released draft guidance regarding the consideration of GHG in NEPA documents. On December 18, 2014, CEQ released revised draft guidance that describes in more detail how federal departments and agencies should consider the effects of greenhouse gas emissions and climate change in their NEPA reviews. The revised draft guidelines include a presumptive threshold

of 25,000 metric tons of carbon dioxide equivalent (CO_2e)[11] emissions as a reference point on an annual basis below which a GHG emissions quantitative analysis is not recommended unless quantification below that reference point is easily accomplished. The guidance also emphasizes that agency analyses should be commensurate with projected greenhouse gas emissions and climate impacts, and should employ appropriate quantitative or qualitative analytical methods to ensure useful information is available to inform the public and the decision-making process in distinguishing between alternatives and mitigations. This revised draft guidance advises that when assessing direct and indirect climate change effects, agencies should take account of the proposed action, including connected actions, "subject to reasonable limits based on feasibility and practicality." The reasonable mitigation measures and alternatives as provided for under the existing regulations to lower the level of the potential GHG emissions need to be considered in the analysis. This revised draft guidance applies to all proposed Federal agency actions, including land and resource management actions. CEQ has not adopted the GHG emissions significant threshold for NEPA purposes (CEQ 2014); therefore, there is no current standard for GHG emissions to compare for this project.

4.1.2 No Build Alternative

The No Build Alternative assumes that the existing transportation system would continue to operate at its current capacity and the rail corridor would remain unchanged. Freight traffic would continue to serve the existing customers located on the NHML, and intercity bus service would continue to serve passengers between Concord, Manchester, Nashua, and Boston.

As this is a Tier 1 screening level analysis, a quantitative analysis is not required for the No Build Alternative.

4.1.3 Build Alternative

The mobile source dispersion models and hotspot analyses are not required for this project at a Service-level NEPA analysis, as the results of the local scale emissions for the project are below the federal general conformity *de minimis* levels for all applicable criteria pollutants in every nonattainment or maintenance area in New Hampshire and Massachusetts. Therefore, the local air quality impact is not significant due to the project operation.

For the regional context, the emission increases presented in Table 4.2 show that the Build Alternative would not only be below the federal general conformity *de minimis* levels, but would also even create net emission reduction benefits by saving vehicle trips for some pollutants (CO and SO_2). Therefore, the project is presumed to conform to the applicable SIPs and would not require a full conformity analysis and conformity determination. The detailed analysis can be found in the *Air Quality Technical Memorandum* in Appendix A.

[11] A universal unit of measurement that allows the global warming potential of different GHGs to be compared

Table 4.2: Build Alternative Air Quality Impacts– Criteria Pollutants

Emissions Increases (ton/year)	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOC
Personal Vehicles	-29.23	-1.92	-0.09	-0.08	-0.03	-0.69
BX Buses	-3.80	-13.78	-0.63	-0.58	-0.03	-0.85
Locomotive	7.13	47.89	1.78	1.73	0.03	2.81
Net Emissions Increases	-25.91	32.19	1.06	1.07	-0.04	1.27
Applicable General Conformity Emission de minimis level (to each nonattainment or maintenance area)	100	100	NA	NA	100	100
Exceed de minimis level?	No	No	NA	NA	No	No

Note: NA = Not Applicable

The estimated annual operational emissions increases in MSAT (HAPs) and GHG emissions associated with the Build Alternative are presented in Table 4.3 and Table 4.4, respectively. The Build Alternative is expected to create fewer emissions in GHG by saving vehicle trips and, therefore, it would have less environmental and global climate change impact and be more beneficial to the environment.

The New Hampshire 10-year State Energy Strategy from the New Hampshire Office of Energy & Planning Department in September 2014 also supported rail as one of the major energy-saving strategies for the state. It recommended the State of New Hampshire should continue supporting efforts to maintain and to expand rail service.

Table 4.3: Build Alternative Air Quality Impacts– Hazardous Air Pollutants

Emissions Increases (ton/year)	1,3-Butadiene	Acrolein	Formaldehyde	Benzene	Naphthalene	POM	DPM	Lead
Net Emissions Increases	0.15	0.02	0.34	0.90	0.06	NA	1.07	0.00007

Note: NA = Not Applicable

Table 4.4: Build Alternative Air Quality Impacts– Greenhouse Gases

Emissions Increases (metric ton/year)	Greenhouse Gases in CO_2e
Personal Vehicles	-699
BX Buses	-5,021
Locomotive	2,735
Net Emissions Increases	-2,985

Since climate change is caused cumulatively by world-wide activity, the Study team could not determine the impact of the Build Alternative on climate change. Therefore, the approach applied here for evaluating the potential impact of the project is to identify the project's potential GHG emissions, and to evaluate whether it incorporates cost-effective energy efficiency and renewable energy measures into its design, construction, and operation to the maximum extent practicable, consistent with social, economic, and other essential considerations. By doing so, the project would demonstrate consistency with state and local policies.

Since this is a Tier 1 (or Service-level) NEPA analysis, the details of design, construction, and operation are not yet fully available. Therefore, this section identifies potential measures for inclusion, which would reduce the project's energy and GHG footprint if implemented. These measures will be further investigated, and, if found to be practicable, incorporated in the project's design and operation.

Operational

Shift Locomotives Engines to Higher Tier 1s or to Change the Fuel to Biodiesel Fuel: The project could use higher tier (i.e., newer/more efficient) locomotive engines that provide better control and generate lower emissions. Options to use biodiesel for the locomotives could be investigated, including blends of B20 and B100 (20 percent biodiesel with 80 percent standard diesel and pure biodiesel, respectively). B20 can be used with current technology while B100 may require some adjustments for new engines. The use of B20 would reduce GHG emissions by 10 percent and B100 would reduce GHG emissions by 50 percent.[12] Using biodiesel also reduces emissions of CO, PM, and sulfates; however, it results in an increase of NO_x emissions compared to traditional diesel fuel.

Electrification: The benefits of electrifying the NHML have not been quantified at this time. Benefits would increase over the years as the New Hampshire grid shifts to increasingly higher fractions of renewable power sources (the New Hampshire grid currently includes relatively large fractions of nuclear and hydro power, which result in very little GHG emissions). The cost of electrification is not included in the Build Alternative.

Sustainable Station Design and Construction: Although station energy use was not included in this analysis, new stations could be designed in accordance with the new requirements from the state.

Construction

Use of Local, Renewable, and Recycled Materials: 75 percent of the construction emissions were estimated to come from the extraction, production, transport, and disposal of construction materials. Although precise details are not known at this time, reduction in these emissions can be substantial if local, renewable, and recycled materials are used. The largest contributors are cement and steel. If emissions associated with material can be cut in half (existing strategies demonstrate that this is

[12] EPA. *Smart Way Grow & Go Program Overview, Frequent Questions*. EPA420-F-06-068, October, 2006.

possible), the emissions payback period, a measure of how long a CO_2 mitigating process needs to run to compensate for the CO_2 emitted to the atmosphere during the life cycle stage, could be reduced by nearly 40 percent.[13]

Biodiesel for Construction Engines: Biodiesel blends would be used in construction engines to the extent practicable.

Replanting Trees: Although not quantified in this analysis, any trees that need to be removed for construction could be replaced with a larger number of trees, replacing the trees in kind or more on a tree-mass basis.

Future Analysis: If the Build Alternative progresses to the Tier 2, or project level, additional analysis would include the potential air quality implications of local traffic to and from stations, locomotives, and other sources operating in rail yards and other locations. Potential construction impacts would also be analyzed. If the project is not included in the SIP, an applicability analysis would be performed to determine whether a general conformity analysis is required. In addition, because line-haul operations change substantially, micro-scale line-haul and meso-scale emissions likely would be investigated. All emission estimations for criteria pollutants, HAPs, and GHG would need to be refined. The detailed GHG reduction measures may be reviewed and evaluated for applicability and practicability, and incorporated into the project as appropriate. In addition, beneficial measures would be quantified, if practicable. If substantial changes in design occur, the overall GHG emissions analysis would be reevaluated as well, and further refined if possible.

4.2 Noise and Vibration

The noise and vibration limits chosen for the analysis satisfy the federal guidelines of the FTA for train and rail facility operations[14] and are discussed in this section and in Appendix B. Since FRA noise and vibration assessment guidelines are relevant only to high-speed rail projects, FRA guidelines defer the noise and vibration analysis of projects that do not fall into the category of high-speed rail (with operating speeds exceeding 90 miles per hour) to the FTA guidelines. As the maximum speed associated with this project is 75 miles per hour, this project is being evaluated in accordance with the FTA noise and vibration assessment guidelines. The noise-sensitive receptors for the analysis include relevant receptors defined by FTA criteria. The number of receptors potentially impacted have been determined using FTA's general assessment guidelines, including comparing existing with future noise levels and rating impacts. The vibration impact assessment uses the FTA general assessment procedure of determining whether absolute vibration limits will exceed specified thresholds at vibration-sensitive receptors. Additional detail can be found in the *Noise and Vibration Technical Memorandum* in Appendix B.

[13] EPA. *Solid Waste Management And Greenhouse Gases: A Life-Cycle Assessment of Emissions and Sinks 3rd Edition*, September 2006
[14] FTA. *Transit Noise and Vibration Impact Assessment*. USDOT Report Number FTA-VA-90-1003-06, May 2006

4.2.1 Affected Environment

The region for this analysis includes areas and communities within Middlesex County in Massachusetts and Hillsborough and Merrimack Counties in New Hampshire. These areas are mixed in terms of rural, residential, commercial, and industrial uses with isolated residential clusters considered to be suburban in nature, except for the downtown urban areas of Lowell, Nashua, Manchester, and Concord.

In general, freight trains without horns would generate 67 decibels (dBA) day-night average noise levels (L_{dn}) at 50 feet from the rail tracks. The noise level would drop off at a rate of 4.5 dBA per doubling of distance, per the FTA Guidance Manual. The warning horn noise level would be 74 dBA L_{dn} at 50 feet from the rail centerline within one-fourth-mile of each grade crossing.

Warning horns would be the dominant noise sources when receptors are near grade crossings. When receptors are not near grade crossings, the dominant noise sources would be passing freight trains, passenger trains, or vehicular traffic.

4.2.2 No Build Alternative

No noise impacts would result from the No Build Alternative in that this scenario maintains freight operations within the corridor with no projected and planned annual growth. The FTA impact criteria are based on an increase in noise between the existing and future conditions and the No Build Alternative would not introduce an increase in noise levels in the Study area.

4.2.3 Build Alternative

The Build Alternative was analyzed for impacts to noise and vibration related to operations, stations, traffic, and construction.

Operations Noise Impacts: The Build Alternative would have predicted unmitigated noise impacts due exclusively to the added warning horns. Table 4.5 provides a summary of the unmitigated noise impact results. Hillsborough County, New Hampshire has the most parcels with severe noise impacts with 58 single- family residential units and 13 multi-family residential units impacted. Installation of stationary wayside horns at the 10 grade crossings where severe, unmitigated noise impacts exist for the Build Alternative would mitigate noise and result in no adverse noise impact on the surrounding communities.

Table 4.5: Summary of Unmitigated Noise Impact Results

County	Number of Severe Impact Parcels				Number of Moderate Impact Parcels			
	Residential Single-Family	Residential Multi-Family	Institutional	Recreational	Residential Single-Family	Residential Multi-Family	Institutional	Recreational
Middlesex (MA)	2	0	0	0	47	50	1	1
Hillsborough (NH)	58	13	0	0	503	46	0	0
Merrimack (NH)	2	0	0	0	54	5	0	0

Source: URS Corporation, 2014

Table 4.6: Summary of Severe Noise Impact at Intersections

Crossing Description	City Limit/County	No. of Receptors with Severe Impacts	Maximum Distance Between Track and Receptor (ft)
Wellman Avenue	Middlesex County near Lowell	2	73
Crown Street	Nashua, Hillsborough County	1	55
West Mitchell Street track crossing panel	Manchester, Hillsborough County	30	175
Dunbar Street (Sundial Av) track crossing panel	Manchester, Hillsborough County	12	192
Granite Street track crossing panel	Manchester, Hillsborough County	2	80
Pleasant Street track crossing panel	Manchester, Hillsborough County	6	160
Spring Street track crossing panel	Manchester, Hillsborough County	2	132
Kidder Street track crossing panel	Manchester, Hillsborough County	1	161
Commercial Street track crossing panel	Manchester, Hillsborough County	17	135
Edgewater Drive track crossing near W River Road	Hookset, Merrimack County	2	159

Operations Vibrations Impacts: Due to the distance between the rail activities and the closest vibration-sensitive locations, no vibration-related impacts are anticipated with the Build Alternative. None of the residential buildings in the Study area would experience levels exceeding the FTA limits of 80 Vibration Velocity Level (VdB) for ground borne vibration and 43 dBA for ground-borne noise. Likewise, no

institutional buildings in the Study area would experience levels exceeding the FTA limits of 83 VdB and 48 dBA.

Station Noise Impacts: The dominant noise source near each station would be the warning horn. When a train slows down near a station, train pass-by noise would be reduced. However, the warning horn would be used when a train approaches each station regardless of the train speed. There are no noise- or vibration-sensitive parcels within 500 feet of any of the proposed station sites to be impacted by the station noise, including horn soundings. Therefore, station noise is considered negligible and not included in the impact calculation.

Traffic Noise Impacts: While traffic conditions would change for the roadways around the proposed stations, there are no new major roadways or roadway expansions anticipated with the Build Alternative. Because the proposed stations are located in the developed areas of Nashua, Bedford, Manchester, and Concord, the existing traffic volumes around the station sites are already high. Traffic noise produced by the Build Alternative is not anticipated to cause significant impacts due to the already existing high-ambient noise environment and lack of sensitive receptors in the impact range of the Build Alternative.

Construction Noise Impacts: Only four potential daytime impacts and up to 324 potential nighttime impacts have been identified as a result of the analysis. However, any such impact would be addressed through committed mitigation measures. Because the construction noise mitigation measures would be followed during construction, no noise impacts would result from implementing the Build Alternative. Table 4.7 provides a summary of the unmitigated construction noise impact results.

Construction Vibration Impacts: Operation of the Build Alternative is not expected to result in impacts exceeding FTA limits for residential buildings or for institutional buildings in the Study area. There are no significant vibration impacts expected during construction of the Build Alternative. Some equipment may cause perceptible ground-borne vibrations. For example, construction equipment can produce vibration levels at 25 feet that range from 58 VdB for a small bulldozer to 112 VdB for heavier equipment. Any potential impacts would be mitigated during construction.

Table 4.7: Summary of Unmitigated Construction Noise Impact Results

County	Potential Daytime Impacts				Potential Nighttime Impacts			
	Residential Single-Family	Residential Multi-Family	Institutional	Recreational	Residential Single-Family	Residential Multi-Family	Institutional	Recreational
Middlesex (MA)	0	1	0	0	27	43	2	2
Hillsborough (NH)	3	0	0	0	205	29	0	1
Merrimack (NH)	0	0	0	0	11	2	1	1

Source: URS Corporation, 2014

4.3 Hazardous Waste Sites

The NHDES OneStop Geographic Information System (GIS) website was used to identify contaminated sites within the 1,000-foot search distance. The website includes NHDES project sites with administrative tracking records, such as underground storage tanks (USTs) and hazardous waste generators, as well as contaminated sites with documented discharges or suspected discharges of petroleum or hazardous materials. In reviewing the corridor through the OneStop GIS website, three basic assumptions were applied: 1) the Merrimack River is considered to be a contaminant migration barrier -soil and groundwater contamination are assumed to not cross the river, 2) groundwater flow within 1,000 feet of the Merrimack River is generally toward the river, and 3) sites with a status of Closed or Inactive are assumed, in the absence of other mitigating factors or information, to be in compliance with state and federal requirements with respect to soil and groundwater.

A database report was commissioned from Environmental Data Resources, Inc. (EDR) for each of the properties proposed for construction of new facilities (Target Properties). The EDR report includes a summary of environmentally-related sites identified in state and federal environmental databases (database sites). These sources include databases that track controlled facilities and/or activities, e.g., hazardous waste generators and regulated USTs with no identified violations, as well as sites with known contamination such as discharges of petroleum and/or hazardous waste, remediation activities, institutional controls as the result of discharges, and ongoing environmental monitoring due to discharges. The search radius of the database report for each Target Property conforms to the American Society for Testing Materials (ASTM) 1527-13, Section 8.2.1, and is based on the approximate property or construction boundaries.

Additional details are in the *Contamination Inventory Memorandum* in Appendix C to this report.

4.3.1 Affected Environment

Along the existing railroad track bed, there is a high probability of the presence of contaminated soils or debris. Contaminants commonly found associated with railroad corridors include railroad ties (wood treating chemicals), spilled or leaked fluids (oil, cleaning solvents), herbicides, transformer fluids [Polychlorinated Biphenyls (PCBs)], fossil fuel combustion products [Polycyclic Aromatic Hydrocarbons (PAHs)], asbestos, and metals such as arsenic and mercury. Also, existing steel bridge overpasses along the corridor were likely painted with lead-based paint prior to 1970, which may or may not have been removed or sealed.

Full Corridor: Of the contaminated sites within 1,000 feet of the corridor, 81 were identified as having the potential to impact the corridor.

Concord – Stickney Avenue: The Target Property has a history as a vehicle repair and machine shop facility since at least 1926. Sign and highway department equipment painting has been conducted on the property during the prior NHDOT usage and vehicle painting continues currently as a commercial operation. Based on the development history, the presence of petroleum and halogenated VOCs, PAHs

related to coal use in the past, hazardous materials related to painting and solvent usage, and elevated metals concentrations in the subsurface is possible.

Manchester – Granite Street: The EDR database report did not identify the Target Property as a contaminated site. The property is depicted on historical Sanborn maps dated 1885 and 1891 as rail tracks and a freight depot. An 1897 map depicts tracks only. The 1915 through 1954 maps depict rail tracks and a rail station and associated facilities. The 1971 and 1983 maps depict rail tracks and parking; the 1985 and 1989 maps depict rail tracks and a commercial building on the southern portion and parking. The building is currently occupied by Hampshire First Bank with an address of 80 Canal Street.

Bedford/Manchester Airport: The EDR database report did not identify the Target Property as a contaminated site. The Target Property is not depicted on historical Sanborn fire insurance maps. Historical aerial photographs appear to depict the Target Property as undeveloped from 1947 through 1998. No contaminated sites requiring further review were identified.

Nashua – Crown Street: The Target Property and vicinity has been developed for industrial use since prior to circa 1885, as documented by historical Sanborn fire insurance maps. Documented property usage nearby has included machine shops, a steam boiler works, and rail. The OneStop database indicates that the site is a Leaking Underground Storage Tanks (LUSTs), Unsolicited Site Assessment, and a Brownfields site. A Phase I/II report has been completed for the property on behalf of the City of Nashua and are located in Appendix C.

4.3.2 No Build Alternative

The No Build Alternative would result in no potential to encounter contamination or generate contaminated material.

4.3.3 Build Alternative

The Build Alternative may result in short-term, adverse impacts during construction of the rail and station sites due to the potential for movement of contaminated soils or material. However, the Build Alternative would likely have a long-term beneficial impact on the corridor because construction activities would provide final solutions for some contaminated sites, lowering potential exposure in the future.

During Tier 2 Phase I ESAs would be completed as necessary for each property acquired in order to be eligible for LLPs. If Recognized Environmental Conditions (RECs) are identified during the Phase I ESA process, the RECs should be addressed through clean-up or further investigation through a Phase II assessment. Based on the development histories of the properties and surrounding areas, it is advisable that the Nashua – Crown Street, Manchester – Granite Street, and Concord – Stickney Avenue properties be assessed for the presence of petroleum or hazardous substances that might require management or disposal, regardless of the findings of a Phase I ESA. Given the history and settings of these properties, assessment of subsurface conditions for the presence of VOCs, PAHs, PCBs, and

Resource Conservation and Recovery Act (RCRA) 8 metals in soils is advisable. Assessment for asbestos should be considered for the Nashua – Crown Street property.

4.4 Water Quality

Surface water quality is regulated statewide by the NHDES under the New Hampshire Code of Administrative Rules (Env-Wq 1700), in Massachusetts under the Code of Massachusetts Regulations (314 CMR 4.00), and nationally by the USEPA under the Clean Water Act (CWA). Surface water bodies were identified using available mapping, such as National Wetland Inventory Maps, the New Hampshire Wetlands Base Map, Massachusetts Geographic Information System (MassGIS), U.S. Geologic Survey (USGS) topographic maps, and aerial photographs. Additional detail can be found in the *Natural Resources Technical Report* in Appendix D.

4.4.1 Affected Environment

The dominant surface water feature within the Study corridor is the Merrimack River, which flows from north to south through the entire corridor from Concord to Nashua to Lowell. The existing rail line parallels the Merrimack River crossing it twice: once in the Town of Hooksett and again from the City of Manchester to the Town of Bedford. Based upon a review of USGS topographic maps and the NHDES Watershed Report Cards, the existing rail corridor crosses 25 other rivers or streams between the Massachusetts border and the end of the project Study area in Concord. Two crossings (Baker Brook and Spit Brook) occur in urban areas of Manchester and Nashua, respectively, and flow through culverts instead of natural channels. In addition, Horseshoe Pond in Merrimack, South End Marsh in Concord and an unnamed pond in Concord, as well as numerous wetlands, are also located within 100 feet of the existing rail line.

The Study corridor is not located near any Outstanding Resource Waters, as designated by the Massachusetts Surface Water Quality Standards (314 CMR 4.00) and NHDES Regulation Env-Wq 1708.05.

4.4.2 No Build Alternative

The No Build Alternative would have no impact to water quality compared to existing conditions since no construction would occur and no pavement, drainage structures, or stormwater treatment would be added. The existing corridor currently supports freight rail traffic, which does not contribute to the impairments of the Total Maximum Daily Loads (TMDLs) that have been developed for the impaired water bodies in the corridor.

4.4.3 Build Alternative

The Build Alternative would not adversely impact water quality within the corridor as it is an existing rail line and improvements to drainage and stormwater management would be part of the project. The upgrade to culverts and associated stormwater BMPs along the entire length of the corridor, as well as at potential station locations, would have a net beneficial impact to water quality. The site design for each station, where new parking is being proposed, would be designed to meet applicable state

stormwater standards and guidelines. In addition, the existing corridor currently supports freight rail traffic, which does not contribute to the impairments of the TMDLs that have been developed for the impaired water bodies in the corridor. It is not anticipated (based on the passenger rail operating characteristics) that the four round trips per day would contribute to the existing impairments in the corridor.

There would be, however, negligible to minor, short-term, localized impacts during construction activities in the corridor, including replacing or rehabilitating bridges or culverts. At this Tier 1 stage, a small bridge just north of The Tyngsborough Bridge is the only known bridge in the corridor that would need replacement in implementation of the project. The relatively short and temporary duration of these activities, combined with appropriate stormwater and drainage management and, construction BMPs, would ensure that any impacts are negligible to minor.

4.5 Wetlands

Wetlands are federally protected under the CWA and activities resulting in impacts to them require a permit from the U.S. Army Corps of Engineers (USACE) under Section 404 of the CWA. Executive Order (E.O.) 11990, "Protection of Wetlands", requires federal agencies, such as FRA, to make sure their projects minimize impacts to wetlands. Wetlands are also protected under State of New Hampshire statutes, with permits obtained through the NHDES Wetlands Bureau. Wetlands are also regulated at the state-level by the Massachusetts Wetlands Protection Act (WPA), which is administered by the municipal conservation commissions, with overview by the MassDEP.

Wetlands along the project corridor were not field-delineated, but were identified using available mapping including National Wetland Inventory Maps, the New Hampshire Wetlands Base Map, MassGIS, USGS topographic maps, and aerial photographs. Field reviews of the proposed station and layover facilities were conducted in order to obtain more accurate information on wetland resources. Approximate wetland boundaries within and adjacent to the proposed facilities were mapped using Global Positioning System (GPS), but wetland delineation flags were not placed in the field and surveyed. Additional detail can be found in the Natural Resources Technical Report in Appendix D.

To more accurately evaluate wetland impacts and to apply for USACE and NHDES permits, a formal wetland delineation within the entire project corridor and the station and layover facilities would need to be conducted during the project's preliminary design phase during Tier 2.

4.5.1 Affected Environment

Wetland resources within the project corridor include palustrine and riverine systems that feed into the Merrimack River. Since the proposed rail corridor follows an existing railroad embankment, wetland and stream crossings have bridges or culverts. As a result, wetland systems crossed by the rail embankment have already been impacted by the placement of fill and culverts. Table 4.7 provides a summary of the large wetland systems that are located along the project corridor.

Prime wetlands within the project corridor are located in the municipalities of Hooksett and Nashua. Prime wetlands are identified in Table 4.8. Within the City of Nashua, the Merrimack River, the Nashua River, and Salmon Brook are also considered prime wetlands. None of the prime wetlands within the project corridor have a 100-foot buffer zone.

Table 4.8: Prime New Hampshire Wetlands in Corridor

Town	Federal Classification	Prime Wetlands	Description
Concord	PUBH, PUBF, PEM1F, PSS1E, PFO1E	No	Located near I-93, Exit 12;includes the "South End Marsh" (conservation land owned by the City of Concord) and a NHDOT wetland mitigation area
Bow	PSS/EM1E, PSS1E, PUBHh, PUB/SS1F	No	Located near a Public Service of New Hampshire (PSNH) facility; wetland system appears to have been altered by PSNH facility; Bow Bog Brook flows through wetland system
Hooksett	PSS1E, PUBHh	Yes	Includes wetlands and open water areas located between Route 3A and the Merrimack River
Hooksett	PSS/EM1E	No	Wetland system associated with an unnamed tributary to Merrimack River; located between Dale Road and Merrimack River
Hooksett	PSS1E, PUBF	Yes	Wetland system associated with Messer Brook; located near Hooksett/Manchester town line
Manchester	PEM1F, PSS/EM1E, PFO/EM1E	No	Wetland system associated with unnamed tributaries to Merrimack River; located approximately 1 mile north of Amoskeag Street bridge
Merrimack	L1UBH, PSS1E, PSS1C	No	Horseshoe Pond and associated wetlands also includes Naticook Brook
Merrimack	PFO1E, PFO4E, PEM1Eb	No	Located near Mast Road, between US Route 3 and the Merrimack River
Nashua	R5UBHx, PUB/SS1Fh, PFO1E	Yes	Wetland system associated with Salmon Brook

In Massachusetts, the following are the wetland and water resources within the corridor:

- Unnamed tributary to the Merrimack River and adjacent wetlands: Located north of Parlee Farms in Tyngsborough
- Bridge Meadow Brook: Located north of the Route 3A bridge over the Merrimack River in Tyngsborough
- Unnamed tributary to the Merrimack River (flows from Uptons Pond): Located in Tyngsborough near intersection of Route 3A and Westford Road
- Deep Brook and adjacent wetlands: Located in Chelmsford near Wotton Street
- Stony Brook and adjacent wetlands: Located in Chelmsford near Church Street
- Black Brook: Located in Lowell near the intersection of Middlesex Street and Pawtucket Street and appears to be piped under the project corridor and the surrounding urban area
- Pawtucket Canal: Located in Lowell and is crossed twice by the project corridor
- River Meadow Brook: Located in Lowell near the Lowell Connector and the southern end of the project corridor

4.5.2 No Build Alternative

The No Build Alternative would have no impact to wetland resource areas since no construction would occur and the corridor would remain in its current state.

4.5.3 Build Alternative

The Build Alternative would have no impact in most areas of the corridor and minor temporary and permanent impacts to jurisdictional wetland resource areas in a few discrete areas of the corridor. Minor temporary impacts may occur during construction activities, such as replacing or rehabilitating bridges or culverts, relocating utilities for track work, and grading work associated with station construction. These impacts would be mitigated during design and restored after construction has been completed. Minor permanent impacts may occur during these same activities in cases where temporary impacts cannot be restored in-place. In these cases, the project sponsor at the Tier 2 level would identify compensatory mitigation at the appropriate ratio for replication. As more detail is developed in the project's next phase, these impacts will be defined in greater detail. Any wetland impacts would be subject to state and federal permitting requirements which would include compensatory mitigation for any unavoidable impacts.

The following station sites are located in previously developed areas and no wetlands or watercourses are located within or adjacent to the site: Concord – Stickney Avenue, Manchester – Granite Street, and Nashua – Crown Street. The Bedford/Manchester Airport station has several wetlands and watercourses located at the site. North of Ray Wieczorek Drive, the majority of the site is forested wetland. South of Ray Wieczorek Drive, there are two small forested wetlands and one emergent/scrub-shrub wetland. These three wetlands drain to Sebbins Brook, which flows into the Merrimack River. As currently designed, this station would impact less than 1,000 square feet of wetland at this site.

4.6 Threatened and Endangered Species

Threatened and endangered species and critical habitat are provided protection on both federal and state levels. The Endangered Species Act of 1973 (16 USC 1531-1543, Sec. 2A) is the federal legislation that provides protection. Under the Endangered Species Act, the FRA is required to consult with the U.S. Fish and Wildlife Service (USFWS) and/or National Marine Fisheries Service (NMFS) to ensure that its grant-funded activities are not likely to jeopardize the continued existence of listed species or adversely modify designated critical habitats. The State of New Hampshire protects species through the Native Plant Protection Act of 1987 and the New Hampshire Endangered Species Conservation Act of 1979. The State of Massachusetts protects species through the Massachusetts Endangered Species Act (MESA) (M.G.L. c.131A). The Massachusetts Natural Heritage and Endangered Species Program (NHESP) is the state agency responsible for the protection of plant and animal species that are listed as threatened, endangered, and of special concern in Massachusetts. In addition, the Bald and Golden Eagle Protection Act (16 USC 668) provides federal protection for bald and golden eagles. Projects that impact these species may require the development of an eagle conservation plan.

Information on important wildlife habitat and recorded occurrences of rare, threatened, and endangered species was obtained from the USFWS Information, Planning, and Conservation System website, the New Hampshire Natural Heritage Bureau (NHB), the Massachusetts NHESP, the New Hampshire Wildlife Action Plan, and the MassGIS website. Additional detail can be found in the *Natural Resources Technical Report* in Appendix D.

4.6.1 Affected Environment

NHB identified the following species of concern in the project corridor: bald eagle (*Haliaeetus leucocephalus*), peregrine falcon (*Falco peregrinus*), eastern hognose snake (*Heterodon platirhinos*), New England cottontail (*Sylvilagus transitionalis*), and grasshopper sparrow (*Ammodramus savannarum*). NHESP identified three species of concern within the project corridor, including bald eagle, riverine clubtail (*Stylurus amnicola*), and cobra clubtail (*Gomphus vastus*). Information obtained from the USFWS Information, Planning, and Conservation System website identified one plant species, small whorled pogonia (*Isotria medeoloides*), within the project corridor. No critical habitat was identified by the USFWS. A full listing of threatened and endangered species can be found in the *Natural Resources Technical Report* in Appendix D to this report.

The undeveloped, vegetated areas along the corridor are of greater concern for threatened and endangered species than the densely developed areas since they provide more habitat for these species, particularly the eastern hognose snake, the New England cottontail, the grasshopper sparrow, the riverine clubtail, and the cobra clubtail. Nesting and roosting sites for bald eagles are present along the Merrimack River, including in the more densely developed areas of the corridor near Manchester and Nashua. Portions of the corridor that are located along the Merrimack River and contain large trees that are used nesting and roosting may provide valuable habitat for this species.

NHB also listed exemplary natural communities in the corridor, including Acidic Riverside Seep, Dry Appalachian Oak Forest, Pitch Pine – Scrub Oak Woodland, Semi-Rich Oak – Sugar Maple Forest, and Sugar Maple – Silver Maple – White Ash Floodplain Forest.

The primary wildlife corridor within the vicinity of the project is along the Merrimack River. As noted, the Merrimack River provides important habitat for bald eagles. Even though the river corridor passes through areas that are highly developed, it provides habitat for a variety of species including mammals, migratory birds, reptiles, and amphibians. The Merrimack River corridor connects fragmented areas of undeveloped forested land and floodplain habitat that are located near the project, particularly in the towns of Bow, Bedford, and Merrimack. Smaller wildlife corridors located near the project include:

- The undeveloped forested land and power line right-of-way located south of Garvins Falls dam in the Town of Bow – This area provides habitat for several state-listed species. The power line right-of-way provides a corridor for wildlife movement; however Route 3A and I-93 may limit the extent of the corridor. A large area of undeveloped land is located on the opposite (east) side of the Merrimack River.

- Baboosic Brook and Souhegan River in the Town of Merrimack – Habitat along these streams provides a connection from the Merrimack River to larger undeveloped tracts of land and open space areas located west of the Everett Turnpike. The US Route 3 and Everett Turnpike crossings may limit wildlife movement and the effectiveness of this corridor.
- Pennichuck Brook in the Town of Merrimack – Habitat along this stream provides a connection between the Merrimack River and larger areas of upland and wetland habitat located west of the Everett Turnpike. Crossings of US Route 3, the Everett Turnpike, and several local roads may provide some restrictions to wildlife movement.

4.6.2 No Build Alternative

The No Build Alternative would result in no impacts to federal and state regulated wildlife and critical habitat since no construction would occur and the corridor would remain in its current state.

4.6.3 Build Alternative

The Build Alternative has the potential to disturb or destroy habitat in some locations along the corridor. However, as currently designed, the project would require limited vegetation removal as stations are located in previously developed areas, and the existing rail right-of-way has been maintained to control vegetation in the past. Impacts to wildlife corridors, compared to existing conditions, are not anticipated since no new rail lines or other structures that could further restrict wildlife movement are proposed. Although the speed of the proposed commuter rail would be faster than the speed of the existing freight rail, the frequency of the commuter rail (eight trains per day) is not anticipated to be at a level that would have a substantial adverse effect on wildlife movement across the tracks.

During the next phase of the project, records of federal- or state- listed species would be confirmed with the USFWS, New Hampshire Fish & Game (NHF&G), NHB, and NHESP to determine if listed species or designated critical habitat are actually present within the rail corridor. Field surveys may also be necessary. If protected species or habitat is present in areas where project activities would occur, coordination with the appropriate agencies would be required to identify potential impacts and mitigation measures.

4.7 Floodplains

Executive Order (E.O.) 11988, "Floodplain Management," requires federal agencies to review federally-funded projects that may affect floodplains and floodways in an effort to reduce the risk of flood loss and to minimize the impacts of floods. This E.O. was amended on January 30, 2015; at the time of preparation this EA, implementing guidance for the amended E.O. was not available.

The Digital Flood Insurance Rate Maps (DFIRMs) available on the New Hampshire Geographically Referenced Analysis and Information Transfer System (NH GRANIT) GIS website and MassGIS website were reviewed to determine the locations of flood hazard areas within the project corridor. Since the rail corridor is located along the Merrimack River, a large portion of the project is located within or

adjacent to areas that are mapped as 100-year floodplains. Additional detail can be found in the *Natural Resources Technical Report* in Appendix D.

4.7.1 Affected Environment

Most of the proposed station and layover facility sites in New Hampshire are located within or adjacent to floodplain areas. These areas are generally mapped as either "Zone AE" (100-year floodplain or 1 percent annual chance of flood) or "0.2 percent annual chance of flood hazard" (500-year floodplain). Portions of the downtown Nashua site are mapped as "Zone X, Protected by Levee."

The project corridor crosses through the 100-year floodplain (Zones A and AE) in several locations in Massachusetts. These floodplains are associated with the Merrimack River and its larger tributaries (Deep Brook, Stony Brook, Pawtucket Canal, and River Meadow Brook). The largest Zone A floodplain area is located in Chelmsford, where approximately one mile of proposed new rail (double-track on the existing embankment) is located within an area mapped as Zone A floodplain.

4.7.2 No Build Alternative

The No Build Alternative would have no impacts to floodplains or floodways since no construction would occur and the corridor would remain in its current state.

4.7.3 Build Alternative

The Build Alternative would have minor to negligible impacts to floodplains in the project corridor. As the existing rail right-of-way runs adjacent to the Merrimack River and in many cases is less than 250 feet from the river bank, impacts to floodplains would be unavoidable in certain discrete sections of the corridor. However, within the existing right-of-way, the project corridor historically carried two tracks along its entire length, and the Build Alternative calls for restoring that second track on the existing embankment in certain locations. To the extent practicable, the design team has located station elements outside of floodplains. In locations where floodplain elevations would be altered, the project would provide compensatory floodplain storage and station designs would be modified to protect structures and equipment. This would be potentially necessary in Concord, Bedford and Nashua. Through mitigation, adverse impacts to floodplains would be kept to a minimum. In addition, implementing guidance for the amended E.O. will be followed if it is available at the time of Tier 2 analysis and applicable to Tier 2 project activities.

4.8 Energy Resources

Energy resources are measured over time and related to the energy consumption and GHG emissions from the construction and the operation of the project (see Section 4.1 Air Quality and Greenhouse Gas Emissions). New Hampshire's transportation sector accounted for 35 percent of New Hampshire's energy consumption in 2011[15] and ranked 41st nationally in VMT with over 12,894 million miles (2012).[16] This project would help reduce the state's VMT and overall energy consumption by offering a new passenger rail service and reducing the number vehicles on the state's roadways.

4.8.1 Affected Environment

The project would impact energy sources during project construction and during new passenger rail service operation. Energy resources would be required to build the station facilities and operate the trains and other project facilities. Operation of the service would also require energy.

4.8.2 No Build Alternative

The No Build Alternative would not impact energy resources related to the construction and operation of the project as the corridor would remain in its current state. However, energy consumption related to VMT within the US Route 3 and I-93 travel corridors could increase without the construction of the Build Alternative because the only means of surface passenger travel would be by automobile and bus. No surface alternative to avoid highway congestion would be available

4.8.3 Build Alternative

The Build Alternative would introduce passenger rail operations, which currently do not exist in the corridor. This service is expected to divert trips from vehicles to passenger rail, reducing the overall VMT and GHG emissions. However, the Build Alternative could potentially have a minor adverse impact on traffic operations around certain station locations. As described in Section 4.1 Air Quality and Greenhouse Emissions, emission increases related to traffic for the Build Alternative are below the minimum threshold for a conformity determination. The Build Alternative would create a net emission reduction benefit from the saving of vehicle trips for some pollutants (CO and SO_2).

During construction, the project would consume energy through the processing of materials and construction activities. All impacts during construction would be addressed in Tier 2.

4.9 Visual and Aesthetic Resources

Visual and Aesthetic Resources are natural and cultural landscape features that people see and that contribute to the public's appreciative enjoyment of the environment. Aesthetic and visual resource impacts are generally defined in terms of the extent to which the project's physical characteristics and potential visibility would change the perceived visual character and visual quality of the viewed

[15] U.S. Energy Information Administration, www.eia.gov/state/?sid=NH
[16] U.S. Energy Information Administration, http://www.eia.gov/state/print.cfm?sid=NH

landscape. As part of the cultural resources studies (see Section 4.15), visual impacts were considered as part of the historic architecture evaluation. In addition to historic architectural resources, other resources identified as visual resources include parks and significant natural resources.

4.9.1 Affected Environment

The most significant natural resource in the corridor is the Merrimack River, which runs adjacent to the rail right-of-way for its entire length, and in some cases is less than 250 feet away. In addition to the river, there are three wetland systems that are classified as "prime" wetlands in New Hampshire – two in Hooksett and one in Nashua. The rail right-of-way also abuts several parks/recreation areas along the route.

As documented in greater detail in Section 4.15 Cultural Resources, there are a number of aboveground historic architectural resources adjacent to the rail right-of-way. In general, the corridor is highly developed in the urban landscapes of Lowell, Nashua, Manchester, and Concord, and less developed in the rural areas between the major urban centers. Generally, the significant natural resources are located outside of the urban areas, and the historic architectural resources are located within the urban areas.

4.9.2 No Build Alternative

The No Build Alternative would have no impacts to visual and aesthetic resources since no construction would occur and the corridor would remain in its current state.

4.9.3 Build Alternative

Impacts to visual resources, including natural and cultural resources, were not fully assessed at the Tier 1 level. Visual impacts of the project will be better understood at the Tier 2 level when the project plans are more fully developed. However, based on current plans of work associated with the rail line, including infrastructure associated with upgrading the existing rail and adding double-track, it is expected that the Build Alternative would cause limited impacts on visual resources as the rail right-of-way historically accommodated double-tracking throughout corridor length. For the work associated with the stations and layover facility, it is also anticipated that the Build Alternative may cause limited impacts to visual resources as the stations would be built in underutilized, previously developed land and the stations would consist of high-level platforms, which are limited in scale and do not require building large pedestrian crossovers at each station.

4.10 Accessibility

The Americans with Disabilities Act (ADA) of 1990 requires that persons with disabilities be accommodated for all public facilities including transportation. All stations and transportation facilities must meet the ADA design standards and applicable state and local codes.

4.10.1 Affected Environment

The accessibility evaluation focused on how the alternatives impacted accessibility for patrons with disabilities. The Build Alternative would include four stops in New Hampshire (Concord, Manchester, Bedford/Manchester Airport, Nashua), in addition to three existing Massachusetts commuter rail stops (Lowell, Woburn, and Boston). The four new stations would provide high-level platforms.

4.10.2 No Build Alternative

The No Build Alternative would have no impacts to accessibility since no new passenger rail service would be available.

4.10.3 Build Alternative

The Build Alternative would have a beneficial impact on accessibility as it would meet all ADA design standards and applicable state and local codes. Station design would include level boarding between the platform and train. Ramps would be included from the parking lots to the raised station platforms. The proposed park-and-ride lots would provide handicap accessible parking spaces. All station facilities would be ADA accessible.

4.11 Property Acquisition

Property acquisition requirements were determined based on the selection of preferred station locations in the corridor and through research of assessor's databases in the affected towns. The existing rail right-of-way is of sufficient width to accommodate the proposed track work for the project. Therefore, the focus of this section is on station development.

4.11.1 Affected Environment

Four station locations were developed through research on previous planning studies in the corridor, workshops with local stakeholders in each community, and the Study team's professional judgment. In Concord, the preferred station location and layover facility is located on property owned by NHDOT, which consists of buildings that are no longer in use by the department. Part of the station work would require relocating the track in this area, which would require acquisition of one privately-held parcel. In Manchester, the preferred station location would require coordination with the City of Manchester, as the proposed platform and parking is located at an existing municipally-owned parking lot. At Bedford/Manchester Airport, the majority of land in the vicinity of this location has been previously acquired by the state during the construction of the Ray Wieczorek Drive Bridge. There is one parcel still in private ownership that is leased to a natural gas company, which would be impacted by the project. In Nashua, the preferred station location would require coordination with the City of Nashua, as the parcel for the platform and parking is located on municipally-owned lot.

4.11.2 No Build Alternative

The No Build Alternative would not require property acquisitions, since no construction would occur and the corridor would remain in its current state. The proposed properties identified for stations and station development in the Build Alternative would be available for alternative development purposes.

4.11.3 Build Alternative

The Build Alternative would have minor impacts on privately held property in the corridor, as the station development would only require acquisition of two privately-held parcels. The remaining land for development is owned by the state or by the municipality. All private property acquisitions would comply with the Uniform Act. Public Law 91-646, the "*Uniform* Relocation Assistance and Real Property Acquisition Policies *Act* of 1970," (*Uniform Act*) provides important protections and assistance for people affected by federally funded projects. These properties are generally underdeveloped/underutilized and would see substantial benefit with the development of stations at these locations (see Section 4.17 Socioeconomics). The one parcel with the most impact is located at the Bedford/Manchester Airport site, as it is currently developed and utilized as a natural gas storage location. It should be noted that the assessment of property impacts is based on conceptual design and impacts may change as more detailed design is completed in subsequent stages of the project.

4.12 Land Use

The land use and zoning evaluation inventories existing land uses and zoning within a half-mile of each proposed station and determines the Build Alternative's potential land use impacts and its compatibility with existing zoning and local plans and policies. Below is a summary of the existing land use and zoning within a half-mile of each of the proposed station locations. For more information regarding land use please see Appendix E *Sustainable Land Use Technical Report*.

- Concord: Currently the area immediately adjacent to the proposed station is zoned for Opportunity Corridor Performance (OCP) District, as well as urban commercial. The existing land use is primarily transportation (rail, roadway and parking) with adjacent commercial uses. The zoning code for the OCP states that specific transit-supportive permitted uses include a railroad passenger station. According to the Opportunity Corridor Master Plan17, the City of Concord would like to see this area developed in a mix of uses, specifically office, retail, high density residential and possible hotel. Additionally, the Master Plan 203018 discusses land use goals that coordinate land use planning with transportation planning allowing for the transportation system to expand where necessary.
- Granite Street, Manchester: The zoning around this proposed station is central business district, urban multi-family, and general industrial/industrial park. The existing land uses are commercial, transportation, residential and mixed use. The construction of a station at this location would

[17] http://www.concordnh.gov/DocumentCenter/View/1663
[18] http://nh-concord.civicplus.com/DocumentCenter/View/1456

not significantly alter the existing land uses; the immediate area where the station would be is already transportation land use. Bringing intercity rail into downtown Manchester would complement existing zoning and support local comprehensive plans.

- Bedford/Manchester Airport: The zoning at this station location is transportation, residential and general business district. The existing land uses are open space, residential, transportation, and industrial. of the Town of Bedford has existing plans to develop this site and an intercity rail station is consistent with these plans. While there would be a change from the existing zoning and land uses, the change is consistent with what is planned for the site.
- Crown Street, Nashua: The existing zoning is general industrial, urban residential and mixed use. The existing land uses are industrial, residential, commercial and transportation. The existing zoning and land use are supportive of the development of an intercity rail station. Additionally, the plans and policies from the City of Nashua are supportive of an intercity rail station. Nashua's land use code allows for a Transit-Oriented Development (TOD) district that complements the recommendations of the Nashua Master Plan19. The Master Plan discusses the goal of investing in non-vehicular systems such as transit and regional rail.

4.12.1 Affected Environment

The land use evaluation was conducted according to FRA's Procedures for Considering Environmental Impacts (as revised FR/Vol. 64, No. 101/Wednesday, May 26, 1999 [28545-28556] and using the document "*Guidance on the Federal Railroad Administration Categorical Exclusion Worksheet*.[20]" This guidance specifies that evidence should show that surrounding land uses and zoning issues are compatible and that the local plans and policies are supportive of the project. The existing land use and zoning within a half mile of each proposed station has been evaluated. As described in Section 4.12, the existing land use and zoning at the four proposed station locations are compatible with the development of an intercity rail station. Land use and comprehensive plans and policies from each of the cities support the implementation of a rail station. Any changes to land use would be minimal and would be changes that each municipality already anticipates in the event of the construction of a rail station.

4.12.2 No Build Alternative

Land use changes unrelated to passenger rail station development may occur under the No Build Alternative, but attempting to estimate such changes would be speculative. The No Build Alternative would not advance the comprehensive plans and land use goals of any of the cities through which the Build Alternative would operate.

[19] http://www.gonashua.com/CityGovernment/Departments/PlanningDepartment/PlansandStudies/NashuaMasterPlan/tabid/675/Default.aspx

[20] https://www.fra.dot.gov/eLib/Details/L02707

4.12.3 Build Alternative

Based on a qualitative assessment, it is anticipated that the Build Alternative would have a moderate impact on sustainable land use goals. The Build Alternative would have a low-to-medium impact on catalyzing more compact, infill transit-supported land use and development patterns around the stations, and would reduce reliance on vehicles for trips and errands[21]. The Build Alternative is compatible with the existing land use at all four of the proposed stations. In terms of the direct land use impacts of constructing and maintaining a rail station, the existing land use and proposed future land use plans support the development of a rail station. Indirect land use impacts, such as TOD that may occur with the presence of a rail station, are also compatible with the existing and future land use plans from each of the municipalities. The overall land use plans and vision for the station areas and corridor are supportive of rail station and many local plans directly call for the development of a rail station and the associated development.

4.13 Environmental Justice

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, issued in 1994, states that "each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations."

The CEQ document, *Environmental Justice: Guidance Under the National Environmental Policy Act (1997)* states that minorities are individuals who are members of the following population groups:

- American Indian or Alaska Native, Asian or Pacific Islander, Black or Hispanic.

The CEQ guidance also outlines that minority populations should be identified where either:

1. The minority population of the affected area exceeds 50 percent; or,
2. The minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis; or,
3. A minority population also exists if there is more than one minority group present and the minority percentage, as calculated by aggregated all minority persons, meets one of the above stated thresholds.

Disproportionately high and adverse environmental effects are determined if:

- There is or will be an impact on the natural or physical environment that significantly and adversely affects a minority population, low-income population or Indian tribe.

[21] Capitol Corridor Land Use & Economic Development Analysis, January 2014, available under separate cove

- Whether environmental effects are significant and are or may be having an adverse impact on minority populations, low-income populations, or Indian tribes that appreciably exceeds or is likely to appreciably exceed those on the general population or other appropriate comparison group; and
- Whether the environmental effects occur or would occur in a minority population, low-income population, or Indian tribe affected by cumulative or multiple adverse exposures from environmental hazards.

DOT Order 5610.2(a), *Department of Transportation Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, sets forth the DOT policy to consider environmental justice principles in all DOT program, policies and activities. Environmental Justice (EJ) areas are defined as Census Block Groups that represent neighborhoods of high-minority, low-income, non-English speaking, and foreign-born populations.

4.13.1 Affected Environment

As described in the CEQ guidance, a geographic area should be defined as the potential impact area in order to determine whether a proposed action is likely to have disproportionately high and adverse human health and environmental effects on low-income and minority populations. U.S. Census data was used to calculate statistics related to income and race for individuals in Census Tracts within 1,000 feet of the Build Alternative's route.[22] Data was collected for New Hampshire and Massachusetts, and the U.S. for overall comparison. Refer to Appendix F for more information on the equity analysis.

Race

Approximately 11 percent of the population living in the 39 Census Tracts that are within 1,000 feet of the proposed rail alignment are minorities.[23] One Census Tract in Manchester, Census Tract 6, has a minority population that exceeds 50 percent (56.7 percent). The Tract immediately surrounding the proposed Granite Street station (Census Tract 2004) has a minority population of 17 percent. There is one Tract to the west of the proposed station (Census Tract 20), where the minority population is 40 percent. In addition to the minority population clusters around the proposed Granite Street station, there are also clusters of minorities around the proposed station at Crown Street in Nashua. In Census Tract 106, which surrounds the Crown Street station, the minority population is 21 percent. The minority population in the State of New Hampshire is seven percent. The percentage of minorities within the corridor is higher than the state, but less than the neighboring State of Massachusetts (24 percent) and less than the U.S. (37 percent).

Based on this data and following the CEQ guidance, the minority population throughout the corridor does not exceed 50 percent of the area. As little to no adverse impacts is anticipated, the minority population in Census Tract 6 would not face disproportionate adverse impacts. The minority population

[22] United States Census*, American Community Survey Five-Year Data 2011*
[23] Ibid

exceeds the minority population in the state by four percent; four percent is not determined to be meaningfully greater. The calculation used to assess the impact of this project on racial groups combines all minorities into a single groups; the combined number is used for this analysis. This analysis shows that there are not minority populations present in the project area that would be subject to protection under Executive Order 12898.

Furthermore, the minimal anticipated local negative impacts associated with noise and vibrations could be easily mitigated. On a regional scale, impacts to air quality are actually anticipated to improve, as this is an intercity rail project and could possibly remove vehicles from roadways if travelers choose to take the rail service instead of driving. Refer to sections 4.1 and 4.2 as well as Appendix A and Appendix B for additional details.

Low-Income Population

Approximately eight percent of the population in the 39 Census Tracts within 1,000 feet of the rail corridor has fallen below the poverty line within the last 12 months (based on the five-year 2012 American Community Survey Census data).[24] This is approximately the same percentage as the State of New Hampshire, where eight percent of the population is also below the poverty level. The population below the poverty level in the corridor is less than the State of Massachusetts (almost 11 percent) and the U.S. (14 percent). No individual Census Tract exceeds 50 percent of the population below the poverty line.

Based on this data and following the CEQ guidance, the low-income population does not exceed 50 percent of the area. The low-income population is also not meaningfully greater than a comparable geographic area - the State of New Hampshire in this case. The percent of the population below poverty is the same in the corridor and the state.

There is not a significant presence of a low-income population in the corridor. Additionally, there are no anticipated negative impacts on air quality or noise and vibration.

4.13.2 No Build Alternative

There would be no change in the status quo for the No Build Alternative. Predominately positive benefits are anticipated for the Build Alternative in terms of improved mobility, increased transportation options, and better access to services. The No Build Alternative would not achieve these benefits for any population group, including EJ populations.

4.13.3 Build Alternative

The Build Alternative would have a major beneficial impact for EJ populations within proximity to proposed stations in Concord, Manchester, and Nashua, as the project provides increased access to transportation options within the corridor. Potentially minor adverse impacts to certain populations

[24] Ibid

include the noise impacts of horns within certain communities. The noise impacts and mitigation are addressed under the Section 4.2, Noise and Vibration.

4.14 Public Safety

Increasing rail traffic in the corridor would increase the likelihood of conflicts between rail operations, traffic operations, and pedestrian movements. Existing railroad safety features were evaluated with the owner, PAR, and through field reconnaissance and GIS mapping. Of particular concern were interlockings, block signals, and at-grade crossings.

4.14.1 Affected Environment

The train control signal system for the route supports NORAC Rule 261 between North Station and Manchester. Rule 261 allows for bi-directional train operation with automatic wayside block signals on all main line tracks. North of Manchester, there are no wayside signals and operations are governed by DCS rules, wherein a train order issued over the radio by the railroad dispatcher in Billerica, Massachusetts is necessary to move a train.

There are 35 locations identified between Lowell's Gallagher Terminal and Stickney Avenue in Concord where roadways or pedestrian paths cross the railway at grade. Grade crossings are of particular concern as they present the greatest accident hazard on the railway due to the potential for vehicle/pedestrian conflicts with trains. Grade crossings would require sensitive treatment should substantially greater volumes of trains be reintroduced along the route. Federal safety regulations require trains to sound their horns at all grade crossings. A federally sanctioned "quiet zone" may be established cooperatively with the local community working with the railroad to make substantial investments that reduce the likelihood of accidents.

The density of 35 crossings along the 48-mile route is relatively low for an intercity railroad. The railroad generally follows the banks of the Merrimack River and most of the grade crossings lead to relatively small riverfront residential enclaves or industrial sites. Of the 35 grade crossings, 21 are public roads, 13 are private driveways, and one is an informal community crossing. Only six of these crossings are heavily travelled: Crown Street, Hollis Street, and Bridge Street in Nashua; Granite Street, and; Hall Street in Concord.

Public grade crossings are roadways that are under the jurisdiction of and maintained by a public authority. Private grade crossings are on privately-owned roadways such as those leading into an apartment complex, housing estate, or commercial/industrial development. A private crossing is not intended for public use and is not maintained by a public road authority.

4.14.2 No Build Alternative

Public safety improvements would not be achieved under the No Build Alternative because no upgrades to the Centralized Traffic Control signal system or the Automatic Highway Crossing Warning System

would occur. This would impact the 35 at grade rail crossings. Grade crossings present the greatest accident hazard due to the potential for vehicle and pedestrian conflicts.

4.14.3 Build Alternative

The Build Alternative would have a beneficial impact in the project corridor through the installation of upgraded safety features. The existing railroad (NHML) has a fully functioning CTC signal system in-place between Lowell and Manchester that would be renewed and upgraded for the new passenger service. Existing block signals were identified by reference to PAR documentation. New and renewed interlockings were identified in the track configuration planning process. In addition, the project includes installing all new equipment for the AHWD. It is also assumed that the rail line would operate with Positive Train Control (PTC), which is in the process of being incorporated in PAR, Amtrak, and MBTA facilities around New England, and would be in place by the time this route is operational. Lastly, public safety benefits would be realized by travelers shifting from road to rail.

4.15 Cultural Resources and Historic Properties

The Build Alternative may develop into a federal undertaking having the potential to impact historic properties and subject to review under Section 106 of the NHPA of 1966, as amended, and its implementing regulations, 36 CFR Part 800. Historic properties are defined in the NHPA as any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places. Examples of activities that have the potential to cause impacts to cultural resources, including historic properties, include physical destruction, physical alteration, or removal of the resource to another location; introduction of visual, atmospheric, and audible elements (including noise and vibration); and neglect that causes deterioration. To address initial Section 106 concerns, a preliminary cultural resource study was conducted for the Build Alternative's Limit of Disturbance (LOD). For the purposes of the Tier 1 study, the LOD determined a preliminary Area of Potential Effect (APE) running from Lowell, Massachusetts to Concord, New Hampshire. This preliminary APE focused on areas that may be directly and indirectly impacted (or the LOD) by the proposed construction such as station and layover construction and major track realignment. The preliminary APE was developed for the purpose of getting a reasonable sense of historic properties or potentially historic properties present in in the project area through a "desktop review;" the preliminary APE, however, will need to be refined and agreed upon through future Section 106 consultation with the Massachusetts and New Hampshire State Historic Preservation Officers (SHPOs) at the Tier 2, or project, level.

While the entire project corridor from Lowell to Concord is examined in the Tier 1 survey, the majority of detailed discussion of archaeological resources centers on the areas within the sections of the corridor that may be directly impacted by the proposed construction. A larger five-kilometer archaeological study buffer was examined to establish the archaeological context and potential of the area surrounding the project corridor. This effort combined a review of the known prehistoric and historic archaeological sites as well as a cultural resource survey of historic maps of the region. These

sources are synthesized to determine the archaeological potential of the corridor and recommend potential field testing within the LOD/APE.

For historic architectural resources, the study area included potential areas of direct impact (or LOD) and a limited area of potential indirect impact that would result from the construction of above-ground facilities, namely stations and layover areas. This indirect study area consisted of a 500-foot preliminary APE buffer surrounding potential station locations and layover facilities. The historic architectural survey consisted of an inventory of previously identified historic properties and a windshield survey of architectural resources over 50 years of age that had not yet been identified or evaluated for historic significance. The cultural resources technical reports can be found in Appendix G.

In December 2014, Section 106 consultation was initiated and the preliminary cultural resources studies were submitted to the Massachusetts and New Hampshire SHPOs for review. Comment letters were issued by the New Hampshire SHPO on December 22, 2014 and by the Massachusetts SHPO on December 31, 2014. A subsequent meeting was held at the New Hampshire Department of Transportation on January 15, 2015 and attended by FRA, SHPO, and NHDOT staff and NHDOT's environmental consultant. The purpose of the meeting was to discuss the preliminary reports, SHPO comments, and determine the next steps. The parties determined that the current level of effort and preliminary resource identification is sufficient for a Tier 1 Study. The Tier 2 analysis, however, will require the APE to be more broadly defined in consultation with the SHPOs so that it encompasses all areas of potential direct and indirect impact. This project is in an early planning stage and establishing a refined APE is dependent on the project components included in the next phase of the project. Redefining the Tier 1 APE at this time is premature.

If NHDOT seeks federal funding for the next phase of this project, the lead federal agency will consult with the New Hampshire and Massachusetts SHPOs, as required by Section 106 of the National Historic Preservation Act, to establish the project APE, identify historic properties and determine whether or not any cultural resources surveys or archaeological testing is necessary, determine effects, and resolve any adverse effects.

4.15.1 Affected Environment

Historic Architecture: In New Hampshire, there are two previously identified historic properties within the direct APE that have been determined to be eligible for listing on the NRHP: the Eagle Square Historic District and the Amoskeag Millyard Historic District, as well as 14 previously identified historic properties within the indirect APE. Background research and a field visit also found that there are 12 architectural resources over 50 years of age within the direct APE that have not been previously surveyed or evaluated for historic significance, including the rail line itself, two bridges that carry the rail line over the Merrimack River, five storage or warehouse buildings, two office buildings, and two garages. For additional detail, see the Reconnaissance-Level Historic Architectural Survey in Appendix G.

Background research gathered from Massachusetts Cultural Resource Information System (MACRIS), a Massachusetts Historical Commission (MHC) visit, and other online sources determined that there are

four NRHP-listed resources in the preliminary APE. One of those resources, the Lowell Locks and Canals Historic District is also a National Historic Landmark (NHL). The other three are the Lowell Historic Preservation District, Lowell National Historic Park, and Middlesex Canal Historic and Archaeological District. In addition, background research and the field visit determined that there are two previously unidentified properties that may be 50 years of age or older within the direct APE. This includes the rail line itself, and one of the bridges that carries the rail line over the Pawtucket Canal.

Archaeology: In New Hampshire, overall, the potential for prehistoric archaeological resources in the Study area remained consistently high, owing in large part to its proximity to the Merrimack River. The historical archaeological sensitivity was also determined to be high given the density of historic settlement within the Study area. The archaeological sensitivity for historical archaeological resources was subdivided into site types. Analysis of these site types revealed that sites of an industrial- or transportation-related association were the most likely form of historic archaeological material to be encountered. Both of these site types were frequently situated along the river and its tributaries from which they derived operational power and transportation. As the extant rail bed follows the course of the Merrimack River, the likelihood of encountering industry/transportation-related resources is therefore high. For a full listing of archaeological sites and potential in New Hampshire, see Appendix G.

In Massachusetts, the Lowell Study area contains a total of 33 previously identified archaeological sites. Within the Lowell Study area, 21 sites are classified as historic sites and 12 sites are classified as prehistoric. Of the 33 previously identified archaeological sites contained within the Lowell Study area, no site occurs within the extant railroad bed; however, several sites do occur in close proximity, namely the Railroad Site (19-MD-0570)[25] and the B&M Roundhouse Site (LOW-HA-31)[26], both of which are immediately adjacent to the current main line.

4.15.2 No Build Alternative

Under the No Build Alternative, NHDOT would not undertake any physical or operational improvements to the Project corridor. Therefore, there would be no effect to historic properties, including archaeological resources.

4.15.3 Build Alternative

The majority of work proposed for this project would be located in previously disturbed track bed or in highly developed areas. Therefore, it is anticipated that impacts to archaeological resources would be minor to negligible. However, given the overall archaeological sensitivity of the project area, efforts to identify archaeological resources and assess and resolve impacts will be necessary once specific locations of ground-disturbing activities are known at the Tier 2 level. Project work that would occur in the existing ROW and consist of replacing second track in selected locations where it existed historically is not anticipated to have direct impacts to historic architectural properties, except for impacts to

[25] Massachusetts site from the SHPO
[26] Ibid

historic properties directly associated with the railroad itself, such as bridges. Indirect effects of the project to nearby historic architectural properties may include visual, noise, and vibration impacts; these would be identified and analyzed at the Tier 2 level.

The background research conducted for this Tier I, or service-level, study indicated there are previously identified NRHP-listed and eligible properties present in the study area, as well as resources that may require further evaluation to determine NRHP eligibility. However, no further identification of historic properties or evaluations of impacts to such properties occurred at this stage. Such activities, as well as surveys, archaeological testing, any necessary mitigation, etc., would take place in the future at the Tier 2 level when project plans are more fully developed and when the nature and full extent of the project is known for determining the APE; this future work would include appropriate Section 106 consultation with the Massachusetts and New Hampshire SHPOs, and other consulting parties as appropriate.

4.16 Parks and Recreation

Section 4(f) of the U.S. Department of Transportation Act of 1966 requires DOT agencies to consider the impacts of transportation projects on the following: parks and recreational areas of national, state, or local significance that are both publicly owned and open to the public; publicly owned wildlife and waterfowl refuges of national, state, or local significance that are open to the public to the extent that public access does not interfere with the primary purpose of the refuge; and historic sites of national, state, or local significance in public or private ownership regardless of whether they are open to the public.

4.16.1 Affected Environment

There are a number of publicly-owned parks and recreation areas that are adjacent to the existing rail right-of-way, though none of them would be impacted by the project, and, as such, do not qualify as Section 4(f) resources. The work associated with the rail would take place within existing right-of-way, and the stations would be located on either private or publicly-owned parcels that are not set aside as either park land or recreation land.

Based on the level of detail included in the preliminary rail design, there is not yet enough information to determine whether any historic sites would be directly impacted by the project and, therefore, classified as a Section 4(f) resource. Future Tier 2 analysis will include further identification of 4(f) resources, and a full Section 4(f) evaluation, including coordination with the appropriate Officials with Jurisdiction, if necessary.

4.16.2 No Build Alternative

Under the No Build Alternative, NHDOT would not undertake any physical or operational improvements to the Project corridor and as a result, there would be no impacts to Section 4(f) resources.

4.16.3 Build Alternative

Impacts of the Build Alternative on Section 4(f) resources in the corridor are not known at this time. Identification of Section 4(f) resources, evaluation of impacts to these resources, and identification of feasible and prudent alternatives if necessary, will occur during a Tier 2 study, once project details are further developed, including specific locations of proposed work.

4.17 Socioeconomics

The Build Alternative is not expected to result in direct negative impacts to neighborhoods, community facilities, ADA accessibility or public services. The proposed station locations are on underutilized properties. Currently, these sites are not easily accessible and are not cohesive parts of the surrounding development pattern. The implementation of the Build Alternative would facilitate development at the station sites and enhance connections to surrounding development, catalyzing additional development and weaving a more fluid network for pedestrians and all community members. There are several sections of this Environmental Assessment that further describe specific impacts of this project: Section 4.10 Accessibility; Section 4.11 Property Acquisition; Section 4.14 Public Safety; Section 4.19 Indirect Effects, Section 4.20 Cumulative Impacts; and Section 4.21 Construction Period Impacts.

Economic benefits of passenger rail investment were developed through examining the literature and findings from recent studies of similar regional rail enhancement projects. Numerous studies have identified a net positive benefit of passenger rail investment to the regional economy, as a result of travel time savings and congestion reduction, expanded access to jobs and workforce, and new development attracted to station areas. Studies have also found a positive impact of passenger rail on property values in station areas. While only a few studies have specifically examined intercity rail, evidence from other rail system expansions in the greater Boston region similarly suggests that passenger rail investment would have a positive socioeconomic effect on the communities it serves.

Interviews were conducted with local stakeholders to gather information on the impact the different rail alternatives could have in bringing about new development over the next 20 years. The Study team also assembled data on land use and zoning to evaluate the potential impact of the Capitol Corridor alternatives on development and redevelopment. This potential was measured in terms of commercial square footage (office and retail) and housing units for the different alternatives.

Lastly, the economic modeling tool IMPLAN was used to estimate the economic benefits to the southern New Hampshire region of each Capitol Corridor rail alternative. The following economic benefits were evaluated:

- Short-term benefits as a result of spending on construction of rail improvements in New Hampshire
- Long-term benefits as a result of the attraction of more residents and jobs to southern New Hampshire; these include benefits from construction of new real estate, as well as ongoing benefits from new worker earnings reinvested in the local economy

4.17.1 Affected Environment

The Concord – Stickney Avenue station area site was identified as suitable for TOD, primarily due to the mixed-use and high-density residential allowances and flexible parking requirements under zoning. Parcels considered most likely to develop or redevelop due to rail alternatives were primarily located within the Opportunity Corridor Performance (OCP) district, the Gateway Performance District (GWP) and the Central Business Performance (CBP) district.

There is little vacant land within the Manchester – Granite Street station area. Due to the rail supportive zoning, however, many underutilized parcels could potentially redevelop in conjunction with the proposed rail service enhancements. Parcels considered likely to redevelop are predominantly located within the CBD with some intensification possible in the residential district. This area is also considered suitable for TOD due to its high-density residential and commercial allowances under zoning.

Given the relatively low residential and commercial densities proximate to the proposed station area for the Bedford/Manchester Airport, this site has the least amount of development potential; however, there was a general consensus among interview participants that rail connectivity to the airport was critical for regional economic development.

The predominant zoning for the Nashua – Crown Street station area is Multi-Family Residential and General Industrial. This analysis assumed development would be predominantly residential with a small amount of commercial use. A mixed use or TOD supportive overlay in this area would boost development potential, given the amount of vacant land suitable for development.

4.17.2 No Build Alternative

The No Build Alternative would not result in socioeconomic impacts . The proposed station sites would likely remain undeveloped, as most of the long-range plans for these sites include station construction, TOD and the implementation of rail service. If construction of the Build Alternative does not happen, the plans that the local municipalities have created for the station sites would not come to fruition.

4.17.3 Build Alternative

The Build Alternative would have a beneficial impact on the economics of the State of New Hampshire. This alternative, with four trains per day serving Nashua, Manchester, and Concord, could potentially generate about 1,600[27] new residential units and 819,000 square feet of commercial space supporting 2,480 new jobs by the year 2030, as shown in Table 4.9. It has the potential to generate 350 new jobs over the construction period (2019-2022), 2,460 jobs related to new real estate development between 2021 and 2030, and 1,140 new jobs annually in 2030 and beyond (with benefits beginning to accrue after 2021) due to reinvested worker earnings (see Table 4.10). Real estate development would add $750 million to the state's output between 2021 and 2030, with reinvested earnings adding $140 million per year beyond 2030.

[27] Rounded to the nearest 100th

Table 4.9: Development Potential at Each Station

Station	Commercial (Square Feet)	Residential (Units)	Jobs
Concord – Stickney Avenue	335,000	400	890
Manchester – Granite Street	284,000	680	1,020
Bedford/MHT	123,000	0	360
Nashua – Crown Street	77,000	560	210

Table 4.10: Impacts on Employment and Output

Build Alternative	Project Construction (2019-2022)	Real Estate Development (2021-2030)	Reinvested New Resident Earnings (Annual, 2030+)
Impact on Employment (Jobs)	350	2,460	1,140
Impacts on Output (Gross Regional Product In Millions of 2014$)	$100	$750	$140

4.18 Transportation

Rail operations for the Build Alternative were modeled using stringline diagrams (also referred to as time-distance diagrams) that plan the flow of traffic on the railroad and are designed to overlay on top of the existing MBTA and Amtrak operations that would share trackage south of Lowell (MBTA) and south of Woburn (Amtrak). Stations were designed to provide direct access from major routes or take advantage of dense areas of development that would most likely utilize the system. Ridership numbers at each station were used to estimate parking requirements. Accessibility at each station is driven by existing guidelines developed by Amtrak.

4.18.1 Affected Environment

As described in Section 1.3 Corridor Existing Conditions, the existing rail corridor is owned by PAR and utilized exclusively for freight rail traffic, with no passenger rail operations. See Section 1.3 for additional details.

4.18.2 No Build Alternative

The No Build Alternative would not result in any impacts to the existing corridor transportation network.

4.18.3 Build Alternative

The Build Alternative would have a beneficial impact on mobility in the corridor by introducing passenger rail operations, which currently do not exist in the corridor. The Build Alternative could potentially have a minor adverse impact on traffic operations around certain station locations. As more detail is developed for the station alternatives and designs, traffic operations will be modeled in and

around the proposed stations. Due to the inherent nature of train schedules, traffic in and around stations usually does not coincide with local rush hour traffic. As a secondary impact to station design, development in and around stations would likely have a beneficial impact on accessibility and walkability in and around stations.

4.19 Indirect Effects

The CEQ has defined indirect effects as follows (40 CFR 1508.8):

"Indirect effects are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population, density or growth rate, and related effects on air and water and other natural systems, including ecosystems."

Indirect effects differ from those directly associated with the construction and operation of a transportation project itself and are often caused by what is commonly referred to as "induced development." Induced develop includes a variety of alterations such as changes in land use, economic vitality, or population density. The potential for indirect effects to occur is determined in part by local land use and planning objectives as well as the physical location of the proposed project. An example of an indirect effect is when a new rail station is built in an undeveloped or underdeveloped area and commercial development that would have not otherwise been built occurs in the vicinity of the new station. Typically, local jurisdictions have plans in place that may allow greater development to occur around such transportation improvements.

4.19.1 No Build Alternative

The No Build Alternative would not foster growth in jobs and economic development around the four proposed stations. The No Build Alternative would also not realize the air quality benefits that a passenger rail corridor can generate.

4.19.2 Build Alternative

The Build Alternative has the potential to do the following: enhance regional roadway transportation by reducing the number of vehicles on the regional network, improve overall air quality through the, reduction in regional vehicle miles traveled, improve accessibility and mobility by offering an alternative transportation option, result in the potential for additional economic value from induced transit-oriented development associated with the new passenger rail stations, result in an increase in property values and an increase in local and regional economic activity along the Capital Corridor through the generation of jobs, additional tax revenues, and associated direct and indirect spending.

Induced development related to the Build Alternative would have the potential for a variety of environmental impacts, including impacts on wetlands, water quality, air quality, vegetation, and wildlife habitat, and increased traffic and noise. These effects would be mainly due to the indirect development that could follow from proposed new passenger rail stations.

While there is a potential for environmental consequences from any potential change in planned land use, local land use controls are adequate to manage any potential development in the areas near stations. In addition, the station area communities would continue to participate in station area planning activities designed to ensure that station area development is carried out consistent with each community's master plan and zoning requirements. While the Bedford/Manchester Airport station is designed to specifically be a park-and-ride style station, the Town of Bedford has planning documents that include mixed use TOD-style development if a station were built at this location. The remaining stations are each designed with TOD in mind, which would likely foster denser development and more walkable communities. This type of growth is generally favored over sprawl-type growth, and helps to protect the natural resources of the state. In addition, as described in Section 4.17 Socioeconomics, The Build Alternative is expected to increase Gross Regional Product and jobs during construction and future operations. Indirect effects due to station development will be further addressed in the Tier 2 NEPA documentation to be prepared during project development.

4.20 Cumulative Impacts

The Council on Environmental Quality (CEQ) has defined cumulative impacts as follows (40 CFR 1508.7):

"Cumulative impact is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

A number of past, present, and future projects identified in the planning documentation for the region can be taken into account when analyzing the project cumulative impact scenario.

- The I-93 widening project is currently underway and serves as a major transportation connection within the corridor.
- Exit 36, located on US Route 3 in Massachusetts, was recently the subject of a planning study by the Southern New Hampshire Regional Planning Commission to study the impact of redesigning the interchange to allow southbound traffic to exit at this location (it currently only supports exiting from the northbound direction).
- Bow-Concord Interstate 93 Transportation Planning Study - This portion of I-93 has been and continues to be studied. In 1992 NHDOT conducted a feasibility study of the corridor where extensive highway improvements were proposed. The results of this study were not well received by the surrounding communities. Additionally, Exit 13 in Concord was reconstructed to accommodate a six lane I-93 (three lanes in each direction). Finally, the 2020 Vision for Concord completed in 2001 identified several visions for I-93 within Concord. These included limiting I-93 to six lanes, providing access to the Merrimack River from downtown, and a potential re-configuration of Exit 14 bringing Bridge Street / Loudon Road over I-93. The project team met with the Bow-Concord project planning team to discuss station alternatives in Concord and the proposed station location is consistent with current planning.

- I-93 Transit Investment Study - The I-93 Transit Investment Study evaluated various transit alternatives in the travel corridor between Manchester and Boston. The study considered a range of bus and rail alternatives to help accommodate future travel demand on the corridor.
- Manchester I-293 Exits 6 and 7 Planning Study - NHDOT has initiated a study to address the transportation needs of a 3-mile segment of I-293 extending northerly from the Granite Street interchange (Exit 5) to approximately one mile north of the NH Route 3A interchange (Exit 7) in Manchester, NH.
- In addition, there is a parallel study for the FTA looking at extending MBTA commuter rail operations north of Lowell to Manchester.
- Lastly, it is assumed development patterns would be affected by these transportation improvements if they are implemented.

4.20.1 No Build Alternative

The No Build Alternative would not contribute to a cumulative effect on the majority of resources identified in this EA. However, it could contribute to cumulative effects on air quality because it would continue the dependence on personal automobiles for travel on the congested US Route 3 and I-93 corridors by not reducing regional VMTs.

4.20.2 Build Alternative

Overall, the Build Alternative would have an incremental beneficial impact on the environment. The project would provide greater access to transportation options for people in the corridor and reduce VMT within the US Route 3 and I-93 travel corridors. Improved air quality could be expected as a result of an improved multi-modal transportation options. In addition, the project is consistent with all local and regional plans and has been coordinated directly and transparently with the communities who would see the greatest impact from the addition of passenger rail service.

Other foreseeable future actions along the Build Alternative corridor include development in the downtown areas of Nashua, Manchester and Concord; expansion of passenger and commuter rail and bus service; and track improvements to serve additional freight customers. These actions combined with the addition of passenger rail service, including new station construction and related TOD, have the potential to impact the variety of resources identified in this EA. However, land development is guided by community master plans and zoning regulations. Local land use controls and permitting are adequate to manage the impacts of any potential development in or near the project corridor, minimizing the potential for cumulative effects. The addition of passenger rail service when combined with freight rail has the potential for a cumulative effect on wildlife mortality and public safety. Increases in freight rail and/or passenger rail operations would bring additional noise and vibration and has the potential to impact public safety. However, potential impacts would be mitigated with safety and communications improvements at grade crossings and improved train control. Construction of the new Bedford/Manchester Airport Station in New Hampshire would directly impact wetlands, thereby potentially contributing to a cumulative effect on this resource when combined with other projects. Any wetland impacts would be subject to state and federal permitting requirements which would include

compensatory mitigation for any unavoidable impacts. During the next phase of analysis, cumulative impacts to wetlands, noise, vibration, public safety, as well as any other resources identified at the Tier 2 stage once project details are known, will be more defined and mitigation measures will be determined if necessary.

4.21 Construction Impacts

Construction impacts are temporary during project implementation and would vary depending on the type of construction activity and location. Impacts would be mitigated with construction best practices.

4.21.1 Affected Environment

The NHML previously accommodated two tracks along the entire length between Boston and Concord; however, aside from sidings, the rail line today is only single-tracked north of the wye at Stony Brook in Chelmsford. To accommodate new passenger rail, the existing rail has to be upgraded, and enough second track needs to be provided to accommodate both passenger rail and freight on the same line. No improvements south of MBTA's Lowell Gallagher Terminal would be required. North of Lowell the railroad would be upgraded to permit safe, reliable operation of eight daily passenger trains at speeds of up to 75 mph. Upgrades would be provided to track, bridges, crossings, and signals, which are summarized in Major Infrastructure Components, Section 3.3.3.

4.21.2 No Build Alternative

There would be no construction under the No Build Alternative. Therefore, no construction period impacts would occur.

4.21.3 Build Alternative

Minor temporary impacts to wetlands and water quality may occur during construction activities, such as replacing or rehabilitating bridges or culverts, relocating utilities for track work, and grading work associated with station construction. These impacts would be mitigated during design and restored after construction has been completed. Minor permanent impacts may occur during these same activities in cases where temporary impacts cannot be mitigated. In these cases, compensatory mitigation would be identified at the appropriate ratio for replication. During construction, best management practices will be employed to control stormwater runoff, erosion, construction vehicle emissions and fugitive dust. Noise associated with the construction of the project is expected to have four potential daytime impacts and up to 324 potential nighttime impacts. As more detail is developed in the project's next phase, these impacts will be better defined and mitigation procedures developed.

5 Agency Coordination and Public Involvement

A Public and Stakeholder Involvement Plan (PSIP) was developed to comply with the NEPA process that outlines how the NHDOT – in cooperation with FRA, FTA, and the Study team – would both educate and seek input from private entities, public agencies, communities, residents, and the traveling public. The PSIP's purpose was to describe how stakeholder and public input would be sought to inform the completion of key project milestones, including the definition of the Study Purpose and Need, the development of alternatives, the evaluation of alternatives, the selection of a recommended strategy, and the methods by which clear and understandable information would be developed and disseminated at the conclusion of each Study milestone. Activities described in this plan would educate key stakeholders and the public about the technical analyses that fed into the decision-making process and to receive input for that process.

A variety of approaches were used to inform stakeholders of Study activities and there were numerous opportunities for discussion and comment. Public opinion and comments were documented and considered throughout the process. The main objectives of the public and stakeholder outreach activities for the Capitol Corridor Study are as follows:

- Build support for the Study, including the NEPA process, among different stakeholder groups
- Encourage stakeholders (appropriate Federal, State, and local authorities, and the public) to engage in the Study efforts at the earliest practicable time.
- Provide clear and understandable information at each step of the Study
- Document and consider public and stakeholder opinion as part of the decision-making process concerning the consequences of the current and any future grant applications
- Create a high-level of transparency regarding how the Study is conducted

Because the Study included rail service as an alternative in the State of New Hampshire, the Study attracted significant interest from public and private stakeholders throughout the region, as well as members of the general public. Public and stakeholder outreach began at Study initiation and was proactive, consistent, and timely to fully engage the public and key stakeholders in the process. Federal, state, and local agencies with regulatory authority were contacted throughout the process to provide input and comment. In addition, NHDOT identified quasi- and non-governmental stakeholders, and solicited comments through public information meetings, PAC meetings, a project website, and other activities.

5.1 Agency and Stakeholder Coordination

The Study team conducted 91 stakeholder meetings, three PAC meetings, and three public meetings (in Concord, Manchester, and Nashua) over the Study's 21-month lifecycle. The initial phase of stakeholder engagement was designed to solicit input from a broad, diverse range of players who all have a stake in the future of passenger rail in New Hampshire.

5.1.1 Project Advisory Committee

The PAC provided input to the Study, including the vetting of early, preliminary alternatives. Throughout the Study, the PAC held meetings (including ongoing Study progress discussions) that coincided with the conclusion of major Study milestones and phases. The Study team coordinated the PAC's efforts. In addition, the Governor's Office, Congressional Delegation Offices, Executive Councilors, and State Senators and State Representatives from communities along the Capitol Corridor were notified of all meetings (public meetings and PAC meetings). Information on the PAC meetings is provided in Appendix H.

The following organizations were PAC members:

- Amtrak
- Central New Hampshire Regional Planning Commission
- City of Concord, New Hampshire
- City of Manchester, New Hampshire
- City of Nashua, New Hampshire/Nashua Transit System
- Conservation Law Foundation of New Hampshire
- The Greater Concord Chamber of Commerce
- The Greater Nashua Chamber of Commerce
- Lowell Regional Transit Authority
- Manchester Transit Authority
- Manchester-Boston Regional Airport
- Massachusetts Bay Transportation Authority
- Massachusetts Department of Transportation
- Merrimack Valley Planning Commission
- Nashua Regional Planning Commission
- New Hampshire Rail Transit Authority
- Northern Middlesex Council of Governments
- Pan Am Railways

- Rockingham Planning Commission
- Southern New Hampshire Planning Commission

5.1.2 Other Stakeholders

One-on-one interviews and group briefings were held early in the Study with representatives of stakeholder groups identified by the Study team in consultation with NHDOT. These sessions allowed NHDOT and the Study team to convey information about the Study's scope and process and gain an understanding of stakeholders' perceptions of the Study, sensitivities associated with the project, and how local communities might react to the project. Stakeholders also provided information on other individuals and organizations that might have a particular interest in or provide support for the project.

Following is a list of stakeholders and a brief description of each.

- Anagnost Companies: Manchester developer
- C&J Trailways: Regional bus service provider in the Study area
- Central New Hampshire Regional Planning Commission (RPC): Planning commission serving 20 communities in Central New Hampshire, including the City of Concord
- City of Concord, New Hampshire
- City of Dover, New Hampshire
- City of Manchester, New Hampshire – Board of Aldermen: Legislative body of the City of Manchester
- City of Manchester, New Hampshire – Mayor's Office: Executive Office of the City of Manchester
- City of Nashua, New Hampshire/Nashua Transit System
- Concord Area Transit: Public transit provider in the City of Concord
- Greater Concord Chamber of Commerce: Business advocacy organization representing businesses in the Central New Hampshire region
- Concord Coach/Dartmouth Coach/Boston Express: Regional bus service providers in the Study area
- Conservation Law Foundation: Non-profit focusing on environmental issues in New England
- FRA: Grantee for the portion of the Study to develop a SDP and related documents for intercity passenger rail service in the corridor between Boston and Concord
- FTA: Grantee for the portion of the Study to provide an Alternatives Analysis for transit service in the Concord-Boston corridor
- Mount Washington College, Manchester, New Hampshire
- Lowell Regional Transit Authority: Public transit provider in the greater Lowell region

- Greater Manchester Chamber of Commerce: Business advocacy organization representing businesses in the Manchester region
- Manchester Community College, Manchester, New Hampshire
- Manchester Transit Authority: Public transit provider in the greater Manchester region
- Manchester-Boston Regional Airport (Manchester Airport): Public airport located in Manchester, New Hampshire
- MassDOT/ MBTA: MassDOT is the state agency that coordinates, plans, and funds all public transportation infrastructure within the Commonwealth; MassDOT oversees the MBTA, which is responsible for providing public transit service to 176 cities and towns in Massachusetts
- Massachusetts Historical Commission: Established in 1963 to identify, evaluate, and protect important historical and archaeological assets of the Commonwealth
- Merrimack Chamber of Commerce: Business advocacy organization representing businesses in the Merrimack region
- Merrimack Valley Planning Commission: Regional planning agency serving 15 communities in the northeast region of Massachusetts
- Greater Nashua Chamber of Commerce: Business advocacy organization representing businesses in the Southern New Hampshire region
- Nashua RPC: Planning commission serving 13 communities in Southern New Hampshire, including the City of Nashua
- National Railroad Passenger Corporation (Amtrak): Publicly-supported service that operates intercity passenger rail service throughout the U.S.
- New Hampshire Rail Transit Authority (NHRTA): Established by the legislature in 2007 for the general purpose of developing and providing commuter rail or other similar forms of passenger rail service; the authority is administratively attached to NHDOT
- New Hampshire Technical Institute, Concord, New Hampshire
- New Hampshire Congressional Delegates: Senators Jeanne Shaheen and Kelly Ayotte; Representatives Carol Shea-Porter and Annie Kuster
- New Hampshire Department of Environmental Services (NHDES): State agency concerned with the protection and wise management of New Hampshire's environment
- New Hampshire Department of Resources and Economic Development (NHDRED): State agency concerned with economic development in the State of New Hampshire
- New Hampshire Division of Historical Resources: Established as the State Historic Preservation Office in 1974 to preserve the historical, archaeological, architectural, and cultural resources of New Hampshire

- Northern New England Passenger Rail Authority/*Downeaster*: Amtrak's rail service from Massachusetts to Maine
- PAR: Operator of more than 2,000 route miles of railroad in the Northeast, including the track included in the Study corridor
- Public Service of New Hampshire (PSNH): New Hampshire's largest electric utility and owner/operator of the coal-fired Merrimack Station in Bow, New Hampshire
- Rivier University, Nashua, New Hampshire
- Rockingham Planning Commission: Planning commission serving the southernmost corridor communities
- Southern New Hampshire University, Manchester, New Hampshire
- Southern New Hampshire Planning Commission: Planning commission serving 13 communities in Southern New Hampshire, including the City of Manchester
- The Duprey Companies: Concord, New Hampshire Developer
- The Northern Middlesex Council of Governments: Regional planning agency serving nine communities in the Northeast region of Massachusetts
- Town of Bedford, New Hampshire
- Town of Bow, New Hampshire
- Town of Durham, New Hampshire
- Town of Exeter, New Hampshire
- Town of Hooksett, New Hampshire
- Town of Hudson, New Hampshire
- Town of Litchfield, New Hampshire
- Town of Merrimack, New Hampshire
- University of New Hampshire

Notes and details of stakeholder meetings can be found in Appendix H.

5.2 Public Involvement

The Study team held three public meetings at key Study milestones, one of which was a scoping meeting to satisfy FRA requirements:

- Study Initiation Public Meeting, Manchester, New Hampshire – June 5, 2013
- Public Scoping Meeting, Concord, New Hampshire – March 5, 2014
- Final Alternatives Meeting, Nashua, New Hampshire – November 20, 2014

Public meeting documentation can be found in Appendix H. Table 5.1 is a summary of stakeholder outreach activities. These were meetings held at various stages of the project to gather public input and to brief stakeholders on the completion of key project milestones, including the definition of the Study Purpose and Need, the development of alternatives, the evaluation of alternatives and the selection of a recommended strategy,

Table 5.1: Stakeholder Outreach Summary

Date	Stakeholder
3/11/2013	Central New Hampshire RPC
3/12/2013	NHRTA
3/12/2013	City of Nashua, New Hampshire
3/12/2013	Nashua Chamber of Commerce
3/12/2013	Concord Area Transit
3/12/2013	Concord Coach/Dartmouth Coach/Boston Express
3/13/2013	FRA
3/13/2013	FTA
3/13/2013	Nashua RPC
3/13/2013	Southern New Hampshire RPC
3/13/2013	Manchester Chamber of Commerce
3/13/2013	Manchester Airport
3/14/2013	Manchester Transit Authority
4/2/2013	Mayor of the City of Manchester, New Hampshire
4/2/2013	Conservation Law Foundation
4/3/2013	MBTA
4/3/2013	MassDOT
4/3/2013	Northern New England Passenger Rail Authority
4/3/2013	Town of Durham, New Hampshire
4/3/2013	University of New Hampshire
4/16/2013	Senator Shaheen District Office
4/16/2013	Southern New Hampshire RPC
4/16/2013	City of Manchester – Board of Alderman
4/17/2013	City of Concord, New Hampshire
4/17/2013	Rockingham Planning Commission
4/17/2013	Town of Exeter, New Hampshire
4/17/2013	C&J Trailways
4/18/2013	Nashua RPC
4/18/2013	Town of Merrimack, New Hampshire
4/18/2013	Merrimack Chamber of Commerce
5/14/2013	Concord Chamber of Commerce
5/14/2013	NHDES
5/14/2013	PAC Meeting – Concord, New Hampshire
5/15/2013	Congresswoman Shea-Porter District Office
5/16/2013	FRA/FTA Conference Call
5/16/2013	Congresswoman Kuster District Office

Date	Stakeholder
5/16/2013	Manchester Chamber of Commerce
5/16/2013	Merrimack Valley Planning Commission
5/16/2013	Anagnost Companies
5/28/2013	Northern Middlesex Council of Governments
5/28/2013	PAR
5/30/2013	City of Dover, New Hampshire
6/5/2013	Public Meeting – Manchester, New Hampshire
6/28/2013	FTA
7/17/2013	MBTA
7/19/2013	Briefing for NHDOT Commissioner Clement
7/19/2013	PAR
7/23/2013	Land Use Workshop – Nashua, New Hampshire
7/23/2013	Land Use Workshop – Concord, New Hampshire
7/25/2013	Land Use Workshop – Manchester, New Hampshire
7/29/2013	EPA
8/19/2013	Congresswomen's Kuster and Shea-Porter's Staff Project Briefing/ Senator Shaheen's Staff Project Briefing/FRA Project Briefing – Washington, DC
11/20/2013	FTA/FRA – Washington, DC
12/17/2013	Central New Hampshire RPC
12/17/2013	City of Concord, New Hampshire
12/17/2013	City of Nashua, New Hampshire
12/17/2013	Nashua RPC
12/18/2013	City of Manchester, New Hampshire
12/18/2013	Southern New Hampshire Planning Commission
12/20/2013	FRA and FTA
1/21/2014	PAC Meeting – Concord, New Hampshire
1/31/2014	MassDOT/MBTA
2/06/2014	Boston Express
2/06/2014	MassDOT/NHDOT
3/03/2014	Commissioner Clement; Governor's staff
3/04/2014	Harry Blunt and Mark Sanborn (Concord Coach/Boston Express); NHDOT Project Management
3/05/2014	Congresswoman Niki Tsongas' staff
3/05/2014	Public Scoping Meeting at NHDOT, Concord, New Hampshire
3/25/2014	FRA Conference call
3/26/2014	Manchester Board of Advisors Meeting
4/03/2014	Meeting with Amtrak Regarding Ridership Forecasting
4/15/2014	John D. (Jody) Ray (MBTA) and Chris Clement (NHDOT)
4/16/2014	NHDOT Natural Resource Coordination Meeting
4/17/2014	FTA – Cambridge, Massachusetts
4/22/2014	FRA Conference Call
4/25/2014	City of Nashua, New Hampshire – Tom Galligani, Economic Development Director
5/07/2014	NHDOT Commissioner and NHDOT Management
5/08/2014	Montagne Communications (NHRTA Public Relations firm)
6/04/2014	Meeting on Bow-Concord Project with NHDOT

Date	Stakeholder
5/14/2014	First Hy-Rail trip with PAR
6/13/2014	FTA Meeting – Washington, DC
7/14/2014	Nashua RPC – Exit 36 SB Planning Study
7/1&28/2014	FRA Conference Calls
7/30/2014	Second Hy-Rail Trip with PAR
8/06/2014	Mayor of the City of Nashua, New Hampshire
8/6/2014	Meeting with Chris Clement, selection of locally preferred alternative and State decision-making
8/6/2014	Meeting with Dan Kelly, development at Spit Brook Road
8/14/2014	FRA call, comments on deliverables
10/21/2014	FRA call with NHDOT Project Management
10/23/2014	Chris Kennedy, Governor's Transport Assistant
10/23/2014	FTA – Cambridge, Massachusetts
11/18/2014	PAC Meeting – Concord, New Hampshire
11/20/2014	Montagne Communications – EJ Powers
11/20/2014	Manchester Union Leader – Michael Cousineau
11/20/2014	Public Meeting – Nashua, New Hampshire
11/21/2014	Congresswoman Annie Kuster
11/21/2014	NHRTA

As a result of agency and stakeholder input, the following is a compilation of the most frequent comments and concerns:

- New Hampshire would benefit from a transportation system that provides multiple transit options, is less focused on single occupancy vehicles, and provides an increase in options that have the potential to ease traffic congestion and save commuting time.
- The Manchester-Boston Regional Airport is an important cog in the New Hampshire economy and a rail connection to the airport should be part of the Study.
- The state needs to work to attract and retain young professionals, who are now leaving New Hampshire at a faster rate than they are moving to the state.
- It is important to demonstrate the impacts and benefits of passenger rail to the state (economic, social, and environmental).
- The project needs to have a solid financial plan.
- State demographics are changing (the population is getting older), and the transportation system needs to address the needs of this changing demographic.
- The location of potential rail stations is important to many of the communities, and they would like to be part of the discussion in identifying appropriate locations.
- System safety needs to be analyzed.
- The fare structure for any system needs to be competitive with other forms of transportation.

- The frequency of operation needs to be competitive with other forms of transportation.
- The Study has many implications for development in New Hampshire, which needs to be quantified.
- Freight rail along the corridor is important, and the Study needs to examine the benefits to freight that could be realized by a passenger rail project.
- The project needs to quantify environmental impacts, including emissions, air quality, noise/vibration, etc.
- An increase in transit options has the potential to ease traffic congestion or slow the increase in traffic congestion in the state.
- Parking issues associated with potential rail stations is a concern in many communities.
- Any transportation study needs to include connections between rail/bus and other parts of the state, i.e., local transit systems.
- There is a concern among stakeholders that any proposed train service would negate the need for existing bus routes, which have been successful to date.
- A transparent process for the Study is important with a high-level of stakeholder and public engagement.
- Many stakeholders are interested in how passenger rail would impact the state's economy.

5.3 Website

A Study-specific website, http://www.nhcapitolcorridor.com, was developed to both disseminate and receive information about the Capitol Corridor Study.

5.4 Media Outreach

In cooperation with the NHDOT Public Information Office, notices of upcoming meetings were sent to the following local news media outlets:

- Print Media
  - Concord Monitor
  - Manchester Union Leader
  - Nashua Telegraph
  - Lawrence Eagle Tribune
- Broadcast Television
  - WBIN, Concord
  - WMUR, Manchester
  - TV 23, Manchester
  - TV 16, Nashua

- Radio
  - WEVO 89.1 FM, Concord
  - WGIR 610 AM, Manchester

5.5 Project Electronic Mailing List

An electronic mailing list was developed and utilized throughout the Study. Some individuals/organizations requested they be added to the list during public open houses, project briefings, or on the project website.

The mailing list is provided in Appendix H.

6 List of Preparers

The following individuals prepared technical portions of this Study:

- **URS Corporation**
  1155 Elm Street
  Manchester, New Hampshire
  - Russ Wilder, PG
  - Carl Chamberlin
  - Jim Cowan, INCE Bd. Cert.
  - Renee Ducker
  - Julia Suprock, AICP
  - Matthew Harris, RPA
  - Vanessa Zeoli
  - Eric Carlson
  - Sam Wang

- **Jacobs Engineering**
  343 Congress Street
  Boston, Massachusetts
  - David O. Nelson
  - Ryan Harris

- **Nobis Engineering**
  18 Chenell Drive
  Concord, New Hampshire
  - Michael Summerlin, PE
  - Stan Bonis, PG

- **Smart Environmental**
  72 North Main Street
  Concord, New Hampshire
  - Glenn Smart
  - Jennifer Riordan, CWS, CPESC

7 Distribution List

The following agencies, organizations, and persons received a copy of the Study:

Table 7.1: Distribution List

US Agencies/Officials	▪ **Federal Transit Administration** Noah Berger ▪ **Federal Railroad Administration** Trevor Gibson ▪ Fed**eral Highway Administration – New Hampshire Division** Jamie Sikora, Environmental Program Manager ▪ **United States Army Corps of Engineers New England District** Michael Hicks ▪ **United States Environmental Protection Agency, New England** Mark Kern Rosemary K. Monahan, PhD, Smart Growth Coordinator
State Agencies/ Officials	▪ **Massachusetts Executive Office of Energy and Environmental Affairs, MEPA Office** Deirdre Buckley, Director ▪ **Massachusetts Department of Environmental Protection** Stephen Johnson, Deputy Regional Director ▪ **Massachusetts Department of Transportation** John D. Ray, Deputy Director – Rail and Transit Division Ronald Morgan, MBTA Planning and Development Office ▪ **Massachusetts Historical Commission** Brona Simon ▪ **New Hampshire Department of Environmental Services** Timothy Drew, Public Information & Permit Administration Gino E. Infascelli, Water Pollution Division Lori Summer ▪ **New Hampshire Department of Transportation** Christine Perron, Senior Environmental Manager ▪ **New Hampshire Division of Historic Resources** Elizabeth Muzzey, Director ▪ **New Hampshire Fish and Game Department** Carol Henderson, Environmental Review Coordinator ▪ **New Hampshire Natural Heritage Bureau** Melissa Coppola, Environmental Information Specialist ▪ **MBTA** John D. Ray
Elected Officials	▪ **Massachusetts** Governor Deval Patrick Governor Elect Charles Baker Congresswoman, Niki Tsongas, Massachusetts 3rd Congressional District Senator Edward Markey ▪ **New Hampshire** Governor Maggie Hassan Senator Jeanne Shaheen Senator Kelly Ayotte Congresswoman Carol Shea Porter Congresswoman Annie Kuster

Regional Planning Commissioners	▪ **Boston Regional Metropolitan Planning Organization** Karl Quackenbush, Executive Director ▪ **Central New Hampshire Planning Commission** Michael Tardiff, Executive Director ▪ **Merrimack Valley Planning Commission** Joe Cosgrove, Environmental Program Manager Anthony Komornick, Transportation Program Manager ▪ **Nashua Regional Planning Commission** Kerry Diers, Executive Director Tim Roache, Assistant Director ▪ **Northern Middlesex Council of Governments** Beverly A. Woods, Executive Director ▪ **Rockingham Planning Commission** Cliff Sinnott, Executive Director ▪ **Southern New Hampshire Planning Commission** David Preece, Executive Director
City and Town Officials	▪ **City of Concord** Mayor Jim Bouley Carlos P. Baia, Deputy City Manager ▪ **City of Manchester** Mayor Ted Gatsas William Craig, Director of Economic Development ▪ **City of Nashua** Mayor Donnalee Lozeau Thomas Galligani, Economic Development Division Director
City Agencies	▪ **Greater Concord Chamber of Commerce** Timothy G. Sink, CCE President ▪ **Greater Manchester Chamber of Commerce** Michael J. Skelton, President & CEO ▪ **Greater Nashua Chamber of Commerce** Christopher Williams ▪ **Manchester-Boston Regional Airport** Mark P. Brewer, A.A.E Director
Interest Groups	▪ **Appalachian Mountain Club** John Judge, President ▪ **Boston Express/Concord Coach** Ben Blount ▪ **Conservation Law Foundation** Tom Irwin, Vice President ▪ **New Hampshire Sierra Club** Catherine Corkey, Director ▪ **Society of the Protection of New Hampshire Forests** Jane A. Difley, President/Forester

8 References

Federal Transit Administration, Office of Planning and Environment. *Transit Noise and Vibration Impact Assessment*. USDOT Report Number FTA-VA-90-1003-06. May 2006.

Federal Transit Administration, U.S. Department of Transportation, New Hampshire Department of Transportation, Draft *Lowell, MA to Nashua, NH Commuter Rail Extension Project Environmental Assessment.* July 2005.

Massachusetts Department of Environmental Protection. January 2008. Final Massachusetts SIP Revision: 8-Hour Ozone Attainment Demonstration. Accessed November 2014 at http://www.mass.gov/eea/agencies/massdep/air/reports/final-ma-sip-revision-8-hour-ozone-attainment.html

Massachusetts Department of Environmental Protection. December 2009. Revision to Carbon Monoxide (CO) SIP Maintenance Plan for Lowell, Accessed November 2014 at http://www.mass.gov/eea/docs/dep/air/priorities/7lowclos.pdf

New Hampshire Department of Environmental Serves. May 2007. Nashua Maintenance Plan for CO. Accessed November 2014 at http://des.nh.gov/organization/divisions/air/do/sip/documents/nashua-maintenance-plan.pdf

New Hampshire Department of Environmental Serves. August 2012. Manchester and Nashua Limited Maintenance Plan for CO. Accessed November 2014 at http://des.nh.gov/organization/divisions/air/do/sip/documents/limited-maintenance-plan.pdf

New Hampshire Department of Environmental Services. OneStop Data Retrieval System. www.des.state.nh.us/OneStop

New Hampshire Department of Environmental Services. OneStop Web Geographic Information System.www.des.state.nh.us/OneStop.

New Hampshire Department of Transportation. *1-93 Corridor Multi-modal Transit Investment Study*. November 2009.

New Hampshire Department of Transportation. *New Hampshire State Rail Plan*. 2012.

Massachusetts Department of Transportation. *Massachusetts Department of Transportation Rail Plan*. September 2010.

New Hampshire Department of Transportation. *Ten Year Transportation Improvement Plan 2013-2022*. June 11, 2012.

New Hampshire Rail Transit Authority, New Hampshire Department of Transportation, Nashua RPC. *New Hampshire Capitol Corridor Project Overview, Based on a White Paper Prepared for Amtrak.* March 2010.

New Hampshire Rail Transit Authority. *Economic Impact of Passenger Rail Expansion along the New Hampshire Capitol Corridor*. January 2010.

National Climatic Data Center (NCDC). Global Climate Change. 2012. Accessed September 2014 at http://www.ncdc.noaa.gov/climate-monitoring/

National Highway Traffic Safety Administration. Model Years 2012-2016: Final Rule, Joint Rulemaking to Establish Vehicle CAFE and GHG Emissions Standards. Accessed September 2014 at http://www.nhtsa.gov/Laws+&+Regulations/CAFE+-+Fuel+Economy/Model+Years+2012-2016:+Final+Rule

U.S. EPA. February 2006. EPA 1999 National-Scale Air Toxics Assessment. Accessed September 2014 at http://www.epa.gov/airtoxics/nata1999/nsata99.html

U.S. EPA. April 2010. EPA and NHTSA Finalize Historic National Program to Reduce Greenhouse Gases and Improve Fuel Economy for Cars and Trucks. Accessed September 2014 at http://epa.gov/otaq/climate/regulations/420f10014.pdf

U.S. EPA. August 2012. EPA and NHTSA Set Standards to Reduce Greenhouse Gases and Improve Fuel Economy for Model Years 2017-2025 Cars and Light Trucks. Accessed September 2014 at http://epa.gov/otaq/climate/documents/420f12051.pdf

U.S. EPA. MOVES (Motor Vehicle Emission Simulator) and its guidance. Accessed September 2014 at http://www.epa.gov/otaq/models/moves/

U.S. EPA. Technical Highlights: Emission Factors for Locomotives, 2009 Accessed September 2014 at http://www.epa.gov/nonroad/locomotv/420f09025.pdf

Vermont Agency of Transportation, New Hampshire Department of Transportation, Mass. *Boston to Montreal High-Speed Rail Planning and Feasibility Study Phase I: Final Report*. April 2003.

Appendices

Appendix A	Air Quality Technical Memorandum
Appendix B	Noise and Vibration Technical Memorandum
Appendix C	Contamination Inventory
Appendix D	Natural Resources Technical Report
Appendix E	Sustainable Land Use Technical Report
Appendix F	Corridor, Regional, Equity Analysis Technical Report
Appendix G	Phase 1A: Cultural Resource Investigation for the New Hampshire Capitol Corridor Rail and Transit Study; Lowell, Tyngsborough, Chelmsford, Middlesex County, Massachusetts Phase 1A: Cultural Resource Investigation for the New Hampshire Capitol Corridor Rail and Transit Study; Hillsborough and Merrimack County, New Hampshire
Appendix H	Public Involvement Materials and Meeting Notes