APPENDIX G

INDIRECT EFFECTS
WRITTEN REEVALUATION/TECHNICAL REPORT

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1.0 INTRODUCTION

In April 2004, the New Hampshire Department of Transportation (NHDOT) and the Federal Highway Administration (FHWA) issued a Final Environmental Impact Statement (FEIS) proposing the widening of I-93 to four-lanes in each direction between Salem and Manchester. On June 28, 2005, FHWA issued a Record of Decision (ROD) approving the proposed alternative (hereinafter referred to as "the Project"). The Conservation Law Foundation subsequently challenged the ROD in U.S. District Court, contending that NHDOT and FHWA violated the National Environmental Policy Act, 42 U.S.C. § 4321 *et seq.* and the Federal-Aid Highway Act, 23 U.S.C. § 101 *et seq.*

A "Memorandum and Order" was issued on August 30, 2007 by the United States District Court for the District of New Hampshire on the case of the Conservation Law Foundation v. Federal Highway Administration and New Hampshire Department of Transportation (*Case No. 06-cv-45-PB and Opinion No. 2007 DNH 106;* hereinafter referred to as "the Order"). The Order directed NHDOT and FHWA to prepare

> "…an SEIS that specifically considers how the Delphi Panel's population forecasts affect Defendants' analysis of both the effectiveness of the Four Lane Alternative as a traffic congestion reduction measure and the indirect effects of the additional population predicted by those forecasts on secondary road traffic and air quality issues." [pp. 85-86]

NHDOT and FHWA are preparing a Draft Supplemental Environmental Impact Statement (DSEIS) on the Project to address the Order, specifically, and to generally supplement the Project's FEIS consistent with the guidance of FHWA Technical Advisory, entitled, "Guidance for Preparing and Processing Environmental and Section 4(f) Documents", dated October 30, 1987 (T6640.8a), relative to changes, new information, or further developments subsequent to the FEIS.

1.1 Purpose

This Written Re-evaluation/Technical Report has been prepared to: (1) identify whether or not there have been changes, new information, or further developments relevant to the Project's indirect effects subsequent to the 2004 FEIS as a result of the Order; and (2) using this identification, assess whether new or updated analyses of the Project's effects are warranted.

1.2 Methodology and Approach

The following methodology and approach was used to evaluate if changes or updates to the analyses described for each respective environmental resource area analyzed in the 2004 FEIS will be required:

- Identify and describe previous analysis methods and criteria used to assess impacts;
- Describe current analysis methods, regulations and guidelines, industry standards, and criteria used to assess impact significance;
- Identify changes in analysis methods, regulations and guidelines, industry standards, and criteria used to assess impact significance;
- Reanalyze the effects of the proposed project using the Delphi Panel's population and employment projections as well as the latest New Hampshire Office of Energy and Planning (OEP) projections with respect to traffic and air quality. Update the results of the other resource

categories as warranted when substantial changes to the impact assessment methods or protocols, industry standards or guidelines, and applicable federal, state, or local government regulations have been identified; and

- Include a summary of findings from these evaluations as part of a stand-alone technical report for each resource category. Each technical report includes a section that provides an overview of the previous analysis methods and criteria used to assess impacts, the results and mitigation recommended in the 2004 FEIS, as well as any changes to the analysis methods, regulations, guidelines, industry standards or criteria used to assess impact significance that have been identified with the updated results. The findings described in each technical report will be incorporated into the Draft SEIS (DSEIS). Refer to Sections 2 through 9 for specific details.

2.0 INDIRECT LAND USE IMPACTS

2.1 2004 Analysis Methods & Prevailing Regulations/Guidelines

2.1.1 Study Area

The 2004 FEIS study area for indirect (or secondary) land use effects included the five municipalities where the proposed improvements to I-93 would occur, and 24 other municipalities in the region surrounding the project. The study area boundaries were first recommended by the Executive Oversight Committee of representatives of federal and state agencies and regional planning commissions, and later subject to further consideration by the members of the Expert Panel (described below). Two panelists also included population and employment allocations for the towns of Boscawen, Canterbury, and Loudon, located north of the study area. The analysis year for the indirect effects evaluation was the year 2020.

2.1.2 Expert Panel

A Delphi is a structured process in which participants (the Panel) provide their assessment of likely future events (in this case the impacts of potential transportation investments) by responding to several rounds of questionnaires or surveys. A moderator tallies and summarizes the results of each round and provides these results back to the panelists. The Panel members are then given an opportunity to revise their initial analyses based on a review of their fellow panelists' work. The Delphi is considered complete when the responses in repeated rounds of questioning do not markedly change. The panelists typically conduct their work independently and somewhat anonymously in an effort to allow for fully reflective responses to the survey question and subsequent responses. The results of the Delphi technique may be summarized through measures of central tendency. Ideally, panelists will reach a consensus.

For the 2004 FEIS, a 16 member Delphi Panel was assembled and included individuals familiar with the corridor and the Study Area who were knowledgeable in the area of real estate, planning, environmental policy, etc. The Expert Panel was tasked with projecting the potential change in population and employment in the 29-community study area based on their best professional judgment. The panelists were directed to explain the rationale for their estimates in memos that were anonymously presented to the other panelists. After reviewing the work of their peers, the panelists had the opportunity to revise their population and employment estimates. Detailed information about the Panel's work is included in the "I-93 Manchester to Salem Expert Panel Analysis Final Report, December 28, 2001 (revised January 22, 2002)" and is summarized in Section 4.12 of the 2004 FEIS.

After two rounds of estimates for both the No Build and Build scenarios, the panelists could not reach consensus. Therefore, the results of the Delphi Technique process were summarized through the calculation of the Panelist's Blended Average Allocation (PBAA)—the average of the median and the mean. The blended average method gives some weight to very high and low outlying values, but gives less weight to these values than using a mean. The PBAA is a convenient measure to consider the opinions of the Panel, but it is important to note that it does not represent a group consensus. The individual panelists' findings represent "informed opinions" which cross a broad spectrum ranging from large additional increases in growth if the highway is widened to no additional increase in growth associated with the widening.

2.1.2 Land Conversion

The PBAA population and employment allocations were used by NHDOT and FHWA as the basis for estimating potential land conversion impacts based on information on average household size, employment density, and average lot sizes. Where available, the land conversion estimates were compared to developable land inventories contained in build-out analyses or master plans.

2.2 Results from 2004 FEIS

PBAA presented in the 2004 FEIS estimated that the project may add nearly 41,000 people and almost 22,000 jobs over the No Build Alternative, a five percent difference. The 2004 FEIS concluded that this additional growth could result in the conversion of approximately 19,400 acres of land for residential development, and 500 to 900 acres for commercial and industrial development between 2000 and 2020. In general, estimates based on the PBAA indicated that the largest absolute growth in population and employment would occur in the cities and large towns in the study area (e.g. Londonderry, Manchester, and Derry), while the largest percent increases in growth would occur in the more rural municipalities away from the corridor (e.g. Auburn, Candia, and Atkinson).

The impacts of the potential indirect land use change effects of the project on environmental resources were discussed qualitatively in the 2004 FEIS. Land development and associated impacts depend on general regional and statewide economic conditions, state permitting requirements, local zoning and land use ordinances and their administration, and the decisions of individual landowners. Given these influences and changing conditions over time, it is difficult to forecast with real confidence specific areas that may be developed or not, and the impacts of such development under the No Build and Build Alternative. After considering the availability of land for development and the location of sensitive environmental resources, the 2004 FEIS concludes that in general, future growth and associated land use impacts are expected to occur in areas planned by localities for future development, which are areas that do not necessarily contain valuable resources. Accordingly, future land use development (including that induced by the widening of I-93) cannot be assumed to take place in areas of important natural resources. The most vulnerable of these resources, such as wetlands and vernal pools, are protected by regulation, as are conservation lands. Further, there appears to be sufficient land to accommodate the land conversions computed for the No Build and Build Alternatives in most of the communities in the New Hampshire portion of the study area. Large unfragmented tracts of forested land and farmland, however, are not necessarily protected in the Study Area. Though any new development may encroach on these lands, such development is expected to be in keeping with local planning with local priorities. In the Massachusetts portion of the study area, important environmental resources are largely protected from future development impacts by existing zoning patterns.

2.3 Record of Decision Commitments/Mitigation/Enhancement

The Record of Decision committed $3.5 million for a Community Technical Assistance Program (CTAP) to help communities in the area influenced by this section of I-93 better deal with and manage growth-related issues. CTAP was envisioned in the 2004 FEIS as a joint effort of state, local and non-governmental organizations to help communities better manage growth and advance conservation efforts.

NHDOT has also committed to provide funding of up to $3 million to the NHDES Drinking Water Supply Land Grant Program to be used to purchase property rights to aid in the protection of water quality around Massabesic Lake, which is used to supply drinking water to Manchester, and parts of Derry and Londonderry.

2.4 2008 Update Evaluations

2.4.1 Changes in Regulations/Guidelines

There have been no changes in the regulations and guidance pertaining to the analysis of indirect land use effects since the 2004 FEIS.

2.4.2 2008 Update Analysis Methods

Scenario 1 Indirect Land Use Effect Methodology

The land conversion analysis based on the Delphi PBAA was updated for Scenario 1. The land conversion analysis is based on the amount of growth over a certain time period. In order to make the Scenario 1 land conversion estimates comparable to the Scenario 2 estimates, the analysis was revised to cover the period from 2005 to 2020 (instead of 2000 to 2020 as in the 2004 FEIS). The total 2020 population and employment from the Delphi PBAA was assumed. The land conversion analysis was conducted based on the amount of growth between 2005 existing conditions and the 2020 future conditions (a fifteen year period). This approach is reasonable because the focus of the analysis is primarily on potential future growth impacts, not past impacts (e.g. 2000 to 2005).

For some towns, including Londonderry, Salem and Windham, the Delphi PBAA 2020 No Build and Build employment levels are lower than the SEIS 2005 base year employment levels (see Table 2-7). This may be due to different employment estimate sources and projection methodologies. These towns were assumed to have zero employment related land conversion between 2005 and 2020 under Scenario 1. An example of this approach using the Town of Londonderry is provided below.

Scenario 1 Londonderry Example

In order to determine land conversion impacts under the Build and No Build conditions, the first step is to determine the amount of population and employment growth between 2005 and 2020.

The 2005 OEP population of Londonderry was subtracted from the Scenario 1 2020 No Build population to determine the population growth between 2005 and 2020. The amount of population growth was then used to estimate the residential land conversion for the 2005 to 2020 period.
33,069 (2020 No Build population) - 24,673 (2005 population) = 8,396 (2005 to 2020 population growth)

The 2005 employment in Londonderry was subtracted from the Scenario 1 2020 No Build employment to determine employment growth between 2005 and 2020. However, since the No Build employment for Londonderry is less than the 2005 employment, the decrease was treated as no change in employment-related land conversion because previously developed land is likely to remain covered by buildings and pavement, not suddenly become undeveloped because of an employment decrease.
11,700 (2020 No Build employment) - 13,506 (2005 employment)- = -1,806 (2005 to 2020 employment change)

The Londonderry example illustrates that the Delphi PBAA employment estimates are substantially different from the more recent estimates prepared for Scenario 2 (employment in Londonderry is expected to increase slightly between 2005 (13,506) and the 2020 No Build condition (13,855) under Scenario 2- see Table 2-7).

The Scenario 1 land conversion analysis was also updated based on changes in the minimum lot size for residences in certain towns, the area of developable land available based on recent build-out analyses, and changes in the proportion of the different types of housing (e.g. single-family, multi-family etc.) in each town, see Section 2.4.3.

Scenario 2 Indirect Land Use Effect Methodology

For the SEIS analysis of indirect effects for Scenario 2, a gravity model analysis was conducted using travel time information from the New Hampshire Statewide model and updated population forecasts. Gravity models are used often in transportation and travel modeling. They are based on the observation that the overall attractiveness of an area to potential residents is a function of the capacity of an area for development (vacant developable land in valued and affordable locations) and accessibility to employment and activity centers, among other things. The model produces quantified results that can serve as the basis for assessing land use change.

Accessibility refers to "the number of opportunities available within a certain distance or travel time."[1] As movement becomes less costly, either in terms of time or money, between any two places, accessibility increases. The propensity for interaction between any two places increases as the cost of movement between them decreases. Accessibility can also be understood as the attractiveness of a place of origin (how easy it is to get from there *from* all other destinations) and as a destination (how easy is it is to get *to* there to all other destinations). Consequently, the structure and capacity of the transportation network affect the level of accessibility in a given area. The accessibility of places can have an impact on land value, and hence the use to which land is put. Holding all other factors constant, the gravity model formulation assumes that areas where accessibility increases as a result of a transportation project will be relatively more attractive for development than if the project had not been built.

It is important to understand that within a gravity model analysis, regional population and employment totals do not change as a result of the transportation project—only the location of growth changes. This use of "control totals" is in contrast to the Delphi Panel methodology which did not use control totals. The use of control totals is consistent with professional practice in projecting future demographic conditions. For the Scenario 2 analysis, this means that the population and employment control totals for the New Hampshire Statewide Model region are the same between the No Build and Build, but the locations of growth are redistributed based on the accessibility analysis. This assumption is supported by the literature regarding the effects of transportation improvements on development. Several recent studies have contained comprehensive reviews of the literature on transportation improvements and regional development.[2] Each of these literature reviews has concluded that in an age where most metropolitan locations are connected by the interstate highway network and other major roadways, roadway improvements, such as a widening, generally do not bring new growth to a region, but instead, influence where growth and development occurs on a local level.

Recent reviews of the literature conclude that:

> Beltways and urban highways more generally do not increase the overall rate of growth [in a region] but may influence where growth occurs and at what densities.[3]
>
> …highway projects affect the geographic location of economic activity by advantaging some places while causing firms and persons to shift their location choices away from other places.[4]

Studies have found that the effect of highways on land prices has been diminishing over time since early studies of the first segments of the interstate system in the 1950s. Boarnet and Haughwout note that studies have shown that incremental improvements in areas that already

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[1] Susan Hanson, *The Geography of Urban Transportation,* The Guilford Press, New York, 1995, p. 4.

[2] Marlon G. Boarnet and Andrew F. Haughwout, *Do Highways Matter? Evidence and Policy Implications of Highways Influence on Metropolitan Development,* The Brookings Institution Center on Urban and Metropolitan Policy, 2000; *NCHRP Report 423A, Land Use Impacts of Transportation: A Guidebook,* Transportation Research Board, 1999; NCHRP Report 456, *Guidebook for Assessing the Social and Economic Effects of Transportation Projects,* Transportation Research Board, 2001; NCHRP Report 403, *Guidance for Estimating the Indirect Effects of Proposed Transportation Projects,* Transportation Research Board, 1998.

[3] Susan Handy, "Smart Growth and the Transportation Land Use Connection: What Does the Research Tell Us?" *International Regional Science Review*, Vol 28 pp 146-167, 2005

[4] Marlon G. Boarnet and Andrew F. Haughwout, *Do Highways Matter? Evidence and Policy Implications of Highways Influence on Metropolitan Development,* The Brookings Institution Center on Urban and Metropolitan Policy, 2000.

possess highway access have reduced the magnitude of the influence of highways on land development activity:

> As more highways are built, and the metropolitan highway network matures, the incremental effect on accessibility from new or improved highways decreases, thus accounting for a smaller change in land prices due to any access premium.
>
> New evidence suggests that metropolitan highway projects still influence land use in the way that theory predicts. The important difference between the new evidence and earlier studies is that the geographic scale of the land use effect appears to be somewhat smaller. A new highway or improvement might importantly reduce travel times in the immediate vicinity of a project, even if the resulting changes in metropolitan-wide transportation accessibility are small. Hence the land use effects of modern highway projects likely operate over a very fine geographic scale, rather close to the project. [5]

For roadway widening projects in particular, the relevant literature suggests that regional total population and employment levels will not change as a result of the project. Indirect land use effects are likely to be focused on shifts in the distribution of future growth, concentrated in areas near the project. These conclusions support the overall framework for the Scenario 2 indirect effects analysis through the use of control totals and a gravity model analysis. It is important to note that transportation is one component in land use decision making, but is not usually the most important component. Other factors include market demand, site suitability, capital availability, economic feasibility, and the regulatory environment.[6]

Overview of the New Hampshire Statewide Model

NHDOT maintains a statewide transportation model in order to systematically plan for future transportation needs. The model is called the "New Hampshire Statewide Travel Model System" or NHSTMS. The purpose of the NHSTMS is to estimate future travel patterns and their effects on transportation infrastructure associated with changes in population and employment in the State. The NHSTMS was developed in 1997, and underwent a substantial updates between 2005 and 2007. Figure 2-1 shows the NHSTMS Traffic Analysis Zones (TAZs) in relation to state and county boundaries. There are a total of 499 internal TAZs and 29 external TAZs. The external TAZs are used to represent trips with origins or destinations outside the model area. The model area covers all of New Hampshire, and portions of Massachusetts, Maine, and Vermont.

The model update process included the use of recent baseline and future year population and employment forecasts. The data sources utilized in these updates included 2000 U.S. Census data, 2005 OEP population projections for New Hampshire, the Massachusetts Statewide Travel Demand Forecasting Model, Maine Office of State Planning population projections for York County, New Hampshire Economic and Labor Market Information Bureau employment forecasts, and employment growth rates from the Bureau of Economic Analysis. During the 2005 updates, extensive coordination was conducted with the regional planning commissions in the model area to adjust the employment forecasts based on local knowledge of upcoming developments and conditions. The update process also included changes to the highway and transit networks, and tourist trip purpose modeling, see the New

[5] Marlon G. Boarnet and Andrew F. Haughwout, *Do Highways Matter? Evidence and Policy Implications of Highways Influence on Metropolitan Development,* The Brookings Institution Center on Urban and Metropolitan Policy, 2000

[6] Urban Land Institute. Influence of Transportation Infrastructure on Land Use. 2004. http://www.fhwa.dot.gov/planning/tranlanduse.pdf

Hampshire Statewide Model Documentation (Appendix xx of the Traffic Technical Report) for detailed information.

New Hampshire Population and Employment Control Totals

The New Hampshire Office of Energy and Planning (OEP) (part of the Executive Department within the Office of the Governor) produces official population forecasts. After extensive discussions with OEP, OEP and NHDOT determined that the OEP's forecasts represent the Build Condition for the DSEIS Scenario 2 analysis. In making population projections, OEP assumed that infrastructure, including sufficient highway capacity would exist. OEP planners believed that population and employment growth surrounding the I-93 corridor would be lower than forecasted due to congestion if the project was not constructed. Therefore, the accessibility analysis was conducted to determine population and employment allocations for the No Build Alternative. The difference in the location of growth between the No Build and Build conditions is the indirect effect of the project.

OEP's most recent population forecast (October 2007) provides municipal-level population forecasts in five year increments from 2005 to 2030. The OEP municipal forecasts were allocated to TAZs in the New Hampshire portion of the New Hampshire Statewide Model. The methodology used to allocate municipal population forecasts to TAZs is explained in Appendix A of the New Hampshire Statewide Model Documentation (Appendix xx of the Traffic Technical Report). The approximate population control total for the entire statewide model is 6,184,400 for 2020, and 6,478,200 for 2030. The 2030 population represents an increase of about 746,900 persons or 13.0 percent from the 2005 population of the model area.

OEP does not produce municipal-level employment forecasts. The New Hampshire Economic and Labor Market Information Bureau (ELMI) produces statewide and county-level employment forecasts. The most recent county-level forecast covers the years 2004 to 2014. There are no official State forecasts for employment beyond 2014. TAZ-level employment in the New Hampshire portion of the statewide model was adjusted based on the most recent OEP population forecasts, anticipating that employment and population would maintain the same proportion to each other as they do in the forecasts prepared for the New Hampshire Statewide Model updates, which included coordination and adjustments based on input from the RPCs. The employment control total for the entire statewide model area is approximately 3,453,200 for 2020 and 3,648,700 for 2030. The 2030 employment forecast represents an increase of about 493,800 jobs or 15.7 percent from the 2005 employment of the model area.

Accessibility Index and No Build Population and Employment Allocations

The New Hampshire Statewide Model was used to calculate the relative accessibility of each TAZ to jobs in all other TAZs in the model using the No Build and Build transportation networks. The Traffic Technical Report provides detailed information on the development of the No Build and Build transportation networks, including a listing of other reasonably foreseeable transportation projects included in the No Build. The difference in the transportation network between the No Build and Build Alternatives is that the Build Alternative network includes the additional capacity associated with widening I-93 to four lanes in each direction. Based on these accessibility indexes, the model was used to reallocate the Build (OEP) population and employment for the No Build Alternative. TAZs that would be relatively less accessible without the project would be relatively less attractive to future development under the No Build Alternative. The increment between the No Build and Build population and employment allocations is the indirect effect of the project for Scenario 2. Detailed

information regarding the calculation of the accessibility index is provided in Appendix A of the New Hampshire Statewide Model Documentation.

Indirect Land Use Effects of I-93 Exit 4A

The towns of Derry and Londonderry, NH have proposed the construction of I-93 Exit 4A, a new interchange between the existing Exit 4 and Exit 5. This project is separate from the NHDOT I-93 Improvements project. A Draft EIS for the I-93 Exit 4A Interchange Study Derry-Londonderry project was published in July 2007. The purpose of the project includes "providing improved Interstate access for commercial and industrially-zoned lands near NH Route 28 in both Derry and Londonderry, thus allowing for the planned and orderly development of such lands to further locally-defined economic development goals and tax base diversification."(Exit 4A DEIS, Page 1-3). The possible construction of I-93 Exit 4A and the associated connector roadway to Folsom Road in Derry, near its intersection with North High Street, would provide access to land for commercial/industrial development on the east side of I-93.

The Exit 4A project was not included in the 2005 New Hampshire Statewide Model update or accounted for in the updated baseline population and employment estimates prepared in coordination with the Regional Planning Commissions during the model update process. However, as a reasonably foreseeable transportation project, Exit 4A is included in both the No Build condition and Build condition traffic modeling for the DSEIS. It should be noted that the New Hampshire Statewide Model does not explicitly account for the localized industrial and commercial development that could occur as a result of the construction of Exit 4A.

Through coordination with FHWA, the I-93 SEIS project team decided to update the 2030 analysis year model for the SEIS Scenario 2 (No Build and Build) to account for the potential indirect land use effects of Exit 4A. The year 2030 was used for the analysis based on the reasonable assumption that there would be a time lag between the construction of the Exit 4A project and potential changes in land use. While the Exit 4A project may be completed by 2020, any land use effects of the new interchange would be more likely to occur by 2030.[7] The methodology developed for assessing the indirect land use effects of I-93 Exit 4A is consistent with the overall SEIS Scenario 2 analysis framework because it maintains the county-level No Build and Build condition employment totals. The methodology allows for the additional employment growth estimated for the Exit 4A area to be shifted from other areas in Rockingham County. The process for estimating indirect land use effects of the Exit 4A project in the 2030 analysis year involved the following steps:

1. Define study area boundaries where indirect land use effects would be the most likely based on the availability of appropriately zoned land in the vicinity of Exit 4A.
2. Estimate the total possible employment growth in the study area assuming all of the available land was developed at a density similar to existing industrial employment centers in Londonderry and Derry.
3. Estimate the portion of the total possible employment growth that could occur during the ten year period between 2020 and 2030.
4. Adjust the county-level distribution of employment to account for the expected increase at Exit 4A, while maintaining the SEIS Scenario 2 county-level employment totals. The SEIS Scenario

[7] See Traffic Written Reevaluation/Technical Report Appendix A-3: Memorandum dated March 4, 2009 from Jamie Sikora, Environmental Programs Manager, Re: *Consideration of Exit 4A in the NH I-93 SEIS*

2 Build condition employment totals are based on New Hampshire Economic and Labor Market Information Bureau (ELMI) forecasts.

For additional information on the methodology and results of the Exit 4A indirect land use effects assessment, refer to the memo entitled *Revised Employment Estimates to Account for the Potential Indirect Land Use Effects of I-93 Exit 4A* (Appendix G-1).

2.4.3 Changes in the Existing Conditions

Changes in existing population and employment are described in the Socioeconomics Written Re-evaluation/Technical Report and incorporated into the New Hampshire Statewide Model. The land use plans of the study area communities were reviewed for information relevant to the land conversion analysis. Since the 2004 FEIS, Auburn and Candia have changed the minimum lot size allowable for new single-family homes. In Auburn the minimum lot size has decreased from 2.5 acres to 2.0 acres, while in Candia the minimum lot size has increased from 2.5 acres to 3.0 acres. The area of developable land available has been updated or added to the analysis based on recent build-out analyses as follows:

- Auburn: 5,853 acres (2007 Master Plan)
- Bow: 1,975 residential lots, 739.3 commercial/industrial acres (2004 Master Plan describing 2002 build-out analysis)
- Chester: 6,353 acres (2006 Master Plan)
- Londonderry: 6,350 acres (2006 build-out analysis)
- Methuen: 1,023 acres (2007 Master Plan)
- Pelham: 2,376 acres (NRPC 2005 Region-Wide Build out Impact Analysis)
- Salem: 2,630 acres (2001 Master Plan)
- Sandown: 900 single family homes (2006 Master Plan)

Another input in the land conversion analysis is the proportion of the different types of housing (e.g. single-family, multi-family etc.) in each town. Since the publication of the 2004 FEIS, OEP has updated this housing type information. This information can be found in the 2006 report entitled *Current Estimates and Trends in New Hampshire's Housing Supply*, which uses 2000 Census data to establish a baseline condition and then adds the number of newly constructed housing units based on coordination with municipal officials regarding the issuance of residential building permits. Table 2-1 presents the updated housing type information for the New Hampshire study area communities. This information was incorporated into the land conversion analysis. The 2004 FEIS percentages of housing units by type for the Massachusetts study area communities were based on build-out analyses and were not changed for the SEIS Scenario 1 and Scenario 2 land conversion analyses.

Table 2-1
Percentage of Housing Units by Type, 2006

Municipality	Single Family Housing	Multi Family Housing	Manufactured Housing
Allenstown	42.0%	24.4%	33.6%
Atkinson	72.4%	27.1%	0.4%
Auburn	94.1%	5.3%	0.6%
Bedford	83.5%	16.5%	0.0%
Bow	92.9%	6.8%	0.2%
Candia	90.9%	5.2%	3.9%
Chester	90.0%	8.0%	2.0%
Concord	42.2%	51.9%	5.9%
Danville	73.1%	6.8%	20.2%
Deerfield	88.5%	6.6%	4.9%
Derry	50.6%	45.0%	4.3%
Dunbarton	94.2%	4.2%	1.6%
Goffstown	69.4%	26.2%	4.5%
Hampstead	70.5%	21.1%	8.4%
Hooksett	63.4%	30.0%	6.6%
Londonderry	69.5%	26.6%	3.9%
Manchester	37.0%	62.7%	0.3%
Pelham	87.2%	12.2%	0.6%
Pembroke	59.7%	35.4%	4.9%
Raymond	63.0%	21.1%	15.9%
Salem	67.5%	25.1%	7.4%
Sandown	84.6%	9.4%	6.0%
Windham	87.6%	12.2%	0.2%

2.4.4 Changes in the Future No Build and Build Conditions (Scenario 1)

Study Area Development Trends

Table 2-2 provides 2020 Delphi PBAA population information for the 29 communities in the 2004 FEIS study area. The total study area population is 40,629 higher under the Build Alternative than under the No Build Alternative in 2020. The 2020 No Build Alternative population of the study area is 743,044, so the incremental increase in population under the Build Alternative is 5.5 percent. The following municipalities could experience a ten percent or greater No Build condition to Build condition population increase in 2020: Atkinson, Auburn, Bow, Candia, Chester, Dunbarton, Hampstead, Hooksett, Londonderry and Pelham. Seventeen communities could experience a No Build condition to Build condition population difference of over 1,000 persons each, with the largest absolute increase occurring in Londonderry (4,181).

Table 2-3 provides 2020 Delphi PBAA employment information for the 29 communities in the 2004 FEIS study area. The total study area employment is 21,527 higher under the Build Alternative than the No Build Alternative in 2020. The 2020 No Build Alternative employment in the study area is 397,325, so the incremental increase in employment under the Build Alternative is 5.4 percent. The following municipalities could experience a ten percent or greater No Build condition to Build condition employment increase in 2020: Allenstown, Atkinson, Auburn, Bow, Candia, Chester, Deerfield,

Dunbarton, Hooksett, Pelham, Sandown and Windham. Seven communities could experience a No Build condition to Build condition employment difference of over 1,000 jobs each, with the largest absolute increase occurring in Manchester (5,701).

Table 2-2
Scenario 1, 2020
Study Area Population, Build Compared to No Build

	2005 Population	2020 No Build Population	2020 Build Population	No Build- Build Difference	No Build- Build Percent Difference
Allenstown	5,032	5,971	6,472	501	8.39%
Atkinson	6,562	8,573	9,757	1,184	13.81%
Auburn	5,177	7,133	8,865	1,732	24.28%
Bedford	20,738	24,906	27,186	2,280	9.15%
Bow	7,805	9,264	10,237	973	10.50%
Candia	4,110	5,408	6,425	1,017	18.81%
Chester	4,617	5,623	6,369	746	13.27%
Concord	42,221	48,253	50,997	2,744	5.69%
Danville	4,492	5,584	6,085	501	8.97%
Deerfield	4,272	5,543	5,989	446	8.05%
Derry	34,655	44,706	47,672	2,966	6.63%
Dracut, MA	28,971	34,018	34,676	658	1.93%
Dunbarton	2,521	2,765	3,061	296	10.71%
Goffstown	17,804	21,394	23,328	1,934	9.04%
Hampstead	8,642	12,520	13,970	1,450	11.58%
Hooksett	13,240	15,794	17,455	1,661	10.52%
Lawrence, MA	70,919	80,501	81,429	928	1.15%
Londonderry	24,673	33,069	37,250	4,181	12.64%
Manchester	109,966	117,672	121,438	3,766	3.20%
Methuen, MA	44,361	50,917	52,304	1,387	2.72%
North Andover/Andover, MA	59,875	68,841	70,472	1,631	2.37%
Pelham	12,485	16,973	18,911	1,938	11.42%
Pembroke	7,352	8,866	9,570	704	7.94%
Raymond	10,639	13,723	14,600	877	6.39%
Salem	29,941	37,774	39,587	1,813	4.80%
Sandown	5,851	7,814	8,174	360	4.61%
Tewksbury, MA	29,120	34,392	35,100	708	2.06%
Windham	12,565	15,047	16,294	1,247	8.29%
TOTAL	628,606	743,044	783,673	40,629	5.47%

Table 2-3
Scenario 1, 2020
Study Area Employment, Build Compared to No Build

	2005 Employment	2020 No Build Employment	2020 Build Employment	No Build-Build Difference	No Build-Build Percent Difference
Allenstown	783	610	711	101	16.56%
Atkinson	971	673	875	202	30.01%
Auburn	1,320	825	1,047	222	26.91%
Bedford	13,768	19,932	21,300	1,368	6.86%
Bow	3,089	4,339	5,003	664	15.30%
Candia	728	449	601	152	33.85%
Chester	473	323	400	77	23.84%
Concord	40,546	59,609	61,052	1,443	2.42%
Danville	207	319	340	21	6.58%
Deerfield	502	321	383	62	19.31%
Derry	8,165	9,009	9,876	867	9.62%
Dracut, MA	5,122	9,268	9,651	383	4.13%
Dunbarton	242	214	284	70	32.71%
Goffstown	3,682	4,523	4,913	390	8.62%
Hampstead	2,196	1,870	2,041	171	9.14%
Hooksett	7,999	8,555	9,497	942	11.01%
Lawrence, MA	22,165	38,332	39,583	1,251	3.26%
Londonderry	13,506	11,700	12,583	883	7.55%
Manchester	66,387	82,182	87,883	5,701	6.94%
Methuen, MA	15,775	41,691	43,355	1,664	3.99%
North Andover/Andover, MA	45,482	59,109	61,349	2,240	3.79%
Pelham	2,091	2,800	3,165	365	13.04%
Pembroke	1,935	2,941	3,095	154	5.24%
Raymond	3,029	3,313	3,464	151	4.56%
Salem	20,919	17,864	19,008	1,144	6.40%
Sandown	242	209	251	42	20.10%
Tewksbury, MA	15,322	14,359	14,696	337	2.35%
Windham	2,974	1,986	2,446	460	23.16%
TOTAL	**299,620**	**397,325**	**418,852**	**21,527**	**5.42%**

Table 2-4 provides the updated estimates of land conversion by town using the Scenario 1 population and employment allocations for 2020. The results show that between 2005 and 2020, residential growth potentially attributed to the 2005 Selected Alternative is expected to convert 19,289 acres of land in the study area, while employment growth could convert 393 to 692 acres, depending on density. The incremental effect of the Build Alternative is in addition to the 46,720 acres of residential development and 2,369 to 4,169 acres of commercial/industrial development between 2005 and 2020 under the No Build Alternative.

Of the communities with developable land estimates available from build-out analyses, the following appear to have the potential for growth pressure to exceed the developable land area in 2020 under current zoning: Pelham in New Hampshire and Lawrence, Methuen and Tewksbury in Massachusetts. In these municipalities, efforts to reuse existing facilities or increases in density could be necessary to

accommodate the expected levels of growth. However, it is important to understand that the land conversion analysis results are an estimate of the potential magnitude of indirect effects. The population and employment allocations for the No Build and Build Alternatives under both Scenarios were not constrained by developable land estimates or land use regulations. Actual growth will be subject to land use regulations and availability of developable land, which could decrease impacts in these communities.

For Pelham, the Scenario 1 land conversion methodology appears to overestimate land conversion in comparison to the more detailed build-out analysis conducted for Pelham by the Nashua Regional Planning Commission (NRPC) in 2005. The NRPC analysis estimated that Pelham would have a population of 24,185 at build-out, substantially greater than the 2020 No Build population used in Scenario 1 (16,973). The NRPC analysis estimated that employment in Pelham would be 4,457 at build-out, substantially greater than the 2020 No Build employment used in Scenario 1 (approximately 2,800). The NRPC analysis takes into account additional factors such as Pelham's Elderly Housing Overlay district which allows up to 40 units per acre with 30 percent of land set aside as open space, among several other differences in land conversion methodologies. Based on NRPC's build-out analysis, Pelham should be able to accommodate the level of growth anticipated by 2020 under Scenario 1.

Methuen potentially reaches build-out in 2020, with the Build condition adding 589 acres of residential development and 37 to 67 acres employment development over the No Build.

Lawrence potentially reaches build-out in 2020, with the Build condition adding 59 acres of residential development and 28 to 50 acres of employment development over the No Build.

Tewksbury potentially reaches build-out in 2020, with the Build condition adding 247 acres of residential development over the No Build.

Unlike the 2004 FEIS land conversion analysis, the Scenario 1 analysis does not predict growth to exceed the developable land area in Bedford. This occurs because the 2005 to 2020 population growth under the updated Scenario 1 analysis (4,168) is less than the 2000 to 2020 population growth estimate used in the 2004 FEIS (6,906).

Table 2-4
Scenario 1, 2005 to 2020
Study Area Land Conversion, Build Compared to No Build

	Total Town Area (acres)	Developable Land Area (acres)	No Build 2005 to 2020			Build 2020		
			Residential Land Conversion (Acres)	Employment Land Conversion Low Density	Employment Land Conversion High Density	Additional Residential Land Conversion	Additional Employment Land Conversion Low Density	Additional Employment Land Conversion High Density
Allenstown	13,167		472	0	0	252	0	0
Atkinson	7,258		1,286	0	0	757	0	0
Auburn	18,438	5,853	1,441	0	0	1,276	0	0
Bedford	21,156	5,700	2,871	249	137	1,570	55	30
Bow	18,269	1,975 residential lots and 739.3 commercial/industrial acres	1,521	50	28	1,015	27	15
Candia	19,557		1,412	0	0	1,106	0	0
Chester	16,718	6,353	788	0	0	585	0	0
Concord	43,000		801	769	424	364	58	32
Danville	7,569		684	5	3	314	1	1
Deerfield	33,348	15,521	1,318	0	0	462	0	0
Derry	23,226	6,100	3,334	34	19	984	35	19
Dracut, MA	13,699	4,988	1,864	166	91	243	15	8
Dunbarton	20,046		481	0	0	583	2	1
Goffstown	24,065		1,142	34	19	615	16	9
Hampstead	9,014		1,445	0	0	540	0	0
Hooksett	23,761		2,230	22	12	1,451	38	21
Lawrence, MA	4,753	211	612	650	359	59	50	28
Londonderry	26,958	6,350	2,566	0	0	1,278	0	0
Manchester	22,355		1,256	637	351	614	230	127
Methuen, MA	14,722	1,023	2,784	1,046	577	589	67	37
North Andover/Andover, MA	38,289	7,931	4,121	427	303	750	70	50
Pelham	17,151	2,376	3,714	28	16	1,604	15	8
Pembroke	14,597		1,081	41	22	503	6	3
Raymond	18,943		1,038	11	6	295	6	3
Salem	16,569	2,630	1,710	0	0	396	0	0
Sandown	9,232	900 single family homes	1,953	0	0	358	0	0
Tewksbury, MA	13,526	1,712	1,840	0	0	247	0	0
Windham	17,772		955	0	0	480	0	0
TOTAL	**527,158**	**N/A [1]**	**46,720**	**4,169**	**2,369**	**19,289**	**692**	**393**

1. Total not applicable because developable land data was not available for all towns listed in the column.

2.4.5 Changes in the Future No Build and Build Conditions (Scenario 2)

Intraregional Development Shifts

Table 2-5 summarizes the gravity model population analysis for New Hampshire counties, and the Massachusetts, Maine, and Vermont portions of the statewide model. It is anticipated that changes in accessibility as result of the Build Alternative would produce a proportional change in the county shares of population and employment. The Build Alternative allocation for 2030 results in approximately 11,100 more people in New Hampshire than the No Build allocation, a 0.71 percent increase. Hillsborough, Rockingham, and Merrimack counties would account for the majority of the population allocation difference for New Hampshire. While the relative accessibility of southern New Hampshire would increase slightly as a result of the Build Alternative, the relative accessibility of the Massachusetts portion of the model region would decrease, resulting in approximately 12,900 fewer residents than under the No Build Alternative, a -0.27 percent decrease. Note that consistent with literature review findings, there is no change in the total population of the entire model region as a result of the 2005 Selected Alternative. In other words, unlike Scenario 1, the gravity model used in Scenario 2 accounts for the movement of jobs and people within the model region.

Table 2-6 summarizes the gravity model employment analysis for the New Hampshire counties, and the Massachusetts, Maine, and Vermont portions of the statewide model. The Build Alternative allocation results in approximately 6,300 more jobs in New Hampshire than the No Build allocation, a 0.78 percent increase. As with the population analysis, Hillsborough, Rockingham, and Merrimack counties would account for the majority of the employment allocation difference for New Hampshire. Massachusetts would have approximately 7,000 fewer jobs with the Build Alternative than under the No Build Alternative, a -0.26 percent decrease. Note that consistent with the literature review findings, there is no change in the total number of jobs in the entire model region as a result of the 2005 Selected Alternative.

Table 2-5
Scenario 2, 2030
Statewide Model Estimated Change in Population Based on Accessibility Change, Build Compared to No Build

	2005 Population	2030 No Build Population	2030 Build Population	No Build – Build Population Difference	No Build-Build Percent Difference
Belknap NH	60,600	74,000	74,500	500	0.68%
Carroll NH	47,000	61,700	61,800	100	0.16%
Cheshire NH	77,300	90,000	89,800	-200	-0.22%
Coos NH	34,400	36,100	36,100	0	0.00%
Grafton NH	86,900	100,100	100,600	500	0.50%
Hillsborough NH	402,800	470,100	474,000	3,900	0.83%
Merrimack NH	146,400	179,800	181,900	2,100	1.17%
Rockingham NH	296,700	347,500	351,700	4,200	1.21%
Strafford NH	121,000	143,100	142,900	-200	-0.14%
Sullivan NH	42,100	51,800	52,000	200	0.39%
New Hampshire Total	1,315,200	1,554,100	1,565,200	11,100	0.71%
Massachusetts Portion Total [1]	4,279,100	4,706,600	4,693,700	-12,900	-0.27%
Maine Portion Total [2]	42,500	67,600	68,000	400	0.59%
Vermont Portion Total [3]	94,600	149,900	151,300	1,400	0.93%
Grand Total	**5,731,300**	**6,478,200**	**6,478,200**	**0**	**0.00%**

Notes: Population rounded to nearest hundred.

1. Includes Essex, Middlesex, Suffolk, and Norfolk counties, and part of Worcester County.
2. Includes part of York County
3. Includes parts of Windham, Windsor, Orange, Caledonia, and Essex counties.

Table 2-6
Scenario 2, 2030
Statewide Model Estimated Change in Employment Based on Accessibility Change, Build Compared to No Build

	2005 Employment	2030 No Build	2030 Build	No Build – Build Employment Difference	No Build –Build Percent Difference
Belknap NH	28,400	36,500	36,800	300	0.82%
Carroll NH	23,000	30,400	30,400	0	0.00%
Cheshire NH	36,300	43,400	43,300	-100	-0.23%
Coos NH	15,100	16,800	16,800	0	0.00%
Grafton NH	56,400	68,200	68,600	400	0.59%
Hillsborough NH	216,200	252,700	255,300	2,600	1.03%
Merrimack NH	81,400	103,200	104,400	1,200	1.16%
Rockingham NH	143,700	181,600	183,600	2,000	1.10%
Strafford NH	46,500	58,800	58,700	-100	-0.17%
Sullivan NH	14,200	17,800	17,900	100	0.56%
New Hampshire Total	661,300	809,400	815,700	6,300	0.78%
Massachusetts Portion Total	2,428,000	2,735,000	2,728,000	-7,000	-0.26%
Maine Portion Total	17,300	27,500	27,600	100	0.36%
Vermont Portion Total	48,400	76,800	77,400	600	0.78%
Grand Total	**3,154,900**	**3,648,700**	**3,648,700**	**0**	**0.00%**

Notes: Employment rounded to nearest hundred.
1. Includes Essex, Middlesex, Suffolk, and Norfolk counties, and part of Worcester County.
2. Includes part of York County
3. Includes parts of Windham, Windsor, Orange, Caledonia, and Essex counties.

Study Area Development Trends

Figure 2-2 shows the percent change in population between the 2030 No Build and Build Alternatives at a local level surrounding the I-93 corridor. The map shows that the accessibility effect of the widening is greatest in the towns closest to I-93, leading to Build populations 2 to 5 percent higher than the No Build population in municipalities such as Hooksett, Manchester, Auburn, Londonderry, Derry, and Windham. Figure 2-3 illustrates a similar pattern and magnitude of change for 2030 employment surrounding the I-93 corridor. The results show that the 29 community study area considered in the 2004 FEIS is sufficiently broad for evaluating indirect land use effects in the SEIS because it encompasses the areas that would experience the greatest accessibility improvement as a result of the project. The 29 community study area is subset of the larger model region, which includes all of New Hampshire and portions of Massachusetts, Maine and Vermont. The remainder of this section provides detailed population and employment allocations for the study area, residential and employment land conversion estimates, and a comparison between the Scenario 2 land conversion results with the results calculated using the PBAA in the 2004 FEIS.

Tables 2-7 and 2-8 provide population information for the 2020 and 2030 Scenario 2 analysis years for the 29 communities in the study area. The total study area population is approximately 5,200 higher under the Build Alternative than the No Build Alternative in 2020, growing to a total difference of approximately 9,700 by 2030. The 2030 No Build Alternative population of the study area is 733,930, so the incremental increase in population under the Build Alternative in 2030 is 1.3 percent. The following municipalities could experience a two percent or greater No Build condition to Build condition population increase in 2030: Auburn, Chester, Derry, Hooksett, Londonderry and Windham. Derry, Londonderry and Manchester could experience a No Build condition to Build condition population difference of over 1,000 persons each. For all of the study area municipalities, the additional population growth expected as a result of the 2005 Selected Alternative is small in comparison to the magnitude of growth expected between 2005 and the 2030 No Build condition. For example, the total population of the study area is expected to grow from 628,606 in 2005 to 733,930 in 2030 under the No Build condition, an increase of 105,324. The additional population growth in the study area under Scenario 2 as a result of the 2005 Selected Alternative is approximately 9,700.

Table 2-7
Scenario 2, 2020
Study Area Population, Build Compared to No Build

	2005 Population	2020 No Build Population	2020 Build Population	No Build- Build Difference	No Build- Build Percent Difference
Allenstown	5,032	5,634	5,690	56	0.99%
Atkinson	6,562	7,307	7,327	20	0.27%
Auburn	5,177	5,680	5,789	109	1.92%
Bedford	20,738	23,730	23,946	216	0.91%
Bow	7,805	9,731	9,835	104	1.07%
Candia	4,110	4,516	4,568	52	1.15%
Chester	4,617	5,116	5,217	101	1.97%
Concord	42,221	47,626	47,860	234	0.49%
Danville	4,492	5,057	5,058	1	0.02%
Deerfield	4,272	4,744	4,778	34	0.72%
Derry	34,655	37,960	38,978	1,018	2.68%
Dracut, MA	28,971	36,347	36,319	-28	-0.08%
Dunbarton	2,521	2,881	2,899	18	0.62%
Goffstown	17,804	20,104	20,256	152	0.76%
Hampstead	8,642	9,770	9,808	38	0.39%
Hooksett	13,240	16,159	16,360	201	1.24%
Lawrence, MA	70,919	72,302	72,507	205	0.28%
Londonderry	24,673	27,683	28,436	753	2.72%
Manchester	109,966	116,515	117,620	1,105	0.95%
Methuen, MA	44,361	46,510	46,694	184	0.40%
North Andover/Andover, MA	59,875	70,171	70,469	298	0.42%
Pelham	12,485	16,822	16,533	-289	-1.72%
Pembroke	7,352	8,332	8,417	85	1.02%
Raymond	10,639	11,843	11,836	-7	-0.06%
Salem	29,941	32,484	32,774	290	0.89%
Sandown	5,851	6,573	6,606	33	0.50%
Tewksbury, MA	29,120	31,785	31,786	1	0.00%
Windham	12,565	13,892	14,095	203	1.46%
TOTAL	**628,606**	**697,274**	**702,461**	**5,187**	**0.74%**

Table 2-8
Scenario 2, 2030
Study Area Population, Build Compared to No Build

	2005 Population	2030 No Build Population	2030 Build Population	No Build- Build Difference	No Build- Build Percent Difference
Allenstown	5,032	5,976	6,071	95	1.59%
Atkinson	6,562	7,707	7,789	82	1.06%
Auburn	5,177	5,999	6,166	167	2.78%
Bedford	20,738	24,978	25,400	422	1.69%
Bow	7,805	10,838	11,032	194	1.79%
Candia	4,110	4,755	4,837	82	1.72%
Chester	4,617	5,449	5,594	145	2.66%
Concord	42,221	50,527	51,021	494	0.98%
Danville	4,492	5,383	5,416	33	0.61%
Deerfield	4,272	5,035	5,095	60	1.19%
Derry	34,655	39,086	40,428	1,342	3.43%
Dracut, MA	28,971	40,196	40,361	165	0.41%
Dunbarton	2,521	3,102	3,140	38	1.23%
Goffstown	17,804	21,474	21,805	331	1.54%
Hampstead	8,642	10,440	10,546	106	1.02%
Hooksett	13,240	17,725	18,099	374	2.11%
Lawrence, MA	70,919	72,364	72,740	376	0.52%
Londonderry	24,673	29,456	30,579	1,123	3.81%
Manchester	109,966	119,764	121,705	1,941	1.62%
Methuen, MA	44,361	47,776	48,164	388	0.81%
North Andover/Andover, MA	59,875	75,991	76,680	689	0.91%
Pelham	12,485	19,612	19,460	-152	-0.78%
Pembroke	7,352	8,926	9,070	144	1.61%
Raymond	10,639	12,509	12,559	50	0.40%
Salem	29,941	33,926	34,440	514	1.52%
Sandown	5,851	7,007	7,091	84	1.20%
Tewksbury, MA	29,120	33,201	33,280	79	0.24%
Windham	12,565	14,728	15,069	341	2.32%
TOTAL	**628,606**	**733,930**	**743,637**	**9,707**	**1.32%**

Tables 2-9 and 2-10 provide employment information for the 2020 and 2030 Scenario 2 analysis years for the 29 communities in the study area. The total study area employment is 3, 298 higher under the Build Alternative than the No Build Alternative in 2020, growing to a total difference of 6, 124 by 2030. The 2030 No Build Alternative employment in the study area is 410,509, so the incremental increase in employment under the Build Alternative in 2030 is 1.5 percent. The following municipalities could experience a two percent or greater No Build condition to Build condition employment increase in 2030: Auburn, Chester, Derry, Londonderry and Windham. Manchester, Concord and Londonderry could experience the largest absolute No Build condition to Build condition difference in employment. For all of the study area municipalities, the additional employment growth expected as a result of the 2005 Selected Alternative is small in comparison to the magnitude of growth expected between 2005 and the 2030 No Build condition. For example, the total employment of the study area is expected to grow from 299,620 in 2005 to 410,509 in 2030 under the No Build condition, an increase of 110,889. The additional job growth under Scenario 2 in the study area in 2030 as a result of the 2005 Selected Alternative is 6, 124.

Table 2-9
Scenario 2, 2020
Study Area Employment, Build Compared to No Build

	2005 Employment	2020 No Build Employment	2020 Build Employment	No Build- Build Difference	No Build- Build Percent Difference
Allenstown	783	1,624	1,641	17	1.05%
Atkinson	971	992	996	4	0.40%
Auburn	1,320	1,189	1,213	24	2.02%
Bedford	13,768	15,819	15,991	172	1.09%
Bow	3,089	6,870	6,929	59	0.86%
Candia	728	758	768	10	1.32%
Chester	473	450	459	9	2.00%
Concord	40,546	55,681	55,990	309	0.55%
Danville	207	173	173	0	0.00%
Deerfield	502	605	610	5	0.83%
Derry	8,165	10,460	10,825	365	3.49%
Dracut, MA	5,122	5,519	5,507	-12	-0.22%
Dunbarton	242	410	412	2	0.49%
Goffstown	3,682	4,959	4,998	39	0.79%
Hampstead	2,196	2,976	2,988	12	0.40%
Hooksett	7,999	8,521	8,614	93	1.09%
Lawrence, MA	22,165	25,953	26,067	114	0.44%
Londonderry	13,506	13,855	14,268	413	2.98%
Manchester	66,387	82,547	83,487	940	1.14%
Methuen, MA	15,775	17,271	17,383	112	0.65%
North Andover/Andover, MA	45,482	63,274	63,526	252	0.40%
Pelham	2,091	2,207	2,159	-48	-2.17%
Pembroke	1,935	2,746	2,775	29	1.06%
Raymond	3,029	3,968	3,970	2	0.05%
Salem	20,919	28,882	29,203	321	1.11%
Sandown	242	176	177	1	0.57%
Tewksbury, MA	15,322	19,219	19,224	5	0.03%
Windham	2,974	2,876	2,925	49	1.70%
TOTAL	**299,620**	**379,980**	**383,278**	**3,298**	**0.87%**

Table 2-10
Scenario 2, 2030
Study Area Employment, Build Compared to No Build

	2005 Employment	2030 No Build Employment	2030 Build Employment	No Build- Build Difference	No Build- Build Percent Difference
Allenstown	783	1,760	1,790	30	1.70%
Atkinson	971	1,063	1,076	13	1.22%
Auburn	1,320	1,271	1,308	37	2.91%
Bedford	13,768	16,906	17,220	314	1.86%
Bow	3,089	7,359	7,465	106	1.44%
Candia	728	815	831	16	1.96%
Chester	473	481	494	13	2.70%
Concord	40,546	60,380	61,035	655	1.08%
Danville	207	185	186	1	0.54%
Deerfield	502	650	657	7	1.08%
Derry	8,165	11,481	11,976	495	4.31%
Dracut, MA	5,122	5,942	5,951	9	0.15%
Dunbarton	242	442	447	5	1.13%
Goffstown	3,682	5,337	5,421	84	1.57%
Hampstead	2,196	3,183	3,216	33	1.04%
Hooksett	7,999	9,105	9,273	168	1.85%
Lawrence, MA	22,165	27,108	27,329	221	0.82%
Londonderry	13,506	16,134	16,733	599	3.71%
Manchester	66,387	89,658	91,439	1,781	1.99%
Methuen, MA	15,775	18,908	19,141	233	1.23%
North Andover/Andover, MA	45,482	68,313	68,878	565	0.83%
Pelham	2,091	2,212	2,174	-38	-1.72%
Pembroke	1,935	2,970	3,019	49	1.65%
Raymond	3,029	4,259	4,281	22	0.52%
Salem	20,919	31,099	31,672	573	1.84%
Sandown	242	189	191	2	1.06%
Tewksbury, MA	15,322	20,228	20,280	52	0.26%
Windham	2,974	3,071	3,150	79	2.57%
TOTAL	**299,620**	**410,509**	**416,633**	**6,124**	**1.49%**

Tables 2-11 and 2-12 provide estimates of land conversion by town using the Scenario 2 population and employment allocations for 2020 and 2030. The results show that between 2005 and 2030 residential growth potentially attributed to the 2005 Selected Alternative is expected to convert 3,633 acres of land in the study area, while employment growth could convert 136 to 240 acres, depending on density. The incremental effect of the Build Alternative is small in comparison to the over 50,000 additional acres of development expected between 2005 and 2030 under the No Build Alternative.

Of the communities with developable land estimates available from build-out analyses, only Pelham NH, Methuen, MA, and Lawrence, MA appear to have the potential for growth pressure to exceed the developable land area in 2020 under current zoning. For 2030, Methuen, Lawrence, North Andover/Andover, Pelham and Tewksbury appear to have the potential for growth to exceed the developable land area. In these municipalities, efforts to reuse existing facilities or increases in density could be necessary to accommodate the expected levels of growth. However, it is important to understand that the land conversion analysis results are an estimate of the potential magnitude of indirect effects. The population and employment allocations for the No Build and Build Alternatives under both Scenarios were not constrained by developable land estimates or land use regulations. Actual growth

will be subject to land use regulations and availability of developable land, which could decrease impacts in these communities.

For Pelham, the Scenario 2 land conversion methodology appears to overestimate land conversion in comparison to the more detailed build-out analysis conducted for Pelham by the Nashua Regional Planning Commission (NRPC) in 2005. The NRPC analysis estimated that Pelham would have a population of 24,185 at build-out, substantially greater than the 2030 No Build population used in the Scenario 2 analysis (19,612). The NRPC analysis estimated that employment in Pelham would be 4,457 at build-out, substantially greater than the 2030 No Build employment used in the Scenario 2 analysis (2,212). The NRPC analysis takes into account additional factors such as Pelham's Elderly Housing Overlay district which allows up to 40 units per acre with 30 percent of land set aside as open space, among several other differences in land conversion methodologies. Based on NRPC's build-out analysis, Pelham should be able to accommodate the level of growth anticipated by 2030 under Scenario 2.

Methuen potentially reaches build-out in 2020, with the Build condition adding 79 acres of residential development and 3 to 5 acres employment development over the No Build. The potential indirect effects of the 2005 Selected Alternative are very small in comparison to the 2020 No Build land conversion estimates of 912 acres of residential development and 33 to 60 acres of employment development.

Lawrence potentially reaches build-out in 2020, with the Build condition adding 13 acres of residential development and 3 to 5 acres of employment development over the No Build. The potential indirect effects of the 2005 Selected Alternative are small in comparison to the 2020 No Build land conversion estimates of 88 acres of residential development and 84 to152 acres of employment development.

With respect to Andover/North Andover, the area appears to reach build-out in the 2030 No Build with 7,407 acres of residential development plus 508 to 716 acres of employment land conversion. The potential indirect effects of the 2005 Selected Alternative are very small in comparison to the No Build growth estimates—317 acres of residential development plus 13 to 18 acres of employment land conversion. Andover and North Andover are addressed as one unit in the update analysis because they comprise a single TAZ in the New Hampshire Statewide Model.

Tewksbury potentially reaches build-out in 2030, with the Build condition adding 35 acres of residential development and 1 to 2 acres employment development over the No Build. The potential indirect effects of the 2005 Selected Alternative are very small in comparison to the No Build land conversion estimates of 1,424 acres of residential development and 109 to 198 acres of employment development.

Unlike the 2004 FEIS land conversion analysis, the Scenario 2 analysis does not predict growth to exceed the developable land area in Bedford because of lower population and employment estimates under the No Build and Build conditions.

Table 2-11
Scenario 2, 2005 to 2020
Study Area Land Conversion, Build Compared to No Build

	Total Town Area (acres)	Developable Land Area (acres)	No Build 2005 to 2020			Build 2020		
			Residential Land Conversion (Acres)	Employment Land Conversion Low Density	Employment Land Conversion High Density	Additional Residential Land Conversion	Additional Employment Land Conversion Low Density	Additional Employment Land Conversion High Density
Allenstown	13,167		303	37	23	28	1	1
Atkinson	7,258		476	4	2	13	1	0
Auburn	18,438	5,853	371	0	0	80	0	0
Bedford	21,156	5,700	2,061	127	70	148	13	7
Bow	18,269	1,975 residential lots and 739.3 commercial/industrial acres	2,008	172	96	109	4	2
Candia	19,557		442	4	2	56	1	0
Chester	16,718	6,353	391	0	0	79	1	0
Concord	43,000		718	800	441	31	26	15
Danville	7,569		354	0	0	0	0	0
Deerfield	33,348	15,521	489	6	4	36	0	0
Derry	23,226	6,100	1,096	134	74	338	20	11
Dracut, MA	13,699	4,988	2,725	33	18	0	0	0
Dunbarton	20,046		709	9	5	35	0	0
Goffstown	24,065		731	66	37	49	3	2
Hampstead	9,014		420	40	22	14	1	1
Hooksett	23,761		2,549	45	25	176	7	4
Lawrence, MA	4,753	211	88	199	110	13	9	5
Londonderry	26,958	6,350	920	106	58	230	24	13
Manchester	22,355		1,067	938	517	180	72	40
Methuen, MA	14,722	1,023	912	126	70	79	9	5
North Andover/Andover, MA	38,289	7,931	4,732	716	508	137	18	13
Pelham	17,151	2,376	3,589	5	3	0	-2	-1
Pembroke	14,597		700	42	23	60	2	1
Raymond	18,943		405	50	27	0	1	0
Salem	16,569	2,630	555	410	226	64	23	13
Sandown	9,232	900 single family homes	718	0	0	33	0	0
Tewksbury, MA	13,526	1,712	930	198	109	0	2	1
Windham	17,772		511	4	2	78	3	2
TOTAL	**527,158**	**N/A [1]**	**30,972**	**4,268**	**2,472**	**1,814**	**240**	**135**

1. Total not applicable because developable land data was not available for all towns listed in the column.

Table 2-12
Scenario 2, 2005 to 2030
Study Area Land Conversion, Build Compared to No Build

	Total Town Area (acres)	Developable Land Area (acres)	No Build 2005 to 2030			Build 2030		
			Residential Land Conversion (Acres)	Employment Land Conversion Low Density	Employment Land Conversion High Density	Additional Residential Land Conversion	Additional Employment Land Conversion Low Density	Additional Employment Land Conversion High Density
Allenstown	13,167		475	37	23	48	1	1
Atkinson	7,258		732	4	2	52	1	0
Auburn	18,438	5,853	606	0	0	123	0	0
Bedford	21,156	5,700	2,920	127	70	291	13	7
Bow	18,269	1,975 residential lots and 739.3 commercial/industrial acres	3,162	172	96	202	4	2
Candia	19,557		701	4	2	89	1	0
Chester	16,718	6,353	652	0	0	114	1	0
Concord	43,000		1,103	800	441	66	26	15
Danville	7,569		558	0	0	21	0	0
Deerfield	33,348	15,521	791	6	4	62	0	0
Derry	23,226	6,100	1,470	125	69	445	20	11
Dracut, MA	13,699	4,988	4,147	33	18	61	0	0
Dunbarton	20,046		1,144	9	5	75	0	0
Goffstown	24,065		1,167	66	37	105	3	2
Hampstead	9,014		670	41	22	39	1	1
Hooksett	23,761		3,917	45	25	327	7	4
Lawrence, MA	4,753	211	92	199	110	24	9	5
Londonderry	26,958	6,350	1,462	62	34	343	24	13
Manchester	22,355		1,596	938	517	316	72	40
Methuen, MA	14,722	1,023	1,450	126	70	165	9	5
North Andover/Andover, MA	38,289	7,931	7,407	716	508	317	18	13
Pelham	17,151	2,376	5,899	5	3	0	0	0
Pembroke	14,597		1,124	42	23	103	2	1
Raymond	18,943		630	51	28	17	1	0
Salem	16,569	2,630	870	421	232	112	23	13
Sandown	9,232	900 single family homes	1,150	0	0	84	0	0
Tewksbury, MA	13,526	1,712	1,424	198	109	28	2	1
Windham	17,772		832	5	3	131	3	2
TOTAL	**527,158**	**N/A [1]**	**48,151**	**4,231**	**2,451**	**3,633**	**240**	**136**

1. Total not applicable because developable land data was not available for all towns listed in the column.

Table 2-13 compares 2020 population levels between Scenario 1 and Scenario 2. For the No Build condition, the Scenario 2 population of the study area is 45,770 or 6.2 percent less than the Scenario 1 population. This is due in large part to new population forecasts used in Scenario 2 predicting slower growth than the forecasts available at the time the Delphi PBAA was prepared. The difference between Scenario 1 and Scenario 2 grows to 81,212 or 10.4 percent under the Build condition as a result of the lower growth forecasts and different indirect effects assessment methodologies (e.g. the use of gravity model with control totals for Scenario 2). The difference between Scenario 1 and Scenario 2 varies by town, with the Scenario 2 population being larger than Scenario 1 population in only a few cases (e.g.

Dracut, MA). Note that for the study area as whole, the Scenario 2 Build condition population (702,461) is less than the Scenario 1 No Build condition population (743,044).

Table 2-13
2020 Study Area Population, Scenario 1 Compared to Scenario 2

	2020 No Build Population				2020 Build Population			
	Scenario 1	Scenario 2	Difference	Percent Difference	Scenario 1	Scenario 2	Difference	Percent Difference
Allenstown	5,971	5,634	-337	-5.64%	6,472	5,690	-782	-12.08%
Atkinson	8,573	7,307	-1,266	-14.77%	9,757	7,327	-2,430	-24.91%
Auburn	7,133	5,680	-1,453	-20.37%	8,865	5,789	-3,076	-34.70%
Bedford	24,906	23,730	-1,176	-4.72%	27,186	23,946	-3,240	-11.92%
Bow	9,264	9,731	467	5.04%	10,237	9,835	-402	-3.93%
Candia	5,408	4,516	-892	-16.49%	6,425	4,568	-1,857	-28.90%
Chester	5,623	5,116	-507	-9.02%	6,369	5,217	-1,152	-18.09%
Concord	48,253	47,626	-627	-1.30%	50,997	47,860	-3,137	-6.15%
Danville	5,584	5,057	-527	-9.44%	6,085	5,058	-1,027	-16.88%
Deerfield	5,543	4,744	-799	-14.41%	5,989	4,778	-1,211	-20.22%
Derry	44,706	37,960	-6,746	-15.09%	47,672	38,978	-8,694	-18.24%
Dracut, MA	34,018	36,347	2,329	6.85%	34,676	36,319	1,643	4.74%
Dunbarton	2,765	2,881	116	4.20%	3,061	2,899	-162	-5.29%
Goffstown	21,394	20,104	-1,290	-6.03%	23,328	20,256	-3,072	-13.17%
Hampstead	12,520	9,770	-2,750	-21.96%	13,970	9,808	-4,162	-29.79%
Hooksett	15,794	16,159	365	2.31%	17,455	16,360	-1,095	-6.27%
Lawrence, MA	80,501	72,302	-8,199	-10.18%	81,429	72,507	-8,922	-10.96%
Londonderry	33,069	27,683	-5,386	-16.29%	37,250	28,436	-8,814	-23.66%
Manchester	117,672	116,515	-1,157	-0.98%	121,438	117,620	-3,818	-3.14%
Methuen, MA	50,917	46,510	-4,407	-8.66%	52,304	46,694	-5,610	-10.73%
North Andover/Andover, MA	68,841	70,171	1,330	1.93%	70,472	70,469	-3	0.00%
Pelham	16,973	16,822	-151	-0.89%	18,911	16,533	-2,378	-12.57%
Pembroke	8,866	8,332	-534	-6.02%	9,570	8,417	-1,153	-12.05%
Raymond	13,723	11,843	-1,880	-13.70%	14,600	11,836	-2,764	-18.93%
Salem	37,774	32,484	-5,290	-14.00%	39,587	32,774	-6,813	-17.21%
Sandown	7,814	6,573	-1,241	-15.88%	8,174	6,606	-1,568	-19.18%
Tewksbury, MA	34,392	31,785	-2,607	-7.58%	35,100	31,786	-3,314	-9.44%
Windham	15,047	13,892	-1,155	-7.68%	16,294	14,095	-2,199	-13.50%
TOTAL	**743,044**	**697,274**	**-45,770**	**-6.16%**	**783,673**	**702,461**	**-81,212**	**-10.36%**

Table 2-14 compares 2020 employment between Scenario 1 and Scenario 2. The results show substantial variation by town, highlighting the difference in the data sources and projection methodologies. Scenario 2 employment levels are larger than Scenario 1 for a majority of the study area towns, but are smaller than Scenario 1 for some of the towns with large employment (e.g. Methuen and Lawrence). In total, study area employment under Scenario 2 is 17,345 or 4.4 percent less than Scenario 1 under the No Build condition and 35,574 or 8.5 percent less than Scenario 1 under the Build condition. The employment level differences between Scenario 1 and Scenario 2 are due to different data sources, forecasting methodologies, and different indirect effects assessment methodologies (e.g. the use of gravity model with control totals for Scenario 2). Note that for the study area as whole, the Scenario 2 Build condition employment (383,278) is less than the Scenario 1 No Build condition employment (397,325).

Table 2-14
2020 Study Area Employment, Scenario 1 Compared to Scenario 2

	2020 No Build Employment				2020 Build Employment			
	Scenario 1	**Scenario 2**	**Difference**	**Percent Difference**	**Scenario 1**	**Scenario 2**	**Difference**	**Percent Difference**
Allenstown	610	1,624	1,014	166.23%	711	1,641	930	130.80%
Atkinson	673	992	319	47.40%	875	996	121	13.83%
Auburn	825	1,189	364	44.12%	1,047	1,213	166	15.85%
Bedford	19,932	15,819	-4,113	-20.64%	21,300	15,991	-5,309	-24.92%
Bow	4,339	6,870	2,531	58.33%	5,003	6,929	1,926	38.50%
Candia	449	758	309	68.82%	601	768	167	27.79%
Chester	323	450	127	39.32%	400	459	59	14.75%
Concord	59,609	55,681	-3,928	-6.59%	61,052	55,990	-5,062	-8.29%
Danville	319	173	-146	-45.77%	340	173	-167	-49.12%
Deerfield	321	605	284	88.47%	383	610	227	59.27%
Derry	9,009	10,460	1,451	16.11%	9,876	10,825	949	9.61%
Dracut, MA	9,268	5,519	-3,749	-40.45%	9,651	5,507	-4,144	-42.94%
Dunbarton	214	410	196	91.59%	284	412	128	45.07%
Goffstown	4,523	4,959	436	9.64%	4,913	4,998	85	1.73%
Hampstead	1,870	2,976	1,106	59.14%	2,041	2,988	947	46.40%
Hooksett	8,555	8,521	-34	-0.40%	9,497	8,614	-883	-9.30%
Lawrence, MA	38,332	25,953	-12,379	-32.29%	39,583	26,067	-13,516	-34.15%
Londonderry	11,700	13,855	2,155	18.42%	12,583	14,268	1,685	13.39%
Manchester	82,182	82,547	365	0.44%	87,883	83,487	-4,396	-5.00%
Methuen, MA	41,691	17,271	-24,420	-58.57%	43,355	17,383	-25,972	-59.91%
North Andover/Andover, MA	59,109	63,274	4,165	7.05%	61,349	63,526	2,177	3.55%
Pelham	2,800	2,207	-593	-21.18%	3,165	2,159	-1,006	-31.79%
Pembroke	2,941	2,746	-195	-6.63%	3,095	2,775	-320	-10.34%
Raymond	3,313	3,968	655	19.77%	3,464	3,970	506	14.61%
Salem	17,864	28,882	11,018	61.68%	19,008	29,203	10,195	53.64%
Sandown	209	176	-33	-15.79%	251	177	-74	-29.48%
Tewksbury, MA	14,359	19,219	4,860	33.85%	14,696	19,224	4,528	30.81%
Windham	1,986	2,876	890	44.81%	2,446	2,925	479	19.58%
TOTAL	**397,325**	**379,980**	**-17,345**	**-4.37%**	**418,852**	**383,278**	**-35,574**	**-8.49%**

Table 2-15 compares residential land conversion between Scenario 1 and Scenario 2 from 2005 to 2020. No Build condition residential land conversion in the study area under Scenario 2 is 15,748 acres or 33.7 percent less than under Scenario 1. Build condition residential land conversion under Scenario 2 is 33,233 acres or 50.3 percent less than under Scenario 1.

Build condition employment land conversion under Scenario 2 is between 893 and 1,641 acres less than Scenario 1, depending on density, see Table 2-16.

Table 2-15
2005 to 2020 Residential Land Conversion, Scenario 1 Compared to Scenario 2

	2005 to 2020 No Build Residential Land Conversion				2005 to 2020 Build Residential Land Conversion			
	Scenario 1	Scenario 2	Difference	Percent Difference	Scenario 1	Scenario 2	Difference	Percent Difference
Allenstown	472	303	-170	-35.89%	724	331	-393	-54.31%
Atkinson	1,286	476	-810	-62.95%	2,043	489	-1,554	-76.06%
Auburn	1,441	371	-1,071	-74.28%	2,718	451	-2,267	-83.41%
Bedford	2,871	2,061	-810	-28.21%	4,441	2,209	-2,232	-50.25%
Bow	1,521	2,008	487	32.01%	2,536	2,117	-419	-16.53%
Candia	1,412	442	-970	-68.72%	2,518	498	-2,019	-80.22%
Chester	788	391	-397	-50.40%	1,373	470	-903	-65.75%
Concord	801	718	-83	-10.39%	1,165	749	-417	-35.75%
Danville	684	354	-330	-48.26%	997	354	-643	-64.47%
Deerfield	1,318	489	-828	-62.86%	1,780	525	-1,256	-70.53%
Derry	3,334	1,096	-2,238	-67.12%	4,318	1,434	-2,884	-66.79%
Dracut, MA	1,864	2,725	860	46.15%	2,108	2,715	607	28.80%
Dunbarton	481	709	228	47.54%	1,063	744	-319	-30.00%
Goffstown	1,142	731	-410	-35.93%	1,757	780	-977	-55.61%
Hampstead	1,445	420	-1,024	-70.91%	1,985	434	-1,550	-78.12%
Hooksett	2,230	2,549	319	14.29%	3,681	2,725	-956	-25.98%
Lawrence, MA	612	88	-524	-85.57%	671	101	-570	-84.89%
Londonderry	2,566	920	-1,646	-64.15%	3,844	1,150	-2,694	-70.08%
Manchester	1,256	1,067	-189	-15.01%	1,869	1,247	-622	-33.28%
Methuen, MA	2,784	912	-1,871	-67.22%	3,373	991	-2,382	-70.63%
North Andover/Andover, MA	4,121	4,732	611	14.83%	4,871	4,869	-1	-0.03%
Pelham	3,714	3,589	-125	-3.36%	5,318	3,350	-1,968	-37.01%
Pembroke	1,081	700	-381	-35.27%	1,583	760	-823	-51.98%
Raymond	1,038	405	-633	-60.96%	1,334	403	-931	-69.78%
Salem	1,710	555	-1,155	-67.53%	2,106	619	-1,488	-70.63%
Sandown	1,953	718	-1,235	-63.22%	2,312	751	-1,560	-67.50%
Tewksbury, MA	1,840	930	-910	-49.45%	2,087	930	-1,157	-55.42%
Windham	955	511	-444	-46.54%	1,435	589	-846	-58.97%
TOTAL	**46,720**	**30,972**	**-15,748**	**-33.71%**	**66,009**	**32,786**	**-33,223**	**-50.33%**

Table 2-16
2005 to 2020 Employment Land Conversion, Scenario 1 Compared to Scenario 2

	2005 to 2020 No Build Employment Land Conversion						2005 to 2020 Build Employment Land Conversion					
	Low Density			High Density			Low Density			High Density		
	Scenario 1	Scenario 2	Difference	Scenario 1	Scenario 2	Difference	Scenario 1	Scenario 2	Difference	Scenario 1	Scenario 2	Difference
Allenstown	0.0	32	32	0	20	20	0	33	33	0	20	20
Atkinson	0.0	1	1	0	0	0	0	1	1	0	1	1
Auburn	0.0	0	0	0	0	0	0	0	0	0	0	0
Bedford	248.7	83	-166	137	46	-91	304	90	-214	167	49	-118
Bow	50.4	152	102	28	85	57	77	155	78	43	86	43
Candia	0.0	1	1	0	1	1	0	2	2	0	1	1
Chester	0.0	0	0	0	0	0	0	0	0	0	0	0
Concord	768.6	610	-158	424	337	-87	827	623	-204	456	344	-113
Danville	4.7	0	-5	3	0	-3	6	0	-6	3	0	-3
Deerfield	0.0	4	4	0	3	3	0	4	4	0	3	3
Derry	34.0	93	59	19	51	33	69	107	38	38	60	21
Dracut, MA	166.4	16	-150	91	9	-83	182	15	-166	100	8	-91
Dunbarton	0.0	7	7	0	4	4	2	7	6	1	4	3
Goffstown	33.7	51	17	19	29	10	49	53	3	27	29	2
Hampstead	0.0	31	31	0	17	17	0	32	32	0	17	17
Hooksett	22.4	21	-1	12	12	-1	60	25	-36	33	14	-20
Lawrence, MA	650.5	152	-498	359	84	-275	701	157	-544	387	87	-300
Londonderry	0.0	14	14	0	8	8	0	31	31	0	17	17
Manchester	636.6	651	15	351	359	8	866	689	-177	478	380	-98
Methuen, MA	1045.8	60	-985	577	33	-544	1,113	65	-1,048	614	36	-578
North Andover/Andover, MA	427.3	558	131	303	396	93	498	566	68	353	402	48
Pelham	28.4	5	-24	16	3	-13	43	3	-40	24	2	-23
Pembroke	40.6	33	-8	22	18	-4	47	34	-13	26	19	-7
Raymond	11.5	38	26	6	21	14	18	38	20	10	21	11
Salem	0.0	321	321	0	177	177	0	334	334	0	184	184
Sandown	0.0	0	0	0	0	0	0	0	0	0	0	0
Tewksbury, MA	0.0	157	157	0	87	87	0	157	157	0	87	87

	2005 to 2020 No Build Employment Land Conversion						2005 to 2020 Build Employment Land Conversion					
	Low Density			High Density			Low Density			High Density		
	Scenario 1	Scenario 2	Difference	Scenario 1	Scenario 2	Difference	Scenario 1	Scenario 2	Difference	Scenario 1	Scenario 2	Difference
Windham	0.0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	**4,169**	**3,092**	**-1,077**	**2,369**	**1,798**	**-571**	**4,861**	**3,220**	**-1,641**	**2,762**	**1,869**	**-893**

2.4.5 Mitigation/Enhancement

This section provides a detailed description of the Community Technical Assistance Program (CTAP), a $3.5 million project enhancement intended to help I-93 corridor municipalities effectively manage growth. The organizational structure of CTAP has evolved over the first two years in response to needs recognized during the strategic planning and initial implementation phases. The CTAP network structure is designed to support three types of activities, which include:

- Visioning and the Development of Goals and Objectives
- Policy and Program Development
- Implementation and Evaluation

The Antioch New England Institute (ANEI) at Antioch University New England worked under contract with NHDOT to support the initial CTAP development process. Primary responsibilities included facilitating the initial strategic planning process; organizing and facilitating the work of four theme working groups in creating the multi-year work plans; providing support to the Management Team and Steering Committee organizing community forums and training conferences preparing written resource materials; and completing the initial program evaluation. ANEI also served as one of the primary conduits of information at municipal and corridor related events.

The CTAP Management Team, comprised of the NHDOT Project Manager and representatives from OEP and NHDES, is responsible for overseeing the day-to-day operation of CTAP. Additional responsibilities include the dissemination of information, the identification of leveraging and partnership opportunities, and the general management for implementing CTAP Programs.

The CTAP community, which is comprised of approximately 80 representatives from the three constituency groups identified below, created a program vision in December 2005. Programs initiated by CTAP have been designed to achieve goals covering four general themes and ten sub-themes. CTAP includes the 26 municipalities that would be both directly and indirectly affected by the 2005 Selected Alternative. Massachusetts study area municipalities identified in the 2004 FEIS have not been included, but three additional New Hampshire municipalities not included in the 2004 FEIS Indirect Effects analysis have been included in CTAP (Litchfield, Hudson and Freemont). Committees representing the three constituent groups having representatives in the CTAP Community are as follows:

- *Local Government Committee*. Each of the 26 communities has a representative and an alternate appointed by the governing board. Representatives and alternates may be any individual that represents the interests of a specific community and does not need to serve on a local board.
- *Non-Governmental Organization Committee*. The committee is comprised of 16 representative organizations and serves to represent all NGOs within the I-93 corridor.
- *Agency Committee.* The committee represents regional, state, and federal agencies and includes all four Regional Planning Commissions in the I-93 corridor (Southern, Central, Rockingham, and Nashua). State agencies include but are not limited to the NHDOT, the NH Department of Fish & Game, NHOEP and NHDES. Federal Agencies include FHWA and the US Environmental Protection Agency, New England Region.

Committee members are notified of all CTAP events, and it is expected that representative members from each attend the CTAP Community meetings held 3 to 4 times per year. The four Regional Planning Commissions in the CTAP Corridor are under contract to implement the CTAP Year One and

Phase Two Programs. Scopes of work and work plans are approved by the CTAP Steering Committee. They are responsible for responding to local community needs relating to CTAP activities and enhancing communications with local boards in their community.

At the end of the strategic planning sessions that took place over four meetings from December 2005 to March 2006, the CTAP community elected a CTAP Steering Committee. The CTAP Steering Committee is a 13 member body which guides the policy and program development of CTAP. This committee is made up 7 community representatives (elected annually by the 26 community representatives) and 6 agency representatives. The Committee was charged with the responsibility of further defining and implementing New Hampshire's allocated funding for CTAP.

The Steering Committee then created four working groups to address specific goals and themes that have been identified through the CTAP process to date. The creation of smaller groups allows the work effort to be more focused in the development of an action plan. These groups meet separately from the larger Steering Committee and meet on a fairly regular basis. In the spring of 2006, the Steering Committee formed four working groups to address the four major areas of program interest:

- Community Infrastructure: (1) Funding and Delivering Municipal Services; (2) Regional Cooperation; (3) Housing; and (4) Transportation;
- Environmental Protection, Land Use, and Open Space: (1) Environmental Protection and Land Use; and (2) Open Space Protection;
- Downtown/Village Centers and Community Vitality: (1) Downtown and Village Centers; and (2) Community Vitality; and
- Local Economy: (1) Economic Vitality and Business Development; and (2) Agriculture and Working Rural Landscapes.

Year One

Each group was responsible for setting priorities within their theme area. Over the summer of 2006, each of the working groups met twice to develop recommended activities for Year One. On September 14, 2006, the Steering Committee met to review the recommendations made by the summer working groups and unanimously selected and approved the 12 programs to be established for Year One CTAP. The CTAP Year One budget of $1,023,000 was allocated as follows:

- Public Awareness - $35,000
- Training (Education for Local Officials and Constituency Groups) - $53,000
- Direct Technical Assistance - $520,000
- Technical Assistance (Tools, Models and Resource Assistance) - $355,000
- Regional Cooperative Initiatives & Pilot Programs - $60,000

The status of each initiative, as reported in the *Mid-Year Status Report of Year One Programs* completed in December 2007, for each of the twelve Year One programs are discussed below. The full report can be found on the CTAP website, http://www.nhctap.com/.

External Communications Plan. The goal of this program is to develop and implement a communication approach for CTAP identifying effective strategies for conveying key messages to specific audiences, which include the general public, planning professionals, and local decision-makers

and board members. This project also includes initial implementation of the developed plan. The plan must address certain points, such as general smart growth fundamentals. Other topics have been specifically identified by the summer 2006 working groups, including priorities set by the communications committee. The implementation phase of this program will extend for the duration of CTAP. The Year One allocation of funds was $35,000.

Local Government Cluster Workshops. The goal of this program is to provide tailored training to local governments in specific areas identified by the summer 2006 working groups. The summer working groups determined that different training methods are necessary to sufficiently improve the working knowledge of local government officials. Additional objectives of this program are to build social capital and to encourage regional cooperation. Workshops are comprised of 3 to 4 towns with representatives from all local government boards. There are approximately two workshops per cluster for a total of fourteen workshops. Workshop topics are selected based on interests and needs expressed by the communities during the CTAP strategic planning process, by the 2006 summer work groups, and the cluster workshop participants. This program may be continued in Phase Two. The total allotted budget was $28,000.

Conservation Commission Institute. The goal of the Conservation Commission Institute is to provide ongoing education and training support to conservation commissions in the 26 CTAP municipalities. The Institutes consisted of a year-long, on-going, regional training series directed towards conservation commissions. This program may rollover from year to year and is expected to serve as the foundation for Regional Conservation Roundtables, which was identified as a Phase Two priority. There are four evening meetings slated quarterly throughout the year. Cost of the program includes development of each training meeting and printed material. The total allotted budget was $25,000.

Local Government Discretionary Accounts. The discretionary accounts are designed to provide support to towns that are not covered under the other Year One Programs. These funds will be managed by the RPCs, and will provide guidance to towns, as necessary, in deciding how funds may be spent. RPCs either provide the services to communities or contract the request to appropriate vendors. The funds may be spent on a wide variety of items consistent with the CTAP directive goals. The funds in the account rollover and do not have to spent in the first year. Municipalities can receive up to $15,000, and the total allotted budget was $390,000.

Connecting Transportation Planning and Land Use. This program develops a plan to integrate transportation and land-use planning. Specific topics were identified by the summer 2006 working groups. This program is initiated and run by the Regional Planning Commissions. The allotted budget for this program was $20,000.

Local Open Space Planning. This program will assist towns in developing or updating local open space plans using a consistent approach and making use of new data and analysis. Specifically, the program will assist planning board and conservation commissions to prepare or update local open space plans that incorporate new information. This program also will encourage the integration of Open Space Plans into Master Plans. Although the goal is to provide this activity to all CTAP towns over the next two to three years, the first year budget assumes that about one-third of the towns in the region will begin this effort in Year One. This program will continue in the successive years until all communities are completed. The total allotted budget for this program was $100,000.

Economic Strategic Planning Inventories. The goal of this program is to provide baseline data need to 1) formulate a strategic plan for a sustainable regional economy and 2) develop strategic regional economic marketing. This project seeks to inventory working farms, farm products, and regional economic development plans. This program also identifies and inventories local and regional economic development corporations. The total allotted budget for this part of the ongoing program was $10,000.

Enhanced GIS-Based Information. The long term goal of this program is to improve or enhance the base level of GIS capabilities for all communities. In Year One, this program created an updated land use GIS data layer based on 2005 aerial photography. This data layer is key input to other CTAP programs. The data will also be used for other local and regional planning efforts, including local master plans, transportation studies and corridor plans, and open space plans. The allotted budget was $130,000.

*Community Planning Assessments***.** The goal of this program is to collect baseline information to help communities determine where they are on the planning curve. The results of these analyses help communities determine how they will progress in the CTAP program. Specific assessment areas identified were identified by the summer 2006 working groups. The allotted budget was $130,000.

GIS Buildout Analysis and Alternatives. The goal of this program is to provide all communities with build-out alternatives. However, it is recognized that not all towns are ready for this program. The program is based on compatible systems. The regional planning commissions developed the specifications for the program so that eventually build-out analyses may be considered regionally. This program will continue in successive years until all communities are completed. The RPCs helped determine which towns are best suited for this program in Year One. The allotted budget was based $70,000 total for seven towns in the first year.

Natural Services Network and Open Space Protection Research. The goal of this program is to build upon and leverage the work already being spearheaded by The Jordan Institute by supporting the completion of the Natural Services Network (NSN), which identifies important ecological services such as water supply lands, agricultural soils, wildlife habitat and flood storage lands. The program researches zoning, regulatory, and voluntary techniques to promote the protection of the NSN. The total allotted budget was $25,000.

*Regional Grant Writing Assistance***.** This program provides professional grant writing assistance to all CTAP communities. The program provides up to fifty hours of professional grant writer service to each community. Communities may use this service to prepare proposals for non CTAP grants that support the overall CTAP directive and goals identified through the CTAP strategic planning process. This program also develops a database for CTAP related and available grants. The total allotted budget was $60,000.

While not part of the Year One project list, Community Grants Awards which are allocated through CTAP Local Discretionary Funds are similar to the Regional Grant Writing Assistance program. Municipalities can receive grants of up to $15,000 for projects that are compatible with CTAP goals in the areas of technical assistance in land use and transportation planning. RPCs are permitted to assist towns in grant writing and project prioritization. Projects can be managed by individual municipalities or their respective RPCs. At this time, fifteen municipalities have received funding for specified projects. Discretionary funds have been approved for the following study area municipalities:

- Derry plans to develop an economic plan for downtown;
- Londonderry is looking to create a targeted area plan; and
- Windham will conduct an impact fee studies for community facilities such as police, fire, and recreation.

Regional and Cooperative Initiatives & Pilot Programs: The goal of this program is to foster the capacity of communities to work collaboratively and on a regional or sub-regional scale. An additional objective of this program is to provide communities an opportunity to access additional CTAP funds in order to address specific growth related needs not covered by other CTAP Programs. All applications must be submitted through a local government and must represent a partnership between two or more local governments. Additional partners are encouraged to participate including NGO's, state agencies, and private sector organizations. Grant request can be made for up to $25,000 with the condition that not all funds will necessarily be distributed. All projects must represent original ideas and funds will not be allowed to duplicate existing work already underway. This program was not funded for Year One.

Year Two

In May 2007, the working groups convened to set priorities for the Phase Two programs. The co-chairs of each Working Group presented the goals and action steps for their theme at the May 31, 2007 Community Meeting. Each participant at that meeting was then invited to indicate his or her top priorities among the steps laid out for each working group. The CTAP Steering Committee turned participants' top priorities into nine new programs for Phase Two. The programs address the goals related to public awareness, educating local officials, direct technical assistance, and assistance with tools and analysis. The $950,000 budget is allocated as follows:

- Public Awareness - $70,000
- Training (Education for Local Officials and Constituency Groups) - $100,000
- Direct Technical Assistance - $645,000
- Technical Assistance (Tools, Models and Resource Assistance) - $135,000

Below is a summary of the Phase Two Programs as reported in the June 2008 CTAP *Guide for Community Driven Regional Land Use and Transportation Planning*:

External Communications Plan Implementation. The goal of this program is to implement an effective communication approach for CTAP and CTAP messages. This project builds upon the Year One program under which a targeted external communication plan will be prepared. The External Communications Plan will target decision-makers and key influences and focus on motivating desirable behaviors to achieve CTAP goals. The proposed budget for implementing the External Communications Plan is $70,000.

Innovative Local Government Training. This program will provide an annual CTAP conference and a focused training program for local government officials. The focused training program targets specific outcomes and action steps related to the CTAP goal areas. This training will use new and innovative methods to reach a broader audience and increase the effectiveness of the training. Approaches such as innovative delivery methods, discussion boards, post training support, customized one-on-one training, and peer-to-peer training will be considered. Topic will be selected based on the needs identified by the Community Assessments (Conducted during Year One), interests and needs expressed by communities during the CTAP strategic planning process, the educational needs identified by the Theme Working Groups, and input from training participants. The proposed budget is $100,000.

Targeted Local Government Accounts. This program is similar to the Year One Local Discretionary Account Program. It will provide each community with $10,000 of semi-discretionary funding to fund projects in keeping with CTAP goals and objectives. These additional funds will be available for a limited set of activities, which is expected to include the following: (1) implementation of an innovative land use technique, (2) implementation of a recommendation from the Community Assessment (conducted under Year One), (3) other priorities related to the CTAP goal areas as approved by the Steering Committee. These funds do not affect the funds distributed in the Year One Local Discretionary Account Program, although they may be used together with these funds and the Local CTAP Collaborative Grants. The proposed budget is $100,000.

Local CTAP Collaborative Grants. This program aims to focus CTAP funding on intercommunity collaboration. To achieve this goal, this program makes available an additional $10,000 per community to be used for projects conducted collaboratively with at least one other town. Collaborative projects may address any topic related to the CTAP goal areas. There is no cap to the total number of towns that may collaborate on a proposal and each town in the collaboration is eligible for up to $10,000 of funding to put towards the collaborative project. These funds do not affect the funds distributed in the Phase-One Local Discretionary Account Program, although they may be used together with these funds and the Targeted Local Government Accounts. All funds will roll over. The proposed budget is $10,000 per town for a total of $260,000.

Local Open Space & Conservation Planning. This Phase Two program will build upon the Year One program that is being completed as a collaborative effort with the Society for the Protection of New Hampshire's Forests (SPNHF). Through the collaboration with SPNHF, open space assessments for each of the 26 CTAP communities have been completed in Year One. Phase Two will assist towns in developing or updating local open space plans using a consistent approach and making use of new data and analysis. The propose budget for this program is $100,000.

Assistance in Support of Agricultural Resources. The focus of this program will be on encouraging the formation of Agricultural Commissions as the vehicle to manage, protect, and promote the interests of farming and agricultural resources. New legislation allows for the establishment of these commissions in New Hampshire and their mission is closely aligned with the agricultural priorities identified by CTAP representatives. Forming a partnership with the NH Coalition for Sustaining Agriculture (an informal network of farmers, agricultural organizations and other groups committed to sustaining agriculture in New Hampshire) this program would empower communities that want to work on specific agricultural issues. The Coalition recently prepared a handbook that describes how to create these commissions and defines their role in supporting agriculture. As an organization, the Coalition members are committed to educating communities on this opportunity. Using CTAP funds to support the Coalition's efforts and to assist communities with implementation efforts through a small grant program are key elements to this program. The proposed budget is $25,000.

Enhanced GIS-based Information. This program will take the next step in enhancing GIS-based information in the CTAP corridor and supplements an effort already underway by UNH Complex Systems Research Center and New Hampshire Audubon. The Phase Two program will focus specifically on updating the conservation lands data layer. It ensures an updated data layer in GRANIT. The proposed budget is $10,000.

Inclusionary Zoning Implementation. The goal of this program is to provide assistance to communities in implementing inclusionary zoning ordinances that would allow for more affordable housing. The propose budget is $30,000.

GIS Build-out Analysis and Alternatives. This will be a continuation of the Year One program, providing additional funds to complete a GIS-based build-out analysis (with a base case scenario and 2 alternatives) for all communities within the CTAP Corridor. The regional planning commissions have developed the specifications for conducting the build-out analyses, which will support a regional evaluation of alternative build-out scenarios. In addition to the individual community analyses, a summary report of the build-out analyses for the entire CTAP region will be prepared. The proposed cost for completing the remaining communities in Phase Two and preparing a summary report is $95,000.

It is the hope that CTAP will become a self-sustaining organization that will continue to provide communities with the necessary tools and resources to continue responsible and effective growth. As of summer 2008, approximately 16 Committee meetings have been held.
On March 27, 2008, ANEI facilitated a process to help the Steering Committee define their future role in the coming phases of CTAP. Through this process, the Steering Committee voted on what should be the leadership roles of the Committee. They also considered what the Committee members were willing to take on in their future roles. The following were identified as the future primary roles for the Steering Committee:

- Coordinate with and encourage the management team, RPC's, and contractors to complete the program plan on time, on budget, and successfully.
- Host/convene multi-town boards of selectmen/council, planning, zoning, and conservation commissions, and facilitate/mediate multi-town cooperative projects.
- Develop a clear, concise statement about CTAP objectives and sponsor a periodic column in local newspaper(s). It is anticipated that these results will help frame the responsibilities of the Steering Committee for the coming phases of CTAP.

Bringing CTAP growth planning assistance into each of the 26 communities will be the next organizational challenge. CTAP has developed a roadmap to a better community, which involves the following steps:

1. Assessment – To be used by communities to determine where they are and where their current planning and zoning will take them in the future. This step involves community planning assessments, economic asset profiles, community build-out analysis, open space assessment and land use mapping.
2. Visioning/Planning – Communities can use assessment information to work toward achieving an envisioned future through transportation & land use integration planning, open space planning, a high-priority natural resource protection plan, community build-out alternatives, workshops and participating in a Conservation Commission Institute.
3. Implementation – Taking the assessments and plans that have been developed and turning them into actions that move the community towards its ultimate vision through a Conservation Commission Institute, discretionary funding and grant writing assistance.

2.5 Conclusions

Under Scenario 2, the 2005 Selected Alternative will enhance accessibility near I-93, incrementally shifting population and employment from other areas of the model region to the study area communities. However, the Scenario 2 population and employment allocations suggest substantially lower levels of growth and land development in the study area for 2020 (and even for 2030) than estimated for Scenario 1 or in the 2004 FEIS. These lower levels of growth reduce the potential magnitude of land use change related environmental impacts. Impacts of future growth will be determined to a large extent by local land use regulations.

3.0 INDIRECT TRAFFIC IMPACTS

The results of the updated traffic analyses conducted for the SEIS are described in the Traffic Written Reevaluation/Technical Report, including the effect of the Delphi PBAA population and employment on secondary roads. The traffic analyses fully incorporate the indirect land use effects of the 2005 Selected Alternative by using the Scenario 1 and Scenario 2 Build and No Build population and employment estimates as inputs in the New Hampshire Statewide Model. The Traffic Technical Report also describes the methods and results of the 2004 FEIS traffic analyses, 2005 existing conditions, changes in Build and No Build traffic conditions, and mitigation.

4.0 INDIRECT AIR QUALITY IMPACTS

4.1 Analysis Methods and Results from the 2004 FEIS

The 2004 FEIS stated that the impacts associated with potential secondary growth for air quality, such as industrial sources, and future residential and commercial growth cannot be reasonably estimated because of the uncertainty of the size, type, and location of such future development. The 2004 FEIS also noted that expected land use, traffic growth, and transportation projects are typically considered in future emission estimates for the New Hampshire State Implementation Plan and conformity determinations.

4.2 2008 Update Evaluations and Conclusion

In response to the court order, the Scenario 1 and Scenario 2 traffic analyses have been conducted to explicitly account for the indirect land use effects of the 2005 Selected Alternative. The traffic analysis results are used as inputs to the air quality analyses; therefore the microscale and regional air quality analysis results described in the Air Quality Written Reevaluation/Technical Report reflect the indirect land use effects of the 2005 Selected Alternative on mobile source emissions.

The Air Quality Technical Report does not evaluate stationary source emissions. The specific form and location of future industrial, residential and commercial growth cannot be reasonably estimated because of the uncertainty of the size, type, and location of such future development. For example, while future employment estimates are available, it is not possible to determine the specific types of businesses involved at the level of detail needed to estimate emissions. Even within general employment categories (e.g. industrial), there is a substantial amount of variation in emissions depending on the specific processes involved.

5.0 INDIRECT NOISE IMPACTS

5.1 Analysis Methods and Results from the 2004 FEIS

The 2004 FEIS stated that noise impacts associated with induced growth cannot be reasonably estimated because the mix of commercial/industrial development as well as its exact location cannot be reasonably estimated. Similarly, noise associated with additional traffic is equally difficult to predict.

5.2 2008 Update Evaluations and Conclusion

In response to the court order, the Scenario 1 and Scenario 2 traffic analyses have been conducted to explicitly account for the indirect land use effects of the 2005 Selected Alternative. The traffic analysis results are used as inputs to the noise analyses; therefore the screening analysis results described in the Chapter 6: Noise reflect the indirect land use effects of the 2005 Selected Alternative on mobile source noise. New stationary noise sources associated with development will be regulated under local noise ordinances. The conclusions of the 2004 FEIS with respect to stationary source noise have not changed.

6.0 INDIRECT WATER RESOURCES IMPACTS

6.1 Analysis Methods and Results from the 2004 FEIS

6.1.1 Surface Water

The 2004 FEIS stated that the potential effects of secondary development on water quality are difficult to assess because so much depends on when, where, and in which watersheds the secondary development will occur. The 2004 FEIS noted that the proposed stormwater treatment practices could reduce pollutant loadings below existing levels and that this would provide a buffer against possible future increases in pollutant contributions from other sources including secondary development.

The 2004 FEIS qualitatively evaluated the potential for increases in chloride concentrations in streams associated with additional septic systems, water softening treatment, and road salt applications. The 2004 FEIS concluded that given the more stringent state and local regulations adopted in the last decade or two associated with storm water management, septic system design and natural resource protection (i.e., wetland delineation, buffer setbacks, etc.) and with the use of Best Management Practices (BMPs), present and future development would be expected to produce smaller incremental changes in water quality than previous development.

6.1.2 Groundwater

The 2004 FEIS stated that any potential impacts on water quality in stratified-drift aquifers caused by additional growth associated with the project are likely to be minimal relative to that associated with the existing development and the future development that will have occurred by the time the project is completed. The 2004 FEIS described the areas of intense existing development over transmissive stratified-drift aquifer areas and concluded that the potential effects of the existing development and related pollutant sources are likely to far outweigh any potential effects associated with the secondary development caused by the proposed project.

With respect to water quantity, the 2004 FEIS noted that both the Manchester and Salem water supplies rely on surface water, not groundwater. The Town of Salem is investigating the use of groundwater as an additional water source because demand is approaching supply limits. The 2004 FEIS concluded that the potential secondary growth associated with widening I-93 may help to perpetuate the need for this additional water supply source, but is not likely to adversely affect the quality or recharge aspects associated with this bedrock aquifer since the area under consideration is already protected as part of the Salem Town Forest.

6.1.3 Floodplains

The 2004 FEIS stated that the estimates of land conversion due to both residential and business growth do not provide a meaningful way to also estimate future impacts on floodplains. Floodplains are localized on the landscape because they primarily lie along flowing waters. In addition, construction in floodplains is currently regulated at the community level per FEMA rules. The 2004 FEIS assumed that there would be minimal involvement of floodplains with any future growth and that any impacts would be required to be appropriately mitigated. Involvement of floodplains with any future growth would also be regulated by existing Federal, State and local laws and ordinances.

6.2 Record of Decision Commitments/Mitigation

The funding commitments to CTAP and the NHDES Drinking Water Supply Land Grant Program described in Section 2.3 enhance the protection of surface water, groundwater, and floodplains from development pressures.

6.3 2008 Update Evaluations and Conclusion

Under Scenario 1, up to 19,981 acres (19,289 acres residential plus 692 acres employment-related) of additional development over the No Build could occur in the study area between 2005 and 2020. Under Scenario 2, up to 3,873 acres (3,633 acres residential plus 240 acres employment-related) of additional development over the No Build could occur in the study area between 2005 and 2030. The potential indirect effects on water resources associated with future development in the study area under Scenario 2 would be substantially smaller than under Scenario 1 or than those estimated in the 2004 FEIS. Only a portion of the land conversion would represent impervious surface cover. This additional development would increase stormwater runoff; however more stringent regulatory requirements and BMPs now in place are expected to reduce the incremental impact of future development on water resources in comparison to past development (e.g. Env-Wq 1500 Alteration of Terrain, among other regulations). The conclusion of the 2004 FEIS regarding indirect effects on water resources remain valid: the potential indirect land use changes associated with the 2005 Selected Alternative are unlikely to result in substantial changes in non-point source pollutant loadings.

7.0 INDIRECT WETLAND RESOURCES IMPACTS

7.1 Analysis Methods and Results from the 2004 FEIS

The 2004 FEIS evaluated potential indirect effects on wetlands using two methodologies. First, for communities where developable land estimates were available, these estimates were used to determine whether there was sufficient space to accommodate future growth, with the assumption that the developable land indentified in planning documents had already taken into account protection of sensitive resources. Developable land information was available for all of the Massachusetts towns, but for only six of the New Hampshire towns. For the Massachusetts communities, it was concluded that growth would occur as "infill" within already developed are appropriately zoned areas, and hence important natural resources would be protected. Five of the New Hampshire towns had sufficient developable land to grow without affecting sensitive resources. Based on this, the 2004 FEIS concluded that 7,000 acres or 35 percent of the total 20,100 acres of additional development could occur with little or no impact on wetlands.

For the remaining approximately 13,100 acres of land that is potentially vulnerable, a worst-case scenario was calculated for possible indirect wetland impacts. The estimates were based on literature regarding the proportion of the landscape typically covered by wetlands. The impact estimates ranged from 1,310 acres to 2,253 acres. However, the 2004 FEIS noted that these estimates ignore the regulatory protection afforded wetlands under state statutes, town ordinances, and the Clean Water Act. The 2004 FEIS noted that approved permits between 1997 and 2002 authorized about 550 acres of wetland impacts in New Hampshire. Offsetting this loss was the creation of approximately 160 wetland acres and the preservation of another 3,600 acres of wetland and upland. The 2004 FEIS concluded that there would be some wetland loss with or without the project as a result of future development, but this loss would be partially offset by compensatory mitigation requirements.

7.2 Record of Decision Commitments/Mitigation

In addition to the extensive wetland creation and land preservation proposed as part of the mitigation package, the funding commitments to CTAP and the NHDES Drinking Water Supply Land Grant Program described in Section 2.3 enhance the protection of wetland resources from development pressures.

7.3 2008 Update Evaluations and Conclusion

For Scenario 2, the analysis results indicate indirect land development impacts substantially smaller than those estimated for Scenario 1 or in the 2004 FEIS. Therefore, potential effects on wetland resources associated with future development in the study area under Scenario 2 would be substantially smaller than in the 2004 FEIS (e.g. smaller area of land conversion and potential wetland conversion). The conclusions of the 2004 FEIS regarding indirect effects on wetland resources remain valid. In particular, while some incremental impacts are expected, these impacts will be at least partially offset by compensatory mitigation requirements.

8.0 INDIRECT WILDLIFE RESOURCES IMPACTS

8.1 Analysis Methods and Results from the 2004 FEIS

The 2004 FEIS analyzed the potential for indirect wildlife habitat impacts using the same methodology described in Section 7.1 for wetlands. The 2004 FEIS concluded that up to 11,000 to 12,000 acres of upland habitat could possibly be affected, in addition to the 1,300 to 2,300 acres of wetland habitat. The 2004 FEIS noted the high level of uncertainty associated with these estimates and that they are strongly influenced by locally controlled land use regulations and policies. With respect to habitat fragmentation, the 2004 FEIS stated that without site-specific information as to where induced development will take place, it is not possible to provide any substantive elaboration on the on the extent or significance of habitat fragmentation.

8.2 Record of Decision Commitments/Mitigation

In addition to the extensive wetland creation and land preservation proposed as part of the mitigation package, the funding commitments to CTAP and the NHDES Drinking Water Supply Land Grant Program described in Section 2.3 enhance the protection of wildlife resources from development pressures.

8.3 2008 Update Evaluations and Conclusion

For Scenario 2, the analysis results indicate indirect land development impacts substantially smaller than those estimated for Scenario 1 or in the 2004 FEIS. Therefore, potential effects on wildlife resources associated with future development in the study area under Scenario 2 would be substantially smaller than in the 2004 FEIS (e.g. smaller area of land conversion and potential habitat conversion). The conclusions of the 2004 FEIS regarding indirect effects on wildlife resources remain valid.

9.0 INDIRECT CULTURAL RESOURCES IMPACTS

Specific indirect effects on cultural resources resulting from land use change cannot be reasonably estimated because of the uncertainty associated with the size, type, and location of such future development in relation to cultural resources. For example, increases in development activity under the Build Alternative may include sites of archaeological importance that could be affected by increases in land consumption and development activity in those locations. However, the specific location of the potential future development and as yet undiscovered archaeological resources are not known. Any incremental effect would be small in comparison to development pressures and land disturbance anticipated under the No Build Alternative. Due to a smaller area of land consumption, the potential indirect effects on cultural resources would be expected to be smaller under Scenario 2 than under Scenario 1.

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