

Appendix D

Economic Effects and Indirect Effects

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Appendix D – Economic Effects



Economic Effects Methodology

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1. Economic Effects

1.1 INTRODUCTION

This methodology explains the NEC FUTURE approach to assessing economic effects (both positive and negative) resulting from the Tier 1 EIS Alternatives. This methodology presents the regulatory framework, involved government agencies, expected regulatory and other outcomes of the Tier 1 EIS process, and relevance to Tier 2, project-level assessments. It also identifies data sources, metrics, and methods to be used to document existing conditions and analyze environmental consequences. This methodology may be revised as the NEC FUTURE program advances and new information is available.

The purpose of this economic effects assessment is to evaluate and compare the positive and negative economic impacts associated with a range of Build Alternatives. The economic effects assessment will comprehensively assess economic impacts associated with construction and implementation of the Tier 1 EIS alternatives, and will be presented in the Tier 1 EIS.

The EIS economic effects assessment is intended to be consistent with and inform a subsequent Benefit/Cost Analysis (BCA) to be performed for the Preferred Investment Program (see Benefit-Cost Recommended Strategy¹ for further details) as part of SDP development. The two efforts use similar information but consider different questions. The EIS economic effects assessment compares all Tier 1 EIS Alternatives across a variety of potential outcomes. The BCA assesses solely whether the Preferred Investment Program, as identified in the Record of Decision for the Tier 1 EIS, offers a return (benefits) equal to or greater than the cost. No BCA is proposed for the economic effects assessment to be completed for the Tier 1 EIS. However, the use of BCA-style outputs when conducting the EIS economic effects assessment will facilitate the decision-making process during alternatives selection. Thus, a purpose of the EIS economic effects assessment is to further an understanding of the comparative benefits and costs of the different Tier 1 EIS Alternatives. As such, and where the available project information supports the level of analysis, the EIS economic effects assessment will report summary measures such as monetized impacts (travel time, travel cost, safety, emissions), as well as a summary measure on a per passenger mile basis, supplemented by a summary ranking of other qualitative factors (potential for regional productivity growth, station development potential, for example).

In those instances where an economic effect is to be considered in both the Tier 1 EIS and the BCA analyses, the methodology applied will be the same to ensure consistency. Both this economic effects assessment and the subsequent BCA are consistent with FRA's "Two-Stage BCA Process" proposed for the NEC FUTURE program.² To the extent practical, the economic analysis and economic factors considered in this effects assessment will be incorporated into the subsequent BCA for the Preferred Investment Program.

¹ NEC FUTURE Benefit-Cost Recommended Strategy, January 29, 2013, FRA Accepted Version, submitted by Parsons Brinckerhoff/AECOM Joint Venture

² High-Level Overview of Proposed Two-Staged BCA Process. FRA Draft Memo, April 24, 2014.

1.2 DEFINITIONS

The economic effects assessment considers the economic effects of the Tier 1 EIS Alternatives due to the following:

- ▶ **Construction Activity** – Added jobs and earnings during the construction period.³
- ▶ **Rail Sector Employment** – Added jobs and earnings associated with changes in railroad operations when services are implemented. These changes could be positive or negative depending on the volume of service provided, the relative efficiency and the degree to which it replaces existing service.
- ▶ **Travel Market Changes** – Monetized value of changes in travel times, safety and travel-related pollutant emissions due to improvements in transportation services (e.g., faster, more frequent rail service) and travelers' resultant shifts among travel modes (auto and air).
- ▶ **Operating Cost and Revenue/Subsidy Effects** – Potential change in operating costs relative to the no build due to operating efficiencies and the resulting impact on an operating subsidy/surplus. The data to make this assessment will be available at an order of magnitude level for the Tier 1 assessment, but will be refined and subsequently included in the full BCA developed as part of the SDP.
- ▶ **Market Effects** – Potential change in development patterns near stations and in surrounding areas as a result of changes in transportation connectivity and accessibility within/among metropolitan areas. These typically longer-term economic effects include induced growth and other indirect effects, which are further described in the Indirect Effects Assessment Methodology.
- ▶ **Labor Productivity and Agglomeration Effects** – Business efficiencies related to availability of a greater range of suppliers and greater access to specialized goods and services; benefit to businesses in urban areas which provide access to large pools of diversified labor, benefit to retailers from a concentration of consumers; and benefit to consumers from lower search costs with expanded choices.
- ▶ **Freight and Commuter Impacts** – Impact of new and/or expanded passenger service investments on freight and commuter operators that serve the corridor. These may be positive or negative.
- ▶ **Fiscal Impacts** – Potential changes in local or regional tax bases due to the construction of and longer-term operations of transportation improvements. The potential need for an operating subsidy represents another type of fiscal impact that is described in the operating cost effects section.

³ Any job loss related to construction activities (i.e., property or business impacts) and other localized effects from construction will be evaluated in subsequent project-level assessments as the level of detail required to do that evaluation is not appropriate for the Tier 1 analysis. For additional information regarding construction impacts, please refer to NEC FUTURE Construction Effects Methodology Report, May 28, 2014, FRA Accepted Version, submitted by Parsons Brinckerhoff/AECOM Joint Venture.

Further details regarding the approach to each of the above assessments are provided in Section 1.5 of this methodology.

1.3 RELATED RESOURCES

The effects assessments from other resources evaluated as part of the Tier 1 EIS will contribute to assessment of economic effects. These related resources are identified in Table 1. Note that the effects assessments for those related resources will be documented within their respective Tier 1 EIS sections.

Table 1 – Related Resource Inputs to Economic Effects Assessment

Resource	Input to Economic Effects Assessment
Transportation	Existing and proposed passenger rail stations and service characteristics
Land Cover	Estimated land area conversions for expanded/new ROW under Tier 1 EIS Alternatives to estimate potential fiscal impacts of change in local tax revenues
Noise	Location of potential dis-amenity (to be assessed qualitatively)
Demographics	- Demographic data to define the location and changing size of existing markets - Population and employment history and forecasts, 1980 to 2040 (Moody's, [2013])
Safety	Accident rates by type (fatal, injury, property damage only) and mode
Air Quality	- Change in volume of individual pollutants and GHG associated with auto and air mode shift associated with power needs for each alternative - Change in volume of individual pollutants and GHG associated with power needs for each alternative
NEC FUTURE Travel Demand Forecasting Model ¹	- Changes in travel time, VMT, passenger miles and trips, mode shift as input to estimating monetized changes in travel costs and time - Fare revenues associated with each alternative - Rail passenger miles for each alternative - Changes in accessibility and connectivity from improved rail service including ridership, station-to-station travel times, used to assess potential for market-related growth in station areas and surrounding region
Operating Costs	- Rail employment roster and labor cost estimates to forecast long-term increase in rail sector employment to assess similar employment and earnings due to change in rail sector jobs - Total and non-labor operating costs for each alternative - Opportunities for potential cost structure economies that are identified in alternatives with regard to the approach to service design, service delivery, operational philosophy, and institutional structure and governance, that could have an impact on O&M costs.
NEC FUTURE Program Alternatives	- Estimated total and allocated construction costs of each alternative (e.g., ROW, rolling stock, tunnels, etc.) -- used to assess direct and indirect/induced construction-related employment and earnings effects during that phase. - Service plan used to volume of service and frequency of connectivity—informs market evaluation and potential for agglomeration economies
NEC Commission Cost Sharing Model	Capacity preserved or created for commuter and freight operations that share the corridor

Source: NEC FUTURE JV Team, 2013

1. NEC FUTURE Market Analysis & Forecasting Methodology Report, October 15, 2012, Final Version, submitted by Parsons Brinckerhoff/AECOM Joint Venture. The model's baseline assumption is that relationship between all fares and related costs (e.g., gas prices) would remain constant in the future. The impact of changes to these fares and other related costs would be assessed as part of the model's sensitivity analysis. In addition, the sensitivity of ridership to the fare structure and pricing policy will be addressed within the travel demand forecasting process.

1.4 AGENCY AND REGULATORY FRAMEWORK

Multiple federal agencies provide guidance on economic factors used when conducting economic assessments. Applicable guidance documents, listed in **Table 2**, will be considered, consistent with a Tier 1 level of assessment, in the economic effects assessment. Specific regulatory compliance requirements are also addressed in Section 1.7 of this methodology.

Table 2 – Federal Agency Guidance on Economic Effects Assessment

Federal Agency	Guidance Document	Description
Office of the Secretary of Transportation (OST), U.S. DOT	- Memorandum on Guidance on Treatment of the Economic Value of a Statistical Life in U.S. Department of Transportation Analyses, Revised Departmental Guidance (1992, with June 13, 2014 update) - Memorandum on Revised Departmental Guidance on Valuation of Travel Time in Economic Analysis, July 9, 2014..	Issues and regularly updates guidance on the values to be used to monetize changes in travel time and safety to be used in project assessments. These values are regularly applied in all of the modal agencies' assessments.
	TIGER Benefit-Cost Analysis (BCA) Resource Guide (Updated April 2014)	Provides guidance on agglomeration economies
National Highway Traffic Safety Administration, U.S. DOT	Corporate Average Fuel Economy for MY2017-MY2025 Passenger Cars and Light Trucks (August 2012), page 922, Table VIII-16, "Economic Values Used for Benefits Computations (2010 dollars)	Provides guidance on assessing emissions factors
Federal Railroad Administration, U.S. DOT	High-Speed Intercity Passenger Rail (HSIPR) Program: funding for Service Development Programs and Individual Projects for Final Design/Construction or Preliminary Engineering/NEPA; <i>Federal Register</i>, Vol. 75, No. 126, Thursday, July 1, 2010, Service Development Plan (Pages 38344-38365), Individual Projects (Pages 38365-38388).	Notice of funding available for high-speed and intercity passenger rail Service Development Plans and Individual Projects (including planning support for multi-state corridors such as the NEC FUTURE program) provides guidance on economic factors to be included in such assessments, from broadly defined economic factors (e.g., the potential of the corridor program to promote economic development) to the public benefit elements to be analyzed for the eventually recommended Service Development Plan (SDP)
Office of Management and Budget, Executive Office of the President	- OMB Circular A-94, "Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs" (10/29/1992) - OMB Circular A-4, "Development of Regulatory Analysis: Section E. Identifying and Measuring Benefits and Costs (September 17, 2003).	The Office of Management and Budget has provided guidance on the discount rates to be used in benefit cost analyses and the general approach to identifying benefits and costs. Although this is described in the context of doing a benefit cost analysis, the discount rates are relevant for discounting the streams of earnings associated with phased implementation of the Alternatives.
Multiple Federal Agencies (Interagency Working Group)	Interagency Working Group on Social Cost of Carbon, United State Government, Technical Support Document: Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866 (February 2010), page 39, Table A-1 "Annual SCC Values 2010-2050 (in 2007 dollars)"	Provides guidance on assessing carbon impact factors; this is the source recommended in U.S. DOT's guidance for the TIGER program.

1.4.1 Regulatory Compliance

No formal agency approvals are required for the Tier 1 EIS.

1.5 METHODOLOGY TO ASSESS EFFECTS

This effects assessment methodology identifies the approach and assumptions for describing existing economic conditions and economic consequences of the Tier 1 EIS Alternatives through the horizon year of 2040. It identifies data sources, defines the Affected Environment considered for economic effects and the approach for evaluating potential direct effects.⁴ In many cases, however, potential market response effects of the Tier 1 EIS Alternatives (i.e., changes to existing land values, changes to development intensity, and agglomeration effects) would be considered ‘indirect’ as they might be longer-term and therefore would occur later in time or removed in distance. These indirect economic effects⁵ will be considered initially in the economics effects analysis and will also contribute to the evaluation of induced growth and its indirect effects on individual resource areas (see Indirect Effects Assessment Methodology).

1.5.1 Existing Conditions

The existing conditions for economic effects will be documented in the Tier 1 EIS for an established Affected Environment. For economic effects, the Affected Environment is the NEC FUTURE Study Area (Study Area) (see **Figure 1**). The Affected Environment for the economic effects assessment is consistent with the areas considered in the Travel Demand Forecasting analysis. This Affected Environment considers the network characteristics of proposed transportation improvements and potential changes in travel times, costs, and accessibility each of which could result in economic effects. The Affected Environment also includes existing freight facilities and freight traffic.

The following data will be compiled to create a profile of existing economic conditions in the Affected Environment:

- ▶ **Employment/Population Trends** -- recent patterns of change in employment and population throughout the Affected Environment will be presented by major Metropolitan Statistical Area⁶ (MSA) and by state and grouped into the following three subregions⁷ (illustrated in Figure 1):
 - South Subregion: Washington, D.C. (including parts of Virginia); Maryland; Delaware; Pennsylvania
 - Central Subregion: New Jersey , New York and portions of southern Connecticut

⁴ Direct Effects are caused by the action and occur at the same time and place (40 CFR § 1508.8).

⁵ Note that “indirect effects” is used here in a NEPA context, not in the economic context—indirect job impacts (a component of the multiplier effect) will be included in the employment assessment.

⁶ Metropolitan Statistical Areas are geographic entities delineated by the Office of Management and Budget (OMB) for use in collecting, tabulating, and publishing Federal statistics. An MSA contains a core urban area of 50,000 or more population, with each MSA including one or more counties, including the counties containing the core urban area and adjacent counties with a high degree of social and economic integration (as measured by commuting to work) with the urban core. See <http://www.census.gov/population/metro/>

⁷ The definition of corridor subregions applied in the economic effects analysis is not finalized and subject to revision in order to remain consistent with any changes to the regional definitions made in other methodologies.

- North Subregion: Connecticut (portions of central and northern), Rhode Island, and Massachusetts (and parts of New Hampshire)

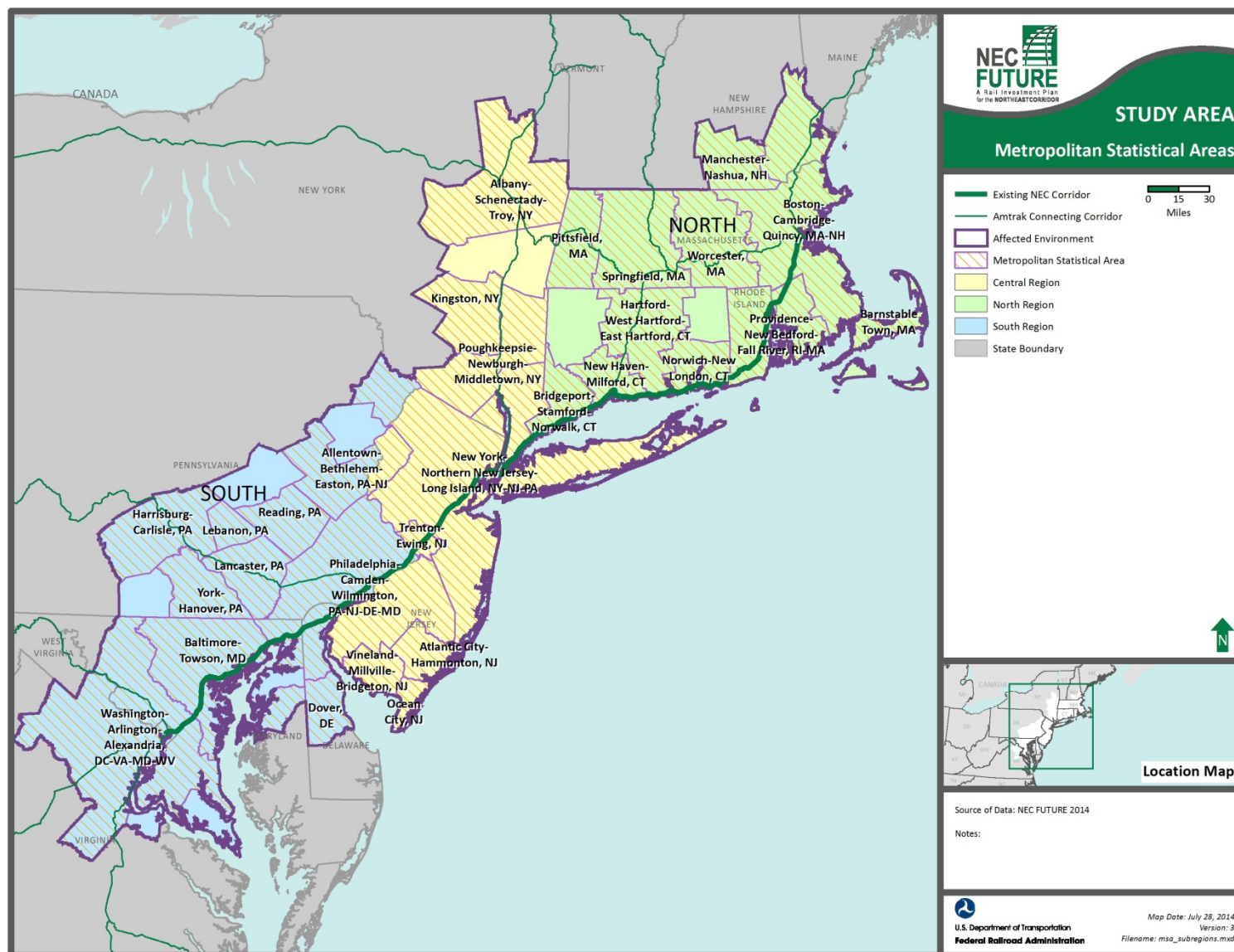
These data,⁸ reported in 10-year increments, will be assessed and grouped by the above referenced regions as part of the Demographics analyses in the Tier 1 EIS (see Demographics Methodology) for use in this economic effects assessment. Certain counties within Virginia and New Hampshire are included in the Affected Environment as the MSAs involved in these studies extend into portions of those states (i.e., counties in northern Virginia included in the Washington, Arlington, Alexandria MSAs and southern New Hampshire included in the Boston-Cambridge-Quincy MSA, respectively, as shown in Figure 1). While the Study Area is built around the MSAs, the areas in between are also included to smooth the boundaries.

Travel markets within portions of Vermont and Maine have the potential to be influenced by the range of rail sector improvements being considered within the Tier 1 EIS Alternatives. Potential demographic and economic effects in these outlying areas are more difficult to quantify; however, future trends in those areas will be qualitatively discussed.

The Tier 1 EIS Alternatives would also potentially result in economic effects within areas outside of the Study Area along connecting corridors (for example the Knowledge Corridor/Inland Route north of Springfield, MA, to Vermont and the Southeast High Speed Rail Corridor south to Richmond, VA) in other nearby adjacent states, where service improvements will be considered and induced growth and other effects could occur. Such potential effects in those areas will be discussed briefly within the Economics Effects assessment and considered further as part of the Indirect Effects Assessment.

⁸ Specific data sources are identified in the NEC FUTURE Demographics methodology

Figure 1 – North, Central and South Subregions of the Affected Environment



- **Regional Economic Base Profile** – The following additional factors will be reviewed, based on data sources listed in Table 3, to profile the economic base within the Affected Environment. For each factor, data will be summarized first by state and then organized by region (south, central, north as illustrated in Figure 1 and described above), with a further focus on the major metropolitan areas as appropriate. A general overview of the region as a whole will also be provided to place the region in the larger context of the national and global economy. This information will supplement and not duplicate the regional overview provided in the Purpose and Need discussion.
- Cost of Doing Business – these indices measure the costs of doing business (e.g., labor, utilities, real estate, taxes, etc.) at the county and state level relative to national averages. Of the 12 states nationally with the highest cost of doing business, eight are within the Affected Environment, with the highest costs in the major MSAs in those states. An economy’s cost structure influences the type of industry that can flourish in that location. Efficient and reliable transportation systems help to offset the costs associated with densely populated and developed economies, allowing industries to remain and flourish.
 - Industrial Diversity Index – this index reflects how closely the industrial mix within a local economy (a state, metropolitan area or multistate region depending on the analysis) resembles the national economy (a reference economy), taking into account the size of the various local industrial sectors. This metric identifies whether the economy is reliant on comparatively few industries (a less diverse economy) or many (a more diverse economy). A diverse (or industrially balanced) economy is generally considered a stable economy. The economy’s fortunes do not rise and fall with the economic success of a single industry. If one industry were to falter, the others would help keep the overall economy healthy.
 - Location Quotient – this compares whether, for each major industrial category (e.g., wholesale/retail, FIRE [finance, insurance, real estate], manufacturing, etc.) an area imports or exports the products and services generated by that sector. As with the Industrial Diversity Index, the interesting factor is the recent trends within the Affected Environment among the states and especially the MSAs, and the extent to which these areas will increasingly be exporters of goods and (especially) services to the rest of the country and internationally.

Collectively, a review of these data, briefly summarized in text, table and graphics as appropriate, will provide an economic profile of the Affected Environment. Patterns among the three regions and the major MSAs, which historically have been responsible for the bulk of the economic activity within the Northeast region, will also be discussed. These economic factors will then be used to compare existing conditions to future conditions with the Tier 1 EIS Alternatives. This comparison will utilize data provided from other Tier 1 EIS resource areas (**Table 1**, the federal agency guidance shown in **Table 2**, and additional data summarized in **Table 3**).

Table 3 –Data Sources for the Evaluation of Existing Conditions and Economic Effects

Data Source	Assessment Topic	Data Application
Moody's Analytics (Annual, by State and Metro Area) (2013)	- Cost of Doing Business - Freight vs. Service - Dependent Industrial Mix	- Assessment of existing competitive position of business sectors. - Assesses sensitivity of areas' economic base to change in passenger and freight services.
U.S. Department of Commerce, Bureau of Economic Analysis (2013)	Industrial Composition, and Industrial Diversity	Assessment of mix of public/private employment, employment diversity relative to national mix
U.S. Department of Commerce, Bureau of Economic Analysis (2013) Regional Input-Output Modeling System – RIMS II Multipliers	Assessment of indirect and induced impacts due to direct employment effects	Use RIMS II multiplier to estimate indirect and induced impacts due to construction investment (during construction phase) and long-term employment gains in rail transit sector.
U.S. Department of Commerce, Census Bureau (2011). Density of growth outward from Metro Area downtown area	Changes in Metro Area Density	Assessment of present density of development and changes in recent decades.
Texas Transportation Institute, Urban Mobility Report, 2013	Planning buffer time	Assessment of travel time reliability

1.5.2 Environmental Consequences

The economic effects assessment will compare the potential for each of the Tier 1 EIS Alternatives to cause economic effects. Those dealing with construction will assess effects over the NEC FUTURE program construction period (assumed to be completed by 2040). The assessment for all others will focus on full build-out conditions in 2040.

The Tier 1 EIS Alternatives could generate near-term economic effects during the NEC FUTURE program's construction period and initial periods of operation. Longer-term economic effects could include market response to improved and new rail services. An economic effects assessment will be developed for each of Tier 1 EIS Alternatives.

The following near-term economic effects will be evaluated for the Affected Environment as a whole:

► **Construction Effects**

- **Jobs/Earnings:** The methodology for estimating the job and earnings impacts will apply RIMS II multipliers to estimated construction costs⁹ to assess the overall construction-related employment and earnings effects of the Tier 1 EIS Alternatives. These effects will be estimated for the overall Affected Environment rather than at the regional or individual state level. The RIMS II multipliers, developed by the US Bureau of Economic Analysis (BEA), will be used to assess overall direct, indirect and induced impacts on employment and earnings due to construction activities. These multipliers, based on national input-output (I-O) model data that track the goods and services produced by each industry and the use of goods and services by industries and final users, account for regional supply conditions and the structure of the local economy. They are widely used to assess economic impacts and offer a transparent and defensible approach to assessing such impacts.¹⁰

Input-output multipliers for the construction and professional services (for soft costs) industry are applied to the estimated project cost to yield an estimate of the total employment needed to build the improvements under the Tier 1 EIS Alternatives. The estimated costs for the Tier 1 EIS Alternatives will be adjusted before the multipliers are applied as follows:

- **Right-of-Way Costs:** Estimated costs for the purchase of additional right-of-way (ROW) will be omitted from the construction-related project cost estimate, as they are not anticipated to support job creation.
 - **Rolling Stock Costs:** Estimated expenditures for vehicles will be omitted, to the extent that the vehicles would be produced outside of the Affected Environment for which this economic effects assessment will be prepared. FRA will further consider the potential for a portion of the vehicle production to occur within the Affected Environment as project work progresses.
 - **Potential Expenditures under the No Action Alternative:**¹¹ Expenditures in the Affected Environment required for the No Action Alternative will be separated from those that would be new to the economy under the other Tier 1 EIS Alternatives. For example, this would include expenditures identified for other rail transportation construction projects in the region under the No Action Alternative, and would therefore not be strictly attributable to the Tier 1 EIS Alternatives.
- **Short-term Nature of Construction Investment:** Because construction jobs are temporary, lasting only for the duration of the construction cycle, they will be reported as person-years

⁹ NEC FUTURE Capital Cost Methodology Report, January 10, 2013, FRA Accepted Version, submitted by Parsons Brinckerhoff/AECOM Joint Venture. Other than preliminary estimates for environmental remediation, no mitigation costs are included in the capital cost estimate.

¹⁰ See US Dept. of Commerce, BEA, *RIMS II: An Essential Tool for Regional Developers and Planners* (Nov. 2012).

¹¹ The No Action Alternative includes all projects and plans that are projected to proceed by 2040 without action resulting from the NEC FUTURE program.

of labor (i.e., a full-time job for one person lasting one year) over the projected construction period. Construction impact estimates typically differentiate new jobs from those already supported within the region. Since for NEC FUTURE, funding or finance sources will not yet be known, the assessment will describe estimated job impacts as “supported or new to the region.”

Based on the capital cost as adjusted to reflect the aforementioned factors, estimated employment and earnings for construction will be calculated in 2014 (real, no escalation) dollars for each Tier 1 EIS Alternative. Assumptions regarding the approximate phasing of the construction work over the approximately 2016 to 2040 time period, in 5-year increments, will be utilized to estimate a discounted constant dollar value (2014) for this 25-year expenditure stream, utilizing the OMB discount rate updates.¹²

Construction phasing will be described for Tier 1 EIS Alternatives (see Construction Effects Approach for further information). While some loss of employment and earnings can occur due to business displacement or relocation, those considerations will be addressed at the Tier 2 level. The Tier 1 EIS will assess these issues qualitatively.

► Rail Sector Employment Effects

FRA will estimate changes in operations and maintenance (O&M) jobs and associated earnings within the rail sector for the Tier 1 EIS Alternatives.¹³ For each Tier 1 EIS Alternative, FRA will estimate crew and overall employee roster sizes for each alternative’s proposed service to calculate order-of-magnitude costs for labor-related cost items. These employee rosters will be based on the experience of existing operators within the NEC as well as experiences from high-speed or high-performance passenger rail operations beyond the NEC. In addition to staffing associated with train operations, specific characteristics of each Tier 1 EIS Alternative such as the number of stations and miles of right of way will be inputs to the development of employee rosters. Estimates of non-labor expenditures will similarly be developed. RIMS II multiplier will then be applied to these direct employment and non-labor expenditure values to estimate the indirect and induced employment effects. These will be recurring impacts that begin with the initial year of operation.

While these changes in employment would be phased in as NEC FUTURE program elements are completed, this assessment will estimate additional employment and earnings in the rail sector (in 2014 dollars) for the horizon year of 2040 under each Tier 1 EIS Alternative. These estimates will be made for the Affected Environment as a whole and not reported by subregion, state or metro area.

► Travel Market Effects

Potential longer-term economic effects are associated with changes in commuter and intercity travel characteristics with the Tier 1 EIS Alternatives. Those travel market effects dealing with the value of changes in travel time, reliability, cost, safety and emissions and possibly additional

¹² Office of Management and Budget, OMB Circular No. A-94, Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs (1992) and “2013 Discount Rates for OMB Circular No. A-94” (January 2013).

¹³ NEC FUTURE Operating & Maintenance Cost Methodology, January 10, 2013, FRA Accepted Version, submitted by Parsons Brinckerhoff/AECOM Joint Venture.

rail capacity will also be used in the Benefit-Cost Analysis (BCA) to be incorporated in the SDP (see Benefit-Cost Recommended Strategy for details of those analyses).

- **Changes in Travel Time, Reliability, Cost and Safety:** The diversion of auto trips and vehicle miles travelled (VMT) from autos to passenger rail may yield a travel cost savings to the drivers who divert to rail and a reduction in accidents as travel is shifted from a more hazardous mode to a safer one. In addition, there is the potential for travel time savings for existing rail travelers who use the new improved service, while remaining road users would potentially gain from reduced roadway congestion. Travelers shifting from air to rail service would potentially experience similar changes in travel time, cost and safety. The value of estimated changes in travel time, costs and safety under each of the Tier 1 EIS Alternatives will be calculated using inputs drawn from the travel demand analysis (primarily VMT, diverted trips by mode, estimated travel times), and monetized using the appropriate U.S. DOT guidance (see Table 2) to provide a total value, in 2014 dollars of these projected changes for the horizon year of 2040. Travel reliability will be considered qualitatively in the Tier 1 EIS; it will be quantified (methodology in development) in the subsequent BCA included as part of the SDP.
 - Travel Time: The projected travel time changes (taking into account the time it takes to access each mode¹⁴) are factored by the value of time that is adjusted for work and leisure trips according to U.S. DOT guidance.
 - Travel Reliability: Three different groups could experience changes in travel reliability as a result of the project's implementation: rail travelers who now have a more reliable train trip, travelers who remain on competing modes and experience less congested and more reliable travel as some travelers divert to rail, and rail operators who share the corridor with the improved intercity passenger rail service. Each of the three potential reliability outcomes (rail travelers, competing mode travelers, rail operators that share the corridor) will be considered qualitatively using information on the typical planning buffer time (the percentage of trip time that travelers or operators incorporate into their trip to account for system unreliability). On time performance metrics and any associated change in buffer time will be used to qualitatively discuss what the Build Alternatives offer relative to the No Action alternative.¹⁵ Reliability offers rail operators non-schedule impacts such as more efficient use of the fleet; these impacts will be noted qualitatively, but not quantified as the level of detail required will not be available in the Tier 1 analysis.

¹⁴ NEC FUTURE Market Analysis & Forecasting Methodology Report, October 15, 2012, Final Version, submitted by Parsons Brinckerhoff/AECOM Joint Venture.

¹⁵ Buffer time is one possible means to demonstrate reliability impacts. The measurement of reliability spans the operations, travel demand and transportation analyses, in addition to economics, and the manner in which it will be described in this report is evolving as the project advances.

- **Travel Cost:** The Tier 1 EIS travel demand and energy resource assessments,¹⁶ along with U.S. DOE modal energy intensity and fuel economy estimates, will be used to establish estimated travel cost savings for travelers diverting from auto and air modes to rail.
- **Safety:** The value of accidents avoided will be calculated by determining the per-passenger mile incident rates for each mode and for three types of accidents: fatalities, injury-only, and property damage only (PDO), and then monetizing changes in the number of accidents using applicable U.S. DOT guidance.
- **Changes in Emissions:** The value of net emissions and greenhouse gas reductions associated with auto (and potentially air) diversions to passenger rail will be monetized according to U.S. DOT and Interagency Federal guidance (see Table 2). The net change in emissions used as the basis for these calculations will be taken from the Tier 1 air quality analyses (see Air Quality Effects Assessment Methodology). The value of estimated change in emissions and carbon under each of the Tier 1 EIS Alternatives will then be calculated to provide a total value, in 2014 dollars, of these changes in emissions in the horizon year of 2040.
- **Potential for Additional Rail Capacity:** The Tier 1 EIS Alternatives will add capacity for intercity and commuter railroads. At this Tier 1 planning level, the potential value of available capacity created under each Tier 1 EIS Alternative, will be addressed at a qualitative level. A cost sharing model for the NEC is currently in development through the Northeast Corridor Infrastructure and Operations Advisory Commission (NEC Commission), the results of which will inform this analysis to the degree possible.
- **Passenger-Freight Rail Conflicts:** Potential conflicts between expanding rail passenger operations under the Tier 1 EIS Alternatives and existing freight railroad operations where both passenger and freight share use of the NEC will be reviewed. The potential for changes in shared use territory conflicts and delays will be reviewed. While the nature of any such conflicts would be noted, no monetary value of such conflicts will be estimated at this Tier 1 level.

The following longer-term economic effects will be evaluated for each region (south, central, north) within the Affected Environment:

► Market Effects

As discussed in Section 1.2, market-response effects – potential change in the location and level of economic activity throughout the Affected Environment – are often treated as indirect effects as defined by NEPA, and receive more detailed attention at the Tier 2 project level. However, the market-related factors altered by the Tier 1 EIS Alternatives and the likely nature of such market changes will be assessed qualitatively as part of the economic effects assessment.

Under the Tier 1 EIS Alternatives, some locations along existing or proposed rail corridors would have improved access to the broader Northeast region. Residents and businesses would pay a

¹⁶ NEC FUTURE Energy Effects Assessment Methodology, April 14, 2014, Final Version, submitted by Parsons Brinckerhoff/AECOM Joint Venture. NEC FUTURE Transportation Effects Assessment Methodology, December 2013, Version 2 (draft), submitted by Parsons Brinckerhoff/AECOM Joint Venture.

premium for those locations. The market's response to the improved access and mobility under the various Tier 1 EIS Alternatives would increase the value and potential development density of properties near or well-connected to these better-served stations. Some of this new development is likely a transfer of value from other locations within the same market area, and therefore not a net increase in development. The stakeholder workshops discussed below will help estimate what part of the development would be a transfer and what part would represent a net increase by providing a better understanding of development decision-making and the factors that would influence those decisions. The literature on volume of development directly attributable to transportation investment uniformly describes the difficulty in separating net new development from transfers described above, but there is no consensus on the likely division. Developer interviews indicate that this division is highly sensitive to local site and market conditions.

Some types of analysis are beyond the level of detail for NEC FUTURE such as land premium studies – i.e., assessing increases in property values near transit or passenger rail stations, that are related to but distinct from station area development assessments. Previous studies have shown a wide range of station area property value increases, from little or no change to over 45% with select instances of significantly higher gains.¹⁷ By contrast, station-area development, or transit-oriented development (TOD), refers to new additional private development that is attracted to the station areas or those connected to them. These station area impacts will not be considered for the Tier 1 EIS level analysis.¹⁸

– **Station Area and Economic Development Workshop**

In order to examine and assess potential land premium and development effects near stations and support for overall economic growth in the Affected Environment, six to eight half-day workshops will be conducted with knowledgeable regional stakeholders. Participant stakeholders will include representatives from the communities surrounding the stations who are knowledgeable about development conditions and real estate dynamics in the corridor. These workshops will be stakeholder working meetings and will not be open to the general public. Participant stakeholders may be drawn from the state and local governments, metropolitan planning organizations (MPOs) or municipal planning agencies, chambers of commerce, the private land developer community, and may include others familiar with local station and regional development market forces.

The purpose of the workshops will be to develop a generally agreed-upon view on whether the range of improvements included under the Tier 1 EIS Alternatives would:

¹⁷ Center for Transit Oriented Development, *Capturing Value from Transit*, November 2008; and Robert Cervero and M. Duncan, "Real Estate Market Impacts of TOD," 2001.

¹⁸ Station area and other development effects of the NEC FUTURE program are of substantial interest to many public and private sector groups, both in terms of the potential for economic opportunities and for the displacement of established businesses and residences in the redevelopment process. The development workshops described below will provide a reliable way of broadly establishing the types of development effects that could be expected under the Tier 1 EIS Alternatives. The NEC Commission report on "The Northeast Corridor and the American Economy" is an example of applicable literature that would be distributed prior to the workshops.

- Affect land values near existing or proposed stations, and if so by how much on average
- Attract private development and if so, how much would result in a net increase in development in the Affected Environment rather than a re-distribution
- Have the greatest impact on development throughout the various metropolitan areas within each region

Local neighborhood and broader metropolitan real estate markets vary considerably throughout the Affected Environment and many factors external to transportation influence development outcomes. The workshops will be distributed among the major markets within the Affected Environment, with representation in at least two workshops in each of the three subregions (south, central, north) used in parallel discussions of demographic and economic development trends (as identified in Section 1.5.1 and depicted on Figure 1).

The attendees' views about development potential in the various markets within that workshop's focus area will be documented, including the level of agreement and range of opinions that need to be considered when projecting potential gains in land values or new development due to these types of transportation investments. Other major factors that may be of equal or greater importance (e.g., quality of schools, zoning, tax levels, highway access, and connectivity to the local transit system) will also likely be identified during this process. The eventual consensus forecast or expectation for future development under the Tier 1 EIS Alternatives will be based in part on the expectations of these regionally knowledgeable land use and real estate professionals.

In advance of the workshop, a set of materials will be prepared describing:

- The Tier 1 EIS Alternatives and the anticipated locations of the stations, service levels, etc.
- A brief summary of applicable literature (e.g., the NEC Commission's report on *The Northeast Corridor and the American Economy*, previous plans that correspond to station areas)
- A summary of market demographics (e.g., population, income, and employment) that correspond to the ¼ mile area around the station sites

The team will prepare questions to guide workshop conversation and ensure that necessary topics are addressed by systematically focusing on corridor development issues. As a check on workshop results and to provide background information, applicable literature will be reviewed to document the types of outcomes experienced in other settings as available. For those Tier 1 EIS Alternatives that would introduce transformational high-speed rail, background information would also draw upon a larger amount of available international literature on these issues.

A summary of the key points and majority/dissenting views will be included in the Market-Response Effects assessment. The assessment will identify the potential for station impacts under the Tier 1 EIS Alternatives based on:

- The magnitude of change in accessibility (e.g., travel time and frequency, number of jobs accessed in 45 minutes of travel)

- Downtown or suburban location because they will likely have different existing land use mixes
- Presence of multimodal connections (local/commuter transit, highway and airport access)
- Potential for and possible locations of land premium changes
- Possible speed with which the market might respond

Collectively, the stakeholders' views and the data analysis will provide a basis for understanding the potential for Tier 1 EIS Alternatives to alter land values and development levels and patterns within the Affected Environment, with a primary focus on metropolitan areas and those broad neighborhoods where stations are anticipated to be located. The result will be a qualitative description of the potential for development changes under the various Tier 1 EIS Alternatives in terms of volume and mix, an approximate sense of the timing of such effects and related investments, and actions that may also be needed for these changes to be realized.

► Labor Productivity and Agglomeration Effects

Urban areas throughout the Northeast region are focal points for commercial transactions, and communication, transport, distribution, and production activities are less costly when producers, suppliers and consumers are concentrated in relatively-dense urban centers.

- Retailers benefit from a concentration of consumers.
- Consumers benefit from lower search costs with expanded choices.
- Business efficiencies related to availability of a greater range of suppliers and greater access to specialized goods and services.
- Urban areas provide businesses with access to large pools of diversified labor, specialized technical and professional services, large client bases, and typically serve as transportation gateways and hubs.

These “agglomeration economies” reduce the cost of transactions and make the urban area’s firms more productive. While recent studies have shown connections between these agglomeration effects and transit and rail projects, the size of such effect and the distance of such effects from the transportation investment vary widely across studies, suggesting that local context plays an important role.¹⁹ Rail service can move large numbers of people within and between increasingly economically integrated and more productive metropolitan areas, and thus improvements to rail service can influence the size, density, and economic geography of the regions it serves.

Agglomeration economies predominantly occur within a given metropolitan area (the agglomeration) rather than in an intercity context (occurring between them), as such effects are

¹⁹ Patricia C. Melo, Daniel J. Graham, and Robert B. Noland, 2009. “A Meta-analysis of Estimates of Urban Agglomeration Economies,” *Regional Science and Urban Economics*, 39, 332–342. Article analyzes results of 34 studies of agglomeration economies. Daniel J. Graham, “Agglomeration, Productivity, and Transport Investment,” *Journal of Transport Economics and Policy*, v. 41, Part 3 (September 2007), pp. 317-343.

generally seen as declining with distance from the transportation investment. However, as the highly urbanized areas along the existing NEC Spine already have significant integration, agglomeration effects are likely to be intensified as the individual metro areas become more fully integrated when major rail investment further link these urban areas together. The largest urban concentrations within the Affected Environment are already served by significant commuter and intercity rail systems, and the key question is whether the proposed level of service under the Tier 1 EIS Alternatives—in terms of speed, reliability, frequency, schedule patterns, and enhanced connections to other modes—would be sufficiently different from current services and those offered under the No Action Alternative to reduce the “effective distance” between travel markets in the Affected Environment and offer the potential for further agglomeration economies.

A comprehensive qualitative discussion of these effects will be included as part of the economics effects assessment, with examples of the types and scales of these effects relative to the assessment of the Tier 1 EIS Alternatives. This will be particularly important when assessing the potential differences among the No Action Alternative and the range of markets served by the Tier 1 EIS Alternatives and their potential to be more or less transformative. Professional judgment, reflecting available professional literature, knowledge of the corridor and input from the proposed economic development workshops, will be used to provide a reasonable assessment of how important these effects may be in the context of the proposed major rail investments.

► **Support of Projected Economic Growth**

The demographics assessment of the Tier 1 EIS will include employment, population, income and other demographic and economic forecasts for the MSAs, counties and states within the same Affected Environment to be used for the economic effects assessment. The economic factors behind those projections will be briefly reviewed, noting that such projections represent unconstrained growth without consideration of transportation capacity – i.e., they assume that necessary public and private investment will be made to serve and maintain the productivity of the region, which would include necessary transportation sector investment. The projections used are mid-level estimates from a low-medium-high set provided by Moody’s. The focus of this analysis is to (as stated) determine the extent to which each alternative would provide the type of investments in commuter and intercity rail services necessary to support this projected growth and reinforce more efficient, sustainable development and travel market patterns within the Affected Environment.

The proposed review of potential market-response, labor productivity and agglomeration effects due to the Tier 1 EIS Alternatives will provide important information on the extent to which each alternative would provide the type of investments in commuter and intercity rail services necessary to support this projected growth and reinforce more efficient, sustainable development and travel market patterns within the Affected Environment. Each of the alternatives would be qualitatively compared against the following growth-supportive factors:

- Sufficient growth in the efficiency and capacity of intercity rail operations in the major travel markets to meet travel demand in 2040 and increase the role of intercity rail in those markets.

- Sufficient growth in the efficiency and capacity of commuter rail operations in the major urban areas to meet travel demand in 2040 and increase the role of commuter rail in key travel markets.
- Introduce major new services that expand the rail network’s connectivity and mobility among intercity and commuter travel markets.
- Introduce transformative new services with sufficiently substantial changes in the rail network’s service level and travel times that the market reach of individual metropolitan markets is similarly substantially changed.

► **Fiscal Impacts**

FRA will discuss the potential changes in local or regional tax bases due to construction and rail operations activities and longer-term market effects for each Tier 1 EIS Alternative. FRA will consider the potential change in operating costs and the impact on operating subsidy/surplus for each Build Alternative relative to the No Action Alternative. FRA will use order-of-magnitude data for this Tier 1 assessment; more detailed information will be incorporated in the subsequent full BCA developed as part of the SDP for the Preferred Investment Program.

1.5.3 Avoidance, Minimization and Mitigation Strategies

Potential adverse economic effects such as construction-related effects on adjacent businesses will be addressed qualitatively in the Tier 1 EIS. Consistent with this qualitative assessment, FRA will develop a menu of potential mitigation measures on a programmatic scale for further consideration in Tier 2. An example of a programmatic mitigation measure is construction phasing to address specific areas of concern.

1.6 TIER 1 EIS OUTCOMES

The Tier 1 EIS economic effects assessment will:

- Estimate potential economic effects of the Tier 1 EIS Alternatives, including the scale of such impacts (local neighborhood, metropolitan, or multistate regional) in 2014 dollars. The economic effects are considered for the horizon year of 2040, with the exception of the shorter-term construction related effects during the NEC FUTURE construction period. As construction phasing is identified for each alternative, more specificity regarding the construction period will be incorporated into this analysis.
 - Construction Activity = Total change in construction jobs (in person-years) and associated wages
 - Rail Sector Employment = Total change in permanent jobs and associated wages (in 2014 \$\$s)
 - Travel Market = Monetized total values for transportation effects, including changes in: travel time and cost; safety; and travel-related pollutant emissions
 - Market Effects = potential for economic growth due to each Tier 1 EIS Alternative. The assessment will be based on the results of six to eight economic development workshops to

obtain insights from peers and real estate market experts into market, labor productivity and agglomeration effects. Results will be presented for the three planning regions (South, Central and North) and the major MSAs within them.

FRA will use the types of mobility/connectivity changes projected under each Tier 1 EIS Alternative and the workshops' consensus regarding the types of changes needed to support near- and longer-term market effects in each of these regions to provide an initial ordinal comparison of the type and range of market effects by alternative.

- ▶ Qualitative discussion of potential adverse effects and a menu of programmatic mitigation measures.

1.7 APPLICABILITY TO TIER 2 ASSESSMENTS

The Tier 1 EIS analysis will identify those component projects and issues most likely to be carried forward for more detailed analysis in project-level Tier 2 studies as well as potential mitigation strategies to be further identified during Tier 2 and subsequent design studies, when the specifics of particular sites are known.

Appendix: Economic Development Workshop

(in support of the Economic Effects Assessment)

Overview

Project Purpose

The Federal Railroad Administration (FRA) initiated NEC FUTURE in 2012 to consider the role of Northeast Corridor (NEC) rail passenger service in the context of current and future transportation demands within the region's highway, air, and rail transportation network. Through the NEC FUTURE program, the FRA will select a long-term vision and investment program for the NEC, and provide a Tier 1 Environmental Impact Statement (EIS) and Service Development Plan in 2016 in support of that vision. The purpose of NEC FUTURE is to improve the capacity and reliability of passenger rail service in the Northeast for both regional and intercity trips in a manner that will enhance mobility options as the region's population and employment continues to grow. This improvement program includes both strengthening existing rail markets and identifying additional travel markets that rail does not adequately serve today, both on and off the NEC Spine. While the horizon year for NEC FUTURE is 2040, the vision for rail on the NEC will provide a foundation for growth well beyond 2040.

Workshop Purpose

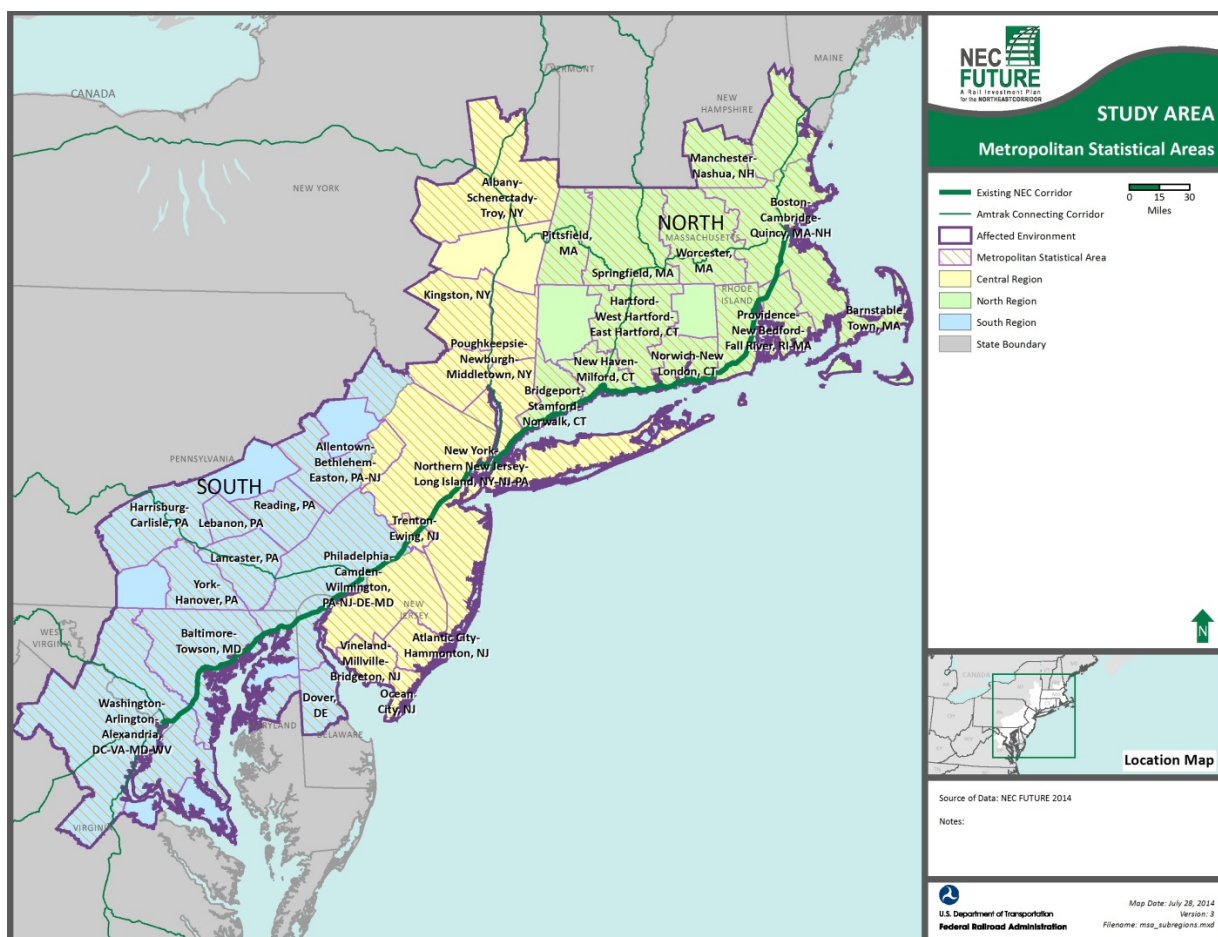
The Tier 1 EIS includes an analysis of the economic effects of each Tier 1 EIS Alternative. The purpose of these workshops is to supplement the data-driven portion of the economic effects assessment with expert opinion on the probable market response to the new passenger rail service offered under these alternatives. The collective conversation among experts knowledgeable about real estate and broader economic development forces within the Study Area will inform the economic effects assessment concerning the near- and long-term economic development effects. Through a facilitated discussion, the participants will use their professional experience to appraise whether the range of Tier 1 EIS Alternatives would:

- ▶ Affect land values near existing or proposed stations, and if so by how much on average based on the market's response to transportation access currently
- ▶ Attract private development near existing or proposed stations and if so, how much would result in a net increase in development in the Affected Environment rather than a re-distribution
- ▶ Alter the pattern of development among the various metropolitan areas within each of the three sub-regions (South, Central and North) (see Figure 1)
- ▶ Change the potential for, and possible locations of, land premium (value changes) outside of station areas
- ▶ Change the possible speed with which the market might respond

- Create the potential for agglomeration economies within or between the urban nodes along the corridor (e.g., Philadelphia and New York City)

A key element in these discussions would be the estimated timing of any projected development that could occur, and those types of services offered under the various Tier 1 Alternatives that would likely be most important in supporting increased development in an area. For example, the speed of market response in a station area near large institutional land owners (a large university or government complex for example) could be very different than an area surrounded by parking lots and small retailers. The speed of market response might vary with the amount and type of new service offered as well.

Figure 1 – North, Central and South Subregions of the Affected Environment



Workshop Structure

- Nine half-day workshops will be conducted with knowledgeable regional stakeholders. Participants will include business, academic, and government representatives from the communities surrounding existing or proposed stations who are knowledgeable about development conditions and real estate dynamics in the corridor. These workshops will be

working meetings and will not be open to the general public. Participants may be drawn from the state and local governments, metropolitan planning organizations (MPOs) or municipal planning agencies, chambers of commerce and the private land developer community, and universities, and may include others familiar with local station and regional development market forces. The workshop participants will be provided background information in advance of the workshop on the Tier 1 EIS Alternatives and the main questions to be explored during the workshop.

- ▶ Workshop participants will not be compensated for their participation. Local participants will not be compensated for their travel.
- ▶ The attendees' views about development potential in the various markets within that workshop's focus area will be documented, including the level of agreement and range of opinions that need to be considered when projecting potential gains in land values or new development due to these types of transportation investments. Other major factors that may be of equal or greater importance (e.g., available land, zoning, tax levels, highway access, and connectivity to the local transit system) will also likely be identified during this process. The eventual consensus forecast or expectation for future development under the Tier 1 EIS Alternatives will be based in part on the expectations of these regionally knowledgeable land use and real estate professionals.
- ▶ The NEC FUTURE team will prepare questions to guide workshop conversation and ensure that necessary topics are addressed by systematically focusing on corridor development issues.

Notes will be taken during the workshop session and a summary of the key points and majority/dissenting views will be included in the Market-Response Effects assessment. As a check on workshop results and to provide background information, applicable literature will be reviewed to document the types of economic outcomes experienced in other settings where rail improvements were implemented. For those Tier 1 EIS Alternatives that would introduce transformational high-speed rail, such background information would also draw upon a larger amount of available international literature on these issues.

Workshop Outcomes

Collectively, the stakeholders' views and the data analysis will provide a basis for understanding the potential for Tier 1 EIS Alternatives to alter land values as well as development levels and patterns within the Affected Environment, with a primary focus on metropolitan areas and those neighborhoods where stations are anticipated to be located. The result will be a qualitative description of the potential for development changes under the various Tier 1 EIS Alternatives in terms of volume and mix, an approximate sense of the timing of such effects and related investments, and actions that may also be needed for these changes to be realized.

Workshop Locations

Local neighborhood and broader metropolitan real estate markets vary considerably throughout the Affected Environment and many factors external to transportation influence development outcomes. The workshops will be distributed among the major markets within the Affected Environment, with at least two workshops taking place in each of the three subregions (South,

Central and North); parallel discussions of demographic and economic development trends (as identified in the map below) utilize the same geographic subregions.

The proposed workshop locations and associated market coverage are:

NORTH SUBREGION (3 workshops)	
Workshop Location	Corridor Market Areas Assessed
Boston	Boston, Providence
Stamford	Westchester and southern Connecticut
Hartford	New Haven, Hartford, and Springfield
CENTRAL SUBREGION (3 workshops)	
New York City	New York City (five boroughs)
Long Island	Long Island
Trenton or New Brunswick	New Jersey Markets
SOUTH SUBREGION (3 workshops)	
Philadelphia	Philadelphia, Harrisburg, Wilmington
Baltimore	Baltimore and other Maryland markets not covered by Washington DC meeting
Washington DC	Washington DC (incl. VA and MD suburbs)

Background Materials

Prior to each workshop, the workshop participants will be provided background information on the 1) alternatives considered; 2) the general existing market conditions in the anticipated station areas; 3) broader corridor issues that could influence market outcomes considered in the workshop; and 4) a summary of studies concerning the potential for agglomeration economies associated with rail investment to inform their thinking. Examples of these materials include:

- ▶ The magnitude of change in accessibility anticipated under the Tier 1 EIS Alternatives (e.g., travel time and frequency, number of jobs accessed in 45 minutes of travel)
- ▶ A summary of market demographics (e.g., population, income, and employment) that correspond to the ¼ mile area around the station sites
- ▶ Available information on existing land use mixes at a downtown versus suburban location, because they may serve different travel markets
- ▶ Presence of multimodal connections (local/commuter transit, highway and airport access) and major institutions (universities, government facilities)
- ▶ A brief summary of applicable literature (e.g., the NEC Commission's report on *The Northeast Corridor and the American Economy*, and previous or current plans for the station areas under consideration)

Workshop Participants

Participants in each market workshop will be selected to offer a range of perspectives. Each workshop should have representation from:

- 1) Private real estate developers familiar with the local market and/or rail-oriented development;
- 2) Planners or economic development representatives familiar with the neighborhood market and broader economy;
- 3) Academic or non-profit researchers focused on urban economics, transportation investment and its impact on economic outcomes.

The information provided by the academic and non-profit community will be applicable corridor-wide in many (not all) cases. They are deliberately included within the market-focused workshops, rather than combined into a separate “corridor-wide” workshop, in order to foster greater diversity and exchange of perspectives and information within the individual market workshops.

Discussion Agenda
Economic Development Workshop
Date, Time and Location TBD
Half Day's Duration

AGENDA	TIME
Introductions/Purpose/Logistics	8:30 AM – 8:50 AM
Overview of NEC FUTURE EIS Alternatives	8:50 AM – 9:15 AM
Anticipated Impacts of the Alternatives	9:15 AM – 10:30 AM
Break	10:30 AM – 10:45 AM
Factors Influencing Outcomes	10:45 AM – 11:45 AM
Wrap-up and Comment Forms	11:45 PM – 12:00 PM

Facilitated Discussion

The invited workshop participants come from a range of technical, regulatory, management and institutional backgrounds both in their current or previous positions. Many have direct experience with transportation-driven economic development. The workshop discussion will be an opportunity to solicit their experiences and technical expertise to inform the economic effects analysis of the NEC FUTURE Tier 1 Alternatives.

An open-forum type discussion will be facilitated within each of the three discussion topics. The workshop facilitator will guide the discussion to: 1) stay on topic; 2) encourage broad participation; and 3) compile a list of “findings, caveats, and resources” to inform the economics effects evaluation of alternatives. The rules of discussion will be established up front to create a ‘safe’ and ‘open’ environment. Items that are off-topic but warrant subsequent discussion will be ‘parked’ and recorded for future reference. Key discussion topics will be noted on chart paper and arrayed around the room. A summary of key discussion points by topic will be agreed upon by the participants at the conclusion of each session and at the conclusion of the workshop. Notes and discussion insights from the workshop will be provided to participants.

First Hour of Discussion: Anticipated Impacts of the Alternatives

FOCUS: Identify the Likely Station-area, Urban Market and Agglomeration Impacts Associated with the Tier 1 Alternatives

The NEC from Washington, D.C., to Boston, Massachusetts, is critical to regional mobility, serving intercity and commuter travel as well as freight movement. The NEC is already at or near capacity and requires significant investment just to achieve a state-of-good repair for the aging infrastructure. One of our biggest challenges is to balance these existing requirements within each market with the future growth needs of a 2040 horizon year. What is the likely market response in station areas?

The operation of the NEC is one of the reasons that the Northeast Region is as economically integrated as it is. Part of the discussion will focus on the potential for economic integration for those areas on and off the corridor.

Prompts for Discussion

- ▶ Given the dense level of development already in place in many locations along the corridor, what, if any, are the economic effects anticipated in existing station areas? It is unlikely the group would come to consensus on a single value. The discussion will focus on establishing a range—the most that might occur and the least that might occur.
 - Land value change?
 - Rate of absorption?
 - Rate of development?
 - Change in use?
 - Greater intensity of development?
 - Other?
- ▶ How will economic development differ in new station areas, if applicable?
- ▶ Are market impacts anticipated outside of direct station areas?
- ▶ What is the magnitude of the economic development impacts?
- ▶ If economic development impacts are anticipated, can we characterize the share that is new versus that which is a transfer based on current experience?
- ▶ Does the improvement of service change the timeline of development already anticipated to occur?
- ▶ Can the alternatives foster agglomeration economies within or between the focus market and other parts of the corridor? How important is this to the long-term outlook of the corridor?

- ▶ What is the cost of continuing down the path that we are currently on—with minimal incremental investments in the NEC (if any)?
- ▶ Are there any potential development outcomes that are undesirable?

SUMMARY OF DISCUSSION

What are the economic development impacts?

Where identified economic development effects are most pronounced geographically?

What is the estimated timing of any projected development that could occur?

Second Hour of Discussion: What Influences Outcomes

FOCUS: Identify the Factors that Support or Hinder the Alternatives' Effect on Economic Development

Economic development does not occur in a vacuum. Many factors must align for transportation infrastructure to serve as a catalyst for economic development. What are these positive and negative factors? What are the risks specific to this market?

Prompts for Discussion

- ▶ What factors outside of the corridor, if any, could influence the realization of any anticipated economic development outcomes in this focus market?
- ▶ What factors elsewhere on the corridor, if any, could influence the realization of any anticipated economic development outcomes in this focus market?
- ▶ What factors within this market, if any, could influence the realization of any anticipated economic development outcomes in this focus market?
- ▶ Of the factors identified in the questions above, how would you rank them in importance?
- ▶ Can public policy play a role? If so, what and how?

SUMMARY OF DISCUSSION

What are the positive and negative factors that influence the Alternatives' influence on economic development outcomes?

How would the identified factors rank in their influence on outcomes?

Can these factors be fostered through policy (positive) or mitigated (negative)? If so, how?

Application of Effects-Assessment Methodology

1. Economic Effects: Application of Effects-Assessment Methodology

1.1 VARIATIONS TO EFFECTS-ASSESSMENT METHODOLOGY

The following variations from the Effects-Assessment Methodology occurred during the process of developing the Tier 1 Draft EIS analysis.

1.1.1 Existing Conditions

At the request of the FRA, discussion on the role of the Northeast regional economy in the context of the national economy was added to the chapter introduction. Economic development factors considered as part of this discussion included:

- ▶ Gross Domestic Product
- ▶ Cost of Doing Business
- ▶ Connection Between Business Costs and Industrial Mix
- ▶ Median Income
- ▶ Age
- ▶ Population Growth Rate

1.1.2 Environmental Consequences

1.1.2.1 Construction Effects

Employment and earnings for construction associated with Full Build-Out (2040) were estimated in 2014 dollars. No assumptions were made regarding the approximate phasing of the construction work.

Construction effects for the No Action Alternative were analyzed under two categories – Funded and Unfunded. The analysis for the No Action Alternative summed the Funded and Unfunded costs. For each of the Action Alternatives, construction impacts were estimated under two categories – low capital cost estimates and high capital cost estimates. Only impacts of the low cost scenario were reported.

Three variations of rolling stock purchases and the associated impacts were considered:

- ▶ Rolling Stock manufactured outside the United States
- ▶ Rolling Stock manufactured in the United States but not in the Study Area
- ▶ Rolling Stock manufactured in the Study Area

In Chapter 6, *Economics Effects and Growth, and Indirect Effects*, impacts were only reported for the scenario that assumed that rolling stock was manufactured in the U.S., but not necessarily in the Affected Environment.

1.1.2.2 Rail Sector Employment Effects

Based on the Operating and Maintenance (O&M) cost estimates, the rail sector employment and earnings effects for each Action Alternative were estimated. To be consistent with the O&M estimations (as outlined in the *Operating and Maintenance (O&M) Costs Technical Memorandum*), the employment and earnings impacts by Alternative and service were estimated for Full O&M only.

1.1.2.3 Travel Market Effects

Changes in Travel Time, Reliability, Cost and Safety:

- ▶ Travel Time: Travel time savings for Intercity rail users included the following components:
 - Base passengers- travelers using Intercity rail service in the No Action Alternative and experiencing travel time savings in the Action Alternatives.
 - Passengers diverted from other modes of transport - travelers using auto, bus, and air modes to complete their trip in the No Action Alternative and diverting to Intercity passenger rail service in the Action Alternatives and experiencing travel time savings.
 - Passengers diverted between Intercity rail services - Due to cheaper fares, improved frequency, and better connectivity, passengers using Intercity-Express service in the No Action Alternative may divert to Intercity-Corridor service. Although travel times for passengers diverting from Intercity-Express service may be longer, Intercity-Corridor service provides an option with lower travel cost and consistent frequency, causing some passengers to make the shift. Any increases in travel times between the No Action and Action Alternatives were included as disbenefits in the analysis.
- ▶ Travel Reliability: While reliability was an outcome of the Action Alternatives relative to the No Action Alternatives, it did not distinguish among the individual Action Alternatives—all were equally reliable. Thus, estimation of this outcome was not undertaken as part of the economic effects analysis.
- ▶ Travel Cost: Travel cost savings for Intercity rail included two components:
 - Savings incurred by base Intercity-Corridor passengers who used the service in the No Action and Action Alternatives and experienced lower fares in all Action Alternatives. The base Intercity-Express riders did not incur travel cost savings, as the fares did not change across alternatives.
 - Savings incurred by passengers diverted from other modes of transport to Intercity passenger rail service. This included savings incurred by passengers diverted from Intercity-Express rail service to Intercity-Corridor rail services in the Action Alternatives due to the lower fares and increased frequency for the Intercity-Corridor service. Travel costs were outputs from the travel demand model and included bus diversions in addition to auto and air. The travel costs associated with the diversions were directly applied.

- ▶ **Safety:** The value of crashes avoided was estimated only for passengers who diverted from auto to Intercity and Regional rail. The analysis did not estimate the effects on safety for diversions from other modes of transportation (bus, rail, and air), as these modes of transportation would continue to provide service.

Changes in Emissions

The value of net emissions and greenhouse gas reductions associated with auto, passenger rail, and freight (diesel) modes were estimated based on changes in criteria pollutants corresponding to the 2040 Action Alternatives compared to the No Action Alternative, as developed in the Air Quality analysis in Chapter 7, Section 7.12.

Potential for Additional Rail Capacity

No reference to the cost-sharing model was included in the analysis.

1.1.2.4 Market Effects

Station Area and Economic Development Workshop

The Station Area and Economic Development Workshops also included participants from academia.

Market-Response Effects Assessment

To assess the economic development potential as a result of the rail improvements, a series of metrics were developed based on the information gathered from the Economic Development Workshops. Market-response effects were presented for the defined metropolitan areas or major hub stations within Metro areas (and not summed by the planning regions or metropolitan statistical areas).

Market-response effects were categorized into three groups – station area development, agglomeration and labor market effects.

Labor Market Effects

For select markets, stations along the NEC spine that are reachable within 30 minutes of rail travel by alternative were identified. The list of identified stations was used to summarize labor pools reachable by 30 minutes of rail travel by each alternative for the major hub stations in each market.

Fiscal Impacts

The analysis did not include tax base impacts as the level of planning for the Tier 1 Draft EIS Alternatives is not sufficiently detailed to permit this estimate. Tax base impacts will be considered as part of the Tier 2, project-level assessments. The anticipated net revenue contributions associated with the operation and maintenance of the NEC FUTURE program were included, following the methodology as written.

1.1.3 Data Variations

Aside from the updates outlined in the previous section, no modifications were needed with respect to the data requirements.

Workshop Summary



Economic Development Workshops – Summary

July 2015



U.S. Department
of Transportation

**Federal Railroad
Administration**

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1. Introduction

NEC FUTURE is a comprehensive planning study being led by the Federal Railroad Administration (FRA) to define, evaluate, and prioritize future investments in the Northeast Corridor (NEC). The NEC is defined as the existing rail transportation spine of the Northeast region, which is anchored by Washington Union Station in the south, Penn Station New York in the center, and Boston South Station in the north. As the rail transportation spine of the Northeast region, the NEC is a key component of the region's transportation system and vital to its economy. A Tier 1 Environmental Impact Statement (EIS) is being prepared as part of the NEC FUTURE program.

1. NEC FUTURE Background

First established 150 years ago, the existing NEC is inadequate to meet the region's current and future needs. By 2040, continued population and employment growth in the Northeast is expected to create increasing demand for travel options across the passenger transportation system—rail, air, highway, transit, and intercity bus. And yet today, the aging infrastructure and capacity limitations of the NEC already result in congestion and delays for daily commuters and for regional and intercity travelers. Forecast growth in population and employment in the Northeast will put increasing pressures on this already constrained NEC rail network. These trends—along with changes in technology, business practices and lifestyles—will continue to influence future travel needs and signify opportunities for new types of service on the NEC and its connecting corridors.¹

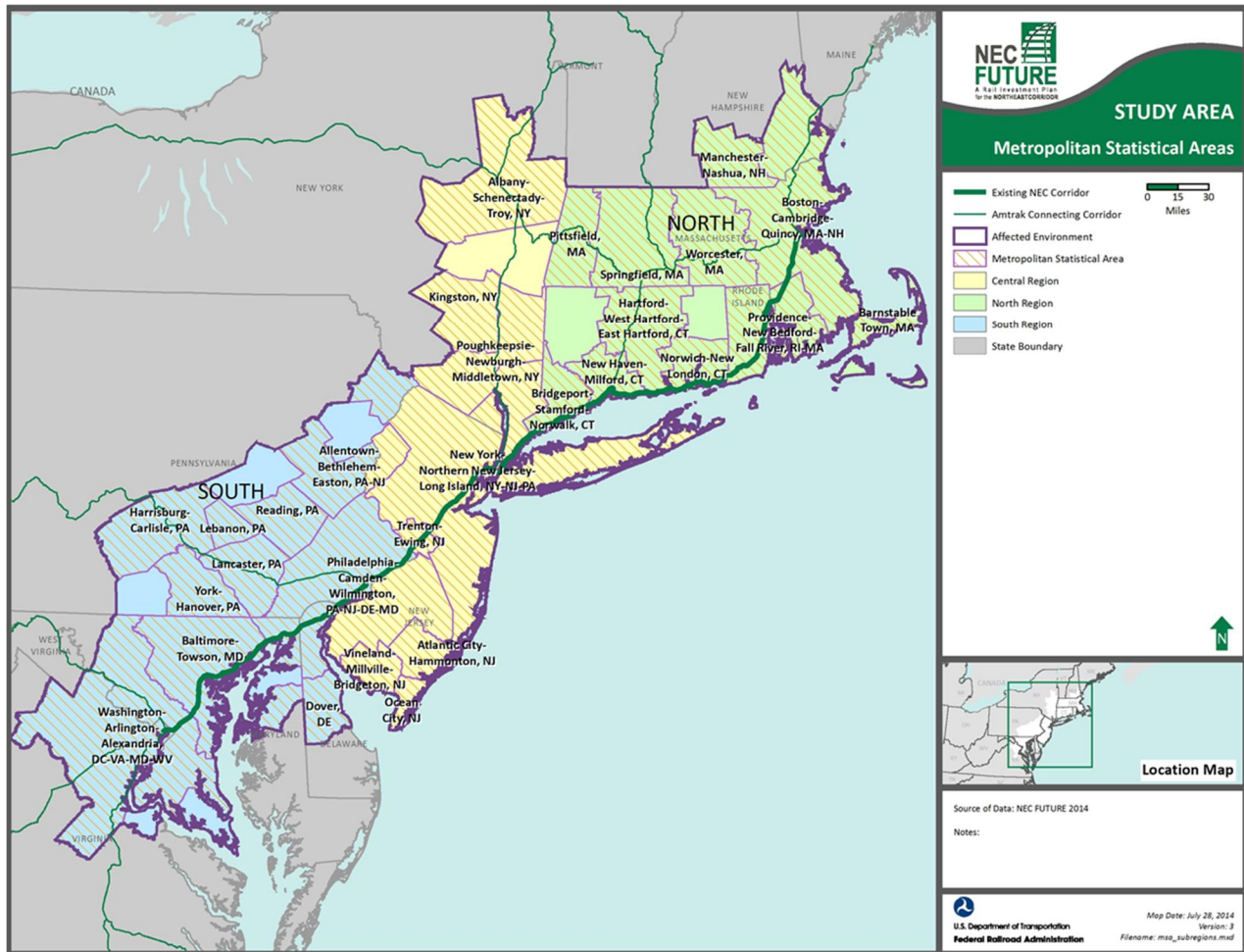
NEC FUTURE is defining a long-term vision to improve passenger rail service on the NEC in a manner that will enhance mobility options and expand passenger rail service in support of future population and employment growth in the NEC FUTURE Study Area. The Study Area extends from the Washington, D.C., metropolitan area to the Boston, MA metropolitan area (Figure 1). The purpose of the NEC FUTURE program is to upgrade aging infrastructure and to improve the reliability, capacity, connectivity, performance, and resiliency of future passenger rail service on the NEC for both intercity and regional trips, while promoting environmental sustainability and economic growth.

A National Environmental Policy Act (NEPA) Tier 1 EIS is being prepared for the NEC FUTURE program. The Tier 1 EIS will examine, at a broad programmatic level, environmental, socioeconomic, and transportation impacts of a range of Tier 1 EIS Action Alternatives, each comprising a different long-term vision for the NEC. Impacts will be compared against a No Action Alternative, and assessed assuming full implementation and build-out of an alternative by 2040. For the purposes of the Tier 1 EIS analysis, the FRA is considering 2040 as the analysis year. However, investments proposed in the NEC FUTURE program are likely to include infrastructure improvements expected to last well beyond 2040 and into the

¹ Those travel corridors that connect directly to a station on the NEC. These include (1) corridor service south of Washington Union Station to markets in Virginia and North Carolina including Lynchburg, Richmond, Newport News, Norfolk, and Charlotte; (2) Keystone Corridor (connects Pittsburgh and Harrisburg to Philadelphia 30th Street Station); (3) Empire (serves the major cities of Niagara Falls, Buffalo, Rochester, Syracuse, and Albany with connections to Penn Station New York); and (4) New Haven-Hartford-Springfield (to New Haven Union Station).

next century. Therefore, the FRA is considering future needs of the NEC beyond 2040 in the development and analysis of alternatives.

Figure 1: North, Central and South Sub-Regions of the Affected Environment



Source: NEC FUTURE team, 2015

A No Action Alternative and three Action Alternatives have been developed for evaluation in the Tier 1 Draft EIS:

- ▶ The No Action Alternative represents the condition of the Northeast region's multi-modal transportation system in 2040 without the NEC FUTURE investment program. It serves as a baseline for comparison with the three Action Alternatives. The No Action Alternative includes improvements to the rail system that are currently planned and programmed, as well as planned highway and airport upgrades. It includes a modest proportion of the significant backlog of work associated with bringing the NEC to a state of good repair. Under the No Action Alternative, NEC rail services do not keep pace with the region's growth, and as a result, service quality is likely to decline.
- ▶ Alternative 1 maintains the role of rail as it is today, with sufficient service levels to keep pace with the significant growth projected in the region's population, employment, and travel demand. This alternative

expands capacity, adds tracks, and relieves key chokepoints, particularly through northern New Jersey, New York, and Connecticut.

- ▶ Alternative 2 grows the role of rail to accommodate a greater proportion of Northeast travelers as population and employment increase. South of New Haven, CT, service and infrastructure improvements are focused generally within the existing NEC, while north of New Haven, a new supplemental, two-track route is added between New Haven and Hartford, CT, and Providence, RI. Alternative 2 serves new markets, reduces trip times, and addresses capacity constraints to support a very significant growth in rail traffic. The existing NEC expands to four tracks, with six tracks through portions of New Jersey and southwestern Connecticut.
- ▶ Alternative 3 transforms the role of rail in the Northeast, positioning it as a dominant mode for travel in the region. In addition to upgrading the existing NEC, Alternative 3 includes a new two-track second spine that supports high-performance rail services between major markets, provides significant reduction in travel time, and provides additional system capacity. South of New York, the second spine closely parallels the existing NEC, while adding new stations in downtown Baltimore, MD, downtown Philadelphia, PA, and at Philadelphia International Airport. Between New York and Boston, several route options are being analyzed.

Each Action Alternative improves service on the existing NEC, achieves a state of good repair, and expands the range of service offerings on the NEC. Each also protects freight rail access and the opportunity for future freight expansion.

The FRA will identify a Preferred Alternative in the Tier 1 EIS Record of Decision (ROD). Following the issuance of the ROD, the FRA will prepare a Service Development Plan (SDP). The SDP will describe a phased implementation plan that details operational, network, and financial aspects of the Preferred Alternative.

1.1 ECONOMIC EFFECT COMPONENT OF THE TIER 1 EIS

The economic effects assessment compares the potential economic effects of each of the Tier 1 EIS Action Alternatives within the NEC FUTURE Study Area (Figure 1). The Tier 1 EIS Alternatives would generate near-term economic effects during the NEC FUTURE program's construction period and initial periods of operation. Longer-term economic effects could include a market response to improved and new rail services.

Certain key factors that affect station-area development, broader economic development, and barriers to development can be more qualitative or uncertain than the models in the economic effects assessment can represent. To better understand these factors, the FRA conducted a series of workshops in locations that represent major urban economies along the NEC.

2. Role of Workshops in Evaluating the Alternatives

2.1 PURPOSE

The purpose of the economic development workshops was to supplement the data-driven portion of the economic effects assessment with expert opinion on the probable market response to the new passenger rail services offered under these alternatives. The collective conversation among experts knowledgeable about real estate and broader economic development forces within the Study Area complements the assessment of near- and long-term economic development effects. Through a facilitated discussion, the participants shared their professional experience to appraise whether the range of Tier 1 EIS Alternatives would:

- ▶ Affect land values near existing or proposed stations
- ▶ Attract private development near existing or proposed stations
- ▶ Alter the pattern of development among the various metropolitan areas within each of the three sub-regions (South, Central, and North) (see Figure 1)
- ▶ Change the potential for, and possible locations of, land premium (value changes) outside of station areas
- ▶ Alter the type and density of development in station areas as trip times are reduced
- ▶ Create the potential for agglomeration economies within or between the urban nodes along the corridor (e.g., Philadelphia and New York City)
- ▶ Impact the economies along the corridor in ways not identified above

2.2 OUTCOMES

Collectively, the stakeholders' views and the data analysis provided a basis for understanding the potential for Tier 1 EIS Alternatives to alter land values as well as development levels and patterns within the Study Area, with a primary focus on metropolitan areas and those neighborhoods where stations are anticipated to be located. The outcome of the Economic Development Workshops is a qualitative description of the potential for development changes under the various Tier 1 EIS Alternatives in terms of volume and mix, an approximate sense of the timing of such effects and related investments, and actions that may also be needed for these changes to be realized.

2.3 EXPERT OPINION TO SUPPLEMENT DATA ANALYSIS

The economic effects assessment of Tier 1 EIS Alternatives is based on published data such as historical statistics on the Study Area economy, economic forecasts developed by Moody's Analytics, and information developed by the project team on the performance of each alternative. Information gathered from knowledgeable experts will supplement quantifiable data, particularly where the nature and location of the alternatives have the potential to change existing economic relationships. This additional step is undertaken because economic models, by their nature, extrapolate existing economic relationships into the future to predict outcomes. When there is the potential to restructure economic relationships, as there is with the

introduction of some features of the Action Alternatives, economic models are less reliable. In these cases, the views of knowledgeable experts are a good check on where and how the models might miss important features of the analysis.²

3. Workshop Process

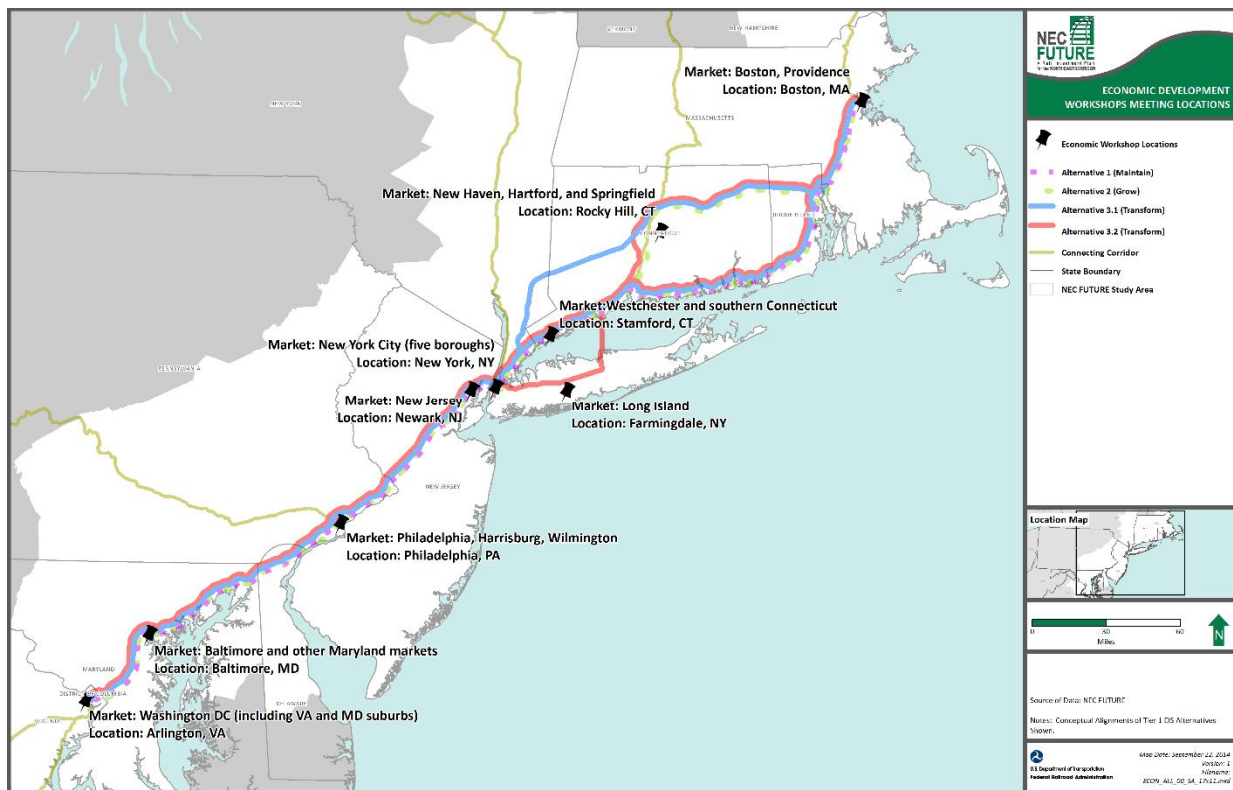
To understand the key factors that affect station-area development, broader economic development, and barriers to development, the FRA conducted a series of workshops in locations that represent major urban economies along the NEC. Figure 2 shows the urban economies and the locations of the workshop, which include the following:

- ▶ Washington, D.C., and suburban Maryland and Virginia (Arlington, VA)
- ▶ Baltimore and other Maryland markets (Baltimore, MD)
- ▶ Philadelphia and Harrisburg, PA, and Wilmington, DE (Philadelphia, PA)
- ▶ New Jersey (Newark, NJ)
- ▶ New York City (five boroughs) (New York City, NY)
- ▶ Long Island (Farmingdale, NY)
- ▶ Westchester, NY, and Southern Connecticut (Stamford, CT)
- ▶ New Haven and Hartford, CT, Springfield, MA (Rocky Hill, CT)
- ▶ Boston, MA, and Providence, RI (Boston, MA)

The FRA invited various stakeholders to each workshop to gather information that will help differentiate between the potential for economic development within and between markets along the NEC for each Alternative. The workshops provided participants with an overview of the NEC FUTURE program No Action and Action Alternatives. Stakeholders provided valuable insights and information for their respective markets.

² This is an established and proven technique for assessing future outcomes when structural changes to the economy are anticipated. A retrospective assessment of forecasts of the telephone's impact on the economy found that the best projections of the technology's adoption and impact on economic activity were made by people involved in the industry, who understood how to operate the technology as well as how to implement it in a way that would generate revenues. (Pool, Ithiel de Sola. 1983. *Forecasting the Telephone: A Retrospective Technology Assessment*. New Jersey: Ablex Publishing Corporation.) The introduction of high-speed rail service or a significant diversification of rail services are large market changes similar in scope to the technological introductions and gradual adoption of the telephone.

Figure 2: Economic Development Workshops Meeting Locations



Source: NEC FUTURE team, 2015

Note: Route options shown in map have been updated since the time of the workshops.

3.1 STAKEHOLDERS

The FRA conducted nine workshops to obtain information from a variety of key stakeholders, ranging from private developers to academicians (Figure 2). Grouping the workshops by markets allowed information about the NEC FUTURE program to be presented to all stakeholders while tailoring each workshop to the unique characteristics that affect each market. In addition, this also allowed for a comparison across markets to better understand both the differences and similarities between markets. The nine workshops had attendees representing the following stakeholder groups:

- ▶ **Private Developers:** These attendees focused on factors that both drive and hinder property investment, as well as the role that rail connectivity and availability plays in supporting economic development and driving their investment and development decision-making process.
- ▶ **Local Planners/Economic Developers:** These attendees shared what aspects of passenger rail are most important to economic development, what other factors drive economic development, how existing/lack of rail infrastructure and connectivity to other markets constrains regional development, and what transit-based factors hinder businesses and/or people from locating in that specific area.
- ▶ **Academic Institutions:** Representatives from academic institutions included both faculty members and administrative officials. Attendees from academic institutions focused on their relationships with

corporations, the importance of connectivity between institutions, and the importance of connectivity to the local urban market for the institution.

- Faculty, Researchers, and Transportation Experts provided insights and expertise in transportation’s relationship with regional economies.
- Administrative Officials described their institution’s perspective on passenger rail as a major employer/landowner in the community. Universities’ decisions concerning development can strongly affect the economy in the surrounding neighborhoods and they can be important partners in station-area development.

4. Synopsis of Workshop Discussions

The following major questions, focused on market-specific potential, were explored in each workshop:

- ▶ The potential for localized station-area development
- ▶ The potential for agglomeration/productivity impacts
- ▶ Labor market effects

Individual workshops varied in the energy devoted and perceived relevance of the three topics to the local market. At times, the conversation discussed one or more topics in tandem—for example how anticipated labor market effects might impact the character of station-area development. This section provides a summary overview of the collective opinion on the three major topics, noting commonalities and differences across the markets.

4.1 FINDINGS AND INSIGHTS

4.1.1 STATION-AREA DEVELOPMENT

Workshop participants uniformly agreed that while rail service was an important contributor to economic development, many other factors need to be in place to have a full “development package.” The most commonly noted economic development factors included the presence of good schools, low crime rates, availability of land, ability to assemble parcels, willing institutional and local government partners, the presence of transit services (preferably a variety of modes), appropriate zoning that permits sufficient density for developers to build, utilities, and supporting infrastructure such as sidewalks and parking.

Participants similarly agreed on the ability of rail service to accelerate and shape development. While developers indicated that they respond to existing infrastructure and/or infrastructure under construction rather than future plans for infrastructure or service, there was agreement that improved rail access and connectivity, particularly in new markets, could accelerate development once in operation and sometimes even before operation when the commitment to the project is announced.

Participants from Wilmington shared a Market-Ready (Re)Development Assessment Tool developed for Delaware local governments. The tool includes the following indicators of whether a community is prepared to advance strategic development, as in station-area development:

- ▶ Sufficient public involvement to establish a clear vision for growth and development
- ▶ Sufficient plans to build on the foundation of its Comprehensive Plan
- ▶ A sound and market-responsive regulatory environment
- ▶ Business-friendly and streamlined processes, an inventory of high-priority market-ready (re)development sites
- ▶ Programs that market local assets and incentivize business attraction³

Rail service pricing was considered an important factor in station-area development. Having a range of service options at different prices was viewed as important for spurring mixed-use development near stations. The pricing of the service determines who uses it and how it is used, which in turn influences the types of projects developers select for the site. The higher-cost premium services more likely serve a business travel market, while the mid-range and lower-cost options attract a broader spectrum of the market and encourage more frequent use.

4.1.2 AGGLOMERATION

In considering economic effects of the three Action Alternatives, one of the largest questions is whether the cumulative changes in travel times and patterns of connectivity could change the way the individual metropolitan economies relate to one another. For example, do the changes in market access reinforce the dominance of the New York market, or by contrast, do the smaller cities benefit to a greater extent and close some of the gap with New York? Strikingly, the participants at each workshop along the NEC selected New York as the most important market for greater rail service connectivity—even when other major markets were physically closer to them. New York City itself sought better mobility within its own economy; participants did not identify the need for greater rail capacity to connect to other major NEC markets except for areas surrounding New York that could supply labor. This suggests that the corridor will remain a New York-centric economy even as smaller individual markets become more integrated over time.

Participants in the Stamford, CT, Long Island, NY, and Newark, NJ, workshops developed the concept of a “City Region User.” This is a traveler with the ability to utilize a greater range of amenities within a single metropolitan region such as New York because of enhanced metro region mobility. The key difference is a shift from core-periphery linkages within the New York metropolitan economy to one that has travelers bypassing the core as a destination and traveling directly between secondary activity centers such as Stamford, CT, to Newark, NJ. The intuition behind this idea is similar to business agglomeration. Businesses gain productivity in large, dense economies because they have access to greater diversity of specialized skilled labor, information, and new innovations. The City Region User is a household that has access to a greater range of employment, shopping, entertainment, and recreational options from the residential location. Greater mobility allows the City Region User to expand his range of activities in the local economy—making the region more attractive for households and supporting local consumption and associated economic activity.

This idea was introduced by participants in the Stamford, CT, workshop. Participants in the subsequent Long Island, NY, and Newark, NJ, workshops were asked about the concept and found it interesting and

³ Cited from University of Delaware memorandum titled “Delaware Local Government Market-Ready (re)Development Assessment Tool.”

shared the perspective of the Stamford participants that the ability to more readily “crisscross” the region would benefit them and change where they work, shop, and play. While it was not discussed directly in the New York workshop, the New York participants’ discussion focused on types of trips within the region (to the airport and evolving commuting patterns for example) as well as how to capture a larger share of the surrounding labor shed—ideas consistent with the internal focus⁴ of the City Region User as it pertains to greater rail accessibility. Outside of the region’s ability to attract workers from the surrounding areas, participants in the New York workshop did not mention the need for better connections to other major NEC markets.

4.1.3 LABOR MARKET EFFECT

Participants in the individual markets varied in their assessment of whether and how enhanced rail service could offer labor market benefits. There was no clear pattern spatially or by size of a metro’s economy. Participants in the Boston and New York workshops—the northern and central anchors of the corridor—thought that the labor market benefits would be huge for their economies. In Washington, D.C., the anchor of the southern corridor segment, participants did not focus on labor market benefits. A number of smaller metro areas also anticipated labor market benefits but varied in their strategy to leverage the labor market integration into development. Baltimore, Wilmington, and Philadelphia all saw opportunities for greater labor market integration among themselves, with frequent and cost-competitive rail service. Of note, rather than serving as bedroom communities to a larger economy, both Wilmington and Baltimore saw enhanced rail service as essential for businesses in their communities to recruit talent and jobs to their communities.

Long Island and the smaller Connecticut communities also anticipated that enhanced rail service would offer labor market benefits. In Long Island, the improved access would allow them to attract convention and tourism visitors and support interaction among the national laboratories and universities with similar institutions in the surrounding region, for example. In Connecticut, the labor market focus was more bi-directional. Participants in both Long Island and Connecticut felt that their economies could attract and retain jobs with the implementation of enhanced rail service, as those communities offered lower-cost alternatives to New York and also supported large defense industry manufacturers. They also, however, maintained a New York-centric orientation and cited the economic impact of hosting residents who work in the city but live and spend in their home economies.

Individual markets varied in their assessment of an acceptable travel time for a commute. In New York and Philadelphia, an hour or less was considered the tipping point. In smaller cities, 30 to 45 minutes was more frequently cited.

4.1.4 TRAVEL TIME, FREQUENCY, AND RELIABILITY

Across all workshop conversations, the tradeoffs among reduced travel time, connectivity, reliability, and frequency of service were explored. Participants uniformly valued reliability of service as the most important or among the leading qualities of service. Participants in the southern and central parts of the corridor indicated that travel time was secondary, and that frequency of service and connectivity to target markets were the most important qualities needed for enhanced rail service to spur development in their communities. In the northern portion of the corridor, however, travel time was valued more highly. Current

⁴ The “internal focus” refers to a local emphasis on enhanced mobility and connectivity *within* the broad New York metropolitan market, as opposed to *external* connections between the New York metropolitan market and other metropolitan areas, such as Philadelphia.

rail service travel time does not permit a day trip between Boston and New York City. Participants indicated that there was a threshold effect regarding the prioritization of travel time and frequency—faster travel times were more important up to the point where they permitted a Boston to New York day trip. Once that time was attained, additional frequencies and types of service became more important as in the southern portion of the corridor.

In the context of travel time and reliability, the value of direct one-seat rides was stressed by participants in all workshops, particularly by the developers who participated. Aside from the comparative time savings associated with a direct connection versus transfer, a direct connection was perceived to reduce the risk of delay. Locations with ready direct access to a variety of markets were favored for private development investment. In addition, because of the greater ease of access, market locations with higher densities of direct connections to other markets have greater agglomeration potential, all else being equal.

4.1.5 AIRPORT ACCESS

Rail connectivity to airports was discussed in several workshops. Participants in the Baltimore workshop maintained that rail service to the airport would permit Baltimore-Washington International Airport (BWI) to expand further and become a greater job generator for the economy. They also felt that it would support the burgeoning tech cluster that is growing near BWI. Participants in the Stamford, CT, workshop also discussed the need for better airport access in their region. Aside from serving consumer choice in the region, better airport access was viewed as important for relieving congested New York, NY, and Newark, NJ, airports and helping mid-central Connecticut attract and retain business expansions.

5. Applying Workshop Findings to Economic Effects Assessment

Collectively, the workshop discussions highlighted some of the major factors that will influence station-area development, agglomeration, and labor market outcomes. Based on these, a series of 14 evaluation factors is proposed for use in analyzing and qualitatively ranking the Alternatives in terms of economic effects. The economic effects will be determined at the metropolitan level and summed to a corridor total where appropriate, as it is possible that the importance of factors may vary throughout the corridor. For example, participants in the northern part of the corridor placed more importance on trip time than those in southern part of the corridor. Also, because of how some metrics are calculated, it may not be appropriate to add them together into a single summary value—direct trips to New York City is one example.

Table 1 summarizes the proposed factors. The shaded areas in the table will be completed as part of the economic assessment once the service plans and travel modeling is available for the No Action and Action Alternatives. Reliability of rail service is not included among the factors, despite having been identified as important for sparking development, since all Action Alternatives are assumed to offer equally reliable service.

Table 1: Candidate Evaluation Factors for Assessing Station Area, Agglomeration, and Labor Market Development Potential

Evaluation Metric	Rationale for Application	How Measured/How Does It Support the Evaluation	Geographic Scale	No Action	Alt. 1	Alt. 2	Alt. 3
Station-Area Development Potential							
Number of Stations of Each Category in the NEC FUTURE Station Typology	Stations serve different markets and roles within the network—downtown station vs. suburban commuter station, for example. These differences influence development outcomes.	Measurement: Numerical count of stations by category Evaluation: Different routes will have different mixes of station types and associated propensities for development. Potential station-area development is impacted by the characteristics of the local sites as well as the Alternatives. Identifies where Alternatives are likely to have greatest impact.	By metropolitan area, summed by category and aggregated to North, Central, South, and Total Corridor				
Are Station Areas Anticipated to be Market Ready?	Although they varied in the factors identified, every workshop noted the need for a “development package” to be in place—elements such as connecting transportation, available land, willing partners, etc.	Measurement: Existing development conditions/ infrastructure near stations; plans or policies preparing for future station-area development. Evaluation: Potential station-area development is impacted by the characteristics of the local sites as well as the Alternatives. Metric identifies where Alternatives are likely to have greatest impact. This metric classifies those station areas as either those that have taken steps to prepare for development and understand how to make this work (those that are actively working to be market ready for rail by having partnerships and plans in place), or those that face some real challenges. For those station areas that are not ready, it identifies places where additional planning for implementation would be necessary to yield station-area development.	By metropolitan area				

Table 1: Candidate Evaluation Factors for Assessing Station Area, Agglomeration, and Labor Market Development Potential (continued)

Evaluation Metric	Rationale for Application	How Measured/How Does It Support the Evaluation	Geographic Scale	No Action	Alt. 1	Alt. 2	Alt. 3
Station-Area Development Potential (continued)							
Range of Pricing/Service Type Options Serving Metro Area	Pricing determines who uses the service; developers build for the market utilizing the service.	Measurement: Numerical count of daily trains by service type—describes the range of prices and proportionate mix available Evaluation: Distinguishes among Alternatives	By metropolitan area, aggregated to North, Central, South, and Total Corridor				
Number of Other Modes Connecting at Metro Area's Dominant Station	The value of clustering modes in one place was noted in several workshops; hubs support greater development intensity than stations with just rail service.	Measurement: Proxied by the station typology ⁵ that sorts stations by local, hub and major hub Evaluation: Metric identifies where Alternatives are likely to have greatest impact.	By metropolitan area, no aggregation of individual stations				
Agglomeration Potential							
Additional Daily Trains Serving Metro Area	Accessibility is a function of mobility and connectivity. Numerous workshops expressed a desire for greater frequency of service. This metric addresses the mobility side—more frequent train service makes it easier to make trips along the corridor.	Measurement: Numerical count of additional trains Evaluation: Metric distinguishes among Alternatives	By metropolitan area, aggregated to North, Central, South, and Total Corridor Where workshops identified a second preferred location after NYC, identify the capacity change to that secondary market—example Baltimore was seeking greater frequencies North to Philadelphia/Wilmington.				

⁵ Station typology lists stations as a local, hub, or major hub, allowing for variance by Alternative. These typologies give a relative degree of station size and ridership, and thereby development potential and transportation connectivity. The major hubs, such as Penn Station in New York, are more likely to have other transportation choices available than the local stations.

Table 1: Candidate Evaluation Factors for Assessing Station Area, Agglomeration, and Labor Market Development Potential (continued)

Evaluation Metric	Rationale for Application	How Measured/How Does It Support the Evaluation	Geographic Scale	No Action	Alt. 1	Alt. 2	Alt. 3
Agglomeration Potential (continued)							
Number of New Locations Accessible Via Direct Rail Connections	Accessibility is a function of mobility and connectivity. This metric addresses the connectivity side—the value of direct rail connections in particular was stressed in several workshops.	Measurement: Numerical count of additional station locations via direct connections Evaluation: Metric distinguishes among Alternatives	By metropolitan area, aggregated to North, Central, South, and Total Corridor				
Frequency of Direct Connections	Accessibility is a function of mobility and connectivity. This metric addresses the connectivity side—the value of direct connections in particular was stressed in several workshops.	Measurement: Numerical count of daily trains to new directly accessible locations Evaluation: Metric distinguishes among Alternatives	By metropolitan area, aggregated to North, Central, South, and Total Corridor				
Number of New Trains Traversing Broad New York Region	The idea of a “regional urban user” came up in a number of workshops in the New York region—the desire to better traverse the New York region itself.	Measurement: Numerical count of additional Origin-Destination pairs served by direct intercity—this metric assumes regional service patterns remain as they are today for the purposes of making the comparison Evaluation: Metric distinguishes among Alternatives	By metropolitan area, Connecticut, New Jersey, and Long Island only				

Table 1: Candidate Evaluation Factors for Assessing Station Area, Agglomeration, and Labor Market Development Potential (continued)

Evaluation Metric	Rationale for Application	How Measured/How Does It Support the Evaluation	Geographic Scale	No Action	Alt. 1	Alt. 2	Alt. 3
Agglomeration Potential (continued)							
Shortest Travel Time to New York	For destinations outside of the New York area, NYC was the leading destination. Participants in the northern regional workshops sought faster service than that available today. Also, the idea that there was a threshold effect concerning trip time came up in a variety of workshops—that once you had service speeds that permitted a day trip for business, frequency, pricing, and reliability became more important.	Measurement: Shortest travel time to NYC in minutes Evaluation: Metric distinguishes among Alternatives	By metropolitan area, North and South regions only				
Longest Travel Time to New York	For destinations outside of the New York area, NYC was the leading destination. Participants in the northern regional workshops sought faster service than is available today. Also, the idea that there was a threshold effect concerning trip time came up in a variety of workshops—that once you had service speeds that permitted a day trip for business, frequency, pricing, and reliability became more important.	Measurement: Longest travel time to NYC in minutes Evaluation: Metric distinguishes among Alternatives—because some markets have a range of service options and associated speeds, a market might be able to make a day trip to NY by Express, but not by the less costly services due to their slower speeds.	By metropolitan area, North and South regions only				

Table 1: Candidate Evaluation Factors for Assessing Station Area, Agglomeration, and Labor Market Development Potential (continued)

Evaluation Metric	Rationale for Application	How Measured/How Does It Support the Evaluation	Geographic Scale	No Action	Alt. 1	Alt. 2	Alt. 3
Agglomeration Potential (continued)							
Number of Trains to New York	Across all workshops—additional rail capacity to New York was identified as important.	Measurement: Numerical count of daily trains Evaluation: Metric distinguishes among Alternatives	By metro, North and South regions only				
Number of Airports Served by Rail Link	Several workshops—Baltimore, Stamford, and New York in particular—noted the value of air-rail linkages for their markets.	Measurement: Numerical count of airports with daily direct rail service Evaluation: Metric distinguishes among Alternatives	Reported for corridor as a whole; no metropolitan or regional variation				
Labor Market Effect							
Number, Total Combined Employment and Total Combined Population of Markets Newly Reachable Within 30 ⁶ Minute Travel (rail/exclude walk time)	While greater accessibility to and through New York was noted in a variety of workshops—a number of workshops also valued connectivity to adjacent metro areas—the Connecticut, Philadelphia/Wilmington, and Baltimore workshops talked about the labor market advantages for their metro areas.	Measurement: Number of new metro areas accessible by rail in time buffer, total employment and population of newly aggregated labor market making the new connection Evaluation: Metric distinguishes among Alternatives—respondents generally felt that a trip time under 1 hour was required for commuting.	For all station locations from the dominant hub station in a metropolitan area, aggregated to North, Central, South, and Total Corridor				

⁶ 30 minutes used to represent a reasonable commute time and to test the sensitivity of 15 fewer minutes for market accessibility (see next metric)

Table 1: Candidate Evaluation Factors for Assessing Station Area, Agglomeration, and Labor Market Development Potential (continued)

Evaluation Metric	Rationale for Application	How Measured/How Does It Support the Evaluation	Geographic Scale	No Action	Alt. 1	Alt. 2	Alt. 3
Labor Market Effect (continued)							
Number, Total Combined Employment and Total Combined Population of Markets Newly Reachable Within 45 ⁷ Minute Travel (rail/exclude walk time)	While greater accessibility to and through New York was noted in a variety of workshops—a number of workshops also valued connectivity to adjacent metro areas—the Connecticut, Philadelphia/Wilmington, and Baltimore workshops talked about the labor market advantages for their metro areas.	Measurement: Number of new metro areas accessible by rail in time buffer, total employment and population of newly aggregated labor market making the new connection Evaluation: Metric distinguishes among Alternatives—respondents generally felt that a trip time under 1 hour was required for commuting.	For all station locations from the dominant hub station in a metropolitan area, aggregated to North, Central, South, and Total Corridor				

⁷ 45 minutes used to represent a reasonable commute time and to test the sensitivity of 15 additional minutes for market accessibility (see prior metric).

6. Highlights from Individual Workshops

The following sections summarize the major themes of the individual market discussions. At times, the workshop participants introduced additional ideas and observations beyond the three major questions. These are noted as well.

6.1 WASHINGTON, D.C.

The Washington, D.C., market is the southern terminus of the NEC, but several participants recognized that it was the juncture between the developing Southeast High Speed Rail Corridor and the NEC. Some felt that the NEC discussion should extend farther south to include Richmond.

6.1.1 STATION-AREA DEVELOPMENT

Respondents felt that Alternative 1 was valuable to the degree that it delivered reliability, frequency, and connectivity to new markets.

Trip time was not a significant concern in this market where travel times and frequencies already permit easy day trips to New York City—the corridor location rated as the most important among participants. This suggests that there may be a threshold effect—that once travel times are sufficient to permit a day trip, other factors become more important in triggering development. These included:

- ▶ Connectivity is more important than travel time—a developer will not undertake a new project based on shaving 30 minutes off the existing Washington, D.C., to New York City trip, but would undertake extensive development that served a whole new market connected by rail to New York—south of the Potomac River, for example. Respondents felt that such an investment could accelerate development in these markets.
- ▶ Direct connections are the most valuable—as one participant put it, “more transfers create more questions about reliability and the economic value decreases.” Locations with a direct connection to a hub are the “money” locations.

Washington, D.C., Key Takeaways

- Pricing is a critical element in determining development outcomes; pricing determines the type of market--developers build for the market.
- The Northeast region's growth lags behind the U.S. average pace and it has the highest cost of doing business among the four major U.S. regions (Northeast, Midwest, South, and West). Investments that support the integration of its highly skilled labor market are necessary to maintain its competitiveness.
- New York City is the prime destination for Washington, D.C. travelers, in terms of expanded rail service.
- Direct connections and the clustering of transit modes at one location increase the economic value of a site.
- Connecting new markets to the corridor's anchors was expected to accelerate development in the smaller markets.
- Trip time was less important than reliability and frequency. Some participants felt that these were substitutes in that trip time to NYC was less important if the train was reliable and had frequent departures to accommodate travelers' schedules.

- ▶ Price of the service—the pricing of the service determines who uses it—business travelers or a mix of business and personal travelers for example. Because developers build to the market, the pricing has an important impact on the type of development that is built.
- ▶ Presence of multiple modes—as the transportation network is “strengthened” by the presence of multiple modes in one location—Union Station in Washington, D.C., for example—the opportunity to increase densities and build to a greater scale is created, provided zoning permits this greater scale.
- ▶ Tertiary locations (those not on the lines) were expected to gain a lot by being connected to something other than a highway. Examples offered included Columbia and Laurel, MD.

6.1.2 AGGLOMERATION/PRODUCTIVITY

In comparing Alternative 1 and 2, respondents felt that speed was less important than improved service with Alternative 2.

- ▶ The group’s expectation for Alternative 2 was that cities would become more functionally integrated with one another (gain productivity through agglomeration) and that development around stations was secondary.
- ▶ Respondents felt that reliability was the most important improvement, followed by frequency of a variety of service types and access to new markets. Trip time followed these other attributes.
- ▶ The presence of reliable, frequent service to a variety of locations at different prices was seen as necessary to foster greater economic interaction with other locations along the corridor.
- ▶ New York City was seen as the prime destination.

Alternative 3 was perceived as a continuation of the improvements provided in Alternative 2, but the group’s focus was primarily on Alternatives 1 and 2. The group’s emphasis on price and the value of a variety of services was one of the greatest along the corridor.

6.1.3 LABOR MARKET EFFECTS

Labor market impacts were not a major focus for the group’s conversation beyond strong support for a variety of services that would allow for a greater diversity of uses and markets.

6.1.4 OTHER CONSIDERATIONS

Evolving future conditions were a major part of the conversation in Washington, D.C. The role of autonomous vehicles, the potential that younger adults (roughly those under the age of 35, often referred to as “Millennials,” and subsequent generations) who currently show a preference for downtown locations might change their location preferences as they move into new stages in life, and evolving work habits and usage of offices were all discussed as market trends that would influence the economic outcome associated with the rail investment. The group felt that connectivity would have high value regardless of how these trends unfolded in the coming decades.

6.2 BALTIMORE

Participants in the Baltimore workshop began by stressing the existing strong linkages to the Washington, D.C., market. Participants felt that Washington, D.C., and Baltimore were a unique urban pairing among the NEC markets.

6.2.1 STATION-AREA DEVELOPMENT

Participants in the Baltimore workshop agreed with other workshop groups that a range of factors needed to be in place for station-area development to occur. Of the factors noted, access to the station and station amenities were areas of particular concern relative to other workshop discussions.

Circulation within Baltimore and the ability to access Baltimore's station were identified as key concerns. Respondents noted that some companies had even threatened to leave the city if the transportation network (not just rail, but road and rail) were not fixed. This issue is important, participants noted, because unless you live near the station, it is difficult to access the station given the existing road conditions. This is a limiting factor on Baltimore's ability to capitalize on potential rail development in the NEC.

6.2.2 AGGLOMERATION/PRODUCTIVITY

Participants in the Baltimore workshop drew a distinction between connections to the Washington, D.C., market and the remaining corridor markets to the north. They felt that Baltimore was already integrated with the Washington, D.C., market, but Washington was a very difficult place to get to because of traffic conditions. They felt that trip time, pricing, and frequency were the greatest issues for Baltimore travelers going to Washington, D.C. Most regular travelers use MARC service because of the more favorable fares, but the trip times and reliability offset that advantage somewhat.

Looking in the other direction, from Washington, D.C., to Baltimore, the participants felt that if there was reliable and reasonably fast service between D.C. and BWI, the Baltimore airport would capture a greater number of the region's air travelers. BWI often has lower fares than Reagan National or Dulles, but the difficulty of getting to the airport and the cost of parking often negate this advantage. Improved rail service such as that envisioned under Alternatives 2 and 3 could change this cost calculation.

Looking north from Baltimore, the most important destination for the participants was New York City. There was little interest in points north of New York. The next most important locations were Newark, DE and

Baltimore Key Takeaways

- Major opportunities looking North in the corridor; rail connectivity in the D.C.-Baltimore corridor is adequate.
- Price points (multiple) open up the market to current non-rail users.
- Frequent (30 minute) and reliable service allows better economic integration with northern Cities.
- Most valuable links: NYC, Wilmington or Newark, and Philadelphia.
- Increasing connections to the north invites businesses to Baltimore. People can get to locations north, which provides an opportunity for existing industries to grow because they are more accessible.
- The D.C.-Baltimore corridor is reaching saturation, but to the north (Wilmington to Baltimore) there is more land available for development and jobs, and not just for commuting to Philadelphia or Baltimore but for growth actually in Wilmington.
- Difficult attracting young workers to Baltimore—technology growth in city is often in industrial sites or around BWI Cyber corridor.
- Worry that if Baltimore is the chokepoint, then the folks traveling between NYC and D.C. will want to skip over Baltimore, so the station location is important.

Wilmington, DE with evenly divided interest. In particular, participants discussed the burgeoning tech industry and the cyber corridor that would benefit from connections to tech and finance firms located between Baltimore and New York. Participants maintained that the Baltimore-Washington, D.C., market was approaching saturation, but that there was greater opportunity and more land available for growth to the north.

6.2.3 LABOR MARKET EFFECTS

As the mid-point between Washington, D.C., and the Wilmington markets, participants believed that frequent and reasonably priced service among the three markets would allow firms to locate in Baltimore and draw workers from all three markets. On the household side, participants believed that families would be attracted by the ability to locate in Baltimore and seek opportunities in all three markets, enjoying greater affordability than in Washington, D.C., and the ability to change jobs without changing residence.

There was also some concern among participants that if Baltimore is perceived as a “chokepoint” or less desirable location in terms of station qualities, travelers between and firms seeking a location between New York City and Washington, D.C., will “skip over” Baltimore and not consider it for expansions or new business.

6.2.4 OTHER CONSIDERATIONS

When asked about the cost of doing nothing, respondents reported that this would lead to continued decline, and that businesses seeking a NEC location would go to New York, Philadelphia, and Washington, D.C., instead. They felt that Baltimore had already lost its power as an economic engine for the state and that if nothing changes it will continue to decline. In this context, respondents felt that Alternative 1 did not change economic relationships enough to permit Baltimore to attract new jobs to the area and counter the downward trajectory.

6.3 PHILADELPHIA AND WILMINGTON

Representatives of the Philadelphia and Wilmington communities participated in the workshop. Linkages between the two markets were discussed, as well as connections to the broader corridor economy.

6.3.1 STATION-AREA DEVELOPMENT

The group felt that station-area development would follow labor market impacts in the Philadelphia and Wilmington economies. Developer participants emphasized that the business community reacts to what is “on the ground” and only builds for what is certain to happen. The impact of price and variety of service were emphasized as important considerations driving the character of the development put in place. Locations with direct access to the airport were identified as particular opportunity sites. As with other workshop groups, the Philadelphia and Wilmington workshop identified a range of factors that need to be in place for development to occur. School quality, supporting infrastructure, and parking were particular areas of emphasis in addition to available space for development, ability to assemble small parcels, and supportive zoning.

Philadelphia and Wilmington Key Takeaways

- Service needs to be connected with a price scheme and what type of development could be generated.
- Participants focused on Alternative 2 as the one that made sufficiently large changes to rail service that the economy would respond. Alternative 1 was viewed as too incremental to be a game changer.
- The under-an-hour threshold is perceptual distance, which makes a significant difference and can change dynamics.
- For Wilmington, a connection to the Philadelphia airport is key and a significant factor in economic development. An increase in service will help support the local market. It is important to look at it from a labor market perspective. Additional development will not occur until job growth occurs.
- Better and swifter connections to other markets such as Philadelphia would help offset the labor shortages in Wilmington.
- Multiple price points and different forms of services are important.
- Chesapeake Connector is a critical project for Wilmington.

6.3.2 AGGLOMERATION/PRODUCTIVITY

When asked about the most important destination along the corridor, respondents looked north to New York, followed by greater frequency of service between Wilmington and Philadelphia. Wilmington also had interest in connections to Baltimore. The desire for these latter connections was driven by labor market considerations (described in the following section).

Overall, participants in the workshop did not see Alternative 1 as a game changer for them; primary interest was in Alternative 2 and 3 as it is under these alternatives that a greater variety of service types and greater frequencies are possible. Put another way, these alternatives, particularly Alternative 3, provide the greatest positive “shock” to the Northeast’s economy as a whole. One participant noted that the vitality of the Northeast region is weaker than other regions—job growth is slowing and the region’s traditional economic drivers are not expected to expand as in the past. For example, banking is now regulated and will be a slower growth industry; the pace of pharmaceutical discoveries is slowing. By contrast, the West, South, and even Midwest are going through transformations and are thriving.

The introduction of significantly altered rail service in the corridor was perceived to allow the region to become much more closely economically integrated than it is currently, provide support for existing industries to operate in new ways, and for new industries to begin to take hold in the corridor. Construction of the Chesapeake Connector project and a reliable direct connection to the Philadelphia airport were important linkages for Wilmington that would help attract a greater diversity of industry to the market.

6.3.3 LABOR MARKET EFFECTS

Participants felt that the labor market effects would be the main driver of economic change in the Philadelphia and Wilmington markets, and that the needs of commuters seeking jobs and firms seeking employees would in turn shape the type of station-area development constructed. Alternatives 2 and 3 were viewed as the most favorable for supporting labor market impacts as these permitted a greater range of service frequency and pricing. Because of the short distance between the two markets, and the existing ability to make a day trip to New York, trip time was a lesser issue.

One example that was used to illustrate the point involves a major private employer in Wilmington. Although the firm is in Wilmington, good service to New York is important for it to thrive at this lower-cost Delaware location. It is, however, having trouble recruiting younger employees. Increased frequency of lower-cost rail service would allow the firm to recruit from the many universities in the Philadelphia area. Those physically located in West Philadelphia (Drexel and University of Pennsylvania) were mentioned as particular examples because of their proximity to the 30th Street Station. Recruits could maintain a residence in Philadelphia but work in Wilmington.

Over time, the group felt that this greater integration would foster a greater “sense of place” in the area around Wilmington, allowing it to begin attracting households and a larger labor pool of its own that would support greater transit-oriented development (TOD). Thus, the evolution is anticipated to occur incrementally, but the catalyst is the frequency and affordability of rail connections that permit Wilmington to draw from Philadelphia’s labor market.

6.3.4 OTHER CONSIDERATIONS

Much like the Washington, D.C., workshop, participants in the Philadelphia and Wilmington workshop considered larger macro trends, particularly those in technology, as important influences on future economic development outcomes. The impact of autonomous vehicles and demographic changes were the primary factors discussed. Of note, some in the group felt that autonomous vehicles and innovations such as Uber might eventually address the “last mile” problem and offer an alternative means of providing transit connectivity from the intercity rail station to the larger metropolitan economy.

6.4 NEW JERSEY

Participants in the New Jersey workshop generally agreed that its orientation would remain toward the New York City market.

6.4.1 STATION-AREA DEVELOPMENT

The labor connection was identified as the major economic driver for New Jersey—station-area development was considered less important. That said, there was a wide-ranging discussion on the difficulties of planning for station-area development in New Jersey. Fragmented planning across the state and along the corridor was identified as a major impediment to obtaining a full return on rail investment.

6.4.2 AGGLOMERATION/PRODUCTIVITY

Participants in the New Jersey workshop developed the idea of an “expanded center” with reinforced linkages within the center of the corridor metro area. This is akin to the “urban regional user” concept developed in the Connecticut and New York workshops. The New Jersey discussion emphasized re-envisioning the center as Manhattan, Jersey City/Newark, and Queens West. Moreover, this expansion should be larger than just the rail mode but should encompass other modes as well.

The ability of New Jersey’s health and educational institutions to connect with peers elsewhere in the Study Area was identified as an important benefit of expanded rail options, supporting the long-term competitiveness of these industries.

6.4.3 LABOR MARKET EFFECTS

The labor market effect is the major driver for New Jersey. The NY-NJ labor-jobs relationship is unchanged, but investments in the NEC could allow this linkage to flourish to a greater extent than it does now to the benefit of New Jersey. Jobs in the city center are not equivalent to jobs in the suburbs.

6.4.4 OTHER CONSIDERATIONS

The New Jersey participants also felt that the interests of the NEC would benefit from having a “champion,” someone who could articulate why the NEC is important to New Jersey and could help rally the private business community to demonstrate their support for investment and planning within the state to capitalize on the investment.

New Jersey Key Takeaways

- Inadequate rail capacity is perceived to be already taking a toll on NJ in terms of office vacancy, out-migration, and lack of multi-modalism.
- There are limitations of infrastructure and limitations of service—they are different.
- NYC-orientation will persist and should be encouraged.
- NJ has a stake in the regional assets’ health.
- Centrally located in the corridor—definition of center should be expanded to include Jersey City and Queens.
- Rail access attracts job creation.
- NJ has a deep talent pool, but it is at risk—comparative advantages are not static.
- The benefits of Alternatives 2 and 3 are not as great as the risk of not attaining Alternative 1 for New Jersey.
- Fragmented planning hinders growth in the corridor and in the state.
- Need partnership of FRA, operators, state, and localities. Need a champion to advance the importance and value of a coordinated NEC to campaign on behalf of the corridor as a whole.
- Liked idea of “urban regional user” as suggested in Stamford workshop.
- 40-minute commute is the tipping point—maximum length of a “comfortable” commute time.
- Central, lower-cost location could induce employers if other factors are addressed—hotels and life sciences are likely sectors.

6.5 NEW YORK CITY

Participants in the New York workshop see the metro area as a global capital. This is reinforced by each of the other corridor workshops, as they all identified New York as the leading destination in the corridor to which they would like to have greater service and connectivity.

6.5.1 STATION-AREA DEVELOPMENT

Station-area development was not a major focus of the New York conversation as it was in some of the other workshops. Given the density of transit stations and surrounding development, station-area development is already well underway—prompting one participant to observe that downtown New York is one large TOD.

6.5.2 AGGLOMERATION/PRODUCTIVITY

Aside from the need to attract labor to the metro area (discussed below), two additional ideas emerged from the discussion. The first was the desire among some for good connections to the region's airports. This was not a universal consensus among the group, but some participants felt that additional air-rail linkages were needed.

The second consideration was the ability to better connect within the region—which can be equivalent to a short intercity trip because of its breadth. Participants supported the idea of an “urban regional user”—someone using the rail service for a more seamless connection between disparate parts of the urban area, allowing the New York region to function more efficiently as a large economy. These are not strictly work or business trips, but include trips for shopping, personal errands, recreation, and entertainment. The improved intraregional circulation would also support resident industries that benefit from face-to-face interaction such as New York's technology industry or the large university and health complexes where joint research initiatives could be undertaken with greater accessibility.

New York Key Takeaways

- NYC is a Global Hub—fast connection to airport is important as a dividend of the program.
- Integrate the air-rail network—always have a 2-seat ride.
- Alternative 1 serves existing growth—improvements but not economic change.
- Capacity is important but depends on how it is used: commuters, connectivity, intercity.
- Strong emphasis on accessing labor—pulling more people in—enhancing the commute shed.
- NJ is more proven market than CT for office—more likely to see initial benefit of Alternative 2.
- Strong interest in connecting services to other markets—Hartford is an untapped market.
- Ridership trends in city changing—not 5 days a week anymore and the peak is spreading.
- Alternatives 1 and 2 serve existing business; Alternative 3 helps other cities such as Albany.
- Development impact of additional capacity depends on how capacity is used—transit within market, intercity, or to accommodate markets connecting from outside the spine.
- The cost of doing business in NYC would increase if congestion increases.
- The cost of inaction results in job loss to the periphery.
- 1-hour commute is the tipping point.

6.5.3 LABOR MARKET EFFECTS

As a global hub, attracting labor was a primary concern of the conversation. In this context, Alternatives 2 and 3 were preferred to Alternative 1 as they offered the ability to better connect to New Jersey, Long Island, southern Connecticut, and for some—even Albany.

6.5.4 OTHER CONSIDERATIONS

The consensus among participants was that additional capacity was important for accommodating the metro area's future growth and allowing it to thrive. That said, the use of that capacity was a critical factor in determining the economic outcome. Allocating that rail capacity to commuter uses, connecting corridors, or intercity service supports different economic outcomes over the long term. In this context, Alternatives 2 and 3 were preferred to Alternative 1 as they offered greater capacity and diversity of services. Alternative 1 was not viewed as providing enough new capacity to support future growth opportunities. Respondents felt that New York would “survive” a No Action Alternative, but that the rest of the NEC would not, as businesses skipped the Northeast Corridor locations and sought locations elsewhere in the U.S. This latter sentiment echoes comments from the Philadelphia workshop concerning the region's competitiveness over the long term.

6.6 LONG ISLAND

Long Island has strong interest in connecting to the broader NEC. A recurring theme in the workshop was that Long Islanders could control the time that they leave in the morning but not the time that they return. More frequent and reliable connections to New York and other locations along the corridor are desired for economic development. Beyond greater ease of connection within the New York metro area, improved connectivity to Boston was identified as an important destination.

6.6.1 STATION-AREA DEVELOPMENT

Participants reported that Long Island is reinventing itself around transit hubs. Local village variability in planning and expertise in managing TOD were cited as concerns in making the most of rail investment in Long Island. Resistance to growth and changing the character of Long Island were also concerns. Unique for the NEC, the importance of ferries as connections to eastern markets, such as the Port Jefferson Ferry to Bridgeport were highlighted as serving important markets. Sewage treatment is also an issue regarding development.

6.6.2 AGGLOMERATION/PRODUCTIVITY

Participants report that congestion is severe enough in some places to make people avoid travel; Port Jefferson to Boston were cited as examples. The economy is also reported to be constrained due to limits in the centralized transportation networks. Long Island has a diversified economy that includes labs/research, tourism, warehousing, agriculture, agro-tourism, the food/beverage industry, and convention/trade shows.

Respondents noted that Brookhaven National Lab was located in Long Island in part to take advantage of the proximity to other research facilities in New York, New Jersey, and Connecticut.

6.6.3 LABOR MARKET EFFECTS

Labor market effects are two-way between Long Island and the larger New York region. The elimination of transfers would support Long Island's efforts to recruit business. Improved service would also allow Long Island residents to access destinations east and north of New York.

6.6.4 OTHER CONSIDERATIONS

When asked what happens to Long Island if no investment is made, the general view of the group was that Long Island's economic growth will be constrained relative to other parts of the region.

Long Island Key Takeaways

- Reliability and connectivity are more important than trip time.
- Congestion is severe enough to change choices—travelers are going east to Port Jefferson to catch the ferry and then to Boston. LIRR was built to access Boston.
- “We can control the time we leave; no control of time coming back.”
- Limits of capacity and connectivity are imposing a penalty on the economy.
- Strong interest in connecting to Newark Airport/NJ—Boston is a game changer—and some interest in Connecticut.
- Access to job opportunities in multiple markets from one point is highly attractive.
- If access to Boston and New England is improved, it opens up tourism/agro-tourism, coliseum sports, allows Long Island to become an entertainment destination and opens up trade show opportunities with access to regional airports.
- Brookhaven National Laboratory located in Long Island to have proximity to major research centers such as MIT and Princeton. Rail investment would support this interaction.

6.7 STAMFORD, CT

Stamford participants identified the area from New Haven, CT to Newark, NJ and Long Island, NY as the key destinations for improved rail service. Participants noted that Stamford/Norwalk has captured about 80% of growth in eight municipalities since 2000.

6.7.1 STATION-AREA DEVELOPMENT

Participants indicated a need to focus on the “essentials,” reporting that there were 300 rail stations in the regional transit network and comparatively few had developable land and walkable development around the station areas. The Stamford workshop included participants who had traveled from Long Island to participate and the resulting conversation covered both Stamford and Long Island topics. Workshop participants described the perception on Long Island that density and growth bring the negatives of urban life with them, which leads to opposition to TOD in some cases. Stamford has some successful TOD experience so the focus of the conversation was on other economic opportunities associated with rail. After Grand Central Terminal on the Metro-North line, Stamford has the most ridership. Stamford also ranks first in reverse commuters.

6.7.2 AGGLOMERATION/PRODUCTIVITY

Participants noted that I-95, the other “spine” of the region, is maxed-out and congestion is spilling over to other roads. The region is also in need of more air service options and rail-air connections would help this. Stamford and Norwalk are the growth engines of this part of Connecticut. Improved rail service/capacity (not trip time) is viewed as an opportunity to redirect growth to urban centers (both residential and jobs) and allows people to access amenities, supporting growth in the region.

Participants in the Stamford workshop were strong supporters of the “urban region user” concept discussed in other workshops—where the emphasis is on better connectivity to other parts of the broader metropolitan region rather than on more distant metropolitan markets. Participants noted that Metro-North’s ridership growth is during off-peak hours and for discretionary trips. The “urban regional user” concept would allow the broader New York economy to function in a more integrated and efficient way, allowing the economy to be more productive than it would be with less fluid travel.

Stamford Key Takeaways

- I-95 is maxed out and traffic is spilling over to other roads.
- Major growth on Metro North Railroad is in off-peak trips.
- Region is in need of more air service options— rail–air connections help.
- Accessibility to jobs for those with fewer options has a multiplier effect.
- Stamford/Norwalk captured about 80% of growth of eight municipalities since 2000.
- It is the gateway to New England and NYC.
- Improved rail service/capacity is an opportunity to redirect growth to urban centers, allows people access to amenities, and supports growth.
- Key destinations in the region are New Haven to Newark, NJ and Long Island, NY.
- Idea of an “Urban Region User” ability to utilize a greater range of amenities within a region with enhanced mobility.
- Public perception that urban amenities are tied to urban problems hinders development outcomes.
- Suburban places are becoming more costly to develop as infrastructure is not in a state of good repair.

Connections to Bradley Airport were also discussed in the context of needing additional air capacity in the region. To the degree that this alleviated air congestion or added capacity to the region, this would be a boon to a variety of industries in Stamford and the broader southern Connecticut region.

6.7.3 LABOR MARKET EFFECTS

Stamford already has strong ties to the New York market. The “urban regional user” concept would permit greater access to job opportunities throughout the region, permitting households to have a better match between residential and work locations, as well as greater ease in changing jobs without changing the home location.

6.7.4 OTHER CONSIDERATIONS

Participants generally favored Alternatives 1 and 2 as a “fix first things first” policy. Both Alternatives create capacity in the New York region that allows for greater movement through the broader New York economy. To the degree that Long Island is integrated into the “urban region user” concept, Alternative 2 is more favorable than Alternative 1.

6.8 NEW HAVEN, HARTFORD, AND SPRINGFIELD

This workshop, held in Rocky Hill, CT, considered opportunities for the Hartford, New Haven, and Springfield markets. Throughout the conversation, Stamford was highlighted as a success story to be emulated.

6.8.1 STATION-AREA DEVELOPMENT

In discussing station-area development, the workshop participants felt that provision of housing options for a variety of household income levels was important. One respondent reported that property around the train station in Stamford is about 30% more valuable than suburban parks on High Ridge Road. Participants noted that in Connecticut, cities are small and do not always have the political ability to assemble land to support significant TOD. There was concern that planning was fragmented to a degree that local communities along the corridor would not have the capacity to respond and prepare to capitalize on NEC investment. There were suggestions of a TOD “czar” or a regional entity to help tie together local community responses. Beyond the required planning work, participants noted that in some cases significant utilities, zoning, and investment in supportive infrastructure will be required.

6.8.2 AGGLOMERATION/PRODUCTIVITY

Workshop participants maintained that regular and reliable rail service that connected Hartford, New Haven, and Springfield would change how the cities work together. Because of the region’s high costs, its focus has to be on knowledge-based industries where face-to-face interaction is still important. These are the anchors of the regional economy as it is transforming itself. Although the major focus of the discussion was on tying the region together and more closely to New York, there was also a desire to be able to more readily access the Washington, D.C., market. This was one of the few examples of a northern market seeking better access to a destination south of New York (or the reverse).

6.8.3 LABOR MARKET EFFECTS

The ability to link the three cities or better link them to larger markets has two types of labor market effects. The first is simply the ability of workers to access an expanded range of work opportunities. The second is the ability to demonstrate a larger pool of available labor, which supports business recruitment and retention. It also allows the region to reach for larger-sized relocations.

New Haven/Hartford/Springfield Key Takeaways

- Participants indicated that access to NYC is most important; however, they still want to be able to go to Washington, D.C. and back in a day. D.C. is becoming more and more important to the Connecticut economy, particularly for biosciences.
- Connecting Hartford-New Haven-Springfield together could change how the cities work together. Currently, only 2% of these populations work in the other cities; no daily connectivity.
- Connecticut’s smaller cities face obstacles in assembling land for transit-oriented development. Need to consider whether the cities/region have the capacity or the mechanism to respond effectively to improvements on the NEC.
- What happens without land assembly, rail investment, and other supporting infrastructure investments? People start to leave, or rather continue to leave. The area is already losing industry to Research Triangle Park.
- The New Haven-Hartford-Springfield region will struggle without reinforcing its base. There are lots of towns and smaller regions, and inter-relationships are key. Steady state is not a happy state.

The discussion also considered the following: only a sliver of the region's population is on the rail corridor—what is the economic development impact for the rest of the population? The participants maintained that basic industries need support to stay in downtown Hartford and that investments need to be made to make the region livable and desirable. It is important to maintain the “place” and the anchor of the economy as other types of businesses are sought to diversify the economy.

6.8.4 OTHER CONSIDERATIONS

Participants were also asked what happens to the region without land assembly, rail investment, and other supporting infrastructure investments—the consensus was that people would continue to leave. Participants felt that the technology industry was leaving the region for the Boston market and Raleigh (Research Triangle Park). They observed that technology and bioresearch firms used to be more evenly-spread across the Northeast, but that the industry was consolidating and becoming more clustered in fewer locations. Rail was seen as part of the solution to maintaining competitiveness, but workshop participants indicated that it was not sufficient on its own and needed to be complemented by local actions and investments to be successful.

6.9 BOSTON AND RHODE ISLAND

Boston is the northern terminus of the NEC. Unlike the southern end of the corridor, there was greater emphasis on trip time in the Boston workshop. The general consensus is that if you can drive to NYC in 3.5 hours, rail needs to be at least 3 hours to be attractive. The general consensus was that trip time and reliability of service were the most important factors and that the overall goal was to recreate the success of the existing Washington, D.C., to New York City service. Participants also stressed that links to New Haven, CT and Maine were important for the Boston market.

6.9.1 STATION-AREA DEVELOPMENT

Participants anticipated that rail-served locations would enjoy a 15% to 20% land premium. Respondents reported that proximity to a rail station was very valuable but noted that the station needed to be in the right place in order to spur development around it. Specifically, the access to and connectivity of the station is important. Critical factors mentioned include connectivity to a variety of modes at the station to get to local destinations and having amenities near the stations, including but not exclusively, retail. The group also highlighted the importance of zoning, the particular value of locations that enjoy a one-seat ride to key destinations, and the role of higher education and health institutions in being willing and engaged partners in corridor development.

6.9.2 AGGLOMERATION/PRODUCTIVITY

The discussion in Boston was largely focused on Boston proper, with the exception that participants felt that improved connectivity to New York, on the order of that available between Washington, D.C. and New York currently, could be a game changer. As with workshops in other locations, respondents identified the benefit of improved connectivity to industries that value face-to-face interaction, of which many are core to the Boston economy: technology, health, education and research, and finance. There was significant discussion about the potential benefit to Boston of new or expanded connectivity to New Haven, Hartford, and Springfield, CT, Worcester, MA, and Providence, RI. While access to the labor and potential industrial linkages were highlighted, some participants observed that the “Knowledge Corridor” could become more New York-oriented. If so, such a relationship would reinforce the Boston to New York economic connection indirectly. In this context, Alternatives 2 and 3 are the preferred alternatives as they provide faster connections to New York and greater capacity for connecting to nearby markets.

Boston and Rhode Island Key Takeaways

- A trip time under 2 hours (and reliable) from Boston to NYC is a game changer. A travel time of 3 hours is nice; Boston to anywhere in less than 3 hours, where air currently serves, should be considered.
- After trip time, then connectivity rises in importance.
- Key market is to NYC.
- After NYC connection, interest is in tapping broader labor market with connections to smaller regional cities.
- Boston is a high-cost location that competes for talent with its quality of life. Transportation and education are big parts of that.
- Direct connections (one-seat rides) are highly valuable in picking development locations.
 - They drive station premium (value of land).
 - It also depends on the length of the trip, in terms of whether frequency or one-seat ride is more important.
- Rail-air connections are important for business travelers.

6.9.3 LABOR MARKET EFFECTS

As a high-cost location, particularly for housing, investments that allow households to live in lower-cost locations and travel to Boston for health, university, financial, or technology jobs helps the region retain business and recruit talent. Current infrastructure is perceived as a negative in this regard as commute times are increasing. In this context, Alternative 1 is helpful in that it would help mitigate lengthening commutes. Alternatives 2 and 3 are more beneficial as they would offer greater connectivity to more affordable markets. Participants felt that the ability to attract labor from a larger pool would be a “big deal” for existing businesses and in recruitment efforts for new business.

6.9.4 OTHER CONSIDERATIONS

When asked whether there were consequences to Boston of not making investments to the NEC, respondents felt that it made central Boston more attractive—provided workers can afford to be in central Boston, households will choose to live there if they cannot live outside the city and travel in. Participants did not believe the technology industry would leave the area because of the rich cluster of technology research universities located in Boston.

Appendix D – Indirect Effects



Indirect Effects Assessment Methodology

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Submitted by:



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1. Indirect Effects Assessment Methodology

1.1 INTRODUCTION

This methodology explains how the Federal Railroad Administration (FRA) will assess the potential indirect effects caused by the NEC FUTURE Tier 1 EIS Alternatives. Although indirect and cumulative effects are often considered together, each involves a distinct set of issues and analyses. Therefore, to maintain a clear distinction between the two concepts, their respective effects assessment methodologies are described in separate documents.

An indirect effects analysis can include “induced-growth effects” as well as “encroachment/alteration effects.”¹ This methodology focuses on ways to analyze the induced growth-related indirect effects of the Tier 1 EIS Alternatives. (See Section 1.2, Definitions.)

This methodology presents the regulatory framework, involved government agencies, expected regulatory and other outcomes of the Tier 1 EIS process, and relevance to Tier 2 project-level assessments. It also identifies data sources, metrics and methods to be used to document existing conditions and analyze environmental consequences. This methodology may be revised as the NEC FUTURE program advances and new information is available.

1.2 DEFINITIONS

Indirect effects, as defined in regulations promulgated by the Council on Environmental Quality (CEQ), are those effects that “...are caused by the action and are later in time and farther removed in distance, but still reasonably foreseeable”.

Reasonably Foreseeable Effects are those that are “sufficiently likely to occur that a person of ordinary prudence would take it into account in reaching a decision”.² Reasonably Foreseeable Effects for a National Environmental Policy Act (NEPA) analysis are those that are “uncertain, but probable” effects of the proposed action. In one of the leading court decisions on this topic, the U.S. Court of Appeals for the First Circuit explained the legal standard as “[O]nly those effects that are “likely” (or “foreseeable” or “reasonably foreseeable”) need to be discussed,...and, as in other legal contexts, the terms “likely” and “foreseeable”, as applied to a type of environmental impact, are properly interpreted as meaning that the impact is sufficiently likely to occur that a person of ordinary prudence would take it into account in reaching a decision.”³

Indirect effects “may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.” (40 CFR 1508.8)

¹ Encroachment/alteration effects are proximity effects (e.g., effects on natural habitats caused by changes in air quality, noise/vibration, etc.) and will be evaluated as direct effects for each respective resource.

² Ibid.

³ Sierra Club v. Marsh, 976 F.2d 763, 767 (1st Cir. 1992)

Induced-Growth Effects likely caused by the NEC FUTURE program are changes in the location, magnitude, or pace of future development that result from changes in accessibility to the transportation network. An example of an induced-growth effect is commercial development occurring around a new interchange and the environmental impacts associated with this development.⁴

Encroachment-alteration type indirect effects are physical, chemical or biological changes in the environment that occur as a result of the project but are removed in time or distance from the direct effects. An example of an encroachment-alteration type indirect effect is a long term decline in the viability of a population of a particular species as a result of habitat fragmentation caused by the project. These types of effects are sometimes addressed as part of a direct effects assessment and are considered as such for the NEC FUTURE program. Each resource effects assessment methodology, as appropriate, describes the approach to assessing direct effects removed in distance or time.

Cumulative effects, the subject of a separate methodology, are defined as the “aggregate result of the incremental direct and indirect effects of a project or plan, the effects of past and present actions, and the effects of reasonably foreseeable future actions by others on resources of concern.”⁵

1.3 RELATED RESOURCES

In assessing indirect effects, FRA will also consider the effects assessments from other related resources evaluated in the Tier 1 EIS. The related resources to be used in this evaluation are included in Table 1.

Table 1 – Related Resource Inputs to Indirect Effects

Resource	Input to Indirect Effects
Demographics	▪ Population and Employment trends
Economic Effects	▪ Findings from stakeholder/expert workshops on possible market responses to development opportunities associated with Tier 1 EIS Alternatives
Transportation	▪ Travel time savings and station-to-station ridership characteristics of Tier 1 EIS Alternatives
Land Cover	▪ Potential for change in land cover associated with Tier 1 EIS Alternatives

Source: NEC FUTURE JV Team, 2013

1.4 AGENCY AND REGULATORY FRAMEWORK

The Council on Environmental Quality (CEQ) regulations (40 CFR Part 1500 Sections 1502.16, 1508.8, and 1508.25) require consideration of indirect impacts in an EIS. The Federal Railroad

⁴ Ibid.

⁵ Center for Environmental Excellence by AASHTO, Practitioner’s Handbook 12, Assessing Indirect Effects and Cumulative Impacts Under NEPA, April 2011.

Administration (FRA) *Procedures for Considering Environmental Impacts* (64 Federal Register 25454, May 1999) state that the discussion of the environmental impacts of all alternatives in NEPA environmental documents should include "...impacts which are direct, indirect and cumulative, and impacts of both long and short-term duration.." An assessment of indirect effects is also specifically required for several resources regulated by other environmental compliance regulations and considered within this Tier 1 EIS, including Section 106 (cultural resources), Section 7 (threatened and endangered species) and Section 404 (water resources).

In addition, the following policies, guidance documents, and reference materials relate to the evaluation of indirect and cumulative effects of projects:

- ▶ Federal Highways Administration (FHWA) Policy and Guidance
 - FHWA Interim Guidance: Indirect and Cumulative Impacts in NEPA (2003)
- ▶ Other resources
 - American Association of State Highway and Transportation Officials (AASHTO) Practitioner's Handbook on Indirect and Cumulative Impacts (AA SHTO 2011)
 - National Cooperative Highway Research Program (NCHRP) Report 403, Guidance for Estimating the Indirect Effects of Proposed Transportation Projects (NCHRP 1998).
 - NCHRP Report 466, Desk Reference for Estimating the Indirect Effects of Proposed Transportation Projects (NCHRP 2002).

1.4.1 Regulatory Compliance

There are no formal regulatory requirements associated with the analysis of indirect effects. However, FRA will discuss potential indirect effects with federal resource and regulatory agencies, particularly with regard to forecasting induced growth and the representative types of indirect effects that growth could have on individual resources. As appropriate, the FRA will also engage state and local agencies in these discussions.

Agencies with jurisdiction over the various resources evaluated as part of the NEC FUTURE Tier 1 EIS are listed within the relevant resource methodologies. During the Tier 1 EIS process, FRA will identify potential opportunities to streamline subsequent Tier 2 environmental reviews (see Section 1.7). Coordination with the agencies identified in the relevant resources methodologies will be consistent with the NEC FUTURE Agency Coordination Plan and support the Statement of Principles (SOP) established between the FRA and federal regulatory agencies as part of the CEQ Pilot program.

1.5 METHODOLOGY TO ASSESS EFFECTS

This effects assessment methodology identifies the approach and assumptions for describing the growth-inducing or growth-influencing effects of the Tier 1 EIS Alternatives. As explained in Section 1.2, encroachment-alteration type effects assessments are described within the appropriate resource-specific methodologies and will be considered and documented separately with each of the relevant resource-specific discussions of the Tier 1 EIS.

The greatest potential for indirect effects associated with NEC FUTURE are likely to be associated with induced growth resulting from improved services and increased ridership. The Tier 1 EIS Alternatives defined for the NEC FUTURE program will propose changes to existing markets and also to currently underserved markets. The result of providing better services and options could trigger growth in certain areas, influencing land use and development patterns. FRA will consider the potential indirect effects of the Tier 1 EIS Alternatives as they relate to this induced growth.

Connecting Corridors

Another indirect effect of the Tier 1 EIS Alternatives would be potentially improved services along connecting corridors (e.g., to the south, Richmond, Virginia; to the west, Harrisburg, Pennsylvania; or to the north, Albany, New York and New England). FRA will qualitatively discuss these indirect growth effects of the NEC FUTURE Tier 1 EIS Alternatives on connecting corridors.

1.5.1 Existing Conditions

FRA will use data compiled for demographics, economic effects, land cover, and transportation together to assess the potential for induced growth resulting from each Tier 1 EIS Alternative. Similarly, FRA will apply the methodologies and metrics proposed to assess direct effects for individual resources (e.g., water resources, land cover, ecology, noise and vibration) to assess the potential for indirect effects to those resources associated with induced growth.

Particularly in support of the identification of “reasonably foreseeable actions,” FRA will coordinate with the FTA as a cooperating agency, regulatory and resource agencies, and other state agencies for their insights and information on reasonably foreseeable actions that that could occur and are related to the proposed action.

FRA will use the data sources listed in Table 2 to establish the future trends in population growth and development patterns for the analysis of indirect effects.

Table 2 – Data Sources for the Evaluation of Indirect Effects

Data Type	Data Source	Data Application
Growth trends and projections	Moody’s Analytics Population and Employment Growth Forecasts, 2012	Potential for induced growth as a function of population and employment forecasts when considered in conjunction with opportunities for land cover conversions, new development, and redistribution of population and employment growth
Transportation	NEC FUTURE Travel Demand Forecasting Model	Change in mobility and accessibility as measured by change in travel times or ridership (station-to-station pairs)

Source: NEC FUTURE JV, 2013

The indirect effects analysis will be focused on areas where induced growth could occur—likely, station areas (existing and proposed) that have the most improvement in accessibility (based on travel times and service frequency) identified as part of the Tier 1 EIS Alternatives. The geographic limits of induced growth are not specifically defined for this methodology, as limits will be

determined on a case-by-case basis, depending on the nature of the station area and potential opportunities created.

FRA will consider indirect effects within the 2040 planning horizon. This time horizon is consistent with long range and comprehensive land use planning horizons (see Land Cover Methodology) and available population and employment forecasts (see Demographics Methodology). For purposes of this analysis, we are assuming that the Tier 1 EIS Alternatives have been implemented and in operation for a period of time sufficient for land use changes to occur. While actually a Tier 1 EIS Alternative might not be fully implemented and in operation by 2040 with sufficient time for land use changes to take place, this assumption creates the analytical framework necessary to understand the potential for change in the future.

1.5.2 Environmental Consequences

As part of the indirect effects analysis, FRA will examine the potential type, location and amount of future program-related population and employment growth in an area. These potential indirect growth effects would occur due to improved accessibility to those areas as a result of passenger rail service enhancements (e.g., more frequent, reliable and faster train service). The areas affected by these mobility gains are those near existing or proposed rail stations or those with connections to areas with new or improved services.

The assessment of indirect effects will focus on the potential effects that may result from induced development related to or resulting from the Tier 1 EIS Alternatives. The assessment will take into account and reflect the results of:

- ▶ Demographic trends for growth in population and employment without implementation of the Tier 1 EIS Build Alternatives (i.e., those trends that occur under the No Action Alternative);
- ▶ Economic effects assessments, dealing with the extent to which substantial mobility gains would increase the efficiency and productivity of the study area, leading to economic growth at a metropolitan area or regional level;
- ▶ Land cover studies, which will provide insights as to those areas most suited to growth, consistent with applicable land use plans and recent market trends; and
- ▶ Transportation analyses, specifically the assessment of what passenger rail markets are projected to experience the increases in overall travel and rail passenger ridership as a result of implementation of an NEC FUTURE alternative, and the possible location for proposed expanded rail stations or shops and yards.

FRA will take the following steps to assess environmental consequences associated with induced growth and therefore considered to be indirect effects:

1. For each Tier 1 EIS Alternative, FRA will identify station areas likely to have the most improvement in accessibility as measured by improvements in representative station-to-station travel times and service frequency (as analyzed for Transportation). This analysis will consider the dependencies of these improvements on other related transportation improvements.

2. For station areas with improved accessibility, FRA will assess the potential for induced growth based on the following factors:
 - Current and the forecast magnitude of the potential increase in population or employment (growth trends as discussed in Demographics);
 - Whether or not the improvements in access and mobility are of sufficient magnitude to influence travel patterns;
 - Factors that might enable or inhibit growth, such as sufficient developed land, sensitive environmental features, or state or local land use plans;
 - Opportunities or limitations for development identified through discussions with regional experts (to be conducted as part of the Economic Effects Assessment);
 - Areas of uncertainty with regard to induced growth related to political or other factors.
3. FRA will identify and map in GIS the station areas with potential for improved access which also have the potential for induced growth based on the assessments conducted in Steps 1 and 2.
4. FRA will use GIS tools to identify areas of environmental sensitivity that overlap with those station areas identified in Step 3 as ones with the potential for induced development
5. FRA will discuss the range of potential indirect effects of induced growth for each of the resource areas included in the Tier 1 EIS. This discussion will highlight a review of areas of sensitivity identified in Step 4 above and will be based on the resource-specific metrics used to conduct the direct effects assessment for each resource.
6. FRA will identify specific sensitive resources or areas of concern that are likely to be affected by induced development as a result of each Tier 1 EIS Alternative.
7. FRA will discuss the opportunity for induced growth on connecting corridors where improved services would result from the improvements proposed for the Tier 1 EIS Alternatives. This would be a much more qualitative discussion than for station areas associated with the Tier 1 EIS Alternatives and would draw on insights and information provided from regulatory and resource agencies, transportation and other state agencies.

1.5.3 Potential Mitigation/Mitigation Strategies

Indirect effects resulting from induced growth is speculative at the Tier 1 level of analysis. Therefore, proposing potential mitigation or mitigation strategies is not appropriate. In addition, while the NEC FUTURE program has the potential to influence changes in land development patterns and uses associated with growth, decisions related to proposed development and the approval of development would occur at the local level.

1.6 EXPECTED OUTCOMES FROM TIER 1 EIS PROCESS

The assessment of indirect effects will broadly identify and disclose the potential for additional program-related induced growth effects on each resource topic presented in the Tier 1 EIS. FRA will highlight areas of particular sensitivity to be considered as the program advances.

1.7 SUBSEQUENT TIER 2 ANALYSIS

As part of Tier 2 NEPA evaluations, the analysis of indirect effects will be undertaken in more detail, and will focus on a more project-specific study area. Understanding where and how NEC FUTURE has the potential to result in indirect effects allows for proactive planning to potentially minimize or avoid adverse effects as planning for the program progresses.

Additionally, FRA will identify ways in which agency coordination during the Tier 1 EIS process could create efficiencies and help streamline subsequent Tier 2 reviews and approvals. For example, if a particular portion or element of a Tier 1 EIS Alternative would not result in the potential for indirect effects, FRA may coordinate with regulatory agencies for the relevant resource to determine whether or not those portions need further evaluation related to indirect effects during the Tier 2 environmental process.

Application of Effects-Assessment Methodology

1. Indirect Effects: Application of Effects-Assessment Methodology

1.1 VARIATIONS TO EFFECTS-ASSESSMENT METHODOLOGY

The following variations from the Effects-Assessment Methodology occurred during the process of developing the Tier 1 Draft EIS:

- ▶ The effects assessment identified the areas with the highest potential for induced growth by Action Alternative, with a focus on the metropolitan areas.
 - To better link the economic effects and indirect effects analyses presented in the same chapter of the Tier 1 Draft EIS, the indirect effects analysis utilized the findings from the Economic Development Response analysis in Chapter 6 of the Tier 1 Draft EIS to identify the metropolitan areas served by the Action Alternatives that had potential for induced growth. The Economic Development Response analysis took into account ridership and transportation data to identify improvements in accessibility.
- ▶ The effects assessment presented three different scenarios of potential for indirect effects across the Action Alternatives, based on the metropolitan areas with the highest potential for induced growth. The assessment described how each area performed with regard to factors identified in the methodology that influenced the potential, type, and amount of induced growth. These factors also identified the range of indirect effects that may occur as a result of that induced growth. Each scenario included a station area example.

1.2 DATA VARIATIONS

Aside from the updates outlined in the previous section, no modifications were needed with respect to the data requirements.