1 Introduction

1.1 Introduction

The Green Line Extension Project is an initiative of the Massachusetts Department of Transportation (MassDOT) and the Massachusetts Bay Transportation Authority (MBTA) to enhance transit services in order to improve mobility and regional access for residents in the communities of Cambridge, Somerville and Medford. The Project is required by the State Implementation Plan (SIP) and fulfills a longstanding commitment of the Central Artery/Tunnel project to increase public transit. The Massachusetts Air Pollution Control Regulations (310 CMR 7.36) require that MassDOT complete this Project by December 31, 2014.

On October 15, 2009, MassDOT filed the Green Line Extension Project *Draft Environmental Impact Report/Environmental Assessment* (DEIR/EA) with the Massachusetts Environmental Policy Act (MEPA) Office. The submission of the DEIR/EA was a major milestone in the development of the Green Line Extension Project. After an extensive public review and comment period, the Secretary of the Executive Office of Energy and Environmental Affairs (EEA) issued a Certificate on the DEIR on January 15, 2010, requiring the preparation of a Final Environmental Impact Report (FEIR) of limited scope for the Proposed Project.

MassDOT expects Project funding will come both from the Federal Transit Administration (FTA) and from Commonwealth bonding. Because MassDOT is seeking funding through the FTA, the Project also requires review under the National Environmental Policy Act (NEPA). At the request of the FTA, MassDOT is preparing a separate Final EA.

The Green Line Extension Project is proposed to be built in two phases with an initial operating segment (the "Proposed Project") being constructed to College Avenue in Medford and a spur to Union Square in Somerville, as described and evaluated in the DEIR/EA as Alternative 1. The second phase of this Project, the

"Future Full-Build Alternative" will include extending the Project from College Avenue Station to Mystic Valley Parkway/Route 16 Station in the future, as described and evaluated in the DEIR/EA as Alternative 2. Although the extension to Mystic Valley Parkway/Route 16 was considered for the Green Line Extension Project, limitations on available funding prohibit the Commonwealth from extending the Green Line beyond College Avenue at this time. This second, future phase is not currently part of the Proposed Project and is not the subject of this FEIR.

As required by the Secretary's Certificate on the DEIR (hereafter referred to as the Secretary's Certificate), this FEIR provides additional analyses of the Proposed Project, including:

- Quantitative environmental analysis of both the Option L and Mirror H Maintenance Facility locations including, for comparative purposes, the prior analysis of Yard 8 (see Chapter 2);
- Narrative discussion clarifying air quality modeling (see Chapter 3);
- Impacts associated with College Avenue Station as a terminal station (see Chapter 4);
- Refined conceptual design of Lechmere Station (see Chapter 5);
- A Public Involvement Plan (PIP) for community participation beyond the environmental process (see Chapter 6);
- Summary of Proposed Project impacts (see Chapter 7); and
- Mitigation measures and Section 61 Findings for Project impacts (see Chapter 8).

The DEIR/EA, available on the Project website, www.mass.gov/greenlineextension, provides the full description of existing conditions and environmental resources affected by the Green Line Extension, as well as a full impacts analysis, methodology assumptions and definitions of applicable terminology for each resource.

1.2 Project Background

Numerous studies over the last 40 years have explored extending transit from Lechmere Station (the current terminus of the Green Line) along the existing MBTA Lowell or MBTA Fitchburg Line commuter rail rights-of-way (Figure 1-1). More recently, the 2005 *Beyond Lechmere Northwest Corridor Study* generated a Major Investment Study/Alternatives Analysis that evaluated a wide range of technologies and operating plans for a future extension. The *Beyond Lechmere Northwest Corridor Study* did not identify a preferred alternative, but rather

investigated a range of cost-effective transit solutions that would increase transit accessibility, improve corridor mobility, increase transit services, and support opportunities for smart growth initiatives and sustainable development.

An Expanded Environmental Notification Form (EENF) was submitted to the EEA on October 10, 2006. The Secretary of EEA issued a Certificate on the EENF on December 1, 2006, requiring a DEIR for the Proposed Project.

After the submission of the EENF, the Project Area was expanded to include the relocation of Lechmere Station. Relocating Lechmere Station was previously reviewed under MEPA as part of the NorthPoint development project (EEA # 12651), but was not previously reviewed under NEPA. The October 2009 DEIR/EA included an evaluation of relocating Lechmere Station to the location previously reviewed under MEPA. The DEIR/EA evaluation included the need to relocate the station, documented the alternatives evaluated, and evaluated the environmental consequences of moving the station.

On Lechmere Station, the January 15, 2010 Secretary's Certificate required the FEIR to:

- "Explore ways to reduce the proposed parking program (in light of the station no longer functioning as a terminus) and consider other design refinements to reduce impacts of the relocated Lechmere Station on abutting land uses (notable the Glass Factory Condominiums)."
- "The FEIR should clarify modeling assumptions, and proposed station layout and mitigation measures that will be implemented to effectively and safely convey bus passengers, pedestrians, and cyclists from the neighborhood to the relocated Lechmere Station."

This information is provided in FEIR Chapter 5, *Lechmere Station*.

Another topic that has been extensively studied has been the vehicle maintenance and storage facility that must be constructed to support the operations of the Green Line Extension. The DEIR/EA stated that the area referred to as "Yard 8 with Adjacent Parcel" (Yard 8) was selected as the preferred location for the construction of a Green Line vehicle maintenance and storage facility, based on the combination of size, configuration, and adjacency to the Green Line Extension tracks. The selection of the Yard 8 site prompted local opposition from some municipal officials, elected representatives, and abutting residents. To try to address and resolve these concerns, MassDOT then qualitatively analyzed two additional possible sites for the facility, Option L and Mirror H, in December 2009.

The January 15, 2010 Secretary's Certificate required MassDOT to "provide a quantitative environmental analysis of both the Mirror H and Option L locations and include for comparative purposes the existing analysis of Yard 8." In response, MassDOT completed the required analysis in April 2010, as provided in the *Environmental Analysis of Additional Maintenance Facilities* technical memorandum[1], summarized in FEIR Chapter 2 and provided in full in Appendix B. The full environmental analysis for Yard 8 was conducted for and included in the DEIR/EA, and was repeated in the April 2010 technical memorandum for comparison purposes.

1.3 The Proposed Project

The Proposed Project is envisioned to provide service to College Avenue in Medford and Union Square using a two-branch operation, both in existing commuter rail rights-of-way. The 3.4-mile Medford Branch would operate from a relocated Lechmere Station to College Avenue in Medford along the MBTA Lowell Line commuter rail right-of-way. This branch would begin at relocated Lechmere Station and head northwest, meeting the MBTA Lowell Line just south of Washington Street in Somerville. From Washington Street, the alignment would run parallel to the MBTA Lowell Line to Medford, terminating its route at College Avenue in Medford. The 0.9-mile Union Square Branch would operate along the MBTA Fitchburg Line commuter rail right-of-way from relocated Lechmere Station into a terminus at Union Square in Somerville.

Seven stations would be constructed for the Proposed Project:

- Relocated Lechmere Station, Cambridge (relocated to east side of O'Brien Highway/Route 28);
- Brickbottom Station, Somerville;
- Gilman Square Station, Somerville;
- Lowell Street Station, Somerville;
- Ball Square Station, Medford;
- College Avenue Station, Medford; and
- Union Square Station, Somerville.

The primary infrastructure improvements of the Proposed Project would include relocating existing commuter rail lines, constructing approximately four miles of new light rail track and systems, four multi-span viaducts, a vehicle maintenance and storage facility, and reconstructing 11 bridge structures to support the extended service.

1 Massachusetts Department of Transportation, *Green Line Extension Project, Environmental Analysis of Additional Maintenance Facilities*, April 21, 2010.

The Proposed Project is expected to generate the MBTA's anticipated daily ridership at the Project's seven stations (boardings and alightings) by approximately 52,000 by the year 2030, with approximately 90 percent of these trips to take place in the Project's opening year of 2014. The Green Line would also see an increase of 30,700 boardings and the entire MBTA system would see an increase of 7,900 new daily linked transit trips as a result of the extension of the Green Line service. Of these new transit rips, approximately 70 percent of these riders are projected to switch from using their automobiles to using transit. The Proposed Project would reduce vehicle miles travelled (VMTs) by 25,018 per day (projected to the year 2030).

Estimated travel time between College Avenue Station and Lechmere Station for the proposed Green Line Medford Branch is 9.5 minutes. Green Line service beyond Lechmere Station for the Medford Branch would operate on headways equal to that of the existing Green Line D branch service: five minutes in the morning and evening peak periods and ten minutes during off-peak periods.

Estimated travel time between Union Square and Lechmere Station for the proposed Green Line Union Square Branch is 4.5 minutes. Green Line service beyond Lechmere Station for the Union Square Branch would operate on headways equal to that of the existing Green Line E branch service: six minutes in the morning peak period, five minutes in the evening peak period, and between nine and ten minutes during off-peak periods.

Fares for the Green Line Medford Branch and Union Square Branch would be $1.70 for one-way adult trips, based on current MBTA subway fares.

1.3.1 Stations

Seven stations would be constructed as part of the Proposed Project, as described in more detail in DEIR/EA Section 3.7.3, *Stations*, and DEIR/EA Appendix B. Station locations for the Green Line Extension were identified through an evaluation process and in working with the public and local officials. Important considerations in station siting and configuration included operations and access, as well as impacts to area properties. Stations are intended to function as neighborhood stations with no provisions for parking.

Stations were designed to meet the Project's goals of improved transit access and accessibility, and to minimize impacts to the community associated with land acquisition, traffic, and loss of local parking. The design for each station is envisioned to provide a headhouse with automated fare lines, vending machines, an information booth, and restrooms. Entry to and exit from the platforms would be by elevators, escalators, and stairs. Station access and platform design were based on requirements and guidance provided by the Americans with

Disabilities Act (1990) (ADA) and the Commonwealth of Massachusetts Architectural Access Board (AAB), as well as requirements of the MBTA. In addition to station amenities and access requirements, station criteria also considered "green" or sustainable design.

1.3.2 Vehicle Requirements

The Green Line Extension Project vehicle fleet will include a mix of three vehicle types: the two current vehicles (Type 7 high-floor cars and Type 8 low-floor cars) and a new "Type 9" low-floor car, which is currently under development. All three vehicle types would be able to operate within the existing system and along the Green Line Extension.

In general, the current Green Line trainsets (or "consists") include two or three cars. For the purpose of calculating the number of required cars, two-car Green Line trains were conservatively assumed. Based on the 2006 MBTA's Service Delivery Policy, the seating capacity of each Green Line car is 44 to 46 seats, depending on the car type, and the maximum peak load standard is 225 percent of the seated capacity for the peak periods. This translates into a peak period train capacity of 198 to 207 passengers per trainset. Utilizing the projected ridership and proposed operating plan for the Proposed Project, as well as working with the MBTA, it was determined that 24 additional Green Line cars would be needed to accommodate the proposed headways and projected ridership for the Green Line Extension Project.

1.3.3 Capital Improvements

Capital improvements for the Medford Branch include construction of light rail tracks and overhead catenary system (OCS) along the existing railroad right-of-way between the relocated Lechmere Station and College Avenue in Medford. Improvements also include use of the MBTA's portion of the "Yard 8" right-of-way between relocated Lechmere Station and Washington Street and along the MBTA Lowell Line between Washington Street and College Avenue. The service would end immediately north of the College Street overpass. A support facility for storage and servicing of the Green Line fleet would be constructed to accommodate the existing north-side Green Line service fleet and the additional fleet of 24 vehicles. In addition to the track construction, some of the existing bridges along the right-of-way would need to be reconstructed to accommodate the additional tracks. The structures that would need to be reconstructed include the former Red Bridge, Washington Street, Walnut Street, Medford Street, School Street, Lowell Street, Cedar Street, Broadway, Harvard Street, and College Avenue. Existing track and signal equipment would also need to be relocated in order to accommodate the planned light rail tracks. Since

College Avenue would be the terminus for the line, additional track lengths would be required north of the station for short-term storage and operational flexibility.

The Union Square Branch would also require light rail tracks and OCS to be constructed along the MBTA Fitchburg Line between the former Red Bridge and the proposed Union Square Station near Prospect Street. The alignment to Union Square would require reconfiguration of the existing signal equipment as well as the commuter rail and freight rail tracks between the MBTA's Boston Engine Terminal (BET) and Webster Avenue. In addition, the existing rail bridge over Medford Street along the right-of-way would need to be reconstructed to accommodate the additional tracks.

New signal, communications, and electrical systems will be required for the Green Line Extension Project. The Proposed Project would require Automatic Wayside Block Signals to govern Green Line train operations for both the Medford Branch and the Union Square Branch.

As described in the DEIR/EA, multiple communication systems are proposed for MBTA operations, MBTA staff communications, mechanical system monitoring, passenger communications, and emergency reporting.

Traction power for the Green Line is provided by 600 volts direct current (VDC) through an OCS. The Proposed Project will require traction power substations to supply direct current (DC) power to both the Medford Branch and the Union Square Branch. New substations would be required at the proposed maintenance facility site and at Ball Square Station. The traction power feeders and returns will be installed in underground electrical conduits. The OCS will consist of an overhead auto-tension catenary system registered and supported on cantilever-type assemblies, span wire assemblies, and portal bents.

1.3.4 Construction

The Proposed Project has been designed to minimize impacts to the corridor municipalities by reducing the footprint of the Project and maximizing the use of existing transportation corridors.

Construction staging and sequencing strategies are critical to achieving an efficient construction project while minimizing the impacts to vehicular traffic, pedestrian traffic, on-street parking, public access, emergency access to local businesses and residences, and general quality of life. This corridor presents several construction challenges including narrow roadways, urban traffic volumes, and a variety of commercial, industrial, and residential land uses that require continuous access, limited space for construction zones and lay down

areas within or near the rail corridor, and existing rail service that must be maintained throughout construction.

The current level of construction staging and sequencing developed for the Project addresses the constraints of the corridor, impacts to abutters, and other construction issues. More detailed evaluation and staging recommendations will be developed as design progresses and through coordination with the City of Cambridge, City of Somerville, and City of Medford, and their respective Fire and Police Departments. This effort would include public input. A comprehensive construction staging and sequencing plan will be developed and included in the final construction contract documents and communicated to the public.

1.3.5 Estimated Cost

During the development of the DEIR/EA, 10-percent concept plans for the Proposed Project were designed and detailed capital cost estimates were developed. The capital improvements include, but are not limited to, construction of track, stations, structures, systems, drainage, utilities, and the maintenance facility. Additional costs include property acquisitions and relocations as well as the cost for vehicle acquisition. The cost of the Proposed Project includes the cost to reconstruct Lechmere Station. The overall cost of the Proposed Project is currently estimated to be approximately $844.5 million in 2009 dollars, including $79.3 million for the 24 Green Line vehicles. Annual operating and maintenance costs would be approximately $22.1 million in 2009 dollars. The total costs for the Proposed Project were increased to include inflation for the time period in which the Project is to be implemented. Therefore, the "Year-of-Expenditure" (YOE) capital costs for the Proposed Project were calculated to be approximately $953.7 million in YOE dollars.

1.4 Public Involvement

The Green Line Extension Project has received significant public input throughout the planning process, as documented in DEIR/EA Section 1.5, *Public Involvement and Agency Coordination*. The public hearing for the DEIR, attended by over 400 people, was held in November 2009. As noted in the Secretary's Certificate, the approximately 400 comment letters (with more than 2,400 individual comments) on the DEIR/EA reflect a substantial interest in the future of the corridor from elected officials and municipal representatives; city, state, and regional agencies; environmental, bicycle, and pedestrian advocacy groups; neighborhood groups; groups that represent the disabled; businesses; residents; and the general public. Table 1-1 provides a summary of substantive comments received, by topic.

Table 1-1 Summary of DEIR/EA Comments

Topic	Number of Comments
Accessibility	98
Acquisitions and Relocations	39
Air Quality	46
Alternatives	184
Community Paths	137
Construction Impacts	31
Coordination (Agency and Public, Other Projects)	240
Costs and Funding	42
Environmental Justice	24
Fish, Wildlife and Plants	4
General Opposition	2
General Support	32
Hazardous Materials	11
Historical and Archaeological Resources	17
Indirect and Cumulative Effects	20
Land Use/Transit Oriented Development	80
Maintenance and Storage Facility	343
MEPA/NEPA Process	154
Mitigation/Section 61 Findings	148
Noise and Vibration	82
Open Space/Parks and Recreation/Section 4(f)	5
Purpose and Need	3
Rail Operations	53
Ridership	12
Safety	15
Schedule	5
Socioeconomics	33
Soils/Groundwater	1
Station Design	392
Stormwater/Surface Water	19
Sustainability	7
Terminus Impacts	48
Track and System Design	37
Traffic and Parking	38
Utilities	11
Visual Environment	10
Wetlands	1

During the review of the DEIR/EA comments, a number of key concerns and issues were raised including, but not limited to:

- **Station Design** – Members of the public were concerned with station design issues. The greatest number of station design comments focused on the relocated Lechmere Station (approximately 200 comments). Comments included the location of the track near the Glass Factory Condominiums; parking at the station; bus circulation and bus stop locations; the pedestrian crossing at O'Brien Highway; and general station layout, access, and

architectural character. Several comments expressed support for adaptive reuse of parts of the existing Lechmere Station, particularly the bus shed. Several comments requested reconsideration of the Mystic Valley Parkway/Route 16 station layout and its inclusion in the Proposed Project.

- **Access –** Stakeholder comments expressed general support for prioritizing pedestrian, bicycle, and bus access to the Project stations. Members of the public were concerned with locations of drop-off and pick-up areas and their impacts on traffic; platform locations; bicycle/pedestrian access; and ADA accessibility at station approaches, within the stations, and between the platforms and vehicles.
- **Maintenance and Storage Facility –** Members of the public were concerned with the location of the maintenance and storage facility. Of all comments received, the majority (including over 225 petition signatures) opposed the siting of the light rail maintenance and storage facility at Yard 8. Most maintenance facility commenters were in favor of the Option L site. Lechmere Station-area stakeholders expressed general opposition to the Mirror H location, while Somerville stakeholders generally preferred Mirror H but also welcomed Option L.
- **Continued Coordination with Agencies and Interested Parties –** Members of the public requested that MassDOT and the MBTA continue public involvement during design and construction. Several requested a construction field office where stakeholders could speak in person with Project representatives regarding construction impacts and mitigation.
- **Alternatives –** Members of the public were predominantly in favor of the Proposed Project. A large number of comments requested that the Project continue to Mystic Valley Parkway/Route 16 in one phase. Few expressed support for a College Avenue terminus of the Medford Branch. Approximately 70 comments expressed concern about traffic and neighborhood parking impacts at College Avenue. Several other comments expressed concern that the College Avenue terminus would not adequately serve Medford Hillside residents. Approximately 50 comments requested that the Project not preclude future extensions or additions of the Green Line. Most of these comments supported a future extension of the Union Square Branch to Porter Square; several comments supported a possible future station on one or both branches near the Brickbottom Artists Building and/or Boynton Yards.
- **Mitigation/Section 61 Findings –** Members of the public were concerned and/or interested with proposed mitigation measures for potential impacts from noise, vibration, traffic, and the maintenance facility. A large number of comments pertained to noise, vibration, and visual impacts at the Glass Factory Condominiums near the proposed Lechmere Station. Most of the comments from Brickbottom Artists Building stakeholders expressed

concern about noise and visual impacts of a maintenance and storage facility at Yard 8; others expressed concern about impacts from railroads and proposed light rail along the south side of the Brickbottom Artists building.

- **Community Path –** Members of the public requested that the design and construction of the Somerville Community Path be included in the Green Line Extension Project (over 125 comments and 175 petition signatures). Many of these comments requested that the Path extend to Lechmere Station as part of the Project.
- **Construction Impacts –** Members of the public expressed concerns with regards to impacts during construction, including noise and vibration, vehicular traffic, detours during bridge reconstruction, pedestrian traffic, on-street parking, public access, and emergency access to local businesses and residences.

1.4.1 Public Involvement since the DEIR/EA

This section discusses public involvement activities that have occurred since the release of the DEIR/EA, including a public meeting in December 2009 to release the results of the operational analysis on the maintenance facility alternatives; municipal meetings with Cambridge, Somerville and Medford; Land Use Workshops, and the creation of a design working group for later phases of the Proposed Project.

Meetings

MassDOT held one public meeting in Cambridge in December 2009 to present the Option L and Mirror H alternatives for siting, design, and construction of a Green Line vehicle maintenance and storage facility. Yard 8, as fully analyzed in the DEIR/EA, was also presented for comparison purposes. The meeting included a presentation by MassDOT and a questions and answer session. The presentation provided an overview of the operational analysis, property acquisition needs, and schedule implications, as well as a preliminary evaluation of potential environmental impacts and costs of the three sites under consideration. Attendance was over 125 people.

Beginning in March 2010, MassDOT and the Project Team have been meeting biweekly with municipal leaders of the corridor communities. These meetings have focused on a wide range of project-related issues, including developing the public involvement approach for the Preliminary Engineering phase of work and planning the municipal Land Use workshops for May and June 2010.

MassDOT, working with the local municipalities, has hosted a series of Land Use Planning Workshops associated with the Green Line Extension Project. After an overview presentation about the Green Line Extension project, participants were given a chance to share knowledge about their neighborhoods and to express their priorities and concerns about future land uses around the station areas. These workshops focused on areas around the planned stations, with the intention that future workshops would focus on the stations themselves. Workshops were held in Medford on May 19, 2010, in Cambridge on May 26, 2010, and in Somerville on June 12, 2010.

MassDOT and the Project Team are committed to reaching out to environmental justice populations. The team sent notifications to these communities to ensure their participation throughout the FEIR process to achieve compliance with state and Federal guidelines.

Fact Sheets

The Project Team prepared a Project Fact Sheet in advance of the DEIR/EA release in the Fall of 2009. This fact sheet outlined the contents of the DEIR/EA, provided a summary of Project impacts, Project cost and funding, an overview of Project components (stations and maintenance and storage facility) and information on providing comments on the DEIR/EA.

The Project Team prepared a Fact Sheet in advance of the FEIR release in Spring 2010. The fact sheet outlined the anticipated content of the FEIR, discussed ongoing survey work and data collection that will be used to advance the design of the Green Line, and discussed upcoming public workshops on station area land use planning and station design.

Website/Emails

MassDOT continually updates the interactive Project website, www.mass.gov/greenlineextension with new information as it becomes available. Interested individuals have signed up to be part of the Green Line Extension mailing list (more than 4,500 names) and have also sent inquiries about the Project to MassDOT and the Project Team.

Since the release of the DEIR/EA, MassDOT has sent weekly notifications to the Project email distribution list concerning on-going data collection efforts, which include survey and geotechnical investigations.

Design Working Group

As part of the planning for the Preliminary Engineering phase, MassDOT is convening a Green Line Extension (GLX) Design Working Group. This group will assist MassDOT by reaching out to local residents, businesses, and institutions to gather input on the design of six new stations proposed for the neighborhoods of Brickbottom, Gilman Square, Lowell Street, Ball Square, College Avenue, and Union Square, as well as the relocation of Lechmere Station. In addition, MassDOT will seek public input on design issues related to the proposed Somerville Community Path and the Green Line Extension vehicle maintenance and storage facility.

On April 1, 2010, MassDOT distributed an application for membership on the GLX Design Working Group to the project database and announced its availability in local newspapers and libraries. Applications were accepted until April 30, 2010. MassDOT announced the members of the Working Group prior to the filing of this FEIR. The list of members is also available on the project website.

1.5 Requirements of Secretary's Certificate

The Secretary's Certificate on the DEIR (January 15, 2010) stated that the DEIR adequately and properly complied with MEPA and with its implementing regulations. The Secretary required MassDOT to prepare and submit for review a limited FEIR in response to those items identified in the scope, summarized in Table 1-2. The limited FEIR focuses on these six main topics:

- Maintenance facility location (Chapter 2);
- Air quality modeling (Chapter 3);
- Impacts associated with College Avenue Station as a terminal station (Chapter 4);
- Redesign of the conceptual layout for Lechmere Station (Chapter 5);
- Development of a plan for community involvement as the Project advances (Chapter 6);
- Summary of Proposed Project impacts (Chapter 7); and
- Mitigation measures and Section 61 Findings for Project impacts (Chapter 8).

The requirements of the Secretary's Certificate, and the sections of this FEIR that address these requirements, are provided in Table 1-2. Detailed, point-by-point responses to the Secretary's Certificate are provided with the other responses to comments in Volumes 2 and 3 (provided on CD) of this document.

Table 1-2 Requirements of the Secretary's Certificate on the DEIR

Category	Requirement	Addressed In FEIR
General	Follow Section 11.07 of MEPA regulations for outline and content, as modified by Certificate.	Throughout
	Identify, describe and assess environmental impacts of any Project changes since the DEIR.	Chapter 7
	Include a copy of Secretary's Certificate and each comment letter received. Respond fully to each substantive comment received to the extent within MEPA jurisdiction.	Appendix A
	Circulate hard copy of the FEIR to each State and city agency from which MassDOT will seek permits or approvals and to each City agency that submitted comments.	Chapter 9
	Circulate a copy of the FEIR to those that submitted individual written comments. MassDOT may circulate FEIR in CD-ROM format, making available a reasonable number of hard copies, to accommodate those without convenient access to a computer to be distributed upon request, first come, first served.	Chapter 9
	Send FEIR notice of availability to those who signed petition and for which addresses are available.	Chapter 9
	A copy of the FEIR should be made available for public review at Cambridge, Medford and Somerville public libraries.	Chapter 9
Maintenance and Storage Facility	Expand upon December 9, 2009 technical memorandum and provide quantitative environmental analysis of Mirror H and Option L and include for comparative purposes the existing analysis of Yard 8. Provide comprehensive analysis of Maintenance Facility siting and operations for: land uses, (including environmental justice), impervious area, parking, stormwater, hazardous materials, traffic, land acquisition, noise, vibration, air quality, open space, historic and archaeological resources, the Community Path, and construction period impacts.	Sections 2.4, 2.5, Appendix B
	Provide a detailed assessment of Maintenance Facility sizing, and in exploring alternatives seek to minimize project footprint and potentially reduce land acquisitions through innovative design.	Section 2.4
	Evaluate impacts to freight operations for each design alternative, noting operational or deed restrictions that may hinder flexibility in Maintenance Facility siting or operations.	Section 2.3
	Comments received from Pan Am Railways (PAR) on the DEIR and concerns raised regarding potential impact of MassDOT's use of Yard 8 on PAR operations should be addressed in Maintenance Facility portion of the FEIR.	Section 2.3
Air Quality	Include narrative discussion clarifying air quality modeling assumptions, challenges associated with inherent evolution of modeling programs and input data, and how air quality modeling results were conducted in manner that sufficiently demonstrated consistency with the SIP.	Chapter 3
College Avenue – Terminus Station	Revisit DEIR models, revise as necessary to accurately assess predicted functions of the College Avenue Station, and describe difference in operations and mitigation measures between DEIR and the FEIR, if any.	Chapter 4
	Clarify how College Avenue Station, functioning as a terminus, will impact traffic, parking, pedestrian, and bicycle operation within the Study Area and outline sufficient mitigation measures to offset identified negative impacts.	Section 4.3

Table 1-2 Requirements of the Secretary's Certificate on the DEIR (continued)

Category	Requirement	Addressed In FEIR
College Avenue – Terminus Station (continued)	Describe Green Line operations at the proposed terminus and how the facility has been designed to accommodate terminal station ridership demand.	Sections 4.2, 4.3, 4.6
	Clarify how train operations at College Avenue Station may impact sensitive noise and vibration receptors, and present appropriate mitigation measures.	Sections 4.5, 4.6
Lechmere Station	Explore ways to reduce the proposed parking program (in light of station no longer functioning as terminus) and consider other design refinements to reduce impacts of relocated Lechmere Station on abutting land uses (notably Glass Factory Condominiums).	Chapter 5
	Clarify modeling assumptions, and proposed station layout and mitigation measures that will be implemented to effectively and safely convey bus passengers, pedestrians and cyclists from neighborhood to the relocated Lechmere Station.	Sections 5.2, 5.4
	Level of information presented in the FEIR should be of sufficient conceptual design to reflect anticipated station layout and operations, relationships to broader transportation network, existing and permitted buildings, and where mitigation measures would be implemented.	Sections 5.2, 5.3, 5.4
Public Involvement Plan	Develop a Public Involvement Plan for Project that clearly outlines how a broad range of participants will continue to provide a meaningful community involvement throughout duration of entire project, including detailed design, engineering, construction phases.	Chapter 6
	Build on lessons learned from previous Advisory Groups, consider ideas presented as part of the Community Corridor Planning Project, reflect comments received on DEIR, and represent a serious commitment by both MassDOT and the MBTA to actively engage public upon completion of MEPA review.	Section 6.1
	Provide plan for procedural engagement of various participants and outline primary substantive topics that are anticipated to be addressed through PIP process.	Sections 6.2, 6.3
	Integrate components of conceptual mitigation plan into broader framework of PIP to provide forum for information sharing between future MassDOT studies and data and interested and affected parties.	Chapter 6
Mitigation and Section 61 Findings	Include separate chapter on mitigation measures. This chapter should include distinct draft Section 61 findings for each State Agency action, clear commitment on mitigation, schedule for implementation, estimate of individual costs of proposed mitigation and identification of parties responsible for implementing mitigation.	Chapter 8
	Include conceptual plan for evaluating, monitoring, and compensating affected parties along corridor with specific emphasis on, but not limited to, noise, vibration, and land acquisition impacts. Conceptual plan should address not only mitigation associated with future ongoing operations of Green Line Extension, but impacts uniquely limited to construction period.	Section 8.1
	Construction period mitigation measures must seek to minimize impacts to vehicular traffic, pedestrian and bicycle traffic, on-street parking, public access, and emergency access to local businesses and residences.	Section 8.4

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Maintenance Facility Alternatives Analysis

2.1 Introduction

A vehicle maintenance and storage facility must be constructed to support the operations of the Green Line Extension. The DEIR/EA stated that the area referred to as "Yard 8 with Adjacent Parcel" (Yard 8) was selected as the preferred location for the construction of a Green Line vehicle maintenance and storage facility, based on combination of size, configuration, and adjacency to the Green Line Extension tracks. The selection of the Yard 8 site prompted local opposition from some municipal officials, elected representatives, and abutting residents. To try to address and resolve these concerns, MassDOT qualitatively analyzed two additional possible sites for the facility in December 2009.[1] Option L, a site identified by MassDOT, is immediately adjacent to the MBTA commuter rail maintenance facility, also referred to as the BET. Mirror H, a site proposed by the City of Somerville, straddles the Inner Belt area of Somerville and the NorthPoint area of Cambridge. All three maintenance facility alternatives are shown on Figure 2-1.

The December 2009 *Additional Maintenance Facility Alternatives Analysis*[2] included an analysis of operations, property acquisition needs, and schedule implications, as well as a preliminary evaluation of potential environmental impacts and costs. It did not include an in-depth environmental analysis of the type presented in the DEIR/EA for the Yard 8 site. This qualitative analysis concluded that both Yard 8 and Option L remained viable locations for the Green Line Extension Project support facility, while the Mirror H site rated lower in a number of categories.

Following an extensive public review and comment period on the DEIR/EA, the January 15, 2010 Secretary's Certificate required MassDOT to prepare a FEIR for the Green Line Extension Project, including a more detailed, quantitative analysis of the environmental and operational impacts associated with Option L and Mirror H.

1 Massachusetts Department of Transportation. *Green Line Extension Project, Additional Maintenance Facility Alternatives Analysis*. December 9, 2009.
2 *Ibid.*

In response, MassDOT conducted that analysis as documented in the April 2010 *Environmental Analysis of Additional Maintenance Facilities*.[3] The full environmental analysis for Yard 8 was conducted for and included in the DEIR/EA, but was repeated in that document for comparison purposes.

MassDOT reviewed and considered the DEIR/EA comments on the maintenance facility together with the outcome of the April 2010 analysis to decide whether to substitute either Option L or Mirror H for Yard 8 as the preferred site for the maintenance and storage facility for the Green Line Extension Project. After balancing all operational and environmental benefits and impacts of the three maintenance facility alternatives, combined with discussions with the local communities, MassDOT has selected Option L as the preferred maintenance facility site for the Green Line Extension Project.

2.2 Requirements of the Secretary's Certificate

The Secretary's Certificate required the FEIR to provide additional information on the Green Line maintenance and storage facility to address comments received during the public comment period. Specific requirements include:

- Expand upon the December 9, 2009 technical memorandum and provide quantitative environmental analysis of Mirror H and Option L and include for comparative purposes the existing analysis of Yard 8.
- Provide a comprehensive analysis of Maintenance Facility siting and operations for: land uses (including environmental justice), impervious area, parking, stormwater, hazardous materials, traffic, land acquisition, noise, vibration, air quality, open space, historic and archaeological resources, the Community Path, and construction period impacts.
- Provide a detailed assessment of Maintenance Facility sizing, and explore alternatives to minimize the project footprint and potentially reduce land acquisitions through innovative design.
- Evaluate impacts to freight operations for each design alternative, noting operational or deed restrictions that may hinder flexibility in Maintenance Facility siting or operations.
- Comments received from Pan Am Railways (PAR) on the DEIR and concerns raised regarding potential impact of MassDOT's use of Yard 8 on PAR operations should be addressed in Maintenance Facility portion of the FEIR.

3 Massachusetts Department of Transportation. *Green Line Extension Project, Environmental Analysis of Additional Maintenance Facilities.* April 21, 2010.

The following sections provide a summary of the supplemental analysis of the three maintenance facility alternatives and respond to the requirements of the Secretary's Certificate.

2.3 Description of Alternatives

This section provides a description of the three locations evaluated as part of the analysis of additional maintenance facility alternatives for the Green Line Extension Project – Yard 8, Option L and Mirror H (Figure 2-1). A summary of the program, operational plan, real estate impacts and cost for each maintenance facility alternative is provided. The complete description of the alternatives is provided in full in Appendix B.

2.3.1 Yard 8

Yard 8 is an approximately six-acre railroad yard adjacent to the proposed Green Line alignment and accessed from Inner Belt Road in Somerville (Figure 2-2). The yard is partially owned by the MBTA and by Pan Am Railways. The Pan Am Railways' portion of the yard is currently used for freight operations while the MBTA portion of the yard is currently inactive. This site, combined with an adjacent undeveloped parcel at 200 Inner Belt Road, was previously determined to be the preferred maintenance facility site that could accommodate the necessary maintenance facility components for the Green Line Extension Project. A detailed environmental analysis of the Yard 8 site was provided in the DEIR/EA.

Program

Yard 8 accommodates the defined support facility program including, but not limited to: storage for 80 Green Line vehicles, two pit tracks, two lift tracks, one wheel truer track, support shops, Green Line vehicle wash, administrative office space, and an approximately 100-space employee parking lot.

Combining the MBTA and Pan Am Railways' portions of Yard 8 would provide sufficient area to accommodate the Green Line Extension tracks and a five-track storage facility that could store 70 vehicles. The shape of Yard 8 is well-suited to provide a double-ended storage yard, with lead tracks at each end feeding ladder tracks which fan out to the five storage tracks.[4]

The layout of Yard 8 allows for a single storage yard north of the maintenance building. Total capacity of the storage yard is 70 cars. It is assumed that, at any one

4 A lead track is a primary track that provides access from a main line track to a yard, and from which a series of yard tracks can be connected via a turnout or switch within the yard. Multiple storage tracks that are connected to the lead track in a "ladder" configuration are referred to as ladder tracks.

time, 10 additional cars would be in the maintenance shop building or temporarily stored on the tracks just outside the building. The building and the yard are proposed to be approximately at the existing grade of the site.

Both the building and the storage yard have double-ended access, which provides redundancy so that operations can be maintained even if a train should derail in the yard. With only single-ended access, a derailment at a critical location in the yard could block trains from entering or leaving the yard, resulting in serious impacts to Green Line service.

This alternative could accommodate potential future air rights development.

Operational Plan

The following includes a brief description of the operational interface of the Yard 8 alternative with future Green Line Extension operations and of the potential impact to existing railroad operations. A more detailed description of the operating plan for the Yard 8 facility is included in FEIR Appendix B.

Yard Interface with Green Line Extension Operations

The Yard 8 facility layout consists of a double-ended yard, which provides the necessary redundant connections to the mainline of the Green Line Extension. Light rail vehicles can directly enter and exit the yard from both the north and south ends of the yard, eliminating the need for any reverse moves[5] or switchbacks for access to the mainline, providing optimal operational efficiencies.

The Yard 8 facility layout includes three lead tracks (Medford Lead, Lechmere Station Lead, and Maintenance Lead) that provide access into and out of the maintenance and storage facility, providing access in both directions on the Medford Branch mainline between Lechmere Station and College Avenue. Reverse moves from the yard would be needed in order for vehicles to access the Union Square Branch.

On the Union Square Branch, there is only the terminal station on this line, so trains on this service would continue to deadhead (i.e., run without picking up passengers) to Union Square. Trains from Union Square to the yard would need to proceed inbound and reverse direction either at Lechmere Station or at the Brattle Loop at Government Center Station.

In the morning, trains would leave the storage yards for Medford Hillside, Union Square and inbound towards Lechmere Station. Prior to the start of revenue

5 A reverse move is when the operator would have to stop the train, leave the control cab at one end of the train and walk to the other end of the train and enter the control cab to operate the train.

operations at 5 AM, the initial trains would deadhead to their respective origin stations. After 5 AM, trains for Medford Hillside could either deadhead or enter revenue service at Brickbottom Station.

Trains would continue to leave the yard until all peak hour service trains are in operation. Toward the end of peak service (approximately 9 AM), some trains would come out of service and return to the yard. In the afternoon, prior to the evening peak, these cars would leave the yard and return to service. After the evening peak, a number of cars would again return to the yard while the remainder would handle the night service schedule. At the end of the service day, the remaining trains would return to the yard, with the last ones arriving after the end of revenue service at 1 AM.

Impacts to Existing Railroad Operations

The construction of a Yard 8 facility would remove all existing freight tracks within Yard 8 and would remove the Wiley Track, a connecting track between the south end of Yard 8 and the Valley Tracks. Thus, this option would require some revisions to current freight operations by Pan Am Railways. There is no impact to CSX freight rail operations with this option. With a Green Line maintenance facility at Yard 8, CSX freight trains could continue to operate as they do today.

The main impact to freight operations would be the reconstruction of Yard 8, converting it from a freight rail yard to the Green Line maintenance and storage yard. Currently, Pan Am Railways has two tracks in the yard: one through track and one storage track. Pan Am Railways' freight trains that operate via the MBTA Lowell Line and through Yard 8, occasionally store freight cars in the yard.

Pan Am Railways' freight trains reach Boston via the MBTA Lowell Line. Typically, there are about three to four round-trips per week for the local switching operation, which serves Somerville as well as Chelsea, Salem, and Peabody via other MBTA routes. In addition, the "sand and gravel unit train" to Boston Sand and Gravel in Charlestown makes another three to four round-trips a week. Most freight trains operate in the evening or night, when MBTA commuter rail operations are less frequent. If Yard 8 were dedicated to the Green Line, it would still be possible for Pan Am Railways to access the Boston area and store freight cars in other nearby locations. Alternative routes exist within the MBTA system to support Pan Am Railways' operations. Based on on-going discussions with Pan Am Railways, existing overall freight rail operations into the Boston area would not be precluded.

Additionally, the Yard 8 facility site would not preclude the future North-South Rail Link project or the ability to expand the BET facility within existing MBTA property limits.

Real Estate Impacts

The maintenance yard for Yard 8 fits within existing rail yards owned by the MBTA and Pan Am Railways. The maintenance facility building would be on private land (the undeveloped portion of 200 Inner Belt Road) that is currently vacant and, therefore, no buildings, structures or businesses would need to be removed or relocated. Maintenance facility uses are consistent with the existing industrial zoning for the area. Table 2-1 provides a list of properties that would need to be acquired for Yard 8. This alternative requires the acquisition of approximately 5.8 acres of land, which is estimated at approximately $15 million.

Table 2-1 Potential Property Acquisitions for Yard 8

Address	Owner/Occupant	Acreage	Full or Partial Lot Acquisition
200 Inner Belt Road, Somerville	Fine Arts Storage Partners	3.9	Partial (undeveloped portion)
0 Inner Belt Road, Somerville	Pan Am Railways (rail yard)	1.9	Full
TOTAL		*5.8 acres*	

The undeveloped parcel at 200 Inner Belt Road (also referred to as 150 Inner Belt Road) that would be acquired for the maintenance facility has an existing land use permit for the construction of a proposed 190,000-square-foot building approximately 64 feet high. The proposed building and the proposed maintenance facility cannot share the site due to space constraints. Therefore, the maintenance facility would require voiding the existing land use permit. If the MBTA acquired the land within the footprint of the facility (tracks and buildings) in fee, this would represent a loss of current tax revenue to Somerville as the MBTA is exempt from local property taxes. This alternative could result in the loss of potential tax revenue which would be generated by future development at this location.

As part of the amendment to the original NorthPoint development agreement, the MBTA has an option to acquire the portion of Yard 8 that is currently owned by Pan Am Railways. Although the Commonwealth would still need to pay for the land, acquisition of this site could be easier than under typical circumstances because of the proposed agreement.

Order-of-Magnitude Capital Costs

An Order-of-Magnitude conceptual capital cost estimate for the proposed maintenance and storage facility at Yard 8 was developed and is estimated to be approximately $79 million in 2008 dollars. Since the publication of the DEIR, the design of Yard 8 was refined to make it more operationally consistent with the other

two alternatives. Table 2-2 provides a breakdown of the conceptual capital cost estimate for Yard 8.

Table 2-2 Order-of-Magnitude Conceptual Capital Cost Estimate for Yard 8

	Cost ($2008)
Real Estate Acquisition	$ 15 M
Building	$ 38 M
Track	$ 22 M
Infrastructure	$ 2 M
Earthwork	$ 2 M
Total	Approx. $ 79 M

2.3.2 Option L

The proposed Option L facility, so called because of its "L" shape configuration, is located immediately adjacent to and northwest of the MBTA's commuter rail maintenance facility, also referred to as the BET (Figure 2-3). Option L is situated along the southern and southeastern fringe of the existing Inner Belt industrial area of Somerville and adjacent to the Valley Tracks just north of the MBTA's BET.

Program

Option L accommodates the same defined support facility program as Yard 8, including but not limited to: storage for 80 Green Line vehicles, two pit tracks, two lift tracks, one wheel truer track, support shops, Green Line vehicle wash, administrative office space, and an approximately 100-space employee parking lot. The maintenance building and associated trackwork are proposed on land adjacent to and northwest of the existing BET facility. That land is currently occupied by two businesses at 20 Third Avenue and 44-48 Third Avenue. The vehicle storage yard is proposed at the southern end of Inner Belt Road just north of the MBTA Fitchburg Line on vacant private property and land that is currently an unused parking lot for 70 Inner Belt Road.

The layout of Option L includes two storage yards and the maintenance building. The south yard is immediately south of the hook in Inner Belt Road. This yard includes eight storage tracks and a runaround track. The south yard would store up to 40 cars. The east yard is east of the maintenance building and just south of Third Avenue. This yard provides eight vehicle storage tracks and has a total capacity of 27 cars. Total capacity of the storage yards is 67 cars. For Option L, 13 cars would need to be stored in the building or tracks just outside the buildings at any given time in order to meet program storage requirements.

The maintenance building for Option L would be identical in size and layout to the building proposed for Yard 8 and Mirror H. The main difference is the location of the building. For Option L, it would be south of Third Avenue and east of the existing building at 70 Inner Belt Road.

To provide double-ended access to the maintenance building, a loop track is added, which provides access to the north side of the building from a runaround track to the east of the building and the east storage yard. This alternative could also accommodate potential future air rights development.

Operational Plan

The following includes a brief description of the operational interface of the Option L alternative with future Green Line Extension operations and of the potential impact to existing railroad operations. A more detailed description of the operating plan for the Option L facility is included in Appendix B.

Yard Interface with Green Line Extension Operations

Option L is the only one of the three alternatives that provides a direct connection to the Union Square Branch and the storage yard. This advantage allows trains to be dispatched directly from the yard to both termini, at Medford Hillside and at Union Square, without the need to perform a reverse move (a move that would impact revenue operations). Option L has two lead tracks (Medford Lead and Union Square Lead) that provide direct access into and out of the storage yards and maintenance facility. This direct connection is not possible with Yard 8 or Mirror H.

Similar to the Yard 8 discussion, in the morning trains would leave the storage yards destined for Medford Hillside, Lechmere Station and Union Square. Prior to the start of revenue operations at 5 AM, the initial trains would deadhead to their respective terminal stations. After 5 AM, trains for Medford Hillside could either deadhead or enter revenue service at Brickbottom Station. On the Union Square Branch, there is only one terminal station so trains on this service would continue to deadhead to Union Square.

Trains would continue to leave the yard until all peak hour service trains are in operation. Toward the end of peak service (approximately 9 AM), some trains would come out of service and return to the yard. In the afternoon, prior to the evening peak, these cars would leave the yard and return to service. After the evening peak, a number of cars would again return to the yard while the remainder handled the night service schedule. At the end of the service day, the remaining trains would return to the yard, with the last ones arriving after the end of revenue service at 1 AM.

Impacts to Existing Railroad Operations

The construction of an Option L facility would impact Pan Am Railways' freight operations to the same degree as the Yard 8 alternative. Similar to Yard 8, the Option L alternative would require the removal of the Wiley Track that connects the south end of Yard 8 to the Valley Tracks. Without the Wiley Track, Yard 8 would be a two-track single-ended yard that would have little utility to Pan Am Railways' operations. There is no impact to CSX freight rail operations with this option. With a Green Line maintenance facility at Yard 8, CSX freight trains could continue to operate as they do today.

If Option L were utilized for the Green Line facility, it would still be possible for Pan Am Railways to access the Boston area and to store freight cars in other nearby locations. Alternative routes exist within the MBTA system to support Pan Am Railways' operations. Based on on-going discussions with Pan Am Railways, existing overall freight rail operations into the Boston area would not be precluded. However, M.S. Walker, a current freight customer of Pan Am Railways and located within the proposed Option L footprint, is a business that would potentially have to be relocated to a location with freight provisions.

Option L would not have any impacts on revenue passenger operations or on other operations associated with the MBTA (e.g., vehicle maintenance and storage, maintenance-of-way). Additionally, Option L would not preclude the future North-South Rail Link project or the ability to expand the BET facility within existing MBTA property limits.

Real Estate Impacts

Option L would require the complete acquisition of two parcels and partial acquisition of two other parcels. The land required for the yard and maintenance facility includes the building and parking at 44-48 Third Avenue; the building and parking lot at 20 Third Avenue; the isolated parking lot for 70 Inner Belt Road; plus the southern corner of 200 Inner Belt Road. M.S. Walker Wholesale Distribution, a wholesale manufacturer/distributor of wine and spirits located at 20 Third Avenue, provides jobs for approximately 74 people (based on parking occupancy). The building located at 44-48 Third Avenue (formerly occupied by Digital Publishing Solutions, Inc.) is being leased temporarily by a Federal agency as an indoor parking/storage facility for confiscated vehicles.

This alternative requires the acquisition of approximately 10.2 acres of land and buildings which has been estimated at approximately $51 million (including building demolition and site cleanup). This cost could be refined with additional research. If the MBTA acquired the land within the footprint of the facility (tracks and buildings) in fee, this would represent a loss of current tax revenue to Somerville as the MBTA is exempt from local property taxes. This alternative could result in the loss of

current and potential tax revenue which would be generated by future development at this location. Table 2-3 provides a list of properties that would need to be acquired for the Option L location. Option L does not use any portion of the Pan Am Railways' owned land at Yard 8.

Table 2-3 Potential Property Acquisitions for Option L

Address	Owner/Occupant	Acreage	Full or Partial Lot Acquisition
20 Third Avenue, Somerville	M.S. Walker Wholesale Distribution	4.6	Full
44-48 Third Avenue, Somerville	APCA Third Avenue, LLC	2.8	Full
70 Inner Belt Road, Somerville	CRG West Parking Lot	1.2	Partial
200 Inner Belt Road, Somerville	Fine Arts Storage Partners	1.6	Partial (undeveloped portion)
TOTAL		*10.2 acres*	

Order-of-Magnitude Capital Costs

An Order-of-Magnitude conceptual capital cost estimate for the proposed maintenance and storage facility at Option L was developed and is estimated to be approximately $129 million in 2008 dollars. Table 2-4 provides a breakdown of the conceptual capital cost estimate for Option L.

Table 2-4 Order-of-Magnitude Conceptual Capital Cost Estimate for Option L

	Cost ($2008)
Real Estate Acquisition	$ 51 M
Building	$ 38 M
Track	$ 33 M
Infrastructure	$ 2 M
Earthwork	$ 5 M
Total	Approx. $ 129 M

Suggestions for Refinements to Option L

Suggestions for refinements to the Option L site were received during the DEIR/EA public comment period. The Project Team reviewed and considered conceptual plans/materials that were received from members of the public for a revised version of Option L deemed "Mirror L," as described in DEIR/EA comment letters from Mr. Stephen Kaiser, dated January 7, 2010 and January 8, 2010. This option was determined infeasible based on discussion with the MBTA operations:

- The Mirror L plan proposes to eliminate one of the Valley Tracks. The Valley Tracks are the main hub of regional freight movements to and from the north, south, east and west. Eliminating either of these tracks would compromise MBTA's ability to store and dispatch work trains daily and impact track rights that have been granted to Pan Am Railways and CSX. The current Option L concept provides two Valley Tracks. The two Valley Tracks between the BET and M.S. Walker are used daily for overnight storage and staging of maintenance-of-way equipment, ballast cars, etc.
- The Mirror L plan would eliminate the only roadway connection to BET and there are no other available connections. Shifting the BET access road grade crossing north would impact Pan Am Railways and BET vehicle storage. Relocating this access would require reconfiguration of existing materials storage areas, relocation of an existing above ground storage tank, and relocation of existing storage structures. In addition, the new access would require construction of approximately five hundred feet of new roadway and at least three new grade crossings. Similarly, the route would require four sharp turns that could eliminate the ability of tractor-trailers to enter BET.
- The Mirror L plan would locate the maintenance facility on an existing BET parking facility. Mitigating for the loss of this existing parking would require construction of a multi-level parking facility. Construction and staging the construction of this facility would impact costs and schedule for the Green Line Extension. At least one of the buildings that are proposed to be taken for Option L would need to be raised for BET temporary parking facilities while the parking deck is being constructed.
- The new Callaghan Track (not shown on the Option L conceptual plan) would be impacted by the proposed parking deck shown in the Mirror L plan (provided in subsequent materials received from Mr. Stephen Kaiser). The new Callaghan Track is north of the shop entry tracks on the south end of the Mirror L proposed parking deck.
- The Mirror L plan would eliminate the northern connection of the BET runaround track to Valley Tracks on the northwest side of the BET maintenance facility. This track and its spur are currently used for movements and storage.
- Although the Mirror L plan would allow the Wiley Track to remain, negotiations regarding Option L are on-going with Pan Am Railways and MassDOT for alternative routes that exist within the MBTA system that could support Pan Am Railways' service to other customers.

2.3.3 Mirror H

Mirror H straddles portions of the NorthPoint site (which includes portions of Cambridge, Somerville and Boston) and a portion of MBTA land (Figure 2-4). This alternative locates the facility at the north side of the proposed NorthPoint

development and partly on MBTA land south of the BET, and represents a plan that places new light rail facilities next to existing MBTA commuter rail facilities.

The technical report refers to Mirror H as the option previously proposed by the City of Somerville, and then enhanced by the Project Team to optimize proposed operations. The enhancements represent layout modifications to provide operational equivalency to the original "Scheme H" as presented in the November 6, 2008 *Green Line Support Facility Alternatives Analysis* for the location of the support facility. The specific enhancements include:

- Extending the double-track lead and adding switches so that trains can operate on either lead track in either direction;
- Providing a 300-foot tail track so that trains to/from Lechmere Station can make the reverse move off the mainline tracks;
- A loop east of the maintenance shop plus a shop runaround track are included to provide access to the east side of the building; and
- Various minor layout modifications to make this option as operationally equivalent as possible to Yard 8 and Option L.

Program

Mirror H accommodates the same defined support facility program as Yard 8 including, but not limited to: storage for 80 Green Line vehicles, two pit tracks, two lift tracks, one wheel truer track, support shops, Green Line vehicle wash, administrative office space, and an approximately 100-space employee parking lot.

The layout of Mirror H includes a single storage yard of six tracks west of the maintenance building. Total storage is 70 cars. It is assumed that, at any time, 10 additional cars would be in the maintenance shop building or temporarily stored on the tracks just outside the building. The maintenance building and most of the storage tracks are in Somerville. Some of the employee automobile parking, as well as the tail tracks and loop east of the maintenance building, are in Boston.

The maintenance building at Mirror H would be identical in size and layout to the building proposed for Yard 8. To provide double-ended access to the maintenance building, a loop track is added that provides access to the east side of the building from a runaround track to the north of the building. This alternative could also accommodate potential future air rights development.

Operational Plan

The following includes a brief description of the operational interface of the Mirror H alternative with future Green Line Extension operations and of the potential impact to existing railroad operations. A more detailed description of the operating plan for the Mirror H facility is included in Appendix B.

Yard Interface with Green Line Extension Operations

Mirror H is the only one of the three alternatives with a single point of access from the yard to the revenue service tracks. Since a stalled or derailed train on a single yard lead track would prevent other trains from entering or leaving the yard, a second lead track was proposed for movements to and from Medford Hillside. All storage tracks in the yard would have direct movements (i.e., no reversing required) to and from the double-track lead when traveling to or from Medford Hillside. However, for trains traveling to/from Lechmere Station or the Central Subway, direct connections would not be available and would require some reverse moves within the yard and/or operations along the mainline tracks to access the yard.

The Mirror H facility does not have a direct connection to Union Square. Trains destined to or from Union Square would need to make a variety of complex moves, some of which would require reversing direction on revenue tracks. A detailed description the Mirror H operations can be found in Appendix B.

Similar to the other alternatives, in the morning trains would leave the storage yards for Medford Hillside and inbound towards Lechmere Station. Prior to the start of revenue operations at 5 AM, the initial trains would deadhead to their respective terminal stations. After 5 AM, trains for Medford Hillside could either deadhead or enter revenue service at Brickbottom Station.

Trains would continue to leave the yard until all peak hour service trains are in operation. Toward the end of peak service (approximately 9 AM), some trains would come out of service and return to the yard. In the afternoon, prior to the evening peak, these cars would leave the yard and return to service. After the evening peak, a number of cars would again return to the yard while the remainder handled the night service schedule. At the end of the service day, the remaining trains would return to the yard, with the last ones arriving after the end of revenue service at 1 AM.

Impacts to Existing Railroad Operations

The proposed Mirror H facility would have no impact on existing freight railroad operations. Pan Am Railways' operations through Yard 8 would remain as would the Wiley Track connection from Yard 8 to the Valley Tracks. Pan Am Railways'

operations would continue as they do today with this option. This option would also not impact CSX freight rail operations. CSX freight trains could continue to operate as they do today with a Green Line maintenance facility at the Mirror H site.

However, construction of the Mirror H facility would preclude the future North-South Rail Link project and the ability to expand the BET facility within existing MBTA property limits.

Real Estate Impacts

Mirror H would be partly in Somerville and partly in Cambridge, with some portions in Boston. If the MBTA acquired the land within the footprint of the facility (tracks and buildings) in fee, this would represent a loss of current tax revenue to the municipalities as the MBTA is exempt from local property taxes. This alternative could also result in the loss of potential tax revenue which would be generated by future development at this location. This alternative requires the acquisition of approximately 4.3 developable acres of Pan Am Railways' owned properties, which is estimated at a value of approximately $11 million. Table 2-5 provides a list of properties that would need to be acquired for Mirror H. At the time of this analysis, discrepancies in City property limits between Somerville and Cambridge were identified and are being reviewed. The amount and cost of property acquisition for Mirror H are subject to change based on the resolution of the city boundary issue.

Table 2-5 Potential Property Acquisitions for Mirror H

Address	Owner/Occupant	Acreage	Full or Partial Lot Acquisition
NorthPoint Development Lots A/B & C/D/E/F	Pan Am Railways	4.3	Partial

Order-of-Magnitude Capital Costs

An Order-of-Magnitude conceptual capital cost estimate for the proposed maintenance and storage facility at Mirror H was developed and is estimated to cost approximately $82 million in 2008 dollars. Since the publication of the February 18, 2009 *Green Line Support Facility – Review of Mirror Scheme H, Addendum to the Alternatives Analysis*, the design of Mirror H has been more fully developed and refined to make it operationally comparable to Yard 8 and Option L. Table 2-6 provides a breakdown of the conceptual capital cost estimate for Mirror H, based on the current design.

Table 2-6 Order-of-Magnitude Conceptual Capital Cost Estimate for Mirror H

	Cost ($2008)
Real Estate Acquisition	$ 11 M
Building	$ 38 M
Track	$ 25 M
Infrastructure	$ 2 M
Earthwork	$ 6 M
Total	Approx. $ 82 M

2.3.4 Summary of Operation Analysis

In comparing the Yard 8, Option L and Mirror H alternatives for the Green Line Extension maintenance and storage facility, each of the alternatives meets the MBTA's desired program and would have similar functionality in terms of hours of operations and start-up service.

However, some alternatives offer a better operating plan for vehicles entering and leaving the MBTA's system to access the yard. While the Yard 8 facility layout has a fully functional layout, Option L offers some improvements beyond Yard 8 in its direct connection to Union Square and without the need to reverse direction to access either the main line or the branch line. Mirror H has the least desirable operating plans of the alternatives in that it requires a number of complex movements in and around the yard to access the mainline and branch line tracks.

Mirror H is the only alternative that does not impact freight operations. However, while both Yard 8 and Option L impact Pan Am Railways' current tracks in Yard 8 and at the Wiley Track, it is understood that their operations would not be substantially affected and that their Boston customers could continue to be served.

Neither Yard 8 nor Option L would preclude future construction of the North-South Rail Link project or the future expansion of the MBTA's BET within existing property limits. Mirror H would preclude both of these projects from occurring.

2.4 Responses to DEIR Comments on the Maintenance and Storage Facility

This section addresses the main questions and concerns received during the public comment period, as required in the Secretary's Certificate. A detailed discussion of the program and requirements for the Maintenance Facility is presented in FEIR Section 2.3, *Description of Alternatives*, and in the technical memorandum titled *Environmental Analysis of Additional Maintenance Facilities* dated April 21, 2010.

The recent flooding and washout of the tracks on the Green Line D Riverside Branch illustrates the importance of well-dispersed maintenance facilities to ensure service reliability. This one breach of the D Branch severed the Riverside Shops, the principal maintenance facility, from the majority of the Green Line that remained in service. Adding a new maintenance facility for the Green Line extension would provide dispersed redundancy, particularly in the event of a service interruption that prevents access to one of the other major shops.

2.4.1 Minimizing Maintenance Facility Footprint

All three alternatives, Yard 8, Option L, and Mirror H, were designed within a compact layout, facilitated by the inherent flexibility of light rail vehicles to negotiate tighter curves. A comparison to other recently constructed light rail facilities around the nation revealed that each of these layouts are highly efficient on the basis of vehicles maintained per acre of land.

While the layouts of the three options are relatively efficient when compared to similar facilities, still, in consideration of the higher demand for land in the urban areas which encompass these three alternative sites, a number of strategies were employed to minimize the site footprint.

- MassDOT worked with the MBTA to identify only those items that were necessary to support the Green Line Extension Project. This was done to keep this facility on the scale of a "local shop" and not become a major shop like the Riverside maintenance facility.
- In all three locations, a significant portion of the site would be on land currently owned by the MBTA.
- Transportation functions (e.g., train operators and their supervisors) would be housed in the same building as vehicle maintenance.
- Offices and employee welfare facilities (restrooms, locker rooms, breakroom, etc.) would be included on a second floor between the two cathedral ceiling sections of the maintenance building, where inspection and repair work is performed.
- Employee parking would be located in scattered locations on the site, locations that are not occupied by tracks or buildings.
- For Option L and Mirror H, a loop track would be used on the "dead end" side of the maintenance building, as the loop would be a more compact layout than if a dead end tail track was used. Thus, using the loop track in these options would require less land for the facility. (This would not be required for the Yard 8 layout which would be completely doubled ended and has no "dead end.")

- Building program requirements were streamlined based on discussions with the MBTA in order to minimize impacts while still providing the operational integrity needed for Green Line operations when the extension is in service.

2.4.2 Minimizing Land Acquisitions

The Secretary's Certificate suggested other possible approaches to minimize land acquisitions necessary for a maintenance facility including:

- Consolidating employee parking areas (the Green Line maintenance facility with the MBTA's BET commuter rail maintenance facility);
- Shifting the MBTA office out of the Cobble Hill area property; and
- Splitting maintenance and storage operations.

Consolidating Employee Parking Areas

Public comments received since the DEIR/EA requested that the proposed employee parking area for the Green Line maintenance facility be combined with the existing BET commuter rail maintenance facility parking area. When designing a rail transit maintenance and storage facility, the layout of the tracks and buildings determines the overall size of the site required. Employee parking is a secondary consideration and spaces are located in scattered "infill" locations around the site that are not required for track or buildings. Thus, the addition of parking within these three site layouts does not add significantly to the size of the site required.

A concern with consolidating parking is that the existing BET commuter rail facility parking lot is sized for the peak demand of that facility. The MBTA states that all existing parking is needed at the BET and that there is no extra capacity to include Green Line parking or any other Green Line functions at the BET facility. Similarly, 100 spaces for MBTA Green Line parking at the maintenance facility is considered the absolute minimum required – MBTA currently has parking problems at Riverside, Reservoir and Lake Street Green Line facilities. To add employee parking at the BET for the Green Line facility would require the construction of a parking deck over the existing lot. This would add significant cost and time to the construction of the Green Line Extension Project since a temporary parking facility would need to be provided while the parking deck is being constructed, whereas the parking requirement may be better met by in-filling in and among the buildings and yard tracks.

For example, if the employee parking were completely removed from any of the three sites, there would be about one acre less land required. But the unneeded land would be in small, unconnected, and irregularly shaped areas, which would not represent buildable lots or useful additions to existing adjacent lots. From a practical

standpoint, if the majority of the parcel is required, MassDOT would take the entire parcel, as the leftover portions would have little to no real estate value.

Nevertheless, during Preliminary Engineering, the exact size of the lot required for rail operational needs would be re-evaluated. If there are leftover sliver parcels not required for the facility, they would be examined to determine if there represent any value as an "add-on" to an adjacent parcel. In such cases, a more beneficial use of the excess slivers of land may be as a landscape or screening buffer between the facility and adjacent private parcels.

Shifting the MBTA Office out of the Cobble Hill Area

Currently, the MBTA occupies a building in the Cobble Hill area in Somerville for its commuter rail system operations. This is occupied by staff from the MBTA and Massachusetts Bay Commuter Railroad (MBCR), the contractor that operates the commuter rail system. The Secretary's Certificate requested MassDOT respond to requests to consolidate the MBCR Cobble Hill commuter railroad operations facility into the new MBTA Green Line maintenance facility.

To shift the MBTA offices out of Cobble Hill, an equivalent amount of floor area would need to be added to the Green Line maintenance building and additional parking demand would be added. As the objective is to minimize the footprint of Green Line facility building and site, the only way to add floor area would be to build it taller. Comparing the footprints of the existing Cobble Hill MBTA/MBCR building and the proposed Green Line maintenance building, it is estimated that it would add two to three stories or (assuming a 12 to 13-foot floor height) about 24 to 36 feet of additional height.

For Yard 8, such added height would be a significant visual impact to the nearby Brickbottom residents. For Option L, the adjacent land uses are all low-rise industrial. A taller Green Line maintenance building would be more visible to the surrounding neighborhood. For Mirror H, such added height would visually block views of the commuter rail maintenance facility from residential structures such as the Glass Factory Condominiums. However, it would add a tall mixed industrial and office structure closer to those residents.

The existing Cobble Hill functions are vital to the commuter rail operations. All dispatching of north side operations is performed at this location. A significant effort and cost would be required to relocate operations out of the existing facility and into a new one.

Splitting Maintenance and Storage Operations

Consideration of scenarios for splitting maintenance and storage operations onto separate sites were included in the initial alternatives analysis (dated November 8, 2008) for the siting of the maintenance facility. Option D2 was the best example of a split operations layout. However, this layout required about 25 percent more land than a single compact site, such as Yard 8, Option L or Mirror H. A split layout requires additional tracks. A consolidated layout allows for the use of common ladder tracks for maintenance and storage building access. A split facility adds to the number and length of such ladder tracks.

Also, a split facility would require a second building. In a consolidated layout, the transportation staff (e.g., train operators and their supervisors) could be located in the maintenance building. In a split layout, a separate building would need to be added to the storage yard site for the transportation staff (welfare facilities for operators and offices for supervisors). This could also increase the overall site footprint.

In summary, the split operations sites would require more land than the current compact consolidated layout with the maintenance and storage on the same site.

2.5 Environmental Resource Analysis

This section discusses the human and environmental resource impacts of the three maintenance facility alternatives (also provided in Appendix B). The human and environmental resource categories considered in this analysis included:

- Air quality
- Noise
- Vibration
- Traffic
- Socioeconomic impacts
- Title VI/Environmental justice
- Visual resources
- Wetlands
- Stormwater management
- Hazardous materials
- Historic and archaeological resources
- Public parks, recreation areas, and conservation land

- Consistency with Federal, state and local planning
- Compatibility with the Community Path

2.5.1 Air Quality

This section compares direct impacts of the three maintenance facility alternatives on air quality. None of the three maintenance facility alternatives would have a measurable impact on air quality. Any maintenance facility alternative, in conjunction with the Project, would remain compliant with the SIP and Air Pollution Control Regulations (310 CMR 7.36).

The three maintenance facility alternatives are not anticipated to generate substantial emissions because the Green Line vehicles that would be stored there would be electric and would not generate air pollution in the Study Area. The proposed maintenance facility itself would be an open building with no heating-related emissions.

The mobile source emissions, generated by automobiles accessing the sites, for all three alternatives would be minimal. The proposed maintenance facility would provide approximately 100 parking spaces. The majority of these trips would occur during off-peak periods when there is little congestion in the Study Area.

2.5.2 Noise

This section compares the direct noise impacts of the three maintenance facility alternatives in combination with the Green Line Extension mainline operations. The noise impact analysis for the Green Line Extension Project is based on the methodology defined in the FTA guidance manual *Transit Noise and Vibration Impact Assessment*.[6] Noise impact has been assessed at sensitive receptors and includes contributions from mainline operations and maintenance facility operations including train movements in and out of the yard, increases in noise from special trackwork, potential wheel squeal, the traction power substation, and the employee parking lot. Figures 2-5 through 2-7 show the noise study measurement locations. Figures 2-8 through 2-10 show the buildings impacted by noise prior to mitigation. Background information on noise and vibration fundamentals, descriptors, impact criteria, land use categories, existing noise conditions and sensitive land use in areas other than near the proposed maintenance facilities are presented in DEIR/EA Section 4.8, *Noise*. Further detail on the reference noise levels, principal modeling assumptions and impact analyses for Option L and Mirror H is available in the

6 Federal Transit Administration. *Transit Noise and Vibration Impact Assessment* (Report FTA-VA-90-1003-06). May 2006.

maintenance facility noise assessment technical memoranda.[7,8] The full noise analysis for Yard 8 was conducted for and included in the DEIR/EA.

The proposed maintenance facility would introduce new noise sources into the surrounding areas and would contribute to the future noise exposure conditions at sensitive receptors. Potential noise impact has been assessed at sensitive receptors near Yard 8, Option L and Mirror H including the Brickbottom Artists Building (northeast and southwest sides), the Hampton Inn Hotel, the Glass Factory Condominiums, proposed NorthPoint development properties, a residential development planned at 22 Water Street, and two planned Archstone residential developments (Phase II – Sites 1 and 2). Based on the current NorthPoint development plan, eight sites have been assumed to be noise-sensitive including the existing Tango and Sierra residential properties and future planned properties shown in Figure 2-10 (Site 1, Site 2, Site 3, Site 4, Site 5 and a park). Based on the current Archstone Development Phase II plan, two sites have been assumed to be noise-sensitive including a future building east of East Street (Site 1) and a building west of Leighton Street (Site 2).

Potential noise impact is assessed by comparing the existing noise conditions with future conditions. Existing noise conditions were measured at five locations near these sensitive properties. A summary of the measurement sites and results is shown in Table 2-7 and the measurement locations are shown in Figures 2-5 through 2-7. Short-term measurement site ST-1 was conducted on the northeast side of the Hampton Inn Hotel and is representative of the existing noise conditions on the northeast sides of the Glass Factory Condominiums, the Hampton Inn Hotel, the northeast side of the Brickbottom Artists Building, and the proposed residential property at 22 Water Street. Short-term measurement site ST-2, on the southwest side of the Brickbottom Artists Building, is representative of the existing noise conditions for the southwest side of the Brickbottom Artists Building. The dominant noise source at ST-2 is commuter train activity on the MBTA Fitchburg Line. Short-term measurement site ST-8, at the end of Water Street, is representative of existing noise conditions at the five future NorthPoint properties and the park. Long-term measurement site LT-10, on the southwest side of the Glass Factory Condominiums, is representative of the existing noise conditions at the existing Tango and Sierra NorthPoint properties (adjusted for relative distances to O'Brien Highway). Short-term measurement site ST-9 was conducted at the planned Archstone properties (Phase II) and is representative of the existing noise for those two sites.

Future noise sources associated with the Project include mainline Green Line operations, MBTA commuter train operations (southwest side of Brickbottom Artist Building only), the relocated bus transit center at Lechmere Station and maintenance facility noise sources. Maintenance facility noise sources include train movements in and out of the yards, increases in noise from special trackwork (crossovers or turnouts), potential wheel squeal on tight radius curves, stationary cars in the yards

7 Harris Miller Miller & Hanson Inc., *Option L Maintenance Facility Noise and Vibration Assessment*, April 2010.
8 Harris Miller Miller & Hanson Inc., *Mirror H Maintenance Facility Noise and Vibration Assessment*, April 2010.

operating with auxiliary equipment on, the traction power substation, and the employee parking lot. Noise from the bus transit center is based on current activity from the MBTA Bus Routes 69, 80, 87 and 88 which total 79 buses departing the station during nighttime hours (10 PM to 7 AM) and 324 buses departing during daytime hours (7 AM to 10 PM).

Table 2-7 Existing Noise Measurement Results

Measurement Site	Location	Existing Day-Night Average Sound Level (Ldn)	Existing Peak-Transit Hour Sound Level (Leq)	Commuter Train Noise Level (Lmax)[d]	Distance to Near Track (feet)
ST-1	Water Street (Cambridge) – Hampton Inn Hotel (northeast side of building)	58[b]	60	N/A	N/A
ST-2	Fitchburg Street (Somerville) – Brickbottom Artists Building (southwest side of building facing Fitchburg Line)	64[a]	61	78	65[c]
ST-8	End of Water Street between O'Brien Highway and Boston Engine Terminal	62[b]	65	N/A	N/A
ST-9	Archstone Parcel on O'Brien Highway (proposed Phase II development)	65[b]	67	N/A	N/A
LT-10	Glass Factory Condominiums [c] (southwest side of building)	65[c]	63 [c]	N/A	N/A

Source: HMMH, 2010 & 2008 and Lechmere Station Relocation Project (November, 2006).
a Ldn estimated by comparing SEL levels of train events to long-term sites whose noise environment is dominated by train noise.
b Ldn estimated according to FTA guidance for short-term measurements conducted between 7 AM and 7 PM.
c Measurement conducted March, 2006 and reported in Environmental Assessment for the Lechmere Station Relocation Project (November, 2006).
d Commuter train noise level is average of all events at site

Train movements in and out of the yards are non-revenue operations between the proposed yards to and from the closest stations (Union Station, Lechmere Station and Brickbottom Station). These "pull in" and "pull out" movements are required to bring trains into service or to take trains out of service for maintenance or at the end of the service day. These movements are in addition to the standard revenue service train operations. Often these additional train movements represent the most significant noise source associated with the maintenance facilities.

Maintenance lead tracks and yard tracks often include special trackwork (crossovers or turnouts) or tight-radius curves which can increase noise levels associated with train movements into and out of the yards. Special trackwork introduces gaps into the rail running surface which would increase noise levels from the train as the wheels impact these gaps. Tight-radius curves, typically 400-foot radius or less, may cause wheel squeal which is a high-frequency tonal noise generated by the wheels.

Another potentially significant noise source associated with the maintenance facilities are stationary cars in the storage yards operating with auxiliary equipment on. Cars are typically operated under this condition in the early morning to heat or cool the interior and prepare the trains for revenue service as well as at other times during the day when cars are in the yards but would be required to return to service. The contribution of noise from such operation of cars in the storage yards is generally

not as significant as the train movements unless receptors are much closer to the storage yards than the mainline tracks. Maintenance operations within the building such as wheel truing, using pneumatic tools and the car wash are not expected to be significant noise sources in the community as the building would shield these activities. The heating, ventilation and air-conditioning (HVAC) system for the maintenance building is also not expected to be a significant noise source. Unlike maintenance buildings for diesel-electric locomotives which require more substantial HVAC systems to handle the train exhaust, this building would only require normal levels of airflow for storing electric Green Line vehicles.

Table 2-8 presents a summary of the potential noise impact at sensitive receptors near the proposed maintenance facilities prior to mitigation. This table shows the results for Yard 8, Option L and Mirror H. Potential noise impact locations for the three alternatives are also shown in Figures 2-8 through 2-10. This table includes the sensitive receptors, which side of the tracks it is on, the future distances between the receptor and the near track centerlines of the mainline Green Line and MBTA Fitchburg commuter line, the existing noise condition (Ldn), the moderate and severe impact criteria, the contribution of noise from mainline operations (which include noise from the bus transit center), the contribution from maintenance facility noise sources, the future noise level (which include maintenance facility, mainline operations and existing noise sources), the increase in noise between the existing and future conditions and whether the potential impact would be moderate or severe.

Table 2-8 Potential Project Noise Impact at Sensitive Receptors (Prior to Mitigation)

Noise Sensitive Receptor Location	Side of Tracks	Distance to Near Track (feet)		Existing Noise Level (Ldn)	Impact Criteria		Future Noise Level from Mainline (Ldn)	Future Noise Level from Yard Sources (Ldn)	Total Future Noise Level (Ldn)[a]	Increase	Total Number of Impacts (buildings)	
		Comm.	Green Line		Mod.	Sev.					Mod.	Sev.
Maintenance Facility - Yard 8												
Brickbottom Artists Building (northeast façade)	West	n/a	18	57.6	60.0	63.5	75.3	69.9	76.4	18.8		1
Brickbottom Artists Building (southwest façade)	West	88	n/a	64.1	65.5	67.9	67.9	59.9	69.9	5.8		-- [b]
Hampton Inn Hotel (northeast façade)	West	n/a	41	57.6	60.0	63.5	66.8[h]	57.3	67.7[c]	10.1		1
Glass Factory Condominiums (northeast façade)	West	n/a	43	57.6	60.0	63.5	70.0[h]	56.9	70.4[c]	12.8		1
NorthPoint Properties (Tango and Sierra)	East	n/a	109	61.0	62.8	65.6	60.5	n/a[d]	63.8	2.8	2	
22 Water Street (Proposed)	East	n/a	60[g]	57.6	60.0	63.5	74.9[e,h]	55.9	75.0[e]	17.4		1
Archstone (Proposed Phase II- Site 1)	East	n/a	15[g]	69.2	70.3	72.1	75.1	n/a[d]	76.1	6.9		1
Total noise impacts prior to mitigation for Yard 8											2	5

Table 2-8 Potential Project Noise Impact at Sensitive Receptors (Prior to Mitigation) (continued)

Noise Sensitive Receptor Location	Side of Tracks	Distance to Near Track (feet)		Existing Noise Level (Ldn)	Impact Criteria		Future Noise Level from Mainline (Ldn)	Future Noise Level from Yard Sources (Ldn)	Total Future Noise Level (Ldn)[a]	Increase	Total Number of Impacts (buildings)	
		Comm.	Green Line		Mod.	Sev.					Mod.	Sev.
Maintenance Facility - Option L												
Brickbottom Artists Building (northeast façade)	West	n/a	18	57.6	60.0	63.5	75.3	69.9	76.4	18.8		1
Brickbottom Artists Building (southwest façade)	West	88	n/a	64.1	65.5	67.9	67.9	60.5	69.9	5.8		-- [b]
Hampton Inn Hotel (northeast façade)	West	n/a	41	57.6	60.0	63.5	66.8[h]	57.8	67.8	10.2		1
Glass Factory Condominiums (northeast façade)	West	n/a	43	57.6	60.0	63.5	70.0[h]	57.3	70.5	12.9		1
NorthPoint Properties (Tango and Sierra)	East	n/a	109	61.0	62.8	65.6	60.5	n/a[d]	63.8	2.8	2	
22 Water Street (Proposed)	East	n/a	60[g]	57.6	60.0	63.5	74.9[e, h]	59.3	75.1	17.5		1
Archstone (Proposed Phase II- Site 1)	East	n/a	15[g]	69.2	70.3	72.1	75.1	n/a[d]	76.1	6.9		1
Total noise impacts prior to mitigation for Option L											2	5
Maintenance Facility - Mirror H												
Brickbottom Artists Building (northeast façade)	West	n/a	18	57.6	60.0	63.5	79.2[d]	69.9[e]	80.9	23.3		1
Brickbottom Artists Building (southwest façade)	West	88	n/a	64.1	65.5	67.9	67.9	56.2	69.6	5.5		-- [b]
Hampton Inn Hotel (northeast façade)	West	n/a	41	57.6	60.0	63.5	66.8[h]	58.8	67.9	10.3		1
Glass Factory Condominiums (northeast façade)	West	n/a	43	57.6	60.0	63.5	70.0[h]	57.5	70.5	12.9		1
NorthPoint Properties (Tango and Sierra)	East	n/a	109	61.0	62.8	65.6	60.5	54.7[e]	64.3	3.3	2	
NorthPoint Properties Site 1	East	n/a	300	61.5	63.2	66.0	50.7	66.4[f]	67.7	6.2		1
NorthPoint Properties Site 2	East	n/a	300	61.5	63.2	66.0	49.9	66.5[f]	67.8	6.3		1
NorthPoint Properties Site 3	East	n/a	500	61.5	63.2	66.0	51.1	64.8[f]	66.6	5.1		1
NorthPoint Properties Site 4	East	n/a	700	61.5	63.2	66.0	48.7	65.1[f]	66.8	5.3		1
NorthPoint Properties Site 5	East	n/a	700	61.5	63.2	66.0	48.7	58.5[f]	63.4	1.9	1	
22 Water Street (Proposed)	East	n/a	60[g]	57.6	60.0	63.5	74.9[e,h]	64.6[f]	75.3	17.7		1
Archstone (Proposed Phase II- Site 1)	East	n/a	15[g]	69.2	70.3	72.1	75.1	n/a[d]	76.1	6.9		1
Total noise impacts prior to mitigation for Mirror H											3	9

Source: HMMH, April 2010.
a Total future noise level includes future mainline noise, future yard noise sources and existing noise sources.
b Brickbottom Artists Building impact is counted under listing for Brickbottom Artists Building (northwest).
c Future noise level reported in DEIR for this receptor does not include yard noise sources.
d n/a = Not Applicable. Receptor does not have significant contribution from maintenance facility noise sources (such as stationary cars operating with auxiliary equipment running). Receptor is not exposed to noise from non-revenue maintenance facility operations (pull ins and pull outs) because it is east of Lechmere Station and all train pass bys would be for revenue service.
e Noise includes contribution from crossover in front of building.
f Most significant yard noise source is stationary vehicles operating with auxiliary equipment running.
g Distance to alignment estimated for future proposed property.
h Future noise level from mainline includes contribution from bus transit center at Lechmere Station.

Yard 8

A total of two buildings would be exposed to moderate impact and five buildings would be exposed to severe noise impact prior to mitigation for Yard 8. Future noise conditions are primarily a function of the mainline train operations and maintenance facility noise sources only increase future noise levels a relatively small amount. Future noise levels from all yard sources are five to 19 decibels lower than noise from mainline operations. As an example of the effect of maintenance facility noise sources, future noise from mainline operations at the northeast façade of the Brickbottom Artists Building would be Ldn 75.3 dBA and noise from the maintenance facility operations would be Ldn 69.9 dBA. The future noise level would be Ldn 75.3 dBA without any contribution from the maintenance facility and would be Ldn 76.4 dBA including the maintenance facility. Therefore, the Yard 8 maintenance facility would only increase future noise levels by 1.1 decibel compared to the mainline operations alone. At the other receptors potentially impacted under Yard 8 (Hampton Inn, Glass Factory Condominiums, two existing NorthPoint properties Tango and Sierra and the proposed developments at 22 Water Street and Archstone Phase II Site 1), the contribution of noise from maintenance facility operations is even less than at Brickbottom Artists Building.

Although there are locations that require mitigation for the Proposed Project, the contribution of noise from the Yard 8 maintenance facility would only increase future noise levels one decibel or less. Therefore, no additional noise mitigation is required specifically due to the proposed Yard 8 maintenance facility option.

Option L

The noise impact assessment results for Option L are very similar to the results for Yard 8. A total of two buildings would be exposed to moderate impact and five buildings would be exposed to severe noise impact prior to mitigation for Option L. Future noise conditions are primarily a function of the mainline train operations and maintenance facility noise sources only increase future noise levels a relatively small amount. Future noise levels from all yard sources are five to 15 decibels lower than noise from mainline operations. Noise from train movements in and out of the yard at Option L would be slightly higher at the southwest façade of the Brickbottom Artists Building than Yard 8 due to the presence of a tight radius curve on the Medford Lead track. Noise from train movements in and out of the yard at Option L would be slightly higher at the Hampton Inn Hotel and the Glass Factory Condominiums due to stationary cars in the south yard operating with auxiliary equipment on.

As an example of the effect of maintenance facility noise sources, future noise from mainline operations at the northeast façade of the Brickbottom Artists Building would be Ldn 75.3 dBA and noise from the maintenance facility operations would be Ldn 69.9 dBA. The future noise level would be Ldn 75.3 dBA without any

contribution from the maintenance facility and would be Ldn 76.4 dBA including the maintenance facility. Therefore, the Option L maintenance facility would only increase future noise levels by 1.1 decibel compared to the mainline operations alone. At the other receptors potentially impacted under Option L (Hampton Inn, Glass Factory Condominiums, two existing NorthPoint properties Tango and Sierra and the proposed developments at 22 Water Street and Archstone Phase II - Site 1), the contribution of noise from maintenance facility operations is even less than at Brickbottom Artists Building.

Although there are locations that require mitigation for the Proposed Project, the contribution of noise from the Option L maintenance facility would only increase future noise levels one decibel or less. Therefore, no additional noise mitigation is required specifically due to the proposed Option L maintenance facility option. Noise mitigation for the Proposed Project including Option L at receptors near Lechmere Station is presented in Section 5.5.1, *Noise*.

Mirror H

For Mirror H, a total of three buildings would be exposed to moderate impact and nine buildings exposed to severe impact prior to mitigation. The relative contribution of noise from maintenance operations versus mainline operations is similar to Yard 8 and Option L at the Brickbottom Artists Building, Hampton Inn, Glass Factory Condominiums and the proposed developments at Archstone Phase II Site 1 with this alternative. At the proposed development at 22 Water Street, there is a greater contribution of noise for the Mirror H option compared to Yard 8 and Option L due to the contribution of noise from stationary cars operating with auxiliary equipment running in the storage yards; however, the total future noise at this proposed property is still primarily a function of mainline operations. Noise from train movements in and out of the yard and mainline operations would be higher at the northeast façade of the Brickbottom Artists Building for Mirror H than Yard 8 or Option L due to the presence of a double crossover and a turnout between the northbound mainline and the maintenance lead track directly in front of the building. For the existing NorthPoint properties Tango and Sierra, future noise conditions also depend primarily on the mainline operations. For the future planned NorthPoint properties (Sites 1 to 5), which are more set back from the mainline (300 to 700 feet) and are closer to the Mirror H storage yards, future noise conditions depend primarily on the stationary cars operating in the yards with auxiliary equipment running. For the proposed development at Archstone Phase II Site 1, there is no considerable contribution of noise from the Mirror H maintenance facility.

At the Brickbottom Artists Building, Hampton Inn Hotel, Glass Factory Condominiums, existing NorthPoint properties Tango and Sierra and proposed developments at 22 Water Street and Archstone Phase II - Site 1, the contribution of noise from the Mirror H maintenance facility would only increase future noise levels less than one decibel. Therefore, no additional noise mitigation is required

specifically due to the Mirror H maintenance facility option for these properties. At the proposed development at NorthPoint (Sites 1, 2, 3 and 4) potential noise impact prior to mitigation is primarily due to the Mirror H maintenance facility and potential mitigation would be associated with this maintenance facility option. It is assumed that future properties at the NorthPoint development would have noise-sensitive receptors at upper-floor residences, which would not benefit from a noise barrier for potential mitigation of noise from stationary cars in the storage yard. Since the proposed development is not currently under construction and is assumed to be completed by 2030, after the completion of the Green Line Extension Project, the buildings could be designed with consideration of the noise environment (i.e. windows with high transmission loss or sound transmission class [STC] ratings) to mitigate potential impact.

2.5.3 Vibration

This section documents direct vibration impacts from the three maintenance facility alternatives. The vibration impact analysis for the Green Line Extension Project is based on the methodology defined in the FTA guidance manual *Transit Noise and Vibration Impact Assessment*.[9] Vibration impacts are assessed for maximum levels, as vibration — unlike noise — is not a cumulative metric. To assess the potential effect of the three maintenance facility alternatives for vibration, the maximum vibration levels from both mainline operations and any movements to or from the maintenance facility are reported for all impacted receptors. The FTA criterion for vibration impacts for residential spaces such as the Brickbottom Artists Building is 72 VdB (vibration velocity level in decibels). The FTA impact criterion does not distinguish between "moderate" and "severe" vibration impacts. Figures 2-5 through 2-7 show the vibration study measurement locations. Figures 2-8 through 2-10 show buildings impacted by vibration prior to mitigation.

The proposed maintenance facilities would introduce new vibration sources into the surrounding areas and may cause potential vibration impact prior to mitigation. Potential vibration impact has been assessed at sensitive receptors near the proposed Yard 8, Option L and Mirror H including the Brickbottom Artists Building (northeast and southwest sides), a residential development planned at 22 Water Street, the Hampton Inn Hotel, the Glass Factory Condominiums, NorthPoint development properties and two planned Archstone (Phase II) residential developments. Based on the current NorthPoint development plan, seven sites have been assumed to be vibration-sensitive including the existing Tango and Sierra residential properties and future planned properties shown in Figure 2-10 (Site 1, Site 2, Site 3, Site 4 and Site 5). Based on the current Archstone development plan, two sites have been assumed to be vibration-sensitive including a future building east of East Street (Site 1) and a building west of Leighton Street (Site 2).

9 Federal Transit Administration. *Transit Noise and Vibration Impact Assessment* (Report FTA-VA-90-1003-06). May 2006.

Vibration generated by trains depends on several factors including the speed of the train, the presence of special trackwork (crossovers and turnouts) and whether the track alignment is at-grade or on an aerial structure. Special trackwork introduces gaps into the rail running surface which would increase vibration levels, similar to noise, from the train as the wheels impact these gaps. Although maintenance lead tracks and yard tracks often include special trackwork, these tracks are typically further away from sensitive receptors. An aerial structure reduces vibration significantly (10 VdB) compared to at-grade alignments because the vibration must propagate through the structure to the support columns and then into the ground and into surrounding buildings.

Table 2-9 shows the potential vibration impact prior to mitigation near the proposed maintenance facility alternatives. This table includes the vibration-sensitive receptor, the distance the mainline and yard track centerlines generating the highest levels of vibration, the maximum vibration velocity in any 1/3-octave band between four and 80 Hz for both mainline and maintenance facility movements and the number of buildings impacted. For all three alternatives, the Brickbottom Artists Building is the only receptor projected to be exposed to vibration impact prior to mitigation. For all maintenance facility alternatives, the maximum vibration generated by any yard movements is lower than the respective mainline operations. Mirror H is the only alternative projected to have potential vibration impact from yard movements. While the future proposed Archstone Site 1 building will be approximately 15 feet from the relocated Green Line alignment, train speeds are expected to be relatively slow (20 mph) and vibration impact is not expected.

Table 2-9 Potential Vibration Impacts at Sensitive Receptors (Prior to Mitigation)

Vibration Sensitive Receptor Location	Side of Tracks	Distance to Track Centerline (feet)		Maximum Vibration Velocity Level in any 1/3-Octave band from 4 to 80 Hz (VdB re: 1 micro-in.sec)		Total Number of Impacted Buildings
		Green Line Mainline	Green Line Yard Tracks	Green Line Mainline	Green Line Yard Tracks	
Maintenance Facility - Yard 8						
Brickbottom Artists Building (northeast façade)	West	18 [a]	46	77	67	1
Total vibration impacts prior to mitigation for Yard 8						*1*
Maintenance Facility - Option L						
Brickbottom Artists Building (northeast façade)	West	18 [a]	60 [b]	77	71	1
Total vibration impacts prior to mitigation for Option L						*1*
Maintenance Facility - Mirror H						
Brickbottom Artists Building (northeast façade)	West	33 [b, c]	50 [b]	84	75	1
Total vibration impacts prior to mitigation for Mirror H						*1*

Source: HMMH, April 2010.

a Green Line is on elevated structure at this location.

b Increased vibration from special trackwork is included at these locations.

c The maximum vibration generated for this alternative and receptor is from the far mainline track due to the presence of a double crossover.

As stated in the DEIR/EA, resilient rail fasteners, which are specially-designed fasteners between the rails and the ties, are one option for mitigating potential vibration impact at the Brickbottom Artists Building. Resilient rail fasteners can reduce vibration by five to 10 VdB at frequencies above 30 to 40 Hz. Approximately 500 feet of vibration mitigation along the length of the Brickbottom Artists Building would be effective in mitigating potential vibration impact. During the next phase of the project, vibration measurements would be conducted at additional sensitive locations to refine vibration mitigation recommendations.

Yard 8

For Yard 8, the maximum vibration level (77 VdB) at the Brickbottom Artists Building is projected to be generated from trains on the elevated near mainline track approximately 18 feet away. The highest vibration generated by yard movements is 67 VdB. Therefore, no vibration impact is projected at any receptors directly from yard movements for Yard 8.

Option L

For Option L, the maximum vibration level (77 VdB) at the Brickbottom Artists Building is projected to be generated from trains on the elevated near mainline track approximately 18 feet away. The highest vibration generated by yard movements is 71 VdB. Therefore, no vibration impact is projected at any receptors directly from yard movements for Option L.

Mirror H

For Mirror H, the maximum vibration level (84 VdB) at the Brickbottom Artists Building is projected to be generated from trains on the elevated far mainline track approximately 33 feet away because this track includes a double crossover to the maintenance tail track. The maximum vibration generated by yard movements is 75 VdB due to the presence of a double crossover on the maintenance yard tail track approximately 50 feet away from the Brickbottom Artists Building.

2.5.4 Traffic

This section discusses existing conditions and impacts to automobile traffic and parking operations as a result of each of the three maintenance facility alternatives. Figures 2-5 through 2-7 show the traffic study intersections.

Yard 8

Yard 8 would have no measurable impact to automobile parking or traffic operations. Access to the facilities would be via Washington Street and Inner Belt Road.

Parking Impacts

There is no existing public or private parking supply at Yard 8. Parking for approximately 100 vehicles would be constructed in concert with the Yard 8 facility. These spaces would be available only to MBTA employees serving either the maintenance facility or the Green Line. There would be no impact to the public parking supply. MBTA Lechmere Station parking would also be unaffected.

Traffic Impacts

All MBTA personnel parking at the maintenance facility would arrive and depart outside of the peak commuting hours and would not impact the peak hour vehicular traffic patterns or traffic operations. There would also be no adverse impact to pedestrians or bicyclists in the vicinity of the facility.

Option L

Similar to Yard 8, locating the maintenance facility at Option L would have no measurable impact to parking or traffic operations. No changes to the conceptual design and circulation plan for Brickbottom Station are envisioned under Option L. Access to the Option L maintenance facility would be via Washington Street and Inner Belt Road.

Parking Impacts

There is an existing unused parking lot on 70 Inner Belt Road, which has 97 striped parking spaces available. This unused parking lot would serve as employee parking for Option L. Existing parking spaces along each building would be removed. Similar to the Yard 8 analysis, Option L would have no impact to the public parking supply.

Traffic Impacts

All MBTA personnel parking at Option L would arrive and depart outside of the peak commuting hours and would not impact the peak hour vehicular traffic patterns or traffic operations. There would also be no adverse impact to pedestrians or bicyclists in the vicinity of Option L.

The two existing building uses on the Option L site include a wholesale liquor distribution center and a building temporarily leased as an indoor parking/storage facility for federally confiscated vehicles (formerly occupied by Digital Publishing Company). It is assumed that these buildings and their associated parking would be removed entirely. Since the majority of vehicle trips associated with these buildings occur during the peak hours, there would be a slight reduction in traffic volumes on Washington Street and Inner Belt Road under Option L. Since the reduction is slight and would likely have no noticeable impact on traffic operations, no reduction in peak hour traffic volumes was assumed in the traffic analysis for the Washington Street/Inner Belt Road intersection.

Mirror H

Similar to Yard 8 and Option L, locating the maintenance facility at Mirror H would have no measurable impact on parking or traffic operations. There may be isolated impacts regarding access to/from the facility as discussed further.

Parking Impacts

There is no existing public or private parking supply at the Mirror H site. New parking for approximately 100 vehicles would be constructed in concert with the Mirror H facility. These spaces would be available only to MBTA employees serving either the maintenance facility or the Green Line Extension. Similar to Yard 8 and Option L, Mirror H would have no impact to the public parking supply. MBTA Lechmere Station parking would also be unaffected.

Traffic Impacts

All MBTA personnel parking at Mirror H would arrive and depart outside of the peak commuting hours and would not impact the peak hour vehicular traffic patterns or traffic operations. There would also be no adverse impact to pedestrians or bicyclists in the vicinity of Mirror H.

Access to the Mirror H Facility and Circulation at Lechmere Station

Regional access to Mirror H would be via Monsignor O'Brien Highway. Traffic to/from the north would use Water Street as a connection from O'Brien Highway to the Mirror H facility. Traffic entering the facility from the south would also be provided via O'Brien Highway and Water Street. This requires the existing median along O'Brien Highway to be cut and a traffic signal installed at Water Street. This improvement is currently proposed as part of the relocation of Lechmere Station. Timing of the construction of this improvement could be impacted if access to Mirror H is needed prior to completion of Lechmere Station construction.

To accommodate pedestrians crossing O'Brien Highway at Water Street, no left turns would be allowed out of Water Street. Therefore, traffic exiting the facility would use North First Street to O'Brien Highway southbound. The construction of North First Street is also proposed as part of the relocation of Lechmere Station. As with Water Street, timing of construction could be impacted if access to Mirror H is needed prior to completion of station construction.

In order to provide access to/from all directions, a roadway connection between Water Street and North First Street would be required. This connection could be provided as part of the Lechmere Station construction, or could be a separate private way behind the station until such time that the NorthPoint development is complete and the accompanying roadway infrastructure is constructed in its entirety.

2.5.5 Socioeconomic Impacts

This section compares the socioeconomic impacts in terms of projected tax effects and job loss for the three maintenance facility alternatives. Two buildings would be purchased and demolished under Option L. All other acquisitions would involve strips of land or vacant lots and would not require building demolition. Table 2-10 lists the current annual property taxes for the areas to be acquired.

Table 2-11 summarizes the annual tax value decreases by city. Somerville would have a annual tax loss of $116,064 (0.12 percent of total city revenue) for Yard 8, $322,440 (0.33 percent of total city revenue) for Option L and $56,222 (0.05 percent of total annual city revenue) for Mirror H. Cambridge and Boston would only experience tax loss under Mirror H, an annual tax loss of $78,411 (0.03 percent of total city revenue) and $2,993 (0.0002 percent of total city revenue), respectively.

Table 2-10 Property Tax Effects of Yard 8, Option L, and Mirror H

Property	Type	Annual Property Taxes on Acquired Area[a, b, c, d]	Estimated Jobs Displaced or Relocated[e]	Acquisition
Yard 8				
200 Inner Belt Road, Somerville	Commercial/industrial building	$80,533	0	Partial (undeveloped portion)
0 Inner Belt Road, Somerville	Pan Am Railways track	$35,531	0	Full
SUBTOTAL		*$116,064*	*0*	
Option L				
20 Third Avenue, Somerville	Commercial/industrial building	$120,420	74	Full
44-48 Third Avenue, Somerville	Commercial/industrial building	$138,005	0	Full
70 Inner Belt Road, Somerville	Commercial/industrial lot	$30,976	0	Partial (parking lot)
200 Inner Belt Road, Somerville	Commercial/industrial lot	$33,040	0	Partial (southern Corner)
SUBTOTAL		*$322,440*	*74*	
Mirror H				
NorthPoint Development Lot 17/A/2, Somerville	Pan Am Railways track	$56,222	0	Partial
NorthPoint Development Lot 1A-102, Cambridge	Pan Am Railways track	$78,411	0	Partial
NorthPoint Development Lot 0202190050, Boston	Pan Am Railways track	$2,993	0	Partial
SUBTOTAL		*$137,627*	*0*	

a Annual property taxes for partial acquisitions are prorated based on the square footage taken from each parcel.
b Somerville Assessor's Office: Fiscal Year 2010 tax rate = $20.44 per $1,000 assessed value (commercial).
c Cambridge Assessor's Office: Fiscal Year 2010 tax rate = $18.75 per $1,000 assessed value (commercial).
d Boston Assessor's Office: Fiscal Year 2010 tax rate = $29.38 per $1,000 assessed value (commercial).
e Jobs estimated based on data from InfoUSA and publicly-available data. Municipal buildings are assumed to relocate within the same city and cause no net change. Vacant buildings are assumed to have no jobs under existing conditions.

Table 2-11 Property Tax Decreases by City for Yard 8, Option L, and Mirror H

	Somerville		Cambridge		Boston	
Alternative	Tax revenue decrease	% of City total	Tax revenue decrease	% of City total	Tax revenue decrease	% of City total
Yard 8	$116,064	0.12	$0	0.00	$0	0
Option L	$322,440	0.33	$0	0.00	$0	0
Mirror H	$56,222	0.05	$78,411	0.03	$2,993	0.0002

Table 2-12 summarizes the job displacements or relocations for each city. Option L would displace or relocate 74 jobs in Somerville. Many of the jobs displaced would likely be relocated or replaced within Somerville. Cambridge and Boston would lose zero jobs for either maintenance facility alternative selected.

Table 2-12 Estimated Job Decreases or Relocations for Yard 8, Option L, and Mirror H

Alternative	Somerville	Cambridge	Boston	TOTAL
Yard 8	0	0	0	0
Option L	74	0	0	74
Mirror H	0	0	0	0
Work Force in City	*47,026*	*55,737*	*347,611*	

Source: U.S. Census Bureau, 2006-2008 American Community Survey
(Total work force included to demonstrate scale of impacts.)

Yard 8

The total estimated annual property tax value of the land and buildings acquired for Yard 8 is $116,064. These acquisitions would reduce annual property tax revenue by 0.12 percent in Somerville.

Yard 8 would not require the displacement or relocation of any jobs. Table 2-12 summarizes the job displacements or relocations for each city.

Option L

The total estimated annual property tax value of the land and buildings acquired for Option L is $322,440. These acquisitions would reduce annual property tax revenue by 0.33 percent in Somerville.

Table 2-12 summarizes the job displacements or relocations for each city. Option L would displace or relocate approximately 74 jobs in Somerville. Many of the jobs displaced would likely be relocated or replaced within Somerville.

This change would not represent a significant fraction of the jobs in Somerville. By comparison, the 2006-2008 U.S. Census estimated the workforce of Somerville at 47,026 workers. Although it is uncertain how many of the jobs displaced under Option L are held by local residents rather than commuters, the small scale of the job displacements relative to the workforce makes it clear that the jobs at stake represent at most a minor economic impact.

Mirror H

The total estimated annual property tax value of the land and buildings acquired for Mirror H is $137,627. These acquisitions would reduce annual property tax revenue by 0.05 percent ($56,222) in Somerville, 0.03 percent ($78,411) in Cambridge and 0.0002 percent ($2,993) in Boston. At the time of this analysis, discrepancies in City property limits between Somerville and Cambridge were found and are being reviewed. These annual tax revenue estimates are subject to change based on the resolution of city limits.

Mirror H would not require the displacement or relocation of any jobs.

2.5.6 Title VI and Environmental Justice

The EEA established an Environmental Justice Policy in 2002, in accordance with Title VI of the Civil Rights Act of 1964, to help address the disproportionate share of environmental burdens experienced by lower-income people and communities of color who, at the same time, often lack environmental assets in their neighborhoods. The policy is designed to help ensure their protection from environmental pollution as well as promote community involvement in planning and environmental decision-making to maintain and/or enhance the environmental quality of their neighborhoods. All major elements of the proposed Green Line Extension Project must meet the standards set forth by this Policy.

The Project must also comply with Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, directing Federal agencies to address environmental injustices in their operations and in communities across the country. The Executive Order requires that each Federal agency shall, to the greatest extent allowed by law, administer and implement its programs, policies, and activities that affect human health or the environment so as to identify and avoid "disproportionately high and adverse" effects on minority and low-income populations.

The U.S. Department of Transportation (DOT) also established its own policy to actively ensure nondiscrimination under *Title VI of the 1964 Civil Rights Act* in Federally funded activities, *DOT Order on Environmental Justice to Address Environmental Justice in Minority Populations and Low-Income Populations (DOT Order 5610.2)*, which the Project must comply with. *DOT Order 5610.2* summarizes and expands on the requirements of *Executive Order 12898* and describes the process for incorporating environmental justice principles into all DOT existing programs, policies, and activities. As shown on Figure 2-11, all three maintenance facility alternatives are within designated environmental justice areas, as is much of the overall Green Line Extension Project corridor.

Yard 8

Yard 8 would require acquiring two pieces of land on Inner Belt Road: the existing Yard 8 at 0 Inner Belt Road and an undeveloped area at 200 Inner Belt Road. Like all other maintenance facility sites considered, this site is within a designated environmental justice area. However, no buildings would be acquired or demolished and no residential land would be acquired, resulting in no direct effect on local environmental justice populations.

The Yard 8 maintenance facility site is in an existing industrial area in between the MBTA Fitchburg and Lowell Lines. The noise from the maintenance facility is included in the overall noise analysis presented in DEIR/EA Section 5.7, *Noise*, and in Section 3.3, *Noise*, of this FEIR Appendix B. Potential severe noise impact is projected at the Brickbottom Artists Building, the Hampton Inn Hotel, the Glass Factory Condominiums, the future 22 Water Street residential development and the future Archstone Phase II – Site 1. Potential moderate noise impact is projected at the existing NorthPoint Tango and Sierra properties, prior to mitigation. Noise from the mainline operations is the dominant factor in future noise levels at these receptors.

Sound insulation of residences to improve the outdoor-to-indoor noise reduction or noise barriers are potential mitigation measures for these existing properties. The need and effectiveness of building sound insulation for interior spaces would be assessed in the next phase of project development. There would be no moderate or severe impacts from noise after mitigation is implemented. With no other residential populations nearby, there would be no disproportionate impact to environmental justice populations due to the Yard 8 maintenance facility.

The building for the maintenance facility would result in a moderate change to the local visual environment by introducing an additional industrial building to this largely commercial/industrial neighborhood. In the absence of the proposed maintenance facility, the site selected may be redeveloped for other uses that would have similar or greater impacts on the local neighborhood. The proposed maintenance facility building site is zoned for industrial use and other related uses.

Overall, the placement of the maintenance facility in an existing industrial district would not result in any substantial changes to the local environment. There would be no disproportionate impact to environmental justice populations due to Yard 8.

Option L

Two buildings would be acquired and demolished as part of Option L. However, no residential land would be acquired, resulting in no direct effect on local environmental justice populations.

Under Option L, 74 jobs would be displaced in an environmental justice area. While the analysis cannot assume that the employees of these businesses are local residents, the local racial makeup and economic status provides the best available indicator for the affected populations. As discussed in Section 3.6, *Socioeconomic Impacts*, of this FEIR Appendix B, the displacement of these jobs does not represent a substantial economic change for the local area.

The proposed maintenance facility site is in an existing industrial area in between the MBTA Fitchburg and Lowell Lines. The noise from the maintenance facility is included in Section 3.3, *Noise,* of this FEIR Appendix B. Potential severe noise impact is projected at the Brickbottom Artists Building, the Hampton Inn Hotel, the Glass Factory Condominiums, the future 22 Water Street residential development and the future Archstone Phase II – Site 1. Potential moderate noise impact is projected at the existing NorthPoint Tango and Sierra properties, prior to mitigation. Noise from the mainline operations is the dominant factor in future noise levels at these receptors.

Sound insulation of residences to improve the outdoor-to-indoor noise reduction or noise barriers are potential mitigation measures for these existing properties. The need and effectiveness of building sound insulation for interior spaces would be assessed in the next phase of project development. There would be no moderate or severe impacts from noise after mitigation is implemented. Therefore, there would be no disproportionate environmental justice impacts from the proposed maintenance facility.

The building for the maintenance facility would change the local visual environment slightly by introducing an additional industrial building to this largely commercial/industrial neighborhood.

Overall, the placement of the maintenance facility in an existing industrial district would not result in any substantial changes to the local environment. There would be no disproportionate impact to environmental justice populations due to Option L.

Mirror H

Mirror H would require acquiring partial pieces of land owned by Pan Am Railways and planned for the future NorthPoint development project. However, no buildings would be acquired or demolished, and no residential land would be acquired, resulting in no direct effect on local environmental justice populations.

The proposed maintenance facility site is in an existing industrial area south of the MBTA Fitchburg Line. The noise from the maintenance facility is included in Section 3.3, *Noise,* of this FEIR Appendix B. Potential severe noise impact is projected at the Brickbottom Artists Building, the Hampton Inn Hotel, the Glass Factory Condominiums, four future properties in the NorthPoint development (Sites 1, 2, 3 and 4), the future 22 Water Street residential development and the future Archstone

Phase II – Site 1, prior to mitigation. Potential moderate noise impact is projected at one future property in the NorthPoint development (Site 5) and two existing properties (Tango and Sierra). Noise from the mainline operations is the dominant factor in future noise levels at the Brickbottom Artists Building, Hampton Inn Hotel, Glass Factory Condominiums, the existing NorthPoint properties Tango and Sierra and future residential development at 22 Water Street and Archstone Phase II – Site 1. Sound insulation of residences to improve the outdoor-to-indoor noise reduction or noise barriers are potential mitigation measures for these existing properties. The need and effectiveness of building sound insulation for interior spaces would be assessed in the next phase of project development. There would be no moderate or severe impacts from noise after mitigation is implemented. Therefore, there would be no disproportionate environmental justice impacts from the proposed maintenance facility.

Noise from Mirror H is the dominant project-related noise source at the five future NorthPoint properties (Sites 1, 2, 3, 4 and 5). It is assumed that future properties at the NorthPoint development would have noise-sensitive receptors at upper-floor residences, which would not benefit from a noise barrier for potential mitigation of noise impact from stationary cars in the storage yard. Since the proposed development is not currently under construction and is assumed to be completed by 2030, after the completion of the Green Line Extension Project, the buildings could be designed with consideration of the noise environment (i.e. windows with high transmission loss or STC ratings) to mitigate potential impact.

The building for the maintenance facility would change the local visual environment slightly by introducing an additional industrial building to this largely commercial/industrial neighborhood. In the absence of the proposed maintenance facility, the site selected may be redeveloped for other uses that would have similar or greater impacts on the local neighborhood.

Overall, the placement of the maintenance facility in an existing industrial area would not result in any substantial changes to the local environment. There would be no disproportionate impact to environmental justice populations due to Mirror H.

2.5.7 Visual Resources

This section compares the direct visual impacts from the three maintenance facility alternatives. The support facility would be an enclosed building, resulting in minimal light exposure to the surrounding area. Any outdoor lighting would be directed downward and towards the building with fixture hoods to prevent any direct lighting impacts at night on neighboring buildings.

Moreover, the aesthetic features of the exterior of the maintenance facility structure would enhance the possibility of quality redevelopment nearby. Heavy visual screening by landscaping or walls would be considered, especially adjacent to the

outdoor rail car storage area. Consideration would be given to the development of a deck for parking or other purposes over the storage yard, which would provide weather protection to the Green Line cars while screening the visual impacts.

Yard 8

Yard 8 has been in continuous use as a rail facility since 1835, and train cars would use the layover tracks mostly at night. The support facility building would be directly across the right-of-way from the Brickbottom Artists Building. The building would be easily visible from the east-facing windows of the Brickbottom Artists Building. Given the existing industrial and commercial buildings visible from this area, the support facility would result in a moderate change to the local landscape by adding a new industrial building.

Option L

Option L is immediately adjacent to the MBTA's BET, on the northwest. Option L is along the southern and southeastern fringe of the existing Inner Belt industrial area. The vehicle storage yard is proposed at the southern end of the Inner Belt Road just north of the MBTA Fitchburg Line on vacant private property and land that is currently an unused parking lot for 70 Inner Belt Road. The maintenance building would be south of Third Avenue and east of the existing building at 70 Inner Belt Road.

A maintenance facility at Option L would require the demolition of two buildings and the construction of a new building. The building would be less visible from the Brickbottom Artists Building than would Yard 8. Given the existing industrial and commercial buildings visible from this area, the support facility would result in a minor change to the local landscape.

Mirror H

Mirror H straddles portions of the NorthPoint site and a portion of MBTA-owned land. This alternative locates the facility at the north side of the proposed NorthPoint development and partly on MBTA land south of the BET, and represents a plan that places new light rail facilities next to existing MBTA Commuter Rail facilities. A support facility in this location would result in some visual changes to the local area. A single storage yard would be in Cambridge to the west of the maintenance building in Somerville. Some of the auto parking, as well as the tail tracks and loop east of the maintenance building, would be in Boston.

The support facility building would be directly across the right-of-way from the proposed NorthPoint buildings. The building would be easily visible from the

northern-facing windows of the proposed NorthPoint buildings. Given the existing industrial (MBTA's BET facility) and commercial buildings visible from this area, the support facility would result in a minor change to the local landscape by constructing a new building.

2.5.8 Wetlands

There are no state- or Federally-regulated wetlands within the Yard 8, Option L, or Mirror H sites. Therefore, there would be no wetland impacts created by developing any chosen maintenance alternative.

2.5.9 Stormwater Management

The proposed maintenance facility would be constructed in previously-developed areas and would be designed to meet the Massachusetts Stormwater Management Standards for redevelopment. Maintenance activities (such as light rail vehicle washing) would be conducted inside the maintenance building and are anticipated to contribute to stormwater. Stormwater from the site would discharge to an existing storm drain system and would not discharge directly to any wetlands.

The MBTA would need to apply for coverage under the EPA Multi-Sector General Permit for Stormwater Discharges Associated with Industrial Activity (MSGP) for the maintenance facility.[10] This general permit requires numerous control measures and operational plans to control spills, manage potential contaminant sources, and prevent the impairment of any water bodies receiving runoff from industrial facilities.

A new EPA National Pollutant Discharge Elimination System (NPDES) permit for an industrial use would be required. This permit would require a new Stormwater Pollution Prevention Plan (SWPPP) to address maintenance and monitoring and a Spill Prevention, Control, and Countermeasures (SPCC) plan to demonstrate vigilance and preparedness for hazardous spills. The storage tracks would have collection trays to catch any incidental drips, leaks, or spills of hazardous materials that may occur during maintenance or storage. The collection trays would be connected to an oil/water separator that would separate petroleum products from stormwater runoff prior to discharge. Any oil or other hazardous materials stored at the site would be secured with secondary containment structures to catch any spills. With the proposed containment measures in place, the maintenance and storage

10 The Multi-Sector General Permit for Stormwater Discharges (MSGP) is part of the National Pollutant Discharge Elimination System (NPDES), which requires permits for various stormwater and industrial discharges in order to prevent the contamination and impairment of receiving waters. The EPA is responsible for issuing NPDES permits in Massachusetts, and the permits are also reviewed by MA DEP. The MSGP covers most types of industrial discharges and requires general control measures as well as specific measures tailored to specific industrial uses. Industrial facilities applying for coverage under the MSGP must demonstrate compliance with all requirements and submit copies of their SWPPPs and SPCCs for review.

facility would not pose a significant risk to any surface or groundwater resources in the vicinity of either site.

Yard 8

Yard 8 would add 2.6 acres of impervious surfaces to the site. Approximately 54 percent of the new total impervious area (approximately 2.7 acres) would be roof area, which is expected to be clean. The stormwater management system would include many of the same features found in the station and railway drainage. Proposed management measures include:

- Deep sump catch basins to collect runoff from paved areas;
- Hydrodynamic particle separators to treat pavement runoff;
- Roof drains from building connected to an underground pipe storm drainage system;
- Underground infiltration chambers to store and infiltrate runoff; and
- Overflow outlets from the infiltration chambers to direct excess flow into the municipal storm drainage system in Inner Belt Road.

The stormwater system would be designed to ensure no net increase in peak flow to the existing municipal drain line in Inner Belt Road.

Option L

Option L would reduce existing impervious surfaces by about 3.2 acres. Approximately 40 percent of the new total impervious area (approximately 3.4 acres) would be roof area, which is expected to be clean. The stormwater management system would include many of the same features found in the station and railway drainage. Proposed management measures include:

- Deep sump catch basins to collect runoff from paved areas;
- Hydrodynamic particle separators to treat pavement runoff;
- Roof drains from building connected to an underground pipe storm drainage system;
- Underground infiltration chambers to detain and infiltrate runoff; and
- Overflow outlets from the detention chambers to direct excess flow into the existing MBTA Fitchburg Line Main Drain, which crosses the eastern portion of this site.

The stormwater system would be designed to ensure no net increase in peak flow to the existing MBTA drain line.

Mirror H

Mirror H would reduce existing impervious surfaces (pavement) by about 0.4 acres. Approximately 47 percent of the new total impervious area (approximately 2.2 acres) would be roof area, which is expected to be clean. The stormwater management system would include many of the same features found in the station and railway drainage. Proposed management measures include:

- Deep sump catch basins to collect runoff from paved areas;
- Hydrodynamic particle separators to treat pavement runoff;
- Roof drains from building connected to an underground pipe storm drainage system;
- Underground storage chambers to detain runoff;
- Underground filtration basin to provide additional TSS removal (in lieu of infiltration); and
- Overflow outlets from the detention chambers to direct excess flow into the existing MBTA Fitchburg Line Main Drain, which crosses the eastern portion of this site.

Infiltration is not advised, as there is ongoing groundwater remediation in this area. The stormwater system would be designed to ensure no net increase in peak flow to the existing MBTA drain line.

2.5.10 Hazardous Materials

This section discusses the potential presence of oil and/or hazardous materials (OHM) on or adjacent to the proposed maintenance facility alternatives for the proposed Green Line Extension Project.

To assess the potential for encountering OHM, Phase I Environmental Site Assessments (ESAs) were performed as per the American Society for Testing Materials (ASTM) 1527-05 Standard and All Appropriate Inquiries (AAI) pursuant to 40 CFR Part 312. The purpose of the Phase I ESAs is to identify Recognized Environmental Conditions (RECs) in connection with the properties, to the extent feasible pursuant to the process described in the Standard. The Phase I ESAs were completed utilizing the Standard as guidance.

The scope of services provided for the Phase I ESAs included the following:

- Performed a computer database search of Federal and state files. The Federal databases included the current Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS), National Priorities List (NPL), Resource Conservation and Recovery Act (RCRA) Transportation,

Storage and Disposal (TSD), RCRA Generators, and Emergency Response Notification System (ERNS) list. The state databases included the state equivalent CERCLIS list, spills, Underground Storage Tanks (USTs), Solid Waste Landfills (SWL), and public water supply lists.

- Reviewed available Massachusetts Department of Environmental Protection (MassDEP) files to provide more information about reported releases of OHM identified through the database search on or adjacent to the sites. The MassDEP files provided additional information regarding past ownership; historic site usage; past usage, storage and disposal of OHM on and adjacent to the subject site; and other evidence of potential environmental impacts.
- Reviewed available municipal and historic files to help confirm ownership history and past usage. Resources included tax records, aerial photographs, Board of Health Department records, Building Department records, Fire Department records, Conservation Commission records, and Sanborn fire insurance maps. The site history review also identified reports of historic spills, disposal areas, or other past releases of OHM on or adjacent to the properties.
- Reviewed previous site documents including an ESA, if applicable and/or available for review.
- Performed a partial site reconnaissance from public roadways to observe each site for overt evidence of a release or threat of release of oil and/or hazardous materials within exterior portions of the entire property. The uses of abutting properties were also documented. No interior inspections were conducted.
- Areas of property acquisition were assessed as discussed above. Properties already owned by the MBTA or the Commonwealth of Massachusetts were not assessed. Notable deviations from the standard include not inspecting interior portions of buildings, interviews with knowledgeable personnel were not conducted, and a user questionnaire was not completed.

The findings of the Phase I Environmental Site Assessments conducted for the three maintenance facility alternatives indicate that all of the proposed maintenance facilities encompass and abut sites of known and suspected OHM contamination. All three alternatives would likely be impacted by fill material present throughout the area, the historic use of the properties for railroad operations, present industrial use of the property, and several documented disposal sites detailed below. Asbestos containing materials (ACM) and/or lead-based paint may be present in site structures or fill piles in the location of the proposed maintenance facilities; therefore, a detailed survey is recommended prior to acquisition or demolition.

The purpose of this analysis was to identify and compare the number of RECs in connection with each maintenance facility site. RECs that are deemed to have a high potential impact consists of sites such as those confirmed with soil, groundwater, and/or indoor air impacts that were reported to the MassDEP and have undergone some type of cleanup or remain an active case. RECs that are deemed to have a

medium potential impact consist of properties such as those with potential sources of OHM with limited or inconclusive information.

It is recommended that upon selection of the preferred maintenance facility site, that subsequent investigation be conducted to identify specific contaminants and associated clean-up costs. On-site contamination encountered would be assessed and, if necessary, remediated prior to and during construction activities. Any necessary response actions would be performed in accordance with the Massachusetts Contingency Plan (MCP).

Yard 8

Based upon the research review conducted for the Phase I ESA, seven RECs are believed to be associated with Yard 8 (off-site releases were consolidated into one REC), comprised of the properties identified in Table 2-13.

Table 2-13 RECs and Potential Impacts for Yard 8

Station/Facility	REC(s)	RTN(s)	Relative Impact
Maintenance Facility	Historic Use of Site at Rail Yard (all Yard 8 parcels)	Not applicable	Medium
	Releases of Petroleum at Nearby Properties (all Yard 8 parcels)	See below[a]	Medium
	Releases of Hazardous Materials (Metals, PCBs, and Unknown Chemicals) at Nearby Properties	See below [b]	Medium
	Release of Petroleum at 100 Inner Belt Road and Petroleum Storage at 70 Inner Belt Road (Currently a portion of the same parcel)	RTN 3-974	Medium
	Release of Arsenic and PCBs at 120 Inner Belt Road	RTN 3-19075	Medium
	Releases of Petroleum at and Current use of MBCR Maintenance Facility at 70R Third Avenue	See below[c]	Medium
	Releases at Yard 8 (Phosphorous trichloride, PCBs, and petroleum)	RTN 3-4222	High

a RTN 3-11444, 3-13082, 3-23562, 3-21316, 3-13535, 3-11570, 3-18392, 3-13854 , 3-11570
b RTN 3-23246, 3-3364, 3-13471, 3-16583, 3-2312, 3-2534
c N90-1956, N90-0236, N90-1810, N93-0627, N93-0705, RTNs 3-24428, 3-22276, 3-26988, 3-22964, 3-23114, 3-18363

Option L

Based upon the research review conducted for the Phase I ESA, seven RECs are believed to be associated with Option L, comprised of the properties identified in Table 2-14.

Table 2-14 RECs and Potential Impacts for Option L

Station/Facility	REC(s)	RTN(s)	Relative Impact
Maintenance Facility	Historic Use of Site as Railroad Yard (all Option L parcels)	Not applicable	Medium
	Use of 48 Third Avenue as a Printing Facility	Not applicable	Medium
	Release of Petroleum at 100 Inner Belt Road and Petroleum Storage at 70 Inner Belt Road (Currently same parcel)	RTN 3-974	High
	Former Condition of 140-200 Inner Belt Road	Not applicable	Medium
	Release of Arsenic and PCBs at 120 Inner Belt Road	RTN 3-19075	Medium
	Releases at Yard 8 (Phosphorous trichloride, PCBs, and petroleum)	RTN 3-4222	High
	Releases of Petroleum at and Current use of MBCR Maintenance Facility at 70R Third Avenue	See below[a]	Medium

a N90-1956, N90-0236, N90-1810, N93-0627, N93-0705, RTNs 3-24428, 3-22276, 3-26988, 3-22964, 3-23114, 3-18363

Mirror H

Based upon the research review conducted for the Phase I ESA, six RECs are believed to be associated with Mirror H, comprised of the properties identified in Table 2-15.

Table 2-15 RECs and Potential Impacts for Mirror H

Station/Facility	REC(s)	RTN(s)	Relative Impact
Maintenance Facility	Historic Use of Site as Railroad Yard (all Mirror H parcels)	Not applicable	Medium
	Fill Material Associated with Millers River (all Mirror H parcels)	Not applicable	Medium
	Current Condition of the Site	Not applicable	Medium
	Release of Petroleum at MBTA Commuter Rail maintenance facility, 29 East Street	RTN 3-2534	High
	Releases of Petroleum at and Current use of MBCR maintenance facility at 70R Third Avenue	See below[a]	Medium
	Releases at the former B&M Railroad Yard (now Pam Am Railways)(all Mirror H parcels)	RTN 3-12277 and RTN 3-11533	High

a N90-1956, N90-0236, N90-1810, N93-0627, N93-0705, RTNs 3-24428, 3-22276, 3-26988, 3-22964, 3-23114, 3-18363

2.5.11 Historic and Archaeological Resources

The Green Line Extension Project Area of Potential Effects (APE) for historic resources includes the area extending approximately 125 feet, or one assessor's lot, on either side of the Proposed Project's Medford and Union Square Branch routes, associated proposed station locations, and maintenance and/or interim train storage facilities.

The APE for historic resources, in accordance with 36 CFR 800.16(d) is defined as "the area or areas within which an undertaking may directly, indirectly, or cumulatively cause changes in the character or use of historic properties (defined as

resources listed or eligible for listing in the National Register), if any such properties exist there."[11] Therefore, the APE includes other areas where the undertaking could cause changes in land use, traffic patterns, or other aspects that could affect historic properties. Factors with potential to cause changes are noise, vibration, visual (setting), traffic, atmospheric, construction, indirect, and cumulative impacts. Different project factors may produce more than one APE for a given undertaking.

The APE for archaeological resources is limited to the construction areas for the proposed maintenance facility alternatives.

There are no historic resources or recorded archaeological sites located within the APE for any alternative site. However, the presence of deeply buried archaeologically sensitive strata below the railroad and modern fill soils is considered possible at all of the proposed maintenance facility alternatives. Further research including a review of soil borings is recommended prior to construction to determine if archaeologically sensitive strata may be impacted by the construction of the maintenance facility.

2.5.12 Public Parks, Recreation Areas, and Conservation Land

There are no public parks, recreation areas or conservation land areas within or adjacent to the proposed Yard 8, Option L, or Mirror H maintenance facility areas; therefore, there would be no impacts to parks or conservation land.

2.5.13 Consistency with Federal, State, and Local Planning

This section compares the consistency and compatibility of each maintenance facility site to other planned Federal, state and local planning initiatives. Figures 2-5 through 2-7 show the existing land uses in the vicinity of the maintenance facility alternatives, and Figure 2-12 shows a generalized zoning map for the communities of Cambridge and Somerville.

Yard 8 and Option L would be compatible locations for the maintenance facility because these alternatives are in the middle of an industrial area. Option L would likely have the least transit oriented development (TOD) potential since it is the farthest away from proposed stations. Option L, in terms of future land use impacts, would likely be the most consistent with local development plans. Mirror H would be less compatible with state and local planning initiatives.

11 Advisory Council on Historic Preservation. United States 36 Code of Federal Regulations, Part 800 – *Protection of Historic Properties.* http://www.achp.gov/regs-rev04.pdf.

Yard 8

Yard 8 is compatible with the potential future Urban Ring project, the Somerville Community Path, and the North-South Rail Link project. Yard 8 within the City of Somerville is zoned Industrial A (IA).

The proposed vehicle maintenance building and overnight rail car storage area are compatible with much of the existing industrial land uses along this segment of the railroad corridor. However, its development character and impacts may potentially affect future non-industrial development opportunities in adjacent areas.

The facility would be similar in appearance to other MBTA maintenance facilities serving the Green Line (e.g., Riverside and Reservoir). To encourage planned mixed use development near the Brickbottom Station and in the Inner Belt area, consistent with City of Somerville planning policies for the area, mitigation measures may be necessary. The design of an aesthetic building facade, the enabling of potential air rights development (perhaps through zoning amendments), and dense screening landscaping may be necessary to create a more compatible facility with future non-industrial land uses.

Option L

Option L does not preclude the potential future Urban Ring project, the Somerville Community Path, or future North-South Rail Link project. Option L within the City of Somerville is zoned Industrial A (IA).

The vehicle maintenance building and overnight rail car storage area are compatible with much of the existing industrial land uses along this segment of the railroad corridor. However, its development character and impacts may potentially affect future non-industrial development opportunities in adjacent areas.

The facility would be similar in appearance to other MBTA maintenance facilities serving the Green Line (e.g., Riverside and Reservoir). To encourage planned mixed use development near the Brickbottom Station and in the Inner Belt area, consistent with City of Somerville planning policies for the area, mitigation measures may be necessary. The design of an aesthetic building facade, the enabling of potential air rights development (perhaps through zoning amendments), and dense screening landscaping may be necessary to create a more compatible facility with future non-industrial land uses.

Mirror H

Mirror H does not preclude the potential Urban Ring and Somerville Community Path projects. However, Mirror H could preclude the future North-South Rail Link

project and the future expansion planned for the BET facility, both of which are programmed within the MBTA's existing property limits. The portion of Mirror H within Somerville is zoned Industrial B (IB). The portion of Mirror H within Cambridge is designated as zoned NorthPoint Residence District PUD (NP PUD-6). Zoning in the NorthPoint District is primarily residential, with retail, office uses and community services. The land in Boston that is adjacent to the proposed NorthPoint development is zoned as a Local Industrial Subdistrict (LI). Mirror H would be less compatible to local planning initiatives than Option L or Yard 8 as the industrial use of this facility would be adjacent to a lot of zoned residential developments.

Most of the underused land between the Mirror H site and the proposed relocated Lechmere Station site, however, is already programmed as part of the NorthPoint development project, which is projected to occupy 46.3 acres and 20 buildings when completed. Full build-out of these developments would be made more attractive by construction of the Green Line Extension, which would make the area more accessible to a larger region.

Farther east and adjacent to the NorthPoint project is the Charles E. Smith/Archstone residential development. Phase I, which includes 437 rental units, was completed in 2007. Phase II is permitted for 426 units. Construction had not yet begun on Phase II as of March 2010.

Directly adjacent to Mirror H is the 2.4 acre site for a 392 unit triple-tower residential/parking/open space project proposed by Catamount Holdings. The development would occupy the vacant site of the former headquarters of the Mac Gray Company at 22 Water Street, behind the Hampton Inn Hotel on O'Brien Highway. The project has been approved by the Cambridge Planning Department.

Additional land use impacts in the station area are uncertain, as there are few other vacant sites available for development. However, the improved Lechmere Station and the proposed future developments are likely to increase land values in the area, making existing underused parcels attractive sites for potential redevelopment.

The vehicle maintenance building and overnight rail car storage area are compatible with much of the existing industrial land uses along this segment of the railroad corridor. However, its development character and impacts would affect future non-industrial development opportunities in adjacent areas.

2.5.14 Community Path

The choice of maintenance facility site would have no impact on the feasibility of the Somerville Community Path extension between Lowell Street and Inner Belt Road, as described in Appendix E of the DEIR/EA.

MassDOT is committed to completing all planning, design, and engineering work - including the identification of necessary property acquisitions - for the proposed extension of the Somerville Community Path between Lowell Street and Inner Belt Road. The limits of the path were predicated on the connections to Lechmere being made through the Inner Belt area via Inner Belt Road and the proposed Urban Ring Bridge into the Lechmere area. However, the cessation of planning for the Urban Ring project has changed this anticipated connection. MassDOT is unable to assume responsibility for designing the Urban Ring Bridge as part of the Green Line Extension Project. That being said, MassDOT is committed to working with the City of Somerville, residents and businesses in the Brickbottom and Inner Belt neighborhoods, and Community Path advocates to design the Path in such a way so as to create improved connectivity within the Brickbottom and Inner Belt neighborhoods and between the Community Path and the Green Line Extension.

2.5.15 Summary of Environmental Findings

Table 2-16 summarizes the findings of the environmental findings of the three maintenance facility alternatives – Yard 8, Option L and Mirror H. None of the maintenance facility alternatives are expected to impact air quality, parking or traffic operations, wetlands, historic and archaeological resources, public parks, recreation areas, or conservation land.

Two existing NorthPoint buildings (Tango and Sierra) would be moderately impacted by noise, prior to mitigation, under each alternative. In addition, Mirror H would moderately impact noise levels at one future NorthPoint property (Site 5). Three existing buildings (Brickbottom Artists Building, Hampton Inn Hotel, and Glass Factory Condominiums) and two future buildings (the proposed 22 Water Street and the proposed Archstone Development - Phase II, Site 1) would be severely impacted by noise, prior to mitigation, under each alternative. In addition, Mirror H would severely impact noise levels at four future NorthPoint properties (Sites 1, 2, 3 and 4).

The Brickbottom Artists Building would be impacted by vibration due to the presence of a double crossover at Mirror H, approximately 50 feet away, between the mainline and maintenance tail track. There are no vibration impacts projected at any receptors directly from yard movements at Yard 8 or Option L.

Table 2-10 provides the property tax effects of Yard 8, Option L, and Mirror H. The total estimated annual property tax value of the land and buildings acquired for Yard 8 is $116,064. These acquisitions would reduce annual property tax revenue by 0.12 percent in Somerville. Yard 8 would not require the displacement or relocation of any jobs.

The total estimated annual property tax value of the land and buildings acquired for Option L is $322,440. These acquisitions would reduce annual property tax revenue

by 0.33 percent in Somerville. Option L would displace or relocate approximately 74 jobs in Somerville. Many of the jobs displaced would likely be relocated or replaced within Somerville.

The total estimated annual property tax value of the land and buildings acquired for Mirror H is $137,627. These acquisitions would reduce annual property tax revenue by 0.05 percent ($56,222) in Somerville, 0.03 percent ($78,411) in Cambridge and 0.0002 percent ($2,993) in Boston. Mirror H would not require the displacement or relocation of any jobs.

Given the existing industrial and commercial buildings visible from this area, the Yard 8 support facility would result in a moderate change to the local landscape. Option L and Mirror H would result in a minor change to the local landscape.

The stormwater system at Yard 8 would be designed to ensure no net increase in peak flow to the existing municipal drain line. The Option L and Mirror H stormwater systems would be designed to ensure no net increase in peak flow to the existing MBTA drain line. Yard 8 would increase the amount of impervious area by approximately 2.6 acres, while Option L and Mirror H would reduce impervious area by approximately 3.2 acres and 0.4 acres, respectively.

All three maintenance facility sites encompass and abut sites of known and suspected OHM contamination. All three alternatives would likely be impacted by fill materials present throughout the area, the historic use of the properties for railroad operations, present industrial use of the property, and several documented disposal sites. Seven RECs are believed to be associated with Yard 8 and Option L, while six RECs are believed to be associated with Mirror H.

Because ACM and/or lead-based paint may be present in site structures or fill piles in the location of the proposed maintenance facilities, a detailed survey is recommended prior to acquisition or demolition. It is recommended that upon selection of the preferred maintenance facility site, that subsequent investigation be conducted to identify specific contaminants and associated clean-up costs. On-site contamination encountered would be assessed, and, if necessary, would be remediated prior to and during construction activities. Any necessary response actions would be performed in accordance with the MCP.

Yard 8 and Option L would be compatible locations for the maintenance facility because these alternatives are in the middle of an industrial area. The land required for the Option L site would likely have the least TOD potential since it is the farthest away from proposed stations. Option L, in terms of future land use impacts, would likely be the most consistent with local development plans. Mirror H would be less compatible site to state and local planning initiatives. The choice of maintenance facility site would have no impact on the feasibility of any alternative alignment for the Community Path.

Table 2-16 Comparison of Yard 8, Option L, and Mirror H - Environmental Analysis

CRITERIA	YARD 8 Rationale	OPTION L Rationale	MIRROR H Rationale
Description	Adjacent to the proposed Green Line alignment and accessed from Inner Belt Road in Somerville	Adjacent to BET, outside the current BET fence line - along the southern and southeastern fringe of the existing Inner Belt industrial area	Partly on NorthPoint parcels C/D/E/F and storage on parcels A/B, and partly on MBTA land currently used for storage by BET
Capital Cost Estimate ($2008)	$79 million	$129 million	$82 million
Total acreage needed	11 acres	11 acres	11 acres
Property Acquisitions			
Number of Parcels	2 Parcels (200 Inner Belt Road, Somerville - partial; 0 Inner Belt Road, Somerville - full)	4 parcels (20 Third Avenue, Somerville [full]; 44-48 Third Avenue, Somerville [full]; 70 Inner Belt Road, Somerville [partial]); 200 Inner Belt Road, Somerville [partial]	NorthPoint Development lots A/B and C/D/E/F [partial], located partly in Cambridge and Somerville
Acreage to be Acquired	5.8 acres	10.2 acres	4.3 acres
Estimated Acquisition Cost	Approx. $15 M	Approx. $51 M	Approx. $11 M
Air Quality	No difference	No difference	No difference
Noise Impacts (cumulative = mainline operations and maintenance facility)			
Potential Moderate Impacts (prior to mitigation)	Two buildings (NorthPoint Properties - Tango and Sierra)	Two buildings (NorthPoint Properties - Tango and Sierra)	Two existing buildings (NorthPoint Properties - Tango and Sierra) and 1 future building (NorthPoint Properties - Site 5)
Potential Severe Impacts (prior to mitigation)	Three existing buildings (Brickbottom Artists Building, Hampton Inn Hotel, Glass Factory Condominiums) and two future buildings (22 Water Street and Archstone-Smith Development –Phase II, Site 1)	Three existing buildings (Brickbottom Artists Building, Hampton Inn Hotel, Glass Factory Condominiums) and two future buildings (22 Water Street and Archstone-Smith Development –Phase II, Site 1)	Three existing buildings (Brickbottom Artists Building, Hampton Inn Hotel, Glass Factory Condominiums) and six future buildings (NorthPoint Properties - Sites 1, 2, 3, and 4; 22 Water Street and Archstone-Smith Development – Phase II, Site 1)
Vibration (from maintenance facility only)	No difference	No difference	Presence of double crossover between mainline and maintenance tail track would impact Brickbottom Artists Building (50 feet away)
Traffic and Access	No measurable impact to parking or traffic operations. Access via Washington Street and Inner Belt Road.	No measurable impact to parking or traffic operations. No changes to Brickbottom Station. Access via Washington Street and Inner Belt Road.	No measurable impact to parking or traffic operations. Possible isolated impacts from access improvements to/from facility (extension of Water Street from O'Brien Highway to Mirror H). Timing of construction could be impacted if access required prior to Lechmere Station construction.
Socioeconomics			
Estimated Annual Tax Loss	Approx. $116,064 (reduction of 0.12 percent in Somerville)	Approx. $322,440 (reduction of 0.33 percent in Somerville)	Approx. $137,627 (reduction of 0.05 percent [$56,222] in Somerville, 0.03 percent [$78,411] in Cambridge and 0.0002 percent [$2,993] in Boston)
Estimated Job Displacement	0 jobs	74 jobs (minor overall economic impact compared to total Somerville workforce)	0 jobs
Title VI and Environmental Justice	No difference	Option L would displace or relocate approximately 74 jobs within Somerville (a minor economic impact relative to total Somerville workforce).	No difference
Visual Resources	Moderate visual change to current landscape	Minor visual change to current landscape	Minor visual change to current landscape
Wetlands	No difference	No difference	No difference
Stormwater Management	Stormwater system would be designed to ensure no net increase in peak flow to the existing municipal drain line in Inner Belt Road	Stormwater system would be designed to ensure no net increase in peak flow to the existing MBTA drain line	Infiltration not advised, ongoing groundwater remediation in area. Stormwater system would be designed to ensure no net increase in peak flow to the existing MBTA drain line.
Impervious Area	Increase of approximately 2.6 acres	Reduction of approximately 3.2 acres	Reduction of approximately 0.4 acres
Hazardous Materials	7 Recognized Environmental Conditions	7 Recognized Environmental Conditions	6 Recognized Environmental Conditions
Historic and Archaeological Resources	No difference	No difference	No difference
Public Parks, Recreation Areas, and Conservation Land	No difference	No difference	No difference
Consistency with Federal, State and Local Planning	Compatible location	Compatible location	Less compatible to state and local planning initiatives. Could preclude future North-South Rail Link project and the ability to expand the BET facility within existing MBTA property limits. Industrial architecture of building may be incompatible with intended residential/mixed-use developments already planned.

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2.6 Construction Impacts

This section discusses potential construction impacts related to the three maintenance facility alternatives. Construction impacts at any of the alternative sites would be generally the same. Table 2-17 provides a summary of anticipated construction impacts. Table 2-18 summarizes construction mitigation measures for the maintenance facility alternatives.

Table 2-17 Construction Impacts of Yard 8, Option L and Mirror H

Traffic ■ No impacts. ■ Temporary lane closures and temporary traffic detours could be required along O'Brien Highway during construction of Mirror H. However, this construction would also be necessary to construct the new Lechmere Station and would occur regardless of the alternative selected.
Air Quality ■ Dust and debris from construction of the maintenance facility. ■ Carbon dioxide emissions from diesel equipment used on-site during construction.
Noise ■ Noise emissions from construction equipment.
Vibration ■ Vibration from heavy construction equipment (e.g., pile drivers).
Water Quality/Stormwater ■ Temporary alterations to the existing stormwater drainage infrastructure during construction. ■ Potential oil/fuel leaks from construction equipment.
Hazardous Materials and Solid Waste ■ Hazardous, contaminated or special wastes could be generated during construction.
Historic and Archaeological ■ Archaeologically sensitive strata below the fill are possible at all the proposed maintenance facility alternatives. An intensive (locational) archaeological survey is recommended prior to construction to determine if archaeologically sensitive strata may be impacted by the construction of the maintenance facility.

Temporary, short-term impacts from construction activities would be mitigated to the extent practicable. Appropriate construction mitigation measures would be incorporated into the contract documents and specifications governing the activities of contractors and subcontractors constructing elements of the Green Line Extension Project, including the maintenance facility and storage yard. On-site resident engineers and inspectors would monitor all construction activities to ensure that mitigation measures are properly implemented. The construction mitigation measures are summarized in Table 2-18.

Table 2-18 Summary of Construction Mitigation Measures

Traffic
■ Temporary detours would be established to minimize traffic disruption due to construction.
Air Quality
■ Apply water to dry soil to prevent dust production. ■ Use water for compaction in the fill areas and as a dust retardant in both the soil cut areas and haul roads. ■ Follow existing MBTA retrofit procedures for construction equipment to reduce emissions.
Noise
■ Use specially quieted equipment with enclosed engines and/or high-performance mufflers. ■ Avoid nighttime construction. ■ Keep truck idling to a minimum. ■ Route construction equipment and vehicles through areas that would cause the least disturbance to nearby receptors where possible. ■ Fit any air-powered equipment with pneumatic exhaust silencers. ■ Locate stationary construction equipment as far as possible from noise-sensitive sites. ■ Construct noise barriers, such as temporary walls or piles of excavated material, between noisy activities and noise-sensitive receivers.
Vibration
■ Avoid nighttime construction. ■ Use alternative construction methods to minimize the use of impact and vibratory equipment (e.g. pile drivers and compactors).
Water Quality/Stormwater
■ Develop and implement a SWPPP in accordance with NPDES and MassDEP standards. ■ Stabilize any highly erosive soils with erosion control blankets and other stabilization methods, as necessary. ■ Reinforce slopes using a hydroseed mix with a resin base, native vegetation, or other approved methods. ■ Use dewatering controls, if necessary. ■ Install a gravel entrance to prevent sediment from being tracked onto roadways and potentially discharged to surface waters. ■ Maintain construction equipment to prevent oil and fuel leaks.
Hazardous Materials and Solid Waste
■ Implement special management procedures for any hazardous, contaminated or special wastes generated during construction, including special handling, dust control, and management and disposal of contaminated soil. Procedures should protect both workers and nearby receptors. ■ Perform subsurface investigations for any planned excavation to test for possible contamination. ■ Prepare a site-specific Health and Safety Plan. ■ Conduct pre-demolition inspections to identify any hazardous materials such asbestos and lead-based paint.

2.7 Summary

As described in the technical memorandum, the operational and environmental analyses indicated that both the Yard 8 and Option L sites were viable locations for a support facility for the Green Line Extension Project. Of the two, each has operational and environmental advantages and disadvantages.

The Secretary's Certificate noted that comments submitted on the DEIR expressed a widespread lack of support for the Yard 8 maintenance facility location. Comments on the DEIR expressed preferences for further evaluation of both Mirror H and Option L, as required by the Secretary's Certificate. Based on the information and comments submitted, MEPA believed "that the Option L may be the most feasible alternative and the one with fewest potential conflicts and impacts."

MassDOT reviewed and considered the comments received on the DEIR/EA along with the results of the environmental analysis and operational analysis to determine whether to substitute an alternative option for Yard 8 as the preferred site for the maintenance and storage facility. Option L was selected by MassDOT as the preferred site for the maintenance and storage facility for the following reasons:

- Option L received the greatest support from the public and local municipal representatives.
- Option L met the MBTA's program requirements for the Green Line maintenance and storage facility.
- Option L provides the most operational flexibility for the MBTA as it provides a direct connection to the Union Square Branch. Neither Yard 8 nor Mirror H would provide this operation.
- Option L is located adjacent to similar railroad land uses (the BET commuter rail maintenance facility).
- Option L would have more separation from existing and proposed residential areas than would Yard 8 or Mirror H.
- Option L would not preclude future development of the Inner Belt area and future roadway connections from the Brickbottom area to the Inner Belt area.

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3 Air Quality

3.1 Introduction

The Secretary's Certificate stated that the FEIR should include a narrative discussion clarifying the air quality modeling assumptions documented in the DEIR/EA, challenges associated with the inherent evolution of modeling programs and input data, and confirming that the air quality modeling results were conducted in a manner that sufficiently demonstrated consistency with the SIP.

The SIP is a comprehensive document, approved by the U.S. Environmental Protection Agency (EPA) that demonstrates that Massachusetts can comply with the National Ambient Air Quality Standards (NAAQS) for air pollutants regulated by the Federal Clean Air Act. Specific requirements of the SIP regarding transit improvements are incorporated into the Massachusetts Air Quality Regulations at 310 CMR 7.36(2) and were approved by the EPA on July 31, 2008.[1] This chapter addresses these requirements identified in the Secretary's Certificate.

3.2 Background

As discussed and further defined in the DEIR/EA, the Federal Clean Air Act contains provisions to ensure that major transportation projects improve air quality. These Transportation Conformity provisions of the Federal Clean Air Act are intended to integrate transportation and air quality planning. Guidance from both the EPA and MassDEP define the air quality modeling and review criteria for analyses prepared pursuant to the Federal Clean Air Act, Transportation Conformity, and the SIP.

1 Federal Register (Vol. 73, page 44654). *Approval and Promulgation of Air Quality Implementation Plans: Massachusetts - Amendment to Massachusetts' State Implementation Plan for Transit System Improvements*.

The Federal Clean Air Act and the SIP require that a Proposed Project not:

- Cause any new violation of the NAAQS;
- Increase the frequency or severity of any existing violations; or
- Delay attainment of any NAAQS.

With respect to the Green Line Extension, the Project is included in the SIP and therefore conforms to the Federal Clean Air Act requirements. The Project also complies with the requirements of the Massachusetts Air Quality Regulations. The air quality analysis included in the DEIR/EA demonstrates that the Proposed Project meets the Transportation Conformity planning and project level requirements. The DEIR/EA also calculated the emissions reductions that would result from the proposed Green Line Extension to College Avenue and Union Square. This analysis showed that the emission reductions for the 2009 SIP package, which includes the Proposed Project and other transit projects, exceed the emission reductions established by the EPA for Massachusetts transit projects (the 2008 Federal Register *SIP Approved Projects Plus Ten Percent Package*). The emission reductions were calculated following the same modeling protocol and procedures required for all Transportation Conformity and SIP air quality analyses.

3.3 DEIR Modeling Assumptions

Transportation Conformity and SIP air quality analyses utilize traffic data from the statewide traffic model and the EPA's emission factor model MOBILE6.2. The statewide traffic model is maintained by the Central Transportation Planning Staff (CTPS), the technical staff of the Boston Region Metropolitan Planning Organization (MPO), which is responsible for SIP air quality submissions.

The statewide traffic model is the basis for determining existing and future traffic data for Federal Clean Air Act and NEPA submissions. The EPA requires that statewide traffic models used for SIP submissions be based upon the most recent approved planning-level data. As a result, statewide traffic models are periodically updated to include newly identified background projects, land use changes, and model enhancements. Statewide traffic models typically include the roadway network that exists at the time it is run and regionally significant projects (background projects) that are reasonably expected to be constructed by the design year (i.e., twenty years into the future). Similarly, the MPOs establish and periodically update the land use for existing and future years.

The statewide traffic model that CTPS uses for forecasting travel demand is based on procedures and data that have evolved over many years. It uses the most up-to-date information, transportation networks, and input data available to CTPS at the time of analysis. The statewide traffic model simulates existing travel modes for transit, automobiles, and walking/bicycling, and forecasts future year travel on the entire transportation system, spanning, in this instance, the majority of eastern Massachusetts. It uses population, employment, number of households, automobile ownership, highway and transit levels of service, as well as downtown parking costs, automobile operating costs and transit fares as important inputs in applying the model to the real world condition. As required by EPA, these inputs are constantly updated so that the model set simulates current travel patterns with as much accuracy as possible.

The greatest challenge to the air quality modeling is ensuring consistent results when the statewide traffic and the mobile source emission factor models are updated. For example, the statewide traffic model of 2006 was used to establish the 2008 Federal Register Replacement/Substitution Project package emissions criteria.[2] This air quality modeling used the most informative transportation network and input data available at that time. The air quality modeling presented in the DEIR/EA uses an improved statewide traffic model with an updated roadway network, more current land use data, and a newer version of EPA's mobile source emissions factor model (MOBILE6.2). All of these measures result in improved accuracy of the present day and future air quality estimates. These modeling assumptions and this real-time approach to air quality modeling results in emission values that are considered appropriate for the SIP process. In fact, this air quality modeling approach is required by EPA for evaluating Transportation Plans, Transportation Improvement Programs, and projects for SIPs and NEPA documents.

3.4 Consistency with the SIP

The Green Line Extension Project is a requirement of the SIP[3] and fulfills a longstanding commitment of the Central Artery/Tunnel Project to increase use of public transit. The Massachusetts Air Pollution Control Regulations (310 CMR 7.36), which implement the SIP, require that the MassDOT complete the Project by December 31, 2014.

The Massachusetts Transit System Improvements (MTSI) regulations (310 CMR 7.36) became effective in December of 1991 and were incorporated into

2 2008 Federal Register (59 FR 50495--50498). *SIP Approved Projects Plus Ten Percent Package*, October 4, 1994.

3 The SIP includes a list of transportation projects funded by the FHWA or FTA, which are consistent with the Statewide Long Range Transportation Plan and the Massachusetts Transportation Improvement Program that are needed to meet the NAAQS.

the Massachusetts SIP in October of 1994.[4] This regulation specified transit system improvement projects deemed necessary to mitigate the air quality impacts of the Central Artery/Tunnel Project. While a number of the projects included in the MTSI regulations have been completed, several others (i.e., Green Line Arborway Restoration; Blue Line Connection from Bowdoin Station to the Red Line at Charles Station; and Green Line Extension to Ball Square/Tufts University) have been delayed. With this in mind, MassDOT and the MassDEP have continued to address project implementation delays within the 2000 Administrative Consent Order and subsequent amendments in 2002 and 2005.

The MTSI anticipated and allows for the substitution of projects included in the original regulation and the approved SIP. In 2005, MassDOT initiated the process for the substitution of the original SIP projects with a new package of projects, including an extension of the Green Line to Medford Hillside with a spur to Union Square, improvements to the Fairmount Line, and the construction of 1,000 Park and Ride parking spaces.

Following a public process on the proposed substitute projects, MassDOT submitted a request to MassDEP to revise the MTSI and the SIP.[5] Air quality modeling was performed for these projects and reported in the 2008 Federal Register notice demonstrating that the current package of transit improvements (Green Line Extension to College Avenue with Union Square Spur; Fairmount; and additional Parking)[6] achieves the emission reductions established by the EPA of the prior *SIP Approved Projects Package Plus Ten Percent*.

Table 3-1 Comparison of Air Quality Benefits in the Year 2025

	Daily Emissions Benefits in Kilograms (kg)		
	Carbon Monoxide (CO)	Nitrogen Oxides (NOx)	Volatile Organic Compounds (VOCs)
SIP Approved Projects Plus Ten Percent Package (2008 FR)	321.2	8.8	12.1
2008 Replacement/Substitution Package: Green Line Extension to Medford Hillside with Union Square Spur; Fairmount; Parking	435	11	17
Current Replacement/Substitution Package: Green Line Extension to College Avenue with Union Square Spur; Fairmount; Parking	520	9.5	16

Sources: 2008 Federal Register (59 FR 50495--50498).*SIP Approved Projects Plus Ten Percent Package*, October 4, 1994; Central Transportation Planning Staff/MassDOT, 2009, State Implementation Plan Evaluation.

4 Federal Register (59 FR 50495--50498), dated October 4, 1994.
5 The Massachusetts Department of Protection adopted revisions to 310 CMR 7.36 on December 1, 2006 and submitted SIP revisions to EPA.
6 Central Transportation Planning Staff (at the request of MassDOT), 2009, *State Implementation Plan Evaluation.*

In 2009, at the request of MassDOT, CTPS conducted an updated air quality analysis of the currently-proposed Green Line Extension to College Avenue with Union Square Spur in combination with the proposed Fairmount Line improvements and additional MBTA parking, as required by 310 CMR 7.36(2). The results of this air quality analysis demonstrated that the emission reductions of carbon monoxide (CO), oxides of nitrogen (NOx) and volatile organic compounds (VOCs) are greater than the *SIP Approved Projects Plus Ten Percent Package* presented in the 2008 Federal Register notice.[7] These results are presented in Table 3-1. The MassDEP reviewed this air quality analysis and stated in their January 8, 2010 DEIR/EA comment letter that the Green Line Extension Project meets the emission reductions for 310 CMR 7.36 (8) *Determination of Air Quality Emission Reductions*, which are the requirements of the SIP.

7 2008 Federal Register (59 FR 50495-50498). *SIP Approved Projects Plus Ten Percent Package*, October 4, 1994, Table 1 - EOT Air Quality Analysis Comparison of Project Packages Benefits in the Year 2025.

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College Avenue Station

4.1 Introduction

College Avenue Station would be the terminal station for the first phase of the Green Line Extension Project (the Proposed Project) and would be an intermediate station during the second phase of the project (the Future Full-Build Alternative). The College Avenue Station is proposed to be located at the corner of College Avenue and Boston Avenue in Somerville, which primarily serves the residential neighborhoods adjacent to the station and the Tufts University community. Figure 4-1 shows the station and the surrounding neighborhood.

The January 15, 2010 Secretary's Certificate required the MassDOT in the FEIR to clarify and confirm impacts associated with the College Avenue Station operating as a terminal station. Specific analyses and information requested by the Secretary included:

- Description of Green Line operations at the proposed terminus (i.e. train reversals, temporary train storage, movement of personnel, etc.) and how the facility has been designed to accommodate terminal station ridership demand;
- Clarification of how the College Avenue Station, functioning as a terminus, would impact traffic, parking, pedestrian, and bicycle operations within the Study Area;
- Clarification of how train operations from the Proposed Project at the College Avenue Station may impact sensitive noise and vibration receptors; and,
- Revisions to DEIR models as necessary to accurately assess the predicted function of the station, presentation of appropriate mitigation measures to offset identified negative impacts, and description of differences in mitigation measures from those proposed in the DEIR, if any.

This Chapter includes a description of the College Avenue Station as a terminal station, describes the Green Line operations in the context of the Station, explains proposed access and circulation at the Station area (traffic, pedestrian and bicycle access), and potential environmental impacts and proposed mitigation measures. This Chapter includes the information required by the Secretary's Certificate.

4.2 Station Description

The College Avenue Station is described in DEIR/EA Section 3.7, *Project Description – Preferred Alternative*, for the Proposed Project (Alternative 1). For the Proposed Project, Green Line service would terminate at College Avenue Station. Figure 4-2 shows the station and Figure 4-3 shows access to the station. Daily ridership at this station is anticipated to be 2,420 boardings (projected to the year 2030) for the Proposed Project. In order to meet accessibility requirements and taking into consideration the eight percent grade along the College Avenue bridge, the station provides two points of access. One access point would be provided from the east side of the College Avenue bridge; the second access point would be provided from the west side along Boston Avenue. A sidewalk would be maintained along the College Avenue bridge for regular pedestrian access.

Vehicular drop-off/pick-up is currently planned along the northbound side of Boston Avenue, in the area where parking does not currently exist. Bicycle parking would also be provided at the station. Local MBTA Bus Routes 80, 94, and 96 would continue to provide service within close proximity of the station with existing bus stops located on College and Boston Avenues, as indicated on the figures.

With College Avenue Station as the terminus, an extension of tracks, known as tail tracks, would be constructed approximately 600 feet beyond the end of the proposed platform. A crossover (a special device allowing a train to move from one track to another) would be located approximately 300 feet beyond the end of the proposed platform. These tracks and the crossover would be required north of the station for short-term storage of vehicles for morning start-up of service (approximately one hour) and for operational flexibility (i.e., reverse direction and provide temporary storage for disabled trains). This track area would be open-air, therefore no additional structures are proposed.

The tail tracks and double crossover north of the proposed College Avenue Station platform would allow revenue trains to drop off passengers on the outbound side of the platform and then continue north out of the station. The crossover would enable the train to switch to the inbound track, reverse direction and then pull into the station on the inbound track and allow inbound passengers to board and then continue to Ball Square Station. Before revenue

service in the morning, up to four train sets may be dispatched to College Avenue and allowed to dwell north of the platform until each train is allowed to start service. MBTA train crews would start each day taking the trains from the Green Line maintenance and storage facility to College Avenue Station before the start of revenue service (approximately 5 AM). Similarly, at the end of each day trains would come out of service at the terminus and return to a storage facility after revenue service has ended (approximately 1 AM). Trains would not be stored overnight at the station and MBTA crews would not start or end their shift at this station.

4.3 Access and Circulation

This section discusses access and circulation in the vicinity of College Avenue Station. This analysis, documented in DEIR Section 5.5, *Traffic*, is provided to summarize College Avenue Station as a terminal station. No changes to the traffic model or analysis have occurred since the DEIR/EA was published.

Based on projected ridership, approximately 800 boardings are anticipated at College Avenue Station during peak hour operations under the Proposed Project. Approximately 40 riders are expected to access the College Avenue Station by vehicular drop-off/pick-up and approximately 40 riders are expected to access the station by bicycle. At a minimum, 40 bicycle parking spaces would be provided, based on the bicycle demand estimates. The remaining riders are assumed to access the station by walking or bus transfers. Traffic volume and pedestrian networks in the Medford Study Area intersections are presented in FEIR Figures 4-4a-b and 4-5a-b.

The information presented in the DEIR/EA for the Proposed Project, as well as the information presented in this chapter, assumes that the Green Line service would terminate at College Avenue Station. The ridership model was run separately for various alternatives both with and without Mystic Valley Parkway/Route 16 Station. When College Avenue is the terminal station, there will be approximately 320 additional boardings per day at this station. This translates into approximately 100 additional boardings at College Avenue per peak hour. The majority of additional trips (about 90 percent) are expected to be pedestrian trips. The balance is expected to arrive via bus, bicycle and drop-off/pick-up. The proposed College Avenue Station layout, as presented in the DEIR/EA, was designed to adequately accommodate the additional daily boardings.

As discussed in the DEIR/EA, the CTPS used its regional travel demand model to provide the traffic forecasts for this study. Future Build model runs for each DEIR/EA alternative were prepared separately by including the extended Green Line as a mode choice and quantifying the number of vehicle trips expected to

change mode from passenger car to transit service. Using the Build alternative model runs, peak hour turning movement volumes were developed for each alternative for a 2030 design year.

Vehicular drop-off/pick-up trips are assigned to each station based on the expected total boardings of that station. A survey completed by CTPS in 2007 indicates that approximately three to seven percent of daily boardings within the urban core originate from drop-offs. An average of five percent, or 120 total trips, was used for the purposes of this analysis. It is assumed that all of the drop-off/pick-up trips would occur during the morning and evening peak periods, with about 67 percent occurring during the morning and evening peak hour (40 trips per peak hour).

The Proposed Project has a measurable effect on both regional and local traffic volumes along Study Area roadways. Local traffic along Boston Avenue decreases under the Proposed Project due to a shift in travel mode from private automobile to transit, creating additional capacity at Study Area intersections. However, since many of the Study Area roadways also provide regional connections, the model results show that the capacity created on the roadway would be largely backfilled by regional traffic volume. It is important to note that the additional vehicles are *shifting* from local roadways through these communities where they do not belong (i.e. cut-through traffic) to the regional system. Therefore, while a large improvement in traffic operations is not seen on Study Area roadways, there are many other roadways outside the Study Area where this benefit would be realized.

Since the release of the DEIR/EA, a few stakeholders raised concerns that the proposed College Avenue Station, serving as a terminal station for the Proposed Project, would not adequately serve the Medford Hillside neighborhood, which was identified as part of the SIP description. To address and resolve these concerns, CTPS prepared a memorandum that demonstrates that the College Avenue Station location does adequately serve the walk market area for the Medford Hillside neighborhood. This memorandum is provided in Appendix C of this FEIR.

4.3.1 Traffic Operations

Intersections that degrade in level of service as a direct result of the Green Line Extension Project and more specifically as related to activity at the College Avenue Station are shown in Table 4-1. Changes in vehicular levels of service are attributable to both pedestrian signal timing changes and vehicular traffic related to drop-off/pick-up activity. Since the traffic modeling efforts in the DEIR/EA specifically evaluated the College Avenue Station as a terminal station, no new

mitigation is proposed beyond what was presented in the DEIR/EA. Mitigation to offset the adverse impacts is presented in Section 4.6, *Mitigation Measures*.

Table 4-1 College Avenue Station 2030 Build Signalized LOS Summary Comparison

	No-Build Morning Peak Hour			No-Build Evening Peak Hour			Proposed Project Morning Peak Hour			Proposed Project Evening Peak Hour		
Signalized Intersection	V/C [1]	Delay [2]	LOS [3]	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
Boston Avenue at Winthrop Street	1.10	65	E	1.09	75	E	1.09	69	E	1.19	91	F
Boston Avenue at College Avenue	0.98	71	E	0.94	60	E	1.04	81	F	0.94	62	E

Note: Intersections degrading by at least one level of service are denoted in **bold**.

1 Volume to capacity ratio
2 Delay in seconds per vehicle
3 Level of Service

4.3.2 Pedestrians and Bicycles

The Proposed Project would increase pedestrian activity in the vicinity of the College Avenue Station. Traffic signal timing and phasing changes at Study Area intersections would improve the pedestrian operations by reducing the amount of time pedestrians would be required to wait for the walk signal. However, pedestrian levels of service are not expected to change. All traffic signals in the Study Area would be improved to meet current standards set by ADA and related state regulations, and to be in compliance with the most recent version of the Manual of Uniform Traffic Control Devices (MUTCD).[1]

There are six intersections in the immediate vicinity of College Avenue Station that require mitigation to address adverse impacts of the Proposed Project on pedestrians. These intersections include Boston Avenue at North Street, Winthrop Street, and Harvard Street; College Avenue at George Street; and two existing midblock crossings, Boston Avenue between Winthrop Street and College Avenue and College Avenue between Boston Street and Frederick Avenue. Mitigation includes adjustments to traffic signal timings, installing warning signage to accommodate the expected increase in pedestrian volumes, and the potential of a new signalized crossing, as discussed in FEIR Section 4.6, *Mitigation Measures*.

The Proposed Project would attract bicyclists to the College Avenue Station. As discussed above, MassDOT is committed to providing as much bicycle parking as possible at College Avenue Station.

1 Federal Highway Administration. *Manual of Uniform Traffic Control Devices*, Washington DC, 2009.

4.3.3 Automobile Parking

No new parking is proposed for College Avenue Station, even as a terminal station. Many of the parking areas near the proposed College Avenue Station already see parking violations throughout the day and the available parking supply is limited. Increased enforcement would be necessary to ensure that parking areas would be used appropriately. MassDOT will work with the City of Medford in the next phase of project development to determine the most appropriate parking enforcement program (i.e. permits, meters, etc.) related to the new station.

Also as discussed in Section 4.6, *Mitigation Measures*, a proposed improvement to the intersection of Boston Avenue at Winthrop Street would require the elimination of a portion of the parking spaces along northbound Boston Avenue.

4.3.4 Bus Transportation

No impacts to bus transportation are anticipated from the Proposed Project. The MBTA may in the future consider the relocation of bus stops to encourage the use of the bus to access the station. The benefit of this action would be further evaluated during Preliminary Engineering.

4.4 Construction Impacts

Temporary access impacts associated with the construction of the College Avenue Station include temporary displacement of parking spaces required to ensure safety and equipment access/delivery during construction. These impacts are expected to be temporary and to terminate once construction is complete. Detours associated with the reconstruction of the College Avenue bridge are also anticipated. The College Avenue bridge is expected to remain open during construction; however, temporary bridge closures are possible and would be limited in time frame and duration. Care would be taken to ensure that adjacent bridges are not closed simultaneously.

Temporary noise impacts could result from construction activities associated with utility relocation, grading, excavation, track work and installation of systems components. Such impacts may occur in residential areas and at other noise-sensitive land use located within several hundred feet of the track alignment. The potential for noise impact would be greatest at locations near pile driving operations for the College Avenue Station structure.

Construction impacts are also expected to include air emissions, dust and vibration, as discussed in the DEIR/EA, and there have been no changes to these impacts since the DEIR/EA.

4.5 Environmental Impacts

This section describes the potential noise and vibration impacts associated with the proposed College Avenue Station, as a terminal station, as required by the MEPA Certificate.

4.5.1 Noise

Extending the Green Line would add a new noise source to the environment along the proposed corridor. While there is existing noise exposure from sources such as commuter trains and automobiles, introducing an additional noise source and relocating the commuter rail lines have the potential to increase future noise at some noise-sensitive receptors. The DEIR/EA, in the analysis of Alternative 1, evaluated noise levels along the entire route of the Green Line Extension, including noise levels associated with College Avenue Station as a terminal station.

Noise impacts are the result of several elements of the Proposed Project:

- Commuter Rail operations on the track shifted to the east, closer to residences;
- Green Line operations on the new western tracks;
- Green Line trains idling on the tail tracks north of the College Avenue Station; and

  Green Line trains operating on the crossover (turnout) switch at the tail tracks.

These noise sources are minor, do not cause potential impacts and are less significant than the noise generated by the commuter trains. As an example, the three residences on Burget Avenue which are closest to the proposed tail tracks, would be exposed to noise (62.1 dBA) from stationary trains on the tail tracks, 72.3 dBA from Green Line operations, and 74.7 dBA from commuter train operations. The total future noise (cumulative noise exposure) would be 76.8 dBA. This constitutes a moderate noise impact and is due primarily to commuter train operations. Other receptors on Burget Avenue would be exposed to even lower noise levels from sources associated with College Avenue as a terminal station.

4.5.2 Vibration

Potential vibration impact from the College Avenue Station was assessed using the methods described in the DEIR/EA (Section 5.8, *Vibration*). This analysis evaluated each vibration-sensitive receptor location taking into account the distances to the future commuter line and Green Line tracks and the presence of any special trackwork (crossovers or turnouts). A crossover on the Green Line tail tracks north of College Avenue Station is the only vibration source that is associated with College Avenue being a terminal station. There would be no vibration impact from Green Line trains near College Avenue Station.

A crossover south of College Avenue Station is required regardless of whether College Avenue Station is a terminal station or an intermediate station. No changes to noise and vibration impacts or proposed mitigation have occurred at this crossover location since the DEIR/EA.

Potential vibration impact prior to mitigation has been identified for residential receptors at Brookings Street due to the shifting of the commuter tracks beyond the College Avenue terminus station. Future vibration levels from the commuter trains would be 75 VdB (an increase from the existing 69 VdB). Since the commuter tracks would be shifted a similar distance closer to these receptors, whether or not College Avenue is a terminal, future vibration levels would be the same.

4.6 Mitigation Measures

This section presents a summary of the proposed mitigation options identified in the DEIR/EA to address adverse environmental impacts associated with construction and operation of the proposed College Avenue Station as the terminus of the Proposed Project. Potential permanent impacts resulting from constructing the station would be mitigated to the extent feasible, as summarized in Table 4-2.

4.6.1 Traffic Mitigation

Specific to College Avenue Station, two intersections require physical improvements to mitigate adverse impacts caused by project-related traffic: Boston Avenue at Winthrop Street and Boston Avenue at College Avenue. Impacts at Boston Avenue and Winthrop Street would be mitigated by restriping the Boston Avenue northbound approach (currently a single lane approach) to provide an exclusive left-turn lane and a shared through/right-turn lane. Signal timing and phasing changes would also be implemented. Approximately 12 parking spaces along Boston Avenue would be removed for this

improvement. It is anticipated that the level of service would improve at this intersection from LOS F to LOS D during the evening peak hour as a result of this mitigation.

Impacts to Boston Avenue at College Avenue would be mitigated by widening College Avenue westbound to provide an exclusive right-turn lane and a shared left-turn/through lane. Signal timing and phasing changes at this location would also be incorporated. To accommodate this improvement, the College Avenue bridge over the railroad tracks would be widened. Since the bridge is already slated for reconstruction as part of the Project, changes can be made without additional construction impacts. It is anticipated that level of service would improve at this intersection from LOS F to LOS D during the critical evening peak hour with this mitigation.

As shown in Table 4-2, pedestrian mitigation is proposed at six intersections surrounding College Avenue Station. This mitigation ranges from restriping crosswalk markings and increasing pedestrian crossing times to installing pedestrian crossing signals and ADA compliant wheelchair ramps.

4.6.2 Noise Mitigation

Noise mitigation is considered based on the need, feasibility, reasonableness and effectiveness of potential options. The FTA states that in considering potential noise impact, severe impacts should be mitigated if at all feasible. At the moderate impact level, more discretion should be used, and other project-specific factors should be included in considering mitigation. These factors include the predicted increase over existing noise levels, the types and number of noise-sensitive land uses affected, existing outdoor-to-indoor sound reduction, and the effectiveness of mitigation options and the cost-effectiveness of mitigating the noise. However, the FTA also states that there is a stronger need for mitigation if a project is proposed in an area currently experiencing high noise levels (Ldn above 65 dBA) from surface transportation sources. This is clearly the case at sensitive receptors adjacent to the College Avenue Station where existing Ldn levels range between 70 to 79 dBA. In view of this guidance by the FTA, the Project would mitigate both moderate and severe noise impacts wherever feasible and wherever existing noise levels are above 65 dBA. Noise impacts will also be mitigated for receptors with no significant outdoor land use if interior day-night sound levels (Ldn) are above 45 dBA from project sources or single-event maximum noise levels (Lmax) above 65 dBA.

To mitigate noise impact from train operations, noise control can be considered at the source, along the sound path, or at the receiver. Source noise control options, for example, may include special insulating hardware at turnout

locations,[2] relocating special trackwork away from sensitive areas and using continuous welded rail. Noise barrier construction is the most common sound path noise control treatment, which is being considered for the track alignment, as described in the DEIR/EA. It can be very effective at reducing noise levels in the community.

A noise barrier 1,000 feet long, approximately six feet in height on a retaining wall along the right-of-way would be effective in mitigating potential noise impact at receptors on Burget Avenue and Brookings Street. This noise barrier is required whether or not College Avenue is a terminal station. Future noise levels from both commuter and Green Line trains are expected to be reduced nine to 11 decibels with this barrier and future noise levels are expected to be lower than existing levels. Figure 4-6 shows the location of the proposed noise barrier.

4.6.3 Vibration Mitigation

The purpose of vibration mitigation is to minimize adverse effects from a project at sensitive locations. While the consideration of noise mitigation is well-defined, there is more variability in the approach to vibration mitigation and the specific measures that may be considered. The goal for mitigating potential vibration impact from the proposed Green Line Extension Project is to reduce future vibration below the impact criteria, which is 72 VdB for Green Line trains and 75 VdB for commuter trains. At some locations, close to the existing commuter trains, future vibration levels may not be able to be reduced below the impact criterion with reasonable mitigation measures. As stated in the DEIR/EA, these locations were identified as locations with potential residual impacts, however, additional measurements will be conducted in the next phase of Project development and mitigation measures could be refined. At these locations, mitigation measures that will reduce vibration levels 5 decibels or more will be considered reasonable and effective with the intention of keeping future vibration levels at or below existing vibration levels.

The effectiveness of specific vibration mitigation measures is dependent on several factors such as the component design, installation techniques, axle loads of the trains and frequencies of concern. Resilient rail fasteners, which are specially-designed fasteners between the rails and the ties, may reduce vibration by 5 to 10 VdB. Ballast mats may be effective in reducing vibration levels 10 to 15 VdB.

Generally, well-designed and properly-installed ballast mats or resilient rail fasteners would be effective in reducing vibration levels up to 15 VdB for the Green Line trains and up to 10 VdB for commuter trains, keeping future vibration levels generated from commuter trains at or below existing levels and

2 A turnout is a mechanical device that enables a train to switch from one track to another.

reducing vibration levels generated from Green Line trains below the impact criterion. Vibration mitigation generally performs better for light rail vehicles because they do not weigh as much as commuter trains.

Figure 4-7 shows the vibration mitigation location near College Avenue Station. A total of 250 feet (500 track-feet) of vibration mitigation (location #17) is proposed to mitigate potential impacts at receptors on Brookings Street. This mitigation is required whether or not College Avenue is a terminal station.

4.6.4 Visual Impact Mitigation

The Project would incorporate vegetation in and above fences, trees, and steep slopes on each side of the right-of-way at the College Avenue Station site to minimize the rail corridor's visibility. These would reduce the net loss of vegetation and reduce the visual impact of any tree removal on the neighborhood. The retaining wall design, including any vegetated features, would be developed in the final design for the Proposed Project.

The major materials used in the College Avenue Station structure would be masonry, steel and glass. Landscaping would be designed to provide protection from the elements without obscuring visibility. Landscaping would be inviting both to the users of the stations and to the passers-by, using small trees and low shrubs, which are easily maintained. The new College Avenue Station would be visible from their street access points and from nearby bridges.

The Proposed Project would require some degree of noise mitigation, as described above, such as noise barriers to protect sensitive receptors such as residences from increases in train noise. Noise barriers would reduce the visibility of the green space surrounding the right-of-way and it would also prevent any further visual impacts by obscuring the trains and rails that would otherwise be visible from residential back yards.

There have been no changes to the visual impact mitigation since the DEIR/EA.

4.6.5 Summary of Mitigation Commitments

This section summarizes the proposed mitigation options identified in the DEIR/EA to address adverse environmental impacts associated with construction and operation of the proposed College Avenue Station as the terminus of the Proposed Project.

Potential permanent impacts resulting from constructing the station would be mitigated to the extent feasible, as summarized in Table 4-2. MassDOT would be

responsible for ensuring that all mitigation commitments are implemented. There have been no changes to the impacts analysis or mitigation commitments since the DEIR/EA, but are summarized in Table 4-2.

Temporary, short-term impacts from construction activities would be mitigated to the extent feasible. Appropriate construction mitigation measures would be incorporated into the contract documents and specifications governing the activities of contractors and subcontractors constructing elements of the Proposed Project. On-site resident engineers and inspectors would monitor all construction activities to ensure that mitigation measures are properly implemented. Construction mitigation measures for the Proposed Project are summarized in DEIR/EA Table 6-2.

Table 4-2 College Avenue Station Mitigation Commitments

Environmental Categories	Mitigation Measure	Implementation Schedule
Traffic	Reconstruct the northbound Boston Avenue approach at the intersection of Boston Avenue at Winthrop Street to provide an exclusive left turn lane and a shared right-turn/through lane.	Completion of construction
	Reconstruct the westbound College Avenue approach to provide an exclusive right-turn lane and shared left-turn/through lane.	Completion of construction
	Upgrade pedestrian signal heads and provide increased pedestrian crossing time at the intersection of Boston Avenue at North Street.	Completion of construction
	Restripe crosswalk markings at the intersections of Boston Avenue/Winthrop Street and Boston Avenue/Harvard Street.	Completion of construction
	Install warning signage at the existing Boston Avenue midblock crossing between Winthrop Street and College Avenue.	Completion of construction
	Conduct a signal warrant analysis and, if warranted, install a pedestrian signal on College Avenue between Boston Avenue and Frederick Avenue.	Completion of construction
	Restripe crosswalk markings and install wheelchair ramps at the intersection of College Avenue at George Street.	Completion of construction
	Work with cities to develop station area parking enforcement plans.	Completion of construction
Noise	Provide noise mitigation in the form of sound insulation, special hardware at turnout locations, and/or rail lubrication to mitigate all moderate and severe noise impacts (see Figure 4-6 and Table 8-2).	Completion of construction
	Provide noise mitigation in the form of noise barriers on the east side of the College Avenue Station to mitigate noise impacts.	Completion of construction
	Install continuously welded rail for light rail tracks.	Completion of construction
Vibration	Provide vibration mitigation in the form of ballast mats and specially-engineered trackwork to mitigate vibration impacts (see Figure 4-7 and Tables 8-3 and 8-4).	Completion of construction
Water Quality/ Stormwater	Include maintenance and monitoring of stormwater management measures at the Station in the Proposed Project SWPPP. Include a detailed outline of inspection and cleaning schedules for stormwater management practices.	Completion of construction
	Implement all aspects of the SWPPP including recommendations in annual updates based on new or improved procedures or changes to operations.	Completion of construction
Visual	Provide vegetation on and/or above retaining walls to minimize visual changes.	Completion of construction
	Design station landscaping to provide protection from the elements without obscuring visibility.	
	Work with affected communities on design of noise barriers and vegetated walls.	Prior to construction

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5 Lechmere Station

5.1 Introduction

Since the filing of the EENF for the Green Line Extension, the Project Area was expanded to include the relocation of Lechmere Station. The relocation of Lechmere Station to the eastern side of Monsignor O'Brien Highway/Route 28 and associated roadway and busway improvements had previously been intended to be constructed as part of the NorthPoint development project. However, due to the uncertainty surrounding the NorthPoint project and because it is necessary to relocate the station in order to extend the Green Line, the Commonwealth added the relocation of Lechmere Station and area roadway improvements into the Green Line Extension Project during the development of the DEIR.

Relocating Lechmere Station was previously reviewed under MEPA as part of the NorthPoint development project (EEA # 12651), but was not reviewed under NEPA. The DEIR/EA included an evaluation of relocating Lechmere Station to the location and in the same alignment and configuration that was previously reviewed under MEPA. The DEIR/EA evaluation included the need to relocate the station, alternatives evaluated, and the environmental consequences of moving the station.

This chapter addresses the requirements of the January 15, 2010 Secretary's Certificate on the DEIR, which include:

- Reduce the proposed parking program (in light of the station no longer functioning as a terminus);
- Consider other design refinements to reduce impacts of the relocated Lechmere Station on abutting land uses (notably the Glass Factory Condominiums);
- Clarify modeling assumptions and proposed station layout and mitigation measures that would be implemented to effectively and safely convey bus

passengers, pedestrians and cyclists from the neighborhood to the relocated Lechmere Station; and

- Explore ways to improve integration of the Lechmere Station into the surrounding neighborhood.

To respond to these issues, and respond to comments on the DEIR/EA, this chapter presents the following information:

- A revised layout of the Lechmere Station, including an analysis of design alternatives that were evaluated in an attempt to minimize impacts to nearby properties, and design modifications considered to improve integration with the existing and proposed residential developments;
- A revised analysis of access and circulation, including bus, pedestrian, and bicycle access; and
- An updated analysis of the environmental impacts and mitigation measures based on the revised station concepts.

5.2 Revised Station Layout

Lechmere Station, located in East Cambridge, is currently the existing terminus of the Green Line on the northern end of the MBTA's system. The Green Line Extension Project would extend transit service from relocated Lechmere Station to Medford Hillside along the MBTA Lowell Line, with a branch line from relocated Lechmere Station to Union Square via the MBTA Fitchburg Line. The new elevated Lechmere Station would be relocated to the east side of O'Brien Highway with a new and realigned viaduct. Daily ridership at this station is anticipated to be approximately 10,900 boardings (projected to the year 2030).

The Lechmere Station layout shown in the DEIR was based upon the original NorthPoint development project concept for relocated Lechmere Station. Based on comments received on the DEIR and on the requirements of the Secretary's Certificate, the station design was revisited to evaluate opportunities to address concerns related to parking, access from the neighborhoods, pedestrian and bicycle safety, MBTA operations (both bus and Green Line), and impact on abutters.

Working closely with the MBTA, the City of Cambridge, and reviewing feedback from local interest groups and residents, a redesigned Lechmere Station has been developed that achieves many of the desired goals including reducing parking at the station, separating bus operations from vehicular and pedestrian movements, providing an improved station layout with access from two sides, accommodating requests for a wider crosswalk across O'Brien Highway, and providing dedicated bicycle lanes within the station area. Figure 5-1 shows the

revised station layout and the surrounding neighborhood. Figure 5-2 shows the revised station plan itself in detail, and Figure 5-3 shows routes of access for the station.

5.2.1 Refinements to Concept Design since the DEIR/EA

Modifications made to the Lechmere Station layout since the DEIR include:

- The proposed parking program has been reduced from approximately 234 parking spaces (as shown in the DEIR/EA) to approximately 180 parking spaces. These parking spaces would be provided in two separate parking lots and would replace some of the 347 parking spaces that exist today at Lechmere Station. It is anticipated that the remainder of the parking spaces that exist today will be replaced in the future within the NorthPoint project, as previously envisioned.
- The roadway improvements along O'Brien Highway proposed by the NorthPoint project and shown in the DEIR are still anticipated in the revised station layout. However, slight modifications to the roadways in this station layout include:
  - An exclusive busway with one-way circulation to accommodate local bus service, including MBTA Bus Routes 69, 80, 87, and 88, with access and egress from O'Brien Highway via Water Street.
  - Bus layover would be located further away from the Glass Factory Condominiums.
  - An access road would be provided to connect Water Street, North First Street, and East Street allowing vehicular access through the station limits.
  - Vehicular access to the north parking lot would be provided via Water Street and the one-way southbound segment of the station access road.
  - Vehicular access would be provided to the south parking lot via East Street with connections from Water Street and North First Street.
  - Curbside drop-offs for taxis, corporate shuttles, and station patrons would be provided at the station along the access road and also along new North First Street.
  - Bicycle lanes have been included along the access road so that bicycles can directly access the station and in order to make a continuous connection between the proposed 22 Water Street multiuse path on the north and the recently constructed NorthPoint path on the south.

- Pedestrian access would be provided by a wider (15 feet wide) crosswalk across O'Brien Highway/Route 28.

- The station layout has been redesigned to address many of the comments received by the public. While final station design will be explored further in the next phase of project development and in conjunction with the public involvement program, the following design elements at the station have been modified:
  - Access into the station headhouse from both the north and south sides of the building structure has been added. This would allow direct access to the station from the bus drop-off/pick-up area on the north and from the intersection of O'Brien Highway and North First Street on the south.
  - The automatic fare collection and other station amenities will be fully enclosed within the station headhouse and protected from the elements.
  - The revised station design proposes a canopy system starting along the perimeter of the headhouse, underneath the elevated structure, and extending to the northeast corner of the O'Brien Highway/ North First Street intersection. The canopy system would establish an architectural presence on O'Brien Highway and which would increase station visibility. This architectural feature is proposed originating at the station and running along North First Street to better define the station entry and direct users from O'Brien Highway to the station area.
  - Because the station will no longer function as a terminal station, the proposed center island platform length was reduced from 450 feet long to 225 feet long, which can adequately accommodate a typical three-car Green Line trainset (rather than two trainsets, as required in the terminal station layout). The platforms will continue to be accessed using elevators, escalators, and stairs.
  - Bicycle racks would continue to be provided to encourage use of this mode.
  - Once the relocation is complete, the existing Lechmere Station would be demolished and the existing station site would be made available for potential future redevelopment, including the potential inclusion of a public or community use.

In the next stages of the project, the visual identity of the station will be further explored and final design will be advanced. The station identity will be shaped by the design of platform and station elements (i.e. canopy, elevators, side walls, etc.). Visual qualities will be investigated that integrate station elements and Green Line infrastructure. Design elements will have to be balanced with

potential neighborhood impacts (such as those associated with extensive glass surfaces, including noise and light impacts). Additional aspects of the station that influence its appearance and will be evaluated in more detail are providing security, visibility, and noise mitigation.

5.2.2 Other Alternatives Considered

A number of station layouts were considered in an effort to attempt to shift the station and tracks further away from the Glass Factory Condominiums and/or improve the functionality of the station. Scenarios included shifting the tracks, relocating the headhouse to the south side of the station site, and providing two separate headhouses. A summary of this analysis follows.

- The track alignment through the station site is constrained on the south side by the Archstone development parcel at East Street and on the north side by the MBTA right-of-way between the Hampton Inn Hotel and the 22 Water Street development site. The MBTA's property around the station site is also constrained by its non-linear configuration, resulting in design challenges when trying to accommodate all of the station uses. Modifications intended to push the elevated track structure further to the east away from the Glass Factory Condominiums would require the use of curves that could impact train operations and could create additional noise impacts. Additionally, shifting the tracks from the current alignment would have a significant impact on the permitted NorthPoint development plans for this area. Based on potential noise impacts and feedback received from the MBTA and the City of Cambridge, it was determined that the track alignment would remain as proposed in the DEIR/EA.
- Two additional headhouse options were evaluated as part of the FEIR analysis. Headhouse alternatives were explored in response to stakeholder comments requesting MassDOT to consider the potential of a second station entrance for those MBTA customers accessing the station from other locations. The first option included a single headhouse location on the southern side of North First Street. The second option included two headhouses on the north and south side, respectively, of North First Street. Each option demonstrated some advantages and disadvantages compared to the DEIR/EA Lechmere Station conceptual design.
    - Single headhouse, South of North First Street - Under the single headhouse option, the main station entrance would be relocated to the southern portion of the MBTA parcel. This would move the building structure further away from the Glass Factory Condominiums, reducing potential impacts to abutting land uses. The single headhouse would also provide increased visibility from O'Brien Highway. However, a single headhouse at this location

would have a significant impact on the bus operations through the site. Since buses would still need to access the site via Water Street, buses could then operate as proposed, creating a significant distance between the bus berths and the station entrance and creating additional pedestrian/vehicle conflicts with bus transfers crossing North First Street to access the station. Another option that was evaluated was to provide a bus berthing/layover area on the south side of the site, between North First Street and East Street. This location presented many challenges for buses in terms of limited space, traffic operations and bus functionality. Additionally, the use of this parcel for the station and bus operations is not consistent with the permitted NorthPoint development plan.

- Two Headhouses, South and North of North First Street: The two headhouse option, with one on the north and one on the south side of North First Street, incorporates advantages found in the single headhouse option. The two entrances would provide equal opportunity for station access to all people, whether they walk from current and future land uses around the station, or use bus, car or bike to come to the Green Line. However, a second entrance would further reduce the MBTA's parking, for which there is significant demonstrated demand; require additional circulation and fare collection areas; and increase capital and operating costs with little additional benefit for the project. Additionally, the use of this parcel for the station's second headhouse is not consistent with the permitted NorthPoint development plan.

The evaluation of various station layout alternatives concluded in support of the DEIR/EA's single headhouse north of North First Street, as this location is compatible with the MBTA's bus operation needs, provides functionality and reasonable access to the surrounding areas for passengers arriving from a variety of modes, provides a fully accessible station in a cost-effective manner, and is consistent with the permitted NorthPoint development plan.

5.3 Access and Circulation

This section discusses refined access and circulation in the vicinity of relocated Lechmere Station based on the revised station layout present in this FEIR. Approximately 3,200 boardings are anticipated during the peak hour at the station by 2030. Because approximately 90 percent of the passengers using this station are expected to walk or bike to reach the station, pedestrian/bicycle circulation is critical to the success of the station. This section reevaluates the assumptions presented previously the DEIR and updates the analysis for traffic operations, pedestrian and bicycle access and parking needs based on the

modified station layout plan developed for the DEIR. Traffic volume and pedestrian networks in the Cambridge Study Area intersections are presented in FEIR Figures 5-5a-b and 5-6a-b.

5.3.1 General Station Access

Station surface-level connectivity to other modes of transportation is provided in the following ways:

- Four berths allow passengers to alight or board MBTA buses;
- Twelve to fifteen curbside drop-off/pick-up spaces for passengers carpooling to the station (kiss-and-ride), taxis and corporate shuttles;
- Two separate parking lots, one to the north and another to the south, accommodating 65 and 115 parking spaces, respectively, for a total of 180 spaces;
- Two major pedestrian connections with East Cambridge through the Water Street and First Street crossings of O'Brien Highway; and
- Several dedicated bicycle lanes integrated into the broader vehicular network and connected to a bike storage area adjacent to the headhouse.

As directed in the Secretary's Certificate, buses will be prohibited from idling in the bus layover and boarding area.

The proposed single headhouse on the north side of North First Street includes two entrances. One entrance services the bus passengers, a kiss-and-ride area and those pedestrians who are coming from the north. The other entrance services pedestrians coming from the west and south, another kiss-and-ride area along North First Street, and those who have parked in the two parking lots. The headhouse includes passenger circulation elements that are commonly found in MBTA Green Line stations, including:

- Enclosed unpaid areas for waiting and for purchasing of tickets;
- Automatic Fare Collection;
- A lobby area in the paid zone;
- An escalator and a stair connecting the lobby to the platform; and
- Two elevators.

Passengers would arrive from the surface street level at the northern end of a center island platform. The platform would be constructed 24 feet above street level and wide enough to safely accommodate inbound and outbound passengers. For passengers awaiting the train, a canopy as wide and as long as the platform would provide weather protection. At the south end of the center

platform, a second egress structure would allow passengers to exit the platform and reach the surface level in the case of an emergency.

The relocated Lechmere Station concept is consistent with design standards for roadways and for the station as defined by the local agencies including, but not limited to, MassDOT and the City of Cambridge. The station has been designed to be fully accessible, consistent with the ADA. The redesign of Lechmere Station with an exclusive busway will minimize conflicts with buses and vehicles in the station area and will provide a direct connection from the bus berthing area to the station, minimizing potential conflicts with bus riders and vehicles.

Careful attention has also been paid to minimizing conflicts with pedestrians and vehicles within the station area. The use of crosswalks and channelization techniques such as fencing will direct pedestrians to primary paths of travel. Specifically, the use of fencing along the western edge of the north parking lot will discourage pedestrians from walking directly into the access road, while fencing along the edge of the Glass Factory Condominiums property will discourage trespassing on private property. The use of pedestrian signals at primary station access points will also provide better pedestrian access at the roadways. A 15-foot wide crosswalk is now being provided on the north side of the intersection of O'Brien Highway and North First Street as a direct result of preferences articulated by the public. Finally, exclusive bicycle lanes are being provided in and around the station site for ease of access for bicycle commuters. Additional safety and design features can be considered as the station design moves into Preliminary Engineering.

5.3.2 Traffic Operations

This section discusses the consistency of the proposed station refinements for the relocated Lechmere Station with the area traffic operations. This section also discusses how traffic in the vicinity of the relocated Lechmere Station would operate in year 2030 under two different scenarios:

- The "Interim Condition," a scenario in which the Green Line Extension Project and other area development projects (i.e. 22 Water Street) are completed, but does not include the construction of the full NorthPoint development project and its associated internal roadway/busway improvements.

- The "Future Build Condition," which includes the final construction and implementation of the full NorthPoint development program.

The purpose of the evaluation of these two scenarios is to detail the impacts that the internal roadway system and busway will have on the O'Brien Highway corridor, during both the short (no additional NorthPoint construction) and long term (NorthPoint fully built).

Consistency with NorthPoint

The NorthPoint project includes proposals to construct of a number of mixed-use buildings and internal circulation roadways to be built on private property not currently owned by the MBTA or MassDOT. Because NorthPoint does not have a definitive schedule for construction, MassDOT has proposed a station layout that would include all of the Lechmere Station elements – including circulation roadways, station, parking and bus berthing/layover – all within the property limits owned by the MBTA.

To the extent feasible, the station layout includes the proposed roadway improvements along O'Brien Highway and within the station area. However, once NorthPoint is constructed, the station's internal circulation roadways would be modified, where appropriate, to match the roadway layout delineated as part of the City of Cambridge's special permit for the NorthPoint project. Modification to the portions of the busway, the north-south internal circulation road, and parking areas will be necessary to accommodate the NorthPoint development. However, the relocation of Lechmere Station as proposed for the Green Line Extension Project would not preclude the NorthPoint buildings or roadways from being constructed as permitted.

Since there are some differences in traffic circulation at the station with and without NorthPoint, this traffic analysis considers both future conditions as they relate to the Green Line Extension Project. However, it should be noted that the reconstruction of O'Brien Highway from Third Street to East Street is anticipated to be completed as part of the Green Line Extension Project prior to the opening of relocated Lechmere Station. General travel patterns from the East Cambridge neighborhood and access to the station headhouse would not change with NorthPoint completion and there would be no change in pedestrian or bicycle access. Therefore, only the difference in traffic operations and associated pedestrian crossings are discussed under the Interim Conditions.

Interim Conditions

The key difference in traffic circulation between the time the station is constructed and the time NorthPoint is fully constructed is access to and from the station at Water Street. Mitigation plans for this intersection, in both the Interim and Future Build Conditions, include breaking the median along O'Brien

Highway and signalizing the intersection to permit a left turn into Water Street from southbound O'Brien Highway.

Under the Interim Condition, to accommodate bus operations – specifically the Route 69 bus that operates via Cambridge Street – a left-turn movement out of Water Street would be permitted. The circulation road for the park-and-ride traffic associated with Lechmere Station between Water Street and North First Street is a one-way street. Therefore, none of the patrons parking at the station would egress from Water Street. However buses, existing Water Street traffic, and traffic related to the 22 Water Street development would be permitted to turn left until such time that NorthPoint is complete.

Once the busway and internal circulation road is reconstructed as part of NorthPoint, the intersection geometry and traffic signal timing and phasing would be revised to restrict left-turns from Water Street. In the final condition, no left-turns would be allowed out from Water Street. This restriction is necessary to control traffic queuing along O'Brien Highway between Water Street and North First Street and also to facilitate a better pedestrian crossing of O'Brien Highway at Water Street.

Table 5-1 presents the expected 2030 traffic operations at Study Area intersections in the vicinity of Lechmere Station under the Interim Condition, compared to the No-Build Condition. Since NorthPoint is not constructed in this scenario, traffic and pedestrian volumes related to the NorthPoint development have not been included in the analysis.

Table 5-1 Interim Condition Level of Service Results

	2030 No-Build Morning Peak Hour			Interim Condition Morning Peak Hour			2030 No-Build Evening Peak Hour			Interim Condition Evening Peak Hour		
Intersection	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
O'Brien Highway at Third Street	1.15	>120	F	0.79	26	C	>1.20	>120	F	0.74	30	C
O'Brien Highway at Water Street	0.72	14	B	0.60	25	C	0.60	16	B	0.63	18	B
O'Brien Highway at North First Street	0.86	31	C	0.66	50	D	0.85	52	D	0.71	46	D
Cambridge Street at North First Street	0.72	28	C	0.70	29	C	0.81	63	E	0.77	44	D
O'Brien Highway at Charlestown Avenue	>1.20	>120	F	>1.20	>120	F	>1.20	>120	F	>1.20	>120	F

Source: Vanasse Hangen Brustlin, Inc. using Synchro 7 (Build 763) software
Note: Shaded cells denote Level-of-Service E/F conditions
1 V/C – Volume-to-capacity ratio
2 Delay – Control delay per vehicle, expressed in seconds
3 LOS – Level-of-Service

As shown in Table 5-1, assuming that all proposed area roadway improvements described in detail in the DEIR/EA and supplemented in this FEIR are made, acceptable traffic operations (LOS D or better) would occur under the Interim Condition at all locations except O'Brien Highway/Charlestown Avenue, which currently operates at LOS F and, therefore, would not be further degraded by the Green Line Extension Project.

Pedestrians at the intersection of O'Brien Highway and Water Street would be required to cross O'Brien Highway concurrently with the Water Street traffic phase. Lead pedestrian intervals, which are common throughout Cambridge, would be used to facilitate this crossing under the Interim Condition. A lead pedestrian interval allows pedestrians a few seconds to enter the crosswalk while all approaches have a red traffic signal indication, becoming visible to drivers before the light changes to green. The concurrent traffic movement (in this case the Water Street phase) then turns green so that traffic and pedestrians move together. Using the forecasted bus operations for the station and expected trip generation from the 22 Water Street development,[1] approximately 80 peak hour vehicles are expected to exit Water Street turning left; this equates to one to two vehicles per minute or two to three vehicles per traffic signal cycle. Therefore, the chance of conflict between pedestrians and vehicles is small and the majority of pedestrians would cross O'Brien Highway unimpeded.

2030 Future Build Condition

The impacts discussed in the DEIR/EA are based on the 2030 Future Build Condition, which includes the NorthPoint development, relocated Lechmere Station, and other area development plans. A revised analysis was completed as part of this FEIR to address changes in circulation and access. These results, which compare the Future Build conditions to the No-Build Condition, are shown in Table 5-2.

No major changes in levels of service are expected between the No-Build and Future Build Conditions due to the Proposed Project. As discussed in the following sections, pedestrian operations have been analyzed in more detail in response to the Secretary's comments on the DEIR/EA. Due to a slight modification in pedestrian distribution to/from the new station, traffic operations at the intersection of Cambridge Street and North First Street would degrade slightly (from LOS D to LOS E) from what was previously presented in the DEIR/EA. This is true for both the No-Build and Future Build Conditions. The analysis included the reconstruction of O'Brien Highway, as it is presented in Section 5.2, *Land Use*. No additional mitigation is proposed in the immediate vicinity of Lechmere Station.

1 Vanasse and Associates, *Transportation Impact Study for Proposed Residential Development at 22 Water Street*, November 2006.

Table 5-2 2030 Future Build Condition Level of Service Results

Intersection	2030 No-Build Morning Peak Hour			2030 Future Build Morning Peak Hour			2030 No-Build Evening Peak Hour			2030 Future Build Evening Peak Hour		
	V/C[1]	Delay[2]	LOS[3]	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
O'Brien Highway at Third Street	1.15	>120	F	0.87	67	E	>1.20	>120	F	0.89	63	E
O'Brien Highway at Water Street	0.72	14	B	0.73	19	B	0.60	16	B	0.65	18	B
O'Brien Highway at North First Street	0.86	31	C	0.90	40	D	0.85	52	D	0.89	53	D
Cambridge Street at North First Street	0.72	28	C	0.91	41	D	0.81	63	E	0.92	67	E
O'Brien Highway at Charlestown Avenue	>1.20	>120	F	>1.20	>120	F	>1.20	>120	F	>1.20	>120	F

Source: Vanasse Hangen Brustlin, Inc. using Synchro 7 (Build 763) software
Note: Shaded cells denote Level-of-Service E/F conditions
NA Not Available
1 V/C – Volume-to-capacity ratio
2 Delay – Control delay per vehicle, expressed in seconds
3 LOS – Level-of-Service

Supplemental Analysis: O'Brien Highway

At the request of commenters, an analysis was completed as part of the FEIR to determine whether the southbound side of O'Brien Highway could be reduced from three travel lanes to two from just north of Third Street to East Street. With two lanes southbound, the intersection of O'Brien Highway at North First Street is expected to operate at LOS F during the morning peak hour. Intersections at Water Street and Third Street during the morning peak hour and all three intersections during the evening peak hour would operate at overall LOS D or LOS E. During both peak hours, the southbound O'Brien Highway approach to Third Street is projected to operate at LOS E or LOS F.

The estimated queues in the southbound direction, particularly during the morning peak hour, are substantial. It is anticipated that queue spillback would have a significant effect on upstream intersections, blocking side street traffic from being able to enter the mainline traffic flow. Estimated queues at Third Street are expected to extend back to the Twin Plaza driveway. Based on projected levels of service and queuing, a reduction in the number of travel lanes is not recommended for the southbound direction. The level of service and queue results for this assessment are provided in Appendix D.

5.3.3 Pedestrians and Bicycles

The pedestrian crossings across O'Brien Highway were identified as a concern for East Cambridge residents during the DEIR/EA process. To address and resolve these concerns, a full examination of pedestrian trip patterns was completed. The 2008 Green Line passenger survey results for passengers boarding at Lechmere Station were used as a basis for this assessment. These

data are provided in Appendix D. As part of the survey, passengers were asked various questions about their trip to Lechmere Station and their point of origin. For the purposes of the pedestrian analysis, the focus was on those responding as walking to or parking at Lechmere Station.

Approximately 11 percent of passengers boarding at Lechmere Station currently either park at the station parking lot or originate on the northeast side of O'Brien Highway. These passengers cross O'Brien Highway today but would no longer need to cross in the future. The survey identifies that about 25 percent of passenger trips originate in East Cambridge, east of Second Street. These pedestrians are most likely to use the new pedestrian crossing at North First Street to access the relocated station. The remaining 64 percent of passengers originate along Cambridge Street, between Cambridge Street and O'Brien Highway, or west of Second Street. These pedestrians are most likely to use the pedestrian crossing at Water Street to assess the existing station. Some of these pedestrians may also choose to cross O'Brien Highway at Third Street.

All new crosswalks along O'Brien Highway and at Cambridge Street and First Street would be designed such that they provide pedestrian crossing times that are in compliance with the Federal Highway Administration's MUTCD, ADA (including associated state regulations) and associated state requirements. To the extent feasible, delays to pedestrians could be minimized by reducing vehicular levels of service slightly (i.e. vehicular traffic operates at a worse level of service), particularly at the intersection of O'Brien Highway and North First Street. In this case, the proposed traffic signal plans have been established to manage vehicle queuing and progression rather than vehicle delay. The operations of signalized pedestrian crossings would be further refined as part of the Preliminary Engineering process. This includes identifying the exact width and length of crosswalks and further refinements to signal timing and phasing. The crossings of O'Brien Highway would be shortened to the extent feasible and provide substantial improvement over the existing condition.

The proposed configuration, with new crossings and split phase signal operation for First Street and North First Street will increase protection for pedestrians crossing between Lechmere Station and East Cambridge. The North First Street phase will allow pedestrians to cross in the westerly crosswalk across O'Brien Highway without facing conflicting left turning vehicles. Likewise, the First Street phase will allow pedestrians to cross in the easterly crosswalk without conflicting left or right turns. This approach to pedestrian phasing allows full crossings of O'Brien Highway on both the east and west side of North First Street. Additional half-crossing phases have been included in the phasing plan. The half-crossings provide effective extensions of the pedestrian crossing phases and a higher pedestrian level of service. The provision of half-crossings to a center median is a typical, often used method of accommodating pedestrians in an urban setting. It allows for the maximum capacity utilization at an intersection while providing good pedestrian accommodation. This is

accomplished by allowing pedestrian movements to "overlap" between multiple phases. This "overlapping" has the result of effectively providing for a full crossing for the majority of pedestrian movements without having to lengthen phases unnecessarily. It also allows pedestrians to take advantage of every possible interval for crossing O'Brien Highway, while protecting pedestrians from higher volume and higher speed left-turn movements.

The proposed pedestrian overlap phasing with supplemental half-crossings is dependent upon the provision of a center median island of sufficient width to accommodate those pedestrians who do not make it across in a single movement. However, even under a design that only provides for full crossings, a median for pedestrian refuge is recommended given the high vehicle volume and occasionally high travel speeds experienced along O'Brien Highway. Regardless of the care in designing proper pedestrian signal indications and signage, some portion of the population will choose to initiate a crossing of O'Brien Highway beyond the time at which a full crossing can be made. To address the potential safety implications associated with these pedestrians, and to properly channel opposing left-turns (O'Brien Highway north to First Street), a median with a minimum width of 20 feet is recommended.

Proposed bicycle access to/from relocated Lechmere Station has been refined since the DEIR/EA. From the east side of the station, bicycle access from the south would continue to be provided via the existing bicycle path along the Charles River Basin and connection into NorthPoint. Access from the north would be via a proposed (non-MassDOT) multiuse path to Water Street. Since the DEIR/EA was published, additional bicycle lanes have been added to the internal circulation road within the station area. At Water Street, and along O'Brien Highway, the Project proposes the construction of on-street bicycle lanes. Access to/from Lechmere Station from the west side of the tracks would be via these on-street accommodations. Bicyclists entering from the north can choose to ride with roadway traffic, turning left to enter the station at Water Street or dismount and use pedestrian crosswalks at Water Street or North First Street. Bicycle parking (at a minimum of 110 spaces) would be provided near the northern entrance to the station concourse.

5.3.4 Automobile Parking

A parking demand analysis was performed to evaluate whether there is an opportunity to reduce parking at Lechmere Station with the planned extension of the Green Line through Somerville and Medford. The existing parking lot at Lechmere Station provides 347 marked parking spaces that are available for a daily parking rate of $5.50. The Lechmere Station parking lot is currently more than 95 percent full (about 330 vehicles) throughout the day, which suggests that a permanent reduction in parking supply may not be feasible. If parking demand is high, and the new Green Line service does not serve the people who currently park at Lechmere Station, a reduced parking supply could encourage drivers to

park on-street, where they can, or in area parking garages. A more detailed analysis was performed to determine whether current parkers at Lechmere Station would likely board the Green Line at other stations along the extension, thereby reducing the number of spaces needed at Lechmere.

Origin-Destination Research

A license plate survey was conducted at Lechmere Station in April 2010. The survey results were used to determine what municipalities the vehicles originated from. This information was used to estimate the number of riders who currently park at Lechmere who may change travel mode and walk to stations that would now be closer to their home, thereby reducing the number of parking spaces needed at Lechmere. With assistance from CTPS, the Registry of Motor Vehicles' database was used for this assessment.

A total of 367 license plates were recorded. Out of 336 Massachusetts plates recorded, almost 93 percent, or 312, were matched with an address. Combined with the 31 out-of-state plates, there were 343 usable results. This is virtually equal to the capacity of the lot. Table 5-3 summarizes the origins of the 343 usable plates.

Table 5-3 Lechmere Station Driver Origins

Origin	Number	Percent
Drivers from points north	194	57 %
Drivers currently living along Green Line Extension route	45	13 %
Out of state plates	31	9 %
Drivers from Boston and points South	73	21 %
Total	343	100%

Projected Parking Demand/Supply

Each of the four points of origin in Table 5-3 was analyzed to project how many drivers would likely continue to park at Lechmere Station after opening of the Green Line Extension. This demand was compared to the proposed parking supply of 180 spaces, which is the amount that can be provided prior to NorthPoint construction.

In the license plate survey, there were 194 vehicles that originated from communities north of Lechmere Station but not in the communities that would be directly served by the Green Line Extension. One can hypothesize that the drivers of these vehicles need parking to continue to use the Green Line. Since

none of the new stations along the planned extension would provide parking, drivers from communities to the north would still want to park at Lechmere.

Forty-five vehicles originated in neighborhoods along the Green Line Extension. Based on the proximity of the origin to the proposed stations, (using the methodology described in the DEIR) it was estimated that the drivers of 31 of those vehicles live close enough to a planned Green Line station to walk to it. The remaining 14 drivers would continue to drive and park at Lechmere Station or could potentially change modes and bike to a new station.

The 31 out-of-state plates were assumed to belong to regular parkers who are residents of the area but have not registered their vehicles in Massachusetts. Based on the projected diversion of vehicles registered in Massachusetts, it was assumed that the same share of vehicles registered out-of-state would change travel mode and chose one of the new Green Line stations. This would remove another four vehicles from the Lechmere Station parking area.

The behavior of drivers from Boston and points south is more difficult to project. Since Lechmere Station is the current end of the Green Line north of the Boston, everyone boarding at this station is destined for Boston and points south. It seems likely that drivers from Boston and points south are destined for downtown Boston but park at Lechmere Station and use the Green Line to save the cost of parking in expensive downtown garages. None of the new stations on the Green Line Extension would serve these drivers, who can be expected to continue using Lechmere Station.

Based on this analysis, only 35 vehicles currently parking at Lechmere Station are expected to change travel mode and use a station along the extension. Assuming no latent demand for parking at Lechmere Station, the demand for parking would be reduced to 295 or 115 spaces more than the planned supply of 180 spaces. Since the new station would be built on the site of the existing parking area, no parking is expected to be available during construction. During the design phase for the project, alternate parking locations for construction and during the Interim Condition would be evaluated and recommended.

Suggestions for temporary parking in the area have been made by commenters. Based on the analysis described above, it appears that the overall parking supply can be reduced by 35 to 50 spaces. This range encompasses the number of people who are likely to switch to a new station and those who may live too far to walk but are within a reasonable biking distance. However, a vast majority of those who drive and park at Lechmere Station today would continue to do so in the future since they live outside the pedestrian catchment area for the proposed stations. Those living in towns north of Boston have few alternate options and are unlikely to be able to change their travel patterns and still use public transit as a means of commuting. Therefore, the findings of this analysis are that the

existing Lechmere Station parking supply should be reestablished as currently planned in the NorthPoint special permit.

Because of limited available information and the difficulty in quantifying latent demand for parking in and around Lechmere, the analysis does not include the latent demand that exists anecdotally. The passenger surveys used to determine pedestrian routes were also used to determine whether passengers admit to parking in East Cambridge (either on-street or in a parking garage) to board at Lechmere Station. None of the survey respondents identified this as a mode choice. The likelihood of latent demand supports the need to reestablish a higher number of parking spaces as soon as it is reasonably feasible to do so.

5.4 Environmental Impacts

This section describes the potential environmental impacts associated with the proposed changes to the design of relocated Lechmere Station, as required by the MEPA Certificate. Impacts to abutting land uses, specifically noise and vibration impacts, were evaluated for the revised station design. All other environmental impacts related the station have not changed since the DEIR/EA and are described in detail therein.

5.4.1 Noise

This section compares the direct noise impacts of the relocated and redesigned Lechmere Station, including the Green Line operations in the vicinity of the station. The noise impact analysis for the Green Line Extension Project is based on the methodology defined in the FTA guidance manual *Transit Noise and Vibration Impact Assessment*.[2] Background information on noise and vibration fundamentals, descriptors, impact criteria, land use categories, existing noise conditions and sensitive land use in areas other than near Lechmere Station are presented in DEIR/EA Section 4.8, *Noise*. Buildings with potential noise impacts are shown in Figure 5-4.

The Proposed Project would introduce new noise sources into the surrounding areas and would contribute to the future noise exposure conditions at sensitive receptors. Potential noise impact has been assessed at sensitive receptors near Lechmere Station including a residential development planned at 22 Water Street, the Hampton Inn Hotel, the Glass Factory Condominiums, NorthPoint development properties and two planned Archstone residential buildings. Based on the current NorthPoint development plan, eight sites have been assumed to

2 Federal Transit Administration. *Transit Noise and Vibration Impact Assessment* (Report FTA-VA-90-1003-06). May 2006.

be noise-sensitive including the existing Tango and Sierra residential properties and future planned properties shown in Figure 2-10 (Site 1, Site 2, Site 3, Site 4, Site 5 and a park). Based on the current Archstone development plan, two sites have been assumed to be noise-sensitive including a future building east of East Street (Site 1) and a future building west of Leighton Street (Site 2).

Potential noise impact is assessed by comparing the existing noise conditions with future conditions. Existing noise conditions were measured at four locations near sensitive properties near Lechmere Station. A summary of the measurement sites and results is shown in Table 5-4 and the measurement locations are shown in Figures 2-5 through 2-7. Short-term measurement site ST-1 was conducted on the northeast side of the Hampton Inn Hotel and is representative of the existing noise conditions on the northeast sides of the Glass Factory Condominiums, the Hampton Inn Hotel and the proposed residential property at 22 Water Street. Short-term measurement site ST-8, at the end of Water Street, is representative of existing noise conditions at the five future NorthPoint properties and the park. Long-term measurement site LT-10, on the southwest side of the Glass Factory Condominiums, is representative of the existing noise conditions at the existing Tango and Sierra NorthPoint properties (adjusted for relative distances to O'Brien Highway). Short-term measurement site ST-9 was conducted at the planned Archstone properties (Phase II) and is representative of the existing noise for those two properties.

Future noise sources associated with the Project near Lechmere Station include mainline Green Line operations, maintenance facility noise sources and the bus operations at Lechmere Station. Noise from mainline Green Line operations near Lechmere Station includes an increase from radiated noise when on elevated structure. Maintenance facility noise sources include train movements in and out of the yards, increases in noise from special trackwork (crossovers or turnouts), potential wheel squeal on tight radius curves, stationary cars in the yards operating with auxiliary equipment on, the traction power substation, and the employee parking lot. Noise from buses is based on current activity from the MBTA Bus Routes 69, 80, 87 and 88, based on the MBTA's 2010 service schedules, which total approximately 162 buses arriving during daytime hours (7 AM to 10 PM) and approximately 40 buses arriving at the station during nighttime hours (10 PM to 7 AM).

Table 5-4 Lechmere Station Existing Noise Measurement Results

Measurement Site	Location	Existing Day-Night Average Sound Level (Ldn)	Existing Peak-Transit Hour Sound Level (Leq)
ST-1	Water Street (Cambridge) – Hampton Inn Hotel (northeast side of building)	58[b]	60
ST-8	End of Water Street between O'Brien Highway and Boston Engine Terminal	62[b]	65
ST-9	Archstone Parcel on O'Brien Highway (proposed Phase II development)	65[b]	67
LT-10	Glass Factory Condominiums [c] (southwest side of building)	65[c]	63

Source: HMMH, 2010 & 2008 and Lechmere Station Relocation Project (November, 2006).
a Ldn estimated by comparing SEL levels of train events to long-term sites whose noise environment is dominated by train noise.
b Ldn estimated according to the FTA guidance for short-term measurements conducted between 7 AM and 7 PM.
c Measurement conducted March, 2006 and reported in Environmental Assessment for the Lechmere Station Relocation Project (November, 2006).
d Commuter train noise level is average of all events at site.

5.4.2 Impact Assessment

Table 5-5 presents a summary of the potential noise impact at sensitive receptors near Lechmere Station prior to mitigation. This table shows the results for the Project including the preferred maintenance facility location at Option L described in detail in Chapter 2. This table includes the sensitive receptors, which side of the tracks it is on, the future distance between the receptor and the near track centerlines of the mainline Green Line, the existing noise condition (Ldn), the moderate and severe impact criteria, the contribution of noise from mainline operations (which includes bus noise), the contribution from maintenance facility noise sources, the total future noise level (which includes mainline operations, bus noise, maintenance yard and existing noise sources), the increase in noise between the existing and future conditions and whether the potential impact would be moderate or severe. Potential noise impact locations are also shown in Figure 5-4.

Near Lechmere Station, a total of two properties (NorthPoint Tango and Sierra) may be exposed to moderate noise impact and four properties (proposed 22 Water Street, Hampton Inn Hotel, Glass Factory Condominiums and the proposed Archstone Phase II Site 1 building) may be exposed to severe noise impact prior to mitigation. Future noise levels from mainline operations include a four decibel increase due to radiated noise from the structure at Glass Factory Condominiums, NorthPoint properties Tango and Sierra and the proposed building at Archstone Site 1. This increase in noise is not included for the Hampton Inn Hotel and 22 Water Street where the alignment is proposed to be on retained fill rather than on an elevated structure.

Table 5-5 Potential Noise Impact at Receptors Near Lechmere Station (Prior to Mitigation)

Noise Sensitive Receptor Location	Side of Tracks	Distance to Near Track (feet)	Existing Noise Level (dBA Ldn)	Impact Criteria		Future Noise Level from Mainline dBA (Ldn)	Future Noise Level from Yard Sources (Ldn)	Total Future Noise Level (Ldn)[a]	Increase (dBA)	Total Number of Exterior Impacts (buildings)	
		Green Line		Mod.	Sev.					Mod.	Sev.
22 Water Street (Proposed)	East	60[c]	57.6	60.0	63.5	74.9[d]	59.3	75.1	17.5		1
Hampton Inn Hotel (northeast façade)	West	41	57.6	60.0	63.5	66.8[d]	57.8	67.8	10.2		1
Glass Factory Condos (northeast façade)	West	43	57.6	60.0	63.5	70.0[d,e]	57.3	70.5	12.9		1
NorthPoint Properties (Tango and Sierra)	East	109	61.0	62.8	65.6	60.5[e]	n/a[b]	63.8	2.8	2	
Archstone (Proposed Site 1)	East	15[c]	69.2	70.3	72.1	75.1[e]	n/a[b]	76.1	6.9		1
Total noise impacts prior to mitigation for Option L										*2*	4

Source: HMMH, 2010.
a Total future noise level includes future mainline noise (including bus transit noise), future yard noise sources and existing noise sources.
b Receptor does not have significant contribution from yard noise sources.
c Distance to alignment estimated for future proposed property.
d Future noise level from mainline includes contribution from bus transit center at Lechmere Station.
e Noise from train operations includes increase due to radiation of elevated structure.

5.4.3 Vibration

This section documents direct vibration impacts from the Project to vibration-sensitive receptors near Lechmere Station. The vibration impact analysis for the Green Line Extension Project is based on the methodology defined in the FTA guidance manual *Transit Noise and Vibration Impact Assessment*.[3] Vibration impacts are assessed for maximum levels, as vibration — unlike noise — is not a cumulative metric. The FTA criterion for vibration impacts for residential spaces is 72 VdB. The FTA impact criterion does not distinguish between "moderate" and "severe" vibration impacts.

Potential vibration impact has been assessed at sensitive receptors near Lechmere Station including a residential development planned at 22 Water Street, the Hampton Inn Hotel, the Glass Factory Condominiums, NorthPoint development properties and two planned Archstone residential developments. Based on the current NorthPoint development plan, seven sites have been assumed to be vibration-sensitive including the existing Tango and Sierra residential properties and future planned properties shown in Figure 2-10 (Site 1, Site 2, Site 3, Site 4 and Site 5). Based on the current Archstone Phase II development plan, two sites

3 Federal Transit Administration. *Transit Noise and Vibration Impact Assessment* (Report FTA-VA-90-1003-06). May 2006.

have been assumed to be vibration-sensitive including a future building east of East Street (Site 1) and a building west of Leighton Street (Site 2).

Vibration generated by trains depends on several factors including the speed of the train, the presence of special trackwork (crossovers and turnouts) and whether the track alignment is at-grade or on an aerial structure. Special trackwork introduces gaps in the rail running surface which would increase vibration levels, similar to noise, from the train as the wheels impact these gaps. An aerial structure reduces vibration significantly (10 VdB) compared to at-grade alignments because the vibration must propagate through the structure to the support columns and then into the ground and into surrounding buildings.

The proposed Lechmere Station would not result in vibration impact for these properties. While the future planned Archstone Phase II Site 1 and 2 buildings would be approximately 15 feet from the relocated Green Line alignment, train speeds are relatively slow (20 mph) and vibration impact is not expected.

5.5 Mitigation Measures

This section discusses the proposed noise and vibration mitigation to address adverse environmental impacts associated with construction and operation of the proposed relocated Lechmere Station, as identified in the previous sections. MassDOT would be responsible for ensuring that all mitigation commitments are implemented.

5.5.1 Noise

Several options for mitigating potential impacts have been considered for properties near Lechmere Station including source treatments, path treatments and receiver treatments. Since the existing buildings near Lechmere Station, the Hampton Inn Hotel and Glass Factory Condominiums do not have any noise-sensitive exterior land use with frequent human activity, potential sound insulation mitigation has been considered to minimize potential impacts to interior spaces. The outdoor-to-indoor noise level reduction (OILR) of these buildings was measured by playing a high-amplitude broadband noise outside of the building and measuring the relative difference inside and outside of the building. Building facades, windows and doors generally reduce high-frequency noise more efficiently than low-frequency noise. Therefore, the frequency content (or spectrum) of the Green Line trains has been used to project the overall A-weighted noise level reductions of the buildings. Green Line trains on elevated structure generate more low frequency noise due to the radiation of the structure and, therefore, a spectrum from Green Line trains on elevated structure has been used accordingly.

The existing OILRs of the Hampton Inn and Glass Factory Condominiums range from 28 to 31 dBA and 27 to 35 dBA, respectively. These measurements show that the windows and walls of these buildings have relatively high existing noise reduction. Interior day-night sound levels (Ldn) from future transit noise sources (mainline operations, bus transit noise and maintenance facility noise) and maximum single-event (train pass-by on mainline) noise levels (Lmax) from the Proposed Project have been projected based on the lowest measured OILR at each building including a three decibel factor of safety. The noise criteria for interior spaces, when there is no outdoor land use with frequent human activity, are a day-night sound level (Ldn) of 45 dBA and a maximum single-event noise level (Lmax) of 65 dBA with windows closed. Table 5-6 presents the exterior Ldn and Lmax noise levels from project sources, the minimum OILR measured at each building, the interior noise levels from project sources and whether mitigation is required based on both interior noise level criteria at the Hampton Inn Hotel and Glass Factory Condominiums. Future interior noise levels at the Hampton Inn Hotel are projected to be 42.7 (Ldn) and 59.3 (Lmax) which are both below their respective criteria; therefore, noise mitigation is not required for this receptor. At the Glass Factory Condominiums, interior noise levels are projected to be 46.0 (Ldn) which is above the criterion for interior day-night sound levels. Therefore, noise mitigation is required for the Glass Factory Condominiums.

Since the Glass Factory Condominiums building has relatively good existing noise reduction performance (27 to 35 dBA), mitigation by means of barriers on the elevated guideway and the use of vibration track isolation (ballast mats or resilient rail fasteners) would be more effective than sound insulation in mitigating potential impact and would also provide benefit to other exterior areas near the relocated Lechmere Station.

Absorptive barriers on both the near edge of the elevated guideway and between the inbound and outbound tracks will be effective in reducing noise from Green Line trains at sensitive receptors even at upper floor receptors. The elevated guideway barrier between the inbound and outbound tracks is needed for reducing noise from trains on the far track. The heights of these barriers depend significantly on the guideway design and how close to the trains they can be constructed. Ideally, the barriers would be located within four feet of the near rail or closer. The heights of these barriers will be refined during the Preliminary Engineering phase of the Project.

Table 5-6 Interior Noise Levels at Existing Buildings Near Lechmere Station

Noise Sensitive Receptor	Exterior Future Noise Levels from Project Sources		Minimum Outdoor-to-Indoor Noise Level Reduction (dB)	Interior Future Noise Levels from Project Sources[a]		Mitigation Required due to Interior Noise Levels above 45 dBA Ldn or above 65 dBA Lmax
	Day-Night Sound Level (Ldn)	Single-Event Maximum Level (Lmax)		Day-Night Sound Level (Ldn)	Single-Event Maximum Level (Lmax)	
Hampton Inn Hotel	67.3	83.9	27.6	42.7	62.3	No
Glass Factory Condos	70.2	86.5	27.2	46.0	59.3	Yes

Source: HMMH, 2010.
a Interior future noise levels are calculated by subtracting the minimum outdoor-to-indoor noise level reduction from the exterior noise levels and subtracting a three decibel factor of safety.

Vibration isolation of the track by means of ballast mats (if ballast and tie track is installed on the elevated structure) or resilient rail fasteners (if direct fixation track is used) will minimize the contribution of noise radiated from the structure. While ballast mats or resilient fasteners are often intended to mitigate potential vibration impact, they would also be effective in this circumstance in reducing radiated noise from the structure.

Potential moderate noise impact has been identified for exterior land use at the existing Tango and Sierra residential properties at NorthPoint due to the proposed relocation of the Green Line near East Street. Since these are moderate noise impacts, existing noise levels are below 65 dBA (Ldn) and the relative increase in noise is low due to the proposed shifting of the Green Line structure, no mitigation is required for this property. If constructed, the Archstone Phase II buildings would provide acoustic shielding from Green Line operations.

Since the proposed developments at 22 Water Street and Archstone Phase II Site 1 are not currently constructed and are assumed to be completed concurrent with the Green Line Extension Project, the buildings could be designed with consideration of the noise environment (i.e. windows with high transmission loss or STC ratings) to mitigate potential impact. It is anticipated that the developments would be designed and constructed to address the impacts of the Green Line Extension and MassDOT would not be responsible for additional mitigation.

Table 5-7 summarizes the proposed noise mitigation for receptors near Lechmere Station including the Option L maintenance facility. Noise barriers totaling 900 feet in length (two barrier each 450 feet long) and 450 feet (900 track-feet) of ballast mat or resilient rail fasteners would be effective in minimizing the potential for noise impact at Glass Factory Condominiums. Figure 5-4

shows the location of the proposed noise mitigation near proposed relocated Lechmere Station.

Table 5-7 Proposed Noise Mitigation for Receptors Near Lechmere Station

Mitigation Number	Noise Mitigation	Station Number Location (Length)
1	Barriers on northeast edge of the elevated guideway and in between the inbound and outbound tracks.	90+50 to 95+00 (450 feet)
1	Ballast mats or resilient rail fasteners on inbound and outbound tracks	90+50 to 95+00 (450 feet)

Source: HMMH, 2010.

5.5.2 Vibration

No mitigation would be needed as no potential vibration impact has been identified for receptors near the proposed relocated Lechmere Station.

6

Public Involvement Plan

6.1 Requirements of the Secretary's Certificate

MassDOT and the MBTA are committed to active engagement with the public during completion of the Green Line Extension, through engineering, into construction and eventual Project completion. The Secretary's Certificate on the DEIR requires development of a PIP for the Project:

- To facilitate collaborative land use planning, review of advanced Project design elements (notably station design), and implementation of mitigation measures.
- To clearly outline how a broad range of participants (i.e., representatives of regional planning agencies, local government, business interests, community groups, representatives of environmental justice areas and the disabled community, abutters, and bicyclist and pedestrian groups) would continue to provide meaningful community involvement throughout the duration of the entire Project, including detailed design, engineering, construction phases.
- To build on the lessons learned from the previous Advisory Groups convened in association with the Project, to consider ideas presented as part of the Community Corridor Planning Project, to reflect on comments received on the DEIR, and to represent a serious commitment by both MassDOT and the MBTA to actively engage the public upon completion of MEPA review.
- To provide not only a plan for procedural engagement of the various participants, but that it would also outline the primary substantive topics that are anticipated to be addressed through the PIP process.

This chapter lays out strategies and tools for accomplishing MassDOT's goals and complying with the Secretary's Certificate.

6.1.1 Overview

MassDOT developed and implemented a robust program of community involvement during previous stages of planning for the Green Line Extension Project. The Project has benefitted from strong interest and involvement in Cambridge, Somerville and Medford, as well as neighboring communities. Local government officials, planners, community organizations, neighborhoods and hundreds of individuals have participated in the Project. They have shared their time, ideas and concerns at meetings, in letters and emails, on websites and in newspaper articles.

In partnership with the MBTA, MassDOT would continue this outreach through the design, engineering and construction of the Green Line Extension. This chapter lays out the elements of the PIP that would guide that outreach through the remaining phases of the Green Line Extension Project.

Public outreach for the Green Line Extension has four principal goals:

- To provide an interactive, collaborative and credible public process;
- To equip the design team with ideas and recommendations from the public that would inform the design of the Green Line Extension;
- To solicit input from local residents and businesses, local and regional government agencies and interest groups; and
- To provide methods to keep residents, business owners and municipal officials informed about construction, its potential impacts and schedule, and to lessen those impacts as much as possible.

The team has consulted with the corridor municipalities, community groups and many others in developing this plan. Suggestions made in the DEIR/EA comment letters were strongly considered, as were lessons learned from the public process undertaken during preparation of the DEIR/EA. While this plan outlines a set of approaches and topics, it is a flexible and evolving document. MassDOT plans to periodically update the PIP, to assess successes and/or challenges associated with the outreach and consider suggestions for changes or improvements.

6.1.2 Public Involvement Background and Lessons Learned

MassDOT established a public involvement process for the environmental review/conceptual engineering phase of the Green Line Extension Project in September 2007. This effort was, in some sense, a continuation of the work begun in 2004 during the *Beyond Lechmere Major Investment Study/Alternatives*

Analysis process. MassDOT formed a Green Line Extension Advisory Group (which included some participants from the *Beyond Lechmere* process), conducted public meetings and coordinated with staff and elected officials of Cambridge, Somerville and Medford, as well as other stakeholders and neighborhood interest groups along the corridor.

The public involvement effort during the environmental review/conceptual engineering phase included:

- Eleven Advisory Group meetings (between September 2007 and March 2009);
- Two rounds of public meetings (two meetings in January/February 2008 and two in March 2009, of which one round included more than 600 people);
- Five station workshops in January and February 2008; and
- Participation in numerous community and neighborhood briefings.

In response to public requests, the Green Line Extension team held technical tutorials on ridership modeling; conducted a technical tutorial and tour of the Green Line Riverside vehicle maintenance and storage facility; and in response to public concerns, produced a full study of the maintenance facility site selection process and added several new sites to the evaluation process. In response to suggestions from the public, MassDOT studied the possibility of constructing tunnel segments for the Green Line Extension. Also based on public concern about construction impacts, the Green Line Extension team developed a construction staging plan to help minimize potential future impacts, which would continue to be updated throughout the next phases of Project development.

MassDOT translated materials into languages spoken in the Project area, provided interpreters as requested and prepared audiotapes and large-print documents. An electronic and postal mail database was maintained and frequently updated. Email blasts updated the public on meetings and other Project-related activities; postal mail was used for people who do not use email.

The Project website provided and continues to provide easy access to current and archived documents, meeting notices and summaries, and reference materials; it also provides a way to sign up for the Project mailing list and to send questions to the Project Team. Between November 2007 and March 2009, the site attracted more than 23,000 new visitors and had a total of more than 145,775 page views.

Based on public comments received during the DEIR process, MassDOT understands that the next phase of public involvement should build upon past experiences and gained knowledge to meet the goals we have now set out. Furthermore, the Green Line Extension Project is now entering a fundamentally

new phase – one with a focus on physical and site-specific design rather than large-scale planning issues – requiring a different kind of public involvement process. In particular:

- Meetings of the Project Design Working Group should be scheduled on a regular and predictable basis so participants can plan in advance and have their time and commitments respected;
- Disagreements or conflicts should be addressed promptly and solutions or agreements shared publicly;
- Participants in the Design Working Group should be committed to and supportive of the planning process for the Green Line Extension Project;
- Topics raised and covered by the Design Working Group should be generally germane to the Green Line Extension Project as it has been defined and must not claim resources of the Project and the Design Working Group that could be better dedicated to pertinent and pressing issues;
- Options for mitigation must be understood and described effectively (mitigation is provided to prevent or remediate negative impacts caused by the Project); and
- MassDOT and the MBTA must be full partners in the process, with support from the corridor communities.

6.2 Topics

While it is not possible to predict all of the issues the corridor communities, residents and businesses would be interested in during the upcoming phases, the list below is based on the Green Line Extension planning process to date, DEIR comments and feedback from reviewers, comments on the process and documents and experience with transportation engineering and construction.

Before listing the primary topics on which MassDOT would be seeking public input during the upcoming phases of the Green Line Extension Project, it must be noted that special attention should be paid to the topic of mitigation, which has been cited frequently as a topic of interest. While the Green Line Extension Project is in general a low-impact project, the Green Line Extension team would outline avoidance or mitigation policies, construction mitigation, and mitigation for long-term operation of the system to the extent possible. These strategies would include vehicular, bicycle and pedestrian mitigation; traffic mitigation; and construction management and detour plans. Mitigation decisions would be made both on a corridor-wide basis (i.e., construction of sound walls) and an individual property basis (when there are impacts to be mitigated). The MBTA has existing policies on mitigation, which would be followed for the Green Line

Extension. MassDOT has pledged to work with the corridor municipalities to develop station–area parking enforcement plans as appropriate, although ultimate establishment and enforcement would be local responsibilities. Plans to mitigate noise and vibration would be presented to the public, with adherence to existing standards (in accordance with the FTA guidance) to serve as the goal. The design documents would detail how MassDOT would evaluate, monitor and compensate affected parties along the corridor with respect to noise and vibration and other impacts. FEIR Chapter 8 outlines Section 61 mitigation commitments as required by the FTA and state regulatory programs.

The following topics represent other key subject areas where MassDOT expects that members of the public are likely to comment. While MassDOT welcomes this input, topics related to building and operating the transit system safely must remain in the purview of MassDOT and the MBTA.

The sub-topics listed below are representative but not necessarily exhaustive. MassDOT and the MBTA would present them in the context of the financial, operational and program constraints within which the agencies operate.

6.2.1 Preliminary Engineering Topics

The Project Team anticipates that the topics listed below would be of interest to Project constituencies. While this interest is welcome, final determination of many elements of the transit system would be guided by regulation and established practice. In these cases, the Project Team would provide relevant explanations for policies and decisions.

Design

- Design, approaches to and use of each station in the corridor, including the look and feel of the stations (to be the subject of workshops in the communities);
- Access to each station, traffic management and approaches to the stations, safety, connectivity – for all modes;
- Accessibility (stations and the Community Path);
- Connectivity with bus service;
- Pedestrian access and safety;
- Bicycle approaches and storage;
- Design of the Community Path;
- Design of the Maintenance Facility, layover storage and yard layout;

- Mitigation of operations, noise, safety; and
- Bridge redesign.

Land Use

- Land use planning in the station areas: the topic of the first round of Green Line Extension Workshops; the results would be presented to the corridor municipalities for their use in local planning and zoning;
- Connections to the Community Path and other local destinations; and
- Siting and land acquisitions for stations and maintenance facility.

Operations and Maintenance

- MBTA station program elements and operation;
- Maintenance of stations;
- Protective fencing;
- Community Path maintenance and safety;
- Maintenance facility and yard use; and
- Mitigation of noise and vibration (noise walls, vibration mats and other mitigation).

Final Design, Construction Impacts and Testing

- Communication: Project schedule and updates, construction office and access to staff, progress updates, emails and notices to media;
- Management of right-of-way issues: noise, construction equipment and dust/dirt, safety;
- Permit management and compliance;
- Traffic management and detours; communication about detours and closings;
- Business operations (maintaining deliveries and customer access);
- Parking impacts;
- Effects on commuter rail (regional issue);
- Effects on bus travelers, pedestrians and bicyclists, if impacted by traffic detours; and

- Startup and operations.

Stakeholders and Constituencies

The Green Line Extension Project has benefitted from extraordinary public interest and support. The Secretary of the EEA received hundreds of comment letters and petitions expressing opinions on the Project during the DEIR phase. Almost all of the commenters supported the Proposed Project and had suggestions for improvements, enhancements or changes. The major stakeholders include:

- The FTA;
- The MBTA;
- The cities of Cambridge, Somerville and Medford, their municipal governments, elected officials and staff;
- Residents, businesses and property owners near the stations, maintenance facility and Community Path;
- Interested members of the general public;
- MBTA users; and
- Environmental justice populations in Cambridge, Somerville and Medford.

Throughout the Project, MassDOT has worked with and would continue to work with various local environmental justice community groups, including but not limited to:

- Affordable Housing Organizing Committee of Somerville
- Assembleia De Deus
- Bethel Evangelical Church
- Cambridge Council on Aging
- Cambridge East End House
- Cambridge Housing Authority
- Catholic Center at Tufts
- City of Medford Office of Human Diversity
- City of Somerville Multi-Cultural Commission
- Community Action Agency of Somerville
- Comunidade Evangelica Pentecostal Church
- Concilio Hispano, Inc.
- East Cambridge Planning Team
- East Somerville Main Streets
- East Somerville Neighborhood Association
- East Somerville Organizing Initiative
- First Church of Somerville

- Friends of the Community Path
- Green Line Advisory Group of Medford
- Groundwork Somerville
- Holy Cross Polish Church
- Igreja Presbiteriana De Boston
- Just a Start Corporation
- Latino Coalition of Somerville
- Massachusetts Alliance of Portuguese Speakers
- Medford Council on Aging
- Medford Green Line Neighborhood Association
- Medford Housing Authority
- Mission Church of Our Lord Jesus Christ
- Mystic Learning Center, Inc.
- Mystic Valley Elder Services
- Saint Ann's Parish
- SCM Community Transportation
- Somerville Climate Action
- Somerville Community Corporation
- Somerville Council on Aging
- Somerville Housing Authority
- Somerville Immigrant Service Providers Group
- Somerville Living Wage Committee
- Somerville Transportation Equity Partnership
- Somerville/Cambridge Welfare and Housing Coalition
- Somerville-Cambridge Elder Services
- Saint Clements Parish, Medford
- Saint Francis of Assisi Church
- Saint Joseph's Church
- Tri-City Community Action Program, Inc.
- Unity Church of God
- West Medford Community Center
- Zion Christian Fellowship Church

The Community Path

MassDOT has committed to completing 100-percent of the planning, design, and engineering for the proposed extension of the Somerville Community Path between Lowell Street and Inner Belt Road as part of the final design of the Green Line Extension Project (as described in the Secretary's Certificate, page 9). Planning for the Community Path would be part of the overall Green Line Extension outreach efforts, including:

- Focusing on connections between the stations and the Community Path at the public design workshops;

- Considering materials and design elements;
- Highlighting planning and design challenges ("pinchpoints," etc)
- Considering landscaping and "green" design components;
- Seeking input on access to the Path as a way to support pedestrian and off-road bicycle access to stations; and
- Providing information on design progress and seeking input at key milestones.

The Project Team would plan for access to bicycle parking facilities at stations (as part of the design workshops). MassDOT is committed to working with the City of Somerville, residents and businesses in the Brickbottom and Inner Belt neighborhoods, and Community Path advocates to design the Path in such a way as to create improved connectivity within the Brickbottom and Inner Belt neighborhoods and between the Community Path and the Green Line Extension. MassDOT notes Somerville's goal to secure funding for the simultaneous construction of the Community Path and the Green Line Extension. MassDOT is not able at this point to commit to funding the construction of the Community Path. However, MassDOT will continue to work with the City of Somerville to identify potential state and Federal funding opportunities for the construction of the Community Path.

6.3 Public Outreach Strategies

MassDOT and the MBTA share the goal of maintaining a collaborative relationship with the Green Line Extension stakeholders and municipalities during the upcoming engineering and construction phases. The agencies plan to continue and enhance effective outreach strategies and hope to involve new stakeholders and interests in the design review. During construction, the outreach approach would shift to providing frequent and accurate public information on construction progress, schedule, traffic and pedestrian detours, and other pertinent issues.

The methods for this engagement are described in this section. They include public information meetings; community briefings, meetings and presentations; formation of a Design Working Group; Design Public Workshops; maintenance of a website; production of Project fact sheets and information materials; email notices and communication; media outreach; coordination with ongoing projects; and outreach to environmental justice populations.

6.3.1 Public Information Meetings

MassDOT would host a number of public information meetings (with open houses before the formal meetings) to share milestone information and collect public comments and suggestions. These meetings are scheduled for non-work hours, in locations that are accessible and near public transportation. The meetings typically move among locations in Somerville, Cambridge and Medford and have attracted strong participation. The meetings would be held:

- To kick off the Preliminary Engineering work and introduce the MBTA's Station Design Program;
- Between the Schematic Design Update and Intermediate submittals (before designs are finalized for the facilities);
- Between the Intermediate and Pre-final Final submittals (when there are draft final materials for public review); and
- After the Pre-Final Submittal, but before the Design/Build construction contractor is procured, to present the preliminary design effort.

6.3.2 Community Meetings, Briefings and Presentations

MassDOT and the MBTA would respond to requests for meetings and briefings with community, civic, business and citizen groups in Cambridge, Somerville and Medford, and other municipalities as appropriate. These would include presentations to elected and municipal officials; briefings for chambers of commerce, environmental or community groups; to residents and business owners along the right-of-way. These meetings augment larger forums and help MassDOT speak directly to stakeholders in convenient neighborhood or group settings.

6.3.3 Design Working Group

MassDOT and the MBTA would convene a Green Line Extension Design Working Group. This group would advise MassDOT and the MBTA on the planning of public design workshops, participate in the workshops, share Project information with their neighborhoods, and serve as a corridor advisory group during engineering and construction. MassDOT and the MBTA invited the public to apply for membership with the goal of having representation from all of the neighborhoods adjacent to Green Line Extension facilities (the maintenance facility, Union Square, Lechmere, Brickbottom, Lowell Street, Ball Square and College Avenue, with interest in the Community Path as well). The group would include representatives from the MBTA and from Cambridge,

Somerville and Medford. The group would convene in June 2010 and at least quarterly, but potentially more often as engineering begins.

The Design Working Group would meet approximately quarterly for the duration of Preliminary Engineering and would advise MassDOT and the MBTA on issues related to station design, general construction, and other community-related concerns. Topics expected to be discussed in the meetings are described in Section 6.2, *Topics*. Meetings of the Design Working Group would be public, with a period at the end of each meeting for public comments and questions. Meetings of the group would be scheduled in advance with public notice. Summary meeting notes would be posted on the Project website and made available in print by request. A list of the Design Working Group members would be made available on the Project website once available.

If issues arise among the members of the Design Working Group that cannot be resolved, the members may bring concerns to the leadership of MassDOT and the MBTA. MassDOT and MBTA staff would endeavor to help resolve the issues if at all possible. A Green Line Extension Project Ombudsman would address issues that arise during construction; see Section 6.4, *Public Outreach During Construction*.

6.3.4 Green Line Extension Workshops

MassDOT and the MBTA would conduct a series of public workshops to gather input on land use and facility (stations, vehicle maintenance and storage facility, Community Path) design issues. The workshops would be organized around facility locations or groups of locations. All would be well-advertised, open to the public and in accessible venues. The workshops would be held in a series format in Cambridge, Somerville and Medford and would address the following topics:

- **Workshop Series 1**: Site issues and land uses around stations, the maintenance facility and the Community Path (late Spring 2010)
- **Workshop Series 2**: Station and facility elements (September 2010)
- **Workshop Series 3**: Design of each facility (November 2010)
- **Workshop Series 4**: Final review of Preliminary Engineering facility designs and the Community Path (Spring 2011)

MassDOT and the MBTA would organize the workshops and other events in consultation with city planners from each community, the Green Line Extension Design Working Group, and professional planners on the team. The workshops would include information on each facility location, maps and draft plans,

comment and review sessions, and other features. Information on the dates, agendas, etc., would be circulated using community resources, media, emails and flyers. Venues would be chosen in consultation with the communities and the Design Working Group.

Summaries of workshop materials and notes would be available on the Project website and presented to the communities. The workshops would include facilitated discussion groups, and interpreters would be available. The goals of the workshops are: (a) to gather opinions and ideas on facility issues in advance of key design milestones, (b) to present the facility designs for public review, and (c) to submit the designs for final public review in advance of final design and construction.

6.3.5 The Green Line Extension Website

The Green Line Extension website is www.mass.gov/greenlineextension. The site includes a Project overview, history and ways to participate; stores Project documents, current and archival; announces meetings and events and new activities; welcomes comments and questions via email and invites site visitors to sign up for Project information and emails. The site is updated frequently. Notes and presentations from Project meetings, workshops and other activities are posted on the site.

6.3.6 Project Fact Sheets

MassDOT and the MBTA would produce Project fact sheets during Preliminary Engineering to provide updates on Project status, key contracts, summaries of new reports or plans, schedule information and milestone descriptions. The fact sheets would be posted on the website for easy printing (in PDF format, so they can be downloaded and/or shared electronically) and distributed at Project meetings and presentations. The fact sheets would be available at all community and public meetings and in appropriate formats. Each issue would be translated into Spanish and made available in other languages on request.

6.3.7 Email, Communication and Notices

The Green Line Extension Project team would continue to use a number of methods for communicating with the public about Project meetings, issues and publications. In addition to the website, the team maintains an electronic database with contact information for over 4,500 people who have attended meetings, requested information, signed up online, written a comment letter, talked with a staff member, or are abutting property owners to the Green Line

Extension. The database contains emails and postal addresses. Emails are used regularly for notices; postal addresses for public meetings and others. The database would be updated after meetings and events. (Emails are not used for purposes other than sharing Green Line Extension information. Individuals can unsubscribe from the list upon request.)

In addition, the Project Team would continue to use the following communication strategies:

- Sending letters to right-of-way abutters notifying them of any upcoming field work and advising them how to stay informed on the schedule of work. For the field survey and boring work conducted February to June 2010, weekly updates were also mailed or emailed (as appropriate) to the database;
- Posting meeting information on the website and including it in emails to the database;
- When appropriate, preparing and distributing flyers at Lechmere and Haymarket Stations, at Orange Line Stations or door-to-door;
- Sharing meeting and Project information with community groups, the cities in the corridor, regional planning agencies, and translating them into Spanish (and other languages on request);
- Placing ads in local and regional publications for major meetings; and
- Using the MassDOT blog (*Commonwealth Conversations: Transportation*) and the MassDOT Twitter feed.

The team also provides materials in alternate formats on request (including large print and languages other than English). The Project Team welcomes suggestions on ways to continue to broaden communication and outreach.

6.3.8 Media Outreach

MassDOT and the MBTA would provide frequent updates to local and regional media to enhance communication with residents and business owners in Cambridge, Somerville and Medford. The team would distribute media advisories/press releases for all public meetings, workshops, major document releases and events of interest. In the past, this communication has enhanced the release of Project information. The Project Team would also invite local cable television stations to film major meetings to make them more accessible to corridor residents who find it difficult to attend meetings in person.

Advisories would be distributed to the following media outlets:

Newspapers

Boston Courant
Boston Globe
Boston Herald
Boston Metro
Boston Post-Gazette
Cambridge Chronicle
Daily Medford Mercury
El Mundo
El Planeta
Medford Transcript
Somerville Journal
Somerville News
Vocero Hispano

Radio Stations

WBMX 98.5 FM
WBOS 92.9 FM
WBUR 90.9 FM
WBZ 1030 AM
WERS 88.9 FM
WGBH 89.7 FM
WHRB 95.3 FM
WMBR 88.1 FM
WMKI 1260 AM
WRBB 104.9 FM
WRKO 680 AM
WTKK 96.9 FM
WUMB 91.9 FM
WXKS 107.9 AM
WZLX 100.7 FM

TV Stations

Cambridge Community Television
TV 3 Medford
Somerville Community Access Television
WBPX TV
WBZ CBS
WCEA TV
WCVB ABC
WGBH
WHDH NBC

WLVI CW

Other

State House News Service

6.3.9 Coordination with Ongoing Projects

The MBTA and MassDOT are continually coordinating the planning and engineering of the Green Line Extension Project with other projects. This is an issue of concern to stakeholders, who often express concern about Project coordination or are interested in obtaining more information about other projects. When appropriate, the Project Team would include updates on coordination with relevant projects in the communities or corridor that might affect or be impacted by the Green Line Extension. These may include proposed transit projects, such as changes to the Orange Line, implementation of the Urban Ring, commuter rail service expansion, or roadway, projects or issues related to the bicycle and pedestrian path networks.

6.3.10 Environmental Justice Populations

The Green Line Extension would benefit environmental justice communities by improving access to public transit. The Green Line Extension is not anticipated to disproportionately affect environmental justice populations through land acquisition or other impacts. During the next phases of Project development, the Project Team would continue to target efforts to reach this population. This outreach would include activities to:

- Widely distribute Design Workshop notices in multiple languages at local bus stops and to potential abutters, door-to-door (languages include Spanish, Portuguese and Haitian Creole; other requests would be accommodated);
- Provide information to city, community and neighborhood groups on the Project, on meetings and on how to participate;
- Provide interpreters, materials and flyers in multiple languages;
- Translate the fact sheet into Spanish and provide other languages, on request, and make these materials available on the website and in print;
- Provide accommodations such as taped meetings for the visually impaired and audio equipment at meetings and workshops for the hearing impaired; and
- Meet individually with community groups to present information on the Project and collect input and comments.

6.3.11 Accessibility

MassDOT and the MBTA would conduct all of their meetings in accessible location and would provide accommodations on request for participants, including interpreters, audio equipment and large print materials. Notices would include Spanish and Portuguese text, at minimum, describing the importance of the announcement.

6.4 Public Outreach During Construction

MassDOT and the MBTA are committed to continuing a robust public involvement process during the construction of the Green Line Extension. In general, MassDOT and the MBTA are committed to strategies that would (a) inform the public of construction plans, (b) provide regular updates on construction, traffic detours and other impacts, and (c) solve problems that arise during construction. MassDOT and the MBTA would achieve these goals in part by requiring the Green Line Extension construction contractor to commit to a spectrum of outreach activities and efforts to mitigate the impacts of construction. MassDOT and the MBTA would hold the construction contractor to these obligations. Working together, agency and contractor staff members would be dedicated to implementing these communication and problem-solving strategies.

- Establishing a **Project construction office** along the right-of-way that is accessible to the general public.
- Establishing the position of Green Line Extension Project **Ombudsman**; this staff member would be employed by the construction contractor and would field all construction-period comments and complaints, coordinate with the cities, and respond to public concerns.
- Providing a **Project phone number** for inquiries and setting up a **database tracking system** to respond to concerns.
- Continuing to maintain the **Project website** to post construction updates and bulletins, changes in schedules and traffic management updates.
- Meeting quarterly with the Design Working Group, which would become the **Construction Working Group**, to review issues associated with construction (e.g., notices, schedule, traffic management) and advise MassDOT and the MBTA on solving problems that often arise from unexpected conditions, weather or construction-related challenges.
- Hosting **construction kick-off meetings** for neighborhoods along the right-of-way before construction begins to outline work, schedules, detours, construction mitigation, etc. The team would schedule periodic briefings for

elected and municipal officials and coordinate technical issues with local and state agencies.

- Producing **quarterly construction updates** for website posting, emailing and sharing with communities. MassDOT and the MBTA would provide an annual summary of Project construction progress and schedule updates.
- Developing a **business outreach plan** to assist local businesses during construction. Assign construction management staff to work with the construction contractor(s) to keep businesses open.
- Implementing the MBTA's policies on mitigating construction impacts (such as dust, rodent control, pedestrian access, road detours and support for local businesses, as mentioned above).
- Providing **regular updates** on construction work to local and regional media. Update traffic management plan information through media advisories and Project update meetings (see above).
- Participating in **Project coordination meetings** to anticipate challenges, mitigation needs and solve problems that arise during construction. Meet with officials, residents and business owners to identify and solve problems.

MassDOT and the MBTA would review these communication and outreach plans in light of comments received on this document and the final Certificate from the Secretary of EEA, new ideas or proposals from the Design Working Group, communities, or individuals, and information that arises during the Preliminary Engineering phase. As always, MassDOT and the MBTA are committed to public outreach strategies that reflect the phase of the Project, that provide all interested individuals with an opportunity to give input and ask questions, and that assist the Project Team in its plans and designs for the Green Line Extension.

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7

Summary of Proposed Project Benefits and Impacts

The Secretary's Certificate on the DEIR required MassDOT to identify, describe and assess environmental impacts of any changes in the Project that have occurred between the preparation of the DEIR and the FEIR. This Chapter summarizes the benefits and impacts of the Proposed Project and highlights any changes since the DEIR was released.

7.1 Overview

The DEIR/EA evaluated the Proposed Project's impacts – both beneficial and adverse – on natural and human resources. Table 7-1 provides a summary of adverse permanent, temporary, and construction-related impacts to environmental resource categories from the entire Proposed Project. These impacts were compared to the effects of the No-Build Alternative, in the year 2030. The Green Line Extension Project offers tremendous benefits with minimal impact to the Project Area by virtue of the fact that it is being constructed along existing MBTA railroad rights-of-way, which would enable light rail service to serve pedestrian-oriented centers with minimal disruption to the surrounding community and without significant property or neighborhood impacts. Other benefits related to the Project's environmental impacts include:

- **Land Use, Social and Economic Resources –** The Proposed Project is expected to decrease low intensity commercial and light industrial uses in the Project corridor and increase mixed-use, high-density transit-oriented development, particularly at Union Square, Brickbottom Station, and Ball Square Station. Impacts to land, businesses and residences have been minimized as much as possible through the use of existing transportation corridors. The Proposed Project would provide socioeconomic benefits due

to increased transit access, which enhances both the potential for local commerce and the potential for area residents to commute to jobs elsewhere.

- **Environmental Justice** – According to the transit modeling performed for the Project, the Proposed Project would substantially increase transit access to environmental justice and disability populations. The Proposed Project would focus regional transportation investment funds in established environmental justice communities, connecting residents to jobs and services in Boston and Cambridge and strengthening business and residential districts in the corridor. There would be no disproportionate impacts to environmental justice areas from the Proposed Project.
- **Traffic –** The Proposed Project does not have an adverse impact on traffic operations throughout the Study Area and, in fact, makes improvements to many intersections for traffic and pedestrian movements. The Project would not physically alter designated bicycle facilities nor disrupt plans for future on-road or off-road facilities. When the opportunity is available, connections can be made from bicycle facilities directly to proposed stations. Ample bicycle parking would be provided at the Proposed Project station locations to accommodate and encourage commuting by bicycle. Minimal impacts to parking and recommendations for parking enforcement plans are expected as part of the Proposed Project.
- **Air Quality –** The Proposed Project represents a significant investment in urban mass transit which would provide important transportation, air quality, and urban redevelopment benefits and would fulfill a longstanding commitment to incorporate transit projects as an integral element of the Central Artery/Tunnel project. The air quality study performed for the Proposed Project demonstrates that the Green Line Extension Project complies with the Federal Clean Air Act and the SIP. The Proposed Project would reduce daily VMT by 25,018, improving air quality and providing zero-emission transportation capacity for anticipated growth.
- **Noise –** Although the Proposed Project would introduce a new noise source into the Project Study Area, proposed noise barriers, potential sound insulation, and rail lubrication would be effective in mitigating all potential noise impacts from the Proposed Project and no residual impacts would be expected. In fact, for locations along the existing commuter rail lines, the future noise levels would be substantially lower than the existing noise levels due to the introduction of noise barriers.
- **Vibration –** The proposed vibration mitigation for the Proposed Project – including ballast mats or resilient fasteners on the proposed Green Line tracks and the relocated commuter rail tracks and the relocation or use of specially-engineered trackwork – would be effective in keeping future vibration levels at or below existing levels for commuter trains and in

reducing future vibration from Green Line trains below the impact criteria (72 VdB for commuter rail and 75 VdB for Green Line trains).

- **Visual –** The Proposed Project would not have a significant effect on the local visual environment. The changes proposed would occur in urbanized areas within and adjacent to the existing right-of-way and would have little overall visual impact for the public. The most significant change would be the loss of forested areas along the right-of-way, reducing the green space visible from local residential areas. The addition of landscaping at the stations and both on and above the retaining walls would reduce the overall visual effect of vegetation losses. The proposed noise barriers would block the view of the right-of-way for adjacent homes and prevent any further visual impacts by obscuring the trains and rails that would otherwise be visible from residential back yards. Noise barriers can be designed in a manner to minimize the visual impacts on abutters.
- **Historic Resources –** The Proposed Project has impacts on a minimal number of historic or archeological resources, including the existing Lechmere Station (which is eligible for listing in the National Register), several domestic properties, and the industrial area surrounding Option L. However, a Memorandum of Agreement (MOA) has been developed that specifies measures to be implemented to mitigate adverse effects resulting from the Project.
- **Hazardous Materials –** The Proposed Project would have an environmental benefit by remediating several sites that currently contain contaminated soils. Mitigation measures during construction include special handling, dust control, and management and disposal of contaminated soil and groundwater in order to prevent construction delays and to provide adequate protection to workers and any nearby sensitive receptors. All response actions must ensure that any nearby or adjacent receptors are adequately protected.
- **Indirect and Cumulative Impacts –** The Green Line Extension Project is proposed for an area that is already densely developed. The extension of rail service through this area provides opportunities for the cities to modify their zoning and create infill development. The Proposed Project would support a number of major redevelopment projects that are currently planned and underway near the proposed station sites. It is not expected that the Green Line Extension would lead to an increase in the overall level of growth in the region. Rather, it would focus the growth into patterns that would increase the number of viable travel options available to corridor residents and employees, including transit, walking, and bicycling. The Proposed Project is also not likely to generate additional regional growth in jobs or population. However, it may affect where that growth occurs, the form of the growth, and the pace of redevelopment.

Table 7-1 Summary of Proposed Project Impacts

Environmental Categories	Impacts	Type/Timeframe
Land Use	Acquisition of 41 properties (approximately 16 acres), including eight buildings.	Permanent
Socioeconomics	Reductions in local commerce as affected/acquired businesses relocate.	Permanent to Temporary
	Reduction of annual property tax revenue by $6,527 in Cambridge, $15,777 in Medford, and $528,375 in Somerville from the Green Line extension (includes an increased tax revenue loss since the DEIR/EA of $322,440 in Somerville from the Option L maintenance facility).	Permanent
	Displacement or relocation of 92 jobs in Somerville for the Green Line extension (includes 74 jobs for the proposed maintenance facility).	Permanent to Temporary
Environmental Justice	Displacement or relocation of 92 jobs, all located in environmental justice areas.	Permanent to Temporary
	58 percent of noise impacts to sensitive receptors located in environmental justice areas.	Permanent (in absence of mitigation)
Traffic	Level of Service decreases at five intersections.	Permanent (in absence of mitigation)
	Minor modification of MBTA Routes 69, 80, 87 and 88 upon construction and completion of the Lechmere Station.	Permanent (in absence of mitigation)
	Removal of approximately 12 parking spaces on Boston Avenue near Winthrop Street	Permanent (in absence of mitigation)
	Road closures related to bridge reconstruction requiring traffic detours and resulting in some disruption to typical travel patterns.	Construction
	Temporary displacement of parking spaces, particularly in the immediate vicinity of station and bridge construction.	Construction
	Two bridges would be temporarily closed to traffic during construction.	Construction
Noise	Increase in noise levels for the Hampton Inn Hotel, Glass Factory Condominiums, and Brickbottom Lofts; 6 to 19 decibels higher than relatively quiet existing conditions.	Permanent (in absence of mitigation)
	Moderate noise impact projected at 121 single-family and multi-family residential buildings and severe noise impact projected at 43 residential buildings. Moderate noise impact projected at three institutional buildings (Science and Technology Center at Tufts University, Outside the Line Artist's Studio, and Bacon Hall at Tufts University) and severe noise impact projected at one institutional building (Walnut Street Center).	Permanent (in absence of mitigation)

Table 7-1 Summary of Proposed Project Impacts (continued)

Environmental Categories	Impacts	Type/Timeframe
	Future noise levels at the Brickbottom Artists Building, Hampton Inn Hotel, and Glass Factory Condominiums from maintenance facility range from 57.3 dBA to 69.9 dBA (non-revenue train operations to and from maintenance yard). Total future noise levels from maintenance facility, mainline operations and existing sources range from 67.8 dBA to 76.4 dBA.	Permanent (in absence of mitigation)
	Temporary noise impacts from construction activities associated with utility relocation, grading, excavation, track work and installation of systems components.	Construction
Vibration	Shifting the existing commuter rail lines closer to sensitive receptors resulting in increased vibration levels.	Permanent (in absence of mitigation)
	Vibration impact projected at 92 single-family and multi-family residential buildings and at three institutional buildings (Science and Technology Center at Tufts University, Outside the Line Artist's Studio, and Bacon Hall at Tufts University).	Permanent (in absence of mitigation)
	Temporary vibration impacts at locations near pile driving and vibratory compactor operations.	Construction
Stormwater Management	Two acres of new pavement and rooftops for the station structures and platforms.	Permanent (in absence of mitigation)
Fish, Wildlife and Plants	Direct impact to 2.6 acres of low-value habitat, including areas near Brickbottom Station (0.9 acres), Gilman Square Station (0.6 acres), and Lowell Street Station (1.1 acres).	Permanent (in absence of mitigation)
	Direct impact to approximately 1.1 acres of medium-value wildlife habitat near College Avenue Station, extending north of the station to approximately Winthrop Street.	Permanent (in absence of mitigation)
Parks and Recreation Areas	Trum Playground (Section 4(f) property), would be indirectly impacted by moderate noise level increases by 3.5 dBA, from 68.6 dBA [Leq] to 72.0 dBA [Leq]. Trum Playground is a Category 3 land use, which applies to recreational resources that are not sensitive to noise.	Permanent (in absence of mitigation)
Visual Resources	Minor changes to the local landscape from the proposed maintenance facility.	Permanent (in absence of mitigation)
	Visual changes from the removal of 3.7 acres of existing vegetation and numerous noise barriers (between Brickbottom Station and College Avenue Station.	Permanent (in absence of mitigation)

Table 7-1 Summary of Proposed Project Impacts (continued)

Environmental Categories	Impacts	Type/Timeframe
Historic and Archeological Resources	Alterations to the Cambridge steel elevated portion of the Lechmere Viaduct, eligible for listing in the National Register.	Permanent (in absence of mitigation)
	Removal of the existing Lechmere Station structure, recommended as National Register-eligible.	Permanent (in absence of mitigation)
Hazardous Materials	Potential exposure of soil and/or groundwater impacted with OHM during the Green Line extension and maintenance facility construction.	Construction

The following sections provide additional detail on the Project's impacts and benefits.

7.2 Land Use, Social, and Economic Resources

This group of categories evaluates the impacts on properties, types of land uses, jobs, neighborhoods, and property tax revenues. The increased transit access and ridership has the potential to increase commerce and encourage greater economic development along the Green Line Extension, which would increase property values and offset decreases in municipal property tax revenue.

Increases in projected land acquisitions have occurred since the development of the DEIR due to the required land acquisitions for the proposed maintenance facility Option L. Specifically, additional full land acquisitions are required at 20 Third Avenue (M.S. Walker Wholesale Distribution) and 44-48 Third Avenue (APCA Third Avenue, LLC) for construction of the Option L maintenance facility, totaling 7.4 acres. Additional partial land acquisitions at 70 Inner Belt Road (CRG West Parking Lot) and 200 Inner Belt Road (Fine Arts Storage Partners), totaling 2.8 acres, are also required.

Acquiring buildings and properties for the Project is unavoidable due to the dense urban character of the Project Area. Despite the relative abundance of commercial and industrial properties in the affected cities, the acquisition and demolition of existing businesses could result in temporary reductions in local commerce as the affected businesses relocate or permanent reductions if the businesses do not reopen locally or at all. The use of the existing right-of-way minimizes the property acquisitions, which would be much higher for an extension that involved establishing a new right-of-way through these cities.

The use of the existing right-of-way for most of the tracks also avoids dividing and segmenting any neighborhoods, which could otherwise cause significant changes to the local character. The proposed property acquisitions would not cut off access within any existing neighborhoods or block access from one neighborhood to another.

The Proposed Project is expected to decrease low intensity commercial and light industrial uses in the Project corridor and increase mixed-use, high-density transit-oriented development, particularly at Union Square, Brickbottom Station, and Ball Square Station. Impacts to land, businesses and residences have been minimized as much as possible through the use of existing transportation corridors.

Constructing the Proposed Project as currently designed would require approximately 16 acres of land acquisition from approximately 41 properties, and would require relocating seven businesses. Since the DEIR/EA, Option L has been designated as the preferred location for the Green Line maintenance and storage facility. The largest area acquisitions are for the Project's maintenance and storage facility at Option L in Somerville (four parcels totaling 10.2 acres). In terms of impact, the most substantial acquisitions are those that require the displacement and relocation of residences and active businesses. These are located at Ball Square (three businesses), Union Square (two businesses), and for the Option L maintenance facility (two businesses). No residences would be displaced. Tables 7-2 and 7-3 show the land acquisitions required for the extension to Medford Hillside and to Union Square, respectively.

Table 7-2 Land Acquisitions for Extension to Medford Hillside

Address	Description	Cause of Impact	Area (square feet)	Full or Partial Lot Acquisition
Cambridge:				
South of East Street	NorthPoint parcel	Viaduct	6,963	Partial
East Street	City-owned parcel	Viaduct	1,549	Partial
Water Street	City-owned parcel	Viaduct	1,366	Partial
Monsignor O'Brien Highway	NorthPoint parcel	Track junction	240	Partial
Lechmere Station	MBTA station	Station relocation	--	n/a
Somerville:				
1 McGrath Highway	Commercial (undeveloped portion)	Tracks	104	Partial
35 McGrath Highway	Commercial (undeveloped portion)	Tracks	295	Partial
Monsignor O'Brien Highway	Undeveloped area	Viaduct	35,703	Partial
20 Third Avenue	M.S. Walker Wholesale Distribution	Option L	200,972	Full
44-48 Third Avenue	APCA Third Avenue, LLC	Option L	121,540	Full
70 Inner Belt Road	CRG West Parking Lot	Option L	52,248	Partial
200 Inner Belt Road	Fine Arts Storage Partners	Option L	67,834	Partial

Table 7-2 Land Acquisitions for Extension to Medford Hillside (continued)

Address	Description	Cause of Impact	Area (square feet)	Full or Partial Lot Acquisition
Somerville: (continued)				
24 Joy Street	Vacant	Brickbottom Station	12,000	Full
30 Joy Street	Vacant	Brickbottom Station	6,000	Full
Medford Street	Electrical substation	Tracks	37,947	Full
350 Medford Street	The Homan's Building (vacant, city-owned)	Gilman Square Station	48,296	Full
20 Vernon Street	Factory/artist studios (parking lot)	Tracks	2,779	Partial
61 Clyde Street	Undeveloped portion	Tracks	4,348	Partial
42 Murdock Street #1, 2, 3	3-family residence/condo (yard)	Tracks	260	Partial
46 Murdock Street	2-family residence (yard)	Tracks	260	Partial
50 Murdock Street	Vacant lot (yard)	Tracks	260	Partial
Rear of 54/56 Murdock Street	N/A	Tracks	260	Partial
675 Broadway (Somerville part)	Lot 2: Veterinary office; Lot 3: Karate studio	Ball Square Station	7,555	Full
662 Boston Avenue (Somerville part)	Auto Repair	Ball Square Station	340	Full
664 Boston Avenue (Somerville part)	Bowling Alley	Ball Square Station	340	Full
Medford				
675 Broadway (Medford part)	Lot 2: Veterinary office	Ball Square Station	4,448	Full
662 Boston Avenue (Medford part)	Auto repair	Ball Square Station	5,927	Full
664 Boston Avenue (Medford part)	Bowling alley	Ball Square Station	5,927	Full
Boston Avenue	Street right-of-way (Commonwealth of MA)	Tracks	1,739	Partial
590 Boston Avenue	Gas station/car wash (lot)	Tracks	285	Partial
474 Boston Avenue	Student offices and café (lot)	Tracks	580	Partial
179 College Avenue	Street right-of-way (Commonwealth of MA)	Tracks	180	Partial
Boston Avenue	Street right-of-way (Commonwealth of MA)	Tracks	1,205	Partial
Total number of parcels: 31		Total Area:	629,750 square feet (14.5 acres)	

Note: N/A = Not Applicable

The Proposed Project would provide socioeconomic benefits due to increased transit access, which increases both the potential for local commerce and the potential for area residents to commute to jobs elsewhere. As a result of the land acquisition, the Proposed Project would result in a total decrease of $550,679 in municipal property taxes (includes land acquisition required for the Option L maintenance facility).

The Proposed Project would displace an estimated 92 jobs in Somerville (74 jobs would be displaced for the maintenance facility at Option L). Although it is uncertain how many of the jobs displaced are held by local residents rather than commuters, the small scale of the job losses relative to the Somerville workforce (47,656 workers [2000 U.S. Census]) makes it clear that the jobs at stake represent at most a minor economic impact. There is an inherent economic advantage to being located close to public transit and to educational and social centers such as

Tufts University and Union Square. Therefore, many of the jobs affected would not actually be eliminated but only relocated locally.

Table 7-3 Land Acquisitions for Extension to Union Square (via commuter rail right-of-way)

Address	Description	Cause of Impact	Area (square feet)	Full or Partial Lot Acquisition
Somerville:				
1 Fitchburg Street	Retail condominium (lot)	Tracks	954	Partial
McGrath Highway (under)	City-owned parcel	Tracks	954	Partial
120 McGrath Highway	Garage (lot)	Tracks	954	Partial
35 Charlestown Street	N/A (lot)	Tracks	1,132	Partial
174 Somerville Avenue	Shopping mall (lot)	Tracks	1,132	Partial
51 Allen Street	Auto repair	Tracks	31,761	Full
40 Bennett Street	Warehouse (lot)	Tracks	1,004	Partial
Rear of 50 Prospect Street	Storage lot for commercial building	Union Square Station	8,039	Full
50 Prospect Street	Commercial building	Union Square Station	13,037	Full
42 Prospect Street	Vacant	Union Square Station	3,021	Full
Total number of parcels: 10		Total Area:	61,988 square feet (1.4 acres)	

Note: N/A = Not Applicable

7.3 Environmental Justice

According to the transit modeling performed on the Project, the Proposed Project would increase transit access to environmental justice and disability populations. The Project connects low-income and environmental justice communities to the region's fixed-guideway network, thus improving access to jobs and services. The Project is designed to provide fair access to stations and economic development opportunities and avoid any disproportionate share of impacts. The Project complies with Federal DOT requirements for environmental justice as developed through Executive Order 12898, DOT Order 5610.2, and Title VI of the Civil Rights Act of 1964.

The proposed Option L maintenance and storage facility requires the acquisition of two commercial buildings and the displacement of an additional 74 jobs, all located within environmental justice areas. These acquisitions would reduce annual property tax revenue by 0.33 percent in Somerville. However, this change would not represent a significant fraction of the jobs in Somerville and many of the jobs displaced would likely be relocated or replaced within Somerville. Furthermore, no residential land would be acquired, resulting in no direct effect on local environmental justice populations.

The primary benefit of the Project for local residents and workers is improved access to transit. The Green Line Extension would improve transit access to jobs, on average, by 6.1 percent; access to colleges by 7.6 percent, and access to hospital beds by 9.8 percent.[1] While there are impacts of building acquisitions and noise on environmental justice populations, these impacts are unavoidable due to the proximity of the existing rail corridors to environmental justice areas. These impacts are neither severe nor disproportionate, and the impacts would be balanced by the transit benefits to environmental justice populations. While the exact economic benefits cannot be determined, providing increased transit access and economic opportunities to the same neighborhoods affected by the Project would offset any economic impacts to these neighborhoods.

In summary, the Proposed Project would result in the acquisition of seven commercial buildings and displace approximately 92 jobs in environmental justice areas. There would be no disproportionate noise impacts to environmental justice areas from the Proposed Project. Noise mitigation would be required for the residences affected, resulting in no residual adverse impacts due to noise.

7.4 Traffic

This section discusses the direct, indirect, and cumulative effects of the Proposed Project with respect to intersection, pedestrian, bicycle, public bus transportation, and parking systems in the Study Area. For the year 2030, the DEIR/EA analyzed future traffic volumes throughout the Study Area (both with and without the Project), the impacts of the Project on the transportation system in the surrounding communities, and any measures that would mitigate Project impacts. Potential impacts to traffic circulation, including pedestrian and bicycle use, from the Proposed Project would remain the same as those analyzed in the DEIR/EA.

The DEIR/EA analyzed traffic for the No-Build and Proposed Project in order to evaluate the effects of the Project on intersection levels of service and pedestrian and bicycle circulation. The DEIR/EA provides a detailed assessment of the impacts on the transportation system associated with the Proposed Project. The following conclusions were reached:

- **Traffic Operations** – With mitigation at four intersections, the Proposed Project would improve operations at ten intersections.

1 Improved access was evaluated only for the Full-Build Alternative (DEIR/EA Alternative 2), which provides similar benefits to the Proposed Project (DEIR/EA Alternative 1 and the subject of this FEIR). This analysis was provided in DEIR/EA Appendix G, *Transit Access for Environmental Justice and Disability Populations*.

- **Pedestrians –** Pedestrian improvements would be implemented at 33 locations throughout the Study Area to accommodate the expected number of pedestrians accessing proposed stations. Pedestrian delays throughout the Study Area would be improved and signals would be timed to ensure pedestrians have adequate time to cross the street.
- **Bicycles –** The Proposed Project would not physically alter designated bicycle facilities nor disrupt plans for future on-road or off-road facilities. When the opportunity is available, connections from bicycle facilities directly to proposed stations can be made. Ample bicycle parking (a minimum of 380 spaces) would be provided at the Proposed Project station locations to accommodate and encourage commuting by bicycle.
- **Parking –** A total of 12 parking spaces would be removed to accommodate mitigation at Boston Avenue and Winthrop Street. Enforcement would be necessary to ensure that on-street parking is being used appropriately. At the redesigned Lechmere Station there would be a loss of approximately 167 existing parking spaces during the Interim Condition. As the NorthPoint development project is currently permitted, these spaces would be replaced in full upon completion of the NorthPoint development project.
- **Bus Transportation –** Slight operational changes to bus service would occur at relocated Lechmere Station to facilitate the station relocation. No other bus routes or services would be impacted. The MBTA may in the future consider the relocation of bus stops to encourage the use of the bus to access the station. Additionally, once the Green Line Extension is constructed and operational, the MBTA would, as they do throughout their systems, continuously evaluate opportunities to optimize bus services. The benefit of this action would be further evaluated during Preliminary Engineering.
- **Construction Impacts –** Construction impacts would be related to construction and traffic detours and would be temporary. In the vicinity of the stations and bridges, available parking may be temporarily displaced. Construction staging would limit the number of temporary bridge closures and ensure that adjacent bridges are not closed at the same time.

7.5 Air Quality

The Proposed Project is a significant investment in urban mass transit which would provide important transportation, air quality, and urban redevelopment benefits and would fulfill a longstanding commitment to incorporate transit projects as an integral element of the Central Artery/Tunnel project. The DEIR/EA described the air quality benefits associated with the Green Line Extension Project and describes its consistency with the SIP and MassDEP's Transit Regulations. The DEIR/EA included a mesoscale and microscale air

quality analysis that evaluated emissions of VOCs, NO_x, carbon dioxide (CO_2), CO, and particulate matter (PM). The microscale (local or hotspot) analysis evaluated CO and PM. The regional (mesoscale) analysis evaluated ozone precursors (VOCs, NO_x, CO_2, CO, and PM).

Based on the origin-destination study and parking demand study conducted for Lechmere Station, there would continue to be a demand for parking in the vicinity of Lechmere Station, either at the Station or in parking facilities nearby. As such, the projected regional air quality is not expected to notably change because the parking demand is expected to continue through the construction and implementation of the Green Line Extension. It is anticipated that these vehicles would continue to travel their existing routes and park in the Lechmere Station area and, therefore, there would be no change in the air quality on a regional (mesoscale) level.

In addition, a hot spot (microscale) air quality analysis was conducted at the intersections of Cambridge Street at First Street, Monsignor O'Brien Highway at East Street/Cambridge Street, and Monsignor O'Brien Highway at Charlestown Avenue/Lands Boulevard. As major intersections in the Study Area, the emissions are not expected to considerably change at these hot spots. Although reduced parking would be available at Lechmere Station, the parking demand is expected to continue to be there and the number of vehicles through these intersections is expected to be the same in the area (although the movement of the vehicle [right, through, or left-turn] may be different). The emissions at these study intersections are, therefore, not expected to notably change from what was calculated in the DEIR/EA.

7.5.1 Microscale Analysis

The microscale analysis indicates that reductions in CO concentrations are expected to occur over time when compared to 2007 existing conditions. All of the calculated future CO concentrations are equal to or less than the 2007 existing conditions concentrations. These reductions can be attributed to more efficient automobiles with enhanced emissions control technologies and the benefits of the Massachusetts Vehicle Inspection and Maintenance program. The Proposed Project would not exceed the CO NAAQS.

The microscale analysis also calculated the 24-hour PM_{10} concentrations and the 24-hour and annual $PM_{2.5}$ concentrations for 2030. All of the 24-hour PM_{10} concentrations are well below the PM NAAQS of 150 ug/m^3. All of the annual $PM_{2.5}$ concentrations are well below the $PM_{2.5}$ NAAQS and all of the 24-hour $PM_{2.5}$ concentrations are below the $PM_{2.5}$ NAAQS.

7.5.2 Mesoscale Analysis

The air quality study included a mesoscale analysis that estimates the area-wide emissions of VOCs, NO_X, CO_2, CO, and PM emissions. The mesoscale analysis evaluated the changes in emissions based upon changes in the average daily traffic volumes, roadway lengths, and vehicle emission rates. The mesoscale analysis calculated the 2030 mobile source emissions from the major roadways in the Study Area. These emissions, estimated to be 22,687.5 kilograms per day (kg/day) of VOCs, 19,186.2 kilograms per day of NO_X, and 3,385.7 kg/day of PM_{10}, establish a baseline to which future emissions can be compared.

The results of the mesoscale analysis demonstrate that the Proposed Project would reduce emissions of VOC, NO_X, and PM_{10} as compared to the No-Build Alternative. The air quality study demonstrates that the Proposed Project for the Green Line Extension Project complies with the CAAA and the SIP.

7.5.3 Greenhouse Gas (CO_2) Analysis

The EEA has developed a policy that requires a Proposed Project to evaluate GHG emissions. The air quality study calculated the GHG emissions from mobile sources related to the Proposed Project. While GHG emissions include several gases, CO_2 was selected for evaluation because it is the most significant component of transportation-related GHG emissions. The year 2030 was selected as the future year of analysis to be consistent with the regional long-range transportation plan. The Proposed Project would reduce CO_2 by 17,115 kg/day in comparison to the No-Build Alternative and therefore not contribute to an increase in GHG emissions.

7.6 Noise

The Green Line Extension would add a new noise source to the environment along the proposed corridor. While there is existing noise exposure from sources such as commuter trains and automobiles, introducing an additional noise source and relocating the commuter rail lines have the potential to increase future noise at some noise-sensitive receptors. The Proposed Project involves relocating the commuter rail lines up to 18 feet along some portions of the corridor and introducing the proposed Green Line tracks on the west side of the corridor along the Medford Branch and on the south side on the Union Square Branch.

The noise analysis conducted for the FEIR for the proposed Option L maintenance facility showed a slight increase in overall noise impact from that reported in the DEIR/EA. Specifically, noise from train movements in and out of the yard at Option L would be slightly higher at the southwest façade of the Brickbottom Artists Building than would be Yard 8 due to the presence of a tight radius curve on the Medford Lead track. In addition, noise from train movements in and out of the yard at Option L would be slightly higher at the Hampton Inn Hotel and the Glass Factory Condominiums due to stationary cars in the south yard operating with auxiliary equipment on. At the northeast façade of the Brickbottom Artists Building, the Option L maintenance facility would only increase future noise levels by 1.1 decibels compared to the mainline operations alone. At the other receptors potentially impacted under Option L, the contribution of noise from maintenance facility operations is even less than at Brickbottom Artists Building.

Potential noise impact on the west side of the MBTA Lowell Line alignment is due primarily to the proximity of noise-sensitive receptors to the Green Line trains. At close distances (within approximately 50 feet) the contribution of noise from Green Line trains is more significant than from commuter trains. Future noise levels on the west side are projected to generally increase one to two decibels due to the close proximity of noise-sensitive receptors to the Green Line trains. At a few specific locations (Alston Street near Cross Street) the increase in noise levels is higher (five decibels) due to the close proximity (25 feet) to the near track centerline of the proposed Green Line trains.

Because existing noise levels are relatively high at locations along the existing commuter rail line, even small increases in future noise levels are considered to have the potential for moderate or severe noise impact. Moving the commuter rail closer to residences on the east side of the MBTA Lowell Line right-of-way would therefore have moderate to severe impacts in some locations. The areas of noise impacts are shown in Figures 7-1 through 7-5.

Temporary noise impacts could result from construction activities associated with utility relocation, grading, excavation, track work, and installation of systems components. Such impacts may occur in residential areas and at other noise-sensitive land uses located within several hundred feet of the alignment. The potential for noise impact would be greatest at locations near pile-driving operations for bridges and other structures, and at locations close to any nighttime construction activities.

The Proposed Project would expose 164 residential buildings to moderate (121) or severe (43) noise levels, and would expose three institutional buildings (Tufts Science and Technology Center, Outside the Line Artist's Studio, and Bacon Hall at Tufts University) to moderate noise levels and one severe institutional impact

(the Walnut Street Center, a non-profit support center for adults with developmental disabilities near Union Square).

With mitigation, there would be no severe noise impacts from the Proposed Project expected. Noise mitigation including noise barriers and potential sound insulation treatments would be feasible, reasonable, and effective in mitigating all potential noise impact due to the Proposed Project. During the next phase of the Project, the existing outdoor-to-indoor noise reduction of the buildings would be measured. Some of these large buildings, however, may have a greater outdoor-to-indoor sound reduction than for typical buildings (about 25 dB with windows closed). If it can be established that there is indoor activity only and that the performance of these windows is sufficiently better than normal, sound insulation mitigation may not be necessary. If sound insulation is required and the most effective mitigation option, it would be considered cost-effective if it can improve the noise reduction of the building by five decibels or more.

At most locations, the noise barriers would be effective in reducing noise levels from transit sources generally seven to 11 decibels and would result in substantial reduction in future noise levels in comparison to existing noise levels. The proposed noise barriers and potential sound insulation would be effective in mitigating all potential noise impacts from the Proposed Project and no residual impacts would be expected. In fact, for locations along the existing commuter rail lines, the future noise levels would be substantially lower than the existing noise levels due to the noise barriers. Therefore, with mitigation, there would be no severe noise impacts from the Project and noise improvements would be made along the corridor.

7.7 Vibration

The Green Line Extension Project would add a new vibration source to the environment along the proposed corridor. While there is existing vibration exposure from sources such as commuter trains and automobiles, introducing an additional vibration source and relocating the commuter rail lines have the potential to increase future vibration at some sensitive receptors. The Project involves relocating the commuter rail lines up to 18 feet to the east along some portions of the corridor and adding the proposed Green Line tracks on the west side of the corridor.

Vibration from the Option L maintenance facility would remain the same as that analyzed in the DEIR; at a maximum vibration level of 77 VdB at the Brickbottom Artists Building, generated from trains on the elevated near mainline track approximately 18 feet away.

Vibration impact from the commuter trains generally occurs within 60 feet of the future commuter rail near-track centerline and within 40 feet of the proposed Green Line near-track centerline. Most receptors projected to be exposed to vibration impact from commuter train activity are on the east side of the MBTA Lowell Line or the south side of the MBTA Fitchburg Line where the proposed commuter rail near track is planned to shift up to 18 feet closer than its current location. Shifting the existing commuter rail lines closer to sensitive receptors is expected to increase vibration levels. Most receptors projected to be exposed to vibration impact from Green Line train activity are located on the west side of the MBTA Lowell Line. The areas of vibration impacts are shown in Figure 7-6 through 7-10.

Temporary vibration impacts could result from construction activities associated with the Green Line Extension Project. The potential for vibration impact would be greatest at locations near pile driving and vibratory compactor operations.

The Proposed Project may potentially expose 95 vibration-sensitive buildings to impact without vibration mitigation. This includes 92 single-family and multi-family residential buildings and three institutional buildings (Tufts Science and Technology Center, Outside the Line Artist's Studio, and Bacon Hall at Tufts University).

The proposed vibration mitigation including 19,700 track-feet of vibration mitigation such as ballast mats or resilient fasteners on the proposed Green Line tracks and the relocated commuter rail tracks and the relocation or use of specially-engineered track (flange-bearing or moveable-point frogs) for 10 crossovers and turnouts would be effective in keeping future vibration levels at or below existing levels for commuter trains and in reducing future vibration from Green Line trains below the impact criteria of 72 VdB (commuter rail) or 75 VdB (Green Line trains).

7.8 Visual

The Proposed Project would require acquiring property, demolishing buildings, constructing new Green Line track and stations, and relocating the commuter rail track within the existing right-of-way. Some existing vegetation would be removed, and new retaining walls and noise barriers would be built. Noise barriers can be designed in a manner to minimize the visual impacts on abutters. Fences, trees, and steep slopes on each side of the right-of-way minimize the rail corridor's visibility. The right-of-way is only visible to the public from certain locations, such as from bridges or through fences. With the exception of the Lechmere Station area, which would be on an elevated structure, there would be

minimal visual impact on the area. Because the changes would occur in urbanized areas within and adjacent to the existing right-of-way, they would have little overall visual impact on the public. New planting and screening efforts along the right-of-way and atop the retaining walls would be done in coordination with abutting residents and businesses to ensure that no undue visual impacts are imposed on local neighborhoods. The Project would incorporate vegetation in and above these walls and at the stations in order to maximize the amount of vegetation along the expanded right-of-way. These would reduce the net loss of vegetation and reduce the visual impact of any tree removal on the neighborhoods.

The additional analysis of the proposed Option L showed that the Option L maintenance building would be less visible from the Brickbottom Artists Building than would have been the building at Yard 8. However, given the existing industrial (MBTA's BET facility) and commercial buildings visible from this area, the support facility would result in only a minor change to the overall local landscape.

The stations themselves generally have small footprints and are located along and within the right-of-way to the greatest extent possible, minimizing the overall visual impact. The major materials used in the station buildings would be masonry, steel, and glass. Landscaping would be designed to provide protection from the elements without obscuring visibility. Landscaping would be inviting both to the users of the stations and to the passers-by, using small trees and low shrubs which are easily maintained. The new stations would be visible from their street access points and from nearby bridges.

The Proposed Project would require noise mitigation, usually consisting of noise barriers, to protect sensitive receptors (such as residences) from increases in train noise. Noise barriers would range from six to 12 feet tall and would block the view of the right-of-way from adjacent homes. While this would reduce the visibility of the green space surrounding the right-of-way, it would also prevent any further visual impacts by obscuring the trains and rails that would otherwise be visible from residential back yards.

The Proposed Project would not have a significant effect on the local visual environment. The changes proposed would occur in urbanized areas within and adjacent to the existing right-of-way and would have little overall visual impact on the public. The most significant change would be the loss of forested areas along the right-of-way, reducing the green space visible from local residential areas. The addition of landscaping at the stations and both on and above the retaining walls would reduce the overall visual effect of vegetation losses. The proposed noise barriers would block the view of the right-of-way for adjacent

homes and prevent any further visual impacts by obscuring the trains and rails that would otherwise be visible from residential back yards.

7.9 Historic Resources

The FTA is the lead Federal agency for the Green Line Extension Project with responsibility for compliance with Section 106 of the NHPA of 1966 and other Federal statutes. The Draft Environmental Assessment filed under NEPA addresses compliance with Section 106 of the NHPA and Section 4(f) of the Department of Transportation Act of 1966. Potential impacts to historic resources from the Proposed Project would remain the same as those analyzed in the DEIR/EA.

The Proposed Project would impact historic resources by relocating the existing Lechmere Station, which is recommended in the *Historic and Archaeological Resources Reconnaissance Survey Technical Report*[2] as potentially eligible for the National Register of Historic Places, to the north side of the O'Brien Highway in Somerville. This constitutes an "adverse effect" under Section 106 and a "use" under Section 4(f). The DEIR/EA documented that there are no feasible and prudent alternatives to the use of the Lechmere Station, and that adverse effects cannot be avoided.

Relocated Lechmere Station and associated roadway and busway improvements have long been intended to be constructed as part of the NorthPoint development project. However, due to the uncertainty surrounding the future of the NorthPoint project, the Commonwealth has included the planning for the relocation of Lechmere Station and area roadway improvements into the Green Line Extension Project. The new Lechmere Station would be relocated and elevated, situated on a new and realigned viaduct on the east side of Monsignor O'Brien Highway/Route 28. Once the relocation is complete, the existing Lechmere Station would be demolished and cleared, and the area would be made available for potential future redevelopment.

A draft MOA has been developed that specifies the measures that would be implemented by the FTA to mitigate the adverse effects. Mitigation measures include archival photographic documentation for recording purposes and historical interpretation. In its comment letter on the DEIR/EA, the Massachusetts Historical Commission (MHC) requested that the FTA complete its identification, evaluation and consultation for the undertaking and make a

2 Public Archaeology Laboratory, *MBTA Green Line Extension Project, Historic and Archaeological Resources Reconnaissance Survey*, Volumes I and II. October 2008.

finding of effect prior to finalizing the MOA, which could be a programmatic agreement including a future extension to the Mystic Valley Parkway/Route 16.

Due to their location primarily within the existing right-of-way and their design, the remaining proposed stations would have no effect or no adverse effect on historic properties in the surrounding APE.

The Proposed Project would potentially affect one archaeological sensitive area needed for the proposed Brickbottom Station. This sensitive area is documented as having the potential to contain significant belowground remains associated with mid-late nineteenth-century worker housing that characterized the Joy Street section of Somerville during the late industrial period.

The Option L maintenance and storage facility may also contain deeply buried archaeologically sensitive strata that could be impacted by construction associated with the proposed new vehicle maintenance building. Mitigation measures for archaeological sites that would be adversely affected by construction activities would include an archaeological data recovery program designed in accordance with state and Federal guidelines and standards for the excavation of National Register-eligible archaeological sites. Should any significant and National Register-eligible archaeological resources be identified during the intensive survey or subsequent site evaluation testing, measures to avoid, minimize, or mitigate any adverse effects of the Project on the National Register-eligible resource(s) would need to be determined by the FTA and MassDOT, in consultation with the MHC and other consulting and interested parties.

7.10 Hazardous Materials

The Proposed Project would require construction in areas where contaminated soils or groundwater are likely to be present in the vicinity of the rail right-of-way or proposed stations and where soil and/or groundwater remediation may be required as the Project design progresses. The remediation includes removing contaminated soil and pumping contaminated groundwater in accordance with the provisions of the MCP, MGL Chapter 21E and 21C, and the Federal RCRA.

The analysis of proposed Option L maintenance and storage facility for the FEIR determined that construction at this site may encounter seven RECs hazardous releases.

The Proposed Project requires construction in seven areas which collectively contain 23 RECs. These include off-site properties where releases have occurred but have been cleaned up or where there are underground storage tanks that are unlikely to have leaked; properties such as those with potential sources of oil and hazardous material with limited or inconclusive information; and sites such as those with confirmed soil, groundwater, and/or indoor air impacts that were reported to MassDEP and have undergone some type of cleanup or remain an active case.

The Proposed Project would have an environmental benefit by remediating sites that contain "high impact" RECs. Three high-impact sites would be cleaned as part of the proposed Green Line Extension Project.

Mitigation measures during construction on sites with RECs include special handling, dust control, and management and disposal of contaminated soil and groundwater in order to prevent construction delays and to provide adequate protection to workers and any nearby sensitive receptors. All response actions must ensure that any nearby or adjacent receptors are adequately protected.

7.11 Indirect and Cumulative Impacts

The DEIR/EA evaluated the consistency of the Project with ongoing and planned projects and evaluated the indirect and cumulative effects of the Proposed Project by topic. Potential indirect and cumulative impacts from the Proposed Project would remain the same as those analyzed in the DEIR/EA.

Indirect impacts are defined as "effects which are caused by the [proposed] action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to changes in the pattern of land use, population density, or growth rate…" For this analysis indirect effects are defined as potential land use impacts of the Proposed Project. In comparison, direct land use impacts are displacements of properties required for the Project.

Cumulative impacts are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time." Cumulative impacts include the direct and indirect impacts of a project together with the reasonably foreseeable future actions of others.

The Proposed Project is not likely to generate additional regional growth in jobs or population. However, it may affect where that growth occurs, the form of the growth, and the pace of redevelopment.

The Green Line Extension Project is proposed for an area that is already densely developed. The extension of rail service through this area provides opportunities for the corridor cities' to modify their zoning and create infill development, with opportunities for more housing and other changes that Somerville is already contemplating. The Proposed Project would support a number of major redevelopment projects that are currently planned and underway near the proposed station sites, particularly in the NorthPoint area of Cambridge. Improved mobility, access to a wider range of transportation options, and less traffic congestion would make these projects particularly appealing.

This section describes the potential indirect effects on land use within a ½-mile radius of each proposed station site. This represents the maximum distance riders are willing to walk.

Land Use – The Proposed Project is likely to result in higher density redevelopment, more TOD, and lower on-site parking requirements in areas that are within walking distance of the stations. The following station areas have the greatest potential for higher density redevelopment and TOD: relocated Lechmere, Brickbottom, and Union Square.

Transportation and Traffic – The Green Line Extension Project would provide a new transit option northwest of NorthPoint that would mitigate potential increases in automobile traffic from continued growth and redevelopment in the Project corridor. Combined with the Community Path and the Alewife Brook Parkway to Mystic Valley Path, the Green Line Extension would improve the regional transportation network and reduce regional traffic and congestion.

Property Values – Property values are likely to increase in areas within walking distance of the stations. However, the increases are likely to be relative, as the Project corridor is already highly desirable, and housing affordability is already a concern. The greatest increases are likely to occur in areas that are planned for significant redevelopment: Union Square, Boynton Yards, the Brickbottom District, and the Inner Belt District. Public policy to preserve affordability for moderate-income residents and small businesses should be implemented to mitigate transit-related increases in land values.

Economy – Continued transition away from the industrial and trade sectors toward the services, knowledge-based industries, life sciences, technology, and the arts is anticipated and is supported by public policy. Planned and Proposed

Projects that would expand employment centers in the corridor (redevelopments in East Cambridge, Brickbottom and Inner Belt districts, Union Square, and Boynton Yards) would support this trend and are more likely to proceed with the existence of the Green Line Extension.

Neighborhoods – Redevelopment of underused land in the Project corridor would be enhanced by the addition of a new and improved transit alternative. The greatest changes would likely occur in the Brickbottom and Inner Belt districts and in Boynton Yards, where planning is underway for potential redevelopment of these lower rent, commercial/industrial neighborhoods as mixed-use employment centers. Public policy to preserve affordability for moderate-income residents and small businesses should be implemented to minimize impacts of redevelopment on existing neighborhoods.

Environmental Justice – Environmental justice populations would benefit from the addition of a reliable transit alternative that would provide more opportunities to live and work in places throughout the region. However, increases in land values near new stations, particularly around Brickbottom and Union Square, may impact small businesses and limit affordable housing opportunities. Public policy to help preserve small businesses and maintain housing affordability should be implemented to help maintain diverse communities in the corridor.

7.12 Summary

The DEIR/EA evaluated the Project's impacts – both beneficial and adverse – on natural and human resources. The analysis of the proposed Green Line Extension with respect to the maintenance and storage facility, College Avenue Station, and Lechmere Station described in this FEIR shows that the benefits and impacts of the Proposed Project are as described in the DEIR/EA, with only minor changes.

As described in this FEIR, the Proposed Project consists of extending Green Line service along the Medford Hillside Branch from the relocated Lechmere Station to the College Avenue Station, with four intermediate stations (Brickbottom, Gilman Square, Lowell Street, and Ball Square). The Union Square Branch would have one station, at Union Square. The Green Line Extension would be constructed entirely within existing railroad rights-of-way, which would require that the existing commuter rail tracks be shifted and that several roadway bridges over the rail right-of-way be widened. A maintenance and storage facility would be constructed in Somerville at the Option L site. The Proposed Project, as analyzed in the DEIR/EA and this FEIR, meets the state Air Quality regulatory criteria and the requirements of the SIP.

Since the publication of the DEIR/EA, two substantive changes have been made to the Proposed Project:

- The maintenance facility is proposed at the Option L site, and is no longer proposed at the Yard 8 site.
- The relocated Lechmere Station has been redesigned in response to comments on the DEIR/EA, with reduced parking and modified access.

These changes have not substantively changed the project impacts, and have reduced impacts in some categories.

The Proposed Project would provide transportation benefits, unchanged since the DEIR/EA:

- Substantially increasing transit access to environmental justice and disability populations;
- Focusing regional transportation investment funds into established environmental justice communities, connecting residents to jobs and services in Boston and Cambridge and strengthen business and residential districts in the corridor;
- Making connections from bicycle facilities directly to proposed stations, when the opportunity is available and providing ample bicycle parking at the Proposed Project station locations to accommodate and encourage commuting by bicycle;
- Reducing daily VMT by 25,018, improving air quality and providing zero-emission transportation capacity for anticipated growth.

With the mitigation measures committed to by MassDOT and the MBTA, the Proposed Project would have measurable benefits in several categories:

- Improving many intersections for traffic and pedestrian movements;
- Lowering future noise levels at locations along the existing commuter rail lines due to the noise barriers;
- Keeping future vibration levels at or below existing levels for commuter trains and in reducing future vibration from Green Line trains below the impact criteria (72 VdB for commuter rail and 75 VdB for Green Line trains);
- Remediating several sites that contain contaminated soils.

The Proposed Project would also have indirect social and economic benefits:

- Decreasing low intensity commercial and light industrial uses in the Project corridor and increase mixed-use, high-density TOD, particularly at Union Square, Brickbottom Station, and Ball Square Station;
- Providing socioeconomic benefits due to increased transit access, which increases both the potential for local commerce and the potential for area residents to commute to jobs elsewhere.

Further analysis completed since the DEIR/EA filing, including an analysis of environmental impacts of the Option L maintenance and storage facility, the College Avenue Station as a terminus, and the relocated Lechmere Station, revealed the following changes in environmental impacts:

- Additional annual property tax revenue reduction of $322,440 in Somerville from the Option L maintenance and storage facility;
- Reduction of impervious surfaces by 3.2 acres, improvement in water quality and decrease in stormwater runoff from the Option L maintenance and storage facility;
- Displacement or relocation of 74 jobs in Somerville for the proposed Option L maintenance and storage facility;
- Slightly higher noise from train movements in and out of the yard at Option L at the southwest façade of the Brickbottom Artists Building than at Yard 8 due to the presence of a tight radius curve on the Medford Lead track.
- Slightly higher noise at the Hampton Inn Hotel and the Glass Factory Condominiums from train movements in and out of the yard at Option L due to stationary cars in the south yard operating using auxiliary equipment;
- An additional seven RECs hazardous releases to be remediated at the proposed Option L maintenance facility.

8

Draft Section 61 Findings and Mitigation Commitments

8.1 Introduction

The Secretary's Certificate requested that the FEIR include:

- A distinct draft Section 61 finding for each state agency action that contains:
  - A clear commitment to mitigation, a schedule for implementation;
  - An estimate of the individual costs of the proposed mitigation; and
  - An identification of the parties responsible for implementing the mitigation.
- A conceptual plan for evaluating, monitoring, and compensating affected parties along the corridor that includes:
  - A specific emphasis on, but not limited to, noise, vibration, and land acquisition impacts; and
  - Mitigation measures associated with the future ongoing operations of the Green Line Extension and impacts uniquely limited to the construction period.

This chapter presents MassDOT's proposed mitigation program to address adverse environmental impacts associated with construction and operation of the proposed Green Line Extension Project. This chapter also includes draft Section 61 Findings for the Proposed Project, as specified above.

Typically, transit projects such as the Green Line Extension Project evaluate the potential impacts of the Proposed Project using standard analytical measures and methods approved by the FTA and relevant state agencies, as was done in Chapter 5, *Environmental Consequences*, of the DEIR/EA and updated in Chapter 7, *Summary of Proposed Project Benefits and Impacts*, of the FEIR. Mitigation measures are typically developed based on these standard methods

and legal requirements, and are the basis for the Project's mitigation commitments (as articulated in Chapter 6, *Draft Section 61 Findings and Mitigation Commitments*, of the DEIR/EA and summarized in Chapter 7, *Summary of Proposed Project Benefits and Impacts,* of the FEIR).

Specific mitigation elements that are subject to FTA regulations and guidelines include noise, vibration, and land acquisition (which is governed by the Uniform Relocation Act). The Uniform Act stipulates how the value of property acquisition must be established, and requires FTA to compensate land owners for the fair market value of their property. MassDOT is required to follow the procedures established by the Uniform Act for any property acquisition.

This requirement of the Certificate appears to require MassDOT to monitor noise and vibration during and after construction (with the proposed mitigation measures in place), evaluate whether the actual noise and vibration levels correspond with the modeled values, and somehow compensate property owners for any noise or vibration in excess of the modeled mitigated values. Presumably, this implies that MassDOT would compensate property owners for any decrease in property value due to noise or vibration, rather than (as would normally be the case for MBTA projects) installing additional noise or vibration mitigation measures within the right-of-way or offering the homeowner additional sound insulation.

MBTA would monitor noise and vibration after service starts to determine future noise levels generated by the Green Line Extension and the relocated commuter rail. If noise levels are found to be higher than the projections, the MBTA would investigate the cause and take appropriate corrective action. It is worthwhile to note that when conducted for the Greenbush Line, projections made based on measurements of actual MBTA commuter rail trains on the Greenbush Line showed that there were no locations where actual noise levels exceeded the pre-construction modeled levels.

8.2 Project Benefits

The Proposed Project is expected to generate 52,000 new daily boardings and alightings at the Project's seven stations and generate new systemwide transit ridership of 7,900 boardings per day and a reduction of 25,018 VMTs per day (projected to the year 2030). The increased transit access and ridership would improve corridor mobility, improve traffic conditions, improve regional air quality, increase services to environmental justice populations, and support future smart growth initiatives and sustainable development.

8.3 Overview of Project Mitigation Measures

This section summarizes the mitigation measures proposed to prevent or reduce environmental impacts.

8.3.1 Traffic

By 2030, regardless of the Green Line Extension Project, traffic signal timing and phasing would be inadequate to accommodate the projected traffic demands at a number of locations. The Project would include optimizing traffic signal timing and phasing at all signalized study area intersections to maximize the efficiency of these locations.

Pedestrian Mitigation

Mitigation measures are necessary to accommodate efficient pedestrian access to the proposed Green Line Extension stations. Mitigation measures include:

- Installing crosswalks, wheelchair ramps, and appropriate warning signage;
- Increasing pedestrian walk time;
- Improving existing crosswalk markings and repairing existing pedestrian signal equipment;
- Signalizing side street crossings and increase walk time on main streets; and
- Conducting signal warrant analyses and, if warranted, installing signals.

Under existing conditions, 18 signalized intersections do not currently provide enough time (as defined in the MUTCD, the ADA and associated state regulations) for pedestrians to cross the street before the flashing "Don't Walk" signal ends. In total, pedestrian mitigation is proposed at 33 locations. In some cases, pedestrian mitigation is proposed at locations that were not otherwise studied as part of this analysis. These locations were identified for mitigation as part of the regional pedestrian analysis, as documented in DEIR/EA Appendix F. These measures are presented in Table 8-1.

Table 8-1 Proposed Project Pedestrian Mitigation Measures

Intersection	Proposed Mitigation
Boston Avenue at North Street	Upgrade pedestrian signal heads and increase pedestrian walk/flashing don't walk time
Boston Avenue at Winthrop Street	Restripe crosswalk markings
Boston Avenue between Winthrop Street and College Avenue (mid-block)	Install warning signage for mid-block crossing
Boston Avenue at Harvard Street	Restripe crosswalk markings
Powder House Rotary	Increase pedestrian walk/flashing don't walk time
Boston Avenue at Broadway	Install crosswalk across Broadway
College Avenue between Boston Street and Frederick Avenue (mid-block)	Conduct signal warrant analysis and install pedestrian signal for crossing
College Avenue at George Street	Restripe crosswalk markings and install wheelchair ramps
Main Street at George Street	Install crosswalk across George and install wheelchair ramps
Main Street at Mystic Valley Parkway Ramps	Restripe crosswalk markings
Main Street at Harvard Street	Restripe crosswalk markings
Main Street at Mystic Avenue	Restripe crosswalk markings
Medford Street at Broadway	Increase pedestrian walk/flashing don't walk time
Medford Street at Lowell Street	Install crosswalk across Medford Street (south)
Medford Street at Central Street	Repair pedestrian signal head and increase pedestrian walk/flashing don't walk time
Medford Street at School Street	Increase pedestrian walk/flashing don't walk time
Medford Street at Pearl Street	Conduct signal warrant analysis and if warranted install pedestrian signal for crossing
Medford Street at Walnut Street	Increase pedestrian walk/flashing don't walk time
Medford Street at Highland Avenue	Signalize side street crossings. Increase pedestrian walk/flashing don't walk time
Highland Avenue at Lowell Street	Increase pedestrian walk/flashing don't walk time
Highland Avenue at Central Street	Increase pedestrian walk/flashing don't walk time
Washington Street at McGrath Highway	Incorporate pedestrian crossings into traffic signal phasing and install appropriate equipment
Washington Street at Tufts Street	Conduct signal warrant analysis and if warranted install pedestrian signal for crossing
Washington Street at Inner Belt Road	Increase pedestrian walk/flashing don't walk time
Medford Street at Somerville Avenue/ McGrath Highway	Incorporate pedestrian crossings into traffic signal phasing and install appropriate equipment
Washington Street at Somerville Avenue/Prospect Street	Increase pedestrian walk/flashing don't walk time
Washington Street at Somerville Avenue/Webster Street	Increase pedestrian walk/flashing don't walk time
Washington Street at Kirkland Street	Increase pedestrian walk/flashing don't walk time
Prospect Street at Webster Street	Install a crosswalk across Prospect north. Increase pedestrian walk/flashing don't walk time. Incorporate unsignalized crossings into traffic signal and install appropriate equipment.
O'Brien Highway at Third Street	Provided updated pedestrian crossing timing and phasing
O'Brien Highway at Water Street	Install a new crosswalk across O'Brien Highway and provide a new signalized pedestrian crossing
O'Brien Highway at North First Street	Providing new pedestrian crossing timing and phasing
Cambridge Street at First Street	Providing new pedestrian crossing timing and phasing

Traffic Mitigation

Several intersections would require additional physical mitigation to address adverse impacts, caused by the Project's increased vehicular traffic, as described in the following sub-sections.

Boston Avenue at Winthrop Street

Impacts at Boston Avenue and Winthrop Street would be mitigated by restriping the Boston Avenue northbound approach (currently a single-lane approach) to provide an exclusive left-turn lane and a shared through/right-turn lane. Signal timing and phasing changes would also be implemented. Approximately 12 parking spaces along Boston Avenue would be removed for this improvement. It is anticipated that level of service would improve at this intersection from LOS F to LOS D during the evening peak hour as a result of this mitigation, which is when traffic operations at this location are at their worst. The improvement would improve queuing in the northbound direction at the intersection during other times of the day, but not substantially change level of service since it is expected to operate at an overall acceptable level (LOS D or better) during the rest of the day.

Boston Avenue at College Avenue

Boston Avenue at College Avenue would be mitigated by widening College Avenue westbound to provide an exclusive right-turn lane and a shared left-turn/through lane. Signal timing and phasing changes at this location would also be incorporated. To accommodate this improvement, the College Avenue bridge over the railroad tracks would be widened. Since the bridge is already slated for reconstruction as part of the Project, changes can be made without additional construction impacts. It is anticipated that level of service would improve at this intersection from LOS F to LOS D during the critical evening peak hour with this mitigation. The improvement would improve queuing at the intersection during other times of the day, but not substantially change level of service since it is expected to operate at an overall acceptable level (LOS D or better) during the rest of the day.

Washington Avenue at McGrath Highway

A new traffic signal phasing sequence is proposed at this intersection to incorporate a pedestrian phase into the traffic signal (although this is a signalized intersection, pedestrian crossings at this location are not part of the traffic signal). This change would likely require new traffic signal equipment and new wiring to connect the traffic signal heads to the control cabinet. With these improvements

in place, it is anticipated this intersection would remain at LOS E rather than degrade to LOS F during the morning and evening peak hours.

Prospect Street at Somerville Avenue

To accommodate Project-related pedestrian traffic at this location, pedestrian crossing times would increase, which would cause an adverse impact to overall vehicular traffic operations (i.e. increased delay) during at least one peak hour. There is no opportunity at this location to increase capacity by adding lanes or changing lane allocation. However, traffic and pedestrian signal timings could be further adjusted to balance the needs of pedestrians and motorists once the Project is in service.

Washington Street at Somerville Avenue/ Webster Street

To accommodate Project-related pedestrian traffic at this location, pedestrian crossing times would increase, which would cause an adverse impact to overall vehicular traffic operations (i.e. increased delay) during at least one peak hour. There is no opportunity at this location to increase capacity by adding lanes or changing lane allocation. However, traffic and pedestrian signal timings could be further adjusted to balance the needs of pedestrians and motorists once the Project is in service.

Medford Street at Pearl Street

This unsignalized intersection processes a high volume of traffic, currently operates at LOS F during the morning peak hour, and would degrade to LOS F during the evening peak hour by 2030, with or without the Project in place. The number of pedestrians crossing Medford Street would increase and would require a crosswalk to accommodate pedestrian demands.

A traffic signal would be installed to accommodate changes to this intersection as a result of the Project. Pearl Street would be controlled by the traffic signal and crosswalks would be striped on the south (Medford Street) and east (Pearl Street) approaches to the intersection. Due to the intersection's proximity with School Street, the two traffic signals would operate as a coordinated system. With the proposed improvement, the intersection of Medford Street and Pearl Street would operate at LOS B during both the morning and evening peak hour.

O'Brien Highway Reconstruction

The Future-Build NorthPoint development is assumed to be in place by 2030, the design year for the Green Line Extension transportation analysis. By 2030, it is also assumed that all mitigation associated with the NorthPoint development would be in place. This includes reconstructing O'Brien Highway from Third Street to Museum Way (including the midblock pedestrian crossing west of Land Boulevard) and constructing internal NorthPoint streets as delineated in the NorthPoint special permit.

A number of the mitigation measures associated with NorthPoint are necessary to support the relocation of Lechmere Station across O'Brien Highway. With the delay of the NorthPoint development, these mitigation measures would be undertaken by MassDOT as mitigation for the Green Line Extension. Specifically, the following measures are proposed:

- Reconstruct O'Brien Highway at its intersection with Third Street to restrict westbound left-turns from O'Brien Highway to Third Street, provide an upgraded pedestrian crossing, new signal timing, and new phasing.
- Reconstruct O'Brien Highway at its intersection with Water Street to remove the median and allow eastbound left-turns from O'Brien Highway to Water Street. Left-turns from Water Street would be allowed on an interim basis until NorthPoint is constructed and then restricted once NorthPoint is built. A new crosswalk would be provided on the south side of the intersection and the intersection would be signalized.
- Reconstruct O'Brien Highway at North First Street and East Street:
  - First Street would be extended to connect to O'Brien Highway, creating a new signalized intersection.
  - Eastbound left-turns onto North First Street (into the new station) would be prohibited. This movement would be accommodated at Water Street.
  - Westbound left-turns from O'Brien Highway to First Street and Cambridge Street would occur at this intersection under the proposed mitigation.
  - East Street would be reconstructed to be a right-turn in/right-turn out driveway and the median extended along O'Brien Highway to prohibit other movements. The existing traffic signal would be removed.
- Reconstruct the intersection of Cambridge Street and First Street, including new signal timing and phasing.
- Reconstruct First Street between Cambridge Street and O'Brien Highway to make the roadway one-way eastbound to O'Brien Highway southbound.

The proposed improvements are necessary to support vehicular traffic and pedestrian crossings associated with the relocation of Lechmere Station. Traffic signal wiring would extend roughly to East Street, to be tied into by the NorthPoint proponent in order to complete the mitigation measures committed to along O'Brien Highway as part of their special permit.

Parking Enforcement Mitigation

The lack of available long-term parking at the Green Line Extension stations may encourage some motorists to park on local streets. Increasing parking enforcement or changing local parking restrictions to restrict commuter parking would be effective in reducing neighborhood impacts. MassDOT would work with the affected communities to develop acceptable parking enforcement plans for the areas within one-half mile of the stations in order to limit potential impacts.

8.3.2 Noise

In the absence of mitigation, a total of 164 noise-sensitive receptors would be exposed to noise impact by the Proposed Project. These include 121 moderate impacts and 43 severe impacts at single-family and multi-family residential buildings, moderate impact at three institutional buildings (Tufts Science and Technology Center, Outside the Line Artist's Studio and Bacon Hall at Tufts University), moderate impact at Trum Playground and severe noise impact at the Walnut Street Center (a non-profit support center for adults with developmental disabilities) near Union Square.

MassDOT would mitigate both moderate and severe noise impacts wherever feasible and wherever existing noise levels are above 65 dBA, based on FTA noise mitigation guidance. At locations with no outdoor areas of frequent human use (as defined per FTA), noise mitigation would be considered for interior spaces. Some of the large buildings, however, may have a greater outdoor-to-indoor sound reduction than for typical buildings (about 25 dB with windows closed). If it can be established that there is indoor activity only and that the performance of these windows is sufficiently better than normal, sound insulation mitigation may not be necessary. Mitigation would be considered based on whether interior maximum single-event (train pass-by) noise levels (Lmax) are above 65 dBA or whether interior day-night sound levels from Project sources (Ldn) are above 45 dBA.

To mitigate noise impact from train operations, noise control would be considered at the source, along the sound path, or at the receiver. Source noise control options may include special hardware at turnout locations, relocating special trackwork away from sensitive areas and using continuous welded rail.

Noise barrier construction is the most common sound path noise control treatment and can be very effective at reducing noise levels in the community. Noise control at the receiver can also be achieved by using sound insulation treatments at residences and institutional buildings. Sound insulation would be considered an effective mitigation measure if it is possible to improve the noise reduction of the existing building by five decibels or more and provide interior noise levels of 65 dBA or less (Lmax or maximum noise level) from transit sources. Proposed mitigation recommendations would be refined further during the design process of the Project.

For many locations along the MBTA Fitchburg and Lowell Lines, noise barriers are a feasible and effective means of noise mitigation because the existing right-of-way is lower than sensitive receptors for substantial portions of the Project. Noise barriers would be constructed with an absorptive surface to minimize the potential of sound reflecting off barriers to sensitive locations on the opposite side of the tracks. Table 8-2 shows a summary of proposed noise barrier mitigation. This table includes the barrier length, side of tracks, barrier height, and range of noise reduction and the general location of the barrier. The areas of impact and proposed noise barrier locations are shown in Figures 7-1 through 7-5.

Noise barriers ranging between six and 12 feet in height would be effective in reducing noise levels from the Project by generally seven to 11 decibels. The 18 noise barriers (10,750 feet in length and approximately 90,000 square feet in area) would cost approximately $2.7 million dollars based on $30 per square foot of installed noise barriers not counting design and inspection costs.

Near College Avenue Station, a noise barrier 1,000 feet long, approximately six feet in height on a retaining wall along the right-of-way would be effective in mitigating potential noise impact at receptors on Burget Avenue and Brookings Street (noise barrier # 16). Since the additional noise at these sensitive receptors due to College Avenue Station being a terminal station is small, this noise barrier is not required specifically due to College Avenue Station being a terminal station for the Proposed Project. Future noise levels from both commuter and Green Line trains are expected to be reduced nine to 11 decibels with this barrier and future noise levels are expected to be lower than existing levels.

Additionally, refinements in mitigation related to the new Option L maintenance facility location in conjunction with the redesigned Lechmere Station have resulted in additional recommended mitigation including noise barriers totaling 900 feet in length (two barrier each 450 feet long) and 450 feet (900 track-feet) of ballast mat or resilient rail fasteners, which would be effective in minimizing the potential for noise impact at Glass Factory Condominiums. Since the contribution of noise from the proposed Option L maintenance and storage facility is low compared to mainline operations, this noise barrier is not required

due to the maintenance facility alone. The heights of these barriers depend significantly on the guideway design and how close to the trains they can be constructed. Ideally, the barriers would be located within four feet of the near rail or closer. The heights and effectiveness of these barriers would be refined during the Preliminary Engineering phase of the Project.

Table 8-2 Summary of Proposed Project Noise Barrier Mitigation

Barrier Number	Length (feet)	Side of Tracks	Barrier Height (feet)	Noise Reduction (dBA)	Location
1	450[b]	West	TBD	TBD	On elevated guideway edge and between inbound and outbound tracks
2	300	West	7	7 to 17	On existing retaining wall
3	500	East	7	7 to 14	Right-of-way limit
4	750	East	6 to 10	9 to 16	Right-of-way/Trackside
5	850	East	9	10 to 14	Right-of-way limit
6	300	West	7	7 to 14	Right-of-way limit
7	300	East	7	9 to 11	Right-of-way limit
8	250	West	6 to 12	7 to 9	On proposed retaining wall
9	1,050	East	7 to 10	10 to 15	Right-of-way limit
10	1,000	East	8	9 to 15	Right-of-way limit
11	400	West	8	8 to 12	On proposed retaining wall
12[a]	100	East	8	10 to 14	Right-of-way limit
13	400	East	8	10 to 14	Right-of-way limit
14	800	West	8	10 to 14	Right-of-way limit
15	1,200	East	10	6 to 15	On trackbed retaining wall
16	1,000	East	6	9 to 11	Right-of-way/retaining wall
17	250	South	8	10 to 14	Trackside
18	400	North	8	10 to 14	Trackside

Source: Harris Miller Miller & Hanson Inc., August 2010.
a There is an existing 6-foot barrier at this location.
b Barrier includes segment on guideway edge and in between inbound and outbound tracks (two segments 450 feet in length each)

At some locations projected to be exposed to noise impact, noise barriers as described above may not be a feasible or effective means of mitigation. These locations include the:

- Brickbottom Lofts;
- Apartment complex on Pearl Street (near Medford Street);
- Visiting Nurses Association;
- Tufts Science and Technology Center;

- Outside the Lines Art Studio;
- Tufts Bacon Hall; and
- Walnut Street Center in Union Square.

Some of these buildings have upper-floor residences that may not benefit from a potential noise barrier. For buildings that do not have significant outdoor land use, sound insulation mitigation would be considered during the Preliminary Engineering phase of the Project. Substantial improvements in building sound insulation (on the order of 5 to 10 dBA) can often be achieved by adding an extra layer of glazing to windows, by sealing any holes in exterior surfaces that act as sound leaks, and by providing forced ventilation and air conditioning so that windows do not need to be opened.

In order to best determine the most appropriate mitigation type for each of these individual properties, during the next phase of the Project, the existing outdoor-to-indoor noise reduction at these locations would be measured and assessed. An analysis would be made as to whether mitigation is required for buildings that do not have significant outdoor land use, if the noise reduction of the building could be improved by five decibels or more with sound insulation treatments or if noise barriers would be effective in reducing interior noise levels at these locations. Specific mitigation measures would be developed as they are appropriate to each individual structure during Preliminary Engineering.

Estimated costs for sound insulation depend on specific factors such as the existing noise reduction, existing HVAC systems and the number and size of windows and doors that would need to be replaced. The costs associated with potential sound insulation or noise barrier mitigation for these properties would be defined during the next phase of the Project.

The following mitigation measures would be applied where feasible to minimize temporary construction noise impacts:

- Avoiding nighttime construction in residential neighborhoods;
- Using specially quieted equipment with enclosed engines and/or high-performance mufflers;
- Locating stationary construction equipment as far as possible from noise-sensitive sites; and
- Constructing noise barriers, such as temporary walls or piles of excavated material, between noisy activities and noise-sensitive receivers.

The Secretary's Certificate included the requirement that the "FEIR should include a conceptual plan for evaluating, monitoring, and compensating affected parties along the corridor with a specific emphasis on, but not limited to, noise, vibration, and land acquisition impacts."

Typically, transit projects such as the Green Line Extension Project evaluate the potential impacts of the Proposed Project using standard analytical measures and methods approved by the FTA and relevant state agencies, as was done in Chapter 5 of the DEIR/EA and updated in Chapter 7 of the FEIR. Mitigation measures are typically developed based on these standard methods and legal requirements, and are the basis for the Project's mitigation commitments (as articulated in Chapter 6 of the DEIR/EA and summarized in Chapter 7 of the FEIR). The MBTA's experience is that this type of mitigation program is very successful and homeowners find that it provides a significant amount of noise reduction.

As was done for the Greenbush Line, the MBTA would monitor noise and vibration after service starts to determine noise levels generated by the Green Line Extension and the relocated commuter rail. If the levels are found to be higher than the projections, the MBTA would investigate the cause and take appropriate corrective action. It is worthwhile to note that when conducted for the Greenbush Line, projections made based on measurements of actual MBTA commuter rail trains on the Greenbush Line showed that there were no locations where actual noise levels exceeded the pre-construction modeled levels.

8.3.3 Vibration

The goal for mitigating potential vibration impact from the proposed Green Line Extension Project is to reduce future vibration below the impact criteria, which is 72 VdB for Green Line trains and 75 VdB for commuter trains. At some locations, mitigation measures that would reduce vibration levels five decibels or more would be considered reasonable and effective with the intention of keeping future vibration levels at or below existing vibration levels.

The effectiveness of specific vibration mitigation measures is dependent on several factors such as the component design, installation techniques, and axle loads of the trains and frequencies of concern. The following are vibration mitigation options proposed for locations along the proposed Green Line Extension Project shown in Table 8-3:

- Resilient rail fasteners connect the rails to the ties and may reduce vibration by 5 to 10 VdB.
- Ballast mats are rubber pads placed underneath the ballast and may reduce vibration levels 10 to 15 VdB.

- Resiliently supported ties are rubber pads placed underneath the ties and may reduce vibration 10 VdB.
- Floating slabs isolate train vibration from the surrounding ground with springs or rubber pads and may reduce vibration 15 VdB or more. Drawbacks towards floating slabs include difficulties in designing for heavy commuter trains, difficulties in designing for outdoor environments and the relatively high cost.
- Similar to noise, gaps in the rail increase vibration levels of the trains. Mitigation may include using special hardware or relocating turnouts and crossovers and using continuous-welded rail rather than jointed rail.
- Maintenance programs are important for controlling vibration. Rail grinding and wheel truing to maintain smooth rails and true wheels can be effective in reducing potential vibration impact.

The areas of impact and proposed vibration mitigation locations are shown in Figures 7-6 through 7-10. During the Preliminary Engineering phase of the Project, vibration measurements would be conducted at several properties expected to be impacted by vibration. These measurements would further refine the vibration reduction needed to mitigate potential impact. A vibration reduction goal for mitigation measures, such as ballast mats or resilient fasteners, would be specified in the bid documents. Suitable mitigation measures would be introduced into the Project to achieve the mitigation goal.

Assuming that both tracks of a particular rail line are mitigated, a total of 19,700 track-feet of vibration mitigation is proposed to mitigate potential impacts for the Proposed Project. An estimated cost for installed ballast mats is $3.5 million based on a cost of $180 per track-foot and an estimated cost for resilient fasteners is $5.9 million based on a cost of $300 per track-foot.

Special trackwork (turnouts and crossovers) cause local increase in vibration levels of up to 10 VdB. In addition to the locations of proposed vibration mitigation shown above, relocating special trackwork (turnouts and crossovers) away from sensitive receptors or using specially-engineered trackwork (flange-bearing or moveable-point frogs) would minimize potential vibration impact at some locations. Table 8-4 provides a summary of existing crossovers and turnout locations that are recommended for specially-engineered trackwork or relocation. These crossovers and turnout locations are shown on Figures 7-6 through 7-10.

Table 8-3 Summary of Proposed Project Vibration Mitigation[1]

Vibration Mitigation Location[2]	Length (feet)	Rail Line
1	450	Green Line
2	500	Green Line
3	300	Green Line
4	950	Commuter
5	800	Commuter
6	400	Green Line
7	200	Commuter
8	900	Commuter
9	600	Green Line
10	1,200	Commuter
11	400	Green Line
12	150	Commuter
13	1,100	Commuter
14	700	Commuter
15	200	Green Line
16	250	Commuter
17	250	Commuter
18	250	Green Line
19	250	Commuter

Source: Harris Miller Miller & Hanson Inc., August 2010.
1 Ballast mats or resilient fasteners.
2 See Figures 7-6 through 7-10

Table 8-4 Potential Vibration Mitigation Measures for Crossovers and Turnouts

Special Trackwork Location[1]	Type of Special Trackwork	Rail Line
A	Number 8 Double Crossover	Green Line
B	Turnout	Commuter
C	Number 8 Double Crossover	Green Line
D	Turnout	Commuter
E	Crossover	Commuter
F	Crossover	Commuter
G	Crossover	Commuter
H	Crossover	Commuter
I	Number 8 Double Crossover	Green Line
J	Turnout	Green Line

Source: Harris Miller Miller & Hanson Inc., August 2010.
1 See Figures 7-6 through 7-10

8.3.4 Water Quality/Stormwater

The Proposed Project would create approximately two acres of new impervious surfaces, including roofs, walkways, platforms, and other pavement for the new stations. Since the DEIR/EA, there has been a reduction in impervious surface for the overall Project as a direct result of the use of Option L for the maintenance facility location. Because part of the Option L site is currently covered by buildings and pavement but would be replaced with substantial areas of trackwork with pervious stone ballasted surface areas, the Option L maintenance facility would decrease impervious area by approximately 3.2 acres. Taking into consideration the increase in impervious surfaces at the station areas and the reduction in impervious surfaces at the maintenance facility, there would be no net increase in impervious surfaces as a result of the overall Proposed Project.

New and expanded stormwater management systems would be required to collect the runoff from these areas. These systems would discharge into the existing municipal stormwater drainage systems. Proposed stormwater management devices include:

- Deep sump catch basins to collect runoff from paved areas;
- Underdrains beneath the rail ballast to collect runoff within the rail corridor;
- Hydrodynamic particle separators to treat pavement runoff;
- Low Impact Development practices, where feasible, to maintain natural hydrology (e.g., raingardens to treat disconnected roof drainage and/or parking runoff);
- Underground infiltration/detention chambers to store and infiltrate runoff; and
- Overflow from the underground chambers to municipal storm drainage systems.

The proposed stormwater management system would include detention/ infiltration systems as needed to maintain existing flow rates at existing outfalls. The extent of infiltration for each system would be determined during a later phase of the design based on actual soil analysis at the proposed system location. The infiltration systems would be sized taking into consideration soil conditions, and the remaining volume of runoff would be stored and released through a controlled outlet to match the existing rate of flow. Where infiltration is not possible due to poor soils or high groundwater subsurface detention systems would be sized to maintain predevelopment flow rates at each design point**.**

The Massachusetts Stormwater Management Standards require controlling flow rates to prevent flooding and removing total suspended solids (TSS) to improve water quality. The proposed drainage system would include

detention/infiltration systems to maintain existing flow rates at existing outfalls. The extent of infiltration for each system would be determined for the final design based on actual soil analysis at the proposed system location. The remaining volume of runoff would be stored and released through an outlet control structure to match the existing rate of flow at each design point. Where infiltration/exfiltration is not possible due to poor soils or high groundwater, the subsurface detention system would be sized to maintain predevelopment flow rates at each design point. Maintaining existing flow rates would avoid exacerbating the existing effects of combined sewer overflows (CSOs) on the receiving waters.

TSS removal would not be necessary since the right-of-way would generate negligible TSS as it is not salted or sanded as roads and parking lots are. Where needed, TSS removal would be accomplished by way of proprietary water quality devices such as Vortechs units, which use whirlpool-like chambers to remove floating and suspended solids. These units would be installed prior to the proposed detention systems or before each connection to the existing drainage system. Each device would be sized to treat the 10-year flow rate at the proposed outfall and to maintain the predevelopment rate of flow in the existing drainage system.

With these measures in place, no increases in flooding or impairment of the receiving waters are expected.

MassDOT would prepare a detailed long-term operations and maintenance plan for the Proposed Project's stormwater management system. MassDOT would design a drainage system to meet MassDEP Stormwater Standards to the extent feasible, including meeting any applicable Total Maximum Daily Load (TMDL) requirements. MassDOT also acknowledges that the Proposed Project would be required to achieve requisite NPDES permit obligations, including MS4 requirements to implements construction site runoff controls, post-construction runoff controls, and pollution prevention/good housekeeping measures.

8.3.5 Historic Resources

The south end of the Project Area that intersects with the Cambridge steel elevated portion of the Lechmere Viaduct, which is eligible for listing in the National Register as part of the Viaduct, and would be impacted by the Proposed Project. In addition, removing the existing Lechmere Station structure and constructing a new station on the east side of O'Brien Highway/Route 28 would affect a property that is recommended as National Register-eligible. This work would require mitigation as stipulated in the MOA. The proposed Gilman Square Station would have an indirect effect on the Gilman Square Area and Central Hill Area through the introduction of new visual elements.

With the exception of these areas, direct permanent impacts from work within the existing railroad right-of-way is not likely to directly affect significant historic resources, as no significant resources are found inside the railroad right-of-way. However, a number of historic architectural resources immediately abut the right-of-way and would be indirectly affected by noise and vibration. Impacts to these historic structures could occur as a result of soundproofing, if the noise study found that noise mitigation was required.

Noise mitigation would include noise walls and sound insulation, treatments which in themselves have the potential for adverse effect. Noise walls that are proposed adjacent to the Susan Russell House, Michael Cotter House, and Hill-Michie Co. Auto Garage would be of a material and color that is compatible with the historic character of the properties to minimize any additional visual affect from noise walls. The introduction of new doors, windows, or other insulating treatments would be appropriate for the historic property and meet the Secretary of the Interiors Standards for Rehabilitation.

Mitigation would be provided for individual and district historic resources that are listed or eligible for listing in the National Register and that would be adversely affected by permanent aspects of the Project. Attention to the historic character of Somerville would be integrated into the design of stations, although the stations would not adversely affect historic properties. Mitigation at Lechmere Station, which is proposed to be demolished, would consist of archival documentation and consideration of salvage of architectural elements. Historic interpretive signage may also be included.

Affected historic properties proposed to be subject to sound insulation mitigation consist of the A & P Warehouse (Brickbottom Lofts) and Warner and Childs Garage (Tufts Bacon Hall). Vibration mitigation would consist of measures incorporated into the rail bed, ballast, and track design and therefore there would be no effects and no need for additional mitigation.

The Proposed Project would affect one archaeologically sensitive area, a potential mid-late nineteenth-century worker housing site at the proposed Brickbottom Station. There is also the potential for archaeologically sensitive strata below railroad and upper fill deposits in the Option L maintenance and storage facility area where the new vehicle maintenance building is proposed.

For archaeological resources, final design of the Proposed Project would seek to avoid the archaeologically sensitive areas discussed above. If avoidance through Project redesign is not possible, then subsurface testing as part of an intensive (locational) archaeological survey may be warranted in consultation with the FTA, MassDOT, and MHC. The intensive survey would be designed to locate and identify any potentially significant archaeological resources that may be impacted by the Project. The intensive survey would be conducted under a state

archaeological permit issued by the MHC/State Archaeologist following a research design and testing strategy developed specifically for each sensitive area according to the type of expected archaeological resource(s).

Should any significant and National Register-eligible archaeological resources be identified during the intensive survey or subsequent site evaluation testing, then measures to avoid, minimize, or mitigate any adverse effects of the Project on the National Register-eligible resource(s) would need to be determined by the FTA and MassDOT, in consultation with the MHC and other consulting and interested parties. Mitigation measures for archaeological sites that would be adversely affected by construction activities would include an archaeological data recovery program designed in accordance with state and Federal guidelines and standards for the excavation of National Register-eligible archaeological sites.

8.4 Section 61 Findings

These proposed Section 61 Findings for the Project have been prepared to comply with the requirements of Massachusetts General Laws, Chapter 30, Section 61, and in accordance with the MEPA regulations at 301 CMR 11.07(6)(k), which requires state agencies and authorities to review, evaluate, and determine the impacts on the natural environment of all projects or activities requiring permits issued by the state, and to issue findings describing the environmental impacts, if any, and certifying that all feasible measures have been taken by the Project Proponent to avoid or minimize these impacts. As described below, MassDOT has reviewed the environmental effects of the Proposed Project. Based on the review, MassDOT finds that all feasible measures have been taken first to avoid and then minimize those effects.

8.4.1 Project Description

The Green Line Extension Project is envisioned to provide service to Union Square and to Medford using a two-branch operation, both in existing commuter rail rights-of-way. One branch would operate from relocated Lechmere Station to Medford along the MBTA Lowell Line. This branch would begin at relocated Lechmere Station and head northwest, meeting the MBTA Lowell Line just south of Washington Street in Somerville. From Washington Street, the alignment would run parallel to the MBTA Lowell Line to Medford, terminating its route at Medford Hillside in the vicinity of College Avenue. The second branch would operate along the MBTA Fitchburg Line from Lechmere Station into a terminus at Union Square in Somerville. The Union Square Branch would begin at relocated Lechmere Station and head northwest, following the MBTA Fitchburg Line to Prospect Street in the Union Square area.

The route length would be about three miles to Medford Hillside with an approximately one-mile spur to Union Square. The primary infrastructure improvements of the Proposed Project would include relocating existing commuter rail lines, and constructing approximately four miles of new light rail track and systems, 11 bridge structures and a maintenance facility to support the extension service. The environmental impacts of the Proposed Project have been fully evaluated and are described in detail in the DEIR/EA, with supplemental information provided in this FEIR.

The Project would include one relocated Green Line station, six new Green Line stations, and a maintenance and storage facility (Option L). The stations include:

- Relocated Lechmere Station, Cambridge (relocated to the east side of O'Brien Highway);
- Union Square Station, Somerville;
- Brickbottom Station, Somerville;
- Gilman Square Station, Somerville;
- Lowell Street Station, Somerville;
- Ball Square Station, Medford; and
- College Avenue Station, Medford.

The Proposed Project for the Green Line Extension Project has been selected as it provides a balance of cost, ridership, and environmental impacts. MassDOT also believes that the Proposed Project would help the Commonwealth achieve its goal of providing expanded transportation services and improve regional air quality. The Proposed Project would meet all Project goals, would be operationally feasible, and would generate a high number of new systemwide transit trips.

8.4.2 History of MEPA Review

An EENF was submitted to the EEA on October 10, 2006. The Secretary of EEA issued a Certificate on the EENF on December 1, 2006, requiring a DEIR for the Proposed Project.

The DEIR/EA was submitted to the EEA on October 15, 2009, in compliance with the MEPA regulations (301 CMR 11.00). The MEPA Certificate was issued on January 15, 2010. This FEIR responds to the requirements of the Secretary's Certificate.

8.4.3 Related Permits and Approvals

The Proposed Project would require permits and approvals from several local, state and Federal agencies. Table 8-5 below lists the permits and approvals that are anticipated for the Proposed Project.

Table 8-5 Possible Permits or Approvals

Agency	Approval or Permit
FTA	Finding of No Significant Impact Section 4(f) Determination Section 106 Finding Memorandum of Agreement with MHC Federal funding approval
U.S. Environmental Protection Agency Region I	Compliance with NPDES Construction General Permit for stormwater discharges during construction Compliance with NPDES Small Municipal Separate Storm Sewer System (MS4) General Permit
Massachusetts Water Resource Authority (MWRA)	Direct Connect Permit for sewer connections Compliance with MWRA NPDES permit for stormwater discharges through the Combined Sewer Overflow system (Somerville CSO areas only) Massachusetts General Laws Chapter 30, Section 61 Finding
Massachusetts Historical Commission (MHC)	Review of Project for impacts to historic and archaeological properties and approval for compliance with M.G.L. Chapter 9, Sections 26-27C Memorandum of Agreement (with FTA and MassDOT) Section 61 Finding
MassDOT	State funding approval Section 61 Finding Memorandum of Agreement with MHC Access permits Approval and access permit for intersection and signal modifications, as appropriate
City of Medford	Approval for reconstruction of bridges and associated temporary closings/detours for construction Building permits as needed for station construction Approval and access permit for intersection and signal modifications, as appropriate
City of Somerville	Approval for reconstruction of bridges and associated temporary closings/detours for construction Building permits as needed for station construction Approval and access permit for intersection and signal modifications, as appropriate
City of Cambridge	Building permits as needed for station construction Approval and access permit for intersection and signal modifications, as appropriate

8.4.4 Summary of Mitigation Commitments

Potential permanent impacts resulting from constructing the Proposed Project would be mitigated to the extent feasible, as described in Chapter 5 of the DEIR/EA and summarized in Table 8-6. Anticipated, known costs related to each mitigation measure are also identified in this table.

Table 8-6 Project Mitigation Commitments

Human and Environmental Resources	Mitigation Measure	Implementation Schedule	Cost Estimate	Implementation Responsibility
Traffic	Provide roadway and signal modifications at ten specific intersections in order to prevent adverse traffic impacts from the Project. Revisit opportunities to reduce vehicular traffic associated with the addition of new stations during design.	Completion of construction[1]	$10 M	MassDOT/MBTA
	Provide pedestrian improvements at 33 specific locations to improve pedestrian flow and safety.	Completion of construction[1]	$800,000	MassDOT/MBTA
	Work with cities to develop station-area parking enforcement plans.	Completion of construction[1]	N/A	MassDOT/MBTA
	Work with the MBTA to evaluate opportunities to improve connections between the new stations and existing bus connections.	Prior to/Completion of construction[1]	N/A	MassDOT/MBTA
	Work with cities and applicable emergency personnel during design of intersection mitigation measures, as well as establishment of construction management and detour plans.	Prior to/Completion of construction[1]	N/A	MassDOT/MBTA
Noise	Provide noise mitigation in the form of noise barriers or sound insulation to mitigate severe noise impacts. Provide noise mitigation for moderate noise impact where existing noise levels are above 65 Ldn. Provide noise mitigation for impacts with no significant outdoor land use if interior day-night sound levels (Ldn) are above 45 dBA from Project sources or single-event maximum noise levels (Lmax) above 65 dBA.	Completion of construction[1]	$2.7 M (noise barriers), costs for sound insulation or noise barriers to be determined in next phase	MassDOT/MBTA
Vibration	Provide vibration mitigation in the form of ballast mats or resilient rail fasteners and relocated or specially-engineered special track to mitigate vibration impacts.	Completion of construction[1]	$3.5 M (mats), $5.9 M (fasteners)	MassDOT/MBTA
Hazardous Materials	Consult with MassDEP during design and commencement of construction to ensure planning and implementation of demolition and management of contaminated soils is consistent with applicable MassDEP regulations and recommendations.	Completion of construction[1]	N/A	MassDOT/MBTA

Table 8-6 Project Mitigation Commitments (continued)

Human and Environmental Resources	Mitigation Measure	Implementation Schedule	Cost Estimate	Implementation Responsibility
Land Use	Work with the community for the area of the future Mystic Valley/Route 16 to consider land use and station design elements.	Prior to construction	N/A	MassDOT/MBTA
	Complete the final design for the proposed Somerville Community Path between Lowell Street and the Inner Belt area. Work with City of Somerville to identify opportunities for state and Federal funding for construction of Community Path.	Prior to construction	$2 M	MassDOT/MBTA
Water Quality/ Stormwater	Prepare a Stormwater Pollution Prevention Plan (SWPPP).	Prior to construction	N/A	MassDOT/MBTA
	Install detention and infiltration systems to infiltrate peak runoff and to prevent any increase in peak flows to municipal stormwater drainage systems and to remove TSS from stormwater runoff prior to discharge.	During construction[2]	$455,000	MassDOT/MBTA
	Install hydrodynamic particle separators to treat pavement runoff.	During construction[2]	$255,000	MassDOT/MBTA
	Install Low Impact Development practices, where feasible, to maintain natural hydrology (e.g., raingardens to treat disconnected roof drainage and/or parking runoff).	Completion of construction[1]	TBD	MassDOT/MBTA
	Update the Operation and Maintenance (O&M) plan in the SWPPP to include a detailed outline of inspection and cleaning schedules for stormwater management practices, including detention areas and deep sump catch basins.	Completion of construction[1]	N/A	MassDOT/MBTA
	Implement all aspects of the SWPPP including recommendations in annual updates based on new or improved procedures or changes to operations.	Post-construction	N/A	MassDOT/MBTA
Visual Environment	Provide vegetation on and/or above retaining walls to minimize visual changes.	Completion of construction[1]	TBD	MassDOT/MBTA
	Work with affected communities on design of noise barriers and vegetated walls.	Prior to construction	N/A	MassDOT/MBTA

Table 8-6 Project Mitigation Commitments (continued)

Human and Environmental Resources	Mitigation Measure	Implementation Schedule	Cost Estimate	Implementation Responsibility
Historical and Cultural Resources	Perform archival documentation of historic structures to be removed or altered.	Prior to demolition	$30,000	MassDOT/MBTA
	Construct noise barriers with materials and colors compatible with adjacent historic properties.	Completion of construction[1]	N/A	MassDOT/MBTA
	Provide noise mitigation (sound insulation) for sensitive historic structures that cannot be protected using noise barriers.	Completion of construction[1]	N/A	MassDOT/MBTA
	Perform intensive archaeological survey before disturbing any archaeologically-sensitive areas.	Prior to construction	$50,000	MassDOT/MBTA
Public Involvement	Continue civic engagement opportunities during the design process. Provide transparent public information and outreach process once construction commences.	Completion of construction[1]	N/A	MassDOT/MBTA
	Engage interested parties in a station Design Working Group.	Prior to construction	N/A	MassDOT/MBTA
	Conduct land use workshops with affected communities to further identify community needs and issues near the proposed station areas.	Prior to construction	N/A	MassDOT/MBTA
Design	As design advances, facilitate future transit projects such as light rail expansion or connections to existing infrastructure to the extent possible.	Prior to construction	N/A	MassDOT/MBTA
	Include “green” design component (recycled or recyclable materials or incorporate vegetation) in design of proposed retaining walls.	Prior to construction	N/A	MassDOT/MBTA
	During design, refine Project designs to further minimize temporary and permanent impacts on local neighborhoods and property owners.	Prior to construction	N/A	MassDOT/MBTA
	Design all stations in compliance with ADA standards, Massachusetts AAB standards; MBTA’s settlement agreement with the Boston Center for Independent Living; applicable National Fire Protection Association standards.	Prior to construction	N/A	MassDOT/MBTA

1 Completion of construction (12/31/2014)
2 During construction (11/11/2011 – 12/31/2014)
TBD = To be determined during final design
N/A = Cost not applicable for this item

Temporary, short-term impacts from construction activities would be mitigated to the extent feasible. Appropriate construction mitigation measures would be incorporated into the contract documents and specifications governing the activities of contractors and subcontractors constructing elements of the Project. Prior to construction, MassDOT would prepare a detailed plan to address various construction period impacts through coordination with cites and appropriate emergency personnel. This plan would seek to avoid, minimize and mitigate potential impacts to vehicular traffic, pedestrian and bicycle traffic, on-street parking, public access, emergency access to local businesses and residences, dust, noise, odor, rodents and construction-related nuisance conditions. MassDOT would work with contractors to establish construction protocols. On-site resident engineers and inspectors would monitor all construction activities to ensure that mitigation measures are properly implemented. The construction mitigation measures are summarized in Table 8-7, and described in Section 3.7.6 of the DEIR/EA.

Table 8-7 Summary of Construction Mitigation Measures

Environmental Categories	Mitigation Measure	Implementation Schedule	Implementation Responsibility
Traffic	Temporary detours would be established to minimize traffic disruption due to construction.	During construction[1]	MassDOT/MBTA
	Bridge reconstruction would be timed so as to minimize temporary bridge closures and to ensure that adjacent bridges were not closed simultaneously.	Completion of construction[2]	MassDOT/MBTA
Noise	Use specially quieted equipment with enclosed engines and/or high-performance mufflers.	During construction[1]	MassDOT/MBTA
	Avoid nighttime construction in residential neighborhoods.	During construction[1]	MassDOT/MBTA
	Keep truck idling to a minimum.	During construction[1]	MassDOT/MBTA
	Route construction equipment and vehicles through areas that would cause the least disturbance to nearby receptors where possible.	During construction[1]	MassDOT/MBTA
	Fit any air-powered equipment with pneumatic exhaust silencers.	Prior to construction	MassDOT/MBTA
	Locate stationary construction equipment as far as possible from noise-sensitive sites.	During construction[1]	MassDOT/MBTA
	Construct noise barriers, such as temporary walls or piles of excavated material, between noisy activities and noise-sensitive receivers.	Prior to construction	MassDOT/MBTA
Vibration	Avoid nighttime construction in residential neighborhoods.	During construction[1]	MassDOT/MBTA
	Use alternative construction methods to minimize the use of impact and vibratory equipment (e.g. pile drivers and compactors).	During construction[1]	MassDOT/MBTA

Table 8-7 Summary of Construction Mitigation Measures (continued)

Environmental Categories	Mitigation Measure	Implementation Schedule	Implementation Responsibility
Water Quality/ Stormwater	Develop and implement a SWPPP in accordance with NPDES and MassDEP standards.	Prior to construction	MassDOT/MBTA
	Stabilize any highly erosive soils with erosion control blankets and other stabilization methods, as necessary.	During construction[1]	MassDOT/MBTA
	Reinforce slopes using a hydroseed mix with a resin base, native vegetation, or other approved methods.	During construction[1]	MassDOT/MBTA
	Use dewatering controls, if necessary.	During construction[1]	MassDOT/MBTA
	Install a gravel entrance to prevent sediment from being tracked onto roadways and potentially discharged to surface waters.	During construction[1]	MassDOT/MBTA
	Maintain construction equipment to prevent oil and fuel leaks.	During construction[1]	MassDOT/MBTA
Air Quality	Apply water to dry soil to prevent dust production.	During construction[1]	MassDOT/MBTA
	Use water for compaction in the fill areas and as a dust retardant in both the soil cut areas and haul roads.	During construction[1]	MassDOT/MBTA
	Follow existing MassDEP's Solid Waste and Air Quality Control regulations and MBTA retrofit procedures for construction equipment to reduce emissions.	During construction[1]	MassDOT/MBTA
	Comply with MassDEP's idling regulations. Post idling restriction signage on Project construction sites.	During construction[1]	MassDOT/MBTA

1 During construction (11/11/2011 – 12/31/2014)
2 Completion of construction (12/31/2014)

8.4.5 Proposed Section 61 Findings

The language in the following paragraphs is a proposed Section 61 Finding that extends to cover all potential impacts of the Project and could be adopted by the MassDOT, MHC, Massachusetts Water Resource Authority (MWRA), or other state agency.

Project Name: Green Line Extension Project
Project Location: Boston, Cambridge, Somerville, and Medford, Massachusetts
Project Proponent: Massachusetts Department of Transportation
EEA Number: 13886

The potential environmental impacts of the Project have been characterized and quantified in the EENF, DEIR, and summarized in this FEIR, which are incorporated by reference into this Section 61 Finding. Throughout the planning and environmental review process, the proponent has been working to develop measures to mitigate significant impacts of the proposed action. With the

mitigation proposed and carried out in cooperation with state agencies, the agency finds that there are no significant unmitigated impacts.

The proponent has summarized Project Mitigation and Construction Mitigation measures (Tables 8-6 and 8-7) that specify the mitigation measures that the proponent would provide.

Therefore, [AGENCY], having reviewed the MEPA filings for the Green Line Extension Project, including the mitigation measures summarized in Section 8.3, finds pursuant to M.G.L. C. 30, S. 61 that, with the implementation of these mitigation measures, all practicable and feasible means and measures would have been taken to avoid or minimize potential damage from the Project to the environment.

9 Distribution List

In accordance with Section 11.16 of the MEPA regulations at 301 CMR 11.00 and the MEPA DEIR Certificate, this FEIR is being distributed to the following governmental agencies and other parties.

It is expected that notice of the availability of this FEIR will be published in *The Environmental Monitor* on or about June 23, 2010. Per Section 11.06(1) of the MEPA regulations, the public review period for a FEIR lasts 30 days. Thus, written comments are due by July 23, 2010.

Copies of this report will also be posted on the Project website (http://www.mass.gov/greenlineextension) and also made available at the listed libraries. A notice of availability will be sent to those who signed petitions, for which addresses are available. To request a copy of this document, please contact Regan Checchio at (617) 357-5772 or at rchecchio@reginavilla.com.

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Department of Environmental Protection
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Northeast Regional Office
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Wilmington, Massachusetts 01887

Department of Environmental Protection
Air Quality Program
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Massachusetts Highway Department
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District Highway Director - District 4
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Arlington, MA 02476

Massachusetts Highway Department
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Boston, MA 02116

Massachusetts Highway Department
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Massachusetts Historical Commission
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Massachusetts Water Resources Authority
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Metropolitan Area Planning Council
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Metropolitan Area Planning Council
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9.3 Municipalities

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Somerville Board of Health
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City Hall Annex
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Somerville City Clerk
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Somerville Conservation Commission
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Somerville Office of Strategic Planning and Community Development
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Medford Office of Veterans' Services
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Somerville Public Library – West Branch
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Cambridge Public Library – Main Library
449 Broadway
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Cambridge Public Library – Boudreau Branch
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- Cheryl Bakey
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- Ellen Band
- Sarah Bapst
- Susanna Barry and Seth Boyd
- Edward Batista, Jr.
- Jenny Bauer
- John Bay
- Elizabeth Bayle
- Belmont Citizens Forum, John Dieckmann (petition with 175 signatures)

- Laurinda Bedingfield
- Christopher Beland
- James and Christine Bennett
- Lois Bennett
- Melissa Bennett
- William Bennett
- Tom Bent
- Sarah Bergstrom
- Dan Berman
- Fred Berman and Lori Segall
- Nancy Bernhard
- Michael Bernstein
- Jane Fair Bester
- Jack Beusmans
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- Ron Bonney
- Jose Borges
- Bonnie Borthwick
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- Chris Braiotta
- Donna Brallier
- Len Brault
- Brickbottom Artists Building/Condominium Trust (petition with 231 signatures)
- Alan Brody
- Paula Brody
- Peter Bronk
- Barbara Broussard
- Francis Brown
- Susan Brown
- John Buckley
- Andres Bueno
- Joelle Bueno
- Ramon Bueno
- Natasha Burger and Jasper Vicenti
- Donald Burgess
- Lee Busch
- Samantha Butler
- Charles Cameron
- Roberta Cameron
- Irving Camiel and Lawrence E. Johnson
- Stuart and Lana Camiel
- James Campen

- Doug Carr
- Krogen Carreno
- Rolando Carrera
- Catamount Holdings LLC, Christopher P. Kaneb
- Patty Caya
- Adam Chamberlain
- Samir Charnalia
- Change.org (petition with 158 signatures)
- Patrick Chasse
- Chadi Chemaly
- Lucy Chen
- Priscilla Chew
- Adam Chiavoli
- Dorie Clark
- Scott Clark
- Theodora Clark
- Sara Cohen
- Stacy Colella
- Fernando Colina
- Community Corridor Planning Project (petition with 144 signatures)
- W. Scott Cooledge
- Conservation Law Foundation, Rafael Mares
- Kevin Costello and Bethany Morris
- Paul Cote
- Gerard Cronin
- David Crosbie
- Sam Crosbie
- Courtney Croteau
- Cummings Foundation, Inc., Joel B. Swets
- Cummings Properties, LLC, Dennis A. Clarke
- David and Jane Dahlbacka
- Maria Daniels
- M. Susanna Darling
- Deborah Davidson
- Marc Davidson
- Cornelia Davis
- Jeffrey Davis
- John F. Deacon
- Keelin Deasy
- Christopher DesAutels
- Jennifer DesAutels
- Tom Devlin
- Chris Dewing
- Damien DiBona

- Rebecca Didier
- Tai Dinnan
- Darlene Domain
- Rita Donnelly
- Frances Donovan
- David Douglas
- Downtown North Association, Robert O'Brien
- Driscoll Electric Co., Inc., Brendan Driscoll
- Dennis Dunn
- Catherine D'Urso and Deborah Silva
- East Cambridge Planning Team, Barbara Broussard
- John Roland Elliott
- Marwa Elsabbahy
- Elias El-Wadi
- Alex Epstein
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- Anthony Espy
- April Evans
- Phyllis Ewen
- Matthew Fallon
- Keith Fallon
- Robert Feigin
- Alex and Ami Feldman
- James Feldman
- Friends of Community Path, Joel Bennett
- Neil Fennessey
- David Filimon
- Max Fine
- Norman Fine
- Charles Fineman
- Lois Fiore
- Brian Flynn
- George Gabin
- Florence Gates
- Peter Gee
- Diane Georgopulos
- Louis Geppetti
- Hans Geuns-Meyer
- Stephanie Geuns-Meyer
- Celia Gilbert
- Thomas Gilbert
- William Gilligan
- Sheila Gilmartin
- Ethan Gilsdorf

- Sharman Gingrich and Christopher Harris
- Glass Factory Condominium Trust
- Phil Goff
- Marsha Goldberg
- Rex Gonsalves
- Lisa Gordon
- Steve Gottlieb
- Linda Goulet
- Kyle Grady
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- Green Line Advisory Group for Medford (GLAM), Carolyn Rosen et al
- Alan Greene
- Stephanie Groll
- Gabrielle Rossmer Gropman
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- Groundwork Somerville, Jennifer Lawrence
- Anthony Guarciariello and Benice Costanzo
- Kevin Guiney
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- Daniel Hamalainen
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- John Harding
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- Michael Hegarty
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- Brian Hilliard
- Ally Hines
- Lisa Hodsdon
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- Karen Holtzman and Thomas Gardon
- John Howe
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- Jared Ingersoll
- Institute for Human Centered Design, Valerie Fletcher
- Sal Islam
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- Stephen H. Kaiser
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- Michael Korcynski
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- Kenneth Krause
- Elaine Krohn
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- Donna Laquidara-Carr
- Jerry Lauretano
- Jennifer Lawrence
- Chris Leary
- Scott Lever
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- Pauline Lim
- Thomas Lincoln
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- Anthony Lorenzo
- Patricia Lyga and Kay Canavino
- Joseph Lynch, Jr.
- Max Malaret
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- Nelson/Nygaard Consulting Associates, Stephanie Groll
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- Nilsson Associates, Ltd, Richard Nilsson
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- Kevin Oliver
- Chip Olson
- Crispin Olson
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- Harpreet Pall
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- John Paul
- Cynthia Pellegrini
- George Perkins
- Catherine and Alan Peterson
- David Phillips
- Nancy Phillips
- Ruth Piscitelli
- Matthew Podrer
- Miki Ann Polumbaum
- Cvetiva Popu
- Professional Services Corporation, PC (on behalf of the Brickbottom Condominium)
- Jordana Psiloyenis
- Michael Quinn
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- Jeffrey Reese
- Felice Regan
- Mary Anne Regan
- Arnold Reinhold
- Ellin Reisner
- Jill Richard
- Rachel Rockenmacher
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- Lynn Rosenbaum
- Sara Rosenfeld
- Carolyn Ross
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- Somerville Community Health Agenda, Lisa Brukilacchio
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- Stephanie Zawacki

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