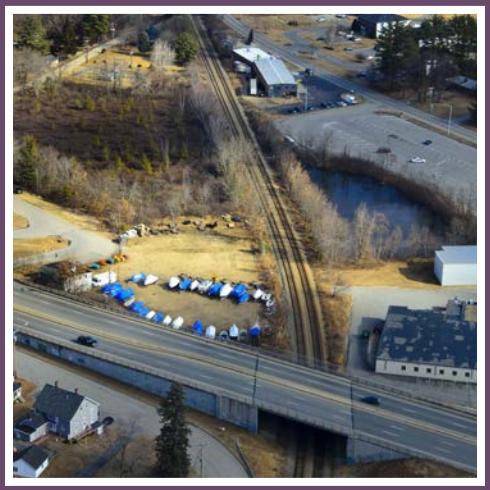
New Hampshire DOT
Department of Transportation



Plaistow Commuter Rail Extension Study

Alternatives Analysis Report

Plaistow, New Hampshire

March 2015

HDR

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1. INTRODUCTION

1.1 Overview of Study

As part of the Plaistow Commuter Rail Extension Study, the New Hampshire Department of Transportation (NHDOT) developed a set of alternatives for a potential extension of the Massachusetts Bay Transportation Authority (MBTA) Commuter Rail service from Haverhill, Massachusetts to the Plaistow, New Hampshire area. The study was conducted by the NHDOT in partnership with the Town of Plaistow, Town of Atkinson, and the Rockingham Planning Commission in New Hampshire, to examine potential alternatives for a train station and layover facility, and their resultant impacts. The NHDOT engaged a team of design and planning professionals, led by HDR, Inc. (HDR), to identify possible sites, develop design concepts, and analyze their potential impacts.

The goal of the study is to evaluate the extension of the MBTA Haverhill Line Commuter Rail service from Haverhill, Massachusetts to Plaistow, New Hampshire. The objective of the study is to develop information and analysis that can form the basis of an informed decision-making process regarding whether or not to advance the project.

1.2 Process

This alternatives analysis report is the initial step in preparing an Environmental Assessment (EA) for the extension of Commuter Rail service to Plaistow, New Hampshire. This report summarizes the initial phases of the Environmental Assessment (EA) process including:

- Development of project purpose and need;
- Development of evaluation criteria to be used throughout the study process;
- Development of initial site concepts (seven stations and nine layover facilities);
- Screening of these site concepts based on identification of fatal flaws or substantial impacts using input from community stakeholders;
- Selection of three alternatives for further development, analysis, and review;
- Development of more detailed alternative sketch plans;
- Analysis of alternatives using data obtained through site visits; additional data collection; detailed evaluations of land uses, environmental resources, noise and vibration, air quality, historic and cultural resources, and transportation impacts. Potential ridership, service plans, capital costs, and an operations and maintenance plan will also be completed to assist in the analysis of each alternative;
- Evaluation of each alternative using evaluation criteria; and
- Identification of a Recommended Alternative to advance through the EA process as the Build Alternative.

To encourage a collaborative process and engage the public and stakeholders, several public meetings were held and a project advisory committee was formed to meet regularly as a working group for the study. Additionally, meeting materials and other documentation were available on a project website. Meeting summaries are provided in Appendix A.

1.2.1 PROJECT ADVISORY COMMITTEE (PAC)

A Project Advisory Committee (PAC) was formed at the beginning of the study to facilitate communication between the study team members and local community, business, civic, and advocacy organizations. PAC members include representatives from the Town of Plaistow, Town of Atkinson, Merrimack Valley Planning Commission, Rockingham Planning Commission, MBTA, Northern New England Passenger Rail Authority, Pan Am Railways, and the City of Haverhill.

The NHDOT and HDR team conducted several PAC meetings throughout the study process. The initial meetings were held to review the project scope, purpose and need, initial site options and attributes, facility design requirements, and alternatives evaluation criteria. Later meetings were held to review the three alternatives and develop a Recommended Alternative.

- PAC Meeting #1 was held on January 28, 2014 at Plaistow Town Hall
- PAC Meeting #2 was held on March 6, 2014 at Plaistow Town Hall
- PAC Meeting #3 was held on April 3, 2014 at Atkinson Town Hall
- PAC Meeting #4 was held on September 9, 2014 at Plaistow Town Hall
- PAC Meeting #5 was held on December 16, 2014 at Atkinson Town Hall
- PAC Meeting #6 was held on January 6, 2015 at Plaistow Town Hall
- PAC Meeting #7 was held on January 20, 2015 at Plaistow Town Hall

1.2.2 PUBLIC MEETINGS

In addition to the PAC meetings held with local organizations and community stakeholders, four public meetings were held to engage the public during the Alternatives Analysis process. An initial listening session was held in August 2013 to introduce the project and three additional public informational meetings were held in May 2014, October 2014, and February 2015. The first public informational meeting in May 2014 introduced a set of preliminary site options in order to narrow the number of options and develop a set of alternatives. The study team presented the three alternatives at the second public informational meeting in October 2014. Input from this public meeting was used to help the study team and PAC select a recommended alternative that was presented at a third public informational meeting in February 2015.

- A Project Listening Session was held on August 22, 2013 at Plaistow Town Hall
- Public Informational Meeting #1 was held on May 22, 2014 at Plaistow Town Hall
- Public Informational Meeting #2 was held on October 9, 2014 at Plaistow Town Hall
- Public Informational Meeting #3 was held on February 24, 2015 at Plaistow Town Hall

2. PURPOSE & NEED

2.1 Introduction

To maintain a reasonable level of mobility within the southern New Hampshire to Boston Corridor as transportation demand continues to grow, additional transportation capacity must be identified. The goal of studying a commuter rail extension from Haverhill, Massachusetts to Plaistow, New Hampshire is to provide a comprehensive understanding of the potential public benefits as well as potential impacts of an additional travel mode option in the southern New Hampshire to Boston Corridor. Currently, the rail line through Plaistow carries both freight and passenger trains, but no trains currently stop in Plaistow. The study will evaluate railroad resources to determine if it is feasible to extend rail service.

2.2 Purpose

The purpose of the commuter rail extension from Haverhill, Massachusetts to Plaistow, New Hampshire is to provide an additional travel mode option that increases overall mobility in Plaistow and surrounding communities.

2.3 Need

Transit improvements for the Town of Plaistow and surrounding communities are needed to support economic opportunities and improve mobility for residents and businesses in the Plaistow area. Specific needs that can be addressed through transit improvements include:

- Reducing impacts of high roadway congestion on average commuting travel time;
- Increasing access to employment opportunities;
- Reducing commuting costs, particularly for commuters to employment centers in the Plaistow to Boston corridor;
- Improving access to transit and resulting mobility improvements;
- Improving regional air quality; and
- Supporting economic development and job creation.

2.3.1 CONGESTION & MOBILITY

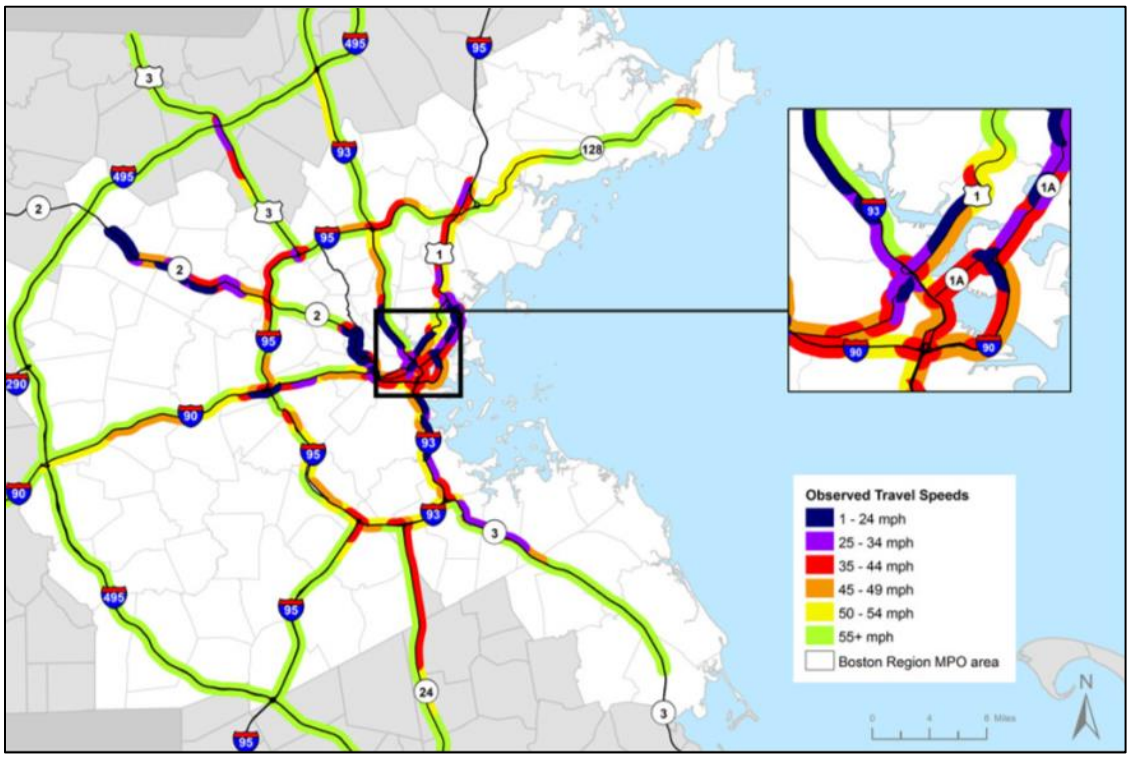
Greater Boston has a diverse transportation network, with extensive transit and road connections between major population and employment centers. The predominant mode of travel in the region is by single occupant vehicle, particularly for trips starting and ending outside the urban core. However, roadways in eastern Massachusetts and southern New Hampshire experience severe peak-hour congestion, causing delays and restricting mobility throughout the region. Increasingly, as a means to

avoid congestion and high parking prices, travelers are opting for rail transit where available, as evidenced by the increase in MBTA Commuter Rail ridership between 2000 and 2010.

2.3.1.1 Roadway Congestion

Highway access in the region is provided through Interstates 93, 95, and 495, U.S. Route 3, and a variety of other local and state roads, including Route 125. Interstates in metropolitan Boston and southern New Hampshire have peak-period congestion and capacity issues. I-93 in Massachusetts, in particular, has unstable traffic flow that is at or beyond capacity in key areas, making it among the most congested roadways in the nation.[1] The automobile commute from Plaistow to downtown Boston typically exceeds 100 minutes during peak hours, more than 2.5 times longer than a non-congested journey.[2] Due to environmental concerns, cost, and community resistance, it is unlikely that significant roadway capacity will be added in the region in the near future, particularly in eastern Massachusetts. Therefore, congestion relief in the region will necessarily have to result from non-highway improvements. Figure 2.1 illustrates typical AM traffic conditions in eastern Massachusetts.

Figure 2.1 Travel Speeds for Expressways, AM Peak Period (2004-2007)



Source: Central Transportation Planning Staff, Boston MPO; Note: Roadways in Eastern Massachusetts experienced a decline in usage due to economic conditions from 2007-2010; however, traffic has recovered to pre-recession levels.

[1] "Congested Corridors (US only for 2012). INRIX Traffic Scorecard, http://www.inrix.com/scorecard/uscorridors.asp, accessed November 11, 2013

[2] www.maps.google.com, observed in December 2013 and January 2014.

2.3.1.2 Limited Mobility

Travel options from Plaistow and surrounding towns in southern New Hampshire to major employment centers to the south often involve significant delays or long trip times during weekday peak periods. Table 2.2 summarizes travel costs and scheduled journey times for sample travel options between Plaistow town center and downtown Boston during peak periods. The routes chosen represent the most direct routes specified by Google Maps from Plaistow town center to the sample destination. Alternative routes were explored and found to have no timesavings or longer travel times.

Table 2.1 Sample One-way Time & Cost from Plaistow to Boston (North Station) on Existing Systems

Mode	Parking/ Connection Cost	Fare*	Driving Cost**	Total	Sample Journey (Minutes)***
Local Bus to Haverhill Station for MBTA Commuter Rail	$1.00	$9.75	$0.00	$10.75	126
Passenger Car to Haverhill Station for MBTA Commuter Rail	$4.00	$9.75	$2.94	$16.69	68-83
Passenger Car to Haverhill Station for Amtrak Downeaster Service	$4.00	$13.00	$2.94	$19.94	62
Passenger Car to Haverhill River Edge Plaza for Coach Bus Service****	$0.00	$13.00	$3.84	$16.84	105
Passenger Car to Malden Center for MBTA Orange Line	$6.00	$2.10	$19.89	$27.99	52 (85+ in traffic)
Passenger Car	$35.00	-	$21.22	$56.22	43 (100+ in traffic)

Source: MBTA, Amtrak, Government Center Garage, and Coach Company, accessed November 18, 2013
**Fares are typically cheaper when purchased as part of a monthly or 10-trip pass. One-way fares current to September 2014.*
***All driving costs are calculated with Plaistow Town Hall as the origin, using FHWA Driving Cost Per-Mile Data 2013*
****Sample journey times do not account for transfer, wait time, or traffic/regular delays.*
*****Coach Bus service no longer operates from Plaistow's park-and-ride site on Westville Road and this site in Haverhill is currently the closest to Plaistow.*

Until Prior to the end of service in October 2013, the Coach Company provided bus service to the Plaistow park-and-ride lot located on Westville Road. The bus originally operated directly from Plaistow to Boston, but the route was plagued with roadway congestion and suspended. Later service shifted to a more circuitous route that went from Plaistow through Newburyport, Massachusetts to reach Boston. As of October 1, 2013, the Coach Company suspended operations to the Plaistow.

To access express bus service to Boston, residents must currently drive to Salem, New Hampshire; Haverhill, Massachusetts; or other surrounding communities. Although the bus service is frequent, offering seven round trips per day, buses are subject to many of the same delays automobiles experience on the region's congested roadways for access to Boston.

Currently, the Merrimack Valley Regional Transit Authority (MVRTA) Number 13 bus connects Plaistow to rail transit and express bus service in downtown Haverhill. However, MVRTA buses and other schedules are not always coordinated, leaving passengers with unpredictable transfers and wait times. In addition, MVRTA buses only operate to Plaistow's southern border, leaving most residents with long walks, cab rides, or finding other means of reaching the limited public transit service.

MBTA and Amtrak rail service is provided in downtown Haverhill, Massachusetts. A large park-and-ride lot is located next to the station, charging $4.00 per day. Amtrak and MBTA service from Haverhill Station operates frequently and a journey to Boston takes 50 to 71 minutes; the disparity in rail times reflects the impact of express and local service and other schedule service adjustments. Additionally, commuters can opt for rapid transit service by driving to Malden (Malden Center Station), Massachusetts for the MBTA's Orange Line into downtown Boston. All options are significantly more cost effective than driving and paying for garage parking in downtown Boston; however, reaching each mode requires a connecting bus journey or car ride, causing delays and inconvenience for travelers, particularly during rush hour. Additionally, according to the Transportation Research Board, transit passengers are willing to accept longer journey times to avoid transfers.[3] Single-seat tips are preferred to multi-seat transit rides (i.e., trips that require transfers or the use of different modes).

Driving to downtown Boston from Plaistow during peak hours can regularly take over 100 minutes. In downtown Boston, parking fees are among the highest in the nation, with garages near North Station charging $35 for daily rates.

2.3.1.3 Changing Transportation Market Preferences

The traveling public is increasingly favoring modes of transportation other than driving. Nationally, driving rates, calculated by population-adjusted vehicle-miles traveled (VMT), peaked in June 2005, and have since declined. While a decline in driving habits due to a recession and unemployment could be expected, the decline began before the 2008-2009 Recession. The decline has continued despite a modest recovery in the economy and a growing employment rate. Figure 2.2 indicates that VMT, adjusted for population growth, has fallen 8.75 percent since 2005, and shows no sign of abating.[4]

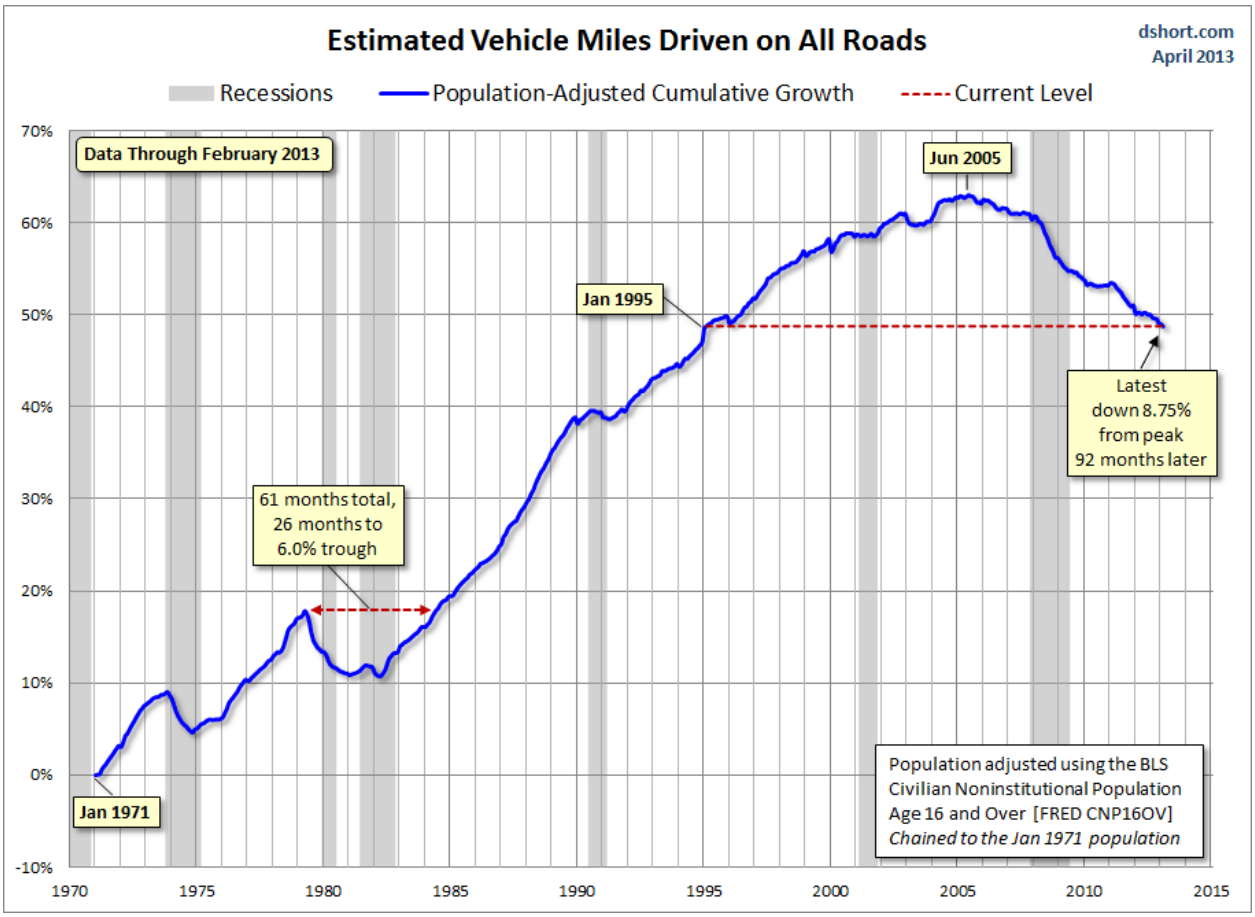
While per-capita driving has decreased, national transit ridership and ridership on the Haverhill Line have grown. Nationally, transit ridership increased over 40 percent from 1995 to 2011, even as the nation's population increased by only 17 percent during the same period.[5] Despite the 2008-2009

[3] Transit Cooperative Research Program Report 95, "Traveler Response to Transportation System Changes Handbook, Third Edition: Chapter 9, Transit Scheduling and Frequency." http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_95c9.pdf
[4] Data for chart is from the Federal Highway Administration's collection and processing of state maintained traffic counters at 4,000 locations nationwide.
[5] "2013 Public Transportation Fact Book." American Public Transportation Association. October 2013, Page 11. http://www.apta.com/resources/statistics/Documents/FactBook/2013-APTA-Fact-Book.pdf

Recession and the loss of employment in Boston's Central Business District, the Haverhill Line's average weekday ridership grew slightly from an average of 10,232 in 2005 to 11,045 daily boardings in 2009.[6]

[6]"Ridership and Service Statistics; Thirteenth Edition 2010." Massachusetts Bay Transportation Authority, July 2010, Page 04-06. http://www.mbta.com/uploadedfiles/documents/bluebook%202010.pdf

Figure 2.1 VMT Adjusted for Population Growth Since 1971



Source: Short, Doug. "Vehicle Miles Driven: Population-Adjusted Fractionally Off Its June Post-Crisis Low." Advisor Perspectives, October 1, 2013, http://advisorperspectives.com/dshort/updates/DOT-Miles-Driven.php

Demographics in New Hampshire and Massachusetts are changing and key populations will increasingly drive less and rely on public transit more. Importantly, the region's senior population is growing. Along with members of the Millennial Generation, people born between 1982 and the early 2000s, seniors drive significantly less than other cohorts.

By 2030, the U.S. Census Bureau projects that the population in New England states will see a dramatic change in the general age of the population with the percent of population over 65 years of age rising significantly. While population aging is occurring across the country, the New England states are generally older than the U.S. average and aging more rapidly than the U.S. average. With this aging population comes a decrease in mobility and a higher reliance on public transit.

As shown in Table 2.2, the population of individuals 65 years of age and over, a population segment who tend to rely more on public transit, in Massachusetts and New Hampshire is projected to increase by 80 percent between 2000 and 2030. Although most senior residents do not regularly commute for

employment, the mobility provided by commuter rail service may be life changing for some senior residents.

Table 2.2 Population 65 Years of Age and Over

State	Total Population 65 Years of Age and Over (Percentage of Total Population)		Percent Increase Between 2000 and 2030
	2000	2030	
Massachusetts	860,162 (13.5)	1,463,110 (20.9)	70.1
New Hampshire	147,970 (12.0)	352,786 (21.4)	138.4
Total	1,008,132	1,815,896	80%

Source: Population Pyramids and Demographic Summary Indicators for States, retrieved on Nov. 11, 2013, http://www.census.gov/population/projections/data/statepyramid.html

Additionally, the Millennial Generation drives significantly less than previous generations. Between 2001 and 2009, VMT among 16-34 year olds declined 23 percent, public transit use rose 40 percent, and bicycling rose 24 percent.[7] Trends were consistent among income groups, with even well off young Americans driving less and using alternative transportation more.[8] Reasons for the decline in driving among young Americans vary, but potential attributes include the increasing cost of driving, more young people living in transit-oriented areas, the 2008-2009 Recession, and the impact of technology.[9]

2.3.2 REGIONAL AIR QUALITY ATTAINMENT

The eastern Massachusetts and southern New Hampshire regions are in attainment/maintenance status for ozone and carbon monoxide levels, according to the United States Environmental Protection Agency (USEPA).[10] Ozone and carbon monoxide levels are significantly influenced by transportation patterns, particularly where commuting by single occupancy vehicles is prevalent. Public transit options, particularly rail, have a proven record of attracting commuters and a positive impact on the regional air quality, by allowing commuters to shorten or eliminate vehicle trips. Public transit may facilitate existing and future commuters to drive less and contribute less to negative regional air quality. Alternatives to the single occupant private auto are being explored to increase mobility in the Greater Boston area without further air quality degradation.

[7] Davis, Benjamin; Dutzik, Tony; Baxandall, Phineas. "Transportation and the New Generation: Why Young People Are Driving Less and What It Means for Transportation Policy." *The Frontier Group,* June 2012, http://www.frontiergroup.org/reports/fg/transportation-and-new-generation.
[8] Ibid.
[9] Plumer, Brad. "Why aren't younger Americans driving anymore?" *Washington Post,* April 22, 2013, http://www.washingtonpost.com/blogs/wonkblog/wp/2013/04/22/why-arent-younger-americans-driving-anymore/
[10] "Green Book Nonattainment Areas for Criteria Pollutants as of July 2, 2014, http://www.epa.gov/airquality/greenbook/index.html

2.3.3 ECONOMIC OPPORTUNITY

Transportation infrastructure has a significant impact on the economy of regions, with infrastructure facilitating job access and employer's access to larger employee talent pools. Connectivity between job centers and specialized employment clusters is a key consideration for New Hampshire residents. Currently, residents must rely on expensive and congested auto-journeys or inconvenient transit services to major employment centers. Inconvenient access to jobs places Plaistow and the surrounding communities in a disadvantageous position compared with peer areas in southern New Hampshire and eastern Massachusetts.

Access to jobs is especially important in New England, where unemployment rates vary considerably between metropolitan regions. Despite years of recovery after the 2008-2009 Recession, the unemployment rate remains high but varies across the region depending on city, town, and county. This is especially true in Plaistow, where the unemployment rate is 7.1 percent (August 2013), two percent above the New Hampshire state average.[11] Transportation improvements could help to lower unemployment rates by better connecting people to jobs available in other parts of the region, most notably the Boston region.

The Boston regional core – which includes downtown Boston, Cambridge, and Somerville – contains approximately 445,000 jobs.[12] These jobs are easily accessed via commuter rail and MBTA rapid transit; however, due to high parking costs and roadway congestion, jobs in the regional core are not easily accessible by private automobile. Creating a direct connection to the Boston regional core job market will provide residents with vastly increased employment opportunities. Currently, Plaistow residents have relatively easy access to jobs in New Hampshire (645,400 in total) and the northern I-495 belt (252,000 in total) via private automobile; providing a direct transit connection to the Boston regional core will improve Plaistow residents' access to this significant labor market through a direct transportation link.

2.3.4 MBTA TRAIN OPERATIONAL EFFICIENCY

The MBTA Commuter Rail Haverhill Line is operated inefficiently due to capacity constraints at the Bradford Yard in Haverhill. The Bradford Yard constrains the number of trains that are stored near the Haverhill Line's northern terminal and causes the MBTA to run non-revenue trains to Somerville, Massachusetts at the end of daily operations for storage. Extending commuter rail operations to Plaistow and creating a new layover yard would enable the MBTA to streamline operations on the Haverhill Line through more efficient train movements and using fewer labor hours.

[11] "Labor Force and Unemployment." New Hampshire Employment Security, September 17, 2013, http://www.nhes.nh.gov/elmi/statistics/laus-data.htm

[12] "2012 Average Employment and Wages." Massachusetts Labor and Workforce Development http://lmi2.detma.org/lmi/map_box.asp?title=Cambridge, accessed November 10, 2013

3. DEVELOPMENT OF SITE OPTIONS

As part of this study, potential locations for two different types of facilities will be evaluated: layover facilities and stations. Each facility type has different design requirements or guidelines, which were used to help identify preliminary site options. This section outlines the design requirements that were considered as part of the site options presented in the following section of this report.

3.1 Layover Facility Requirements

Layover facilities are important facilities on commuter rail lines. Located at or near the end of a rail line, trains are stored here between the last trip of each day and the first trip at the beginning of the next day. For efficient operations, a layover facility should be located as close as possible to the terminal station with co-location of a layover facility and terminal being the current MBTA design standard for new facilities. Design requirements for layover facilities are based on the MBTA's Commuter Rail Design Standards.[13] In general, layover facilities must be able to accommodate six train sets with a minimum length of 835 feet for each track. More specific requirements or guidelines for the location and layout of a layover facility are provided in Tables 3.1 and 3.2.

Table 3.1 Layover Facility Location Design Requirements/Guidelines

Design Feature	Requirements/Guidelines
Main Line Rail Access:	▪ Directly accessible from the main line and as close as possible to the proposed station.
Roadway Site Access:	▪ Accessible to emergency service vehicles. ▪ Accessible to commercial vehicles to deliver supplies (fuel, oil, parts, food, etc.).
Site Characteristics:	▪ Rectangular or elongated shaped (approximately 1,500-feet long and 118 feet wide). ▪ Parallel tracks and level site.
Environmental Elements:	▪ Space for an on-site treatment facility for recovery/containment system. ▪ Stormwater management practices, including detention basin and an oil/water separator tank.

[13] MBTA, Commuter Design Standards, 19 April 1996, http://www.mbta.com/uploadedfiles/Business_Center/Bidding_and_Solicitations/Design_and_Construction/Commuter%20Rail%20Design%20Standards%20Manual.pdf

Table 3.2 Layover Facility Layout/Design Guidelines

Design Feature	Requirements/Guidelines
Train Storage:	▪ Minimum clear track length of approximately 835 feet. ▪ Accommodate six train sets including eight bi-level coaches and one locomotive. ▪ Three sets of paired tracks with a centerline-to-centerline distance of 15 feet and a distance of 35 feet between pairs. This allows for an access road. ▪ Optimal design includes the following to avoid trapping operational trains behind a disable train include: - Escape track - Internal yard crossovers - Tail track
Vehicular Circulation:	▪ Parking area for train and maintenance crew and main site access road. ▪ Every track in yard used to store trains should be adjacent to at least one access lane.
Additional Facilities:	▪ Must include storage shed, crew facilities, and storage space for maintenance equipment. ▪ Electricity, sewer, water, cable/telephone, and gas.

3.2 Station Requirements

A station includes not only the platform to access the commuter rail, but also parking and access roadways. The requirements for station design are based on the MBTA's Commuter Rail Design Standards[14] and the American Railway Engineering and Maintenance-of-Way Association (AREMA) Manual Chapter 28 of Clearances. In general, a station platform must be able to accommodate a platform that is at least 815 feet in length, and would ideally be located on a separate track from the main line. Additionally, the following design guidelines for a station must be considered:

- **Platform Length** - Minimum platform length: 815 feet to accommodate nine, 85-foot-long coaches.
- **Platform Height** - 48 inches above top of rail for full high-level platform.
- **Canopy** - Length consistent with MBTA station guidelines.
- **Parking** - Assume minimum one parking space per two daily riders.
- **Design Criteria** - Design to follow MBTA Commuter Rail Station Access Design Criteria.
- **Track Configuration** - Station area track configured to permit normal operations to/from revenue service and to/from layover facility.

[14] MBTA, Commuter Design Standards, 19 April 1996, http://www.mbta.com/uploadedfiles/Business_Center/Bidding_and_Solicitations/Design_and_Construction/Commuter%20Rail%20Design%20Standards%20Manual.pdf

4. SITE OPTIONS

4.1 Overview of Site Option Attributes

Using the layover and station facility requirements, a series of conceptual site options were developed. All of the layover and station site option are shown on Figure 4.1. Each conceptual layover facility and station site was evaluated based on a series of attributes that were identified to evaluate the suitability of a site for further consideration. These attributes were categorized and summarized as they relate to the surrounding community, environmental conditions, and service operations.

4.1.1 COMMUNITY ATTRIBUTES

The community attributes are the number of parcels occupied by layover facility or station, the distance to nearest residence, the impact to adjacent business access, the potential for adjacent development, and the consistency with the town's master plan.

4.1.2 ENVIRONMENTAL ATTRIBUTES

The environmental attributes include the effects to the stream buffer, the number of stream crossings, the estimated amount of wetland impacts, and the impacts on wildlife habitat. Calculation of wetland area is provided for general assessment purposes. The data used during this stage of analysis was based on readily available GIS wetland data layers and was not derived from a detailed on-site wetland survey or delineation.

4.1.3 SERVICE OPERATIONAL ABILITY

The ability of a layover facility to efficiently facilitate service operations is determined by the number of non-revenue miles the train must make in order to enter the facility, the operation of trains into and out of the facility as well as the impacts the train has on adjacent roadways and rail traffic.

4.2 Layover Facility Attributes

4.2.1 SUMMARY

As shown in Figure 4.1, nine layover facility site options were identified in four general areas along the corridor. The following tables summarize the community, service operational, and environmental attributes of each of the layover facility site options. More details about each option, including a site option graphic, are presented in the following sections. Detailed graphics showing the preliminary site concept for each of the layover facilities is provided in Appendix B.

Figure 4.1 Overview Map - Site Options

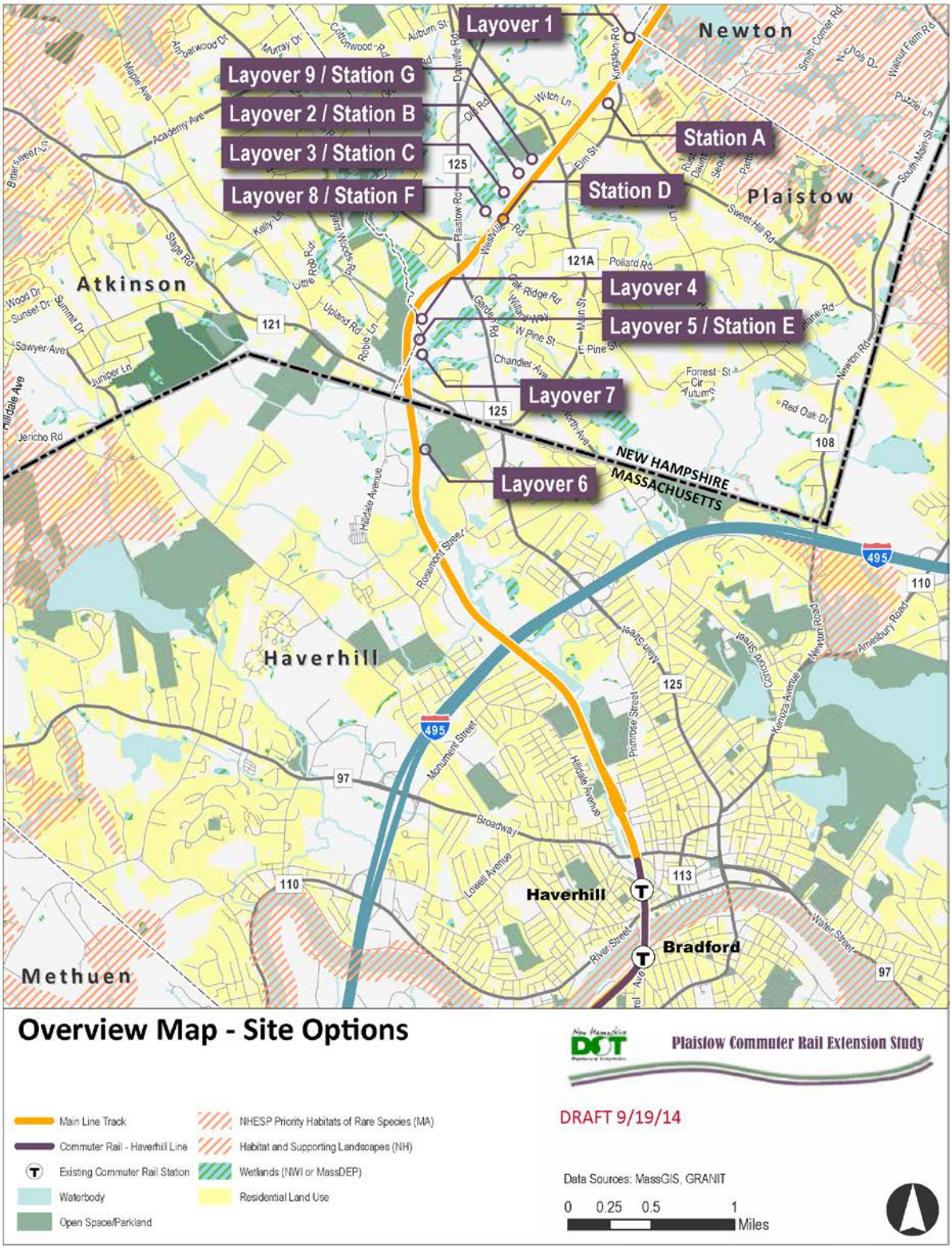


Table 4.1. Layover Facility Summary Table - Community Attributes and Service Operational Ability

Layover ID #	Location	# of Parcels Impacted	Distance to Nearest Residence	Impact to Adjacent Business Access	Potential for Adjacent Development	Consistency with Master Plan	Operational Ability
1	Kingston Road	9	107 feet	2	No	Yes	Good
2	Joanne Drive	3	730 feet	1	Yes	Partially Yes	Poor
3	Joanne Drive	2	131 feet	1	Yes	Yes	Good
4	Home Depot	3	887 feet	1	No	Yes	Fair
5	Home Depot	3	940 feet	0	No	Yes	Fair
6	Haverhill	2	2,250 feet	0	No	Yes	Fair
7	Home Depot	3	165 feet	0	No	Yes	Fair
8	Joanne Drive	3	81 feet	1	No	Yes	Poor
9	Joanne Drive	2	210 feet	1	Yes	Partially Yes	Good

Table 4.2 Layover Facility Summary Table - Environmental Attributes

Layover ID #	Impact Stream Buffer	Stream Crossing	Estimated Area of Wetlands	Located in Wildlife Habitat
1	Yes	Yes	2,770 sf	Yes
2	Yes	No	53,020 sf	No
3	Yes	Yes	36,500 sf	No
4	Yes	Yes	0 sf	No
5	Yes	Yes	0 sf	No
6	Yes	No	0 sf	No
7	Yes	Yes	9,000 sf	No
8	Yes	No	4,000 sf	No
9	Yes	Yes	1,500 sf	No

4.2.2 LAYOVER FACILITY 1

4.2.2.1 Location

Layover 1 is located in Plaistow. Access to crew building and parking for Layover 1 is from Kingston Road.

4.2.2.2 Community Attributes

- Number of parcels impacted from layover: 9
- Approximate distance to nearest residence: 107 feet
- Impact to adjacent business access: 2 businesses
- Potential for adjacent development: No
- Consistency with Town Master Plan: Yes - The site is designated as Light Industrial and Rural Use Area on the Town of Plaistow Master Plan Future Land Use Map.

4.2.2.3 Environmental Attributes

- Within stream buffer: Yes
- Stream crossing: Yes
- Estimated area of wetland impacts: 2,770 square feet (sf)
- Located in wildlife habitat: Yes

4.2.2.4 Operational Ability

Layover 1 is operationally ideal. The layover is located north of the station allowing the trains in the morning to exit the facility and travel directly to the station. The same for the returning train in the evening; after leaving the station, the train can enter the facility without having to change direction.

4.2.3 LAYOVER 2

4.2.3.1 Location

Layover 2 is located in Plaistow. Access to crew building and parking at Layover 2 is from Joanne Drive. This layover facility site option is configured to be developed in conjunction with Station B.

4.2.3.2 Community Attributes

- Number of parcels impacted from layover: 3
- Approximate distance to nearest residence: 730 feet
- Impact to adjacent business access: 1 business
- Potential for adjacent development: Yes

- Consistency with Town Master Plan: Partially yes - The site is designated as Light Industrial and Public Land and Open Space on the Town of Plaistow Master Plan Future Land Use Map.

4.2.3.3 Environmental Attributes

- Within stream buffer: Yes
- Stream crossing: No
- Estimated area of wetland impacts: 53,020 sf
- Located in wildlife habitat: No

4.2.3.4 Operational Ability

Layover 2 is not operationally ideal. The train must exit the facility going north, the opposite direction of the destination. When entering or exiting the facility to/from the south, the train must change directions while sitting on the main line, which delays other train's operations and increases operating time.

4.2.4 LAYOVER 3

4.2.4.1 Location

Layover 3 is located in Plaistow. Access to crew building and parking at Layover 3 is from Main Street. This layover facility site option is configured to be developed in conjunction with Station C.

4.2.4.2 Community Attributes

- Number of parcels impacted from layover: 2
- Approximate distance to nearest residence: 131 feet
- Impact to adjacent business access: 1 business
- Potential for adjacent development: Yes
- Consistency with Town Master Plan: Yes - The site is designated as Light Industrial on the Town of Plaistow Master Plan Future Land Use Map.

4.2.4.3 Environmental Attributes

- Within stream buffer: Yes
- Stream crossing: Yes
- Estimated area of wetland impacts: 36,500 sf
- Located in wildlife habitat: No

4.2.4.4 Operational Ability

Layover 3 is operationally ideal. The train can exit the layover facility traveling south without having to change directions. The same movement occurs when trains enter the facility in the evening.

4.2.5 LAYOVER 4

4.2.5.1 Location

Layover 4 is located in Plaistow and Atkinson. Access to crew building and parking at Layover 4 is through the Home Depot parking lot.

4.2.5.2 Community Attributes

- Number of parcels impacted from layover: 3
- Approximate distance to nearest residence: 887 feet
- Impact to adjacent business access: 0 businesses
- Potential for adjacent development: No
- Consistency with Town Master Plan: Yes - The site is designated as Commercial Corridor on the Town of Plaistow Master Plan Future Land Use Map. The majority of the site is located in the Town of Atkinson, which is currently in the process of developing a new Master Plan. The Atkinson portion of the site is within the Commercial/Industrial zoning district.

4.2.5.3 Environmental Attributes

- Within stream buffer: Yes
- Stream crossing: No
- Estimated area of wetland impacts: 0 sf
- Located in wildlife habitat: No

4.2.5.4 Operational Ability

The Layover 4 facility is not co-located with any station site options. All the station sites are located north of the Layover 4 site. Trains need to move between the layover facility and a station site to the north, which would increase operational time.

4.2.6 LAYOVER 5

4.2.6.1 Location

Layover 5 is located in Plaistow and Atkinson. Access to crew building and parking for Layover 5 is through the Home Depot parking lot. This layover facility site option is configured to be developed in conjunction with Station E.

4.2.6.2 Community Attributes

- Number of parcels impacted from layover: 3
- Approximate distance to nearest residence: 940 feet
- Impact to adjacent business access: 0 businesses
- Potential for adjacent development: No
- Consistency with Town Master Plan: Yes - The site is designated as Commercial Corridor on the Town of Plaistow Master Plan Future Land Use Map. The majority of the site is located in the Town of Atkinson, which is currently in the process of developing a new Master Plan. The Atkinson portion of the site is within the Commercial/Industrial zoning district.

4.2.6.3 Environmental Attributes

- Within stream buffer: Yes
- Stream crossing: No
- Estimated area of wetland impacts: 0 sf
- Located in wildlife habitat: No

4.2.6.4 Operational Ability

Layover 5 is not operationally ideal because once the train leaves the facility; the engineer will need to change the direction of the train on the main line track to enter Station E, which is located south of the layover facility. This would potentially result in impacts to freight and other passenger trains on the main line and cause delays.

4.2.7 LAYOVER 6

4.2.7.1 Location

Layover 6 is primarily located in Haverhill, but access to the crew building and parking for Layover 6 is through a parcel in Plaistow that is located off Atkinson Depot Road.

4.2.7.2 Community Attributes

- Number of parcels impacted from layover: 2
- Approximate distance to nearest residence: 2,250 feet
- Impact to adjacent business access: 0 businesses
- Potential for adjacent development: No
- Consistency with Town Master Plan: Yes - Although the City of Haverhill's Master Plan is not readily available, the site is within Haverhill's Industrial Park zoning district.

4.2.7.3 Environmental Attributes

- Within stream buffer: Yes
- Stream crossing: No
- Estimated area of wetland impacts: 0 sf
- Located in wildlife habitat: No

4.2.7.4 Operational Ability

The Layover 4 facility is not co-located with any station site options. All the station sites are located north of the Layover 4 site. Trains need to move between the layover facility and a station site to the north, which would increase operational time.

4.2.8 LAYOVER 7

4.2.8.1 Location

Layover 7 is located in Plaistow. Access to crew building and parking for Layover 7 is from Atkinson Depot Road.

4.2.8.2 Community Attributes

- Number of parcels impacted from layover: 3
- Approximate distance to nearest residence: 165 feet
- Impact to adjacent business access: 0 businesses
- Potential for adjacent development: No
- Consistency with Town Master Plan: Yes - The site is designated as Commercial Corridor on the Town of Plaistow Master Plan Future Land Use Map.

4.2.8.3 Environmental Attributes

- Within stream buffer: Yes
- Stream crossing: Yes

- Estimated area of wetland impacts: 9,000 sf
- Located in wildlife habitat: No

4.2.8.4 Operational Ability

Layover Facility 7 is operationally ideal. The train can exit and enter the layover facility without having to change directions on the main line.

4.2.9 LAYOVER 8

4.2.9.1 Location

Layover 8 is located in Plaistow. Access to crew building and parking for Layover 8 is from Joanne Drive. This layover facility site option is configured to be developed in conjunction with Station F.

4.2.9.2 Community Attributes

- Number of parcels impacted from layover: 3
- Approximate distance to nearest residence: 81 feet
- Impact to adjacent business access: 1 business
- Potential for adjacent development: No
- Consistency with Town Master Plan: Yes - The site is designated as Light Industrial on the Town of Plaistow Master Plan Future Land Use Map.

4.2.9.3 Environmental Attributes

- Within stream buffer: Yes
- Stream crossing: No
- Estimated area of wetland impacts: 4,000 sf
- Located in wildlife habitat: No

4.2.9.4 Operational Ability

Layover 8 is not operationally ideal. The train must exit the facility going north, the opposite direction of the destination. When entering or exiting the facility to/from the south, the train must change directions while sitting on the main line, which delays other train's operations and increases operating time.

4.2.10 LAYOVER 9

4.2.10.1 Location

Layover 9 is located in Plaistow. Access to crew building and parking for Layover 9 is from Main Street. This layover facility site option is configured to be developed in conjunction with Station G.

4.2.10.2 Community Attributes

- Number of parcels impacted from layover: 2
- Approximate distance to nearest residence: 210 feet
- Impact to adjacent business access: 1 business
- Potential for adjacent development: Yes
- Consistency with Town Master Plan: Partially yes - The site is designated as Light Industrial and Public Land and Open Space on the Town of Plaistow Master Plan Future Land Use Map.

4.2.10.3 Environmental Attributes

- Within stream buffer: Yes
- Stream crossing: Yes
- Estimated area of wetland impacts: 1,500 sf
- Located in wildlife habitat: No

4.2.10.4 Operational Ability

Layover 9 is operationally ideal because the train does not have to change direction upon arrival or departure. The train can exit and enter the layover facility without having to change directions on the main line.

4.3 Station Attributes

4.3.1 SUMMARY

Seven different potential station site options were identified. The following tables summarize the attributes of each station option. Additional details and supporting graphics are provided below and in Appendix B.

Table 4.3 Station Summary Table - Community Attributes

Station	Location	# of Parcels	Distance to Residence	Impact to Adjacent Business Access	Potential for Adjacent Development	Consistency to Town Master Plan
A	Kingston Road	6	148 feet	0	No	No
B	Joanne Drive	3	730 feet	1	Yes	Partially Yes
C	Joanne Drive	2	131 feet	1	Yes	No
D	Westville Road	2	88 feet	1	No	Yes
E	Home Depot	3	940 feet	0	No	Yes
F	Joanne Drive	3	81 feet	1	No	Yes
G	Joanne Drive	2	210 feet	1	Yes	Yes

Table 4.4 Station Summary Table - Environmental Attributes

Station	Within Stream Buffer	Stream Crossing	Estimated Area of Wetlands Impacts	Located in Wildlife Habitat
A	No	No	0 sf	No
B	Yes	No	655 sf	No
C	Yes	Yes	5,610 sf	No
D	No	No	0 sf	No
E	No	No	0 sf	No
F	Yes	No	4,000 sf	No
G	Yes	Yes	1,500 sf	No

4.3.2 STATION A

4.3.2.1 Location

Station A is located in Plaistow. Access to parking and the station platform at Station A is at the intersection of Kingston Road and Hale Spring Road.

4.3.2.2 Community Attributes

- Number of parcels impacted from layover: 6
- Approximate distance to nearest residence: 148 feet
- Impact to adjacent business access: 0 businesses
- Potential for adjacent development: No
- Consistency with Town Master Plan: No - The site is designated as Resource Protection and Conservation Areas and Medium Density Residential on the Town of Plaistow Master Plan Future Land Use Map.

4.3.2.3 Environmental Attributes

- Within stream buffer: No
- Stream crossing: No
- Estimated area of wetland impacts: 0 sf
- Located in wildlife habitat: No

4.3.2.4 Operational Ability

Station A is operationally ideal because it is located off its own double-ended track allowing the train to enter and exit without changing direction. To minimize dead/non-revenue miles the station should be located to the south of the layover facility.

4.3.3 STATION B

4.3.3.1 Location

Station B is located in Plaistow. Access to parking and the station platform at Station B is from Joanne Drive. This station site option is configured to be developed in conjunction with Layover Facility 2.

4.3.3.2 Community Attributes

- Number of parcels impacted from layover: 2
- Approximate distance to nearest residence: 730 feet
- Impact to adjacent business access: 0 businesses
- Potential for adjacent development: Yes
- Consistency with Town Master Plan: Yes – The site is designated as Light Industrial on the Town of Plaistow Master Plan Future Land Use Map.

4.3.3.3 Environmental Attributes

- Within stream buffer: Yes
- Stream crossing: No
- Estimated area of wetland impacts: 655 sf
- Located in wildlife habitat: No

4.3.3.4 Operational Ability

Station B is operationally idea because it is located off its own double-ended track allowing the train to enter and exit without changing direction. To minimize dead/non-revenue miles the station should be located to the south of the layover facility.

4.3.4 STATION C

4.3.4.1 Location

Station C is located in Plaistow. Access to parking and the station platform at Station C is off Main Street. This station site option is configured to be developed in conjunction with Layover Facility 3.

4.3.4.2 Community Attributes

- Number of parcels impacted from layover: 2
- Approximate distance to nearest residence: 131 feet
- Impact to adjacent business access: 0 businesses
- Potential for adjacent development: Yes
- Consistency with Town Master Plan: Partially Yes – the site is designated as Light Industrial and Resource Protection and Conservation Areas on the Town of Plaistow Master Plan Future Land Use Map.

4.3.4.3 Environmental Attributes

- Within stream buffer: Yes
- Stream crossing: Yes
- Estimated area of wetland impacts: 5,610 sf
- Located in wildlife habitat: No

4.3.4.4 Operational Ability

Station C is located within the layover facility, which allows for dead/non-revenue miles to be minimized. The advantage of the station track within the layover is a train can be stored over night and be ready for operation in the morning without having to travel to a different location.

4.3.5 STATION D

4.3.5.1 Location

Station D is located in Plaistow. Access to parking and the station platform at Station D is from Westville Road.

4.3.5.2 Community Attributes

- Number of parcels impacted from layover: 2
- Approximate distance to nearest residence: 88 feet
- Impact to adjacent business access: 1 business
- Potential for adjacent development: No
- Consistency with Town Master Plan: Yes - The site is designated as Light Industrial and Commercial Corridor on the Town of Plaistow Master Plan Future Land Use Map.

4.3.5.3 Environmental Attributes

- Within stream buffer: No
- Stream crossing: No
- Estimated area of wetland impacts: 0 sf
- Located in wildlife habitat: No

4.3.5.4 Operational Ability

Station D is operationally idea because it is located on its own double-ended track allowing the train to enter and exit without changing direction. To minimize dead/non-revenue miles the station should be located to the south of the layover facility.

4.3.6 STATION E

4.3.6.1 Location

Station E is located in Plaistow and Atkinson. Access to parking and the station platform at Station E is through the Home Depot parking lot. This station site option is configured to be developed in conjunction with Layover 5.

4.3.6.2 Community Attributes

- Number of parcels impacted from layover: 2
- Approximate distance to nearest residence: 940 feet
- Impact to adjacent business access: 0 businesses

- Potential for adjacent development: No
- Consistency with Town Master Plan: Yes - The site is designated as Commercial Corridor on the Town of Plaistow Master Plan Future Land Use Map. The majority of the site is located in Atkinson, New Hampshire, which is currently in the process of developing a new Master Plan. The Atkinson portion of the site is within the Commercial/Industrial zoning district.

4.3.6.3 Environmental Attributes

- Within stream buffer: No
- Stream crossing: No
- Estimated area of wetland impacts: 0 sf
- Located in wildlife habitat: No

4.3.6.4 Operational Ability

Station E is operationally ideal because it is on its own double-ended track allowing the train to enter and exit without changing direction. The station is close to the layover facility, which minimizes dead/non-revenue miles.

4.3.7 STATION F

4.3.7.1 Location

Station F is located in Plaistow. Access to parking and the station platform at Station F is from Joanne Drive. This station site option is configured to be developed in conjunction with Layover 8.

4.3.7.2 Community Attributes

- Number of parcels impacted from layover: 3
- Approximate distance to nearest residence: 81 feet
- Impact to adjacent business access: 1 business
- Potential for adjacent development: No
- Consistency with Town Master Plan: Yes - The site is designated as Light Industrial and Commercial Corridor on the Town of Plaistow Master Plan Future Land Use Map.

4.3.7.3 Environmental Attributes

- Within stream buffer: Yes
- Stream crossing: No
- Estimated area of wetland impacts: 4,000 sf
- Located in wildlife habitat: No

4.3.7.4 Operational Ability

Station F is operationally ideal because it is on its own double-ended track allowing the train to enter and exit without changing direction. The station is close to the layover facility, which minimizes dead/non-revenue miles.

4.3.8 STATION G

4.3.8.1 Location

Station G is located in Plaistow. Access to parking and the station platform at Station G is from Main Street. This station site option is configured to be developed in conjunction with Layover 9.

4.3.8.2 Community Attributes

- Number of parcels impacted from layover: 2
- Approximate distance to nearest residence: 210 feet
- Impact to adjacent business access: 1 business
- Potential for adjacent development: Yes
- Consistency with Town Master Plan: Yes - The site is designated as Light Industrial and Commercial Corridor on the Town of Plaistow Master Plan Future Land Use Map.

4.3.8.3 Environmental Attributes

- Within stream buffer: Yes
- Stream crossing: Yes
- Estimated area of wetland impacts: 1,500 sf
- Located in wildlife habitat: No

4.3.8.4 Operational Ability

Station G is located within the layover facility, which allows for dead/non-revenue miles to be minimized. The advantage of the station track within the layover is a train can be stored overnight and be ready for operation in the morning without having to travel to a different location.

5. SITE OPTION SCREENING

5.1 Site Option Development

The PAC reviewed the first set of conceptual site options for a layover facility and station on March 6, 2014. At the time of that meeting, eight layover facility and five station site options had been developed and were reviewed. The details of each preliminary site option were reviewed including the location, features, and the community, environmental, and operational attributes. PAC members were asked to seek input from interested constituents to facilitate any potential modification to the concept plans prior to the public meeting.

Following review of the eight layover facility and six station site options by the PAC and the Town of Plaistow, the Board of Selectmen issued a May 20, 2014 letter that summarized their preferences regarding preferred sites and requested development of an additional option for a combination of a station and layover. This option, identified as Layover 9 and Station G, included the use of the 144 Main Street property owned by the Town of Plaistow. This property had been excluded from initial consideration due to the stipulation of a memorandum of understanding between NHDOT and the Towns of Plaistow and Atkinson that excluded specific sites in each respective municipality. The 144 Main Street property was later added to the list of potential sites to allow an option to be developed that would allow the preservation of a larger portion of the adjacent land parcel known as the Chart Industries property (now owned by Testa Realty, LLC) for potential future redevelopment.

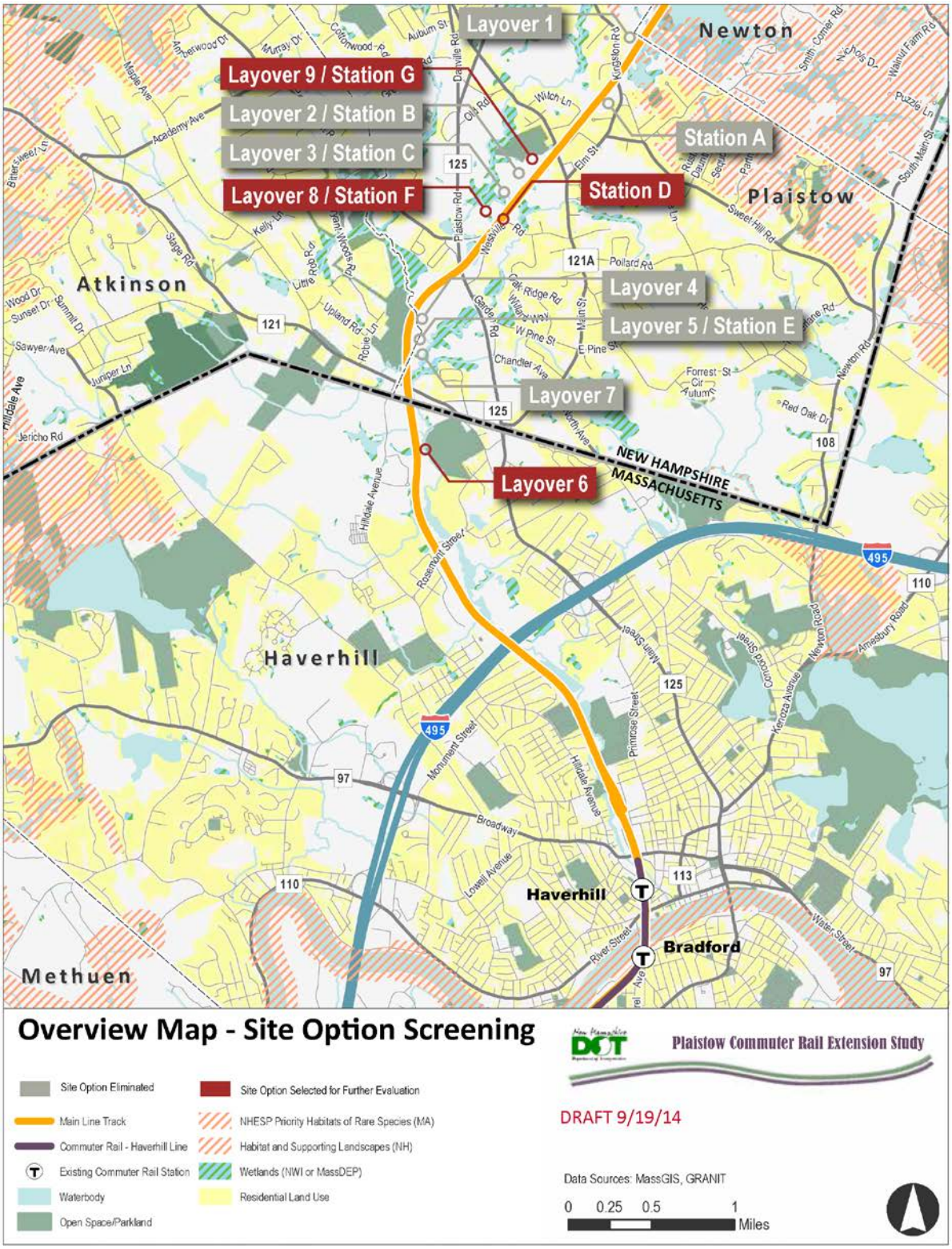
At the public meeting held on May 22, 2014, the conceptual site options for a layover and station facility in or adjacent to Plaistow were presented. This included nine potential layover facility site options and seven different potential station site options, including the new layover facility and station site option located at the 144 Main Street property. Each layover facility or station site option was evaluated based on a series of attributes that were identified to help evaluate the suitability of a site for further consideration. These attributes were categorized and summarized as they relate to the surrounding community, environmental conditions, and service operations.

The study team used input from the meetings and correspondence noted above to select three alternatives for further development and analysis. The rationale for the selection of these three alternatives is provided in the following sections.

5.2 Initial Screening of Site Options

To facilitate further investigation of potential site options, screening was performed of the developed concept options. The selected and eliminated site options are shown on Figure 5.1 and the reasons for their elimination are provided below.

Figure 5.1 Overview Map - Site Option Screening



5.2.1 LAYOVER 1

The Layover 1 site is located off Kingston Road in Plaistow at the northern end of the study corridor, directly adjacent to the border with Newton, NH. The proposed layover tracks are oriented at almost 90 degrees off the main line track.

The Layover 1 site footprint encroaches on sensitive wildlife habitat and wetlands to avoid crossing into Newton. This stipulation is from the MBTA/Pam Am Railroad agreement that limits consideration of extending commuter rail service to the approximate location of the Plaistow/Newton town line. The site is in close proximity to multiple residences to the south. Access to two adjacent businesses to the north (a bark mulching facility and trucking company) would have to be removed or relocated to accommodate the tracks. A route to relocate the business access does not appear to be feasible without causing significant impact to sensitive wildlife habitat.

Based on the impacts to the existing businesses, the substantial impacts to sensitive wildlife habitat and wetlands, a recommendation from the Town of Plaistow to consider other sites, and non-supportive comments at the public meeting, the Layover 1 site was eliminated from further consideration.

5.2.2 STATION A

Located just south of the Layover 1 site next to Kingston Road, the Station A site is located on the opposite side of the tracks, which hinders operational efficiency if Layover 1 or another layover facility site on the west side of the track is selected. Because the Layover 1 site was eliminated from further consideration, it would be difficult to efficiently operate trains between Station A and any of the remaining layover sites.

The future land use designation for the Station A site is Resource Protection and Conservation Area and Medium Density Residential, which makes the development of a station on this site not consistent with the Town of Plaistow Master Plan. The Station A site has good access to Kingston Road, but the general character of the area is residential with numerous residences located within close proximity. The location on Kingston Road also is not convenient for access from Route 125, which would be a preferred access route for potential area riders.

Based on impacts to area residents, inconsistency with future land use, and the elimination of the Layover 1 site from further consideration, the Station A site was eliminated from further consideration.

5.2.3 LAYOVER 2

The Layover 2 site is located on a 35-acre parcel owned by Testa Realty, LLC between Joanne Drive and Main Street. The layout for the layover facility extends away from the main line track to the west. The lead track off the main line is entered from the north and travels south into the facility. The train must change direction on the main line causing congestion for other train travel. The concept creates

potential impacts on a potential sensitive archaeological resources area as well as wetlands and stream buffer area. While the layout maintains some potential for adjacent development on the Testa Realty, LLC property, the layout requires a significant portion of the 35-acre parcel.

Based on impacts to natural resources that appear to be greater than similar options under consideration, the Layover 2 site was eliminated from further consideration.

5.2.4 Station B

The Station B site is located on the parcel owned by Testa Realty, LLC between Joanne Drive and Main Street. The location of the station has potential impacts on a potential sensitive archaeological resources area, wetlands, and stream buffer. Access to station parking is from Joanne Drive, which would require another stream crossing.

The Station B site was developed to be integrated with Layover 2. Based on impacts to natural resources and the elimination of the Layover 2 site, the Station B site was eliminated from further consideration.

5.2.5 Layover 3

The Layover 3 site is located close to the Layover 2 and Station B sites between Joanne Drive and Main Street, but has more impacts on the natural resources located on the Testa Realty, LLC and the Chart, Inc. properties to the west. The layout requires multiple tracks to cross a stream and it encroaches on wetlands and a potential sensitive archeological resources area. The northern half of the 35-acre Testa Realty, LLC parcel remains available for potential future development, but in general, the site will be dominated by the layover facility and station area.

Based on impacts to natural resources, in particular the impact from multiple tracks over a stream, that appear to be greater than similar options considered, the Layover 3 site was eliminated from further consideration.

5.2.6 STATION C

The Station C site is located on the Testa Realty, LLC and the Chart, Inc. properties between Joanne Drive and Main Street. The station is parallel with the Layover 3 site. The station track and platform cross a stream and it encroaches on wetlands. The site remains available for potential future development. Access to station parking is from the north through the 144 Main Street site.

The Station C site was developed to be integrated with the Layover 2 site. Based on impacts to natural resources and the elimination of the Layover 2 site, the Station C site was eliminated from further consideration.

5.2.7 LAYOVER 4

The Layover 4 site is located on the border of Atkinson and Plaistow on an undeveloped site behind Home Depot just before Atkinson Depot Road. The site is currently used for agricultural uses. The layout would require multiple tracks to cross a substantial stream that runs along the northern edge of parcel. Access to the site is from the north through the Home Depot parking lot. Grade differentials on the site would require significant site work, including adding large amounts of fill, with anticipation of significant impacts to the stream. Additionally, comments received during the public meeting were not supportive of this site based on perceived potential noise impacts to nearby receptors.

Based on impacts to natural resources and non-supportive public comments, the Layover 4 site was eliminated from further consideration.

5.2.8 LAYOVER 5

The Layover 5 site is located in Atkinson, on the east side of the main line track along the border with Plaistow on the site behind Home Depot. The site is in the same general area as the Layover 4 site. The site is currently used for agricultural uses. The layout would require multiple tracks to cross a substantial stream and a large grade differential between the north and south end of the site would require significant site work. The roadway to the layover is from the north via the Home Depot parking lot, which creates potential traffic and access conflicts. Additionally, comments received during the public meeting were not supportive of this site based on perceived potential noise impacts to nearby receptors.

Based on impacts to natural resources and non-supportive public comments, the Layover 5 site was eliminated from further consideration.

5.2.9 STATION E

The Station E site is located in Atkinson on the east side of the main line track behind Home Depot. The station track would require crossing a stream. To access the layover facility, the train must change directions on the main line, causing operational congestion. The roadway to the station is from the north via the Home Depot parking lot.

The Station E site was developed to be integrated with the Layover 5 site. Based on impacts to natural resources and the elimination of the Layover 5 site, the Station E site is eliminated from further consideration.

5.2.10 LAYOVER 7

Located in Plaistow, just east of the Atkinson border, the Layover 7 site is located on a 9.4-acre undeveloped parcel west of Home Depot. The site is currently used for agricultural uses. The layout is similar to the Layover 5 and 6 sites, but the train access point comes from the opposite direction. The Layover 7 site layout would require multiple tracks to cross a stream along with the majority of the facility located in wetlands. Due to the grade differences, significant site work is required to accommodate a layover facility. The site lacks direct access to a major roadway. Consequently, the development of this site would require an easement through a residential parcel along Atkinson Depot Road, or a new access road parallel to the main line trucks under a bridge along Atkinson Depot Road. Additionally, comments received during the public meeting were not supportive of this site based on perceived potential noise impacts to nearby receptors.

The Layover 4 and 5 sites were eliminated from further consideration. Although the Layover 7 site is similar to the Layover 4 and 5 sites, it appears the Layover 7 site would be the most feasible site of the three. However, based on impacts to natural resources and non-supportive public comments, the Layover 7 site is also eliminated from further consideration.

5.3 Sites Selected for Further Evaluation

The initial screening of the nine layover and seven station sites was undertaken to support a more in-depth evaluation of the sites that had the most potential viability. As shown on Figure 5.1, three combinations of the initial station and layover sites were selected to proceed as part of the alternatives development. Each alternative consists of a layover site and an assumed likely companion station. The need for a layover and station combination is based on the premise that operational efficiency requires layover facilities to be near the terminus station of a given rail line.

While each paired alternative includes a layover facility that is compatible with the nearby companion station facility, each station or layover facility site was considered to have independent utility. As such, during the alternative development and analysis process, it was possible that potential paring of layover and stations not initially considered was also considered. During the development of the paired alternatives, it was suggested that the Alternative II layover facility and the Alternative III station could be a potential pairing. As the three alternatives were refined, this potential pairing was also analyzed, but it was determined that this was not a viable alternative and therefore never officially considered a fourth alternative.

The three alternatives summarized below were later refined and are described in more detail in the following sections of this report. The alternative refinement process was informed by field investigations that further characterized natural resources, train operational considerations, and noise assessments of existing and future conditions.

5.3.1 ALTERNATIVE I

Alternative I includes two sites on the east side of the main line track: the layover site that is primarily located in Haverhill but accessed through a parcel in Plaistow and the station site is on Westville Road in Plaistow. The selected sites were identified as Layover 6 and Station D.

- **LAYOVER 6**
  - The Layover 6 site is primarily located in Haverhill but accessed through a parcel in Plaistow located on Atkinson Depot Road (Route 121). The site is located on the east side of the main line track, which will minimize operational issues between the layover facility and the Station D site, which is also located on the east side of the tracks. The Layover 6 site is located in the Haverhill Business Park zoning district and is designated as Light Industrial and Commercial Corridor on the Haverhill Future Land Use Map. The Layover 6 site is located on an undeveloped parcel in Haverhill, adjacent to existing industrial land, and requires only one stream crossing. The layover site would require access through a new driveway from a private roadway located on the south side of Atkinson Depot Road. This site is largely away from potential noise receptors.
  - Another consideration of this site is the relatively long distance from the layover site to any potential station site. The MBTA expressed concerns about the operational efficiency of this alternative and noted that additional investigation would be required during the alternative development and review process.
- **STATION D**
  - The Station D site is located in Plaistow off Westville Road and utilizes the existing state-owned park–and-ride lot. Access to the station parking is from Westville Road. Future parking expansions are anticipated to be needed for this site.
  - To minimize impacts to freight and the existing Amtrak Downeaster train, a dedicated station track would need to be constructed to allow passenger trains to terminate a run and hold until departure for the return inbound trip. The space for the station track is constrained by an adjacent pond and wetland area. This would cause the station location to be located east of the park-and-ride lot. The anticipated station would affect an existing business and require a slight relocation of Westville Road onto open areas of residential property. The station is compatible with the Town of Plaistow Master Plan.

5.3.2 ALTERNATIVE II

Alternative II includes a co-located station and layover facility located on the west side of the main line track on an undeveloped parcel on Joanne Drive. The layover facility was previously identified as Layover 8 and the station site as Station F.

- **LAYOVER 8**

- The Layover 8 site is located in Plaistow off Joanne Drive on a parcel owned by Chart, Inc. The layover facility is angled away from the tracks to avoid wetlands and the stream buffer on the north edge of the parcel. Dedicated access between the layover facility and station will be provided to minimize operational impacts that could occur from trains accessing the main line track.
- The location of the layover site appears to have potential minimal impacts associated with noise. Access to the site could be configured from Route 125 or from the east through the Testa Realty, LLC owned property.

- **STATION F**
  - The Station F site is located along the main line tracks with parking access from Joanne Drive. The station site is located in close proximity to a few residences on Joanne Drive. However, the station avoids wetland impacts.
  - This station was developed to be compatible with Layover 8. Access to the site could be configured from Route 125 or from the east through the Testa Realty, LLC owned property.

5.3.3 ALTERNATIVE III

Alternative III includes a co-located station and layover facility located on the west side of the main line track on the Testa Realty, LLC owned parcel and 144 Main Street parcel. The layover facility was previously identified as Layover 9 and the station site as Station G.

- **LAYOVER 9**
  - The Layover 9 site is located on the Testa Realty, LLC owned property and the 144 Main Street property owned by the Town of Plaistow. Different from the other Testa Realty, LLC property site options, this option places the layover facility parallel to the main line. The benefit of this option is that it reduces the footprint on the Testa Realty, LLC property and increases the development potential on the remainder of the property. The layout of this option requires minimal wetland and stream impacts.
- **STATION G**
  - The Station G site is located on the parcel owned by Testa Realty, LLC and the 144 Main Street property owned by the Town of Plaistow. As with the Layover 9 site, this option places the station parallel to the main line. This option was developed to be utilized with Layover 9 and allows for potential development on the remainder of the properties. Access to the station is from Main Street.

6. ALTERNATIVES

6.1 Introduction

The three alternative sites selected for further review are shown on Figure 6.1. Each of the alternatives are summarized below, including the site location, description of the site's physical layout, and terminal operations. More detailed graphics for each alternative are provided in Appendix C. More detailed analysis is provided in Section 8 later in this report.

6.1.1 SERVICE PLAN

All of the station locations proposed in the three alternatives are within one-quarter mile of each other. As such, a single service plan was completed for all alternatives. It is anticipated that the addition of a station in Plaistow would add ten minutes to the existing travel time from the Haverhill Station to North Station. Details on the service plan are included in Appendix D.

6.1.2 RIDERSHIP

Ridership for all alternatives is also assumed the same given the proximity of the stations. To determine initial and future ridership, a market area was identified for a new terminal station in Plaistow, which includes Plaistow and four surrounding communities (Atkinson, Kingston, Hampstead, and Newton, NH). As detailed in Appendix E, the existing Plaistow Area ridership at Haverhill and Bradford Stations is estimated at 139 boardings (i.e. roundtrip passengers per day). This translates to 278 one-way trips per day. At the beginning of service at a new station in Plaistow, it is estimated that 118 boardings would transfer or divert from the station in Haverhill. Within the first year of service, it is estimated that an additional 52 boardings would occur based on improved access and diversions from other modes of transportation for a total of 170 boardings by the end of Year 1. By 2030, it is projected that with employment growth and growth in the number of Plaistow area residents who are employed in Boston or Cambridge and would benefit from commuter rail ridership, the total boardings at a station in Plaistow is expected to grow to at least 258 boardings per day. This may be greater if the connection between Plaistow area and Boston/Cambridge employment is similar to other communities in the region.

6.1.3 TERMINAL OPERATIONS

The Plaistow area train station will be the last stop of the MBTA Haverhill Line. The operations of trains to and from the station and the layover facility, as well as operations to the station through the day are termed terminal operations. The assumed terminal operations are based on discussions with MBTA staff and observations of morning train startup and evening train layup at other MBTA terminal stations.

The project would result in an increase in commuter rail activity between the new Plaistow Station and existing Haverhill Station. Plaistow Station would have 13 arrivals and 13 departures each day.

After completion of their last trip from Boston, five trains would lay over at the proposed layover facility, which would support up to six trains. Each locomotive starts up 90 minutes prior to its scheduled departure and relocates from the layover track to the station 30 minutes prior to its scheduled departure. Train startup operations include the steps needed to ready the trains for movement to the station for the initial train of the day and sufficient time to address any malfunctions or complications in preparing the train for daily service.

The first locomotive is scheduled to startup at 3:25 AM to meet a 4:55 AM departure. At the end of the day, each train is allotted a total of 30 minutes between arrival at the station and shut down, which includes 10 minutes at the station and 20 minutes at the layover tracks.

6.2 Alternative I

The Alternative I station site is located on the east side of the main line tracks adjacent to Westville Road north of Route 125 (Plaistow Road) in Plaistow, New Hampshire. (See Figure C2 in Appendix C). As shown in Figure C1 in Appendix C, the layover facility is also located on the east side of the rail tracks in Haverhill, Massachusetts. The layover site is located south of the New Hampshire-Massachusetts state line in Haverhill, but is accessed from Plaistow off Route 121 (Atkinson Depot Road). The two sites are a little more than one mile apart.

The station site includes an existing park-and-ride parking lot and an existing commercial parcel located on Westville Road in Plaistow. As shown in Figure C4 in Appendix C, the site is designed to avoid a large pond and associated ditch area on the southwest corner of the site adjacent to the rail line. The 835-foot long station platform is located next to a new dedicated track that splits from the easterly main line track. The station track is a double-ended dedicated track that connects to the main line track at both ends. The dedicated track is 1,589 feet long. The high-level station platform is 835 feet long and located next to a kiss-and-ride area just north of the existing parking lot that is expanded slightly to accommodate 282 spaces. To accommodate the station platform, Westville Road will need to be realigned slightly to the east.

The layover facility site is located in a primarily undeveloped area adjacent to the Little River and City of Haverhill-owned open space to the east and the Upper Hilldale Industrial Park to the west. As shown in Figure C3 in Appendix C, the layover facility is sited to avoid the Little River and associated floodplains and wetland areas on the east and sound ends of the site. The layover facility includes a lead track line that splits from the easterly main line track into three pairs of tracks. A crew layover facility is provided on the north end of the site. A small parking lot is next to the crew facility and is accessed from a new driveway that leads to Atkinson Depot Road to the north.

6.3 Alternative II

The Alternative II station and layover facility site is located on Joanne Drive just east of Route 125 (Plaistow Road) in Plaistow, New Hampshire. As shown in Figure B5 in Appendix C, the site is located on the west side of the dual main line tracks. A new dedicated track splits from the westerly main line track and provides access to both the station platform and the layover facility. The new dedicated station track is 1,745 feet long and will allow a train set to move from the layover facility to the station without using the main line track. The tail track, which allows movement between the station and the layover facility, is 1,218 feet long.

The high-level station platform is 835-feet long and runs parallel to the track. A small kiss-and-ride area is located at the southern end of the platform. A sidewalk connects the station platform to two parking lots located on either side of Joanne Drive. The parking lots were sited to avoid wetlands and potential vernal pools. The approximate number of parking spaces is 284.

The layover facility is located on the western portion of the site, angled away from the main line track. A single track enters the layover facility and splits into three pairs of track. As shown in Figure C6 in Appendix C, the layover tracks are situated to avoid wetlands, ponds, and potential vernal pools. Access to the crew facility and parking lot that are located west of the layover tracks is from a turn around access road that allows trucks to enter northbound traffic on Route 125 (Plaistow Road).

6.4 Alternative III

The Alternative III station and layover facility site is located on the west side of the main line track just south of Route 121A (Main Street) in Plaistow, New Hampshire (See Figure C7 in Appendix C). The majority of the site is an existing developed parcel with a commercial/industrial complex and associated buildings, stockpiles, and storage areas. The site also includes a former industrial parcel owned by the Town of Plaistow that has a water tower with an integrated cell phone tower. As shown in Figure C8 in Appendix C, the layover facility and station are located on the eastern side of the site, away from the Little River and associated wetlands and floodplains located on the southern and western sides of the site.

A new dedicated track splits from the westerly main line track and provides access to both the station platform and the layover facility. The new track splits to allow movement into the layover facility tracks and a separate station track, which is 1,967 feet long. An additional 1,004-foot-long tail track is provided to allow movement between the station and layover facility without using the main line track. Located adjacent to the main line tracks, the layover facility includes three pairs of tracks that split from the dedicated track. Access to the layover facility is from the dedicated track that extends south of the site along the main line track and permits movement between the layover facility and station. The station platform is located west of the layover facility and the station track is split from the dedicated track and runs parallel to the western-most layover track.

The 835-foot-long, high-level station platform is located adjacent to a new parking lot that includes 294 spaces, but offers the ability for future expansion. Access to the parking lot is from an existing access road that connects to Route 121A (Main Street) to the north. A drop-off area is located on the north end of the platform and a sidewalk allows pedestrian access to Main Street.

6.5 Option of Alternative II Layover & Alternative III Station

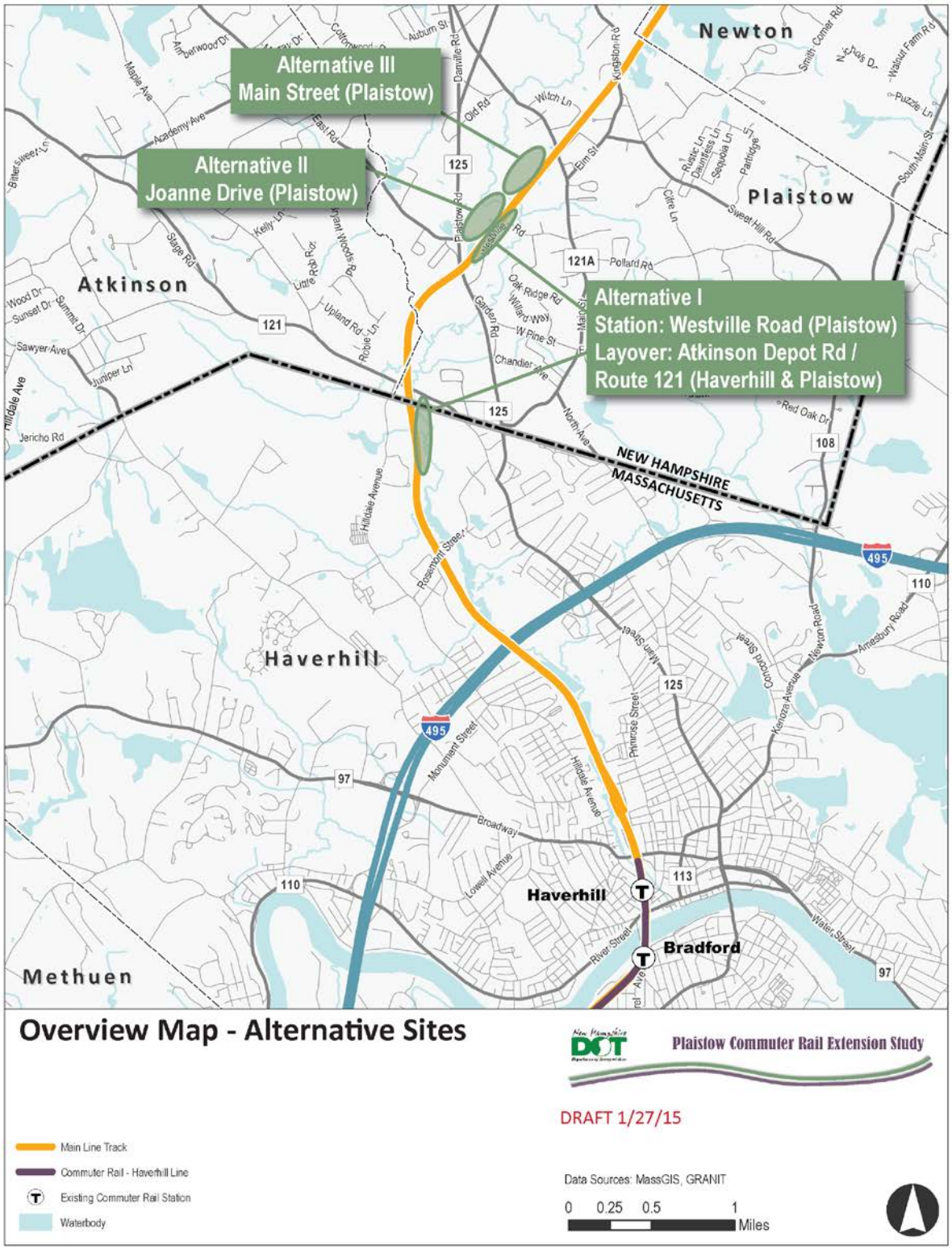
During the course of the alternatives development, a combination of the Alternative II layover facility on the Joanne Drive site and the Alternative III station on the 144 Main Street site was proposed. As shown on Figure C9 in Appendix C, these two sites are located adjacent to each other on the west side of the tracks in Plaistow. Under this option, the station would be located on a dedicated track located directly adjacent to the main line track. This dedicated track would offer a direct connection to the layover facility located on the Joanne Drive site.

Similar to Alternative II, the layover facility is located on the western portion of the site, angled away from the main line track. A single track enters the layover facility and splits into three pairs of track. The layover tracks are situated to avoid wetlands, ponds, and potential vernal pools (See Figure C10 in Appendix C). Access to the crew facility and parking lot that are located west of the layover tracks is from a turn around access road that allows trucks to enter northbound traffic on Route 125 (Plaistow Road).

Like Alternative III, the 835-foot-long high-level station platform is located adjacent to a new parking lot that includes 294 spaces, but offers the ability for future expansion. Access to the parking lot is from an existing access road that connects to Route 121A (Main Street) to the north. A drop-off area is located on the north end of the platform and a sidewalk allows pedestrian access to Main Street.

During the alternative analysis process described in Sections 8 and 9 later in this report, this option was determined to not be a feasible alternative. Consequently, it was not considered as part of the alternative screening process.

Figure 6.1. Overview Map – Alternative Sites



7. ALTERNATIVES EVALUATION CRITERIA

To assist in the selection of a recommended layover facility and station site, a set of comprehensive evaluation criteria were established. The following evaluation criteria listed in Table 7.1 were used at the conclusion of the alternative development to evaluate the three alternatives and identify a selected alternative. The results of the analysis are contained in Section 8 and summarized in Section 9.

Table 7.1. Evaluation Criteria

1. Land Use/Neighborhood Character/Zoning	
Compatibility with Planning Policies	▪ What is the zoning district for the site and is a layover facility/station consistent with the zoning regulations? ▪ What is the future land use category for the site and is the layover facility/station consistent with this land use? ▪ Is the site concept consistent with the town's vision or Master Plan?
Land Use Compatibility	▪ Does the site concept fit with adjacent land uses? ▪ What is the site's proximity to residential uses? ▪ Does the site concept impact protected and recreational open space? ▪ Does the station site concept provide any potential for adjacent compatible development?
2. Land Acquisitions and Displacements	
Acquisitions Required	▪ What is the number and total acreage of the parcels that will be acquired? ▪ Is the site accessible from existing road right-of-way? ▪ Does the site concept require a new access road and/or additional right-of-way/easement acquisition? ▪ Will any property owners or tenants be required to relocate for the proposed site alternative?
3. Socio-economic/Environmental Justice	
Socio-economic Conditions	▪ What is the population density for the surrounding area? ▪ What is the housing density for the surrounding area? ▪ What is the median household income within the adjacent area? ▪ What is the area's transit dependent population?
Environmental Justice	▪ Is the site located within an Environmental Justice community?
4. Transportation	
Traffic Impacts	▪ Will passenger trips to and from the site create significant impacts on nearby roadways? ▪ Will the site concept facilitate traffic patterns that improve traffic circulation?
Non-Vehicular Accessibility	▪ Is the site accessible via public transportation (bus transit service)? ▪ Is the site accessible for pedestrians or bicycles?
Parking Supply	▪ Can the site accommodate sufficient parking for the anticipated ridership? ▪ Is there sufficient parking supply at the station to prevent overflow parking in the surrounding area?
Commuter Rail Operations	▪ Will the site concept interfere with existing commuter rail service? ▪ Is the station conveniently located to attract commuter rail passengers? ▪ Does the site concept allow for additional phasing/growth?
Freight Rail Operations	▪ Would operations at this site impact existing freight rail service?

5. Air Quality	
Regional and Local Impacts	▪ What is the level of regional air quality impact? ▪ Does the site result in localized air quality impacts?
6. Noise and Vibration	
Noise	▪ What is the number of moderate noise impacts? ▪ What is the number of severe noise impacts?
Vibration	▪ What is the number of moderate vibration impacts? ▪ What is the number of severe vibration impacts?
7. Hazardous Materials	
Environmental Concerns	▪ Are there any recognized environmental concerns (REC)?
8. Visual Resources/Aesthetics	
Visual/Scenic Resources	▪ Does the site impact any existing viewsheds or scenic resources?
9. Natural and Cultural Resources	
Natural Resources	▪ What is the impact to wetland resources (acres)? ▪ What is the impact to stream buffers (acres within 100 feet of stream)? ▪ How many stream crossings are required for site concept? ▪ Is the site located within the floodplain? ▪ Does the site concept impact environmentally sensitive areas, such as wildlife habitats or threatened and endangered species areas?
Historic/Cultural Resources	▪ Will there be any impact to historic/cultural resources?
Archeological Resources	▪ Will there be any impact to archeological resources?
10. Operational Feasibility	
Layover Facility	▪ What is the distance to the terminal station? ▪ Does the site allow for efficient service operations with the station?
Station	▪ What is the distance to the layover facility? ▪ Can a train be stored here overnight? ▪ Does the site allow for a double-ended track? ▪ Does the train have to change directions on the main line?
Costs	▪ What are the capital investment costs? ▪ What are the operations and maintenance costs?

8. ANALYSIS OF ALTERNATIVES

As described previously, three alternatives were defined from a set of preliminary options for a station and layover facility. Using the evaluation criteria established at the onset of the study (Section 7), each alternative was analyzed and evaluated for screening purposes. This section includes the detailed analysis of each alternative. The following section (Section 9) includes an evaluation matrix that summarizes the alternative analysis contained in this section and how each alternative meets the established evaluation criteria.

Supporting graphics and maps are included in Appendix F. Other reports, site visit results, and documentation used to complete the analysis are provided in additional appendices and are referenced throughout this section.

8.1 Methodology

The methodology used to conduct the analysis provided in this section is detailed below or in referenced appendices. Relevant information from each of the referenced appendices is included within the discussion of each alternative provided later in this section.

- **Land Use and Economic Development.** The land use impacts and economic development potential of commuter rail was assessed as part of this study. In addition to the alternative-specific analysis contained in this section, HDR completed a Land Use and Economic Development Assessment that examined the overall potential benefits of commuter rail to the Town of Plaistow and surrounding areas. The assessment looked at the overall real estate market in the town, discussed the potential for transit-oriented development (TOD), and identified constraints to development. The complete assessment is provided in Appendix G.
- **Population Density.** Using Federal Transit Administration (FTA) New Starts Policy Guidance from August 2013 and U.S. Census Bureau 2007-2011 American Community Survey (ACS) Five-Year estimate data, the average population density was calculated for block groups in the corridor and surrounding area. Six different population density thresholds were used based on the total persons within each block group per square mile: under 2,560 persons/square mile, 2,560 to 5,760 persons/square mile, 5,761 to 9,600 persons/square mile, 9,601 to 15,000 persons/square mile, 15,001 to 20,000 persons/square mile, and greater than 20,000 persons/square mile.
- **Housing Density.** Thresholds for housing unit density for this analysis are based on the discussion of Reid Ewing's 1997 survey of 11 TOD design guidelines in a NHDOT technical memorandum, "A National Review of Transit-Supportive Land Use Practices and an Analysis of New Hampshire and Massachusetts Land Use Regulations."[1] Using the number of housing units

[1]New Hampshire Department of Transportation and Massachusetts Executive Office of Transportation, A National Review of Transit-Supportive Land Use Practices and an Analysis of New Hampshire and Massachusetts Land Use Regulations." http://www.nh.gov/dot/programs/i93transit/library/documents/FINAL_zoning_ord_review.pdf

from the 2007-2011 ACS Five-Year Estimates for block groups in the corridor and surrounding area, the housing unit density was determined by calculating the total housing per square mile.

- **Household Income.** Median household income from the 2007-2011 ACS Five-Year Estimates was evaluated for the block groups in the study corridor and surrounding area. For comparison, the median household income for the block groups where each site is located was compared with the 2011 U.S. Median Household Income[2] and the 2011 U.S. Poverty Threshold for a four-person household.[3]
- **Transit Dependent Population**. Using census tract data from the 2007-2011 ACS Five-Year Estimates, the number of households that do not have a vehicle available was evaluated. Census tract data was used because it was not available for block groups.
- **Environmental Justice (EJ) Populations.** For the purposes of this analysis, Environmental Justice (EJ) populations are defined for block groups using the 2007-2011 ACS Five-Year Estimates and the following methodology:
    1. ***Minority:*** 25 percent or more of residents identify as a race other than white;
    2. ***Low-Income:*** 25 percent or more of households earn 65 percent or less than the Massachusetts or New Hampshire median household income. In Massachusetts, the median household income was $65,981; 65 percent = $42,887) or New Hampshire median household income (median $64,664; 65 percent =$42,031). Any block group with a median household income in 2011 less than or equal to the Massachusetts or New Hampshire 65 percent value is included; and
    3. ***Limited English Proficient:*** 25 percent or more of the households have Limited English Proficiency (LEP) as identified by the ACS data.

- **Traffic Impact Analysis.** Based on the ridership projections completed for this study, a traffic analysis was conducted to evaluate the potential traffic impacts at each station site. While the ridership projection in Appendix E shows that the highest ridership projection is 258 daily boardings by 2030, this analysis was based on an estimate of 300 passengers per day. Looking at peak hour ridership, the traffic analysis was conducted to evaluate impacts at the roadways near each station location. The complete traffic analysis is provided in Appendix H.
- **Air Quality**. Based on the proximity of the layover facility to sensitive air quality receptors, a comparative screening assessment was conducted. The regional air quality impacts are the same for all three alternatives. The stationary source impacts that are tied to the layover facility sites were analyzed to determine the level of emissions that are based on the anticipated train operations. The distance between the stationary source (in this case the location where trains would be idling) and sensitive receptors forms the basis of the potential for air quality impacts by establishing a distance at which dispersion would be reasonably anticipated. Added emissions are expected to result in negligible impacts, but could impact receptors within 300

[2] U.S. Census Bureau, American Community Survey Briefs, Household Income for States: 2010 and 2011. Issued September 2012. http://www.census.gov/prod/2012pubs/acsbr11-02.pdf.
[3] U.S. Census Bureau, Poverty Thresholds by Size of Family and Number of Children, 2011. http://www.census.gov/hhes/www/poverty/data/threshld/index.html

feet of the layover sites. Further analysis will be completed for the Recommended Alternative as part of the EA.

- **Noise and Vibration.** Using FTA methodology, HDR prepared a Noise and Vibration Impact Assessment to evaluate the impacts along the length of the study corridor between the existing station in Haverhill and the three alternative stations. HDR measured existing noise levels throughout the project area and used the existing levels to identify the appropriate noise impact criteria. Estimated noise levels from proposed extension of service were developed and used to predict the number of moderate and severe impacts. The complete assessment, provided in Appendix I, offers specific mitigation measures to offset the predicted impacts.
- **Hazardous Materials.** Normandeau Associates, Inc. (Normandeau) completed a Hazardous Waste Assessment of the study area, including the three alternative sites. The assessment looked at the potential for hazardous waste impacts and other recognized environmental concerns. Assessment results were based on an extensive database search, a review of site history, and site visits completed in July 2014. Environmental Data Resources, Inc. (EDR) conducted the database search using the American Society for Testing and Materials (ASTM) Phase I Environmental Site Assessment (ESA) databases searching federal and state listings within the study area. Additional information including maps, photographs, and detailed property history and data are included in Appendix J.
- **Natural Resources.** A preliminary field review was conducted on June 30 and July 1, 2014 by Normandeau to identify the approximate locations of regulated water resources including wetlands, streams, floodplains, and vernal pools. Additional information including graphics and methodology from this field investigation are provided in Appendix J. Normandeau also completed a preliminary impact analysis, which identifies the impacts associated with each alternative (Appendix K). The assessment was completed on January 16, 2015 and includes regulatory considerations and describes potential mitigation measures for each alternative site.
- **Historic/Cultural Resources.** Historic Documentation Company, Inc. (HDC) conducted research and completed a site investigation on July 30 to August 2, 2014 to review potential impacts on historic architectural resources for each of the alternative sites. Photos, maps, and other documentation including methodology on the field visits and related research are provided in Appendix L.
- **Archaeological Resources.** A preliminary archeological sensitivity assessment was completed for the alternative sites by Independent Archaeological Consulting, LLC in July 2014. The complete assessment including methodology and photo documentation is provided in Appendix M.
- **Capital Costs.** An estimate of capital costs was prepared to compare the major infrastructure improvement costs for each of the three alternatives (i.e., cost to construct the layover facility, station, parking and roadway improvements, main line track improvements, noise and wetland mitigation, and site acquisition and demolition costs). Additional costs for engineering and design, project administration and construction management, and contingency were also included in the estimate. The summary cost estimate table is provided in Appendix N.

8.2 Alternative I

The Alternative I station site is located on the east side of the main line adjacent to Westville Road north of Plaistow Road in Plaistow. The layover facility is located on the east side of the rail tracks in Haverhill, Massachusetts. The layover site is approximately one-quarter mile south of Atkinson Depot Road and the New Hampshire-Massachusetts state line. The two sites are a little more than one mile apart.
The station site is located close to the commercial and industrial areas along Plaistow Road and residential uses on Westville Road. The site includes dual railroad tracks along the west side of the site, a large paved park-and-ride facility, a tire business, apartments with associated parking and lawn areas, and a body shop. One large pond wetland and associate ditch area is located on the southwest corner of the site.

The layover site is located in a primarily undeveloped area adjacent to the Little River and City of Haverhill-owned open space to the east and the Upper Hilldale Industrial Park to the west. The site is primarily forested, with the existing rail tracks on the west side of the site and the Little River to the east. A buried natural gas line traverses the southern end of the property.

8.2.1 LAND USE/NEIGHBORHOOD CHARACTER/ZONING

8.2.1.1 Compatibility with Planning Policies

- **Consistency with the Plaistow Master Plan.**
  - **Vision.** The Plaistow Master Plan is the town's guide for future growth. The entire plan was updated in 2004; some sections were updated in 2011. As part of the plan for the future development of the city, the master plan outlines future land uses and establishes a set of goals and objectives. Regarding the introduction of passenger rail services, the plan identifies the two following goals and supporting objectives that support the extension of service into Plaistow:
    1. ***Trans Goal 1:*** *"Provide and maintain a transportation system that allows for the efficient movement of people and goods and provides adequate access to places of employment, residential areas, commercial and shopping areas, and recreational opportunities."*
       - *Objective 3: "Provide opportunities for a range of non-automotive transportation alternatives that are easily available to the residents of Plaistow."*
    2. ***Trans Goal 2:*** *"Extend the Massachusetts Bay Transportation Authority (MBTA) Haverhill commuter rail line to Plaistow."*
       - *Objective 1: Secure the appropriate funding to construct a rail station and requisite rail siding. Adequate Congestion Mitigation and Air Quality (CMAQ) funding was received in January 2011. The funding plan requires a layover facility be provided in close proximity to the rail station. Based*

on this requirement, the project was expanded from a rail station to a rail station and layover facility. Plaistow will own and operate the rail station that will be designed in a manner to be revenue neutral to the Plaistow taxpayers.

- *Objective 2: Complete the necessary environmental and engineering studies for the project.*
- *Objective 3: Obtain all the necessary Massachusetts and New Hampshire legislative approvals.*
- *Objective 4: Complete the construction and begin service.*

- **Future Land Use.**
  1. ***Station site.*** As shown on Figure F1 in Appendix F, the Alternative I station is located on Westville Road within the Light Industrial Future Land Use category. According to the Plaistow Master Plan, desired uses in Light Industrial areas include a variety of nonresidential uses including light manufacturing, assembly, research and development facilities, warehousing and distribution, and service uses. A commuter rail station is consistent with this Future Land Use category.

- **Consistency with State or Regional Plans.**
  - The Alternative I layover facility site is located within two Massachusetts designated planning areas.
    1. The Merrimack Valley Planning Commission prepared the *Merrimack Valley Priority Growth Strategy* (September 2009), which is the official planning policy for the City of Haverhill and the adjoining communities in Massachusetts's Merrimack Valley region. The growth strategy identifies the locations where future growth should be encouraged, including the Upper Hilldale/Fondi Road Concentrated Development Center (CDC). A CDC is an area of concentrated development, including a city or town center, consisting of existing and appropriately zoned, commercial, industrial and mixed used areas suitable for high-density development.
    2. The layover facility site is also within a state designated Priority Development Site (PDS). This designation is intended to promote targeted sites for economic development. MGL Chapter 43D, Local Expedited Permitting Program, guarantees a 180-day streamlined permitting process with a single point for contact for all parcels designated as a PDS.

- **Consistency with Zoning Regulations.**
  - ***Station site.*** As shown on Figure E2 in Appendix E, the Alternative I station is located within the Plaistow's Commercial 1 (C-1) zoning district. Multi-modal park-and-ride lots are permitted within this zoning district, but rail services or rail stations are not permitted without a variance. Additionally, the Plaistow Zoning Regulations also includes a Wetlands Overlay District. Although the overlay district is not shown on the zoning map, this overlay district may occur in any zone and may be applicable to the alternative sites located in Plaistow. This overlay district contains all wetlands areas and

wetlands buffers as defined below (from Section 220-20B and Section 220-21 of the Plaistow Zoning Ordinance). A variance may be required for a commuter rail station on this site and development would be subject to the Plaistow site plan review process.

- ***Layover site.*** As shown on Figure F3 in Appendix F, the Alternative I layover facility site is located with the City of Haverhill Business Park (BP) zoning district. Railroad yards and railway express service is a permitted use within the BP district. Bus or railroad passenger terminals are not a permitted use. Rezoning would not be required for this use, but development on the site may be subject to the City of Haverhill site plan review process.

8.2.1.2 Land Use Compatibility

- **Adjacent Land Uses.**
  - ***Station site.*** Residential and commercial uses are located east of the Alternative I station site across Westville Road. As shown on Figure F6 in Appendix F, other uses within close proximity on Westville Road include single-family residential uses, industrial, and commercial uses. East of the parcels on Westville Road is the Little River and low-density residential uses. On the western side of the tracks along Joanne Drive are residential uses, utilities, wetlands areas, and small ponds. Commercial uses, including retail and services, are located along Plaistow Road to the west and south. Forested and wetland areas are located north of the station site.
  - ***Layover site.*** As shown on Figure F5 in Appendix F, most of the surrounding parcels to the east of the Alternative I layover facility site are undeveloped, including forested, pasture, or wetland areas. The parcel adjacent to the north is a horse supply retailer and stable. To the west, on the other side of the rail line, much of the land is also undeveloped. The few developed parcels on Fondi Road or Hilldale Avenue are primarily commercial or industrial. One site occupied by WBC Extrusions manufacturing facility has rail access from the main line. To the south, a utility right-of-way runs along the southern border of the layover facility site. Beyond an area of undeveloped forested and wetland land, low-density residential uses are located to the east and southeast along Merrill Avenue.
- **Access/Connectivity.**
  - ***Station site.*** Access to the station site is via Westville Road, which connects to Route 125 (Plaistow Road) to the south and Route 121A (Main Street) to the east. The roadway is a 2-lane local roadway.
  - ***Layover site.*** The layover site does not have direct roadway access. The closest roadways are Route 121 (Atkinson Depot Road) to the north, Rosemont Street to the south, or Fondi Road on the western side of the main line tracks.
- **Proximity to Residential Uses.**
  - ***Station site.*** Single-family and multi-family residential uses are located to the east across Westville Road, within one-tenth mile from the station. Two single-family

residences are also located on Joanne Drive adjacent to the track within close proximity to the station site. Approximately 289 residential units are located within one-half mile from the Alternative I station site.

- ***Layover site.*** The nearest residential uses are located to the south and southeast of the facility. The site is located within one-quarter mile from the nearest residence. Residential uses are also located north of Route 121 (Atkinson Depot Road) in Plaistow. Approximately 234 residential units are located within one-half mile from the Alternative I layover site.

- **Protected and Recreational Open Space.**
  - ***Station site.*** A small pond is located at the south end of the station site between the park-and-ride lot and the track. The station is in close proximity to the Little River, which is located about one-quarter mile to the east and north of the station site. Neither the station site or the adjoin parcels do not appear to qualify as a Section 4(f) property.
  - ***Layover site.*** The Little River forms the eastern border of the two layover facility parcels. The City of Haverhill owns the adjacent parcel across the Little River. This site, known as the Clement Farm Conservation Area, is a 53-acre property designated as permanently protected open space. The American Legion, Wilbur M. Comeau Post has a long-term lease for the building and grounds on the eastern side of the property. The City of Haverhill maintains athletic fields on the eastern side of the property and hiking trails throughout the wooded portions of the site. Neither the layover site nor the adjoining parcels do not appear to qualify as a Section 4(f) property.
- **Potential for Adjacent Compatible Development.**
  - ***Station site.*** The station site is constrained to the east by Westville Road and existing residential development. The parcel to the north was recently developed. The adjacent parcels have limited additional development potential for transit-oriented development (TOD) or traditional development. Within a one-half mile distance of the station, the potential for development or redevelopment is limited due to existing residential and commercial development.
  - ***Layover site.*** The layover site is constrained to the east by the Little River, protected open space, and existing residential uses. The undeveloped parcels to the west of the site are within the Upper Hilldale PDS/CDC and are planned for industrial uses per the Regional Growth Strategy. The adjacent parcels to the west have potential for traditional industrial uses, but the parcels to the east are protected open space or residential uses and do not have potential for TOD or traditional development.

8.2.2 LAND ACQUISITIONS

8.2.2.1 Acquisitions Required

- ***Station site.*** As shown on Figure F6 in Appendix F, the station site for Alternative I is situated on four parcels with a total of 8.23 acres. The majority of the acquired acreage would be used for

station development. The parcel ownership and current use are listed in Table 8.1. Three of the four parcels are occupied and at least two businesses would need to be relocated. An existing State of New Hampshire park-and-ride lot is located on a state-owned parcel and extends onto the adjoining Scandia Plastics site at 55 Plaistow Road. This site would not need to be acquired, but an easement to utilize the existing parking lot would be required. The station site is accessible from Westville Road, which would have to be realigned to the east. Additional ROW would be required on the east side of the roadway.

- ***Layover site.*** The Alternative I layover facility site is situated on two parcels for a total of 38.65 acres (See Figure F5 in Appendix F). Approximately six acres of the acquired property would be used for the development of the layover facility. The ownership and current use for these parcels is listed below. The site does not have direct access to a major roadway. Access through another property is needed, potentially from the north via a parcel in Plaistow that is owned by Dover Saddlery that is located off Route 121 (Atkinson Depot Road).

Table 8.1. Alternative I Parcels

Parcel ID	Site Address	Owner	Existing Use	Zoning	Size (acres)	Current Assessment
Alternative 1 Station – Plaistow						
27-45	37-39 Westville Rd	John J Guide Realty, LLC	Auto Supplies – Freedom Tire/USA 1 Motors	C-1	0.89	$516,080
27-54	33 Westville Rd	Town of Plaistow	Undeveloped/ROW	C-1	0.16	$2,280
26-36	45 Westville Rd	State of New Hampshire	Park-and-ride Parking Lot	C-1	2.46	$297,470
26-38*	55 Plaistow Rd	Acton Family Ltd Partnership	Manufacturing - Scandia Plastics Inc. (north corner of site includes portion of existing park-and-ride lot)	C-1	4.72	$1,921,000
Alternative 1 Layover Facility – Haverhill						
585-430-4	Hilldale Ave/ Main St	David F. Post	Pasture (used by Dover Saddlery Feed & Stables located to north)	BP	19.45	$23,200
585-430-5	Hilldale Ave	WBC Extrusion Products	Undeveloped	BP	19.2	$4,600

Source: Town of Plaistow Assessor; City of Haverhill Office of the Assessor
**Acquisition of this entire parcel is not required; a portion of the existing park-and-ride is located on the northeast corner of the parcel.*

8.2.3 SOCIO-ECONOMIC/ENVIRONMENTAL JUSTICE

8.2.3.1 Socio-economic Conditions

- **Population Density.** Using FTA New Starts Policy Guidance from August 2013 and 2007-2011 ACS Five-Year Estimates, the average population density was calculated for block groups in the corridor and surrounding area. Figure F9 in Appendix F shows the population density for the Alternative I sites. FTA guidance provided breakpoints for population density (persons per square mile).
    - ***Station site.*** Using the FTA breakpoints, the entire Town of Plaistow has low population density, with less than 2,560 persons per square mile. This includes the area around the Alternative I station site.
    - ***Layover site.*** The City of Haverhill has areas of higher density, most significantly in the downtown and surrounding neighborhoods. One block group in downtown Haverhill has a density of over 20,000 persons per square mile. The layover site is located approximately 2.5 miles north of the downtown in a much more rural area. The site is within a block group with low population density, or less than 2,560 persons per square mile.
- **Housing Density.** Based on common housing density thresholds for different modes of public transit and the 2007-2011 ACS Five-Year Estimates, housing density was analyzed for block groups within the corridor and surrounding area. Similar to population density, housing density within the entire Town of Plaistow is low, at less than 1,280 dwelling units per square mile. Housing density is higher in block groups in the City of Haverhill, primarily in the downtown and surrounding areas. As shown in Figure F10 in Appendix F, the layover and station sites are both located within block groups with low household density.
- **Median Household Income**
    - ***Station site.*** According to the 2007-2011 ACS Five-Year Estimates, the median household income for the block group where the Alternative I station site is located was $70,357. This compares with a national median household income of $50,502 and a poverty threshold of $23,021 in 2011. As shown in Figure F11 in Appendix F, the adjacent block groups in Plaistow also have above median household incomes.
    - ***Layover site.*** As shown in Figure F11 in Appendix F, the median household income for the U.S. Census block group where the layover site is located was almost twice the U.S. national median at $100,718 in 2011. The adjacent block groups in Massachusetts and New Hampshire all have above median household incomes. Two block groups within one-half mile, including a block group in Atkinson, New Hampshire and one in Haverhill, Massachusetts also has median household incomes of twice the national median.
- **Transit-Dependent Populations**
    - ***Station site.*** According to the 2007-2011 ACS Five-Year Estimates, Rockingham County Census Tract 1011 in Plaistow, which includes the station site and a large surrounding area, has very few households that do not have a vehicle available. Out of the 4,065 households, only 25, or less than 1 percent, did not have a vehicle available.
    - ***Layover site.*** The layover site in Haverhill, Massachusetts is located within the Essex County Census Tract 2604.01. The 2007-2011 ACS Five-Year Estimates show that less

than two percent of households, or 42 out of 2,141 households, did not have a car available.

8.2.3.2 Environmental Justice Populations

- ***Station site.*** As shown in Figure F12 in Appendix F, the station site and the surrounding area are not located within an area with an Environmental Justice (EJ) population.
- ***Layover site.*** The layover site and the surrounding area are not located within an area with an EJ population. Several block groups located south of the layover site in Haverhill, Massachusetts have EJ populations. The primary concern for these block groups is the percentage of households with low income or the high percentage of minority residents.

8.2.4 TRANSPORTATION

8.2.4.1 Traffic Impacts

- **Impacts on Local Roadways.**
  - ***Station site*.** Traffic accessing the Alternative I station site is not expected to create any impacts on local roadways. The station site includes an existing 275-space park-and-ride lot on Westville Road. Based on 2030 future ridership projections, a maximum of 100 morning peak hour vehicular trips is anticipated. These vehicular trips include riders who drive and park at the station, as well as those who are dropped off by another person. Evening peak hour trips are anticipated to be 46 additional trips because the evening peak hour commute is more dispersed than the morning peak. Appendix H provides an analysis of traffic counts and other statistics used to estimate traffic impacts.
  - ***Layover site.*** The layover site is accessed from a new access road off Route 121 (Atkinson Depot Road). Access is limited to train crews, and no impacts on local roadway are expected.
- **Traffic Circulation Improvements.** The Alternative I station parking lot is designed to accommodate peak hour access from Westville Road. No additional traffic circulation impacts are anticipated due to motorists accessing the Alternative I station site.

8.2.4.2 Non-Vehicular Accessibility

- **Access to Public Transportation.** The Town of Plaistow does not currently have bus transit service. If future service were developed, the Alternative I parking area would provide adequate room for a bus drop-off and pick-up operations.
- **Pedestrian and Bicycle Accommodations**. Currently, there are limited pedestrian or bicycle accommodations within one-half mile of the station site. A narrow sidewalk runs along the western side of Westville Road from the existing park-and-ride lot at the intersection with Route 125, where there are crosswalks and pedestrian signals. Narrow sidewalks run on either side of Route 125, including on the bridge over the railroad tracks. Residential areas within one-half mile from the station site, including areas along Garden Road, Whiton Place, and Evans Avenue,

have no sidewalks. No bicycle lanes or other accommodations are located within one-half mile of the station. Most of the roadways within 3 to 5 miles of the station, including Route 125, Westville Road, and Route 121A (Main Street) do not have bike lanes. The station will include secure bike racks inline with most stations in the MBTA system.

8.2.4.3 Parking Supply

To accommodate a kiss-and-ride area, the existing 275-space parking lot will be slightly reconfigured and the total parking capacity will be increased to 282 spaces. This number of spaces is sufficient to meeting the near-term and long-term ridership. Approximately 10 percent of boardings at the station are anticipated to occur by kiss-and-ride, while the other 90 percent are anticipated by park-and-ride users. The station site has limited expansion potential for additional surface parking lots.

8.2.4.4 Commuter Rail Operations

The separation of the Alternative I layover and station sites creates an impact to passenger rail service. At the beginning and end of the day, trains must move nearly 1.1 miles between the two facilities. Since the additional movements between the station and layover would significantly increase the risk of passenger train revenue service delay due to the increased interaction with freight trains, additional operational time would need to be allocated to the trip, to minimize the risk. This potential interference would increase the cost of passenger service operations.

Located in close proximity to Route 125 (Plaistow Road), the Alternative I station is sited to attract both regional and local passengers. The station site has limited potential for on-site expansion of surface parking to accommodate future growth or expansion. Given the natural resource constraints (further described in subsequent sections), the layover site also has limited opportunity for on-site expansion of the layover facility.

8.2.4.5 Freight Rail Operations

The separation of the Alternative I layover and station sites also creates an impact to freight rail service. At the beginning and end of the day, trains must move between the station and layover sites, a distance of 1.1 miles. This impact would be compounded since the double tracked section of the line in Plaistow is where freight trains often wait either for train meets or to address other operational issues along the line. More frequent use of this segment of the line by passenger trains would likely negatively impact freight rail operations.

8.2.5 AIR QUALITY

Impacts to regional air quality from the proposed project would be influenced by changes in auto vehicle miles traveled and the hours and miles of operation of the commuter rail locomotives. There will be no

substantive difference in alternatives with regard to these regional air quality influencing factors, and the total project changes to those influencers are to be minor when taken into context of the total region.

Local impacts to air quality for this project will be driven by the proximity of sensitive receptors to the primary location of emission, the layover facility. Air pollutants of primary concern are nitrogen dioxide (NO2) from the diesel locomotives and the gas-fired HVAC system, and particulate matter smaller than 10 microns (PM10) and smaller than 2.5 microns (PM2.5) from diesel locomotives. Since modeling of potential air quality impacts is driven by estimated pollutant dispersion at the closest sensitive receptor, and the dispersion modeling will be the same for all alternatives, the distance of sensitive receptors from the primary point of emission will provide the greatest difference in impact. Therefore, for screening purposes, the distances of sensitive receptors have been compared. For Alternative I, the layover facility site is within 800 feet of a sensitive air quality receptor (residential uses), but the station site is immediately adjacent to a sensitive air quality receptor (residential uses).

8.2.6 NOISE AND VIBRATION

A general noise and vibration assessment was completed based on FTA guidelines. The complete methodology and results from the assessment, including graphics, are included in Appendix I. The assessment considered the noise and vibration impacts for the entire study corridor from Haverhill to the alternative sites in Plaistow. The assessment identified the noise and vibration sensitive receptors using FTA screening distance procedures. The majority of the noise-sensitive land uses along the study corridor are residential (Category 2) or churches, cemeteries, and schools (Category 3).

Based on a comparison of existing noise and vibration levels and anticipated project-related levels, the total number of noise and vibration impacts were identified for each alternative. Results from the analysis indicate that there are only Category 2 receptors (residential) within the project impact area. The majority of the noise sensitive receptors are common between all three alternatives; however, most of the moderate and severe impacts to these receptors are located in Haverhill. Alternative I has the highest number of total moderate and severe impacts, including the highest number of severe impacts.

The moderate and severe impacts related to Alternative I are shown in Table 8.2. All of these impacts can be mitigated by constructing noise walls or improving the noise insulation of select residential buildings. No additional receptors that would be impacted by project construction noise were identified.

Table 8.2. Alternative I Noise Impact and Mitigation Summary

Noise Receptor(s) Location	Category 2 Moderate	Category 2 Severe	Mitigation Measure(s) / Estimated Cost
Common Impacts/Mitigation (All Alternatives)			
Blossom Rd (Plaistow, NH)	3	1	Building insulation ($180,000)
Rosemont St (Haverhill, MA)	20	8	Building insulation ($1,260,000)
Cogswell St (Haverhill, MA)	5	0	Noise wall ($960,000)
Jeffrey Ln (Haverhill, MA)	6	0	Noise wall ($470,000)
Alternative I Additional Impacts/Mitigation			
Joanne Drive	0	1	Building insulation ($45,000)
Westville Road Station	n/a	n/a	Noise wall ($785,000)
TOTAL IMPACTS – Alternative I	34	10	$3,700,000

Although there were no noise impacts projected that were directly related to locomotive noise at the Alternative I station or layover sites, additional analysis was conducted to evaluate the potential benefits of additional noise walls near the station and layover sites. As defined by the FTA, a moderate noise impact occurs when the change in cumulative noise is noticeable, but not expected to "cause strong, adverse reactions from the community" (FTA 2006). Because nearby homes would be expected to hear project-related noise, the Alternative I sites were evaluated to determine if there would be any noticeable changes in cumulative noise from the proposed station and layover locomotive idling. The additional assessment modeled the use of noise walls at the station or layover sites to attempt to reduce audible noise from idling locomotives.

The areas where locomotive idling above the existing ambient noise levels can be heard are shown in black on Figure 8.1 (Alternative I station site) and Figure 8.2 (Alternative I layover site). At the layover site, two buildings are located within the area that would experience elevated noise levels. Fifteen structures are located within the area that would experience elevated noise levels near the station site.

If a noise wall is constructed, noise impacts above existing noise levels would typically be reduced in the area where locomotive idling occurs. This area is shown within the purple area on Figure 8.1. A noise wall was not modeled at the Alternative I layover site (Figure 8.2) because only two industrial structures are located within the area where noise from the locomotives would be at least minimally audible. At the station site, the noise wall would reduce noise levels such that the number of buildings within the elevated noise area decreases from 15 to 10. The costs for this noise wall are included within the total noise mitigation costs shown in Table 8.2.

In many cases, the noise wall actually reduces noise to levels even lower than the existing ambient noise. Also shown on Figure 8.1 are the areas that would experience a reduction in ambient noise below the existing noise level. This includes locations that are up to 1,500 feet away from the station site. Near the station site, 22 buildings are located within the areas that experience a reduction in ambient noise levels resulting from a noise wall.

Using FTA guidance and measurements of existing train pass-byes, no project-related vibration impacts are predicted as part of any of the alternatives. Therefore, no mitigation is required. Two additional residences adjacent to the station site could be impacted by construction vibration. The impacts from construction-related vibration to these two residences could be mitigated by limiting the use of loaded trucks and large bulldozers near the residences.

Figure 8.1 Alternative I Station Site – Noise Mitigation Analysis

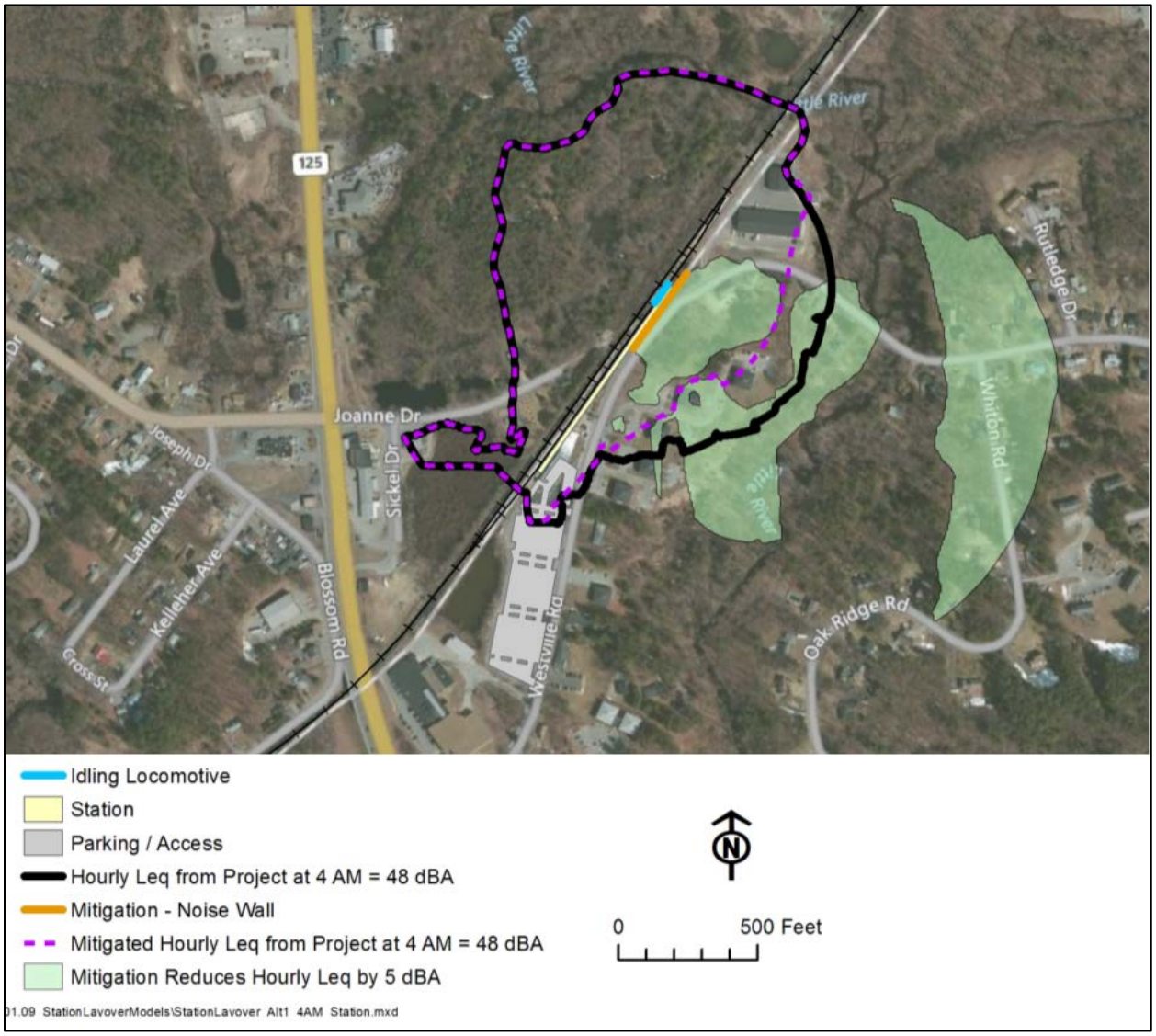


Figure 8.2 Alternative I Layover Site – Noise Mitigation Analysis

8.2.7 HAZARDOUS MATERIALS

As part of a comprehensive environmental assessment for this study, each alternative was evaluated for potential hazardous waste impacts and other recognized environmental concerns. The evaluation included a search of reported state and federal listings using the Environmental Database Resources, Inc. (EDR) database as well as a review of site history and a field visit. The geographic search area for the

EDR database review was defined as a 1,000-foot buffer on either side of the railroad lines in the vicinity of the alternatives evaluated. The full evaluation is included in Appendix J.

No sites were identified within the Alternative I layover facility site by the EDR database search. However, the EDR database search identified several sites in the general vicinity of the Alternative I layover facility site (see EDR Site No. 20-27 in Appendix J).

The EDR database search identified the following sites within the Alternative I station site (identified as Area 4 in Appendix J):

- 38 Westville Road – Blinn Autobody (EDR Site #10);
- 37 Westville Road – Blinn Autobody/Freedom Auto & Tire (EDR Site #12);
- 39 Westville Road – Blinn Autobody/Freedom Auto & Tire (EDR Site #12); and
- 57 Westville Road – Westview Park Condominiums (EDR Site #15).

The EDR database search also identified several sites in the immediate vicinity of the Alternative I station site (see EDR Site No. 9, 11, 13, 14, and 16-19 in Appendix J).

In July 2014, site visits were performed at the aforementioned sites identified in the study area of the Alternative I layover facility and station sites. During the site visits, no observations were made indicating recognized environmental conditions at these sites. However, based on the results of the environmental evaluation, contaminated soil and/or groundwater associated with current and former operations at and in the vicinity of the Alternative I sites could be encountered during site development. A subsurface investigation was not performed at the Alternative I sites as part of this evaluation to determine whether contaminated soil and/or groundwater is located at the Alternative I sites.

8.2.8 VISUAL RESOURCES/AESTHETICS

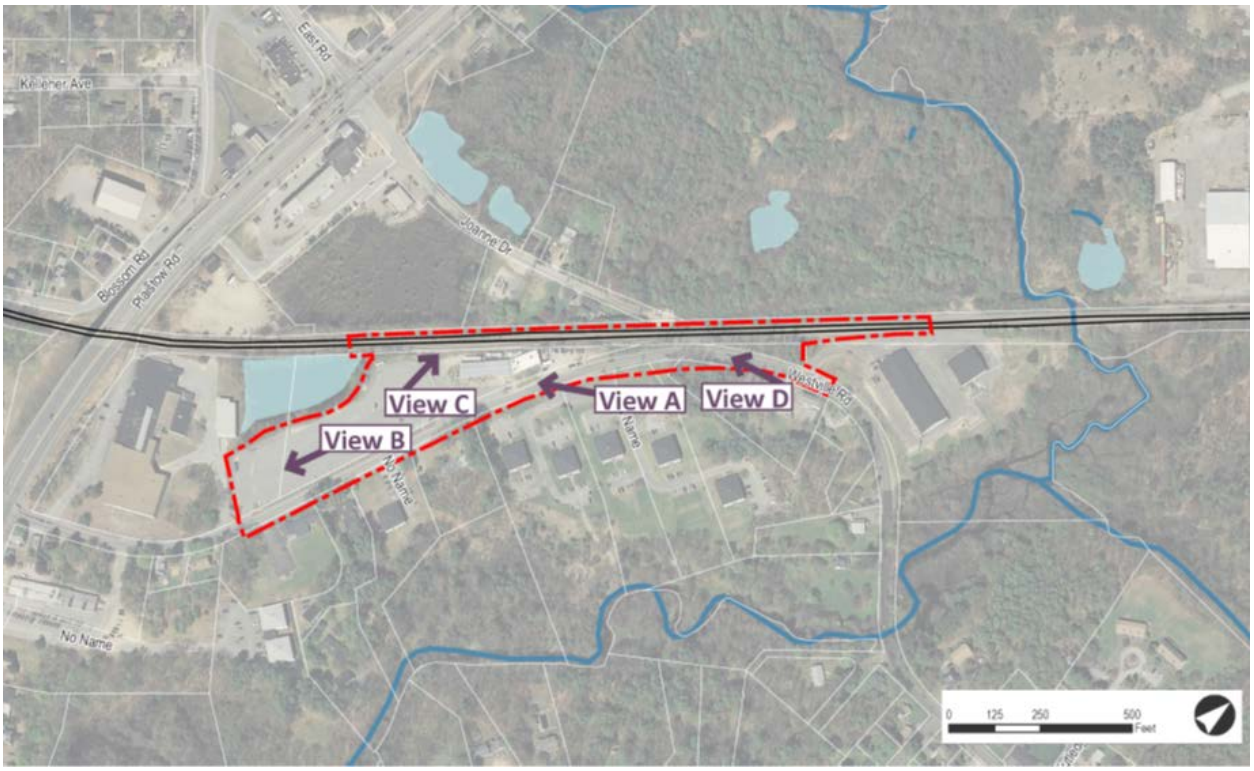
8.2.8.1 Station Site Visual Assessment

The Alternative I station site area is a linear site on the western side of Westville Road. The general visual character of the area along the two-lane roadway consists of multi-family residential buildings set back from the street on the east and commercial and industrial buildings with numerous parking lots on the western side of the roadway, including the station site itself. In one section, Westville Road runs close to the railroad tracks and is separated by a small, vegetated area or ditch.

The primary viewer groups within the Alternative I station site include drivers and passengers on Westville Road, occupants or visitors of adjacent buildings, and pedestrians or bicyclists at street level. For drivers and passengers on Westville Road, building occupants, and street-level pedestrians and bicyclists, the views along Westville Road are similar.

The Alternative I station site includes an existing surface parking lot and a one-story auto-body shop and associated parking lot to the north on Westville Road. North and south of the site are one-story commercial and industrial buildings with parking lots. A pond is located on the southwest corner of the site along the railroad tracks. Across Westville Road to the east are two-story multi-family residential buildings that are set back from the street on large parcels with parking lots in the front. Across the railroad tracks to the west are three smaller residential structures, an electrical utility substation, and large undeveloped areas with ponds, heavy vegetation, and wetlands. Beyond the adjacent parcels to the south and west, additional commercial buildings are located along Route 125, including big-box retailers, and smaller auto-oriented establishments. To the north and east are low-density residential areas and undeveloped vegetated areas along the Little River. The existing visual character in the area is shown in an overview map (Figure 8.3) and photographs (Figure 8.4).

Figure 8.3 Alternative I Station Site Visual Assessment Viewpoints



Alternative I proposes the replacement of the one-story, auto-body commercial structure with an 835-foot long, station platform with a 200-foot long canopy. The station platform is elevated four feet and the total height of the platform and canopy is 14 feet. The existing parking area is expanded to accommodate additional parking spaces and a kiss-and-ride drop off area near new pedestrian ramps and sidewalks to access the platform. An example of a similar existing commuter rail station and canopy in Wilmington, Massachusetts is shown in Figure 8.5. Westville Road is realigned slightly to the east at the northeast edge of the site and a continuous sidewalk with landscape area will be added along the roadway.

Figure 8.4 Alternative I Station Site Photos

Top Left (View A): View looking west across Westville Road towards existing commercial business on site.
Bottom Left (View B): View looking south from existing park-and-ride lot towards existing auto-body shop.
Top Right (View C): View looking northwest towards auto-body shop and across the railroad tracks to Joanne Drive.
Bottom Right (View D): View looking south along Westville Road at northern end of station site.

Overall, the change in visual character would result in minor impacts. The primary visual impact to drivers and passengers on Westville Road and building occupants would be the removal of the one-story commercial building, addition of the station platform and canopy, the expansion of parking, and addition of landscape area along the western side of the roadway. Pedestrian or bicyclist viewers at the street level would experience a similar change in visual character, but would experience an enhancement with the addition of a sidewalk and landscaping along the roadway. With the clearing of vegetated areas along the eastern side of the tracks and the addition of the station platform, all viewers would be able to see across the tracks towards the Joanne Drive area.

Figure 8.5 Wilmington Station Example Photographs

Left: Front view of elevated station platform and canopy at Wilmington Station from across the railroad tracks.
Right: Side view of elevated station platform and canopy at Wilmington Station.

8.2.8.2 Layover Site Visual Assessment

The Alternative I layover site area is a linear site on the eastern side of the main line tracks approximately 750 feet south of Route 121 (Atkinson Depot Road) near the state border in Haverhill. Atkinson Depot Road rises up from the surrounding area to pass over the main line tracks and the Little River. The area on either side of the main line tracks and Little River is lower than the surrounding area. The general visual character of the area along the three-lane roadway is a mix of residential, commercial, and institutional buildings set back from the street and surrounded by wooded areas or pastures. The layover site is screened from the roadway by a commercial business (Dover Saddlery and Dover Feed and Stable) on the south side of Atkinson Depot Road.

The primary viewer groups within the Alternative I layover site include drivers and passengers on Atkinson Depot Road, occupants or visitors of adjacent buildings, and pedestrians or bicyclists at street level. For drivers and passengers on Atkinson Depot Road and street-level pedestrians and bicyclists, the views of the layover facility would be limited. Building occupants in the adjoining properties that are higher in elevation than the layover facility would have the greatest viewing potential.

The change in visual character due to the Alternative I layover facility would result in minor impacts. The primary visual impact to building occupants would be the removal of wooded areas to accommodate the layover crew building and parking area and layover tracks. Drivers and passengers, and pedestrians and bicyclists at street-level would experience a minor change in visual character with the addition of an access road through the property closest to the roadway and along the rail tracks.

8.2.9 NATURAL AND CULTURAL RESOURCES

8.2.9.1 Natural Resources

A preliminary field review to identify the approximate locations of regulated water resources (including wetlands, streams, and vernal pools) for each alternative was completed by Normandeau (Appendix K); however, formal delineations were not completed by Normandeau.

- ***Station Site.*** As shown on Figure C4 in Appendix C and the graphics in Appendix K, the majority of the Alternative I station site on Westville Road is mostly developed. A large pond wetland (PUBH) and associated ditch area are located on the southwest corner of the site. Inlets or outlets to the pond were not observed during site visits. The pond likely has permanent hydrology. It has a shrubby fringe with some herbaceous species and many water lilies and other aquatic plants throughout. The remainder of the site is dry or developed. Based on the preliminary field review performed (Appendix K), water resource impacts are expected to be minimal, as described below.
    - *Wetlands.* Wetlands impacts from the development of the Alternative I station site are restricted to a ditch area along the adjacent railroad tracks resulting in approximately 0.02 acres (887 square feet) of wetland impacts.
    - *Stream Buffers.* No stream buffers will be impacted.
    - *Stream Crossings*. No stream crossings will be required.
    - *Floodplain.* The station site is not located within the floodplain. The Little River is approximately one-tenth of a mile to the east and north and is surrounded by flood hazard areas.
    - *Environmentally-Sensitive Areas.* Species are protected at the federal level and the state level by the U.S. Fish and Wildlife Service (USFWS) and the New Hampshire Fish and Game Department (NHFG), respectively. A search of the USFWS Endangered Species database for Rockingham County, NH identifies ten federal-listed species known or believed to occur in Rockingham County, all of which are found in coastal or marine habitats with the exception of the Small whorled pogonia (*Isotria medeoloides*). Consultation with the USFWS will be required to obtain specific information as to whether the Small whorled pogonia is known to occur at the station site. The NHFG identifies listed species at the state level. In January 2015, consultation was performed with the New Hampshire Natural Heritage Bureau (NHB). Via letter dated January 21, 2015, the NHB indicated that there was an NHB record (e.g., rare wildlife, plant, and/or natural community) present in the vicinity of the Alternative I site, NHB does not expect it will be impacted by the proposed Project. In 2005, the NHFG created the state's first Wildlife Action Plan, intended to provide New Hampshire decision makers with important tools for restoring and maintaining critical habitats and populations of the state's species of conservation and management concern. The Wildlife Action Plan includes several tools to assist communities with integrating wildlife habitat

conservation decisions about land use, such as maps that depict the different habitats throughout the state, habitat quality and conservation focus area maps. As shown on the 2010 New Hampshire Wildlife Habitat Land Cover map, the Alternative I station site is not located in areas of known and potential critical wildlife habitat in the state. Additionally, as shown on the 2010 Highest Ranked Wildlife Habitat by Ecological Condition map, the station site is not located within an area identified as highest ranked habitat, supporting landscapes, or conservation land.

- *Potential Vernal Pools & Buffer Areas.* No potential vernal pools were identified within or near the impact area associated with the Alternative I station site. Potential vernal pools were identified northwest of the site, but there will be no impacts within the 100-foot terrestrial buffer. However, there would be impacts within the 750-foot terrestrial buffer.

- ***Layover Site.*** The Alternative I layover site is primarily forested with open meadow to the north, some of which is wet meadow (See Figure C3 in Appendix C and Appendix K). Soils mapped within the site include fine sandy loams and silt loams, with hydric soils mapped along the Little River. In general, the site slopes from west to east, with the lowest areas along the Little River. The river ranges from 15 to 30 feet wide, has a predominantly sandy/silty bottom, and large forested and scrub-shrub floodplain wetlands along the river on the majority of the site. Several wetlands swales extend upslope within depressions from east to west; however, the majority of the western portions of the site are upland. An intermittent stream flows from a culvert outlet associated with the railroad tracks slopes east towards the Little River in the north end of the site, and the other swales associated with smaller intermittent or ephemeral drainages are located in the central/southern portion of the site. Several potential vernal pools were noted within the floodplain wetlands associated with the Little River on the eastern side of the site.
    - *Wetlands.* The wetlands located within the site are generally associated with the Little River, which flows along the eastern edge of the site. The layover facility will impact less than 0.08 acres (3,547 square feet) of wetlands.
    - *Stream Buffers.* The layover facility track requires a stream crossing of the intermittent stream that flows from a culvert outlet under the main line railroad tracks. This crossing will impact 0.49 acres of the 100-foot stream buffer associated with the intermittent stream.
    - *Stream Crossings*. The layover facility lead track would need to cross the intermittent stream that is already crossed by the main line track.
    - *Floodplain.* The Federal Emergency Management Agency (FEMA) floodplains are generally confined to the lower elevations along the Little River. The floodplain mapped across the central portion of the layover facility site may be erroneous based on topography; therefore, site specific review and flooding calculations are recommended. The majority of the site has been mapped as AE (Regulatory Floodway) flood hazard zone; the western edge of the site are within the AE (1% Annual Chance of Flooding with Base Flood Elevation) and X (0.2% Annual Chance of Flooding) flood hazard zones. Approximately 0.49 acres of the site are within the floodplain.

- *Environmentally-Sensitive Areas.* Species are protected at the federal level and the state level by the U.S. Fish and Wildlife Service (USFWS) and the Massachusetts Office of Energy and Environmental Affairs Natural Heritage & Endangered Species Program (NHESP), respectively. A search of the USFWS Endangered Species database for Essex County, MA identifies a total of ten federal-listed species known or believed to occur in Rockingham County, all of which are found in coastal or marine habitats with the exception of the Small whorled pogonia (*Isotria medeoloides*). Consultation with the USFWS will be required to obtain specific information as to whether the Small whorled pogonia is known to occur at the layover facility site. A review of the NHESP state-listed species for Haverhill, MA indicates that 17 listed species are known or believed to occur in Haverhill, MA. Consultation with the NHESP will be required to obtain specific information as to whether any state-listed species are known to occur at the layover facility site.
- *Potential Vernal Pools & Buffer Areas.* Potential vernal pools are located in the floodplain areas along the Little River, and need to be reviewed during the spring amphibian breeding season to confirm if they are vernal pools or not. If vernal pool species are present, the current design would impact substantial portions of the 100- and 750-foot pool envelope and terrestrial habitat buffers associated with the pools. Additional information about vernal pool impacts and regulatory requirements is outlined in Appendix K.

8.2.9.2 Historic/Cultural Resources

A preliminary reconnaissance to evaluate the presence of historic architectural resources at each alternative and in their immediate area was completed in support of this alternative analysis. The results of the preliminary reconnaissance are included in Appendix L and are summarized below.

- ***Station Site***. The Alternative I station is located on a developed site on Westville Road adjacent to an industrial facility to the south on Plaistow Road and residential uses to the east. Construction of the station would require demolition of an auto-body repair business. Based on architectural character (form, shape, materials, etc.), this structure appears to have been built in two stages within the last 30 years. Due to historic age (pre-1967 construction for this analysis), demolition would not constitute an effect on historic resources. Preliminary reconnaissance finds that construction at the Alternative I station site would be unlikely to affect any historic architectural resources, including the following adjacent properties:
  - The nearest architectural resources of historic age are two adjacent houses located west of the station site across Westville Road. These two properties, a circa 1960 ranch house and a circa 1900 gable-front vernacular house, do not appear (on cursory inspection) to represent historically or architecturally significant resources.
  - Several other properties of historic age are distributed along either side of Plaistow Road and Joanne Drive to the west of the site across the railroad tracks. The Plaistow

Townwide Area Form study was completed in 2003 to evaluate the Town of Plaistow's historic architectural resources. The station site is located within the Westville village that was assessed as part of the 2003 study. The study concluded that the area was not eligible for listing as a historic district on the National Register of Historic Places (NRHP) due to the lack of integrity.

- Two additional historic houses are located northeast of the site along Westville Road. The houses are approximately 400 feet or more from the site and are buffered from potential effect on historic resources by more recent buildings and mature tree cover that blocks the sight lines.

- ***Layover Site.*** The Alternative I layover site is located on an undeveloped parcel that is screened by dense mature tree cover around most of the perimeter of the site. The exception are post-1967 industrial and commercial structures located north and northwest of the site. No architectural resources of historic age appear to be within close proximity to the site. Consequently, the preliminary reconnaissance finds that construction at the Alternative I layover site would be unlikely to affect any historic architectural resources.

8.2.9.3 Archeological Resources

- ***Station site.*** Past construction of roads, parking lots, businesses, and condominiums on and near the station site caused significant disturbance to natural landforms across the vast majority of the site. Only small sections retain any semblance of archeological integrity. During site visits, no evidence of Euroamerican occupation was found. Two areas with potential sensitivity for Native American archaeological resources were identified: a small terrace overlooking a detention pond at the southern end of the site and a patch of grassy lawn at the northern end of the site. A shovel test pit (STP) near the detention pond produced no artifacts and revealed evidence for significant alteration to the natural topography. The station site is unlikely to retain intact archaeological deposits related to pre-contact for Euroamerican activity. However, a final assessment remains contingent on a review of modern utility plans.
- ***Layover Site.*** Historic maps of Haverhill in 1872 show no Euroamerican structures within the layover site and archeologists found no evidence of Post-Contact occupation. Based on the lack of visible features and the close proximity to a major roadway (likely resulting in disturbance of this area), the layover site has low sensitivity for Euroamerican archaeological resources. Site investigations revealed that level terrace areas are adjacent to the Little River on the eastern edge of the site. Such terraces are highly sensitive for Pre-Contact archeological deposits according to current predictive settlement models. Consequently, the entire length of the site along the Little River was determined to have a moderate sensitivity for Native American Cultural Resources. In the event that the Alternative I layover site is selected as the preferred alternative, further archaeological investigations are recommended on this site.

8.2.10 OPERATIONAL FEASIBILITY

8.2.10.1 Layover Facility

The placement of the layover facility at the last station location is consistent with current MBTA operations policy. The reason for locating the layover at the last station is this minimizes movements between the layover facility and the station when trains are positioned at the station for initial trips of a day; and again when trains are moved to the layover upon completion of the last trip of day.

However, the Alternative I layover facility and station are separated by over one mile. This separation would create operational issues for MBTA related to the increased operation times, costs, and risks related to service delay inherent in the movement of trains between the layover facility and station. Currently, the MBTA has to move one train from Haverhill to Boston at the end of the day for overnight storage. In the morning, the train is moved back to Haverhill to begin morning operations. Although the distance between the Alternative I sites is much less than the current movement between Haverhill and Boston, the separation still creates additional costs and inefficiencies.

The MBTA has identified this alternative as not feasible due to the operational concerns and the added risk of delays that could impact the entire MBTA north side commuter rail system. Additionally, the MBTA was concerned about complexity of a NHDOT-sponsored project located in Massachusetts.

8.2.10.2 Station

The Alternative I station site is located on the eastern side of the main line tracks, approximately 1.1 miles north of the Alternative I layover site. Although the proposed station track is double-ended, trains would likely enter and depart the separate station track from the southern lead track. This would eliminate the need for trains to change directions on the main line tracks. Because the station track is separate from the main line track, a train could be stored here overnight, if necessary.

8.2.10.3 Capital Costs

A cost estimate was prepared for Alternative I that evaluated the capital costs to construct necessary infrastructure related to the extension of commuter rail service including construction of the layover facility, station, parking, roadways or access roads, main line track, and signal improvements. The estimate also includes noise impact mitigation measure costs; site acquisition, demolition, and relocation costs; engineering and design (10 percent of the improvement costs) costs; project administration and construction management (10 percent) costs; and contingency (30 percent) costs.

At $40.5 million, Alternative I has the lowest capital costs of the three alternatives. The lower costs associated with this alternative are related to the cost-efficiency of using an existing NHDOT park-and-

ride facility for the station. The real estate acquisition costs and construction of a parking lot will be significantly lower than the other costs. Table 8.3 below summarizes the capital costs for Alternative I.

Table 8.3. Alternative I Capital Costs

Capital Cost	Alternative I	Comments:
Layover	$ 5,700,000	Includes trackwork, crew building, electrical work, bridges, retaining walls, and site work, as applicable.
Parking/Roadway Improvements	$ 1,700,000	Includes layover and station parking, sidewalks, lighting, and access roads.
Station	$ 3,700,000	Includes platform, canopy, ramps, and lighting.
Main line Improvements	$ 11,300,000	Includes signal upgrades, turnouts, and surfacing.
Noise Mitigation	$ 3,700,000	Includes sound walls and building insulation.
Wetland Mitigation	$ -	
Real Estate/Demolition	$ 900,000	Includes land acquisition, relocation, and demolition, as applicable.
Subtotal	$ 27,000,000	
Engineering/Design (10%)	$ 2,700,000	
Project Administration & Construction Management (10%)	$ 2,700,000	
Contingency (30%)*	$ 8,100,000	
ALTERNATIVE I TOTAL	$ 40,500,000	

** The level of contingency is consistent with FTA guidance.*

8.2.10.4 Operations and Maintenance (O&M) Costs

The operations and maintenance (O&M) costs for all alternatives have been assumed to be zero for NHDOT or local entities based on a plan to have the station and layover facility built in the Plaistow area for use by MBTA. In exchange for construction of the station and layover facility by others, MBTA would fund and operate the commuter rail service from the Plaistow area. However, MassDOT officials have stated that with an alternative where the station and layover are not co-located, the assumption of zero local or State of New Hampshire contributions for operations and maintenance costs would require further analysis due to the less efficient operating plan.

8.3 Alternative II

The Alternative II station and layover facility site is located on Joanne Drive east of Plaistow Road (Route 125) in the Town of Plaistow. The majority of the site is currently undeveloped, and is bordered by the existing rail line and a small electric transmission/distribution line to the east and Plaistow Road and

associated commercial businesses to the west. The Little River defines the site to the north. The majority of the site is forested, with some residential and commercial properties to the south and west. The site includes three ponds and several wetlands areas.

8.3.1 LAND USE/NEIGHBORHOOD CHARACTER/ZONING

8.3.1.1 Compatibility with Planning Policies

- **Town of Plaistow Master Plan**
  - **Vision.** As described under Alternative I, the Town of Plaistow Master Plan is the town's guide for future growth. The plan outlines the future land uses within the town and establishes a set of goals and objectives. Regarding the introduction of passenger rail services, the plan identified two goals and supporting objectives that support the extension of service into Plaistow.
  - **Future Land Use.** The Alternative II site is located within three Future Land Use areas as designated on the Town of Plaistow Future Land Use Map (See Figure F1 in Appendix F).
    1. The eastern portion of the site is located within the Light Industrial area. According to the Plaistow Master Plan, desired used in Light Industrial areas include a variety of non-residential uses including light manufacturing, assembly, research and development facilities, warehousing and distribution, and service uses. The majority of the Alternative II facilities are located in this area. A station and layover facility is consistent with this Future Land Use category.
    2. The western edge of the site that fronts on Route 125 (Plaistow Road) is located within the Commercial Corridor area. Desired uses in this area include automobile-oriented uses, offices, banks, restaurants, and lodging. A portion of the layover facility including the crew parking area extends into this Future Land Use area. A station and layover facility may be consistent with this Future Land Use category.
    3. The southwestern corner of the site and the northern portion of the site adjacent to the Little River are designated as Resource Protection and Conservation Areas. This area is intended for restricted development or use and only uses that do not adversely affect the ecological or natural resource value of these areas should be allowed. The Alternative II site layout avoids the areas of the designated as Resource Protection and Conservation Areas.
- **Zoning**. As shown on Figure F2 in Appendix F, the Alternative II station and layover facility is located within the Town of Plaistow Commercial 1 (C-1) zoning district. Multi-modal park-and-ride lots are permitted within this zoning district, but rail services or rail stations are not permitted without a variance. Additionally, the Town of Plaistow Zoning Regulations also includes a Wetlands Overlay District. Although the overlay district is not shown on the zoning map, this overlay district may occur in any zone and may be applicable to the alternative sites

located in Plaistow. This overlay district contains all wetlands areas and wetlands buffers as defined below (from Section 220-20B and Section 220-21 of the Plaistow Zoning Ordinance). A variance may be required for a station use on this site and development would be subject to the Plaistow site plan review process.

8.3.1.2 Land Use Compatibility

- **Adjacent Land Uses.** As shown on Figure F7 in Appendix F, commercial and residential uses are located along Plaistow Road to the west of the Alternative II site. This includes an auto-service shop, an auto dealership, and a hardware store. Farther west, residential uses are concentrated along East Road. The site is bordered on the north by the Little River, which is surrounded by undeveloped open space and wetlands. Further north along the west side of the main track is former industrial land. On Joanne Drive south of the site, existing uses include single-family residences, commercial uses, wetlands, a pond, and an electrical substation. Across the main track to the east are multi-family and low-density single-family residential uses along Westville Road. Further east are additional single-family residences along Oak Ridge Road and Whiton Place.
- **Access/Connectivity.** Access to the Alternative II site is via Joanne Drive. The site is less than one quarter mile from an existing lighted four-way intersection with Route 125 (Plaistow Road), Joanne Drive, and East Road. Route 125 is major north-south highway and East Road provides connections to Atkinson to the west. Joanne Drive dead-ends at the rail line and is a two-lane local roadway. In 2017, construction on Route 125 will begin as the roadway between Old Road and East Road/Joanne Drive is widened to four lanes with a median. The project also includes construction of a service roadway between Old Road, and an existing access road to Baron's Industrial Park will provide access to the rear of properties on the east side of Route 125. At the intersection with Joanne Drive, a turn-around has already been constructed to allow southbound vehicles on Route 125 to reverse direction due to the addition of the median. Access to the crew parking at the layover facility is provided from this turnaround.
- **Proximity to Residential Uses.** Adjacent single-family residential uses are located to the south on Joanne Drive and west on Plaistow Road. Approximately 341 residential units are located within one-half mile from the Alternative II site.
- **Protected and Recreational Open Space.** The Little River forms the northern border of the site. Most of the site is undeveloped wetlands and forested land. No adjacent parcels are protected open space or recreational land. The layover site and the adjoining parcels do not appear to qualify as a Section 4(f) property.
- **Potential for Adjacent Compatible Development.** The site is constrained by wetlands and water bodies. This alternative is designed to avoid the majority of these areas, so any additional development on the site or on adjacent parcels would have to be sited on the wetlands. While, approximately eight non-constrained acres of the site would remain undeveloped due to the site layout, this alternative offers limited potential for TOD-related development due to the site

configuration. Potential exists to connect to future development on the Testa Realty, Inc. property to the north or to the existing NHDOT park-and-ride lot east of the main line rail tracks.

8.3.2 LAND ACQUISITIONS

8.3.2.1 Acquisitions Required

The Alternative II site is situated on five parcels that total 27.22 acres in size. Approximately 13 acres of the total acreage will be required for the layover facility and station development. Two sites are currently undeveloped, but three parcels have existing residential units that would be displaced. A Unitil electric substation is located on one of the residential parcels, but will not be impacted. The table below summarizes the ownership and current use for Alternative II parcels shown on Figure F7 in Appendix F.

Table 8.4. Alternative II Parcels

Parcel ID (Map/Lot)	Site Address	Owner	Existing Use	Zoning	Size (acres)	Current Assessment
27-55	81 Plaistow Rd	Chart Inc.	Undeveloped	C-1	20.7	$152,470
27-38	2 Joanne Dr	Chart Inc.	Undeveloped	C-1	4.4	$24,180
27-40	6 Joanne Dr	Joseph& Linda Fitzpatrick	Two-Family Residential	C-1	0.75	$141,430
27-39	4 Joanne Dr	Vicki Michel	Single-Family Residential	C-1	0.1	$88,050
27-41	5 Joanne Dr	Harry & Heather Treakle	Single-Family Residential; Unitil electric substation	C-1	1.27	$193,100

Source: Town of Plaistow Assessor

8.3.3 SOCIO-ECONOMIC/ENVIRONMENTAL JUSTICE

8.3.3.1 Socio-economic Conditions

- **Population density.** Using FTA New Starts Policy Guidance from August 2013 and 2007-2011 ACS Five-Year Estimates, the average population density was analyzed for block groups in the corridor and surrounding area. FTA guidance provided breakpoints for population density (persons per square mile). Using the FTA breakpoints, the entire Town of Plaistow has low population density of less than 2,560 persons per square mile (see Figure F9 in Appendix F).
- **Housing density.** Based on common housing density thresholds for different modes of public transit and the 2007-2011 ACS Five-Year Estimates, housing density was analyzed for block groups within the corridor and surrounding area. Similar to population density, housing density within the entire Town of Plaistow is low, at less than 1,280 dwelling units per square mile (see Figure F10 in Appendix F).

- **Median household income.** The median household income for the Alternative II site block group was $70,357 according to the 2007-2011 ACS Five-Year Estimates. This compares with a national median household income of $50,502 and a poverty threshold of $23,021 in 2011. As shown in Figure F11 in Appendix F, the adjacent block groups in Plaistow also have median household incomes above the national median.
- **Transit-dependent population.** According to the 2007-2011 ACS Five-Year Estimates, Rockingham County Census Tract 1011 in Plaistow, which includes the Alternative II site and surrounding area, has very few households that do not have a vehicle available. Out of the 4,065 households, only 25, or less than 1 percent, did not have a vehicle available. This is less than the margin of error.

8.3.3.2 Environmental Justice Populations

As shown in Figure F12 in Appendix F, the Alternative II site and the surrounding area are not located within an area with an EJ population.

8.3.4 TRANSPORTATION

8.3.4.1 Traffic Impacts

- **Impacts on Local Roadways.** The Alternative II site is not expected to create impacts on local roadways. The site is accessed from Joanne Drive, which has an existing signalized intersection with Route 125. The station parking is located on either side of Joanne Drive, which will be improved as part of the alternative development. Based on 2030 future ridership projections, a maximum of 100 morning peak hour vehicular trips is anticipated. These vehicular trips include riders who drive and park at the station, as well as those who are dropped off by another person. Evening peak hour trips are anticipated to be 46 additional trips because the evening peak hour commute is more dispersed than the morning peak. Appendix H provides an analysis of traffic counts and other statistics used to estimate traffic impacts.
- **Traffic Circulation Improvements.** The Alternative II station parking lot is designed to accommodate peak hour access from Joanne Drive and Route 125. No additional traffic circulation impacts are anticipated due to motorists accessing the Alternative II site.

8.3.4.2 Non-Vehicular Accessibility

- **Access to Public Transportation.** The Town of Plaistow does not currently have bus transit service. If future service were developed, the Alternative II parking area would provide adequate room for bus drop-off and pick-up operations.
- **Pedestrian and Bicycle Accommodations.** Currently, there are limited pedestrian or bicycle accommodations within one-half mile of the station site. Joanne Drive is a narrow roadway with no sidewalks. The intersection of Joanne Drive and Route 125 (Plaistow Road) has pedestrian

crosswalks and signals. Sidewalks along Route 125 are narrow. Residential areas within one-half mile from the station, including areas along East Road, Marianne Drive, and Laurel Avenue do not have sidewalks. Commercial areas along Blossom Road have narrow sidewalks along the roadway. No bicycle lanes or other accommodations are located within one-half mile of the station. Bike lane lines will need to be added to Route 125 (Plaistow Road), East Road, Westville Road, and Route 121A (Main Street) approximately 3-5 miles from the station. The station will include secure bike racks consistent with most stations in the MBTA system.

8.3.4.3 Parking Supply

The Alternative II site has 219 parking spaces for the station. This number of spaces is sufficient to meeting the near-term and long-term ridership. Approximately 10 percent of boardings at the station are anticipated to occur by kiss-and-ride, while the other 90 percent are anticipated by park-and-ride users. The site has limited expansion potential for additional surface parking spaces. A pedestrian bridge over the main line track could provide access to additional parking at the existing NHDOT park-and-ride lot on Westville Road.

8.3.4.4 Commuter Rail Operations

Alternative II would facilitate the successful operation of commuter rail service. Since trains can operate between the station and layover facility without accessing the main line tracks risk of service delay related to non-revenue service is minimal.

Located in close proximity to Route 125 (Plaistow Road), the Alternative II station is sited to attract both regional and local passengers; although, the station site has limited potential for on-site expansion of surface parking to accommodate future growth or expansion.

8.3.4.5 Freight Rail Operations

Alternative II would have minimal impact on existing freight service. Trains can connect between the station and layover facility without accessing either main line track. Commuter rail train traffic operating on the right-of-way between Haverhill Station and Plaistow Station would have schedules and dispatching coordinated with freight operators to ensure minimal conflicts between passenger and freight trains.

8.3.5 AIR QUALITY

Local impacts to air quality for this project will be driven by the proximity of sensitive receptors to the primary location of emission, the layover facility. Air pollutants of primary concern are nitrogen dioxide (NO2) from the diesel locomotives and the gas-fired HVAC system and particulate matter smaller than 10 microns (PM10) and 2.5 microns (PM2.5) from diesel locomotives. Since modeling of potential air

quality impacts is driven by estimated pollutant dispersion at the closest sensitive receptor, and the dispersion modeling will be the same for all alternatives, the distance of sensitive receptors from the primary point of emission will provide the greatest difference in impact. Therefore, for screening purposes, the distances of sensitive receptors have been compared. For Alternative II, the combined layover facility and station site is the farthest from a sensitive air quality receptor (residential uses) at 600 feet. This site has a low potential for residential/school air quality impacts.

8.3.6 NOISE AND VIBRATION

A general noise and vibration assessment was completed based on FTA guidelines. The complete methodology and results from the assessment, including graphics, are included in Appendix I. The assessment considered the noise and vibration impacts for the entire study corridor from Haverhill to the alternative sites in Plaistow. The assessment identified the noise and vibration-sensitive receptors using FTA screening distance procedures. The majority of the noise-sensitive land uses along the study corridor are residential (Category 2) or churches, cemeteries, and schools (Category 3).

Based on a comparison of existing noise and vibration levels and anticipated project-related levels, the total number of noise and vibration impacts were identified for each alternative. Results from the analysis indicate that there are only Category 2 receptors within the project impact area. The majority of the noise sensitive receptors are common between all three alternatives and most of the moderate and severe impacts are located in Haverhill. Alternative II has the fewest number of total moderate and severe impacts. While this alternative has the highest number of severe impacts, three residences along Joanne Drive that are unique to this alternative will need to be acquired to accommodate the site design and will consequently not require additional mitigation.

The moderate and severe impacts related to Alternative II are shown in Table 8.5. All of these impacts can be mitigated by constructing noise walls or improving the noise insulation of select residential buildings. No additional receptors that would be impacted by project construction noise were identified.

Table 8.5. Alternative II Noise Impact and Mitigation Summary

Noise Receptor(s) Location	Category 2 Moderate	Category 2 Severe	Mitigation Measure(s) / Estimated Cost
Common Impacts (All Alternatives)			
Blossom Rd (Plaistow, NH)	3	1	Building insulation ($180,000)
Rosemont St (Haverhill, MA)	20	8	Building insulation ($1,260,000)
Cogswell St (Haverhill, MA)	5	0	Noise wall ($960,000)
Jeffrey Ln (Haverhill, MA)	6	0	Noise wall ($470,000)
Alternative II Additional Impacts/Mitigation			
Joanne Drive	0	3	Buildings to be acquired/demolished
Joanne Drive Layover/Station	n/a	n/a	Noise wall ($585,000)
TOTAL IMPACTS – Alternative II	35	11	$3,500,000

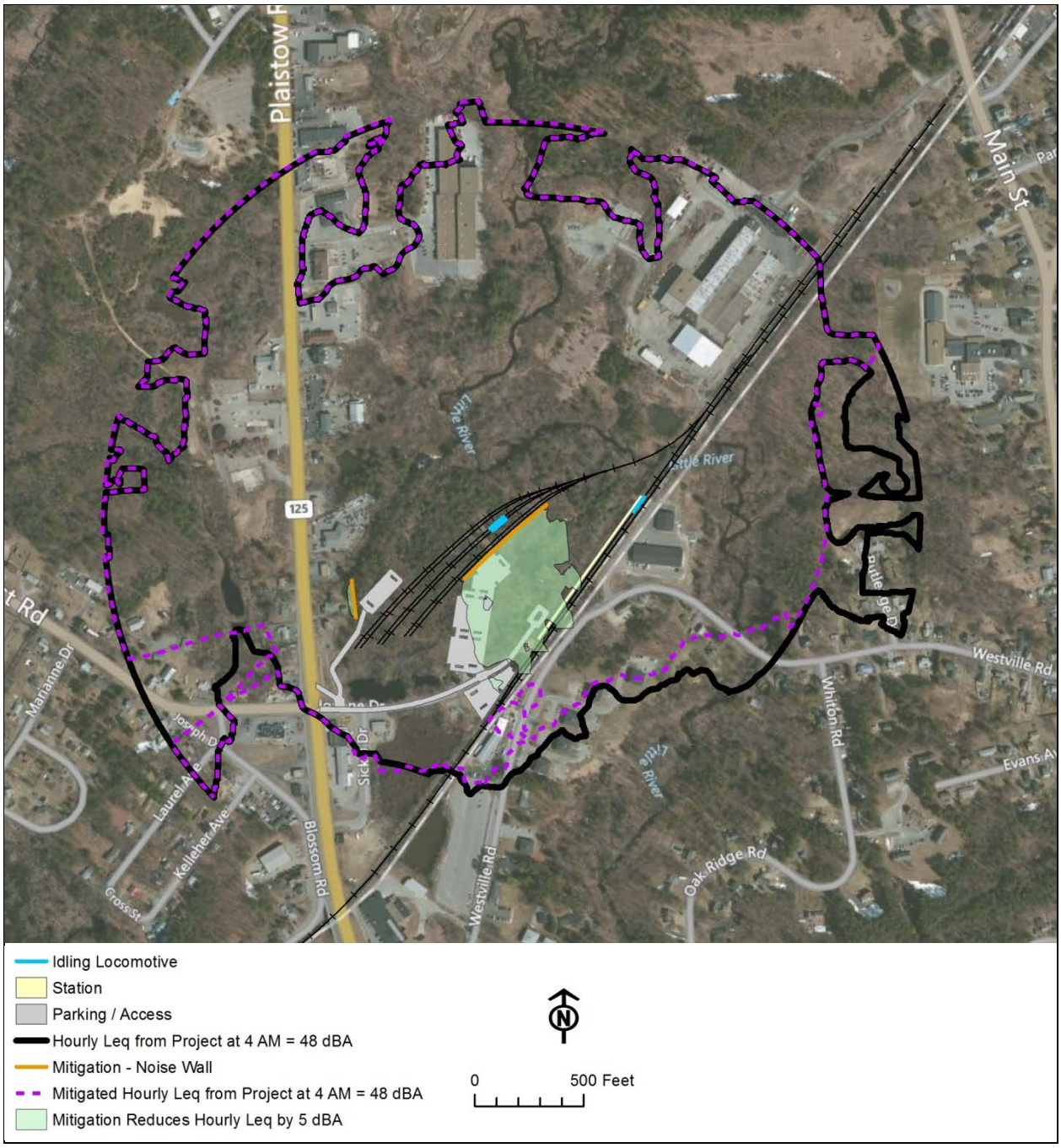
Although there were no noise impacts projected that were directly related to locomotive noise at either the Alternative II station or layover sites, additional analysis was conducted to evaluate the potential benefits of additional noise walls near the station and layover sites. As defined by the FTA, a moderate noise impact occurs when the change in cumulative noise is noticeable, but not expected to "cause strong, adverse reactions from the community" (FTA 2006). Because nearby homes would be expected to hear project-related noise, the Alternative II site was evaluated to determine if there would be any noticeable changes in cumulative noise from the proposed station and layover locomotive idling. The additional assessment modeled the use of noise walls at the station or layover sites to attempt to reduce audible noise from idling locomotives.

The areas where locomotive idling above the existing ambient noise levels can be heard are shown in black on Figure 8.6. Fifty structures, including residential, industrial, and commercial buildings are located within the area that would experience elevated noise levels near the station site. If a noise wall is constructed, noise above existing ambient levels is typically reduced in the area where locomotive idling occurs. This area is shown within the purple line on Figure 8.6. Near the Alternative II site, noise walls would reduce noise levels such that the number of buildings within the elevated noise area decreases from 50 to 39. The costs for noise mitigation using noise walls are included in Table 8.5.

In many cases, noise walls actually reduce noise levels even lower than the existing ambient noise. Also shown on Figure 8.6 are the areas that would experience a reduction in ambient noise below the existing noise level. However, no structures are located within this area.

Using FTA guidance and measurements of existing train pass-byes, no project-related vibration impacts are predicted as part of any of the alternatives. Therefore, no mitigation is required.

Figure 8.6 Alternative II Station Site – Noise Mitigation Analysis



8.3.7 HAZARDOUS MATERIALS

As part of a comprehensive environmental assessment for this study, each alternative was evaluated for potential hazardous waste impacts and other recognized environmental concerns. The evaluation included a search of reported state and federal listings using the Environmental Database Resources, Inc. (EDR) database as well as a review of site history and a field visit. The geographic search area for the EDR database review was defined as a 1,000 foot buffer on either side of the railroad lines in the vicinity of the alternatives evaluated. The full evaluation is included in Appendix J.

No sites were identified within the Alternative II site by the EDR database search. However, the EDR database search identified several sites in the immediate vicinity of the Alternative II site (see EDR Site No. 9, 10, 11, and 12 in Appendix J).

In July 2014, site visits were performed at various sites identified in the study area of the Alternative II site. During the site visits, no observations were made indicating recognized environmental conditions at these sites. However, based on the results of the environmental evaluation, contaminated soil and/or groundwater associated with current and former operations in the vicinity of the Alternative II site could be encountered during site development. A subsurface investigation was not performed at the Alternative II site as part of this evaluation to determine whether contaminated soil and/or groundwater is located at the Alternative II site.

8.3.8 VISUAL RESOURCES/AESTHETICS

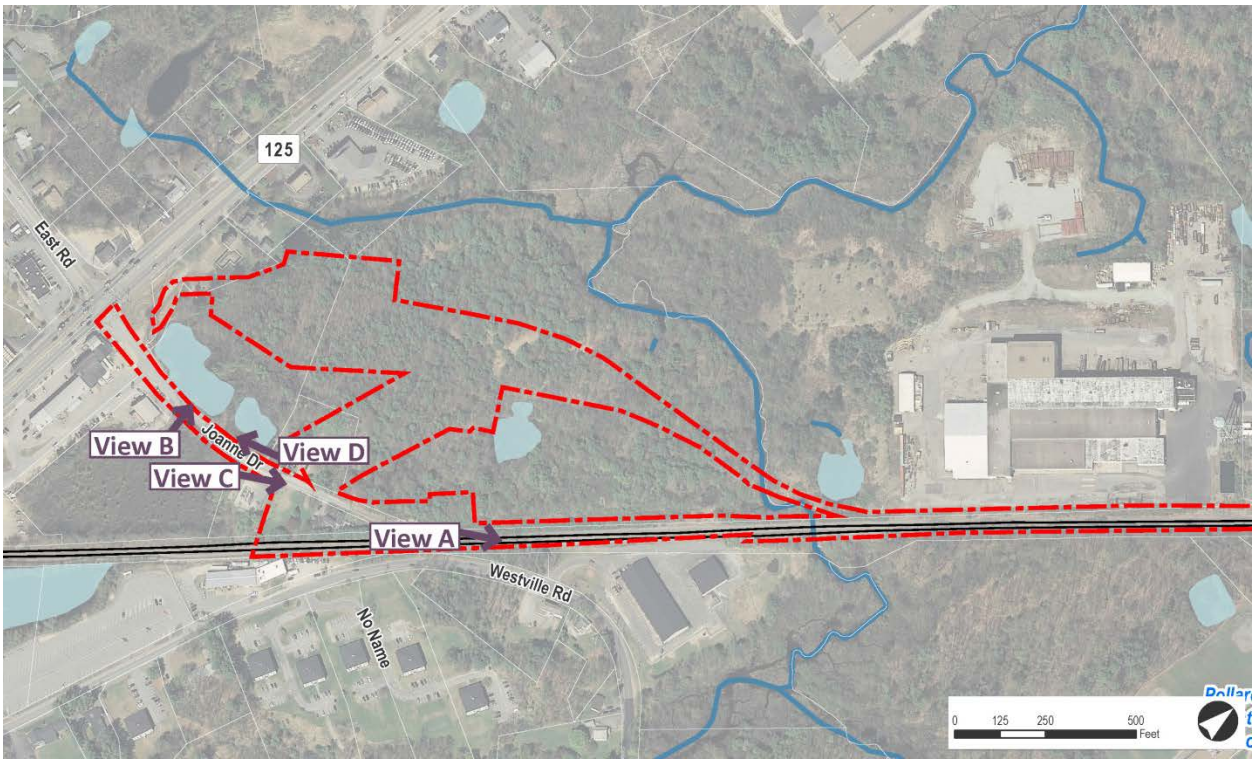
The Alternative II site includes several areas along the north and south sides of Joanne Drive on the western side of the railroad tracks. The general visual character of the site on both sides of Joanne Drive is predominately undeveloped, with several small ponds, wetland areas, and vegetated areas interspersed with residential buildings. An electrical utility substation is located on the southern side of the road.

The primary viewer groups within the Alternative II site include drivers and passengers on Joanne Drive, occupants or visitors of adjacent buildings, and pedestrians or bicyclists at street level. For drivers and passengers on Joanne Drive, building occupants, and street-level pedestrians and bicyclists, the views along Joanne Drive are similar.

The Alternative II site includes three residential structures, an electrical substation, and undeveloped vegetated areas on both sides of Joanne Drive. West of the site along Route 125 are a variety of auto-oriented commercial and industrial buildings. Two ponds are located on the southwest corner of the site and a wetland area is located on the southern side of Joanne Drive. North of the site is the Little River, which is surrounded by vegetated undeveloped areas. Several industrial buildings are located beyond the river on the Testa Realty, Inc. property. Across the railroad tracks to the east are one-story commercial and industrial buildings and several multi-family residential structures. Beyond the adjacent

parcels to the south and west, additional commercial buildings are located along Route 125, including big-box retailers, and smaller auto-oriented establishments. To the north and east are low-density residential areas and undeveloped vegetated areas. The existing visual character in the area is shown in an overview map (Figure 8.7) and photographs (Figure 8.8).

Figure 8.7 Alternative II Station Site Visual Assessment Viewpoints



Alternative II proposes the replacement of the one-story, residential structures with an 835-foot long, station platform with a 200-foot long canopy. The station platform is elevated four feet and the total height of the platform and canopy is 14 feet. Two nearby parking areas are added on either side of Joanne Drive on the site of the residential structures. A kiss-and-ride drop off area is added near the station platform and new pedestrian ramps and sidewalks are added to access the platform. An example of a similar existing commuter rail station and canopy in Wilmington, Massachusetts is shown in Figure 8.5.

The layover facility is located away from Joanne Drive, to the north of the small ponds near the intersection with Route 125. Access to the layover facility crew building and parking area is from a new access road from a planned turnaround at the Route 125 intersection. The majority of the layover facility is set back from Route 125 and Joanne Drive behind existing vegetated areas.

Overall, the change in visual character would result in moderate impacts. The primary visual impact to drivers and passengers on Joanne Drive and building occupants would be the removal of the residential

structures, electrical substation, and wooded areas to accommodate surface parking lots, the kiss-and-ride area, and the station platform. Joanne Drive will be improved, sidewalks will be added, and an enhanced streetscape will be added to provide a safe connection to the station from Route 125 and the new parking lots. The visual character of Joanne Drive will also change with the addition of the station platform and canopy and removal of tree cover. Pedestrian or bicyclist viewers at the street level would experience a similar change in visual character, but would experience an enhancement with the addition of a sidewalk and landscaping along the roadway. The layover facility tracks, parking, and crew building will be screened from Joanne Drive and Route 125 by vegetated cover or a fence. With the clearing of vegetated areas along the eastern side of the tracks and the addition of the station platform, all viewers would be able to see across the tracks towards the commercial, industrial, and residential uses on Westville Road.

Figure 8.8 Alternative II Site Photos

Top Left (View A): View looking north along railroad tracks from the end of Joanne Drive.
Bottom Left (View B): View looking north at pond and wooded area near intersection of Joanne Drive and Route 125.
Top Right (View C): View northeast along Joanne Drive towards residential buildings and electrical substation
Bottom Right (View D): View looking west along Joanne Drive towards Route 125.

8.3.9 NATURAL AND CULTURAL RESOURCES

8.3.9.1 Natural Resources

The Alternative II site is primarily forested, with several large wetland areas in the vicinity, some of which extend into the site. The wetlands located within the site are generally forested with a scrub-shrub understory. As shown in Figure C6 in Appendix C and in the graphics in Appendix K, three ponded wetlands including one in the central portion of the site and two others in the southwest corner are also present, all three of which have forested fringes. The two ponds on the southwest corner of the site have been historically dredged and are fairly well defined and likely controlled via groundwater. The most significant drainage is the Little River, which flows along the northern edge of the site and under the existing railroad corridor.

In general, the site includes two tiers defined by a change in elevation from west to east. The upper tier is predominantly forested uplands with fine sandy soils that are well drained compared with the remainder of the site. Soils on this tier are mapped as Deerfield fine sandy loam. The site steps sharply down to the north and east near a mapped pond and associated wetland areas along the Little River. This half of the site is significantly wetter, with signs of historical disturbances including large pits, mounds, and linear ridges. This area is mapped as “pits, sand and gravel,” which supports the field observations.

- *Wetlands.* To the maximum extent possible, the Alternative II site layout has been designed to avoid significant wetlands areas. However, approximately 0.81 to 0.94 acres (35,000 to 41,000 square feet) of the wetland area will be impacted by the Alternative II site layout. The extent of wetland impact will depend on the extent of bridging that is used on the site.
- *Stream Buffers.* A new layover lead track and station track will cross the Little River and will affect the 100-foot stream buffer associated with the Little River. Approximately 1.97 acres will be impacted. The amount of stream buffer impacts will depend on the extent of bridging that is used on the site.
- *Stream Crossings*. A new layover lead track and station track will require an additional crossing of the Little River next to the existing main line track crossing.
- *Floodplain.* A portion of the Alternative II site is located within a special flood hazard area. A rail crossing is required over the Little River and will pass through FEMA’s designated AE (1% Annual Chance of Flooding with Base Flood Elevation) and X (0.2% Annual Chance of Flooding) flood hazard zones. Approximately 0.53 acres of the site along the Little River are located within the mapped FEMA flood areas. The amount of floodplain impacts will depend on the extent of bridging used on the site.
- *Environmentally-Sensitive Areas.* Species are protected at the federal level and the state level by the U.S. Fish and Wildlife Service (USFWS) and the New Hampshire Fish and Game Department (NHFG), respectively. A search of the USFWS Endangered Species database for Rockingham County, NH identifies a total of ten federal-listed species known or believed to occur in

Rockingham County, all of which are found in coastal or marine habitats with the exception of the Small whorled pogonia (*Isotria medeoloides*). Consultation with the USFWS will be required to obtain specific information as to whether the Small whorled pogonia is known to occur at the Alternative II site. The NHFG identifies listed species at the state level. In January 2015, consultation was performed with the New Hampshire Natural Heritage Bureau (NHB). Via letter dated January 21, 2015, the NHB indicated that there was an NHB record (e.g., rare wildlife, plant, and/or natural community) present in the vicinity of the Alternative II site, NHB does not expect it will be impacted by the proposed Project. In 2005, the NHFG created the state's first Wildlife Action Plan, intended to provide New Hampshire decision makers with important tools for restoring and maintaining critical habitats and populations of the state's species of conservation and management concern. The Wildlife Action Plan includes several tools to assist communities with integrating wildlife habitat conservation decisions about land use, such as maps that depict the different habitats throughout the state, habitat quality and conservation focus area maps. As shown on the 2010 New Hampshire Wildlife Habitat Land Cover map, the Alternative II site is not located in areas of known and potential critical wildlife habitat in the state. Additionally, as shown on the 2010 Highest Ranked Wildlife Habitat by Ecological Condition map, the Alternative II site is not located within an area identified as highest ranked habitat, supporting landscapes, or conservation land.

- *Potential Vernal Pools & Buffer Areas.* Three potential vernal pools are located on the site, all of which are avoided; however, portions of the 100-foot and 750-buffers associated with the vernal pools would be impacted.

8.3.9.2 Historic/Cultural Resources

A preliminary reconnaissance to evaluate the presence of historic architectural resources at each alternative and in their immediate area was completed in support of this alternative analysis. The results of the preliminary reconnaissance are included in Appendix L and are summarized below.

The Alternative II site is located within close proximity to development along Joanne Drive to the south and Plaistow Road to the west. Construction on this site would directly affect a two-story house on Plaistow Road that appears to be a much-altered dwelling of historic age (pre-1967 for the purposes of this analysis). The building does not appear to demonstrate integrity to its architectural character or to possess significant historic or architectural qualities.

Several other properties built prior to 1967 are distributed along Joanne Drive and Plaistow Road within close proximity to the site, but none of these buildings appears likely to possess qualities of historic or architectural distinction. This area, known as Westville, was assessed as part of the 2003 Plaistow Townwide Area Form study that evaluated the Town of Plaistow's historic architectural resources. The 2003 study determined that the Westville village, including the Alternative II site and adjacent area, was not eligible for listing as a historic district on the NRHP. Due to the evident absence of National Register-

eligible historic resources in the immediate vicinity of the site, the preliminary field investigation finds that construction at this site would be unlikely to affect any historic architectural resources.

8.3.9.3 Archeological Resources

The construction of extant buildings off Plaistow Road and Joanne Drive has likely compromised the integrity of potential archeological deposits along the roadways, but the majority of the Alternative II site appears undisturbed. Site investigations revealed that an old road bed cuts through the northern portion of the site near the Little River and surrounding wetlands. Several pieces of cut granite at the terminus of the road have the cylindrical grooves indicative of nineteenth-century stone drills, but no other evidence of an associated structure. Historic maps of the area show no structures at or near this location and the stones may mark a former retaining wall along the roadway.

Level, well-drained terraces overlook the banks of the Little River across the breath of the site. Such landforms are highly sensitive for Pre-Contact archaeological resources based on current predictive models of ancient Native American settlement. Two STPs were excavated within the riverside terraces to access the integrity of the natural soil strata. Both test holes exposed a natural profile of sand-rich A, B, and C horizons, indicative that the site has high sensitivity for Pre-Contact cultural deposits.

Three small ponds are located on the site, one in the center of the site and two in the southwest corner. Landforms surrounding the ponds were assessed to have a high archaeological sensitivity for Native American resources. The remainder of the site suggests moderate Pre-Contact archaeological sensitivity. Given the initial assessment, if Alternative II is identified as the preferred alternative, further archaeological investigations are recommended on this site.

8.3.10 OPERATIONAL FEASIBILITY

8.3.10.1 Layover Facility

The Alternative II layover facility and station are located on the same site on the western side of the main line tracks. The layover facility is connected to a separate tail track that leads directly into the station. The site layout allows for efficient MBTA operations between the station and layover facility.

8.3.10.2 Station

The Alternative II station site is located on the western side of the main line tracks immediately adjacent to the western main line track. The station track connects to the layover facility by a dedicated tail track, eliminating the need to use the main line track to move between the two facilities. The station track is double-ended and trains would be able to enter and exit the station from the south. Trains would not have to change directions on the main line tracks. Because the station track is separate from the main line track, a train could be stored here overnight, if necessary.

8.3.10.3 Capital Costs

A cost estimate was prepared for Alternative II that evaluated the capital costs to construct necessary infrastructure related to the extension of commuter rail service including construction of the layover facility, station, parking, roadways or access roads, main line track, or signal improvements. The estimate also includes noise and wetland mitigation measure costs; site acquisition, demolition, and relocation costs; engineering and design (10 percent of the improvement costs) costs; project administration and construction management (10 percent) costs; and contingency (30 percent) costs.

At $50.5 million, Alternative II has the highest capital costs of the three alternatives. The costs associated with constructing a bridge and retaining walls to minimize impacts on wetlands and stream corridors is the primary driver for the higher costs. Table 8.6 below summarizes the capital costs for Alternative II by general category.

Table 8.6. Alternative II Capital Costs

Capital Cost	Alternative I	Comments:
Layover	$ 10,000,000	Includes track work, crew building, electrical work, bridges, retaining walls, and site work.
Parking/Roadway Improvements	$ 3,200,000	Includes layover and station parking, sidewalks, lighting, and access roads.
Station	$ 3,900,000	Includes platform, canopy, ramps, and lighting.
Main line Improvements	$ 11,300,000	Includes signal upgrades, turnouts, and surfacing.
Noise Mitigation	$ 3,500,000	Includes sound walls and building insulation.
Wetland Mitigation	$ 400,000	
Real Estate/Demolition	$ 1,300,000	Includes land acquisition, relocation, and demolition, as applicable.
Subtotal	$ 33,600,000	
Engineering/Design (10%)	$ 3,400,000	
Project Administration & Construction Management (10%)	$ 3,400,000	
Contingency (30%)*	$ 10,100,000	
ALTERNATIVE II TOTAL	$ 50,500,000	

** The level of contingency is consistent with FTA guidance.*

8.3.10.4 Operations and Maintenance (O&M) Costs

The operations and maintenance (O&M) costs for Alternative II are assumed to be zero for NHDOT or local entities based on a plan to have the station and layover facility built in the Plaistow area for use by

MBTA. In exchange for construction of the station and layover facility by others, MBTA would fund and operate the commuter service from the Plaistow area.

8.4 Alternative III

The Alternative III station and layover facility site is located on the west side of the main track south of Main Street (Route 121A) in the Town of Plaistow. The majority of the site is an existing developed parcel with a commercial/industrial complex and associated buildings, stockpiles, and storage areas. The site also includes a parcel owned by the Town of Plaistow. The site is bordered on the east by the existing rail tracks and to the west and south by the Little River and associated wetland areas. Adjacent uses include residential uses to the north along Main Street, institutional uses including the Plaistow Town Hall to the east across the rail line, and commercial uses to the west along Plaistow Street and Old Road.

8.4.1 LAND USE/NEIGHBORHOOD CHARACTER/ZONING

8.4.1.1 Compatibility with Planning Policies

- **Town of Plaistow Master Plan**
  - **Vision.** As described under Alternative I, the Town of Plaistow Master Plan is the town's guide for future growth. The plan outlines the future land uses within the town and establishes a set of goals and objectives. Regarding the introduction of passenger rail services, the plan identified two goals and supporting objectives that support the extension of service into Plaistow.
  - **Future Land Use.** The Alternative III site is located within four Future Land Use areas (see Figure F1 in Appendix F).
    - The southern portion of the Alternative III site is located within the Town of Plaistow Light Industrial area. According to Plaistow Master Plan, desired uses in Light Industrial areas include a variety of non-residential uses including light manufacturing, assembly, research and development facilities, warehousing and distribution, and service uses. A station and layover facility is consistent with this Future Land Use category
    - The western edge of the site along the Little River is within the Resource Protection and Conservation Area. This area is intended for restricted development or use and only uses that do not adversely affect the ecological or natural resource value of these areas should be allowed. This portion of the site will not be developed.
    - The northern half of the site currently used as a municipal parking lot that is located closer to Main Street is within the Public Land and Open Space area. Areas with this designation include publically-owned lands such as town, school, and public forest properties as well as non-profit conservation lands. The

Plaistow Master Plan encourages the continued use of these areas for public use and to accommodate community needs for open space conservation and protection. A station may be consistent with this Future Land Use category, but a layover facility is not consistent.

- A small portion of the site immediately adjacent to Main Street is within the Main Street Corridor area. This area is intended to designate an area for mixed-uses, including residential and small businesses. Desired uses include automobile and pedestrian-oriented retail, offices, banks, and medium-density residential. Consistency with architectural design guidelines and enhanced landscaping are prioritized in this area to help maintain a "Main Street" or "Town Center" neighborhood characteristic. This portion of the site will not be developed.

- **Zoning**. As shown in Figure F2 in Appendix F, the Alternative III station and layover facility is located within the Town of Plaistow Industrial 1 (I-1) and Village Center (VC) zoning districts. As described under Alternative I, the Town of Plaistow Zoning Regulations also include a Wetlands Overlay District that will be applicable to the Alternative III site. Development of this site would be subject to the Plaistow site plan review process.
  - ***Industrial 1 district.*** The I-1 district permits rail services and stations and other industrial uses or uses that require close "proximity to the rail line that carries both freight and passenger services." According to the zoning ordinance, development in the I-1 district should "favor those industries that are able to take advantage of the rail connection." Rail service and stations are permitted in this zoning district.
  - ***Village Center district.*** The VC district is to provide a pedestrian-friendly area for a mix of commercial, residential, and institutional uses. Public uses are permitted within this zoning district, but a variance may be required for development of a station or layover facility on this site.

8.4.1.2 Land Use Compatibility

- **Adjacent Land Uses.** As shown on Figure F8 in Appendix F, the site is bordered on the west and south by the Little River, which is surrounded by undeveloped open space and wetlands. The adjacent parcel to the north is also undeveloped. Residential uses are located further to the north along Main Street and commercial uses are located along Route 125 (Plaistow Road) to the west. Across the main line track to the east are residential, institutional, and commercial uses in the area along Main Street.
- **Access/Connectivity.** Access to the Alternative III site is from the north off Route 121A (Main Street). An existing driveway leads from Main Street to the Testa Realty, Inc. parcel.
- **Proximity to Residential Uses.** The closest residential uses are located north of the site along Route 121A (Main Street). Additional single-family residential uses are located to the east in the Plaistow town center and to the southeast near Westville Road. Approximately 475 residential units are located within one-half mile from the Alternative III site.

- **Protected and Recreational Open Space.** The Little River forms the western border of the site. The site also borders a 29-acre privately-owned parcel to the north. The majority of the 148 Main Street property has been in a conservation easement since 2011. The property at 148 Main Street is also taxed as forest, farm, or recreation land under the State of New Hampshire's "Current Use" taxation category (RSA 79-A).[4] The Alternative III site and the adjoining parcels do not appear to qualify as a Section 4(f) property.
- **Potential for Adjacent Compatible Development.** The site is configured to align the station and layover facility parallel to the main line and maximize the development potential of the remainder of the site to the west. If wetland areas and stream buffer areas along the Little River to the west are avoided, approximately 15 acres of the 44-acre site are available for adjacent development.

8.4.2 LAND ACQUISITIONS

8.4.2.1 Acquisitions Required

The Alternative III site includes three parcels that total approximately 44 acres in size (see Figure F8 in Appendix F). Only about 16 acres of the site will be required for development of the station and layover facility. The Town of Plaistow owns one of the parcels (the former Penn Box site at 144 Main Street) and Testa Realty, Inc. owns the other two parcels, including the former Process Engineering site and is currently occupied by several businesses. The ownership and current use for these parcels is shown in Table 8.7.

Table 8.7. Alternative III Parcels

Parcel ID	Site Address	Owner	Existing Use	Zoning	Size (acres)	Current Assessment
41-11	144 Main St	Town of Plaistow	Undeveloped (water tower/cell tower)	VC	7.55	$570,010
41-12	146 Main St	Testa Realty, Inc.	Manufacturing (Charter Industries, Atlantic Coast Dismantling, Rebars and Mesh, Helfrich Brothers, pallet manufacturer)	I-1	35	$2,435,180
41-13	144 Main St	Testa Realty, Inc.	Undeveloped	VC	0.41	$6,770

Source: Town of Plaistow Assessor

[4] New Hampshire Statutes, Chapter 79-A, http://www.gencourt.state.nh.us/rsa/html/NHTOC/NHTOC-V-79-A.htm

8.4.3 SOCIO-ECONOMIC/ENVIRONMENTAL JUSTICE

8.4.3.1 Socio-economic Conditions

- **Population Density.** Using FTA New Starts Policy Guidance from August 2013 and 2007-2011 ACS Five-Year Estimates, the average population density was analyzed for block groups in the corridor and surrounding area. FTA guidance provided breakpoints for population density (persons per square mile). Using the FTA breakpoints, the entire Town of Plaistow has low population density of less than 2,560 persons per square mile (see Figure F9 in Appendix F).
- **Housing Density.** Based on common housing density thresholds for different modes of public transit and the 2007-2011 ACS Five-Year Estimates, housing density was analyzed for block groups within the corridor and surrounding area. Similar to population density, housing density within the entire Town of Plaistow is low, at less than 1,280 dwelling units per square mile (see Figure F10 in Appendix F).
- **Median Household Income.** The median household income for the Alternative III site block group was $70,357 according to the 2007-2011 ACS Five-Year Estimates. This compares with a national median household income of $50,502 and a poverty threshold of $23,021 in 2011. As shown in Figure F11 in Appendix F, the adjacent block groups in Plaistow also have median household incomes above the national median.
- **Transit-dependent Populations.** According to the 2007-2011 ACS Five-Year Estimates, Rockingham County Census Tract 1011 in Plaistow, which includes the station site and a large surrounding area, has very few households that do not have a vehicle available. Out of the 4,065 households, only 25, or less than 1 percent, did not have a vehicle available. This is less than the margin of error.

8.4.3.2 Environmental Justice Populations

As shown in Figure F12 in Appendix F, the station and layover facility site and the surrounding area are not located within an area with an EJ population.

8.4.4 TRANSPORTATION

8.4.4.1 Traffic Impacts

- **Impacts on Local Roadways.** The Alternative III site is expected to create minimal impacts on local roadways; however, since there is already an effort in Plaistow to reduce the speed and volume of traffic along Main Street, the fact that the station would increase traffic volume to the roadway by 15 percent during the peak hour is a concern. The site is accessed from an existing driveway off Route 121A (Main Street). A new station parking lot is created on the existing industrial site at the end of an access roadway, which will be improved as part of the alternative development. Based on 2030 future ridership projections, a maximum of 100

morning peak hour vehicular trips is anticipated. These vehicular trips include riders who drive and park at the station, as well as those who are dropped off by another person. Evening peak hour trips are anticipated to be 46 additional trips because the evening peak hour commute is more dispersed than the morning peak. Appendix H provides an analysis of traffic counts and other statistics used to estimate traffic impacts.

- **Traffic Circulation Improvements.** The Alternative III station parking lot is designed to accommodate peak hour access from Route 121A (Main Street). No additional traffic circulation impacts are anticipated.

8.4.4.2 Non-Vehicular Accessibility

- **Access to Public Transportation.** The Town of Plaistow does not currently have bus transit service. If future service were developed, the Alternative III parking area would provide adequate room for a bus drop-off and pick-up operations.
- **Pedestrian and Bicycle Accommodations.** Currently, there are limited pedestrian or bicycle accommodations within one-half mile of the station site. From the existing driveway from the Testa Realty, Inc. property, a narrow sidewalk runs north along the eastern side of Route 121A (Main Street). Sidewalks are located on both sides of roadway between the grade crossing on Main Street and the Town Hall. In this segment, the roadway has sections with wide shoulders, on-street parking, and some areas with no curb and gutter. Residential areas within one-half mile from the station have no sidewalks, including areas along Kimball Avenue, Witch Lane, and Maple Avenue to the north, and Dutson Avenue, Stanwood Avenue, Center Circle to the south. No bicycle lanes or other accommodations are located within one-half mile of the station. The Town of Plaistow recently received a Safe Routes to School grant to improve pedestrian safety along Route 121A near the Pollard Elementary School located just south of the Alternative III site. Within three to five miles of the station, there are no bike lanes on Route 125 (Plaistow Road) and Route 121A (Main Street). The station will include secure bike racks consistent with other MBTA facilities.

8.4.4.3 Parking Supply

The Alternative III site has 294 parking spaces. Additional room is available on this site for future expansion of the proposed surface parking lot.

8.4.4.4 Commuter Rail Operations

Alternative III would facilitate the successful operation of passenger rail service. Since trains can operate between the station and layover facility without accessing the main line tracks, risk of service delay related to non-revenue service is minimal.

Located in close proximity to residential areas along Route 121A (Main Street) and the Plaistow Village, the Alternative III station has the greatest potential to attract local passengers (i.e. Plaistow residents). The station is located about three-quarter miles south of Route 125 (Plaistow Road), which would reduce the ability to attract regional passengers (i.e., residents from surrounding communities). Compared to Alternatives I and II, the Alternative III station site has the best potential for on-site expansion of surface parking to accommodate future growth or expansion.

8.4.4.5 Freight Rail Operations

Alternative III would have a minimal impact on existing freight service. Trains can connect between the station and layover facility without accessing either main line track. Commuter rail train traffic operating on the right-of-way between Haverhill Station and Plaistow Station would have schedules and dispatching coordinated with freight operators to ensure minimal conflicts between passenger and freight trains.

8.4.5 AIR QUALITY

Local impacts to air quality for this project will be driven by the proximity of sensitive receptors to the primary location of emission, the layover facility. Air pollutants of primary concern are nitrogen dioxide (NO2) from the diesel locomotives and the gas-fired HVAC system, and particulate matter smaller than 10 microns (PM10) and 2.5 microns (PM2.5) from diesel locomotives. Since modeling of potential air quality impacts is driven by estimated pollutant dispersion at the closest sensitive receptor, and the dispersion modeling will be the same for all alternatives, the distance of sensitive receptors from the primary point of emission will provide the greatest difference in impact. Therefore, for screening purposes, the distances of sensitive receptors have been compared. For Alternative III, the combined layover facility and station is the closest to a sensitive receptor (Pollard Elementary School) within approximately 262 feet.

8.4.6 NOISE AND VIBRATION

A general noise and vibration assessment was completed based on FTA guidelines. The complete methodology and results from the assessment, including graphics, are included in Appendix I. The assessment considered the noise and vibration impacts for the entire study corridor from Haverhill to the alternative sites in Plaistow. The assessment identified the noise and vibration-sensitive receptors using FTA screening distance procedures. The majority of the noise-sensitive land uses along the study corridor are residential (Category 2) or churches, cemeteries, or schools (Category 3).

Based on a comparison of existing noise and vibration levels and anticipated project-related levels, the total number of noise and vibration impacts were identified for each alternative. Results from the analysis indicate that there are only Category 2 receptors within the project impact area. The majority of

the noise sensitive receptors are common between all three alternatives and most of the moderate and severe impacts are located in Haverhill.

The moderate and severe impacts related to Alternative III are shown in Table 8.8. All of these impacts can be mitigated by constructing noise walls or improving the noise insulation of select residential buildings. No additional receptors that would be impacted by project construction noise were identified.

Table 8.8. Alternative III Noise Impact and Mitigation Summary

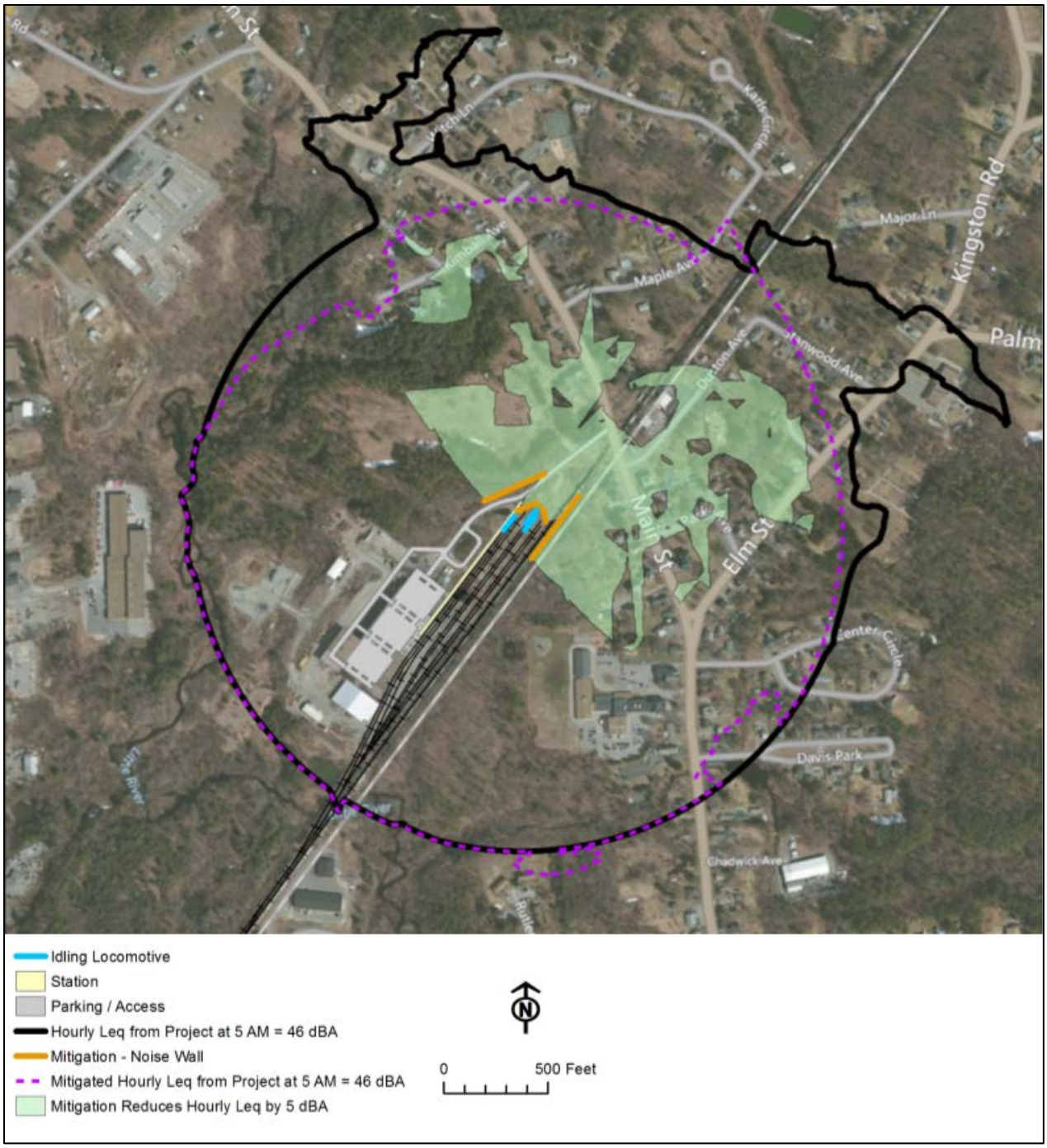
Noise Receptor(s) Location	Category 2 Moderate	Category 2 Severe	Mitigation Measure(s) / Estimated Cost
Common Impacts (All Alternatives)			
Blossom Rd (Plaistow, NH)	3	1	Building insulation ($180,000)
Rosemont St (Haverhill, MA)	20	8	Building insulation ($1,260,000)
Cogswell St (Haverhill, MA)	5	0	Noise wall ($960,000)
Jeffrey Ln (Haverhill, MA)	6	0	Noise wall ($470,000)
Alternative III Additional Impacts			
Joanne Drive	0	1	Building insulation ($45,000)
144 Main Street Layover/Station	n/a	n/a	Noise wall ($685,000)
TOTAL IMPACTS – Alternative I	34	10	$3,600,000

Although there were no noise impacts projected that were directly related to locomotive noise at either the Alternative III station or layover sites, additional analysis was conducted to evaluate the potential benefits of additional noise walls near the station and layover sites. As defined by the FTA, a moderate noise impact occurs when the change in cumulative noise is noticeable, but not expected to "cause strong, adverse reactions from the community" (FTA 2006). Because nearby homes would be expected to hear project-related noise, the Alternative III site was evaluated to determine if there would be any noticeable changes in cumulative noise from the proposed station and layover locomotive idling. The additional assessment modeled the use of noise walls at the station or layover sites to attempt to reduce audible noise from idling locomotives.

The areas where locomotive idling above the existing ambient noise levels can be heard are shown in black on Figure 8.6. One hundred forty three structures, including residential, industrial, and commercial buildings are located within the area that would experience elevated noise levels near the site. If a noise wall is constructed, noise above existing ambient levels is typically reduced in the area where locomotive idling occurs. This area is shown in purple on Figure 8.9. Near the Alternative III site, noise

walls would reduce noise levels such that the number of buildings within the elevated noise area would decrease from 143 to 73.

Figure 8.9 Alternative III Station Site – Noise Mitigation Analysis



In many cases, the noise wall actually reduces noise levels even lower than the existing ambient noise. Also shown on Figure 8.9 are the areas that would experience a reduction in ambient noise below the existing noise level. This includes locations that are up to 1,000 feet away from the site. Near the Alternative III site, 33 buildings are located within the areas that experience a reduction in ambient noise levels through the use of noise walls.

Using FTA guidance and measurements of existing train pass-byes, no project-related vibration impacts are predicted as part of any of the alternatives. Therefore, no mitigation is required.

8.4.7 HAZARDOUS MATERIALS

As part of a comprehensive environmental assessment for this study, each alternative was evaluated for potential hazardous waste impacts and other recognized environmental concerns. The evaluation included a search of reported state and federal listings using the Environmental Database Resources, Inc. (EDR) database as well as a review of site history and a field visit. The geographic search area for the EDR database review was defined as a 1,000 foot buffer on either side of the railroad lines in the vicinity of the alternatives evaluated. The full evaluation is included in Appendix J.

As described in Appendix J, recognized environmental concerns for the Alternative III site include both soil and groundwater contamination associated with two properties with multiple listings on the EDR database located at 144 – 146 Main Street (Route 121A) (EDR Site No. 6 in Appendix J). The database listings are associated with the Chart Industries property (formerly Process Engineering) located at 146 Main Street and the Penn Pacific Corp/Former Penn Box site at 145 Main Street. The former Process Engineering site is currently occupied by Testa Corporation, Charter Industries, Atlantic Coast Dismantling, Rebars and Mesh, and Helfrich Brothers.

In July 2014, a site visit was performed at the Alternative III site (144-146 Main Street). The Alternative III site includes a single large industrial building surrounded by a paved access and parking area. Large storage containers, heavy equipment, marine equipment, and various stored materials associated with heavy industry are kept outdoors around the perimeter of the site as well as in several landing areas northwest of main building. A second building occupies the site northwest of the main building, which houses a pallet manufacturing business. A storage building is located to the southwest of the site. A communications tower atop an abandoned water tank is located northeast of the main building. There is also an open water storage structure at the base of the abandoned water tower in a fence enclosure. On the southeast corner of the property, a cluster of at least nine groundwater monitoring wells were observed.

The site has a history of soil and groundwater contamination on portions of the property. Groundwater monitoring is currently being conducted at the site. Based on the results of the environmental evaluation, contaminated soil and/or groundwater associated with current and/or former operations at the site or surrounding properties may be encountered during site development.

8.4.8 VISUAL RESOURCES/AESTHETICS

The Alternative III site area includes three parcels located off a driveway that extends south from Route 121A (Main Street) on the east side of the railroad tracks. The parcel located closest to Main Street is a vacant former industrial site with an open grassy area, a small pond, and vegetated areas. The southernmost parcel is set back approximately 1,200 feet from Main Street and is an existing industrial site with a large, multi-story industrial building and several smaller structures. The general visual character along Main Street is residential with single-family residences set back from the two-lane street. The primary viewer groups within the Alternative III site include drivers and passengers on Main Street, occupants or visitors of adjacent buildings, and pedestrians or bicyclists at street level. For drivers and passengers on Main Street, building occupants, and street-level pedestrians and bicyclists, the views along Main Street are similar.

The Alternative III site includes one large industrial building, several smaller buildings or sheds, and a water tower with communications antennas. The southern and western portions of the site are undeveloped vegetated wetland areas located along the Little River. A small pond is located south of the industrial building near the rail tracks. The adjacent parcel to the north is a large, mostly undeveloped conservation property with one residential structure. Across the tracks to the east and to the south are wetlands and wooded areas along the Little River. The area to the east along Main Street is the mixed use Plaistow Village with residential, commercial, and institutional uses, including Plaistow Town Hall and an elementary school. The area to the south along Joanne Drive is mostly undeveloped with a few residential units. Beyond the Little River are numerous commercial buildings along Old Road and Route 125 (Plaistow Road). The existing visual character in the area is shown in an overview map (Figure 8.10) and photographs (Figure 8.11).

Alternative III proposes the replacement of the industrial structures with an 835-foot long, station platform with a 200-foot long canopy. The station platform is elevated four feet and the total height of the platform and canopy is 14 feet. A large parking area is added west of the station and is accessed from the existing access roadway. A kiss-and-ride drop off area is added near the station platform and new pedestrian ramps and sidewalks are added to access the platform. An example of a similar existing commuter rail station and canopy in Wilmington, Massachusetts is shown in Figure 8.5.

Lying parallel to the tracks, the layover facility is directly adjacent to the railroad tracks. The layover crew facility is located at the southern end of the site, just south of the station parking lot. The majority of the layover facility is set back from Main Street and screening will be added to block the view from the street. The access roadway will be improved and extended further to the south and sidewalks will be added to connect pedestrians to Main Street. The dominant visual landmark, the existing water tower and communications antennas, can remain within the footprint of the station parking area.

Overall, the change in visual character would result in minor impacts. The primary visual impact to drivers and passengers on Main Street and building occupants would be the removal of the industrial

buildings to accommodate a surface parking lot, the kiss-and-ride area, the station platform, and the new layover and station tracks. The access road to the station parking and crew facility will be improved; sidewalks will be added to provide a safe connection to the station from Main Street. The visual character of Main Street will also change with the addition of new tracks and the station platform. Pedestrian or bicyclist viewers at the street level would experience a similar change in visual character, but would experience an enhancement with the addition of a sidewalk and landscaping along the access roadway. The layover facility tracks will be screened from Main Street by vegetated cover or a fence.

Figure 8.10 Alternative III Station Visual Assessment Viewpoints

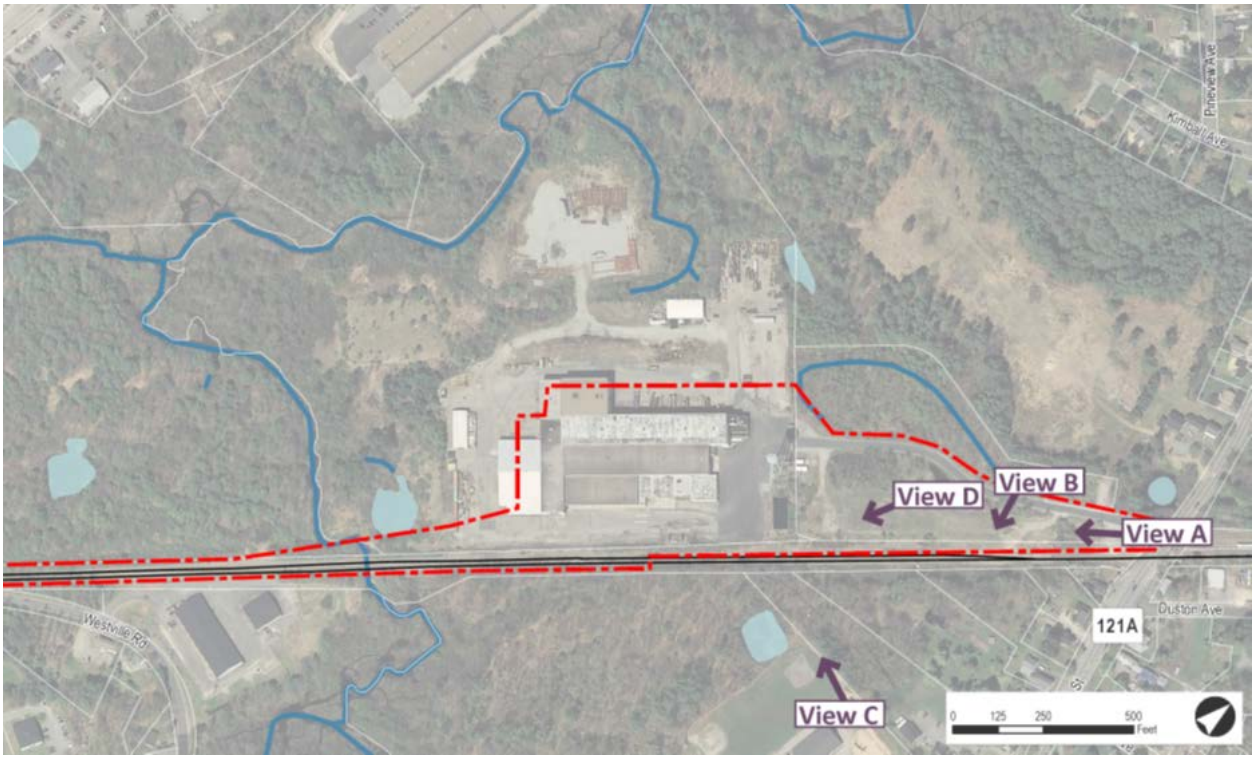


Figure 8.11 Alternative III Station Site Photos

Top Left (View A): View looking south along railroad tracks from Route 121A (Main Street) towards the 144 Main Street parcel.
Bottom Left (View B): View looking east across railroad tracks towards rear of Pollards Elementary School.
Top Right (View C): View looking southwest to site from rear of Pollards Elementary School.
Bottom Right (View D): View looking southeast from 144 Main Street parcel.

8.4.9 NATURAL AND CULTURAL RESOURCES

8.4.9.1 Natural Resources

The Alternative III site is primarily developed with a large commercial/industrial facility. The southern and western portions of the site have undeveloped wetland areas along the adjacent Little River. As shown in Figure C8 in Appendix C and the graphics in Appendix K, two ponds are located within the site. The majority of the site is mapped as “urban land” or “pits, sand and gravel” by the National Resources Conservation Service (NRCS) with hydric silt loam, mucky peat, and sandy soil polygons mapped to the perimeter of the developed area. Monitoring wells were observed during site visits across the southern

end of the site, with a concentration of the monitoring wells near the railroad tracks and around the pond.

Wetlands surround the southern and western edges of the site and include forested and scrub-shrub areas along with smaller patches of emergent vegetation. On the northern portion of the site there are three small wetlands as well as a ditch that loops to the east and is culverted under the driveway that leads into the Testa Realty, Inc. property.

- *Wetlands.* The Alternative III site layout is designed to avoid the wetland areas located on the western and southern edge of the site. Approximately 0.21 acres (9,073 square feet) of wetlands will be impacted near the Little River on the southern edge of the site. Bridging the Little River would reduce the wetland impact.
- *Stream Buffers*. A new layover lead track and station track will affect the stream buffer associated with the Little River. Approximately 1.42 acres of stream buffer will be impacted.
- *Stream Crossings.* A new layover lead track and station track will require an additional crossing of the Little River near the existing stream crossing of the main line track.
- *Floodplain.* A portion of the Alternative III site is located within FEMA's designated AE (1% Annual Chance of Flooding with Base Flood Elevation) and X (0.2% Annual Chance of Flooding) flood hazard zones adjacent to the Little River on the western and southern edges of the site. Approximately 0.33 acres of the site are within the FEMA flood areas. The impact to flood hazard areas could be reduced with bridging of the Little River.
- *Environmentally-Sensitive Areas.* Species are protected at the federal level and the state level by the U.S. Fish and Wildlife Service (USFWS) and the New Hampshire Fish and Game Department (NHFG), respectively. A search of the USFWS Endangered Species database for Rockingham County, NH identifies a total of ten federal-listed species known or believed to occur in Rockingham County, all of which are found in coastal or marine habitats with the exception of the Small whorled pogonia (*Isotria medeoloides*). Consultation with the USFWS will be required to obtain specific information as to whether the Small whorled pogonia is known to occur at the Alternative III site. The NHFG identifies listed species at the state level. In January 2015, consultation was performed with the New Hampshire Natural Heritage Bureau (NHB). Via letter dated January 21, 2015, the NHB indicated that there was an NHB record (e.g., rare wildlife, plant, and/or natural community) present in the vicinity of the Alternative III site, NHB does not expect it will be impacted by the proposed Project. In 2005, the NHFG created the state's first Wildlife Action Plan, intended to provide New Hampshire decision makers with important tools for restoring and maintaining critical habitats and populations of the state's species of conservation and management concern. The Wildlife Action Plan includes several tools to assist communities with integrating wildlife habitat conservation decisions about land use, such as maps that depict the different habitats throughout the state, habitat quality and conservation focus area maps. As shown on the 2010 New Hampshire Wildlife Habitat Land Cover map, the Alternative III site is not located in areas of known and potential critical wildlife habitat in the state. Additionally, as shown on the 2010 Highest Ranked Wildlife Habitat by Ecological

Condition map, the Alternative III site is not located within an area identified as highest ranked habitat, supporting landscapes, or conservation land.

- *Potential Vernal Pools & Buffers.* Based on the site walk performed, no potential vernal pools were identified within or near the site development area associated with Alternative III.

8.4.9.2 Historic/Cultural Resources

Construction on this site would require demolition of the existing multi-section light industrial building that was constructed in the 1980s. Demolition would not constitute an effect on historic resources.

The nearest architectural resources of historic age (pre-1967) are buildings located within the town center village along Main Street northeast of the Alternative III site. The Plaistow Townwide Area Form study, completed in 2003, evaluated the Town of Plaistow's historic architectural resources. The study concluded that the town center village is potentially eligible for listing as a historic district on the NRHP. The closest historic building in the town center village is approximately 350 feet from the Alternative III site. A dense screen of mature trees blocks the site line between these two locations. Preliminary site examination indicates that expansion of rail service and construction of rail facilities on the Alternative III site would have limited impacts on historic district eligibility of the town center village due to distance and tree cover. However, while unlikely, this site has the greatest likelihood of all three alternatives to result in an impact on historic architectural resources.

8.4.9.3 Archeological Resources

The Little River and associated wetlands form the western border of the Alternative III site and an active industrial complex is situated on the majority of the site closest to the railroad tracks to the east. Multiple structures, roads, graded staging areas, and equipment storage yards stretch across the landscape. Construction of the facility has likely obliterated the archaeological integrity of landforms within the bounds of the chain-link fence that encircles the property. The footprint of the developed portion of the site was assessed to have low sensitivity for Pre- and Post-Contact archaeological resources.

An 1892 map of Plaistow shows several historic structures along Main Street in the northeast portion of the site, yet archaeologists found no evidence of Euroamerican structures in this area during site investigations. The modern landscape is cleared and possibly graded, with several short sections of concrete walls that likely mark the locations of demolished, but relatively recent structures. Despite the absence of cellar holes or other surficial evidence, intact material deposits related to Euroamerican occupation of the parcel may remain beneath the grassy fields. This portion of the site is designated as moderate sensitivity for Post-Contact archaeological resources. The remainder of the site is designated as having low sensitivity for Euroamerican archaeological resources.

The western side of the site is predominantly wetlands that slope down from the developed portion of the site to the Little River. Within this low, wet, and uninhabitable landscape, archaeologists identified four areas of moderate sensitivity for Pre-Contact cultural resources to the north, west, and south of the industrial area. A single STP was excavated in the northernmost area of moderate sensitivity, revealing disturbed upper strata while intact natural subsoils with some potential for ancient artifacts or features. Significant subsurface utilities were observed along the perimeter of the industrial areas of the site. Plastic and metal pipes protrude from the ground surface at various points across the other three sensitive areas, suggesting the potential for substantial disturbances. Current utility plans or detailed site plans for a project on this site will be needed to provide the means to refine the sensitivity assessment for Native American archaeological resources. If Alternative III is selected as the preferred alternative, further archaeological investigations are recommended on this site.

8.4.10 OPERATIONAL FEASIBILITY

8.4.10.1 Layover Facility

The Alternative II layover facility and station are located on the same site on the western side of the main line tracks. The layover facility is connected to a separate tail track that leads directly into the station. The site layout allows for efficient MBTA operations between station and layover.

8.4.10.2 Station

The Alternative III station site is located on the western side of the main line tracks immediately adjacent to the main line track. The station track connects to the layover facility by a dedicated tail track, eliminating the need to use the main line track to move between the two facilities. The station track is double-ended and trains would be able to enter and exit the station from the south. Trains would not have to change directions on the main line tracks. Because the station track is separate from the main line track, a train could be stored here overnight.

8.4.10.3 Capital Costs

A cost estimate was prepared for Alternative III that evaluated the capital costs to construct necessary infrastructure related to the extension of commuter rail service including construction of the layover facility, station, parking, roadways or access roads, main line track, or signal improvements. The estimate also includes noise mitigation measure costs; as well as site acquisition, demolition, and relocation costs; engineering and design (10 percent of the improvement costs) costs; project administration and construction management (10 percent) costs; and contingency (30 percent) costs.

At $49.4 million, Alternative III is the second-most costly alternative due in part to the increased real estate acquisition and demolition costs associated with the Testa Realty, Inc. parcel. The site layout for

this alternative offers some cost efficiency compared to Alternative II, but is still higher than Alternative I. Table 8.9 below summarizes the capital costs for Alternative III.

Table 8.9. Alternative III Capital Costs

Capital Cost	Alternative I	Comments:
Layover	$ 6,400,000	Includes track work, crew building, electrical work, bridges, retaining walls, and site work, as applicable.
Parking/Roadway Improvements	$ 2,700,000	Includes layover and station parking, sidewalks, lighting, and access roads.
Station	$ 3,800,000	Includes platform, canopy, ramps, and lighting.
Main line Improvements	$ 11,100,000	Includes signal upgrades, turnouts, and surfacing.
Noise Mitigation	$ 3,600,000	Includes sound walls and building insulation.
Wetland Mitigation	$ -	
Real Estate/Demolition	$ 5,300,000	Includes land acquisition, relocation, and demolition, as applicable.
Subtotal	$ 32,900,000	
Engineering/Design (10%)	$ 3,300,000	
Project Administration & Construction Management (10%)	$ 3,300,000	
Contingency (30%)*	$ 9,900,000	
ALTERNATIVE III TOTAL	$ 49,400,000	

** The level of contingency is consistent with FTA guidance.*

8.4.10.4 Operations and Maintenance (O&M) Costs

The O&M costs for Alternative III are assumed to be zero for NHDOT or local entities based on a plan to have the station and layover facility built in the Plaistow area for use by MBTA. In exchange for construction of the station and layover facility by others, MBTA would fund and operate the commuter rail service from the Plaistow area.

8.5 Option of Alternative II Layover and Alternative III Station

During the alternative analysis process, an additional option of combining the Alternative II layover facility and Alternative III station was also considered. In this option, the layover facility would have the same layout as the Alternative II layover facility. The station would be located on the Alternative III site, but would be located immediately adjacent to the existing main line railroad track. Both facilities are located on the western side of the main line railroad track and a dedicated track would connect the

station to the layover facility. This option would keep the layover facility away from Route 121A (Main Street), but keep the station close to residential areas and commercial uses in Plaistow Village.

The analysis discussion for Alternative II and III provide more detailed information about the two sites for this option, but the key issues for this option are summarized below.

Land Use/Neighborhood Character/Zoning.

- The layover facility is located in the Industrial-1 (I-1) zoning district and the station is split between the I-1 and Village Center (VC) zoning districts.
- Only the station is located within the Town of Plaistow's Public Land and Open Space Future Land Use Area and Main Street Corridor.
- Only the station is located near the more densely populated areas and conservation areas along Main Street. The layover facility is located on an undeveloped parcel near commercial uses on Route 125 (Plaistow Road).
- By placing the station adjacent to the main line railroad tracks, approximately 11 additional acres of the 144 Main Street property (Testa Realty, Inc. and Town of Plaistow parcels) become available for potential redevelopment.

Land Acquisitions

- This alternative requires the acquisition of at least five parcels. The residential parcels along Joanne Drive that would need to be acquired in Alternative II to accommodate the station and parking areas would not need to be acquired under this option.
- Access to the station is from Route 121A (Main Street) and access to the layover facility is from Joanne Drive. No direct vehicular connection is provided between the two sites.

Transportation

- Additional pedestrian and bicycle accommodations would be needed along Route 121A (Main Street) to access the station.
- Similar to Alternative III, this option allows for 294 parking spaces. Additional room for future parking expansion is available on the site, as needed.

Noise and Vibration

- The three residences on Joanne Drive would not be acquired in this option and would be impacted by the close proximity to the layover facility. Additional mitigation measures and costs would be required to address the severe noise impacts.

Hazardous Materials

- This option has the same hazardous materials concerns as Alternative III, primarily related to the potential to encounter soil and groundwater contamination.

Visual Resources/Aesthetics

- In this option, the layover facility is located away from major roadways and only the station is visible from Main Street (Route 121A).

Natural and Cultural Resources

- While this option layout avoids the majority of wetlands on the site, it would require an additional stream crossing for the dedicated layover-to-station track.

- Due to the proximity of the Village Center, development of the station has the greatest potential impacts to historic or cultural resources.
- The site layout is designed to avoid areas along the Little River that have greater likelihood for archaeological resources. The station is located on previously developed and disturbed areas of the site.

Operational Feasibility

- The station and layover facility can be connected by dedicated track. Trains would be able to connect directly between the two facilities without using the main line track.
- The station track is not double-ended, but could be revised to include a second switch in the future since it is directly adjacent to the main line track.
- While a cost estimate was not prepared, it is anticipated that the capital costs for this option would be higher than all three of the alternatives. This is due to the amount of land required to be acquired and the related site acquisition costs.

During the alternative analysis process, this option was determined to not be a feasible alternative. This option would require the most property acquisition and would likely have the highest costs. Consequently, it was not considered as part of the alternative screening process outlined in Section 9 of this report.

9. RECOMMENDED ALTERNATIVE

9.1 Alternative Analysis Summary

The development of alternatives began with the identification of facility and operational needs for a layover facility and station. As discussed in Section 5, an initial screening of site options resulted in the selection of three alternatives for further consideration and evaluation. As outlined in Section 7, a set of evaluation criteria were established to assist in the selection of a recommended layover facility and station site. Using the analysis completed for each alternative (Section 8), all three alternatives were evaluated based on these criteria.

This section provides an overview of the evaluation process that led to the selection of a recommended alternative. The review process included meetings with the PAC, Town of Plaistow Board of Selectmen, and public to review the alternative analysis and solicit their input on the impacts, benefits, and constraints of each alternative. Each alternative was measured against the set of evaluation criteria. Each alternative is summarized and the key issues or benefits of each are outlined below. A complete summary table is provided (Table 9.1) that allows for comparison of each alternative.

Finally, using the results of the alternative analysis and input from the public, local officials, and PAC, a recommended alternative was selected. The rationale for the selection of the recommended alternative, Alternative II, is outlined throughout this section.

9.2 Screening of Alternatives

The alternative screening process included input from the PAC, local officials, and the public. Four PAC meetings and two public meetings were held between September 2014 and February 2015. The study team presented the three alternatives and preliminary analysis at the PAC meeting held on September 9, 2014 at the Plaistow Town Hall. The alternatives and preliminary analysis were then presented at a public meeting held on October 9, 2014 at the Plaistow Town Hall. Based on the preliminary results of the analysis and input gathered from the PAC and public throughout the analysis process, the study team undertook additional screening and analysis of the alternatives in winter 2014-2015.

The study team also reviewed the status of the project and presented the preliminary screening to the Town of Plaistow Board of Selectmen on December 8, 2014 at the Plaistow Town Hall. More detailed analysis and preliminary results of the alternative evaluation were reviewed at a PAC meeting held on December 16, 2014 at the Atkinson Town Hall. Additional analysis, including the alternatives analysis matrix (Table 9.1), was reviewed at two additional PAC meetings held on January 6, 2014 and January 20, 2015 at the Plaistow Town Hall. The second public meeting was held on February 24, 2015.

Table 9.1 Alternatives Analysis Matrix

Evaluation Criteria		Alternative I (Haverhill Layover/Westville Rd Station)	Alternative II (Joanne Drive)	Alternative III (Testa Realty, Inc./144 Main Street)
1. Land Use/Neighborhood Character/Zoning				
Compatibility with Planning Policies	What is the zoning district for the site and is a layover facility/station consistent with the zoning regulations?	Located within the Haverhill Business Park zoning district, the layover facility site is compatible with existing zoning as well as local and regional planning policies. The station site is located within the Plaistow Commercial 1 zoning district and would require a zoning variance.	The station and layover facility site is located with the Plaistow Commercial 1 zoning district and would require a zoning variance.	The station and layover facility site is located within the Plaistow Industrial 1 and Village Center District zoning districts. Development of a station or layover facility is consistent with the Industrial 1 zoning district regulations, but would require a zoning variance for the Village Center District portion of the site.
	What is the Future Land Use category for the site and is the layover facility/station consistent with this land use?	The station site is located within the Plaistow Light Industrial Future Land Use Area. A station use is consistent with this Future Land Use designation. The layover facility site is located within a state-designated Concentrated Development Center (CDC) and Priority Development Site (PDS).	The station and layover facility site is located with the Plaistow Light Industrial, Commercial Corridor, and Resource Protection and Conservation Area Future Land Use Areas. Development on the site is limited to the Light Industrial and Commercial Corridor areas. Development of a station and layover facility is consistent with these Future Land Use designations.	The station and layover site is located within the Plaistow Light Industrial, Public Land and Open Space, Main Street Corridor, and Resource Protection and Conservation Area Future Land Use Areas. Development on the site is limited to the Light Industrial and Public Land and Open Space areas. A station and layover facility is consistent with the Light Industrial designation, but not the Public Land and Open Space designation.
	Is the site concept consistent with the town's vision or Master Plan?	The Plaistow Master Plan supports the extension of MBTA commuter rail service, including the development of a station and layover facility. Development of a station on this site is compatible with the Master Plan. The use of public land is not required.	The Plaistow Master Plan supports the extension of MBTA commuter rail service, including the development of a station and layover facility. Development of a station on this site is compatible with the Master Plan. The use of public land is not required.	While the Plaistow Master Plan supports the extension of MBTA commuter rail service into Plaistow, this site is not consistent with the Town's Master Plan due to the use of the town-owned 144 Main Street property. The site is partially located within the Village Center District, which is envisioned to be the cultural center of the community with a focus on pedestrian-oriented development. The site is envisioned as a park or other public use.
Land Use Compatibility	Does the site concept fit with adjacent land uses?	The station and layover sites are compatible with adjacent land uses. The layover facility has industrial uses to the west and open space to the east. The station utilizes an existing park-and-ride lot and is located next to commercial and residential uses.	The station and layover facility site is compatible with adjacent land uses. Adjacent uses include commercial uses to the west on Route 125, industrial uses to the north, and residential and commercial uses across the tracks to the east.	The station and layover facility site is a reuse of an existing developed industrial site (brownfield site) and a publically owned, former industrial property. Adjacent uses include undeveloped industrial land to the south and open space to the west and north. Across the tracks to the east are residential, commercial, and institutional uses.
	What is the site's proximity to residential uses?	The layover and station sites create minimal to no impact on existing residential development. 289 residential units are located within one-half mile from the layover facility. 234 residential units located within one-half mile from the station.	The site would require acquisition of four residential units. The site creates minimal to no impact on other surrounding existing residential development. 341 residential units are located within one-half mile from the layover facility and station.	The site creates minimal to no impact on existing residential development. 475 residential units are located within one-half mile from the layover facility and station.
	Does the site concept impact protected and recreational open space?	No impact to protected or recreational open space.	No impact to protected or recreational open space.	No impact to protected or recreational open space.
	Does the station site concept provide any potential for adjacent compatible development?	Limited opportunities for adjacent station related development. 144 Main Street/Testa Realty, Inc. parcel remains available for redevelopment.	Development of a station on this site could support station-related development on the adjacent Testa Realty, Inc./144 Main Street parcel to the north.	Because the majority of the site is utilized for the station and layover facility, there is limited development potential on remaining portion of the site (Testa Realty, Inc. parcel).
2. Land Acquisitions and Displacements				
Acquisitions Required	What is the number and total acreage of the parcels that will be acquired?	The layover facility is located on two parcels (38.65 acres). The station is located on three parcels (3.51 acres). The existing park-and-ride lot extends on another parcel.	The station and layover facility site is located on five parcels (27.22 acres).	The station and layover facility site is located on three parcels (44 acres).
	Is the site accessible from existing road right-of-way?	The station utilizes an existing park-and-ride lot on Westville Road, which is one-third of a mile north of a signalized intersection with Route 125. The intersection with Westville Road is signalized. The layover facility is accessed from a new access road from Route 121.	Located at the end of Joanne Drive, the station and facility layover are located about one-quarter of a mile east of the signalized intersection with Route 125.	The station and layover facility site is accessed from an existing driveway from Route 121A (Main Street). The site does not have direct access to Route 125, which is almost one mile to the northwest.
	Does the site concept require a new access road and/or additional right-of-way/easement acquisition?	The layover facility requires a new access road to Route 121 (Atkinson Depot Road) through an existing business site. The station requires a realignment of Westville Road to the east and right-of-way acquisition from several properties.	The station and layover facility site is accessed from Joanne Drive and no additional right-of-way or easement is required.	The station and layover facility site is accessed from an existing driveway from Route 121A (Main Street) and no additional right-of-way or easement is required.

Evaluation Criteria		Alternative I (Haverhill Layover/Westville Rd Station)	Alternative II (Joanne Drive)	Alternative III (Testa Realty, Inc./144 Main Street)
	Will any property owners or tenants be required to relocate for the proposed site alternative?	The layover facility requires acquisition of two parcels. The station creates moderate impact to residential areas from the Westville Road realignment. The station requires acquisition of two businesses and frontage of residential condominiums on Westville Road.	The layover facility and station requires acquisition of four residences and five parcels.	The site creates a moderate impact on existing residential areas and requires acquisition of two businesses and two parcels.
3. Socio-economic/Environmental Justice				
Socio-economic Conditions	What is the population density for the surrounding area?	The layover facility and station sites have similar population density to the surrounding area. The site and surrounding area have low population density (less than 2,560 persons/square mile).	The station and layover facility site has similar population density to the surrounding area. The site and adjacent area have low population density (less than 2,560 persons/square mile).	The station and layover facility site has similar population density to the surrounding area. The site and adjacent area have low population density (less than 2,560 persons/square mile).
	What is the housing density for the surrounding area?	The layover facility and station sites have similar housing density to the surrounding area. The site and adjacent area have low housing density (less than 1,280 dwellings units per square mile).	The station and layover facility site has similar housing density to the surrounding area. The site and adjacent area have low housing density (less than 1,280 dwellings units per square mile).	The station and layover facility site has similar housing density to the surrounding area. The site and adjacent area have low housing density (less than 1,280 dwellings units per square mile).
	What is the median household income within the adjacent area?	The area surrounding the station site (located in Plaistow) has a median household income of $70,357, higher than the national median household income. The area surrounding the layover facility site (located in Haverhill) has a median household income of $100,718, higher than the national median household income.	The area surrounding the site has a median household income of $70,357, higher than the national median household income.	The area surrounding the site median household income is $70,357, higher than the national median household income.
	What is the area's transit dependent population?	Very few area households near the sites and within the overall surrounding areas have no vehicle available (less than 1%).	Very few area households near the site and within the overall surrounding area have no vehicle available (less than 1%).	Very few area households near the site and within the overall surrounding area have no vehicle available (less than 1%).
Environmental Justice	Is the site located within an Environmental Justice (EJ) community?	The layover facility and station sites are not located within an EJ community. The sites create no impact to EJ populations.	The station and layover facility site is not located within an EJ community. The site creates no impact to EJ populations.	The station and layover facility site is not located within an EJ community. The site creates no impact to EJ populations.
4. Transportation				
Traffic Impacts	Will passenger trips to and from the site create significant impacts on nearby roadways?	No significant impacts on nearby roadways will be created by the station and layover facility sites.	No significant impact on nearby roadways will be created by the station and layover facility site.	Minimal impact to nearby roadways will be created by the station and layover facility site due to site access on Main Street. There is concern with the existing level of traffic on Main Street in Plaistow Village.
	Will the site concept facilitate traffic patterns that improve traffic circulation?	Creates no additional traffic impacts.	Creates no additional traffic impacts.	Creates moderate traffic impacts on Main Street (existing traffic calming efforts).
Non-Vehicular Accessibility	Is the site accessible via public transportation (bus transit service)?	Plaistow area has no bus transit service. Parking area would provide room for future bus drop-off.	Plaistow area has no bus transit service. Parking area would provide room for future bus drop-off.	Plaistow area has no bus transit service. Parking area would provide room for future bus drop-off.
	Is the site accessible for pedestrians or bicycles?	Bicycle/pedestrian improvements are needed to access the station site.	Bicycle/pedestrian improvements are needed to access the station site.	The station has good pedestrian connectivity to Main Street/residential access.
Parking Supply	Can the site accommodate sufficient parking for the anticipated ridership?	The station can accommodate sufficient parking for anticipated ridership. The station uses an existing underutilized park-and-ride-lot.	The station can accommodate sufficient parking for anticipated ridership.	The station can accommodate sufficient parking for anticipated ridership.
	Is there sufficient parking supply at the station to prevent overflow parking in the surrounding area?	An existing parking lot is utilized for the majority of parking at the station; additional parking is added directly adjacent to the station platform along with a kiss-and-ride area. The station site has limited potential for surface parking expansion.	The station has potential to connect to a park-and-ride lot on Westville Road (pedestrian bridge over the railroad track) or use the Testa Realty, Inc. property for future parking expansion. The site has limited potential to expand surface parking due to natural resource constraints. The parking for the station is not very close to the station to avoid the wetland areas and to accommodate grade changes at the site. A kiss-and-ride area is close to the station.	The site provides sufficient parking and a kiss-and-ride area. The site offers opportunity to expand future surface parking for the station in close proximity to the station.
Commuter Rail Operations	Will the site concept interfere with existing commuter rail service?	This alternative creates an impact to passenger rail service (operations between layover facility and station), which increases interference with freight trains and increases costs of passenger service operations. The MBTA identified this alternative as not operationally acceptable and considers Alternative I as NOT FEASIBLE.	Minimal impact to passenger rail service.	Minimal impact to passenger rail service.
	Is the station conveniently located to attract commuter rail passengers?	The station is conveniently located to attract local and regional passengers.	The station is conveniently located to attract local and regional passengers.	Compared to Alternatives I and II, the location of the Alternative III station has greater potential to attract local passengers, but less potential to attract regional passengers.

Evaluation Criteria		Alternative I (Haverhill Layover/Westville Rd Station)	Alternative II (Joanne Drive)	Alternative III (Testa Realty, Inc./144 Main Street)
	Does the site concept allow for additional phasing/growth?	The station site has limited potential for on-site expansion of surface parking. The layover facility site has limited potential for on-site expansion.	The site has limited potential for on-site expansion of surface parking or expansion of the layover facility. The site could connect over the tracks to existing Westville Road park-and-ride parking lot.	The site offers opportunity to expand future surface parking for station.
Freight Rail Operations	Would operations at this site impact existing freight rail service?	The sites create impacts to freight rail service (operations between layover facility and station).	The site creates minimal impact to freight rail service.	The site creates minimal impact to freight rail service.
5. Air Quality				
Regional and Local Impacts	What is the level of regional air quality impact?	Will not have a significant affect on regional air quality.	Will not have a significant affect on regional air quality.	Will not have a significant affect on regional air quality.
	Does the site result in localized air quality impacts?	The layover facility site is within 800 feet of a sensitive air quality receptor (residential uses), but the station is adjacent to three sensitive air quality receptors across the tracks on Joanne Drive.	The layover facility and station site is the farthest from a sensitive air quality receptor (residential uses) within 600-620 feet. This site has a low potential for residential/school air quality impacts.	The layover facility site is the closest to a sensitive air quality receptor (Pollard Elementary School) within 262 feet.
6. Noise and Vibration				
Noise	What is the number of moderate noise impacts?	This alternative results in 38 moderate noise impacts. All three alternatives have equal impacts for residences in MA, but this alternative results in four additional moderate impacts in Plaistow. All moderate impacts can be mitigated.	This alternative results in 34 moderate noise impacts, the lowest number for all three alternatives. All alternatives have equal impacts for residences in MA. This alternative results in no additional moderate impacts in Plaistow. All moderate impacts can be mitigated.	This alternative results in 36 moderate noise impacts. Although it is not included as a moderate impact, this alternative has the highest potential noise impact on schools. All alternatives have equal impacts for residences in MA. This alternative results in two additional moderate impacts in Plaistow. All moderate impacts can be mitigated.
	What is the number of severe noise impacts?	This alternative results in 20 severe noise impacts. All alternatives have equal impacts for residences in MA, but this alternative results in one additional severe impact in Plaistow. All severe impacts can be mitigated.	This alternative results in 22 severe noise impacts. All alternatives have equal impacts for residences in MA. While this alternative results in three additional impacts in Plaistow, the three residences impacted are proposed for acquisition and demolition. Overall, this alternative has the fewest number of total noise impacts. All severe impacts can be mitigated.	This alternative results in 21 severe impacts. All alternatives have equal impacts for residences in MA, but this alternative results in one additional severe impact in Plaistow. All severe impacts can be mitigated.
Vibration	What is the number of moderate vibration impacts?	Moderate potential for moderate vibration impacts of all three alternatives (proximity to schools).	Lowest potential for moderate vibration impacts of all three alternatives.	Highest potential for moderate vibration impacts of all three alternatives (proximity to schools).
	What is the number of severe vibration impacts?	Moderate potential for severe vibration impacts of all three alternatives (proximity to schools).	Lowest potential for severe vibration impacts of all three alternatives.	Highest potential for severe vibration impacts of all three alternatives (proximity to schools).
7. Hazardous Materials				
Environmental Concerns	Are there any recognized environmental concerns (REC)?	Layover facility site has the second highest potential for recognized environmental concerns.	The site has the lowest potential for recognized environmental concerns.	The site has the highest potential for recognized environmental concerns.
8. Visual Resources/Aesthetics				
Visual/Scenic Resources	Does the site impact any existing viewsheds or scenic resources?	Change in visual character would result in minor impacts, primarily related to loss of a commercial building, loss of vegetated screening between Westville Road and the railroad tracks, and the addition of a station platform, sidewalks, and enhanced streetscape on west side of roadway.	Change in visual character would result in moderate impacts, primarily related to removal of the residential structures and wooded areas to accommodate surface parking lots, the kiss-and-ride area, and the station platform. Joanne Drive will be improved, sidewalks will be added, and the streetscape will be enhanced. The layover facility will be screened from Joanne Drive and Route 125 by existing vegetation and a fence or other screening as necessary.	Change in visual character would result in minor impacts, primarily related to removal of the industrial buildings to accommodate a surface parking lot, the kiss-and-ride area, the station platform, and the new layover and station tracks. Viewers from Main Street will see an improved access road with sidewalks and landscaping and the layover facility tracks will be screened from Main Street by vegetated cover or a fence. The existing water tower will remain.
9. Natural and Cultural Resources				
Natural Resources	What is the impact to wetland resources (acres)?	The station site has minimal wetland impacts (0.02 acres). The layover facility site impacts 0.08 acres sf of wetlands. Total impact is 0.1 acres and no mitigation is required.	This alternative has the highest impact on wetland resources. Approximately 0.94 acres of wetlands are impacted. Wetland mitigation will be required.	This alternative impacts 0.21 acres of wetlands and no wetland mitigation is required.
	What is the impact to stream buffers (acres within 100 feet of stream)?	The station site has no stream buffer impacts. The layover facility site impacts approximately 0.49 acres of the stream buffer.	This alternative impacts approximately 1.97 acres of the stream buffer.	This alternative impacts approximately 1.42 acres of the stream buffer.
	How many stream crossings are required for site concept?	The station site does not require stream crossings. The layover facility site requires one stream crossing.	This alternative requires a stream crossing for a layover lead track and station track.	This alternative requires a stream crossing for a layover lead track and station track.
	Is the site located within the floodplain?	The station site is not located within the floodplain. Approximately 0.49 acres of the layover facility site are within the floodplain.	A small area of the site (0.53 acres) near the stream crossing is located within the floodplain.	A small area of the site (0.33 acres) is located within the floodplain.

Evaluation Criteria		Alternative I (Haverhill Layover/Westville Rd Station)	Alternative II (Joanne Drive)	Alternative III (Testa Realty, Inc./144 Main Street)
	Does the site concept impact environmentally sensitive areas, such as wildlife habitats or threatened and endangered species areas?	The station site creates no significant environmental impacts. The layover facility site has moderate environmental impacts (stream crossing, stream buffer, and potential vernal pool buffers).	This site has the highest impact on natural resources (wetlands, stream buffers, stream crossings, and potential vernal pool buffers). The site is designed to minimize impacts.	This site has moderate impact on natural resources (stream buffer, stream crossing, and potential vernal pool buffers).
Historic/Cultural Resources	Will there be any impact to historic/cultural resources?	Minimal impacts to historic/cultural resources may occur.	No impact to historical/cultural resources are anticipated.	This site has the greatest likelihood of impacts to historical/cultural resources due to the proximity to Plaistow Village.
Archeological Resources	Will there be any impact to archeological resources?	The station site has low sensitivity for archeological resources. The layover facility site has moderate to high sensitivity for archaeological resources due to proximity to Little River.	The site has moderate sensitivity to archaeological resources due to the proximity to Little River.	The site has low sensitivity for archeological resources.
10. Operational Feasibility				
Layover Facility	What is the distance to the terminal station?	The layover facility and station sites are in two states (MA and NH) and are separated by approximately 1.1 miles. The MBTA has identified the configuration of the sites as NOT FEASIBLE.	The layover facility and station are located on the same site in NH.	The layover facility and station are located on the same site in NH.
	Does the site allow for efficient service operations with the station?	Separated layover facility and station sites cause increases in MBTA operations time with associated increase in cost to operate negating savings from reduced train deadheading.	The site layout allows for efficient MBTA operations between the station and layover facility.	The site layout allows for efficient MBTA operations between the station and layover facility.
Station	What is the distance to the layover facility?	The layover facility and station sites are in two states (MA and NH) and are separated by approximately 1.1 miles.	The layover facility and station are located on the same site in NH.	The layover facility and station are located on the same site in NH.
	Can a train be stored here overnight?	The station track can store a train overnight.	The station track can store a train overnight.	The station track can store a train overnight.
	Does the site allow for a double-ended track?	The station site layout allows for double-ended track for future operational considerations.	The site allows for double-ended track for future operational considerations.	The station has no possibility for a double-ended track for future operational considerations.
	Does the train have to change directions on the main line?	The station layout supports direct pull in and departure of trains.	The station layout supports direct pull in and departure of trains.	The station layout supports direct pull in and departure of trains.
Costs	What are the capital investment costs?	At $40.5 million, this alternative has the lowest estimated capital investment cost.	Due to the site's grade differential and efforts to avoid wetland areas, this site has the highest estimated capital investment cost at$50.5 million.	This alternative has the second highest estimated capital investment cost, at $49.4 million. The higher costs associated with this alternative are based on the higher land values and building demolition costs associated with the site.
	What are the operations and maintenance costs?	Although assumed to be zero for NHDOT or local entities based on a plan to have the station and layover facility built in the Plaistow area for use by MBTA, MassDOT has identified the configuration of this alternative as NOT FEASIBLE.	Assumed to be zero for NHDOT or local entities based on a plan to have the station and layover facility built in the Plaistow area for use by MBTA. In exchange for construction of the station and layover facility by others, MBTA would fund and operate the commuter service from the Plaistow area.	Assumed to be zero for NHDOT or local entities based on a plan to have the station and layover facility built in the Plaistow area for use by MBTA. In exchange for construction of the station and layover facility by others, MBTA would fund and operate the commuter service from the Plaistow area.

9.2.1 ALTERNATIVE I (HAVERHILL LAYOVER/WESTVILLE ROAD STATION)

Located in both Haverhill and Plaistow, the Alternative I layover facility and station would be separated by over one mile. This separation creates operational issues and from the MBTA's perspective, it increases costs and is less desirable than the other two alternatives. Additionally, the layover facility site is less than ideal given the significant potential for impacts to environmental or archeological resources on the site. The layover site is located in Massachusetts, which is expected to create issues for New Hampshire as the project proponent. While the capital investment costs for this alternative are lower than the other two alternatives, the operations and maintenance costs are anticipated to be higher to account for the increased train movement between the station and layover facility.

The Alternative I station site would use an existing, underutilized park-and-ride parking lot on Westville Road for the majority of the station parking. The development potential of the area surrounding the station site is low. This alternative has the lowest potential to accommodate future adjacent transit-oriented development around the station given the character of the adjacent land uses. Westville Road would need to be realigned to accommodate the station facility.

While this alternative has the fewest potential impacts on wetlands, the potential impacts on floodplains and stream corridors are higher than the other two alternatives. In particular, the layover facility is situated near the Little River in an area that has moderate to high sensitivity for environmental and archaeological resources associated with the river and floodplain.

Table 9.2 Alternative I Summary of Key Benefits and Constraints

Benefits/Advantages	Constraints/Issues
▪ Lowest capital investment cost ($40.5 million). ▪ Station site creates no significant environmental impacts, including wetlands or other water resources. ▪ Station uses existing NHDOT park-and-ride lot. ▪ Station and layover facility uses are compatible with adjacent land uses. ▪ Layover facility is furthest from schools/Plaistow Center.	▪ Operational issues tied to 1.1-mile separation of layover facility and station (existing freight & passenger service). The MBTA has identified the configuration of the sites as not feasible. ▪ Most residential properties within 1/2 mile of sites. ▪ Operational subsidies are likely due to separation of facilities; Town of Plaistow cannot support costs. ▪ Layover facility site has moderate to high sensitivity for archaeological resources and moderate environmental impacts (stream and floodplain). ▪ Westville Road must be slightly realigned to the east.

9.2.2 ALTERNATIVE II (JOANNE DRIVE LAYOVER/STATION)

Alternative II has the service utility needed with the least amount of impacts to the local community. From a traffic perspective, the site location on Joanne Drive offers the best regional access for the station. The station would be located just one-quarter mile from an existing signalized intersection at Route 125 (Plaistow Road). Future improvements on Route 125 are planned for completion in the near-

term that would further support placement of a station at this location. Based on the initial analysis, traffic impacts at this location are anticipated to be the least of all alternatives considered.
Due to the environmental conditions and grade differentials of the site, site design will require grading and fill or a new bridge to construct a track from the layover facility tracks to the main line track. To mitigate impacts on wetlands and avoid other water resources, a bridge and retaining walls will be required. This additional site work to avoid wetland areas comes at a premium cost; this alternative has the highest capital costs at $50.5 million.

The Alternative II site would be located adjacent to existing commercial development on Route 125 (Plaistow Road). Compared to the other alternatives, it is more isolated from existing schools and residential areas. Because of its separation, it offers the lowest potential for noise impacts. Additionally, compared to Alternative III, which is a current industrial site and brownfield site, this site has the fewest potential recognized environmental concerns.

Development of a station and layover facility on the Alternative II site could increase the redevelopment potential of the adjacent Testa Realty, Inc. property. In contrast to Alternative III that utilizes the majority of developable area of the Testa Realty Inc. site, Alternative II leaves the full area of that site available for future, potentially compatible development. Further, the proximity of Alternative II to the Testa Realty, Inc. parcel would permit good access from a station to any redevelopment on the Testa Realty, Inc. property. The proximity would support the potential for future mixed-use or TOD on the Testa Realty, Inc. site.

Table 9.3 Alternative II Summary of Key Benefits and Constraints

Benefits/Advantages	Constraints/Issues
▪ Best regional access to Route 125; Joanne Drive has an existing signalized intersection. ▪ Fewest number of noise impacts. ▪ Fewest number of residential properties within ½ mile. ▪ Operationally ideal; co-location allows movement between station and layover facility without access to main line track; reduces impact to Amtrak and freight services. ▪ Low potential for recognized environmental concerns, historical, cultural, and archaeological resources impact. ▪ Allows for potential to connect with future development in Plaistow Center.	▪ Highest capital investment cost ($50.5 million). ▪ Site has the highest potential impact on natural resources, including wetlands. ▪ Requires acquisition of three residential buildings. ▪ To avoid wetland areas and minimize need for ramping due to site grading, parking for the station is not very close to the platform.

9.2.3 ALTERNATIVE III (144 MAIN ST LAYOVER/STATION)

The Alternative III site would be located near the Plaistow Village on the Testa Realty, Inc. and Town of Plaistow-owned 144 Main Street property. The station and layover facility would be co-located on an existing industrial site. In this alternative, the station is located west of the layover tracks away from the

main line track. Due to this configuration, the station cannot be served from a double-ended track, which is not ideal from an MBTA operational perspective.
While the Alternative III location offers the greatest potential to attract pedestrian and bicycle access given its proximity to Route 121A (Main Street) and residential areas, vehicular access to the site would not be ideal given the distance from Route 125 (Plaistow Road). There is also concern that the station would increase traffic within Plaistow Village on Main Street. The location also creates the highest potential noise and vibration impacts as it is the closest of the three alternatives to the existing school on Main Street and the high number of residences within one-half mile.

While not the most expensive of all three alternatives, the capital investment cost for Alternative III is estimated at $49.4 million. The high cost is associated with the acquisition of the Testa Realty, Inc. parcel and the uncertain extent of building demolition and site preparation costs. Additionally, the development of a station and layover facility on this site reduces the development potential of the site and decreases the property tax revenue potential for this parcel.

Table 9.4 Alternative III Summary of Key Benefits and Constraints

Benefits/Advantages	Constraints/Issues
▪ Operationally ideal; co-location allows movement between station and layover facility without access to main line track; reduces impact to Amtrak and freight services. ▪ Station is located closest to Plaistow Village, which would allow the best access for local passengers and bicycle and pedestrian access. ▪ Results in minor environmental impacts and no impacts to potential vernal pools.	▪ Concern with traffic impacts on Main Street. ▪ Reduces opportunities for other (TOD) development. ▪ Highest potential impact on schools/surrounding area. ▪ Site has the most difficult regional access. ▪ Requires acquisition of largest amount of land, including Town of Plaistow parcel. ▪ High capital investment cost ($49.4 million). ▪ The existing industrial site has the highest potential for recognized environmental concerns.

9.3 Recommendation

Based on the input received at the PAC meetings, public meetings, and the evaluation of each alternative, Alternative II is the Recommended Alternative. The Recommended Alternative will be further reviewed as part of a NEPA EA. The EA will compare the Recommended Alternative with a No Build Alternative.

APPENDICES

A. Meeting Minutes
B. Site Option Graphics
C. Alternative Site Graphics
D. Service Plan
E. Ridership Forecasts and Market Assessment
F. Alternatives Analysis Graphics
G. Land Use and Economic Development Assessment
H. Traffic Impact Analysis
I. Noise and Vibration Assessment
J. Hazardous Waste Assessment
K. Natural Resource Assessments
   - Summary of Preliminary Field Review for Wetlands, Streams, and Vernal Pools
   - Natural Resources Preliminary Impact Analysis
L. Preliminary Reconnaissance: Architectural-Historical Data
M. Phase IA Archaeological Sensitivity Assessment
N. Capital Cost Estimate